

Senate Standing Committee on Foreign Affairs Defence and Trade

Additional Estimates – 3 March 2016

ANSWER TO QUESTION ON NOTICE

Department of Defence

Topic: Macroeconomics Report - Studies

Question reference number: 12

Senator: Xenophon

Type of question: asked on Thursday, 3 March 2016, Hansard page 10

Date set by the committee for the return of answer: 22 April 2016

Question:

Senator XENOPHON: I know. One of the inputs to the Macroeconomics study was as per the statement of work at 2.2C: 'copies of a range of economic impact studies for individual capital equipment projects which were commissioned by the department in recent years and cover a number of regional locations as industry areas'. Can you provide the committee with those studies given that they do not appear to be subject to any claims of cabinet in confidence?

Dr Bourke: I believe so. I might take it on notice, but at this stage I would not see any problem with that.

Senator XENOPHON: If you could. I do have some other questions, but I am not sure whether any of my colleagues have questions.

Answer:

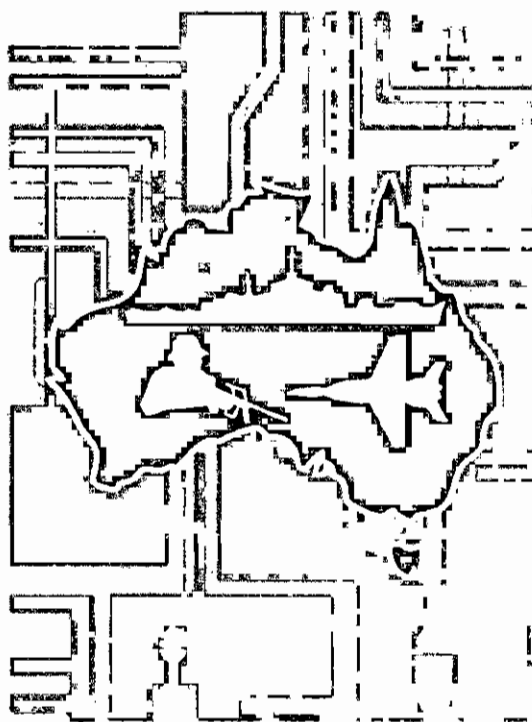
Defence has identified and made available the following economic impact studies which are neither Commercial-in-Confidence nor Cabinet-in-Confidence and were commissioned in whole or in part by the Department since the completion of the preliminary analysis by Macroeconomics noted in the Question on Notice.

All the documents have previously been released publicly by Defence. However, the Department does not necessarily endorse the findings of the documents and cautions that the documents may not reflect the outcome of analysis currently being undertaken into the economic impact of the Future Submarine Program SEA 1000.

Some of the documents are lengthy and not available by web link. Therefore, the documents will be provided in electronic form:

- The Allen Consulting Group Pty Ltd, *Defence and Australian Industry: Description and Economic Analysis*, Canberra, November 1992.
- Tasman Asia Pacific, *Impact of Major Projects: A Case Study of the ANZAC Ship Project - Final Report*, Canberra, February 2000.
- Tasman Asia Pacific, *Impact of Major Projects: A Case Study of the Coastal Minehunter Coastal Project*, Canberra, January 2002.
- SGS Economics and Planning, *The Economic Contributions of Five Defence Air Bases - Final Report*, June 2008.
- SGS Economics and Planning, *The Economic Contributions of Three Queensland Defence Precincts - Final Report*, July 2010.
- KPMG, *Economic Report into the Major Defence Bases in the Northern Territory*, Canberra, September 2010.
- KPMG, *Economic Contribution of the Naval Bases in Sydney*, Canberra, 31 January 2011.

Defence and Australian Industry: Description and Economic Analysis



The Allen Consulting Group
Pty Ltd

November 1992

FOREWORD

The Department of Defence engaged The Allen Consulting Group to provide a description and economic analysis of Australian defence industry.

This paper contributed to a study of Defence's policy for Australian industry, the results of which are set out in the report "DEFENCE POLICY AND INDUSTRY" dated November 1992.

The views expressed in this paper are those of the authoring group and are not necessarily those of the Government or the Department of Defence.

19 November 1992

**REPORT TO THE
DEPARTMENT OF DEFENCE**

**Defence
&
Australian
Industry**

**Description and
Economic Analysis**

**The Allen Consulting Group Pty Ltd
October 1992**

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EXECUTIVE SUMMARY

The Allen Consulting Group (ACG) was commissioned by the Department of Defence to "provide a report containing a descriptive analysis of business units involved in defence production and services in Australia and an assessment of the dimensions of the Australian arms market and economy". The consultants were also asked to conduct a formal survey of companies providing goods and services to Defence. The full terms of reference are at Appendix A.

The time frame for the Report was constrained to an eight week period, with major components limited to a four week period. For this reason and because the terms of reference specified a wide range of activities to be carried out, the Report does not deal with individual industry sectors at a level of detail required for many specific policy purposes.

Essentially, the Report provides an overview or "road map" of defence industry and the links between Defence and the wider economy. It serves to highlight key issues for Defence in managing its relations with suppliers and fostering industry development in the pursuit of Defence objectives.

This Report

This report is based on:

- a wide range of interviews with relevant political, Defence and industry leaders;
- an informal telephone survey of around 100 defence industry companies;
- a formal survey of 58 companies across a range of sectors (see separate Survey report); and
- research and analysis by the consultants.

It is organised into five parts:

1. *Defence Industry: What it Means*
2. *Structure of Defence Industry*
3. *The International (and Australian) Arms Market*
4. *Defence and the Wider Economy*
5. *Defence Industry Development and the Role of Defence*

Part One

Defence Industry: What it Means

Part One notes that to a significant extent, the appropriate meaning to be attached to the term "defence industry" depends on the context. The Statistician separately records a defence industry in the Australian National Accounts, taking "production" of defence (national security) to be about equal to the total Defence budget. This is the appropriate measure if one is interested in the total national effort devoted to Australia's defence.

This Report, however, is primarily concerned with defence related capabilities within Australian industry, for which the National Accounting concept of the defence industry is not helpful. Accordingly, that definition is not adopted in this Report.

The widest concept of defence industry adopted here is one that embraces all industry activity involved in the supply of goods and services to Defence. We term this concept the "extended definition".

This concept is relevant to assessing the broad economic impact of Defence procurement. In times of major conflict this would also be relevant as a guide to the scope of the overall industrial capacity which would be required to support Australia's defence effort. However, since it includes a wide range of minor suppliers of readily available items, it is not particularly meaningful for Defence strategic and industry policy purposes.

The "core definition" of defence industry adopted here is one that makes two further refinements. It is based around industrial capabilities which are strategically important in the context of Australia's overall defence posture. It includes those industrial activities which are driven by Defence demand rather than the demand from other sectors.

The preferred definition of defence industry, therefore, is as follows:

Defence industry is that part of Australian industry providing goods and services or capabilities which are strategically important to Defence.

On this basis, defence industry in Australia comprises about 0.6% of GDP and involves important capabilities in five major industrial sectors – information technology, electronics and communications; shipbuilding and repair; aerospace; ordnance; and vehicles.

Part Two

Defence Industry Business Units

Part Two describes the size, structure and capability of defence industry in five major industrial sectors.

The information technology, electronics and communications sector supplies around \$1bn per annum currently to Defence. Defence makes proportionately small demands on the information technology sector which is made up of firms providing goods and services to Defence as an extension of civilian computer market activities. Defence draws heavily on and indeed shapes the defence related electronics and communications sector. Around a dozen Australian based companies have achieved some defence related systems integration capability.

The defence related electronics and communications sector is particularly important as it develops medium and long term technologies to meet Australia's particular needs. Significant industry policy issues arise since Defence has continuing, close working relationships with many different companies developing specialised technologies.

The shipbuilding sector is dominated by Defence requirements. AMECON and the Australian Submarine Corporation (ASC) comprise around 60% of industry turnover. Much of this expenditure is on defence specific systems rather than traditional shipbuilding. The sustainability of the large capacity which has been developed through these projects is now a critical issue for the industry.

Two companies dominate the aerospace sector – Hawker de Havilland and ASTA. Both depend significantly on Defence, but have diversified their activities and are seeking to build sustainable, commercially based businesses.

The ordnance sector is dominated by Australian Defence Industries, which is 100% Government owned.

Defence represents only a relatively small component of total demand for general transport equipment, but places major demands on relatively few producers of specialised vehicles. Defence is a significant buyer for particular companies in other sectors but it plays little role in shaping these sectors.

Part Three

The International (and Australian) Arms Market

Australia's defence expenditure puts us 17th of the top 20 nations. The US and USSR, prior to the formation of the CIS, together accounted for over 60% of world defence spending. Australia's position is broadly comparable with our standing in GDP per capita terms.

Official figures recording Australia's defence exports are not readily obtainable but preliminary findings suggest exports of defence and related goods (ie armaments and military use only items) and dual use technologies totalled around \$A280m in fiscal year 1990-91 or around 1.3% of world trade in those items.

Australia's largest defence dependent manufacturer is Australian Defence Industries (ADI). Its 1990-91 turnover of \$A446m (\$US343m) places it outside the world's top 100 producers yet its high defence dependence is matched by only 5 of the top 100 companies, 4 of whom are shipbuilders.

The international market in conventional arms¹ has been contracting since the mid to late 1980s, reversing a long period of expansion since the end of WWII.

The easing of cold war tensions is shifting the focus of regional arms trade and product type. Expenditure is expected to fall in NATO countries and former Eastern bloc nations while some growth is expected in the ASEAN region.

The general tightening of fiscal conditions and the resulting requirement for more efficient use of resources suggests that suppliers capable of enhancing performance through "intelligent" control systems for weapons platforms and their armaments will gain an increasing share of the arms market. Platform lives will tend to be extended by periodic refits.

¹ The term "arms" is taken to mean armaments and supporting supplies and technology. Conventional means non-nuclear.

Part Four

Defence Spending and the Wider Economy

Government purchases (including Defence purchases from the defence industries), stimulate GDP in the short run, but have a broadly neutral effect on GDP in the long run, as different industry sectors compete for a limited national supply of labour. From a long run perspective, an assessment of the desirability of any particular government consumption purchase is likely to depend chiefly on whether its subjectively estimated national benefit is greater or less than its value used in calculating GDP under standard national accounting conventions, namely its cost.

Input-output analysis is a tool which can be used to analyse the economic effects of government purchases, including Defence purchases. Long run results show the effects on the industrial structure, while short run results also show effects on the aggregate level of economic activity. These results can be obtained using the most recent ABS input-output table - for 1986-87 - as a database.

After allowing for import leakages, an across-the-board increase in Defence purchases from defence industries of \$100 million is estimated to raise GDP by \$65 million in the short run. In the long run, when a national labour supply constraint is factored in, there is little effect on GDP, as expected. The five defence industries and other sectors feeding off them - such as the transport sector and the finance and property sector - still expand, but other sectors more distantly related to Defence purchases tend to contract slightly as labour is drawn away.

In the short run, the defence industry delivering the largest boost in national employment from an additional \$100 million of Defence purchases is shipbuilding where employment increases by \$41 million. Relative to other defence industries, it has a low import content and is labour-intensive. By way of contrast, an additional \$100 million of purchases of electronic equipment raises employment by only \$13 million because of high import content and capital-intensive production.

In the long run, additional expenditure of \$100 million on any of the five defence industries has a broadly neutral effect on GDP, as expected. The worst results are from increased spending on shipbuilding, where GDP falls slightly, by \$19 million. The national capital stock declines slightly as a result of shipbuilding drawing labour away from capital-intensive industries. These small long run effects on GDP underline the conclusion that the critical issue in evaluating specific Defence purchases - and government purchases more generally - is likely to be

whether the subjectively estimated national benefit is greater or less than the financial cost.

Part 5

Defence Industry Development and the Defence Role

The first Chapter of Part Five examines the prospects for the development of the Australian defence industry and the role of Defence in this development. The relationship between Defence and its suppliers is then discussed, leading to recommendations about monitoring and management steps which would assist Defence to establish more advantageous relationships with its suppliers and to foster industry development serving its objectives.

Available information shows that companies in the aerospace and electronics and communications sectors account for nearly all defence related exports.

The electronics and communications sector is the centre of most Australian defence related research and development. Many of these companies have a strong interest in links to Defence through the DSTO. Australia's level of funding for Defence research and development is significant though below that of countries such as the USA, France, UK, Germany and Sweden, the homes of the world's most significant arms manufacturers.

Prospects for the significant expansion of the Australian defence industry appear modest but can be strengthened. Defence's potential role in the development of each sector is different in important details (see Figure 11.14 for a detailed discussion of the prospects for each industry sector and key roles for Defence).

Two important issues stood out in discussions with companies about their view of the appropriate role for Defence. Companies considered that tender processes needed to be improved and costs reduced. They were also strongly concerned with increasing collaboration and information flow in Defence planning.

The issues raised by companies and other results of the study suggest Defence would benefit from introducing improved supplier management approaches. The risk of close commercial relationships between Defence and its suppliers becoming "cosy" and fostering inefficiency can be reduced by a range of management strategies such as benchmarking, periodic competitive retendering and transparent processes.

The consultants were asked to advise on regular monitoring activities by Defence. Before such monitoring activities can be properly focused, some organisational and management changes are needed, including improved knowledge of supplier management best practice and refocusing organisation attention on supplier management.

As an initial step, Defence should undertake a study of best practice supplier management in industry. The most important regular monitoring activity should be an annual survey of key suppliers (see Figure 13.7 for a detailed summary of monitoring and management issues).

Key Message

The main message from this report, then, is that Defence should know its suppliers and manage its relationship with them better. Not only will this serve Defence objectives, but as shown by both private sector and public sector models (eg telecommunications), it will also be strongly conducive to the development of the Australian industries concerned. These are industries which display many of the characteristics, such as use of advanced technology and skills, which must be emphasised in Australian industry development over the 1990s.

TERMS OF REFERENCE

1. The Department of Defence is seeking assistance from a consultant in a study of Defence industry policy and processes.
2. In particular, the consultant is to provide a report containing a descriptive analysis of business units involved in defence production and services in Australia and an assessment of the dimensions of the Australian arms market and economy. The consultant should amongst other things:
 - (1) examine the term 'defence industry' taking into account the nature of defence production and services, the procurement cycle and Australia's geo-strategic circumstances;
 - (2) describe the business units (size, structure, industry, level of R&D, international links) involved in Defence production in Australia;
 - (3) conduct a simple input-output assessment of the linkages between Defence and Australian industry and exports;
 - (4) analyse the current nature, structure and conduct of the Australian arms market and its future direction;
 - (5) assess the dimensions of the Australian arms economy and advise on the availability and accessibility (internal and external to Defence) of information sources for conducting such an assessment regularly.
3. Depending on the results of this analysis, and following discussion with the Department, the consultant is likely to be asked to:
 - (1) conduct a formal survey of a small group of companies providing goods and services to Defence to assess:
 - their reliance on Australian defence contracts;
 - their current and prospective markets for commercial and/or export business and the synergies between these markets and their Defence business;
 - their levels of R&D, access to other Australian R&D (including DSTO) and/or reliance on overseas R&D;
 - their impressions of the appropriate role of Defence policy for industry;
 - their views on impediments to expanding their markets, including exports (eg. in the areas of technology transfer, R&D, access to capital).
 - (2) Identify trends in international arms market which will impact on business units in Australia involved in Defence production.

PART ONE

Defence Industry: What It Means

"Defence industry is that part of
Australian industry providing
goods and services or capabilities
which are strategically important
to Defence"

Part One Defence Industry

Summary of Main Points

- ❑ *To a significant extent, the appropriate meaning to be attached to the term "defence industry" depends on the context.*
- ❑ *The Statistician separately records a defence industry in the Australian National Accounts, taking "production" of defence (national security) to be about equal to the total Defence budget. This is an appropriate measure if one is interested in the total national effort devoted to Australia's defence.*
- ❑ *This Report, however, is primarily concerned with defence related capabilities within Australian industry, for which the National Accounting concept of the defence industry is not helpful. Accordingly, that definition is not adopted in this Report.*
- ❑ *The widest concept of defence industry adopted here is one that embraces all industry activity involved in the supply of goods and services to Defence. We term this concept the "extended definition".*
 - *This concept is relevant to assessing the broad economic impact of Defence procurement.*
 - *In times of major conflict this would also be relevant as a guide to the scope of the overall industrial capacity which would be required to support Australia's defence effort.*
 - *However, since it includes a wide range of minor suppliers of readily available items, it is not particularly meaningful for Defence strategic and industry policy purposes.*
- ❑ *The "core definition" of defence industry adopted here is one that makes two further refinements:*
 - *It is based around industrial capabilities which are strategically important in the context of Australia's overall defence posture.*
 - *It includes those industrial activities which are driven by Defence demand rather than the demand from other sectors.*
- ❑ *On this basis, defence industry in Australia comprises about 0.6% of GDP and involves important capabilities in five major industrial sectors – information technology, electronics and communications; shipbuilding and repair; aerospace; ordnance; and vehicles.*

1. Defence and Its Industry

Usual concepts of what is an "industry" cannot be simply applied to define a "defence industry". The first steps in defining a defence industry need to be based on an appreciation of how Defence interacts with its supplier companies.

1.1 The Conventional Statistical Concept

The definition of an industry is usually based on the Australian Standard Industrial Classification (ASIC) which provides the foundation for many of the Statistician's economic statistical series. ASIC defined industries such as the "coal industry" or "health industry" convey the concept of reasonably definable goods or services being produced by producers making up the industry for sale or lease to a range of customers. The Statistician does, in fact, identify a "defence" industry category, recording total "production" of \$7,011.1 million in 1986-87.¹

The ASIC concept of defence industry, however, has only the most limited relevance for purposes of this study. That is because in the ASIC classification the defence industry is taken to be the Department of Defence (DoD) and the Australian Defence Forces (ADF). Conceptually, the "product" is assumed to be provision of a certain level of national security or defence preparedness. Annual production is effectively assumed to equal the total annual Defence budget.

As noted, that concept of defence industry seems a long way from the focus of this study. We can begin to see this in the following diagram.

Figure 1.1

1991-92 Defence Production		
Total 1991-92 production \$9.8bn		
Wages and salaries \$4.2bn	Locally sourced goods and services \$4.3bn	Imports \$1.3bn

Source: Defence Budget Brief 1991-92

The ABS concept of "defence industry" identifies the Defence establishment as the producer of "national security"

¹ The latest year for which Input-Output statistics are available. See Australian National Accounts 1986-87: Input Output Tables, ABS Catalogue Number 5209.0. Figure 1.1 uses 1991-92 Defence budget estimates.

Total defence production (ie Defence spending) as recorded by the Statistician comprises three broad components:

- the wage and related costs of maintaining DoD and ADF;
- imports of goods and services for Defence purposes; and
- locally sourced goods and services used by Defence.

All three categories are critical to Australia's capacity to defend itself. The skills and experience embodied in DoD and ADF are vital to that capacity. Imports have traditionally been and remain an important source of defence equipment. And, of course, the ability of local industry to supply a wide range of goods and services to our Defence establishment is also critical.

1.2 Defence Industry - Basic Concept

This study is interested in the term "defence industry" as a measure of the ability of local industry to supply needed goods and services to Defence. This involves a departure from the traditional concept of an industry, as can be seen in Figure 1.2.

Figure 1.2

Defence Industry and Traditional Industry Concepts

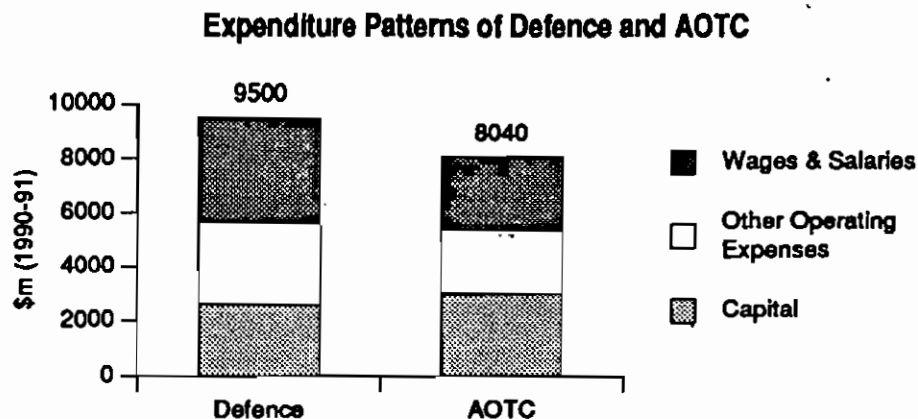
Industry	Definition
eg Coal	Business units supplying relatively homogenous product (coal) to multiple customers in Australia and overseas
Defence	Business units supplying a wide range of non-homogenous goods to Defence and exporting military products

The traditional way of thinking about an industry is not applicable to defence

The unifying characteristic of defence industry in Australia becomes the particular requirements of a large, leading edge purchaser. There is some similarity with the telecommunications industry in Australia in the sense that it can be defined as those business units supplying specialist goods and services to AOTC, as well as to other smaller purchasers.

AOTC's annual expenditure (excluding interest and tax) is somewhat lower than that of Defence, but their levels of expenditure on goods and services are similar, as shown in Figure 1.3.

Figure 1.3



Source: Defence Budget Brief 1990-91 (actual expenditure)
AOTC Annual Report 1990-91

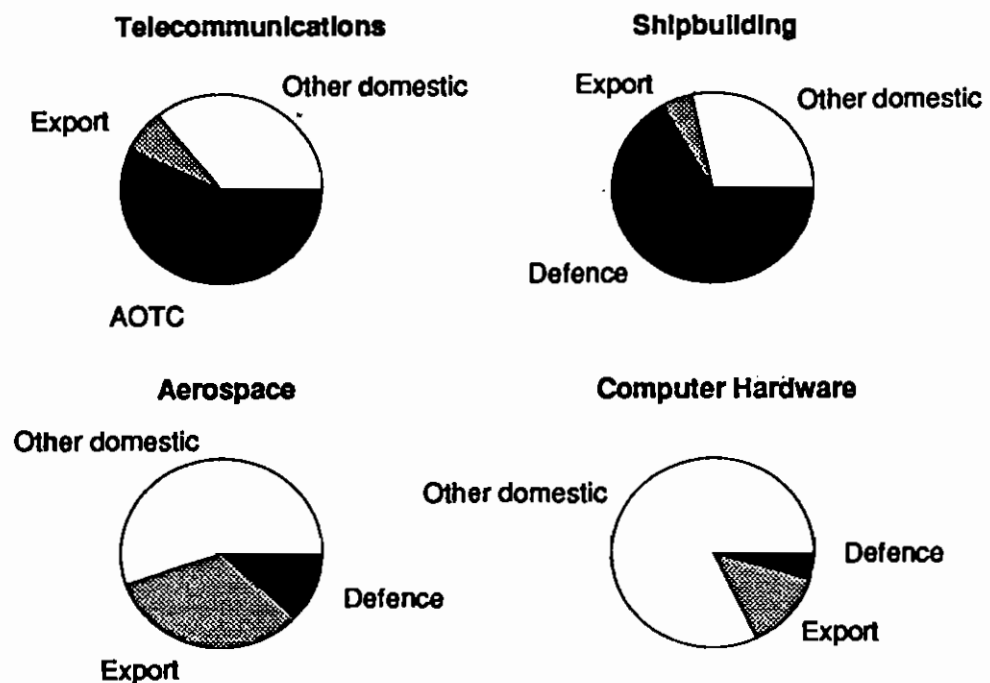
Defence expenditure on goods and services is similar to that of AOTC

There are, however, two essential differences between the two situations. First, AOTC's equipment requirements fit into a relatively homogenous type. Second, and a related point, it is possible to identify in Australia a telecommunications equipment industry in the conventional sense.

Defence, by contrast, buys goods and services from a wide range of companies, in virtually all sectors of the economy. As a result, it does not have the same intense effect in any sector, with the single exception of shipbuilding (see below), though it may dominate the output of individual firms in some sectors.

Figure 1.4

Industry Sales Comparison



Source: ACG estimates (See Part 2)

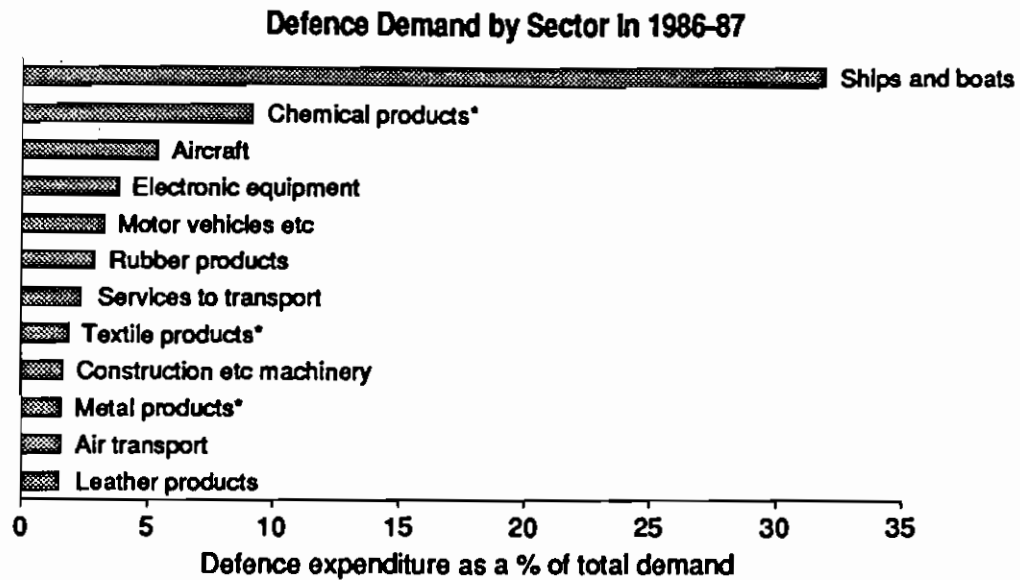
Note: Data displayed on this figure is based on current period estimates and may not correspond to ABS data shown in other figures because of timing differences

Also note that this sales based data does not indicate the inter-relationships of industry eg it does not show the high electronics sector components of shipbuilding and aerospace expenditure

Defence dominates shipbuilding in Australia to the same extent as AOTC dominates telecommunications, but in most other industries it is a small, though perhaps important customer

The 1986-87 input-output data in Figure 1.5 show that, at a 109 industry level, Defence was a dominant purchaser only in the shipbuilding industry. Defence accounted for a measurable percentage of demand in the great majority of the other 108 industry sectors, and more than 1% of demand in 23 industry sectors.

Figure 1.5



* Not elsewhere classified

Source: ABS 5209.0 1986-87

Defence accounts for more than 1% of sector demand in 23 of 109 industry sectors

This very wide purchase spread can also be seen in Figure 1.6 which shows payments to major vendors by industry group in 1990-91.

Analysis of Defence's accounting systems suggests that approximately 3,000 firms or separate businesses were paid more than \$25,000 by Defence in 1990-91 (see Figure 1.7). The continuing implementation of the Commercial Support Program (CSP) is likely to increase further the range of purchases and supplier companies.

Figure 1.6

Payments to Main Vendors 1990-91

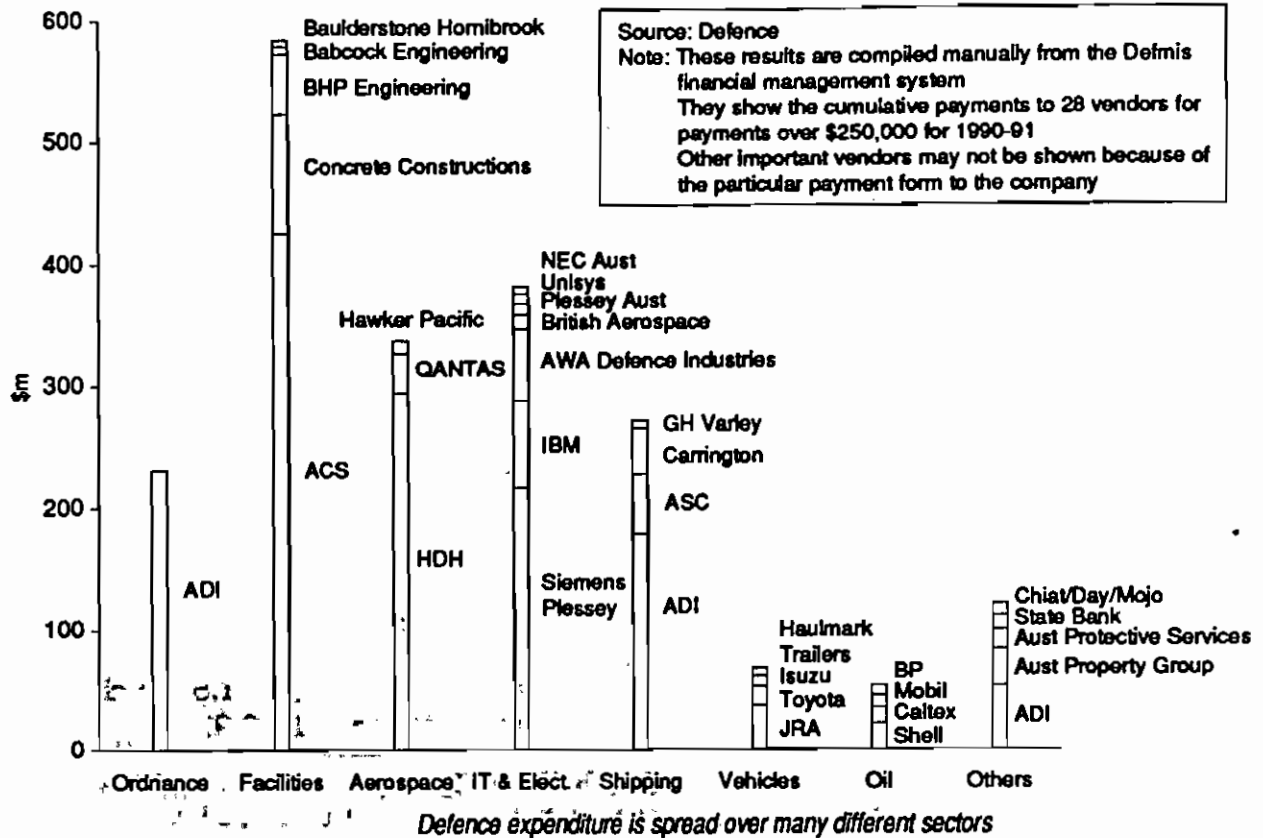
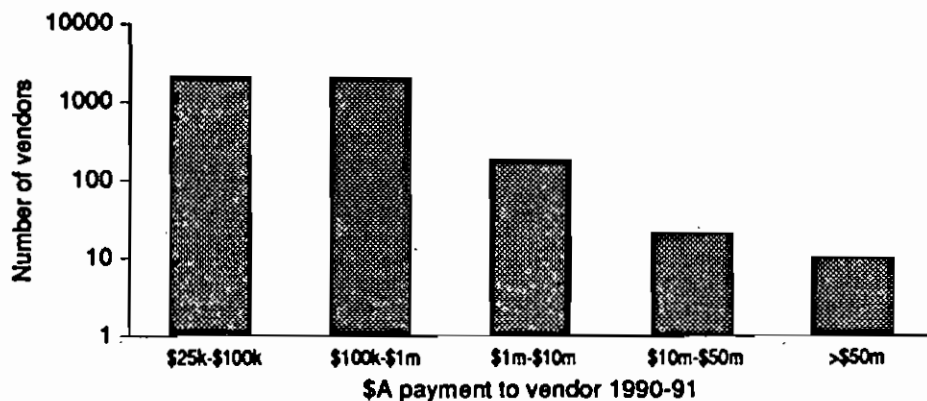


Figure 1.7

Defence Payments to Vendors



Note: Payments are to separate project based vendors: a single company may receive payments for several projects

Source: Defence

Defence deals with a huge number of companies

1.3 Defence Industry – Towards a Definition

The basic concept of defence industry set out above is clear enough even if it differs from the usual statistical concept.² It is that part of Australian industry supplying goods and services to Defence. The question then becomes whether the term should include all or only some of the business units supplying Defence needs.

The data canvassed suggest that including all Defence suppliers would be too far reaching for most purposes. For example, defining defence industry as including *all* economic activity supplying goods and services to Defence would include large and varied expenditures on everyday items such as food, basic office supplies and a wide range of readily available, essentially commercial, goods and services.

It would be useful for some purposes to cast the net as widely as possible – for example, in assessing the overall economic impact of defence spending (see Part 4). However a better targeted model of defence industry is required for Defence industry policy purposes and for purposes of evaluating the appropriate relationship Defence as a major purchaser should seek with its suppliers.

One approach for these purposes would be to apply the United States definition of defence industry as comprising readily identifiable firms and concentrations of activity wholly or largely dependent on defence.³

Following that approach in Australia, however, would confine the industry to a handful of firms, principally the Australian Submarine Corporation (ASC), AMECON, and Australian Defence Industries (ADI), but also some smaller companies such as Telstar Systems Pty Ltd.

Clearly for present purposes the definition should encompass other firms important to Defence, such as Hawker de Havilland, Aerospace Technologies of Australia (ASTA) and a number of others. In short, a concept of the industry is needed which reflects Australia's particular circumstances and lies somewhere between the two extremes.

To develop such a concept, we first need to take account of Australia's broad defence strategic priorities in order to identify industry sectors of particular relevance (Chapter 2), and then provide an operational framework for analysing the various industry capabilities necessary to support those priorities (Chapter 3).

² For that reason the term "defence industry" is to be preferred to "the defence industry".

³ See *Redesigning Defence – Planning the Transition to the Future US Defence Industrial Base*, Office of Technology Assessment, Congress of the United States (Washington, DC: US Government Printing Office, 1991).

2. Defence Objectives

This Chapter briefly canvasses Australia's overall defence priorities and the implications they have for the shape of defence industry in Australia.

2.1 Defence Policy

Australia's defence strategic priorities have been set out in *The Defence of Australia*, 1987.⁴ In summary, the Government's defence policy of self-reliance gives priority to the ability to defend Australia using the base of national resources. This policy does not suggest that Australian industry should have the capability to meet all Defence force materiel, equipment and service requirements in the event of a conflict. Rather, Australia should have the indigenous industrial capacity to meet strategic requirements.

The key Defence planning assumption is that the most likely requirement for Defence military activity takes the form of joint force operations in low level and escalated low level contingencies. The most likely area of operation is the north and north-west of Australia.

Defence strategic assessments suggest that no neighbouring country currently has the capacity or motivation to sustain high level military operations against Australia. Such a military operation would be beyond the scope of all but a few global military forces – a harsh environment, huge distances and long supply lines and the difficulty of capturing major industrial centres are powerful forces militating against such an operation.

This analysis does not preclude the possibility of a more substantial threat to Australia. It assumes, however, that the emergence of such a threat would take some years, allowing sufficient time for the development of Australian military capabilities to meet the new circumstances.

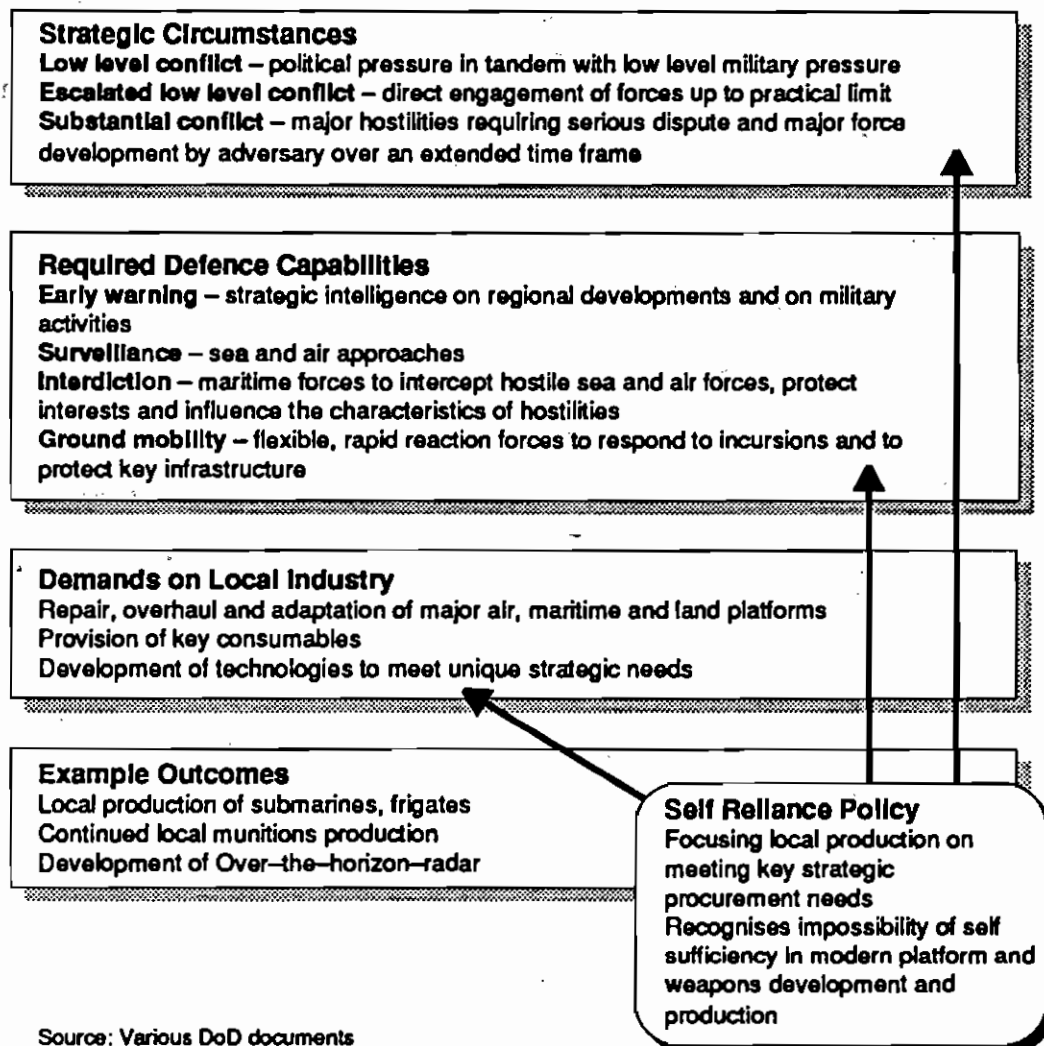
⁴ The Hon K C Beazley MP, *The Defence of Australia*, 1987 (Canberra: AGPS, 1987).

2.2 Implications for Industry

The defence strategy requires a comprehensive array of military capabilities, with both defensive and offensive components. These capabilities include early warning and intelligence of hostile movements, maritime and air based strike and interdiction capabilities and highly mobile land forces. The key relationships and implications for industry are summarised in Figure 2.1.

Figure 2.1-

Broad Industry Implications from Defence Policy Planning



Source: Various DoD documents

Defence related policy for industry follows from strategic defence planning

The policy of self-reliance recognises that local industry cannot realistically supply all ADF needs and broad local industry priorities. The local priorities have been defined in keeping with the overall policy and Australia's circumstances. These are repair, overhaul and adaptation; provision of those consumables which may not be available in time of crisis; and medium and long-term technologies meeting Australia's special defence requirements.

Figure 2.2

Defence Priorities for Developing Local Industry Capabilities

- The repair, overhaul and adaptation of military equipment fundamental to Australia's defence in circumstances to which the Government has given priority, and the provision of munitions, spares and other consumable stores for which we could least rely on overseas supply (including stockpiling and other actions for greater assurance of supply)
- The range of technology and supply and support capabilities (including design, development and manufacture) that meet the longer term needs of the ADF in accord with Government policy and Defence guidance as to an acceptable balance of strategic benefits and costs

Source: The Defence of Australia 1987

2.3 Some Special Considerations

There are also some special characteristics of the defence function and of Defence as a major purchaser which have implications for the shape of supporting industry.

Derived Capability

First, the critical industry support capabilities identified are in part derived capabilities. The strategic requirement to be able to maintain, repair, modify and adapt equipment, regardless of the original source of the equipment means that Australian industry often needs to be (or there are benefits in it being) extensively involved in the design, development and production of particular equipment and technologies. This has become increasingly the case as technology has become more complex.

Specialised Requirements

A significant proportion of Defence purchases are of highly specialised equipment or goods and services which have little if any commercial application. The development of Australian industry capability may in these cases require explicit Defence policies toward industry, which will affect industry structure. Figure 2.3 summarises the main programs which implement the Government's Defence policy for Australian industry.

Figure 2.3

Defence Programs

Program	Features
Commercial Support Program	Promote the transfer of support activities from Defence to industry where this is operationally feasible, cost effective and practicable
Australian Industry Involvement - Local content - Contract specific work - Defence offsets	Maximise level of competitive local content in capital equipment contracts, expanding Australian participation in the supply and through-life support of capital equipment purchased for the ADF
Defence Industry Development Program	Establish generic manufacturing and maintenance capabilities in Australian Industry
Export & International Program	Provide marketing assistance to exporters, including the use of Defence facilities for trials

Source: Doing Australian Defence Business, April 1992

Leading Edge Buyer

Defence requirements mean that Defence may be the only Australian purchaser in specialist areas and that it may need to use leading edge technologies in some areas. It conducts its own research and development through DSTO and has access to the overseas military developments of our allies. It may give technology to local industry in order to develop a strategically important capability, or arrange through contractual obligations for technology to be transferred to a local company by an overseas supplier.

Questions of make versus buy, the need for local assembly and manufacturing capability, and appropriate technologies, are addressed on both strategic and economic grounds. International and internal costs are used as a benchmark, with expandability, connectivity and upgradability as key requirements.

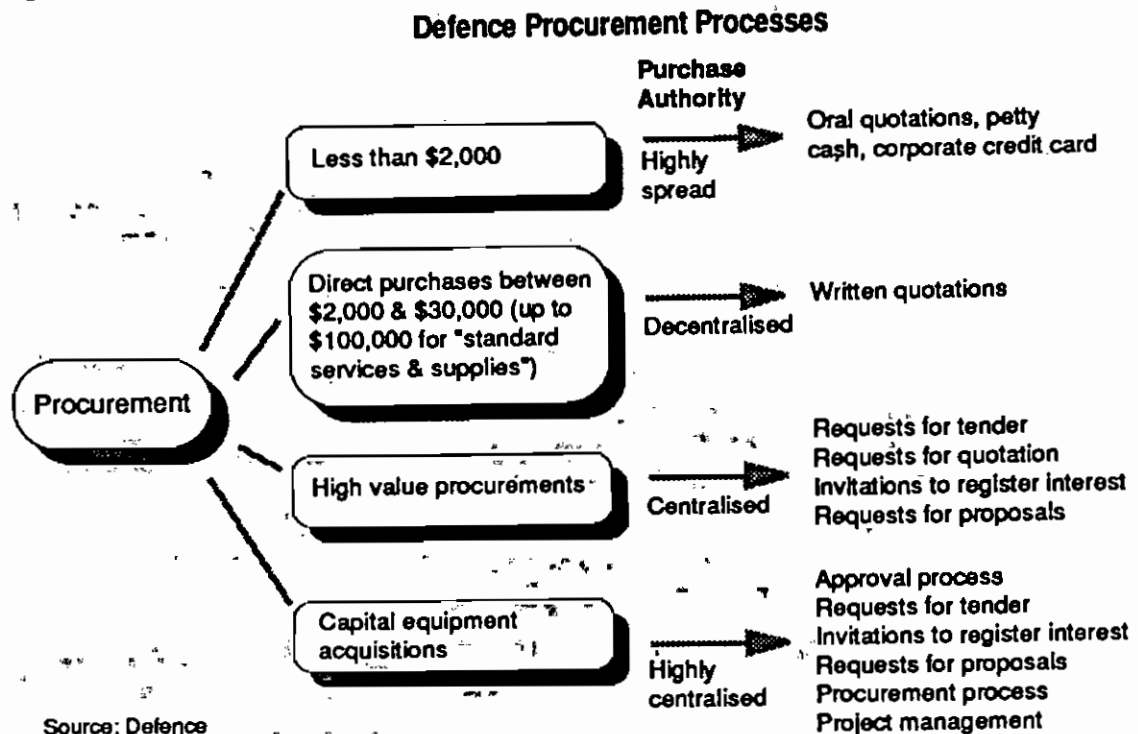
Discontinuity

Defence's specialised purchases particularly, but not only, in the capital equipment area, may be intermittent in nature. The replacement cycle for major weapons platforms such as aircraft or submarines, is approximately 20 years. Historically, this has led to major fluctuations in capacity as local industry expanded during the construction phase and contracted again to meet the lower functional requirements of maintenance and refit work. This has meant that very few businesses in Australia have been able to rely solely on Defence.

Purchasing Policy

Defence purchasing takes place within the overall policy framework established by the government. This framework embraces a wide range of policy aims in areas such as purchasing and industry development. Defence purchasing has evolved procurement structures (see Figure 2.4) to meet its requirements within this overall government framework.

Figure 2.4



Procurement processes are designed to meet Defence's special requirements within an overall government purchasing framework

3. Defence Industry Framework

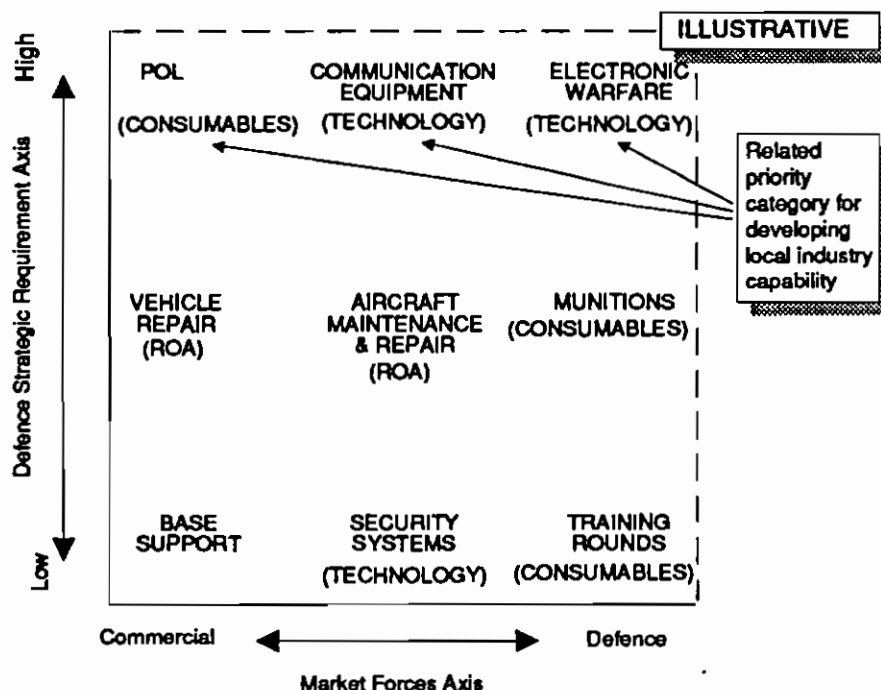
Defence, from its own strategic point of view, is concerned with maintaining and enhancing particular industrial capabilities which will support Australian national security. A framework for classifying industry capabilities in terms of defence strategic needs and related industry characteristics is essential for achieving this goal. For the reasons indicated in the previous chapter, some unique Defence requirements may mean that some relationships between Defence and industry will be different from those normally expected in either the public or private sectors. Any analytical framework needs to be able to deal with this. The strategic importance of capabilities is the key to such a framework.

3.1 Mapping Capabilities

Industry capabilities can be classified according to how strategic the particular requirement is from a defence perspective and the forces which drive the development of the particular capability.

Figure 3.1

Industry Capabilities, Defence Requirements and Market Forces



Capabilities such as base support operations are driven by the commercial market and have limited strategic impact. Electronic warfare capabilities, on the other hand, will be created by Defence

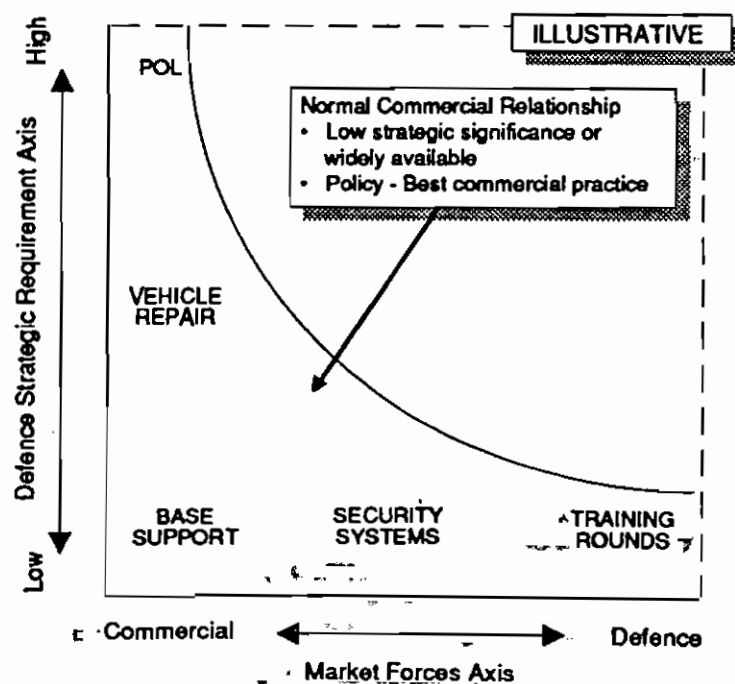
demand and have high priority, falling into the medium and long term technology category of Defence priorities for industry capability development.

The nature of Defence relationships with its suppliers will vary depending on strategic requirements and the forces that drive production. Procurement policy for capabilities that have low strategic significance or are readily available in the commercial market should be based on best commercial practice, involving no special relationship between Defence and its suppliers. This region of the diagram shown in Figure 3.2 has been labelled "Normal Commercial Relationship".

The classification of capabilities into the different categories requires detailed consideration on a case by case basis. Without making such an evaluation and by way of illustration, some capabilities can be identified as most likely to fall into this category of Normal Commercial Relationship. Production of standard rifle ammunition for training would be expected to fall into this category. Although the product is for military use, it has low strategic importance. Standard petroleum and oil products are also most likely to fall into this category. Although petroleum and oil is a vital commodity for sustaining a military campaign, it is nevertheless widely available and its production is driven by commercial, not military, demand.

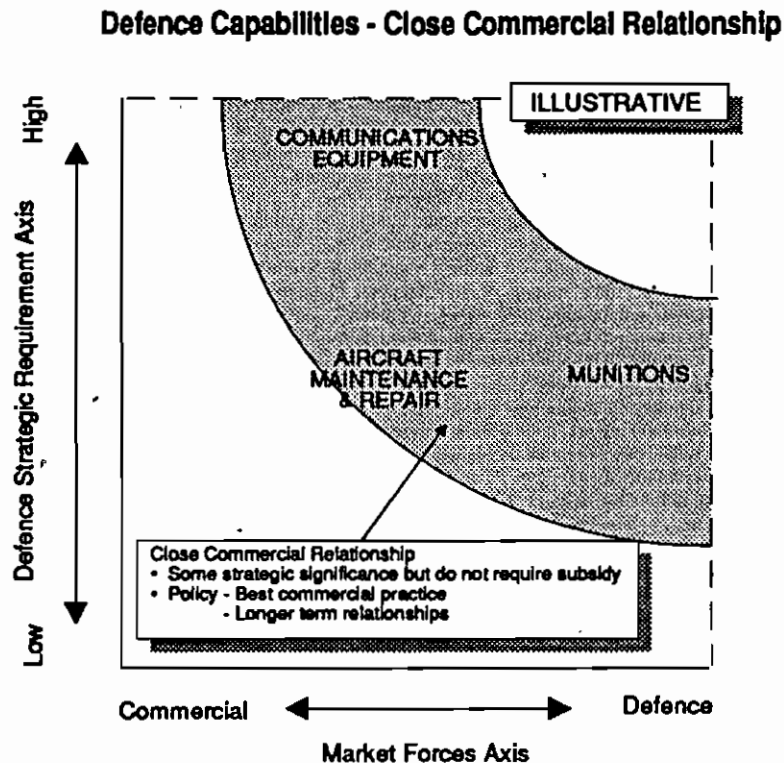
Figure 3.2

Defence Capabilities - Normal Commercial Relationship



"Close Commercial Relationships" may be needed for capabilities that are strategically significant, driven substantially by Defence demand and which can be supplied competitively in Australia. Examples of capabilities that may fall into this category are shown in Figure 3.3.

Figure 3.3



Potential reasons for establishing such relationships, strictly in terms of Defence objectives, are shown in Figure 3.4.

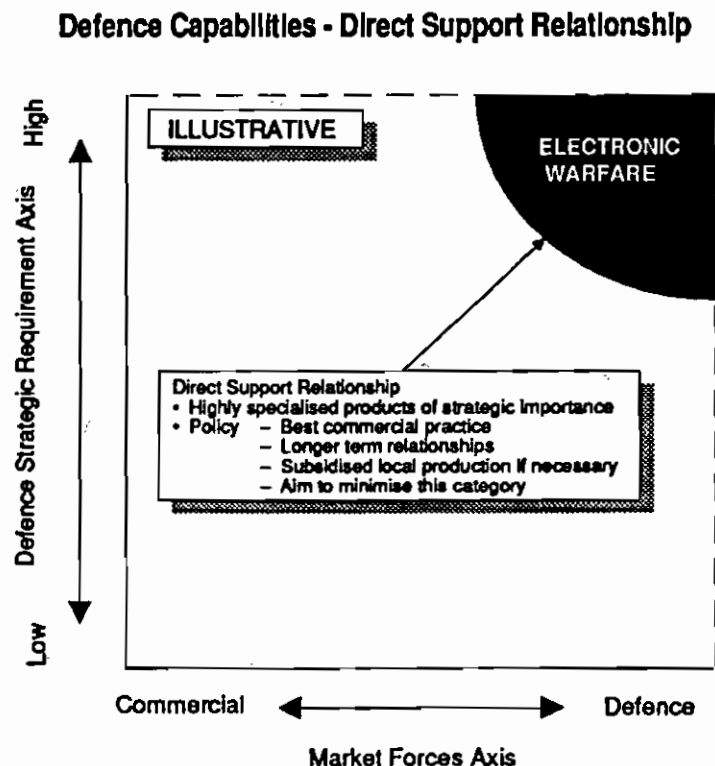
Figure 3.4

Justifications for Close Commercial Relationships

- Inevitability of close commercial relationships in large, complex projects
- Maintenance of strategic capabilities
- Increased Defence knowledge of company and industry capability and particular technology
- Reduced transaction (procurement/management) costs
- Better supplier knowledge of Defence requirements and processes
- Improved supplier learning about particular technologies of importance to Defence
- Increased company investment in processes, personnel and equipment with increased certainty
- Increased potential for development of new technologies meeting Defence's particular needs
- Potential for developing dual use applications, exports and follow-on sales to reduce Defence dependency
- Enhanced company capability to reduce Defence costs

Some capabilities will have high policy significance because they are strategically important and would not be supplied by Australian companies in response to commercial market forces alone; typically their procurement will involve cost premiums. Thus, on the basis of particular strategic considerations, Defence may choose to purchase goods or services in Australia for military (including security) reasons, even though a premium may be required to do so - to offset diseconomies of scale, or possibly other diseconomies of (otherwise) efficient local production. Capabilities in this category may justify a "Direct Support Relationship".

Figure 3.5



An aim of industry policy in this area will be to reduce to the minimum the requirement for a premium to be paid for local capability. Past experience shows clearly that there is a risk in the use of a subsidy (or local preference) of inefficiency and a growing gap relative to international best practice for a comparable activity at a comparable scale. Arrangements with suppliers will need to guard against this.

The aim of reducing cost premiums can also be promoted by assisting suppliers to develop dual use or related commercial products. Alternatively, a particular capability might be removed from the Direct Support category by stockpiling or securing reliable overseas supply arrangements.

Detailed consideration is required to analyse capabilities. For example, electronic warfare, which is used for illustrative purposes here,

comprises many components only some of which relate to high priority capabilities. Supply of a desk top computer used in electronic warfare may fall into the category of Normal Commercial Relationship.

3.2 A Capability Based Industry Definition

This chapter and the previous two have been concerned to "*examine the term 'defence industry' taking into account the nature of defence production and services, the defence procurement cycle and Australia's geo-strategic circumstances*", as requested in the terms of reference.

Taking the three chapters together, one conclusion that can be drawn is that how one defines defence industry depends on one's reason for wishing to do so. The Statistician, for example, identifies a defence industry, the output of which he defines basically as the Defence budget expended by DoD and ADF, who are taken to comprise the industry. While that is a measure of the national defence effort it is of limited practical use beyond that.

We took as our starting point that the interest in defining defence industry for the purposes of this study was essentially about defining the capability of Australian industry to support the defence function. That led us to the view that the conventional way of thinking about an industry has to be almost turned on its head to arrive at a meaningful definition in the context of defence in Australia.

The unifying concept has to be the broad requirements of a large, leading edge purchaser, rather than the production of a relatively homogenous group of products for a range of customers.

One could argue that the 3,000+ firms supplying goods and services to Defence each year make up the defence industry. Many of those businesses however have only the most incidental and purely commercial relationship with Defence. This concept of defence industry can be termed the "*extended definition*" and may be useful for some Defence industry policy purposes.

This approach has clear drawbacks for those purposes. The proposition, for example, that a minor supplier of commercial foodstuffs to Defence should be regarded as being in defence industry, is no more useful than the proposition that it should be in the "steel industry" merely because it supplies some food to a BHP cafeteria. Thus, the main use of the extended definition is not in the Defence industry policy context but in assessing the broad economic impact of Defence expenditure on goods and services (see Part 4).

Two steps are required to arrive at a definition of defence industry in Australia which is more meaningful for Defence strategic and industry policy purposes. The first (Chapter 2) is to take account of Australia's defence strategic priorities and other special characteristics of Defence as a major purchaser. The second (this Chapter) is to see the industry

as comprising those activities of moderate to high defence specialisation.

Consideration of these factors leads to the following "*core definition*" of defence industry.

Figure 3.6

Core Definition of Defence Industry

Defence industry is that part of Australian industry providing goods and services or capabilities which are strategically important to Defence

"Strategically important" in this definition is taken broadly to mean capabilities which are in the categories of Close Commercial or Direct Support Relationships. As Figures 3.1 to 3.5 in this chapter highlight, even these refinements do not lead to neat and unequivocal boundaries between what might be thought of as activities comprising defence industry and others. What is regarded as in or out is a matter of judgment by Defence itself, which will vary over time and with changes in technology and strategic priorities.

3.3 Dimensions of Defence Industry

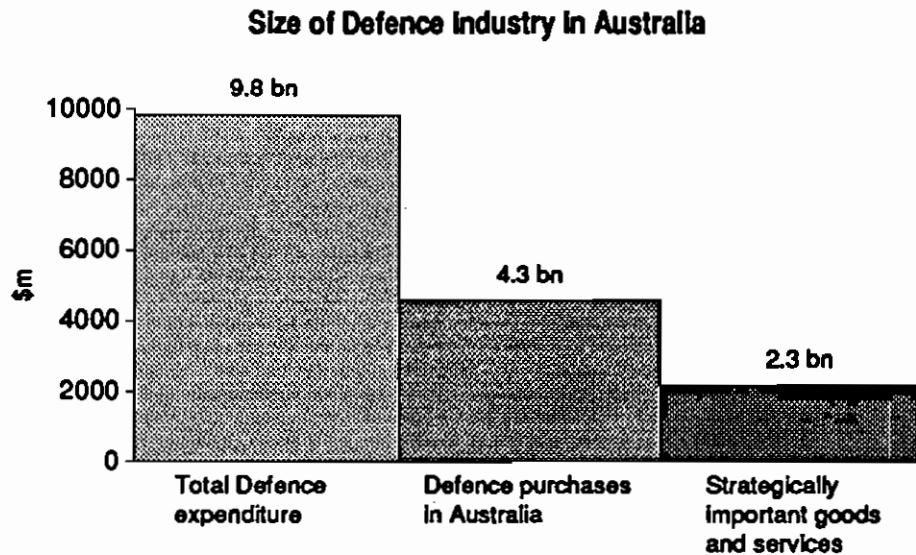
Finally, it is useful to look at the overall size of defence industry in Australia, based on the definitions just given (Figure 3.7).

Our estimate of the size of Australia's defence industry, on the core definition, is \$2.0–2.3b per annum, or about 0.6% of GDP⁵ and involves important capabilities in five major industrial sectors - information technology, electronics and communications; shipbuilding and repair; aerospace; ordnance; and vehicles.

We have arrived at this estimate via two routes. Firstly, the 1991-92 Defence budget estimates of expenditure were allocated according to the category unto which the goods fell and whether they were sourced in Australia or imported.

⁵ The total activity of the main business units concerned would be at least twice as great.

Figure 3.7



Source: ACG estimates

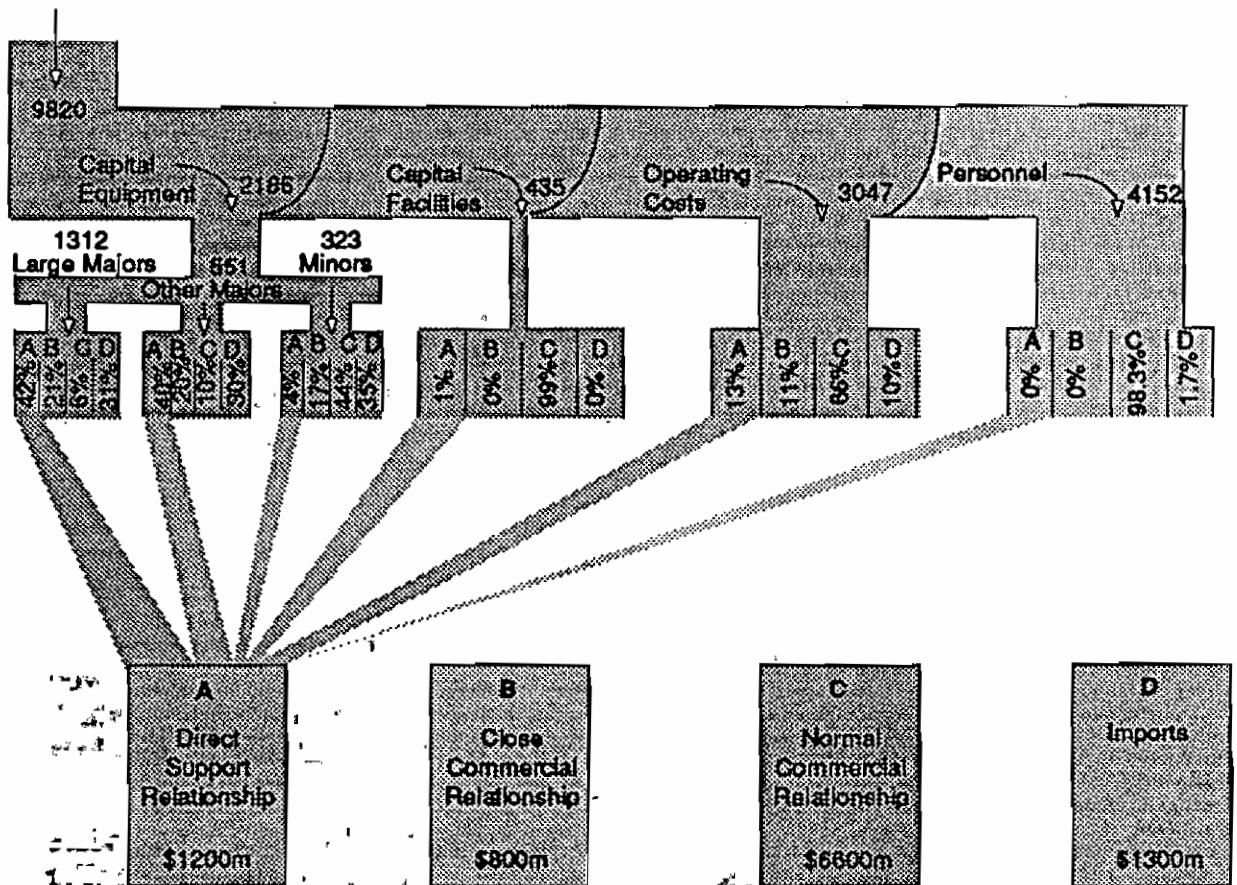
Different definitions of defence industry lead to different estimates of size

The second source of data on defence industry size is a survey of approximately 100 companies conducted for this study, which showed total "defence turnover" of approximately \$2.0 bn for companies which were likely to supply goods or services in the categories of Close Commercial or Direct Support Relationships.

Figure 3.8 shows expenditure on locally sourced goods and services likely to fall into the categories of Close Commercial or Direct Supplier Relationships to be \$1200m and \$800m respectively. Additionally, exports of defence products, estimated on the basis of export control data to be of the order of \$280m (see Chapter 11 for details), were included. These exports represent additional output by business units in defence industry.

Figure 3.8

Analysis of 1991-92 Defence Budget



Source: Defence budget papers, Defence interviews, ACG estimates

Note: Expenditure allocations estimated by reference to interview data for Capital Equipment and Capital Facilities

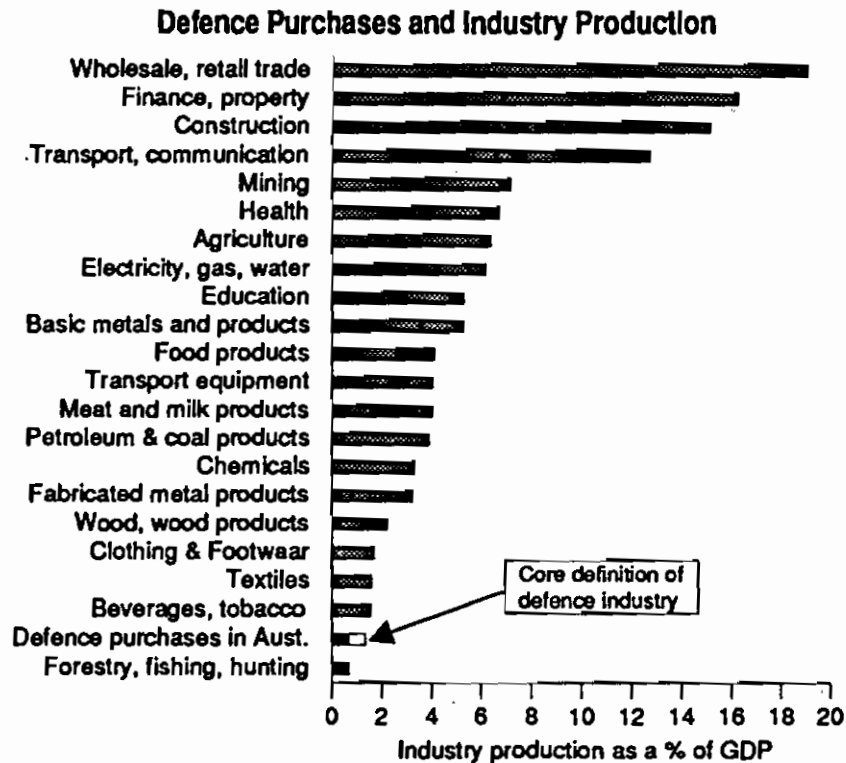
Operating costs allocated by Budget Form B1 - estimates at the sub-appropriation account level where available, and estimated by ACG otherwise

Wages and Salaries treated as expenditures in general industry in country of payment

Estimates should be regarded as Indicative and constrained by data limitations

The size of defence industry can be placed in context by comparing it to the size of other industries as a proportion of GDP (Figure 3.9). This comparison shows that although defence industry is significant it is smaller than other industries.

Figure 3.9



Source: ABS 5209.0 1986-87

Note: Defence is classified according to the 'extended definition' with the 'core definition' shown as a proportion; other industries show total Australian production

PART TWO

Structure of Defence Industry

Part Two Structure of Defence Industry

Summary of Main Points

- ❑ *Part Two describes the size, structure and capability of defence industry in five major industrial sectors.*
- ❑ *The information technology, electronics and communications sector supplies around \$1bn per annum currently to Defence.*
 - *Defence makes proportionately small demands on the information technology sector which is made up of firms providing goods and services to Defence as an extension of civilian computer market activities.*
 - *Defence draws heavily on and indeed shapes the defence related electronics and communications sector.*
 - *Around a dozen Australian based companies have achieved some defence related systems integration capability.*
- ❑ *The defence related electronics and communications sector is particularly important as it develops medium and long term technologies to meet Australia's particular needs. Significant industry policy issues arise since Defence has continuing, close working relationships with many different companies developing specialised technologies.*
- ❑ *The shipbuilding sector is dominated by Defence requirements. AMECON and the Australian Submarine Corporation (ASC) comprise around 60% of industry turnover. Much of this expenditure is on defence specific systems rather than traditional shipbuilding. The sustainability of the large capacity which has been developed through these projects is now a critical issue for the industry.*
- ❑ *Two companies dominate the aerospace sector – Hawker de Havilland and ASTA. Both depend significantly on Defence, but have diversified their activities and are seeking to build sustainable, commercially based businesses.*
- ❑ *The ordnance sector is dominated by Australian Defence Industries, which is 100% Government owned.*
- ❑ *Defence represents only a relatively small component of total demand for general transport equipment, but places major demands on relatively few producers of specialised vehicles. Defence is a significant buyer for particular companies in other sectors but it plays little role in shaping these sectors.*

4. Information Technology, Electronics and Communications

Part Two examines the characteristics of key industries involved in defence related activities in the information technology/military electronics and communications, the shipbuilding, aerospace, ordnance, vehicle and other sectors.

Defence industry is described in terms of the structure of the sector, characteristics of key companies, the impact of Defence expenditure, research and development activities, exports and future markets, Defence related issues from the perspective of companies and the role of Defence in the development of company capabilities.

The activities of companies dealt with in this Chapter can be divided into three groupings, based on competitive focus:

- information technology – computer hardware vendors;
- electronics and communications equipment suppliers; and
- firms with systems development and facility integration (systems integration) skills.

At present, the companies in the information technology sector sell hardware and services to Defence as an extension of their overall Australian marketing operations.

Electronics and communication suppliers have greatest strategic importance as they develop medium and long term technologies to meet Australia's particular defence needs.

Many companies in different sectors are considered to have some systems integration skills; these companies are dealt with in the sections covering the particular company's primary sector of business operation.

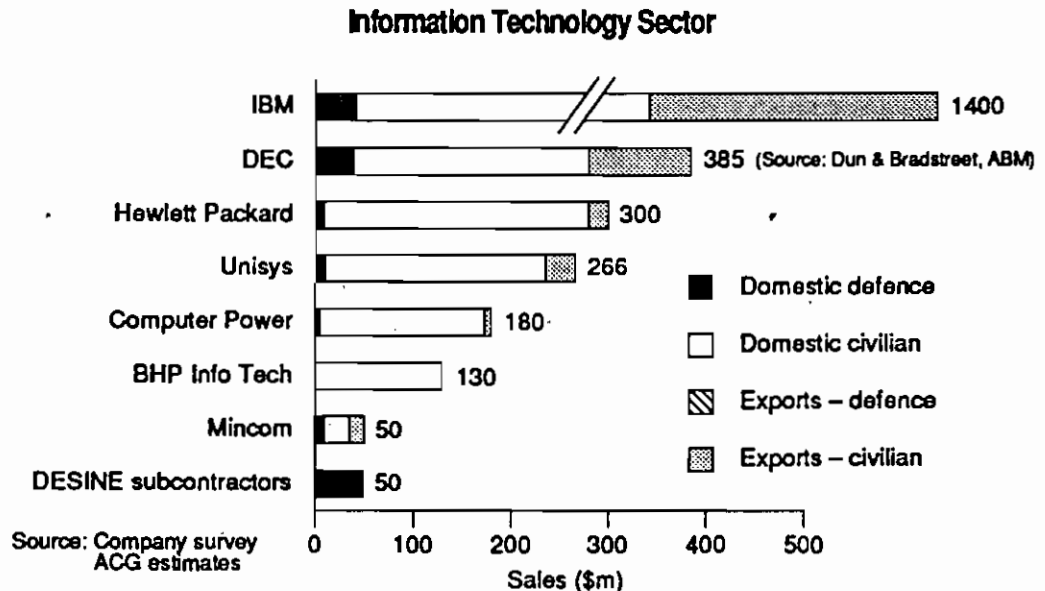
4.1 Information Technology Sector

Information technology sector companies are classed as those primarily providing civilian based computer hardware, software and services.

Industry Structure

The defence related information technology sector is made up of a small group of large companies with a tail of many smaller firms also supplying Defence.

Figure 4.1



Two companies, IBM and DEC, dominate the hardware market

The nature of Defence business for companies in this sector is illustrated in the DESINE contract, awarded to IBM (Figure 4.2).

The overall objective of the DESINE contract was to create an inter-operable and integrated information technology platform across Defence activities. Contract activities involve the application of broad, civilian systems integration capabilities rather than specialist defence related skills.

Key Companies

The two largest Defence suppliers in this sector are IBM and DEC, with Unisys providing a residual maintenance business. Two Australian companies, Computer Power and Mincom, are supplying systems integration and software services under the SSRP contract.

Figure 4.2

DESINE Contract

RESPONSIBILITIES OF THE DESINE PRIME CONTRACTOR (IBM)	DESINE SUBCONTRACTORS (as at July 1992)
• Procurement Support • Acceptance of orders and placement with subcontractors • Monitoring of deliveries of equipment software and services by subcontractors • Invoicing to the Department and payment of subcontractors • Provision of product advice to the Department	*Aspect Computing Pty Ltd - (Training Services) - Barcode Technology - (Data Capture Devices) - CD Networks - (CD Rom Technology) - Clean Line Systems - (Power Supply Equipment) - Cleveland Computers - (Intelligent Workstations) - Computer Associates - (Data Base S/W) - Critec - (Power Conditioning) - Dimension Graphics - (Business Graphics) - Dowdy Communications - (Communications Equipment) - Epson Aust - (Dot Matrix Printers) - Eracom - (Data Encryption) *Gestetner Lasers - (Laser Printers) - Hisoft - (replaced Microcomp) - Honeywell - (Maintenance Services) - Hyperlec - (Add-on Memory for PCs) - Integral Fibre Systems - (Communications Equipment) *Intermec - (Data Capture Devices) - J.N. Almgren - (Communications Equipment) - Labram - (X-Stations) *Memorex Telex - (3270 Compatible Printers) - Microsoft - (Software) - NetComm - (Communications Equipment) - Netlink - (Communications Equipment) - Fuji Xerox - (Workstations) - Software Developments International - (Communications Equip) *Techway Limited - (Intelligent Workstations) - Tercel Lightning Protection - (Power Supply Equipment) - Terran Computers - (Intelligent Workstations) - Toshiba - (Laptop Computers)
- Administration Support • Ongoing maintenance of the DESINE Standard Price list • Review of subcontractor performance • Reporting to subcontractors, to the Department and within IBM on the administration of the contract • Development and operation of IBM internal administration (IT) systems	
- Technical Support • Systems assurance of orders to ensure equipment compatibility and interoperability • Proposal preparation • Testing of new equipment and assistance with future equipment selection	
- Management • Management of the DESINE contract at all levels • Provision of architectural advice • General Executive contact	

Source: IBM

Information technology sector activities are more likely to involve broad, civilian related capabilities

IBM and DEC are not active partners (or competitors) with other companies who have organised consortia to service the Defence market. This situation may, of course, change in the future, as the computer hardware vendors move to provide more value added services. DEC is making some early moves in this regard with DSTO, AWADI and British Aerospace.

IBM is mainly serving a current procurement cycle, whilst DEC relies on a maintenance and support "tail" for more than half of its \$40m annual Defence revenues. The value of this sector of the market is about \$100m pa. The recent purchasing arrangements, being the "single prime" DESINE contract with IBM, are now being questioned. However, these arrangements have led to significant subcontractor opportunities with some 29 suppliers now receiving about half of the revenue stream. The role of the prime contractor will still remain important in major procurements.

The main industry rivals of IBM and DEC, the Japanese firms Fujitsu, NEC and Hitachi, have no substantial stake in the Australian Defence market. This is reflected in analysis of company strategies for Australia which emphasise skills in areas such as software development related to civilian markets. There is no prospect for local Australian hardware suppliers to emerge, except

in the small specialised niche markets that are provided to them by prime contractors, like IBM in the case of DESINE.

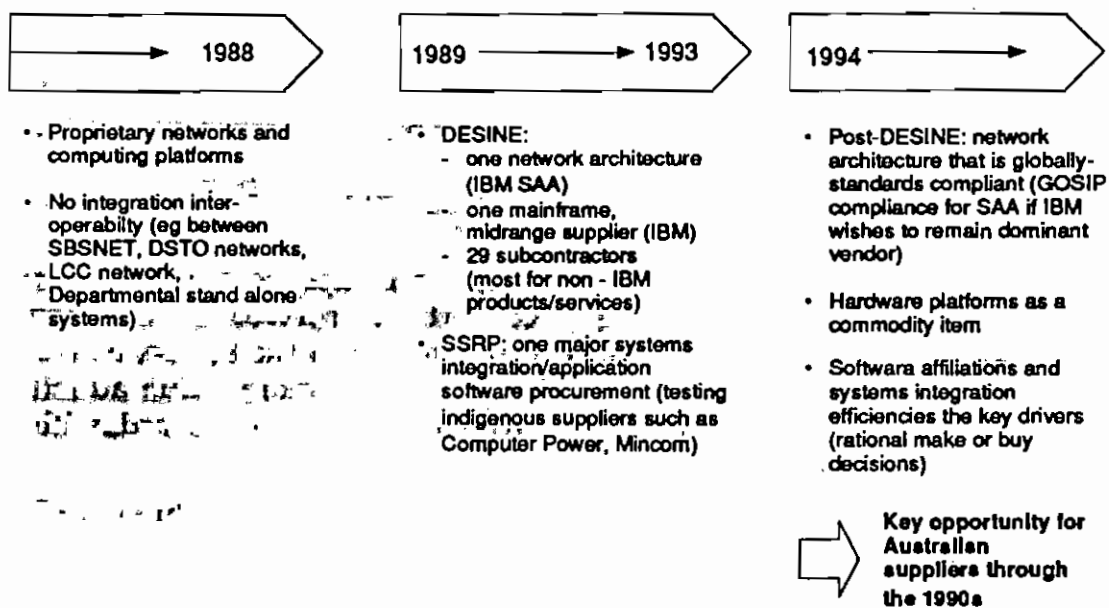
Impact of Defence Spending

Defence spending does not have a substantial impact on this sector. Defence sales are a relatively low proportion of sales for Defence-involved companies' revenues - around 5%. About 2% of the total information technology industry revenue is Defence related. The reliance of specific information technology companies on Defence sales varies considerably over time as a result of substantial impacts of particular contracts.

The major impact of Defence spending on these companies is to develop specialist knowledge of Defence systems and processes within the particular firms. At a technological level, Defence is likely to follow developments in civilian markets rather than a Defence influenced path (Figure 4.3).

Figure 4.3

Likely Evolution of Defence Computing Systems



Standards compliant architectures and high performance software applications will dominate Defence computing systems of the late 1990's

Defence is generally regarded as a core customer because of its size. Related to this, Defence is seen in some cases as an important demonstration, development or test market for particular products.

Research and Development

The larger companies in this sector invest substantial amounts in research and development. For example, IBM spent approximately \$77 million, or 6% of total revenue, on research and development in 1990-91 while Unisys spent approximately \$20.5 million, or 8% of total revenue. In general, research and development activity is

directed towards product development and applied technologies rather than towards basic research, although some basic research is sponsored.

There is little evidence of defence specific research and development carried out by these companies and no Defence funding was reported. IBM, DEC and Unisys carry out their research and development activities as part of a global operation. These activities, and those of the Australian companies in this sector, are carried out in cooperation with a range of academic, specialist information technology and government institutions.

Exports and Future Markets

IBM and DEC have significant civilian exports of computer software, hardware and services, accounting in both cases for over 20% of sales revenue. Information about service exports in this sector may be imprecise because of difficulties in classifying service sales within large multi-national corporations.

No defence related overseas sales by Australian information technology companies were reported. However, these results may be misleading since some exports classed by companies as civilian exports may be subject to defence related security controls.

Companies in this sector perceive their development broadly in terms of extending present services and software development activities within Australia and the region.

A range of factors were perceived by companies as limiting their development. One company felt that its substantial contribution to national development goals had not resulted in significant benefits for the company. Some companies drew attention to the DESINE contract and the appointment of rival IBM as prime contractor for the project as a factor limiting the expansion of Defence related work. General economic conditions and the small size of the Australian market were also cited as barriers to further development.

Company Issues

Companies in the information technology sector identified tender practices and administration as the most important area for improving Defence interaction with suppliers.

Companies strongly suggested that tender costs needed to be reduced through avenues such as shorter tender periods with fixed deadlines and increased initial planning in cooperation with industry. Related to comments on tender processes was the view that contract administrators needed to place greater weight on project outcomes rather than administrative processes.

Some companies also put the view that Defence should only in exceptional circumstances stipulate that prime contractors use particular subcontractors with no links to the prime. Mandatory use

of particular subcontractors was seen to cut across existing company contractual arrangements and working relationships. While Defence was seen clearly to have the right to enforce such provisions, companies questioned whether it was in Defence's long term interests to do so.

Sector Capabilities and Defence Role

The capabilities of the information technology sector will be driven by the civilian market rather than Defence requirements. A large pool of generic computing skills is likely to continue to be available to Defence.

Defence has an important developmental role as a leading edge customer demanding high standards of quality and adherence to international best practice.

Comments from companies suggest that Defence's most important further contribution to the development of this sector is through reducing the cost of tendering for companies.

An issue facing Defence procurement policy in this area appears to be whether Defence should seek to promote, through tendering and other competitively-based processes, a core of Defence related knowledge and skills among a particular sub-group of companies. Such a core of Defence-knowledgable suppliers has, to some degree, already emerged with specialisation of firms such as Computer Power and IBM in Defence work.

4.2 Electronics and Communications Systems Suppliers

The defence electronics and communications sector has greatest strategic significance of any sector, with many technologies developed to meet Australia's particular surveillance, intelligence and related requirements. The products of companies in this sector are key inputs to Defence ground, naval and airforce activities.

Industry Structure

Many companies contest the defence electronics and communications sector. The dominant companies in this sector are those which have secured major project contracts like ship systems and Jindalee.

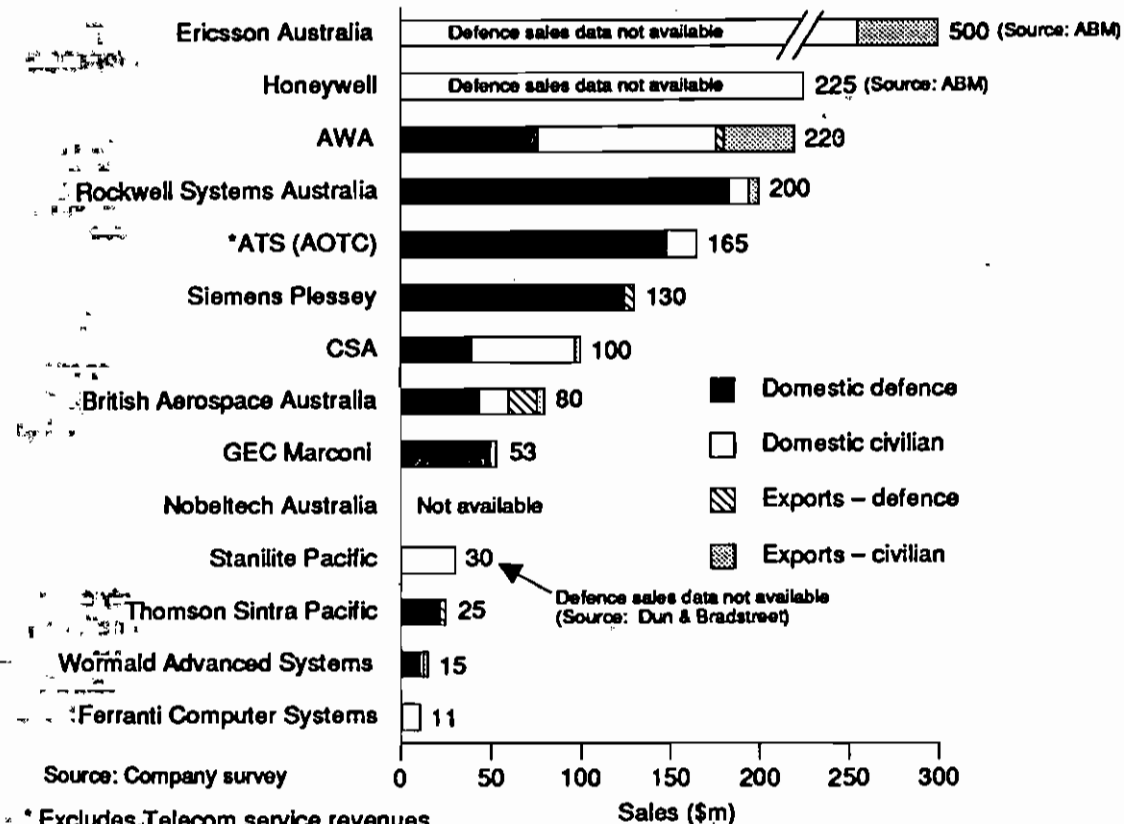
The defence turnover of the top ten suppliers to this sector ranges from \$15m to \$180m. Outside this league of major players, there are a considerable number of smaller suppliers and subcontractors.

The major activities of electronics and communications companies relate to specialised military electronics (associated with naval vessels, aircraft and rocket systems); surveillance and signal processing systems; specialised communications networks and specialised software systems.

Companies cannot however be simply classified according to these groupings. Most companies appear to have particular specialisations and occupy product related niches in the spectrum of defence related electronics and communications. Exceptions to this occur with software related areas where a number of companies have generic systems skills.

Figure 4.4

Major Defence Electronics and Communications Companies



Many players contest the electronics and communications market, with the most significant suppliers holding a few major contracts

There is limited overlap between suppliers to the defence and civilian industries. Important firms in the general information technology and communications market in Australia (eg Alcatel and BHP-IT) are not active in the defence sector. Some, notably AOTC through ATS, have only recently become involved in the defence market.

Key Companies

The structure of company operations in the electronics and communications sector varies greatly, with a range of different approaches to overall strategy. These alternative models are summarised in Figure 4.5.

Figure 4.5

Company Structure and Strategy Models

<i>Alternative Structure & Strategy Model</i>	<i>Relationship to parent</i>	<i>Intra-company synergies</i>	<i>Industry Relationships</i>
1. Integrated multinational business organisation eg Siemens Plessey	Stand-alone business unit, both locally and globally	Within global operations of defence business unit; little synergy with parent company operations, either locally or worldwide	Supports sub-contractors, <u>not</u> pursuing strategic alliances
2. Multi-national organising for regional entry/expansion eg Nobeltech Australia	Close; country presence part of strategy for expansion/geographical diversification	Skill/technology transfer as part of entry strategy	Supports strong alliances/joint ventures with local firms
3. Australian major organising for diversification eg AOTC (ATS) BHP (IT)	Unincorporated subsidiary, managed as new venture	Limited; (buying in skill from outside)	Actively seeking multi-national joint ventures & alliances to consolidate business sustainability
4. Consolidating Australian presence eg AWADI	Subsidiary	Important as parent company consolidates	Developing strong consortium building relationships
5. Australian reverse takeover mode eg CSA	Fully integrated	Strong; a key strategy element	In transition from local subcontractor to prime in competition with former MNC partners; actively seeking local strategic relationships

Source: ACG interviews

Distinct company structures and strategies are apparent in the defence IT&T industry

The industry appears split between those (largely multi-national companies) whose Australian operations are completely tied to Defence as a customer, and suppliers whose defence work is an adjunct to the much larger civilian market.

Overall industry structure and these company structure and strategy differences suggest that Defence purchasing policy will have major impacts on particular companies. For example, the winding down of a major contract may mean that an overseas company with little non-Defence related Australian business will substantially reduce its domestic presence.

Many local factors influence company structure. The facility to gain and maintain quality and standards certification may be easier in a large, diversified company; this capacity is enhanced if defence activity is consolidated within a stand-alone business unit. Requirements for secure areas and the degree to which product specification is unique or departs from comparable commercial offerings are similar factors.

Reliance on Defence Spending

Defence accounts for an estimated 15% of the \$5 billion electronics and communications equipment market. The major impact of this expenditure is on military electronics associated with naval vessels, aircraft, and rocket systems; surveillance and signal processing systems; specialised communications networks; and specialised software systems.

Total Defence expenditure in this area is large, but tied to the life cycle of major projects such as Jindalee or the electronics associated with naval fit-outs.

There is considerable variation in the contribution of Defence income to total company turnover. At the highest end of Defence reliance are firms such as Siemens Plessey, Rockwell Systems Australia, Nobeltech Australia, GEC Marconi, Ericsson Defence and Thomson Sintra Pacific. A number of small companies which develop specialised defence products, such as Compucat, CJ Abell & Co and CEA Technologies, are also highly dependent on Defence business.

At the lower end of direct Defence dependence are smaller firms such as Mitec (microwave equipment) and Auspace (satellite communication systems).

Companies such as AWADI and ATS (AOTC) cannot be simply classified in this spectrum since they are both highly dependent on Defence business but are part of domestic companies with lower overall dependence.

Impact on Company Capability

Defence plays a key role in the development of many companies involved in this sector, beyond the impact expected from the level of Defence spending in this sector. Several companies, such as GEC Marconi and British Aerospace Australia, appear to have developed specialised skills in market niches to meet particularly Australian military electronics and communications needs.

In terms of the framework developed in Part One of this Report, these companies appear to have come to specialise in capabilities which are strategic and particular to Defence.

The close links between such companies and the DSTO and other areas of Defence is important evidence of this specialisation. Beyond the Defence related skill specialisation of these companies, significant project related investment appears to create entry and exit barriers for suppliers.

Managers from these companies appear more deeply interested in Defence policy and procurement patterns than managers from companies in other sectors. This interest is understandable in terms of the key role Defence decision-making has on the direction of companies.

Research and Development

Figure 4.6

Defence Electronics and Communications Research and Development Activities

Air traffic control systems	Nobeltech; Rockwell Systems
Airborne early warning systems	Ericsson Defence Systems
Antenna systems	CEA Technologies
Communication systems and equip.	British Aerospace; CEA Technologies
Electronic warfare	AWA; Nobeltech; CEA Technologies;
Fire control systems	EOS; Nobeltech
Gas detection systems	Gas Tech (Australia)
Infra-red technology	British Aerospace
JORN systems	ATS (AOTC)
Local area networking	AWA
Message switching	Compucat
Micro-circuit design	AWA
Radar and surveillance systems	CJ Abell; CEA Technologies
Microwave components	Mitec
Ship command systems	Nobeltech; Rockwell Systems
Signal processing	British Aerospace; AWA; CJ Abell; GEC Marconi
Simulation and guidance systems	Auspace; Compucat
Specialised software (various)	Siemens Plessey
Submarine detection (sonar buoys)	AWA; GEC Marconi

Source: Company survey

Defence electronics and communications companies carry out a wide range of specialised research and development

The companies in this sector invest substantial amounts in research and development compared with total revenue. Nearly all indicated they were carrying out research and development.¹

Most of the research and development activity related to Defence requirements for specific technologies. Many, but not all, companies reported high levels of Defence funding for research and development.² The level of defence related research and development and Defence funding in this sector appears much higher than for other sectors.

Evidence suggests that companies in this sector are concentrating on research and development of niche technologies with limited overlap of activities from one company to another.

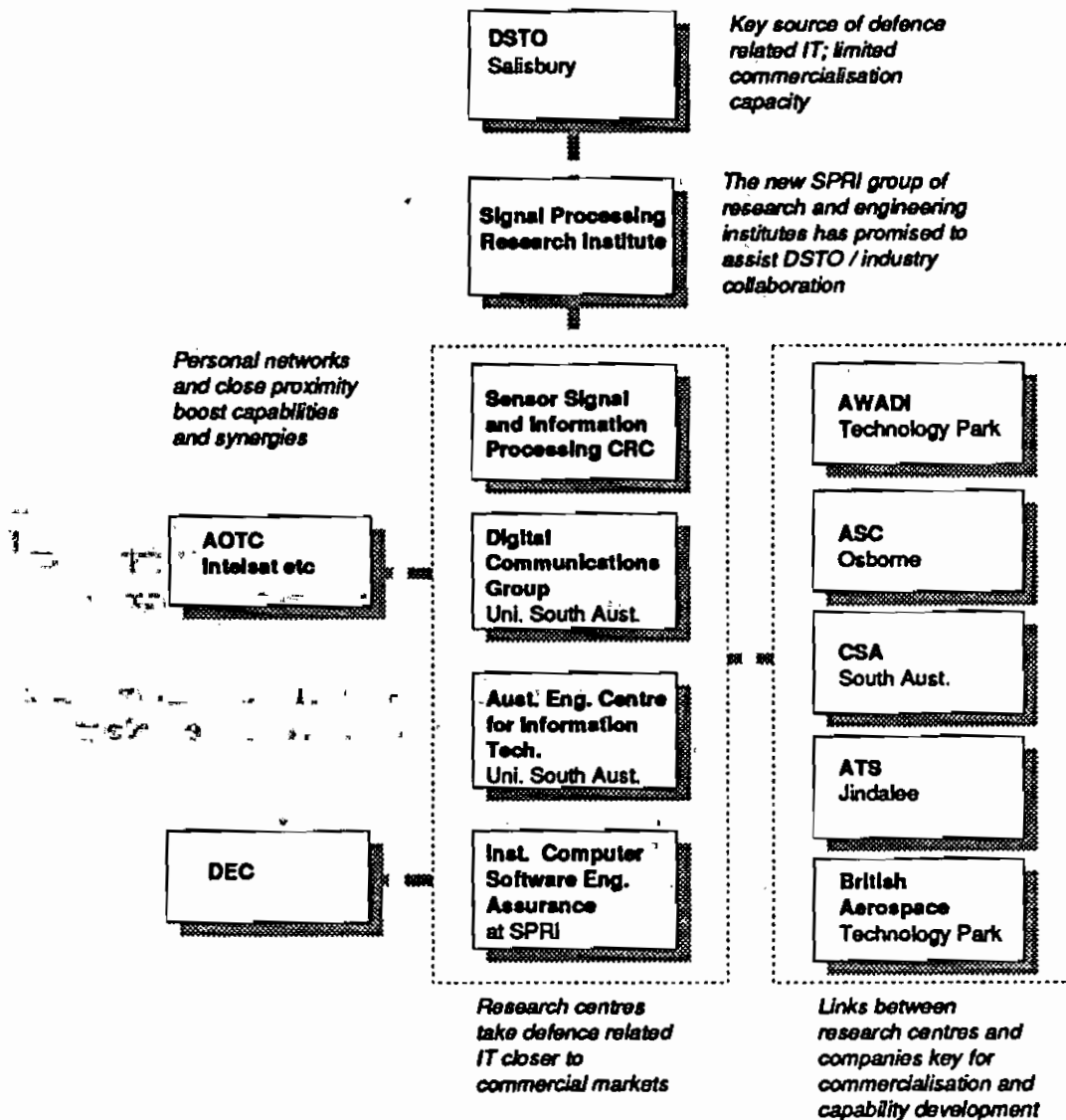
Companies have access to a variety of sources of research and development information including association with international parent companies; joint venture arrangements with other international companies; and a range of academic, specialist information technology and government institutions.

¹ Out of 21 companies contacted in this sector, 16 detailed R&D spending, while four declined to provide information. Companies in other sectors also noted electronics related activity; for example ASTA's airborne defence systems activities.

² Six of the 16 companies providing information about R&D spending indicated Defence funding. See Section 11.3 for details of sector by sector expenditure.

Figure 4.7

Defence Electronics and Communications Industry Emerging Research Cluster



A cluster of defence electronics and communications activities has emerged around the DSTO's Salisbury facilities

DSTO is considered an important source of research and development information for particular companies. A number of companies have formed links with the DSTO's Salisbury facilities and centres associated with the Signal Processing Research Institute. This research network is assisted by close personal contacts between key players, based on years of industry experience and knowledge.

Exports and Future Markets

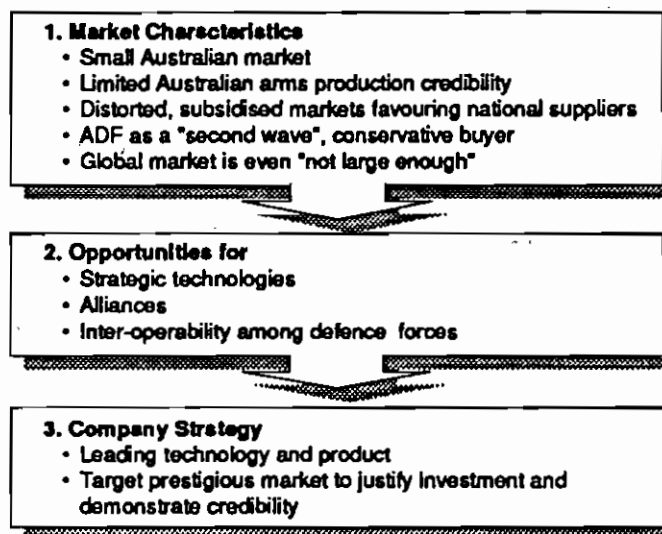
A number of companies in this sector reported significant levels of civilian and defence related exports. Larger companies such as AWA, GEC Marconi and British Aerospace Australia reported total exports of between \$20m and \$40m, accounting for between 20% and 40% of sales. Smaller companies such as Philips Defence, Mitec, CEA Technologies, KEL Aerospace, Gas Tech and Auspace reported export sales of between 20% and 60% of sales.

Defence related exports, although modest by overall Australian export standards, are important in the context of this study. Larger companies such as AWA, GEC Marconi, British Aerospace Australia, Thomson Sintra Pacific and Siemens Plessey, reported export sales of up to \$20m. Smaller companies such as Philips Defence, CEA Technologies, CJ Abell & Co and Auspace reported export sales of up to \$3m.

An important example of a specialised export company in this sector is Electro Optic Systems, which developed the Multipurpose Universal Gunner Sight specifically for overseas markets. The EOS strategy targeted the US market, without consideration of Australian Defence sales.

Figure 4.8

Electro Optic Systems' Market Analysis



Electro Optic Systems' analysis lead the company to the conclusion that it had to target the US with a leading product to be successful

Total defence related exports sales from the sector reported during the survey were around \$60m. Most companies contacted reported that their most important future markets involved exports and were based on existing company technologies.

Barriers to Development

The major barriers commonly reported to be affecting companies' development were the need to build credibility in overseas markets, and constraints on domestic expansion arising from the small domestic market and low Defence demand.

A wide range of other barriers were cited by particular companies without any over-riding pattern of response. Access to capital, constraints on exports of security related products, lack of overseas links, small company size, high Defence related cost structures, lack of a civilian domestic business or need for improved links to the DSTO were commented upon by particular companies.

A number of companies also stated that insufficient government funding limited their development or drew attention to Defence related management issues.

Company Issues

The two most commonly identified areas for improving Defence relations with companies related to tender and contract administration processes and Defence planning/collaboration with companies. Comments were also made about other areas such as improving Defence product development, contract administration, Defence's overall policy for industry and Defence support for industry.

Suggestions for improving tender and contract processes were directed at reducing tender costs. A wide range of suggestions were made including fixed tender time-frames, pre-qualification of bidders and reductions in changes to tender specifications. Attention was drawn to examples of recent tenders which involved major losses for unsuccessful companies.

There was strong support for closer Defence collaboration with companies and the industry, better definition of priorities and requirements and improved long term planning processes. Related to these comments was the common view that Defence knowledge of company capabilities and characteristics should be increased.

Several companies suggested that investment in defence related electronics and communications business and product development had been reduced by uncertainty about Defence decision making.

A number of companies commented on improving the development of defence related products. Most commonly, it was suggested that the DSTO could make a greater contribution to commercialisation of defence related technologies and greater risk-sharing on development projects is needed.

Other companies suggested that Defence management of contracts should place greater emphasis on project outcomes rather than official administration processes. It was felt that processes to ensure

proper contractor performance and adherence to contract provisions distract Defence attention from the desired project outcome.

The most common issue raised about overall Defence policy for industry related to competition in the electronics and communications sector. Some companies suggested that current Defence policy was based too heavily on competition and was leading to fragmentation of overall capability. In a similar vein, the suggestion was made that no additional players should be encouraged to enter the Defence market and that contract margins were too low.

A number of companies also suggested that Defence undertake a more active role in promoting companies' development. Avenues that were recommended for achieving this goal included a stronger buy Australia policy, use of Defence to provide commercial and market intelligence and use of Defence facilities for product testing.

Sector Capabilities and Defence Role

The defence related electronics and communications sector is of key importance to Defence since it is the sector in which most medium and long term technology is developed to meet Australia's special defence requirements.

Defence faces important management and policy issues concerning the development of sustainable capabilities, particularly in areas related to core capabilities. Such a core may be maintained through inter-company arrangements or the development of large indigenous companies. This policy issue underlies comments referring to fragmentation of company capability. We believe it needs to be explicitly addressed in Defence planning.

Figure 4.9

Policy Effects on Core Capability

POLICY AFFECTING CAPABILITY DEVELOPMENT

- For example
- Planning and collaboration contact
 - Weight given to size of supplier, experience, skill, costs
 - Workload planning
 - Tendering processes (stages, preferred tendering processes, cost of tendering process)
 - Support for industry product development and R&D

- R&D decisions
- Strategic procurement
- Through life support

CORE CAPABILITIES

- Advanced IT&T-based systems solutions and capabilities for:
 - Surveillance, intelligence and early-warning
 - Collection, processing and management of complex information in real time
- Ongoing systems solution capability including key skills in systems integration; software applications development; multi-source procurement of commodity components; design of customer electronics and hardware subsystems; through life-cycle systems support; and professional services (such as training) for client support

The development of core capabilities related to advanced systems will be affected by Defence policy decisions

The present industry structure which has arisen in response to Defence procurement decisions does not appear sustainable. Uncertainty about the structure and continued viability of the sector arises for four principal reasons. There are no major players, rather a relatively large number of small companies. Many companies are highly reliant on Defence business, and in some cases a relatively small number of contracts. For many companies in the sector, Defence drives company capability and skill development. A number of these companies are new entrants to the defence market in Australia without a significant base of civilian work.

Industry restructuring in this sector may occur as major contracts wind-down or through rationalisation of company capabilities. This has the potential to affect Defence capabilities adversely – key skills or experience may be lost through sharp declines in company workload. The costs of re-establishing capabilities may be high. Potential opportunities to develop new capabilities through close industry-Defence collaboration may be lost.

The view that greater cooperation and information exchange may increase company investment is based both on the views of sector companies and experience in other sectors, such as communications. Companies making this point did not advocate a lessening of competition at tender, but rather a more knowledgeable interchange at preliminary project stages.

Better Defence planning providing more direction to companies may increase company investment in strategic capability related skills. The manner in which Defence development takes place and the subsequent manufacture of capabilities clearly affects firms' capacities to civilianise or commercialise products, or to export.

A strengthening of company capability or business depth may, particularly in the electronics and telecommunications sector, increase the depth of overall defence capability and bolster the competitiveness of the Australian industry. Increased competitiveness reduces possibilities that Defence may have to subsidise particular capabilities.

Defence's overall role in the development of the defence related electronics and communications sector should be a priority area for industry policy consideration. Policy decision-making in this sector should not, however, focus on company development as an objective, but rather on how Defence can interact with companies to enhance their capability to promote the achievement of its long term strategic objectives. Experience in the civilian telecommunications industry leads us to the view that, relative to other approaches, this policy direction will also lead to long term benefits for companies.

4.3 Systems Developers and Integrators

Issues in systems integration have some similarity to those faced in the electronics and communications equipment sectors. However, the skills involved in systems integration activities are less specialised although considerable application knowledge may be built up during project development.

Figure 4.10

Companies with Systems Integration Skills

• C³I – secure wideband telecommunications	CSA AWADI BAeA AOTC Optus
• Ship systems integration – combat systems – anti-submarine warfare	ASC AMECON
• Air defence systems/air traffic management – Jindalee/JORN – weather system networks	AWADI AOTC/ATS
• Aircraft/aerospace systems integration – electronic countermeasures	ASTA BTR/HdH AWADI BAeA CSA
• Acquisitions/logistics/administration systems	IBM – DESINE Computer Power – SSRP Mincom – SSRP

Source: ACG interviews

A number of Australian-based firms have achieved defence related systems integration skills

About a dozen Australian-based firms have achieved some defence related systems integration capability. Firms' systems integration capabilities are related to the particular industry sectors in which the companies operate rather than any across-the-board systems integration industry. For example, AOTC has communications specific systems integration capabilities while AMECON has shipbuilding related systems integration capabilities.

Not included are the MNC-subsidaries that appear to maintain an Australian presence with systems integration skills only when successful in tendering for a Defence project.

As there is no single systems integration sector (but rather a number of industry related capabilities) aspects of systems integration related companies' operations such as exports or research and development are discussed under major sector headings for the particular company. Figure 4.10 categorises firms against major systems integration categories. Typically, the number of skilled individuals in each firm is small.

In line with industry trends, the hardware component is declining relative to expenditure on software development and systems integration.

Given the episodic nature of major projects, continuity of workload is a major issue for all the firms in this sector, and particularly those with a heavy reliance on Defence activity. Much interest is drawn to prospects for systems maintenance – and its outsourcing to the industry – and in the opportunities associated with mid-life upgrades.

Defence has an important developmental role for companies undertaking systems integration activities. Its demands for high levels of quality, extremely low levels of defects, adherence to project management processes and international standards create a base of internationally competitive company skill.

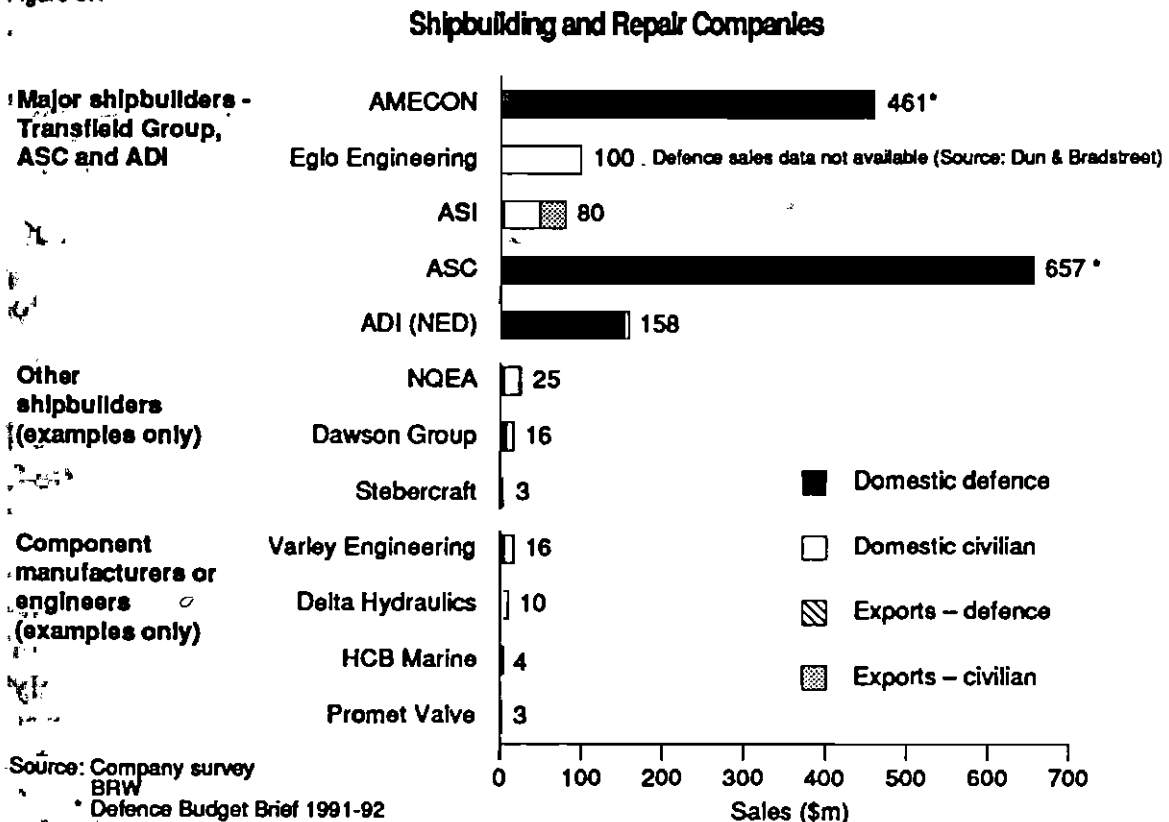
5. Shipbuilding and Repair

The Australian shipbuilding sector is dominated by companies established to manage the submarine and frigates projects. The founding of these companies has created a major defence related capacity, which is likely to undergo some rationalisation.

5.1 Industry Structure

The two major industry players are the Transfield companies, AMECON, Eglo Engineering and Australian Shipbuilding Industries, and the Australian Submarine Corporation. A significant third player is Australian Defence Industries' Naval Engineering Division, which focuses on repair and refit of naval vessels. These enterprises are all heavily Defence dependent, though the Transfield group as a whole has relatively lower levels of exposure.

Figure 5.1



ASC, the Transfield group - AMECON, Eglo and ASI - and ADI are the most important shipbuilders and repairers

In the case of AMECON and ASC, the companies act as project managers and integrators of a wide range of components and systems.

The traditional shipbuilding component of the companies' activities is likely to be very low – a commercial vessel of similar size to the frigate would cost less than 10% of the cost of a frigate on the international market. The most important component of the cost of a modern naval vessel is likely to be electronic systems, a factor which highlights the stress placed on these activities in Chapter 4.

The activities of the major companies are supported by a wide range of largely civilian-based companies providing specialist inputs to the major companies' activities.

At the level below these three major shipbuilding groups, there are many companies making small ships or boats or producing components or services used within the industry. Typical of the larger companies in this group are firms such as the Dawson Group and NQEA.

5.2 Key Companies

Each of the three major enterprises have distinctive structures but face common strategic problems.

Company Structures

AMECON as part of the Transfield group, and linked to ASI and Eglo Engineering, should be considered part of a relatively diversified engineering company.

ASC is a joint venture company formed by Kockums Pacific, AIDC and James Hardie. While it is a specific purpose company like AMECON, focused on the submarine project, it is seeking to diversify through acquisition or development of new businesses.

ADI (NED), as part of the wider ADI organisation, has some synergies with the ADI Weapons and Engineering Division. However, it remains a relatively specialised organisation and faces continued restructuring.

Strategic Issues

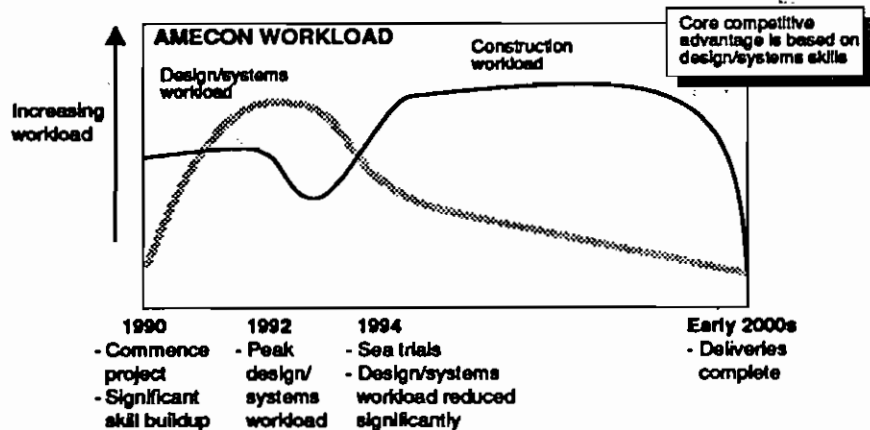
All the major naval shipbuilding and repair enterprises are examining alternative strategies to deal with problems arising from high levels of Defence dependence and the prospect of sharply declining naval workloads. Among the alternatives that companies are exploring are – sale of project management, engineering and systems skills; heavy engineering work; commercial shipbuilding and repair; further Australian naval work; and overseas sales. The businesses will be expected to strongly contest future naval work.

AMECON's approach to these problems are described in Figure 5.2.

Figure 5.2

AMECON's Business Strategy and Issues

Since purchasing Williamstown dockyard, AMECON has dramatically increased performance and has developed the capability to offer Defence turn-key ship and associated systems to meet high level performance specifications effectively at a fixed price.



Business Issues:

With the completion of the first ANZAC Ship in 1996 and unless new construction work is won, AMECON will have limited work for many of its most highly trained systems and design staff, the base of its competitive advantage. This loss would be compounded by losses of intellectual capital among its supplier network. AMECON is now closely examining alternative business strategies.

PROJECT MANAGEMENT AMECON can sell its consulting engineering and associated skill overseas or in Australia. Although AMECON is a leader in its field, competition in consulting engineering is vigorous and domestic demand remains low.

OVERSEAS DEFENCE SALES Associated company ASI has exported patrol boats to Hong Kong and Kuwait, business won in the face of sharp cost based competition. AMECON is, however, unlikely to export frigates against competition from the designers of the ANZAC Ships and FFG Frigates. These companies already provide support to regional governments. An option may be to enter into partnerships with overseas designers to develop vessels tailored for the region. However again, AMECON would be likely to have to compete against its partner's interests in that market. The only realistic solution to gaining market access is for AMECON to develop its own ship designs.

COMMERCIAL SHIPBUILDING AMECON may seek to build specific purpose ships with high design and engineering content. Its options in this area are likely to be limited by low levels of skill exchange between commercial and naval work, limited demand and the need for capital. Capital would be required for further launching capacity.

COMMERCIAL REPAIR Australian shipyards are now regarded as competitive with Singapore and other regional yards for ships of up to 5,000 to 6,000 tonnes, the maximum capacity of local shipyards. The potential development of business in this sector is limited by similar problems to those faced in developing a commercial shipbuilding business.

FURTHER NAVAL SALES AMECON believes that further naval sales will be a key to its future business. Such sales will complement its specialist skills and allow the further development of its, and its suppliers', design and intellectual capabilities.

NAVAL SUPPORT AMECON considers that it is fully constrained in the degree to which it can participate in repairing/refitting naval ships as a result of the "home port policy" and the Commonwealth's 5 year guarantee of "traditional naval work" for ADI (NED). These policies will affect AMECON's capacity to service the ANZAC and FFG frigates, a source of much needed work to service its skill resources and support specialist overheads.

Source: AMECON

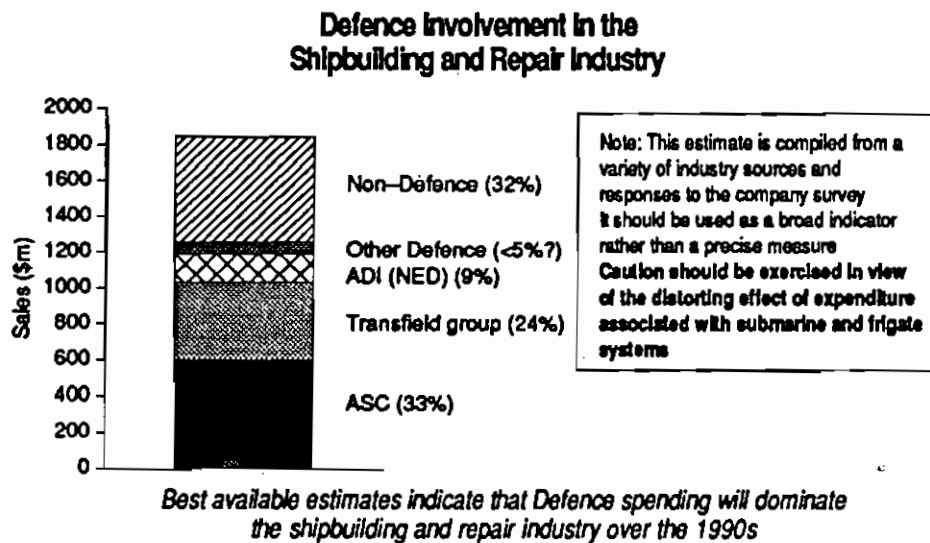
5.3 Impact of Defence Spending

The submarine and frigate projects have made Defence the dominant customer in the Australian shipbuilding industry. Specialised skills have been developed in response to this demand.

Defence Sales and Industry Turnover

Some two thirds of current sales turnover is estimated to be Defence related. The current major projects result in a very high level of Defence related sales which will continue past the turn of the century.

Fig 5.3



AMECON and ASC are currently wholly reliant on revenue from the frigate and submarine projects respectively, although both are seeking to reduce this dependence. ADI (NED) is similarly highly reliant on Defence sales. Below the level of AMECON, ASC and ADI there is a considerable reliance on Defence sales among the sample of companies we contacted. For example, Defence accounts for around 20% of Stebercraft and NQEA sales.

Among the sample of shipbuilding and related companies contacted, Defence is generally regarded as a core customer. These companies will continue to compete strongly for naval work.

Defence Related Development

As outlined in Section 5.2, the major companies have developed specialised skills to meet the Defence demand. As ASC and AMECON function as project managers and systems integrators rather than integrated manufacturers, many project subcontractors have also developed specialised skills.

To investigate this impact we sought views from a sample of 10 companies involved in producing more sophisticated Australian products used in the submarine project. This group was selected from a range of 24 Australian first level subcontractors which were judged to be producing more sophisticated products. (Figure 5.5 shows the results of these interviews and includes details of the sample of companies approached.)

The response from the companies suggests that, for a particular group of companies, the submarine project has resulted in a considerable increase in industrial capability in areas such as design, quality control, management systems and manufacturing processes. A number believed that significant new work or exports would result from the project although no such benefits were able to be quantified currently.

A second group of companies felt that the project had been particularly important in expanding production or providing a base workload. No special development was identified as resulting from participation in the project.

A third group of companies believed that the project would have little or no impact on the company's activities. The low level of impact was traced to irrelevance of the work to commercial activities or the limited scale of the company's involvement.

The overall response suggests that there is a core of companies which are experiencing considerable benefits from the submarine and frigate projects. It would be inappropriate to attempt to estimate the size of this benefit without a more comprehensive study.

Figure 5.5

How the Submarine Project Affected a Group of Major Subcontractors

MAJOR POSITIVE EFFECTS ON SOME COMPANIES...

GAS TECH AUSTRALIA (Sydney) develops and supplies gas detection systems for the submarines.

The submarine project, with its special requirements, has led the company to re-engineer products, fundamentally changing their nature. Director Peter Ketley says that "the submarine project will not be profitable for the company overall but has provided a stable base demand and the opportunity to invest in, and amortise, R&D". Defence requirements have also accelerated the introduction of quality systems.

The company which is 50% locally owned and 50% owned by GAS TECH (US) imports around 5% of its requirements from its overseas parent. Defence currently accounts for about 15% of total sales of over \$5m. The company exports civilian products to Asia with a value of around 20% of sales.

DELTA HYDRAULICS (Devonport) develops and manufactures hydraulics systems for the submarines.

The submarine project has resulted in major advances in the company's engineering capabilities. The systems for the submarines are complex and make leading edge demands on performance and quietness of operation. The company has overcome challenges at every level - design capability, quality assurance, project management, installation of "clean production facilities" and shopfloor skill. The submarine project has been a driving force in the company becoming the dominant Australian hydraulics manufacturer in its field. As a result of its strong relationship with ASC, the company is expanding into further defence projects.

Defence currently accounts for around 15% of the company's \$10m annual sales. The company currently exports hydraulics to the value of around 5% of turnover to New Zealand, India, Bangladesh and Thailand. It is committed to increase its sales substantially to take advantage of its new capabilities.

MACKAY CONSOLIDATED INDUSTRIES (Melbourne) is a medium sized manufacturing company (300 employees) producing moulded, extruded and bonded rubber/steel products for the automotive, mining, trucking and general industry. Mackay have supplied various rubber components for the submarine and have won the contract to supply muffler liners.

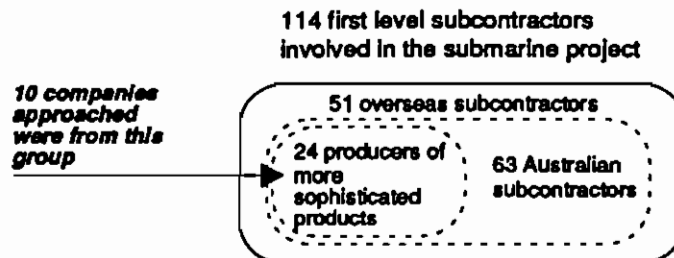
Marketing Director designate, Graeme Wilson, says that the submarine project has had a significant effect on the company. It has been an important factor in credentialling the company for Defence work, creating other opportunities. The company is now working with the Army on personnel carrier components and has licenses to sell DSTO developed polymer bushes overseas.

Demonstrating the company's qualifications for tendering lead to a thorough testing of quality assurance systems with resulting improvement providing spin-offs for commercial activities. The company believes that this process and subsequent redesign and production of imported components has demonstrated that its manufacturing capability is world class or leading edge in some areas.

Around 10% of the companies sales are now Defence related, a proportion which is expected to grow. The company currently exports civilian products worth around 5% of turnover and expects defence related exports in the near future.

Figure 5.5 (Continued)

WHICH COMPANIES WERE CONTACTED?



Note: Many other Australian companies are also involved in supplying goods and services as second level contractors or in other ways

WORMALD ADVANCED SYSTEMS ENGINEERING (Sydney) is a part of Wormald Technology, a group of companies specialising in control systems engineering. Wormald Technology turns over around \$25m, of which WASE accounts for \$15m. WASE's first contract for the submarine project was the design and manufacture of elements of the submarine ship management system for SAAB instruments. This work has led to other business related to the submarine project, including a fire detection and protection contract. Business Manager Peter Hill believes the submarine project has improved the company's quality standards and management systems as well as providing a financial base for its expansion. There has been transfer of design and manufacturing skills from the initial submarine contract.

WASE is currently examining the development of new military and fire-fighting systems based on submarine related technology. The company currently exports civilian products worth around 15% of its turnover to Papua New Guinea and South East Asia.

THE PROJECT HAS LED TO MAJOR EXPANSION FOR SOME ...

ROCKWELL SYSTEMS AUSTRALIA (Melbourne and Sydney) is a subcontractor to ASC for the combat system and internal/external communications on the submarines - with systems effort in Sydney and manufacturing in Melbourne. Winning these contracts has doubled the size of the company's manufacturing operations and considerably increased the skill level and numbers of employees.

Almost all of the company's sales are to Defence, but steps are being taken to diversify into civilian control systems, such as Advanced Train Control. The company exports a small quantity of spare parts and products to Malaysia.

AND A BASE WORK LOAD FOR OTHERS

HCB MARINE (Newcastle) is an Australian-owned marine electrical engineering contractor which supplies lights for the submarines.

Sourcing components from Dutch and Belgium marine lighting companies, the company sees itself as a project manager and system assembler. The submarine has been an important source of work following the collapse of the Carrington Slipways company with which HCB Marine was previously associated (Carrington Slipways was later taken over by ASC).

Figure 5.5 (Continued)

The submarine project has led to a modest transfer of technological skills (in specialist areas such as Radio Frequency Interference and Electromagnetic Interference). Relations with the overseas companies have been good with HCB Marine becoming the Australian agent for industrial and marine lights.

Defence accounts for around 50% of the sales turnover of over \$3m. The company is critical of the administrative burden on contractors, stating that it substantially boosts prices.

JACOBS RADIO AUSTRALIA (Melbourne) is a small company (8 people) designing and manufacturing various electronic equipment including electrical power supplies and transformers. It supplies a range of this equipment to the submarine project as well acting as a technical "fixer" in its area of expertise.

The submarine project has had a major impact on the company's business, importantly providing a base work load during a lean period. As the company has been involved in Defence work since 1980, it already had quality and other systems in place to meet defence requirements. The company considers that it and other Australian companies are capable of supplying a wider range of equipment to Defence against overseas competition. It believes that Defence is its best current customer.

The company exports equipment to New Zealand. Most recently these sales accounted for around 40% of sales revenue.

IN SOME CASES, THE IMPACT IS LESS SIGNIFICANT

PACIFIC MARINE BATTERIES (Adelaide) is a joint venture company established by GNB Batteries (Pacific Dunlop Ltd) and Varta (Germany) to manufacture submarine battery systems. The submarine batteries will effectively be hand made at a rate of one a year, partially within the submarine shell. The batteries are specially designed for long life to accommodate the planned periodic refurbishing of the submarines. Their unique nature means that limited commercial spin-off is expected. Their construction enhances the reputation of the parent company. Sales of the batteries to Defence will account for a small proportion of GNB Batteries' billion dollar annual turnover.

LOGICA (Sydney) won a subcontract to provide specialist software engineering consultancy services for the Integrated Logistics Support System on the submarine project. The extent of this subcontract fell short of expectations, and as the skills applied to the project related to quality management, development methodologies and logistics applications which are used generally across Logica's business, the project did not help the company's development significantly.

Logica's major activities are in consulting, software development and systems integration. It employs around 150 people with a turnover of \$25m. Its UK parent has a large defence based business. The company's major contact with Defence has been through the Jindalee project. Past experience has led to Logica adopting a new approach towards the Defence market - seeking major software component subcontracts through ongoing partnerships with defence prime contractors in specialist areas.

5.4 Research and Development

Few companies in this sector reported investment in research and development. Instead, research and development appears to take the form of on-going product and process development. ASC, AMECON, ADI (NED) and, on a smaller scale, the Dawson Group, are continually developing their capabilities as part of their overall function as project managers and systems integrators.

ASC derives its capabilities from its parent company, Kockums Pacific. The Transfield companies and the other companies in this sector have developed their capabilities within the company.

5.5 Exports and Future Markets

A number of shipbuilders and component producers contacted reported civilian export sales. Companies viewed development in terms of their current activities but with an increased emphasis on exports to overcome problems of local low demand.

Exports

Among the smaller shipbuilders, ASI's export sales of commercial vessels were estimated at around 30% of turnover. The small ship and boat builder, Stebercraft exported most of its production. NQEA exports fast ferries and hovercraft worth 5% of sales to South East Asia and the Middle East.³ Component manufacturer Promet Valve reported export sales to New Zealand and Singapore to the value of 10% of sales.

None of the major companies, AMECON, ASC or ADI, have export sales. No company reported defence related export sales.

Future Markets

The issues faced by AMECON in developing future business have been described in section 5.2. ASC is likely to face similar issues. The smaller ship and boat builders, and component makers identified continued development of their main products and related services within Australia and overseas as their most important future markets.

³ A number of other smaller ship and boat building companies (with low Defence involvement and not contacted during this study) are known to have significant export sales of specialised craft. For example, International Catamarans

Tasmania has exported fast passenger and car ferries to the UK and Uruguay and Oceanfast Pty Ltd exports custom-built aluminium and composite motor yachts worldwide. See *Australian Business Monthly*, August 1992.

Barriers to Development

Leaving aside issues affecting the major shipbuilders, the most commonly reported barrier to the development was the small Australian market and declining Defence expenditure. Companies contacted also focused on Defence related policy and management issues (see Section 5.6) when discussing barriers to their companies' development. The third major factor noted was strong regional competition based on lower labour costs. One firm noted that access to capital was a constraint on its particular activities.

5.6 Company Issues

The most important issue for major companies was the sustainability of current Defence related shipbuilding expenditure. This issue was discussed in terms of better Defence planning of its workload, improving continuity of workload, conglomerating Defence business, collaboration with industry to improve planning or "picking industry winners". Some potential difficulties with approaches such as picking industry winners were highlighted by another company which attacked regional arrangements which resulted in single sourcing of Defence work.

Companies suggested some improvements should be made to tender and contract administration related areas. These comments broadly related to reducing tender costs and improving Defence knowledge of companies. Particular suggested improvements were to streamline administration processes, reduce delays and reduce turnover of Defence personnel.

One company suggested that Defence could support companies by assisting with access to the New Zealand defence market.

5.7 Sector Capabilities and Defence Role

The most important issue in the defence related shipbuilding sector is the future shape and capability of the industry when the submarine and frigate projects reach their final stages. The shape and capability of the industry will primarily be determined by the capacity of AMECON and ASC to develop new markets although it will also be influenced by the way in which Defence meets its requirements in this sector.

Defence Exports

AMECON and ASC are powerful examples of the capability of Australian industry. The companies have shown world competitive skills in naval shipbuilding areas such as ship design and development, project management, systems integration, engineering services and heavy engineering as well other

capabilities related to electronics, information technology and military systems.

Figure 5.6

AMECON, ASC and ADI capabilities

AMECON	ASC	ADI (NED)
• Project management • Systems integration • Engineering consultancy • Heavy engineering • Ship refit, repair and maintenance • Ship design and construction	• Project management • Systems integration • Engineering consultancy • Heavy engineering • Ship refit, repair and maintenance • Ship design and construction	• Project management • Engineering consultancy • Heavy engineering • Ship refit, repair and maintenance

The successful performances of ASC and AMECON and the extensive capabilities which they have developed are in themselves not necessarily sufficient for the development of a commercially based, defence related shipbuilding industry.

The obstacles to development of a commercially based, defence related shipbuilding industry are well known to AMECON and ASC. National governments often favour indigenous companies for the development and construction of naval vessels. As a consequence many nations have naval construction capabilities (at base, these are relatively straightforward heavy engineering – "metal bashing" – capabilities) and the world market has significant over capacity.

At the level of business competition, the most successful commercial naval design and construction companies such as ASC's parent, Kockums, have extensive histories and experience of design and development of new craft. The size of their businesses means they are constantly developing new designs and represent the leading edge of naval technology.

The investment required to match such an existing skill, even from Australian existing high skill levels, may be prohibitive. The major international companies also have strong marketing experience and networks to meet the particular requirements of national governments.

Figure 5.7

Benefits of Investing in Local Capability Development

The investment in the establishment of the AMECON and ASC facilities has been estimated informally within Defence as 8% to 10% of the total project price, or \$800m to \$1000m. The major potential benefit of this investment is the creation of an internationally competitive naval construction facility which will not in the future require further subsidisation. A preliminary evaluation of the competitiveness of the facilities will be possible with submission of tenders for current naval projects.

A second potential benefit from these projects is the development of viable defence related commercial businesses, both in shipbuilding and other supplier industries such as electronics. At this stage in the projects' lives there is limited evidence of such development.

Other potential returns are:

- increased repair, maintenance and overhaul capabilities;
- development of skills and potential civilian businesses and exports for the prime contractors;
- some increased technology capability in a number of supplier companies, with potential export spin-offs;
- demonstration effects, such as best practice project management on related industries; and
- regional economic stimulus (though with countervailing effects on the remainder of the economy – see Chapter 10).

Clearly, the benefits following from the investment deserve a systematic evaluation and should be a future priority for Defence industry policy.

For these reasons, industry observers suggest that AMECON and ASC would have difficulty in competing in markets for major vessels such as frigates or submarines, except with extensive direct government support. This reality is reflected in AMECON and ASC's own business strategies.

It does not rule out, however, the possibility that either company may develop over time smaller specialised craft, such as patrol boats, to meet particular naval requirements of other governments. There are already examples (such as the Transfield company ASI exporting patrol boats to the Middle East) of Australian companies successfully undertaking such diversification. These examples, and others in the civilian market, are evidence of the international competitiveness of the Australian small shipbuilding industry.

A further possibility may be for the formation of alliances with major international companies to develop, construct or market vessels or capabilities. Such a direction would be likely to involve some significant equity investment and a strongly competitive Australian industry base.

Civilian Markets

The civilian shipbuilding market shows increasing evidence of international competitiveness, with a reducing reliance on direct government support. Reports from companies show some exports

while a recent government inquiry also provides additional evidence.⁴

The available examples of exports, for example those by Stebercraft and NQEA, do not suggest any single pattern of Australian competitive advantage. Rather, the experience to date suggests that successful exporters target particular markets with specialised, smaller craft based on company specific skills and capabilities. This appears to be mirrored in exports by the smaller marine components manufacturers.

The major companies, AMECON and ASC, in their business strategies have also examined the potential for expansion in this area. They are also looking at a wide range of civilian areas unrelated to shipbuilding.

As AMECON has identified, there are some important barriers for naval shipbuilding companies seeking to diversify into civilian markets. The most important barriers are the higher cost structures, particular quality requirements and specialised skills required in defence related shipbuilding.

Defence Role

Two important potential roles for Defence can be identified for assisting the development of defence related shipbuilding capabilities. These are the clarification of future Defence requirements in consultation with companies, and improvements in general management areas (these areas are dealt with in more length in Part Five of this Report).

The key industry issue is the likely level of Defence naval expenditure and the prospect of industry rationalisation. The award of the next round of major naval contracts will in particular have important implications for company viability.

It is widely accepted that Defence expenditure will not be sufficient to sustain a level of activity to be experienced at the peak of the submarine and frigate projects. Known Defence requirements suggest a more modest level of new design, development and construction with continuing requirements for repair, maintenance and overhaul.

A policy based clarification of future requirements and the basis for awarding contracts would be an important guide for industry. A necessary component of such a planning exercise is the closer definition of Defence strategic requirements for the shipbuilding sector, the particular means through which these capabilities will be maintained and estimating future Defence demand and its implications for industry supply.

⁴ See *The Shipbuilding Industry: In the Wake of the Bounty*, Report by the House of Representatives Standing Committee on Industry, Science and Technology, AGPS, May 1992.

Defence also has other roles in the development of the shipbuilding sector. Its specification of requirements may take into account the potential for related commercial sales as a means of assisting companies to broaden their market and reducing Defence dependency.

Defence will also continue work closely with particular companies providing specialised capabilities to meet Defence's strategic needs.

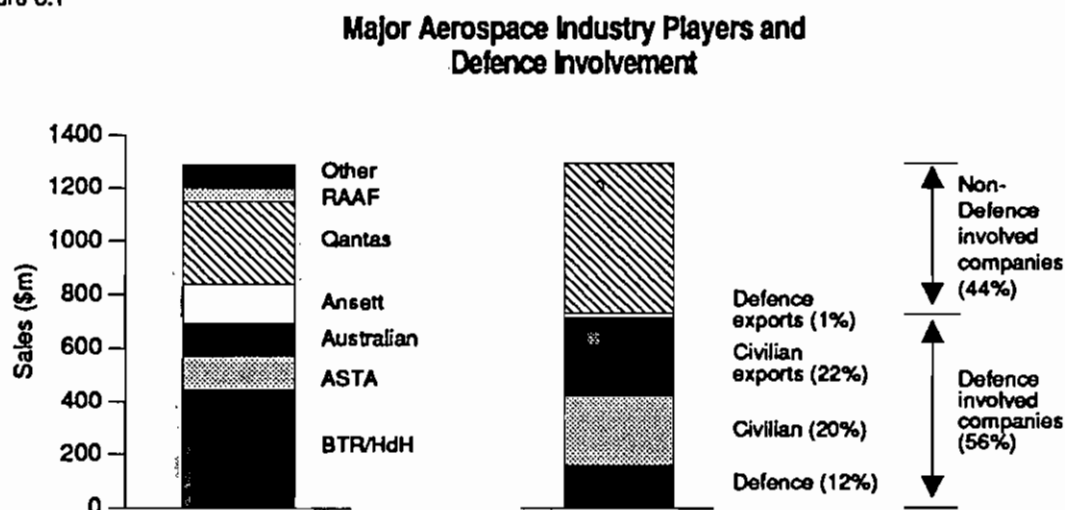
6. Aerospace Sector

Defence is an important customer for many aerospace companies, including the major companies Hawker de Havilland and ASTA. It is not however driving the development of the aerospace sector nor is it a dominant customer. Defence does, however, play a key role in the development of particular company based capabilities related to its special needs.

6.1 Industry Structure

The Australian aerospace industry (excluding aviation electronics) can be divided into two major portions – the repair and maintenance operations of the RAAF and the three major airlines, and the diverse operations of the two aerospace groups BTR-Hawker de Havilland and Aerospace Technologies of Australia (ASTA).¹ Best available estimates suggest that other aerospace companies account for around 10% of industry sales.

Figure 6.1

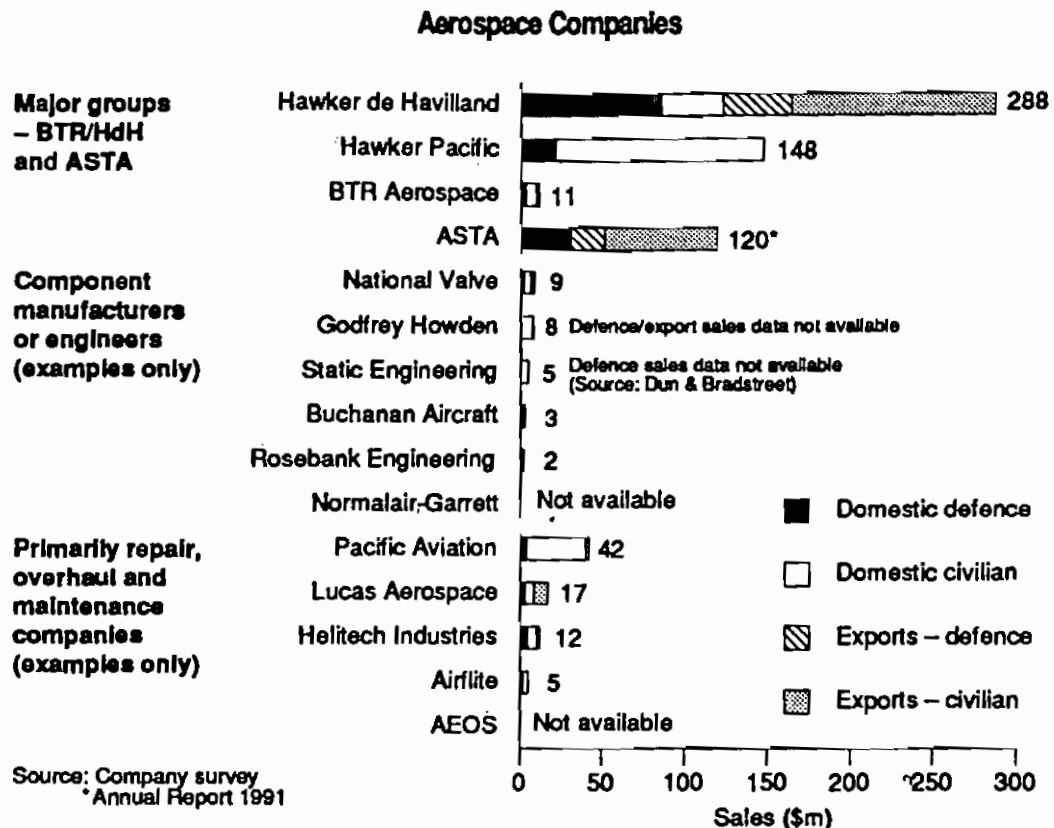


Source note: This estimate is compiled from a variety of industry sources and responses to the company survey – it should be used as a broad indicator rather than a precise measure

Defence currently accounts for a relatively small proportion of overall aerospace sector revenue

¹ The BTR-Hawker de Havilland companies – Hawker de Havilland, BTR Aerospace and Hawker Pacific should be treated as one group following the November 1991 takeover by BTR Plc of Hawker Siddley Plc, Hawker de Havilland's parent company.

Figure 6.2



The BTR-Hawker de Havilland Group and ASTA are the most significant aerospace companies

In addition to the main players, there are also many smaller firms mostly carrying out repair, overhaul and maintenance services (including distribution of parts), or operating in particular niche areas. Examples of repair, overhaul and maintenance companies are Pacific Aviation, Lucas Aerospace, Aircraft Equipment Overhauls & Sales (AEOS) and Airflite.

Buchanan Aerospace, a specialist in composite fibre technology, is an example of a niche company. A large proportion of Buchanan's work is now related to the production of components for the Collins submarine project.

An example of a company commercialising specialist products is Helitech Industries, which is licensed to develop for civilian use composite repair technology, developed at DSTO's Aeronautical Research Laboratory.

A third example of a niche company is Rosebank Engineering, which manufactures and overhauls critical flight control hydraulic engineering components for F111 aircraft. The Rosebank Engineering facility was developed to meet pressing RAAF requirements for these strategic aircraft components.

6.2. Key Companies

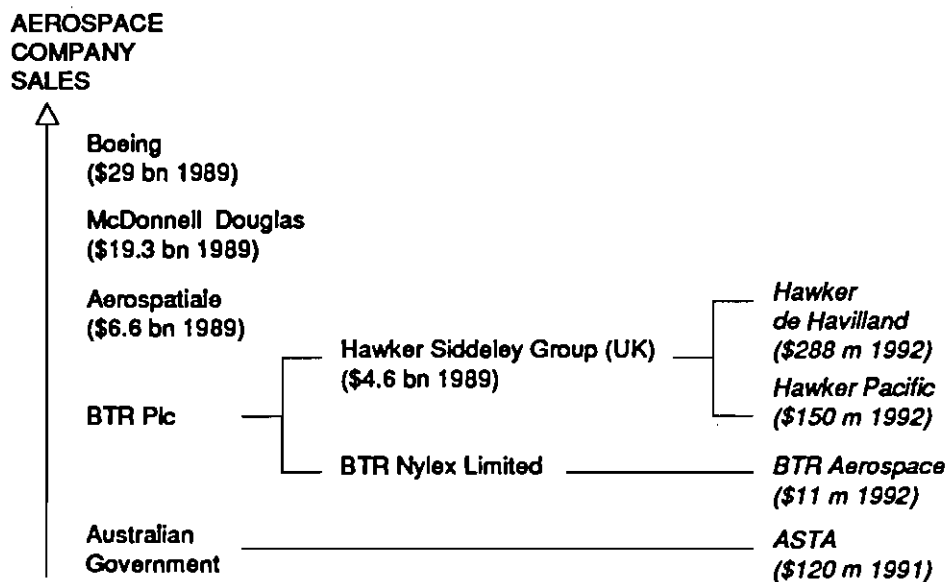
The two major aerospace companies face similar strategic challenges with widely different resource bases and corporate structures.

Corporate Structures

Leaving aside RAAF and airline repair and maintenance operations, the BTR-Hawker de Havilland group is clearly the most significant player in the industry. It is more than three and a half times the size of ASTA and, taking into account BTR Aerospace and Hawker Pacific, has a wider base of operations.

Figure 6.3

Hawker de Havilland and ASTA Corporate Structures



Source: Annual Reports

Hawker de Havilland and the other Australian BTR companies are part of a global aerospace company

The corporate structures of the major players, Hawker de Havilland and ASTA, stand in marked contrast. Hawker de Havilland is part of the global Hawker Siddeley Group now owned by BTR (UK). In contrast, ASTA, owned by the Australian Government has no ownership links with the global aerospace industry.

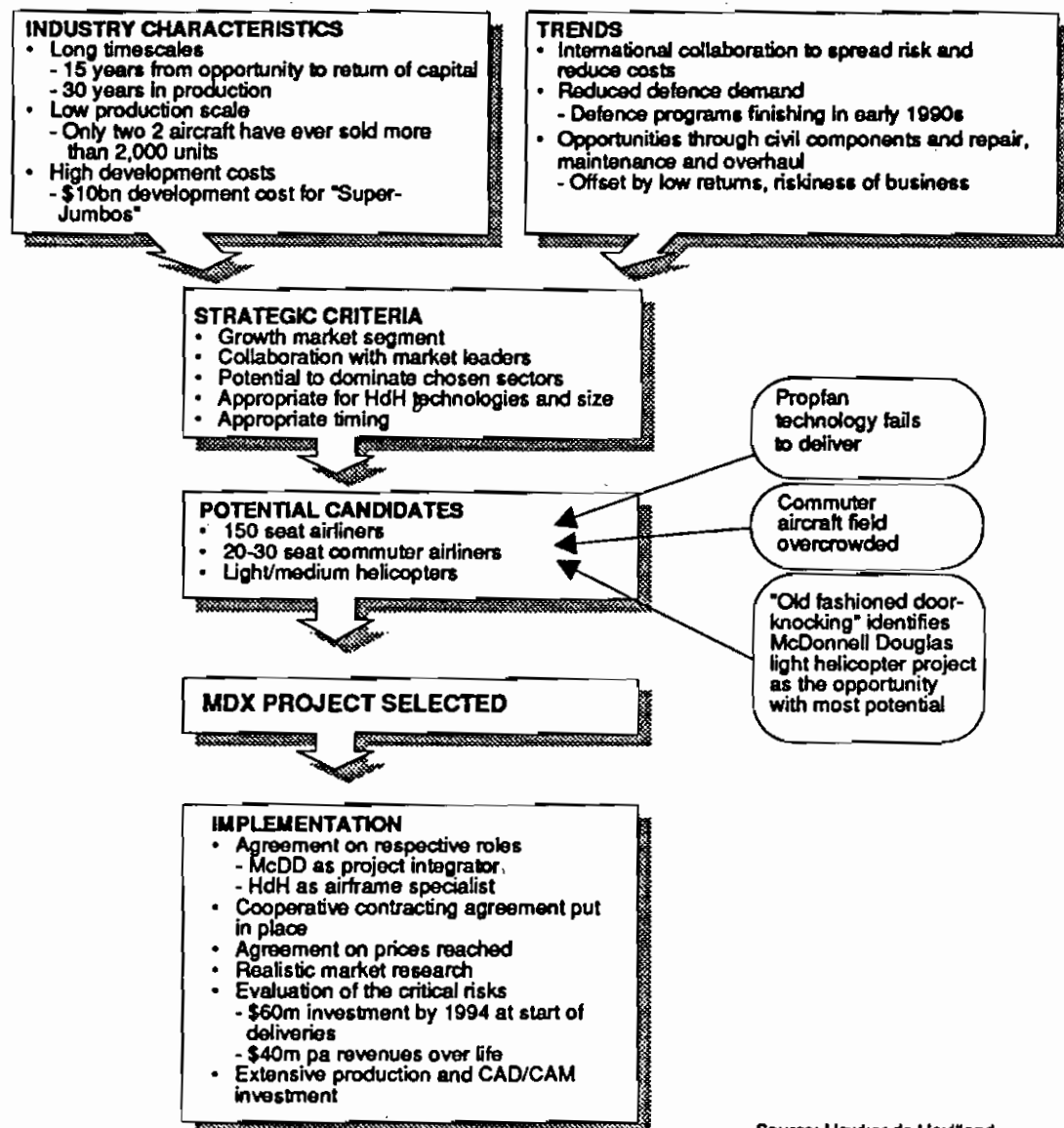
Strategic Issues

Both Hawker de Havilland and ASTA face similar business challenges. They compete in a highly concentrated international aerospace market, subject to significant demand fluctuations. Neither company currently owns major aerospace technology products. Their operations are currently dependent on two major activities – defence related production and repair, overhaul and maintenance; and civilian aircraft component manufacture and refits.

Hawker de Havilland regards this level of dependence as highly unstable for their business, and an unsuitable platform for future development. Production of both military and civilian aircraft is very competitive for subcontractors without equity stakes. International repair, overhaul and maintenance business is also extremely competitive and may not generate sufficient profits for major investment.

Figure 6.4

Hawker de Havilland's Strategic Planning for the MDX



Source: Hawker de Havilland

The Hawker de Havilland strategy was to gain an equity share of a major international project to which the company could contribute in its core areas of competence

Hawker de Havilland's strategy is to seek ownership of a major aerospace product through investment in a joint venture development of the MDX helicopter with McDonnell Douglas. Its

potential investment in the project of around \$100m, representing some 20% of the project, is a major risk for the company.

Commensurate with this risk is the prospect of manufacturing rights and regional marketing rights with sustained high levels of sales over the coming decade. The collaboration in the MDX project has also attracted international offers of collaboration in new fields.

ASTA's strategy has been to pursue aggressively the highly competitive commercial components, systems engineering and heavy aircraft maintenance businesses. As a result of this strategy the company has won long term maintenance and overhaul contracts for British Airways Boeing 747 aircraft, providing a strong base load for the company for several years.

Coupled with this direction, the company has continued to restructure its business, increasing the focus on profitability and developing an appropriate skill base for the company.

Both Hawker de Havilland's and ASTA's strategies potentially increase the depth of skill available for Defence work in repair, maintenance and overhaul, and in manufacturing.

6.3. Impact of Defence Spending

Defence accounts for a significant proportion of aerospace companies' sales if the repair, overhaul and maintenance expenditures of the major airlines and the RAAF is excluded from calculations. As a result, companies undertaking Defence work regard Defence as a core customer for their businesses.

Defence Sales and Industry Turnover

Defence spending in the aerospace sector is estimated, on the basis of the company survey and other industry information, to be more than \$200m, with 60% to 70% of expenditure earned by Hawker de Havilland and ASTA.²

Defence spending is estimated to account for around 12% of aerospace industry spending as a whole. However, for key aerospace companies, Hawker de Havilland and ASTA, and other smaller companies involved in defence work, the proportion of turnover accounted for by Defence is significantly higher.

Defence spending accounts for between 20% and 90% of sales for the sample of smaller companies contacted. This group of companies should not be considered representative of the wider group of small aviation companies which concentrate on civilian aviation.

Hawker de Havilland and ASTA both have a Defence proportion of turnover of between 30% and 40%. Hawker de Havilland and ASTA

² A more precise estimate should be based on detailed analysis of Force expenditures.

are also highly dependent on civil aircraft component production, accounting for over 50% of turnover in both cases.

The military aircraft production component of spending has reduced significantly in recent times, creating difficulties in maintaining base workloads for Hawker de Havilland and ASTA.

Importance of Defence

Defence is regarded by the group of companies contacted primarily as a critical customer, "a mainstay", particularly in the areas of repair and overhaul work.

A small number of companies contacted suggested that Defence work played an important role in demonstrating credibility for sales to overseas defence forces. Others stated that it has been important in developing overall company capabilities and skills. For example, the establishment of Rosebank Engineering was driven by RAAF strategic requirements.

Hawker de Havilland and ASTA have stated previously that Defence related aircraft manufacturing (arising from decisions to subsidise Australian military aircraft production) has contributed to the development of core capabilities which allowed them to undertake their civilian component exports.

6.4. Research and Development

Most aerospace companies reported low levels of investment in research and development compared with total revenue (see Figure 11.10 showing major defence industry R&D activities). The types of activity undertaken broadly fall into two groups - applied technology development; and niche product development. The smaller repair, overhaul and maintenance companies do not engage in any specific R&D programs. However, they are continually upgrading their capabilities and often develop testing equipment and procedures.

Of the companies in the BTR-Hawker de Havilland group, only Hawker de Havilland reported that it was currently involved in research and development. This activity is primarily associated with the MDX helicopter project, concentrating in the area of composite materials technology. Hawker Pacific and BTR Aerospace concentrate on their repair, overhaul and maintenance capabilities while components manufactured by BTR Aerospace are 'build to print'.

ASTA is undertaking research into composite materials technology for aircraft structural components as well as the design and engineering of electronic defence systems.

Of the smaller, niche companies, Helitech Industries and Buchanan Aircraft are both undertaking research into composite materials

technology with Buchanan also developing the niche product known as MIRF (Mobile Intensive care Rescue Facility). Rosebank Engineering has undertaken significant research and development for the Precision Hydraulic Power Supply (PHPS) related to its production and overhaul of hydraulic control systems for the F111.

Helitech Industries' composite material bonding technology and Rosebank Engineering's PHPS were initially developed through DSTO's Aeronautical Research Laboratories.

Few other companies reported Defence funding of research and development. The overseas aircraft manufacturers are the most important source of research and development information while local research and development activities are carried out in cooperation with a range of academic and government institutions.

6.5. Exports and Future Markets

Hawker de Havilland and ASTA are major Australian exporters of elaborately transformed manufactures – civilian aircraft airframe components. The most important market developments in this sector are the Hawker de Havilland MDX project and ASTA's work to secure major overhaul business for international airlines.

Smaller companies have also developed some exports, driven by the recognition that the small Australian market cannot support significant company expansion.

Civilian Exports

Hawker de Havilland and ASTA's combined revenue from exports of airframe components, together with repair, overhaul and maintenance exports, is around \$230m per year. Hawker de Havilland, in the development of its corporate strategy, has noted that both these businesses are regarded as very price sensitive and competitive.

A number of the smaller companies contacted, such as National Valve and Engineering, Lucas Aerospace and Pacific Aviation reported export sales. Exports in these companies accounted for between 4% and 50% of sales and involved both component manufacture and repair, overhaul and maintenance services.

Defence Related Exports

Hawker de Havilland and ASTA account for nearly all of the estimated \$50m defence related exports from aerospace companies. Hawker de Havilland's major activities are overhaul, repair and maintenance of engines for Asian, US and Middle Eastern defence forces; engine component manufacture for the US Navy and systems integration activities. ASTA's major export activities are

the design and engineering of defence avionics systems and the repair and maintenance of aircraft.³

Other companies report minor defence related exports. For example, BTR Aerospace reported brake and landing gear and other component sales to Europe and the US worth around 20% of total export sales of \$1.5m.

Key Future Markets

As outlined in Section 6.2, Hawker de Havilland and ASTA have adopted distinct strategies. In Hawker de Havilland's case, the most important strategic direction is equity investment in the MDX helicopter. Other businesses stated to be targeted include engine component manufacture (for international and Australian/defence and civilian markets); defence related airframe repair and overhaul; Australian defence systems integration and international civilian pilot training.

ASTA views its key future markets as commercial aircraft component manufacture for export, heavy aircraft maintenance and overhaul services to overseas airlines and systems engineering.

The smaller companies contacted reported business development directions in keeping with their core capabilities. Most companies placed substantially increased emphasis on export markets.

Barriers to Development

Four barriers were most commonly nominated as limiting the development of Australian aerospace companies. The small Australian market placed pressure on companies to seek growth off-shore. Credibility was regarded as an important factor in entering new markets, with sales to Australian Defence forces an important factor in demonstrating capability. Overseas ownership of intellectual property rights was nominated as limiting growth in a few cases. Access to capital to finance expansion was seen as a problem for some of the smaller manufacturing companies.

Other barriers nominated by individual companies included lack of overseas sales or distribution links, high Defence related production costs and company willingness to undertake off-shore expansion. Some comments were also made about Defence related barriers to development (see Section below).

³ A potential problem with export classification of services is highlighted in the area of systems integration. Some companies regarded work for overseas primes on systems integration tasks for Australian defence projects as "exports". Insufficient data is currently available to estimate the magnitude of exports classified in this way.

6.6. Company Issues

Aerospace companies contacted identified three major areas for improving Defence dealings with companies and refining Defence policy for industry. The most important group of improvements related to tender practices and contract administration. Suggested improvements included streamlining tender and contract administration processes; reducing tender and contract administration personnel turnover; improving the consistency of criteria for awarding contracts; ensuring that tenders, once called, are not withdrawn; reduced tender time frames; pre-qualification of bidders; and giving personnel responsible for contract administration greater responsibility.

A second important group of suggested improvements concerned Defence knowledge of aerospace companies – improving Defence knowledge of companies and commercial practice, and increasing appreciation of company capability in evaluation of tenders. Related to this was the suggestion that increased recognition be given to the effects of procurement decisions and practices on the development of desired Defence related capabilities. Some regional companies felt that local Defence administrations were uninterested in evaluating the capabilities of companies not located near to regional bases.

The third area related to direct government support for the aerospace industry. A small number of companies called for policy changes such as direct subsidisation for Australian companies to compete overseas and increased funding for Defence strategic infrastructure.

6.7. Sector Capabilities and Defence Role

Three broad aerospace related capabilities can be identified – design and development; production and assembly; and repair, overhaul and maintenance. Each of these capabilities can be applied to whole aircraft systems or particular components for various classes of aircraft. Training or other services may also be developed around these broad capabilities.

While many Australian companies can claim to have at least some measure of skill in some areas, the key question is in which of these areas is there evidence of an internationally competitive and sustainable capability.

Design and Development

Hawker de Havilland's MDX project is a critical test of the Australian capability to design and develop major elements in a new international aerospace project.

The project has important features which suggest a pattern for the future involvement of Australian companies in development of

aircraft. First, Hawker de Havilland is the largest Australian aerospace company and has made a substantial, potentially risky, investment in the project after a long period of market research and strategy development. It has focused its involvement closely by only undertaking airframe related design and development. It has not attempted to compete directly but rather to co-invest with an existing major international player.

Figure 6.5

Hawker de Havilland and ASTA Capabilities

Hawker de Havilland	ASTA
• Defence aircraft and helicopter production • Commercial airframe design and manufacture • Engine component manufacture • Aircraft repair, overhaul and maintenance • Defence systems integration • Pilot training	• Aircraft design and manufacture (training and commercial) • Aircraft component design and manufacture • Aircraft repair, overhaul and maintenance • Defence electronics • Avalon Airport management and development

Both Hawker de Havilland and ASTA have a broad range of aerospace related capabilities

The Hawker de Havilland experience, and that of other industry players, confirms that Australian companies currently possess, or can develop, aerospace design and development skills.

However, the commercial development and exploitation of these skills is likely to be hampered by other factors such as absence of market or business knowledge and skills, ownership of key intellectual property, marketing and distribution networks and credibility to attract investment.

The evidence suggests that, apart from potential large joint venture projects such as that undertaken by Hawker de Havilland, Australian companies are likely to be most successful by focusing their activities on niche areas related to the particular company's core capability.

This type of industry development will be difficult to influence at a broad government policy level. Rather it will be driven by customer requirements and companies' attention to market needs. Defence can serve as an important developer of capability at the company level by closely focusing on its strategic requirements and working with companies to meet those needs within a competitive market based framework.

Production and Assembly

Defence's experience shows that Australian companies have the capacity to produce and assemble complete military aircraft. This activity takes place at a premium to the international market. No Australian company currently undertakes such activity on a commercial basis.

Reasons for the absence of a sustainable Australian military aircraft production capability can be traced to structural and market factors. The small Australian market and other governments' support for local production in the past has limited sales and the scale of production here. The superior production scale enjoyed by producers in larger markets, often with support from their national governments, has led them to develop highly specialised business and technological capabilities which are major barriers to the entry of new players to the market. Specialised manufacturing requirements, small production runs of military aircraft and security considerations limit the opportunities for overseas component manufacturers to supply military aircraft manufacturers. Evidence of these forces in shaping industry structure is seen in the rationalisation of world military aircraft production to relatively few major players.

Hawker de Havilland and ASTA do, however, produce and assemble important airframe components for international aircraft companies. The companies believe that this business was made possible because of the base workload and experience generated through Defence work. The companies' present activities in civilian airframe components represent a narrowing of focus from the broad offset related business.

The development of sustainable commercial activity from an offsets base may have been possible because of the state of development of the international aircraft manufacturing business. In a rapidly growing and changing aircraft production market of the 1970s and 1980s, many opportunities for participation in component manufacture would have arisen. It would not be expected that such a transition would be as likely to be successful in the more mature industry of the 1990s.

The airframe component business is highly price sensitive and very competitive. Its development has also been influenced by DITAC policy promoting access to US component manufacturing markets. Key factors in the sustainability of this business will be continuing access to foreign markets and high levels of productivity. Similar factors may be expected to apply at the level of component or subsystem manufacturing.

There is little evidence to suggest that Defence would generally have an important role in developing this business. No commentator contacted believed continued offset related aircraft work has significant business development spin-offs although it may have some importance for on-going aircraft maintenance.

In particular cases, Defence seeks to develop specialised capabilities to meet strategic needs. It may also promote access to markets as a demonstration customer, or generally develop company capability by acting as a leading edge domestic customer.

Repair, Overhaul and Maintenance

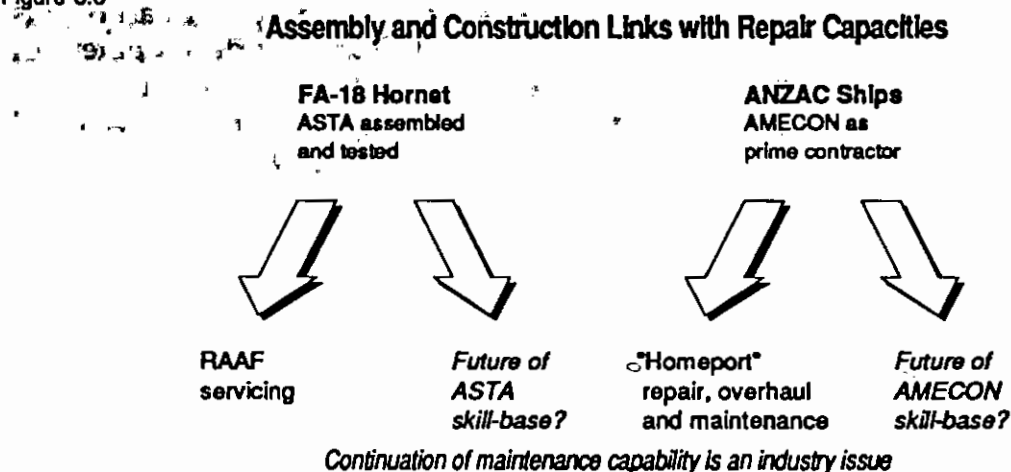
There is considerable evidence of the competitiveness of Australian companies' repair, overhaul and maintenance capability. Among the most important examples is ASTA's servicing of large, commercial airliners. Below this level, smaller companies carry out aircraft and component servicing for customers from regional markets.

Aircraft specific repair, overhaul and maintenance capabilities are the most critical strategic skill for Defence. These skills are likely to continue to be maintained by the RAAF directly or through contracting to the civilian sector.

There is no evidence to suggest that Defence plays a major role in the development of this component of the industry's business. However, as industry comments suggest, Defence may contribute by improvements in management practices.

A particular issue for companies seeking to maintain military aircraft was the difficulty of maintaining skilled capacity arising from assembly operations without a baseload of outsourced maintenance work on the particular aircraft. This issue was also raised in the shipbuilding sector.

Figure 6.6



Defence's role in the expansion of this component of industry capability will be influenced by the degree to which military aircraft maintenance is carried out within Defence. There is insufficient evidence on which to base a firm judgement about whether increasing civilianisation of military aircraft repair, overhaul and maintenance would have a significant effect beyond expanding domestic industry sales. A specific study of repair and maintenance issues in the aerospace sector would contribute to understanding of effects of civilianisation and approaches to maintaining skills.

7. Vehicle, Ordnance and Other Sectors

Defence purchases are not significant for the vehicles sector overall, although some companies may specialise in Defence work.

ADI's ordnance divisions and imports meet Defence requirements in the ordnance sector. The key issue in this sector is the level of local production capability required and the associated premium to be paid to maintain this capability.

Defence has little effect on other industries' development except in its dealings with particular companies specialising in Defence work.

7.1 Vehicles Sector

Most Defence vehicle requirements are met by production by the domestic vehicle industry or by imports of particular types of vehicles. In a few cases, such as that of Jaguar Rover Australia, a local company manufactures special defence vehicles.

Industry Structure

The passenger vehicles market is dominated by the local manufacturing subsidiaries of Toyota, Ford, General Motors and Mitsubishi, accounting for some 70% of the total market. The rest of the market is served by importers, the largest of which is Mazda. A cluster of component manufacturers has been built up to serve the local manufacturers and overseas markets.

The commercial vehicles market is approximately one third of the size of the passenger vehicles market. Within the commercial vehicles market, Toyota is the leader in the light commercials with more than a third of the market. Most of the light commercials are imported. In the large-truck market, Volvo is the market leader with a 20% share. Other truck companies include International, Ford, Scania, Kenworth, Mack and Mercedes Benz. Many of the trucks are locally assembled from overseas kits, although there is some local manufacturing capability. Buses are supplied predominantly by MAN and Mercedes Benz.

Truck body and bus building is done locally. There are also a number of small manufacturers specialising in niche vehicles. Haulmark Trailers adapt their low loaders for Defence use and Simon Abbey provides materials handling equipment for Defence.

Vehicle repair, overhaul and maintenance capability is readily available throughout Australia. There are many small companies serving this market.

The major players in this sector are subsidiaries of large overseas multi-national corporations. Operating in a relatively small market

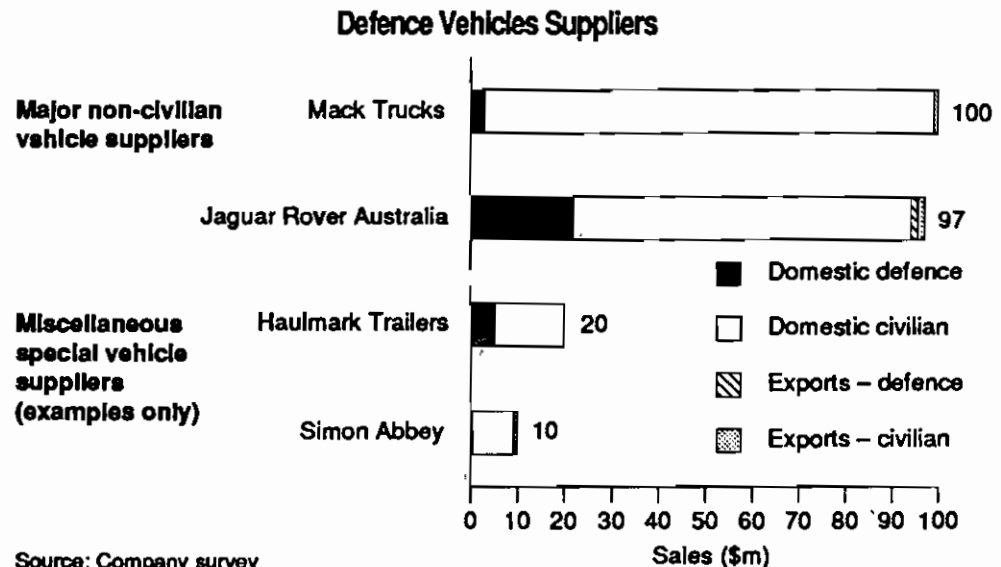
in the world, the Australian subsidiaries follow international trends and have extensive reporting lines back to their corporate headquarters.

Defence Involved Companies

The consultants were only able to identify a small group of companies with a significant current involvement in defence vehicles. The companies contacted were identified through consultation within Defence and through the consultants' knowledge of the vehicle industry.

The major current example of Defence involvement is Jaguar Rover Australia, contracted to supply four wheel drive vehicles to replace the Army's landrovers and landcruisers. Production consisted of 2,892 one tonne, 588 two tonne and 189 commercial four wheel drive vehicles. This represented a significant part of that company's activities.

Figure 7.1



Only Jaguar Rover Australia and Haulmark have significant Defence business

In the commercial vehicle sector, Mercedes Benz provided specialised trucks for Defence and Mack adapted their trucks for Defence use.

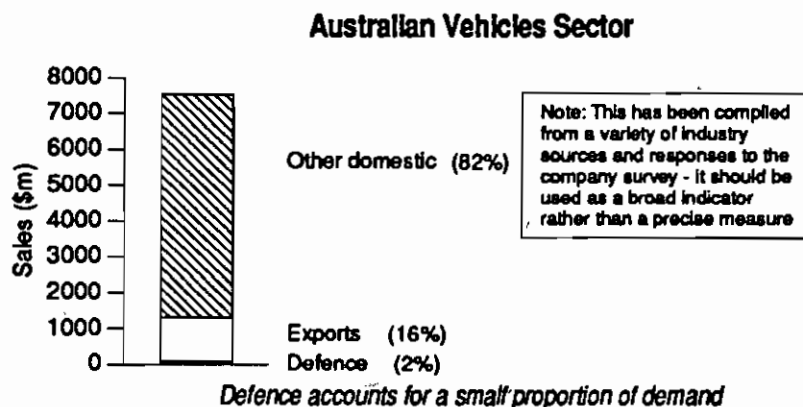
Defence also purchases a range of products from specialist suppliers such as Haulmark Trailers and Simon Abbey (which produces materials handling equipment) as well as from a wide range of component manufacturers. An example of such a component manufacturer is Mackay Consolidated Industries which makes special bushes for defence vehicles.

Defence purchases a wide range of vehicle related repair, overhaul and maintenance capabilities from industry. These are usually managed on a regional basis.

Defence Impact

In overall terms, Defence sales probably accounts for around 2% of industry turnover. This figure is similar to Defence's overall consumption of goods within the economy.

Figure 7.2



Except for the small group of companies which appear to specialise in Defence requirements, such as JRA or Mackay Consolidated Industries, Defence does not appear to have a significant impact on the development of vehicle industry skills or capabilities.

Research and Development

At the component manufacturer level, Mackay Consolidated Industries reported significant research and development (3% of turnover). Its work to commercialise the vehicle bush polymer has seen strong interest from overseas defence forces and manufacturers. The original technology for the bush was developed by DSTO's Materials Research Laboratory. Defence in this case has played the critical role in developing a niche technology to meet its particular strategic needs, with major prospects of successful commercialisation by a joint venture partner.

Future Markets and Exports

The only defence related vehicle export identified by the consultants was JRA's exports of Land Rovers, fire fighting vehicles and coaches to the Middle East. These exports accounted for around 2% of JRA's \$97m turnover. JRA is currently seeking to develop Pacific and Indian Ocean island export markets.

Mackay Consolidated Industries' commercialisation of the polymer vehicle bush is expected to result in significant export sales.

The major constraint on development identified in discussion with companies was the low level of current demand and the small Australian market. High transport costs and difficulties in offering "soft loan" facilities were mentioned as obstacles for expansion in overseas markets. Access to capital for funding research and development was an issue for Mackay Consolidated Industries.

Company Issues

Defence is generally treated as a normal government buyer by major vehicle companies. Among the companies contacted, no issues concerning Defence policy or management were identified.

However, a senior industry figure drew attention to overseas practices of major vehicle manufacturers producing specialist military vehicles from adjuncts to standard production capacity. It was suggested that this increases overall defence capabilities at less cost than the approach of establishing specialised facilities to manufacture relatively small production runs.

Sector Capabilities and Defence Role

Defence has little effect on the development of the vehicle manufacturing and component sector. Most importantly, the scale of Defence demand is not significant by international or domestic standards. There is no evidence to suggest that Defence procurement could influence the success of a significant vehicle export industry.

Defence will continue to rely on the capacity of the civilian industry to meet existing and potential needs for domestic industry capability. Should the need arise, the capabilities of the vehicle manufacturers could be adapted to produce defence vehicles over a period of months.

Defence sales are, however, important to companies as Defence remains a large single customer. Companies such as JRA with extensive Defence experience may be able to specialise in meeting Defence requirements within a competitive procurement policy.

The exceptions to this picture are in those areas in which Defence has particular, very specialised requirements which give rise to the development of a new industry capability. The example of this used in this Section was that of Mackay Consolidated Industries development of a polymer bush for Army vehicles.

Defence's most important role in developing this industry sector will be to work closely with qualified companies to develop the required technologies. Such a relationship has the capability to lead to significant company development in a significant, though small, number of cases.

7.2 Ordnance (and Explosives) Sector

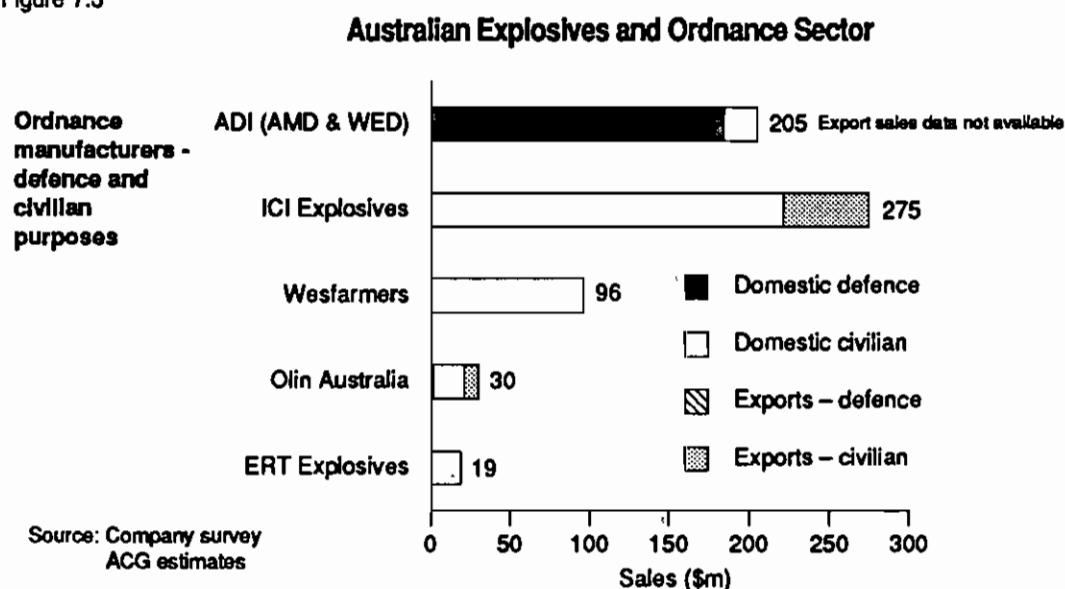
Australian Defence Industries (Ammunition and Missiles Division and Weapons and Engineering Division – ADI) is the only local supplier of weapons, ammunition, explosives and missiles to Defence. The rest of Defence's ordnance is imported.

Industry Structure

The civilian explosives sector is dominated by ICI Australia's Explosives Division with 60% of the market. Their main customers are in the mining and metals industries. Other companies in this sector include Wesfarmers who have about 25% of the domestic market, ERT Explosives and Olin.

Other than some cross-selling of feedstock between ADI and ICI, the civilian and defence sectors of the industry have no interaction with one another. There are few similarities between the activities of the commercial and military sectors, with major technology, cost structure, product, distribution and marketing differences.

Figure 7.3



There is no interaction between the defence and civilian ordnance sectors

ADI

The ADI ordnance divisions are heavily dependent on Defence work, which accounts for 80% of their turnover. There is only a small amount of local civilian work and the rest is exported for both defence and civilian uses.

Figure 7.4

ADI – Key Business Issues

Ammunition and Missiles

- Declining Defence demand
- Significant excess capacity and poorly performing assets
- Excess capacity internationally and industry rationalisation

Weapons and Engineering

- No major weapons programs from Defence
- Significant base workload arising from Collins submarine and ANZAC frigate projects
- Rationalisation of facilities and re-direction into large scale, non-Defence heavy engineering

Naval Engineering

- Reduction in workload with completion of major conversion projects
- Reduced Navy demand for East coast repairs
- Potential rationalisation of industry

Clothing

- Consistent demand for Defence clothing, uniforms
- Likely downturn in demand following completion of present contracts
- Re-direction to become low cost, specialised clothing producer and clothing related services

Other Divisions

- Volatile demand for training services
- Acquisitions and alliances to form basis of niche defence electronics company
- Development of defence related consulting services
- Bidding for logistics related defence contracts
- Creation of industrial decontamination consulting company to capitalise on specialist knowledge

Source: ADI Annual Report 1990.

ADI has recognised a range of key issues affecting business Divisions

The ADI ordnance divisions have recognised the need to restructure their operations and gain efficiencies to match their overseas counterparts. However, there are problems with economies of scale of the operations and declining demand. Even with new plants, ADI believes it will require a premium to maintain the local capability.

In weapons, ADI is producing the Hamel field gun and Steyr rifle, contracts which are expected to end in 1992 and 1994 respectively with some exports. ADI are looking to heavy engineering work in the civilian sector to offset this reduction in work.

Broad issues of concern to ADI about Defence policy and management processes are discussed under other sector headings.

Sector Capabilities and Defence Role

Considerable Defence policy and management resources have been devoted to examining issues associated with the role of ADI and Defence's requirements for local ordnance manufacture. The focus of the policy work has been on which types of ordnance should be produced in Australia on strategic grounds and what premium should be paid for their production. The consultants have not undertaken sufficient research to reach a firm judgment about these issues.

7.3 Other Sectors

Many other sectors also serve Defence. Companies in these sectors are usually providing capabilities as part of their normal commercial operations. There are many small companies which are largely dependent on Defence but they form only a small portion of the total turnover in their sectors. An exception is ADI which has the major portion of the Defence clothing market.

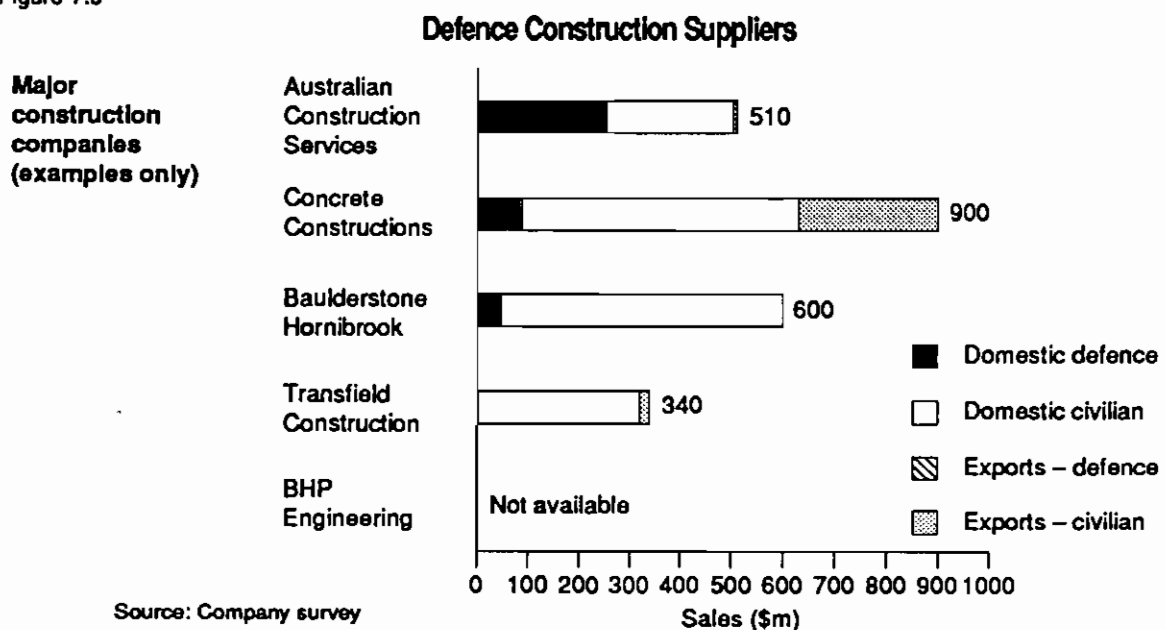
The Commercial Support Program will increase the number of companies that provide for Defence's needs in these sectors. Similarly, the Defence proportion of the turnover of these companies could increase.

Facilities

Civil construction and maintenance of Defence facilities has traditionally been dominated by Australian Construction Services (ACS). In the past, ACS has generated nearly 60% of its revenue from Defence related projects. Now, however, major Australian construction companies such as Concrete Constructions, Baulderstone Hornibrook, Transfield Construction and Leighton Contractors can bid directly for Defence contracts.

Although private sector construction companies will continue to generate most of their revenue from normal commercial work, it is expected that they will capture an increasing amount of Defence work from ACS. In 1986-87, Defence accounted for less than 1% of the sector's turnover; this may have increased as a result of the downturn in the commercial property sector.

Figure 7.5



Australian Construction Services has been Defence's major civil construction contractor

Heavy engineering and metal fabrication companies tend to regard Defence work as a supplement to their normal commercial work. Many of the companies in this sector provide products and services as second tier subcontractors to the prime suppliers of Defence projects. There are many companies in this sector capable of providing services to Defence.

Some companies reported modest levels of research and development activity. For example, BHP Engineering spends approximately \$1m on civilian related research through BHP's central research facilities. Most companies in this sector constantly improve and modify technologies and processes through their normal business activities and through the development of specific client solutions.

Companies reported significant levels of overseas civilian sales. Concrete Constructions identified 25% of its current \$900m sales arising from overseas projects. Low levels of domestic demand are considered to be the major barrier to companies' development.

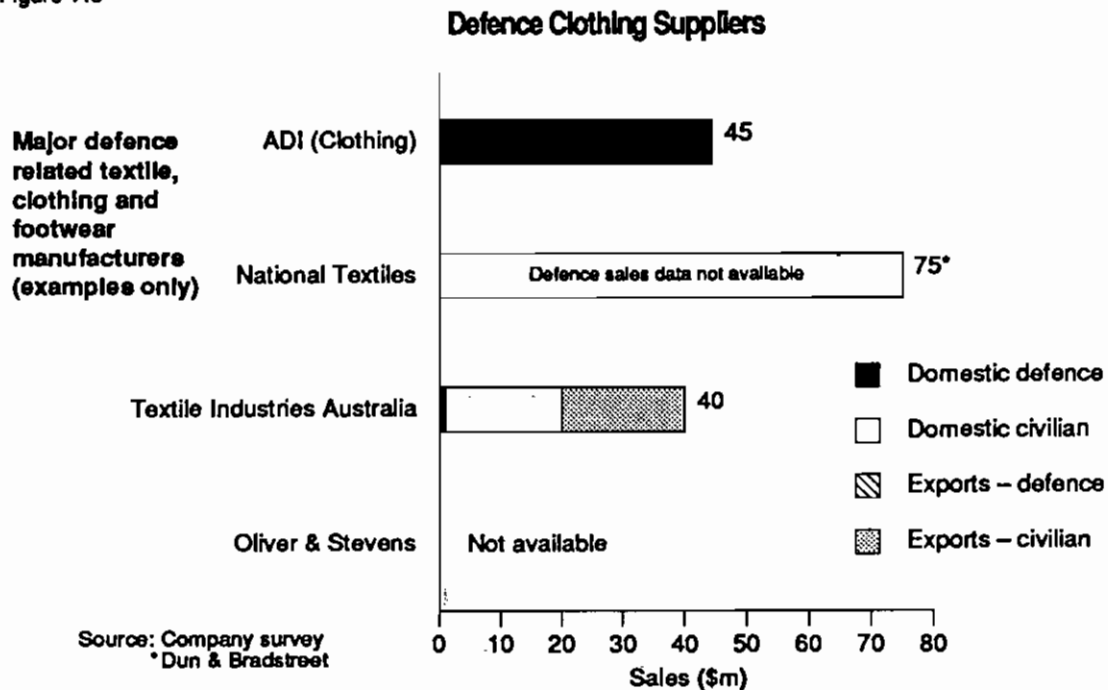
Tender management processes are an issue of concern to the small sample of companies contacted. Shorter tender periods and better definition of Defence requirements were suggested as areas for improvement.

Defence's relationship with the construction and facilities sector does not require any special policies beyond those currently in place.

Clothing

ADI - Clothing Division supplies most of Defence's needs in clothing and is heavily dependent on Defence's custom. The Commercial Support Program may reduce ADI's proportion of Defence work.

Figure 7.6



ADI is the dominant supplier of Defence clothing

ADI's Clothing Division does not currently export any of its production but is hoping to supply overseas markets with high quality military garments in the future. It is also hoping to expand its business in non-defence uniforms and special garments.

The civilian sector has lost market share to imports with the reduction of tariff and related barriers. The major issue in the industry is the continuing high levels of import competition and related concerns about high domestic labour costs, government and other charges and industry uncertainty.

Defence's relationship with the clothing sector should generally not require any special policies. However, Defence requirements for specialised clothing may require more enduring or closer relationships in particular cases.

PART THREE

The International (and Australian) Arms Market

Part Three

The International (and Australian) Arms Market

Summary of Main Points

- ☐ *Australia's defence expenditure puts us 17th of the top 20 nations. The US and USSR, prior to the formation of the CIS, together accounted for over 60% of world defence spending. Australia's position is broadly comparable with our standing in GDP per capita terms.*
- ☐ *Official figures recording Australia's defence exports are not readily obtainable but preliminary findings suggest exports of defence and related goods (ie armaments and military use only items) and dual use technologies totalled around \$A280m in fiscal year 1990-91 or around 1.3% of world trade in those items.*
- ☐ *Australia's largest defence dependent manufacturer is Australian Defence Industries (ADI). Its 1990-91 turnover of \$A446m (\$US343m) places it outside the world's top 100 producers yet its high defence dependence is matched by only five of the top 100 companies, 4 of whom are shipbuilders.*
- ☐ *The international market in conventional arms¹ has been contracting since the mid to late 1980s, reversing a long period of expansion since the end of WWII.*
- ☐ *The easing of cold war tensions is shifting the focus of regional arms trade and product type. Expenditure is expected to fall in NATO countries and former Eastern bloc nations while some growth is expected in the ASEAN region.*
- ☐ *The general tightening of fiscal conditions and the resulting requirement for more efficient use of resources suggests that suppliers capable of enhancing performance through "intelligent" control systems for weapons platforms and their armaments will gain an increasing share of the arms market. Platform lives will tend to be extended by periodic refits.*

¹ The term "arms" is taken to mean armaments and supporting supplies and technology. Conventional means non-nuclear.

8. World Trade In Arms

Part Three of this Report deals with the outlook for the world arms market and Australia's defence industries. Chapters 8 and 9 examine global trade and trends in the arms market.

This Chapter shows how the international market in conventional arms has been contracting since the mid to late 1980s, reversing a long period of expansion since the end of WWII. The easing of cold war tensions is also shifting the focus of regional arms trade and product type. As a result, expenditure is expected to fall in NATO countries and former Eastern bloc nations while increased spending is expected in the ASEAN region.

8.1 Defence Spending

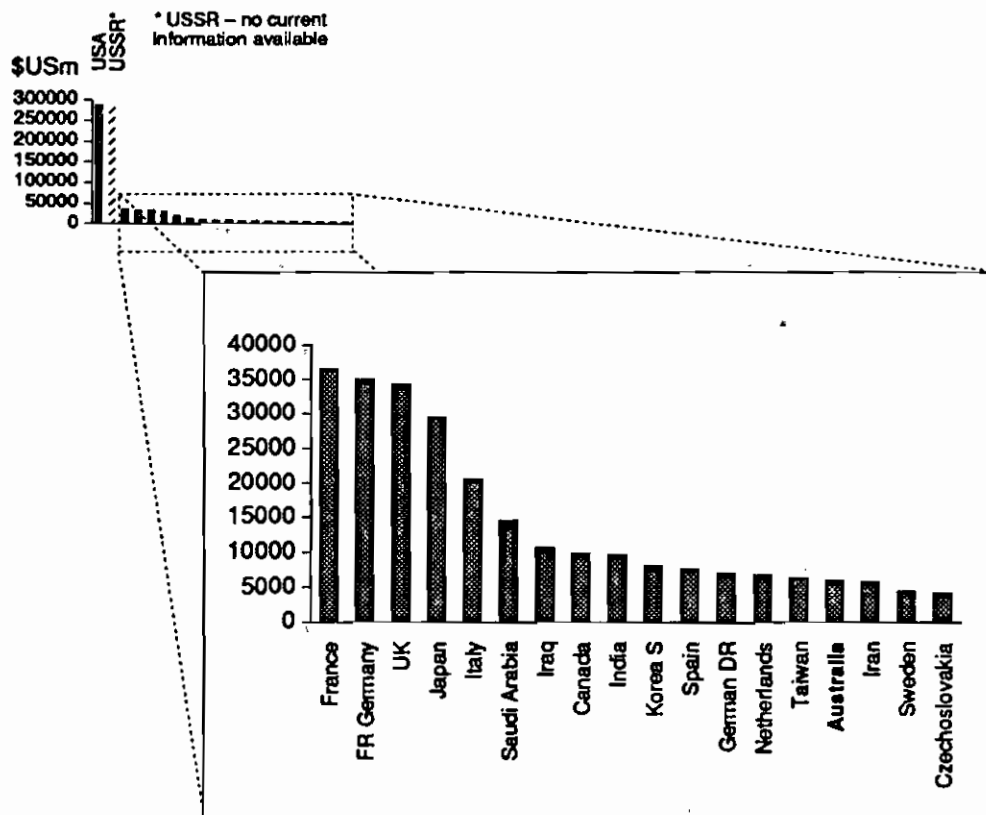
World trade in arms appears to be about 7.8% of world defence spending on goods and services, probably about half the rate of world trade to GDP generally. This is not surprising in view of the premium on self-reliance by governments. It also highlights major distortions in the global arms market.

The US is the Western world's leading producer of arms and defence related products and has the largest defence budget. There are no readily available data for the former Soviet States but their expenditure was thought to be comparable to that of the US in dollar terms, although substantially more as a proportion of GDP.

Australia's defence expenditure in 1989 put us 17th of the top 20 nations. The US and the former USSR together accounted for over 60% of world defence spending in 1989. Australia's position was broadly comparable with our standing in GDP per capita terms.

Figure 8.1

Top 20 Defence Spenders 1989



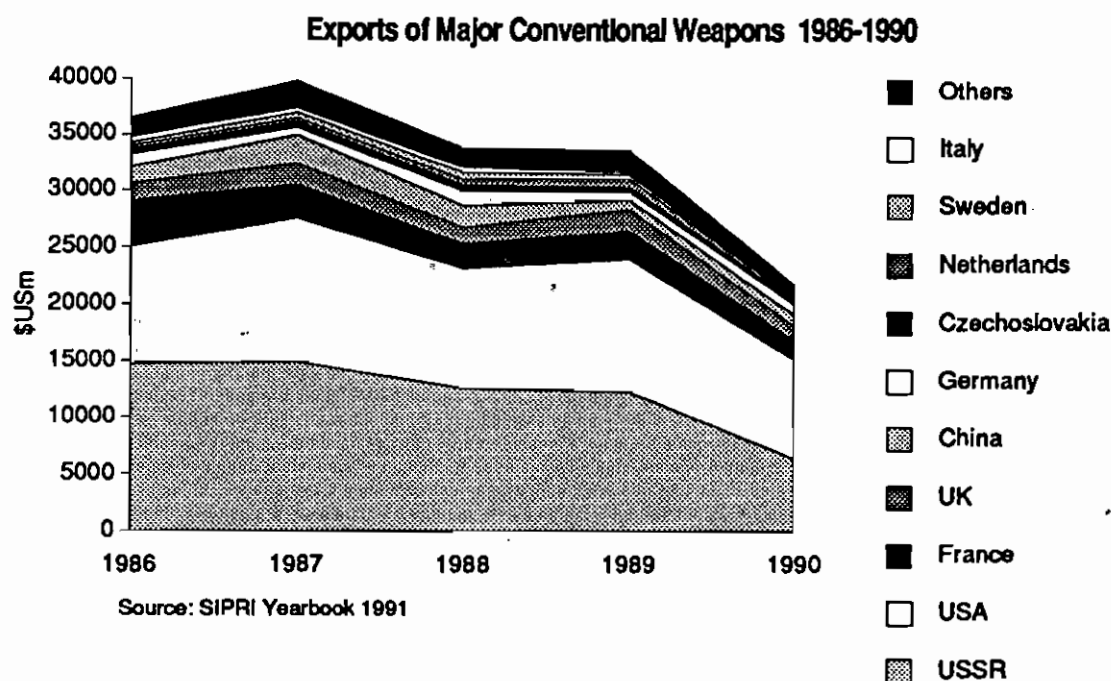
Source: SIPRI (Stockholm International Peace Research Institute) Yearbook 1991

Australia is ranked 17th in the world in defence spending

8.2 Defence Trade - Exports

The world trade in conventional weapons in 1990 was estimated at around \$US21,726m contributing to a five year total to 1990 of approximately \$US165,232m.

Figure 8.2



The international arms market is contracting

These figures capture only the trade in major weapons platforms and systems and do not include small arms, guns less than 100 mm calibre, ammunition and other logistics supplies and services.²

Total arms trade in 1990 continued a downward trend, although the apparent 35% decrease on the previous year's total should be viewed with caution since "latest year" estimates generally increase as more information becomes available.

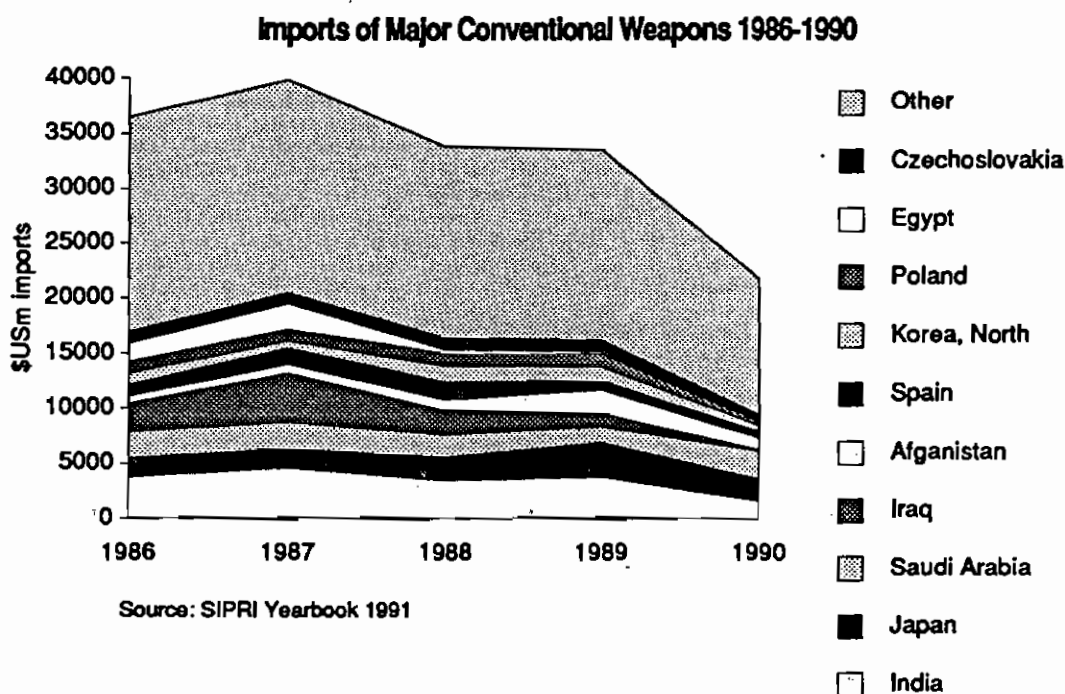
Official figures recording Australia's defence exports are not readily obtainable but preliminary findings by the Exports and International Programs group suggest exports of defence and related goods (ie armaments and military use only items) and dual use technologies totalled around \$A280m in fiscal year 1990-91 or around 1.3% of world trade in those items. (See Chapter 11 for a more detailed discussion).

² These figures are taken from SIPRI (Stockholm International Peace Research Institute) data and estimates. SIPRI's data is compiled from a wide range of published and unpublished sources. Estimates of the excluded categories are not attempted because "Publicly available information is inadequate to track these items satisfactorily". For further information, refer to *SIPRI Yearbook 1991: World Armaments and Disarmaments* pp 274-75.

8.3 Defence Trade - Imports

Defence imports are dominated by Asian and Middle Eastern countries but, even in these regions, there was a decrease in demand over the late 1980s. For example, in the 5 years to 1990, Iraq was the 4th largest importer of arms in the world, closely behind Japan and Saudi Arabia.

Figure 8.3

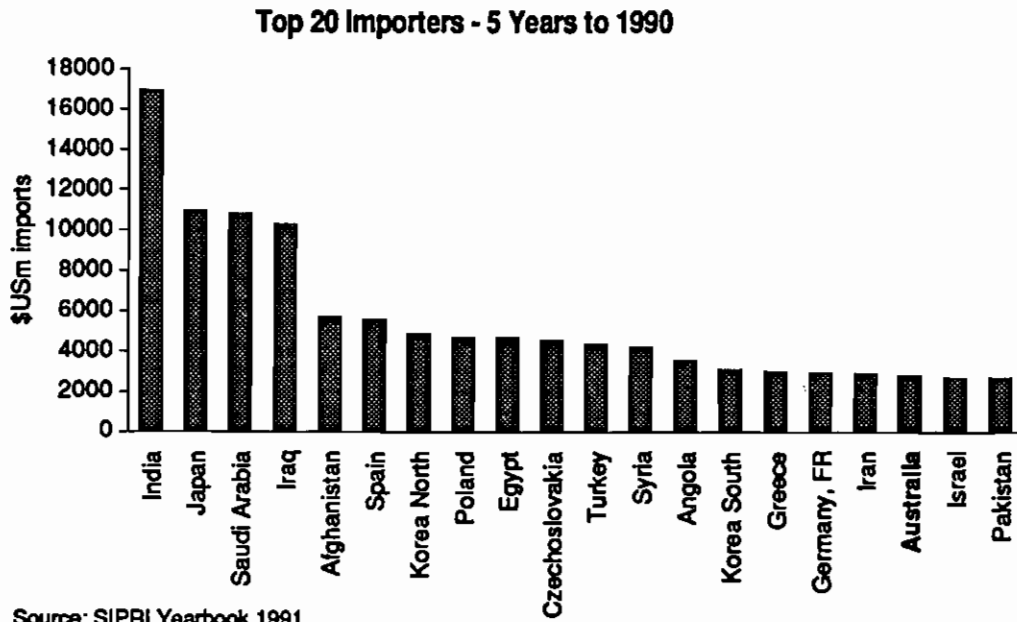


Imports of arms fell substantially over the late 1980s

With the imposition of embargoes on Iraq by all major arms suppliers following the invasion of Kuwait, the Iraqi market, which had in previous years been responsible for as much as 10% of world arms imports was abruptly closed. In the 10 years to 1990, Iraq had imported arms to the value of \$US27bn (1985 constant prices) of which the USSR supplied 55%.

As a consequence of the Gulf War, arms embargoes were also imposed on Jordan and Kuwait further reducing the market in the Middle East, although these trading bans were subsequently lifted. No statistical information is currently available to the consultants about the effects of the Gulf War on arms trade in the Middle East.

Figure 8.4



Source: SIPRI Yearbook 1991

Australia is ranked 17th of the world's arms importers

Commensurate with our economic size and total defence spending, Australia's defence imports in the 5 years to 1990 placed us 17th in the world and 8th of the industrialised nations.

Australia's bargaining position as an arms importer is probably better than the dollar value of imports and total defence spending would suggest. Many of the larger importers purchased almost exclusively from the USSR, as Western embargoes and barriers denied these markets to Western manufacturers, and EC countries tend to keep their purchases within the EC. Thus, Australia is one of the larger arms markets open to all Western arms manufacturers.

8.4 Major Arms Producers

Of the top 10 Western arms producing companies, nine are from the US, and one is from the UK. Nine are key producers of aircraft or aircraft parts and seven are involved in the production of defence related electronics. The largest international arms manufacturers specialise in defence products but also have significant civilian sales.

Figure 8.5

Top 10 Defence Manufacturers

Rank 1989	Company	Country	Industry	Arms Sales 1989 (\$USm)	Total Sales 1989 (\$USm)	Arms Dependence
1	McDonnell Douglas	USA	Ac El Mi	8500	14581	58.30%
2	General Dynamics	USA	Ac MV El Mi Sh	8400	10053	83.56%
3	Lockheed	USA	Ac	7350	9932	74.00%
4	British Aerospace	UK	Ac El Mi SAO	6300	14898	42.29%
5	General Electric	USA	Ac Eng	6250	54574	11.45%
6	General Motors	USA	Ac Eng El Mi	5500	126932	4.33%
7	Raytheon	USA	El Mi	5330	8796	60.60%
8	Boeing	USA	Ac El Mi	4800	20276	23.67%
9	Northrop	USA	Ac	4700	5248	89.56%
10	Rockwell International	USA	Ac El Mi	4500	12633	35.62%

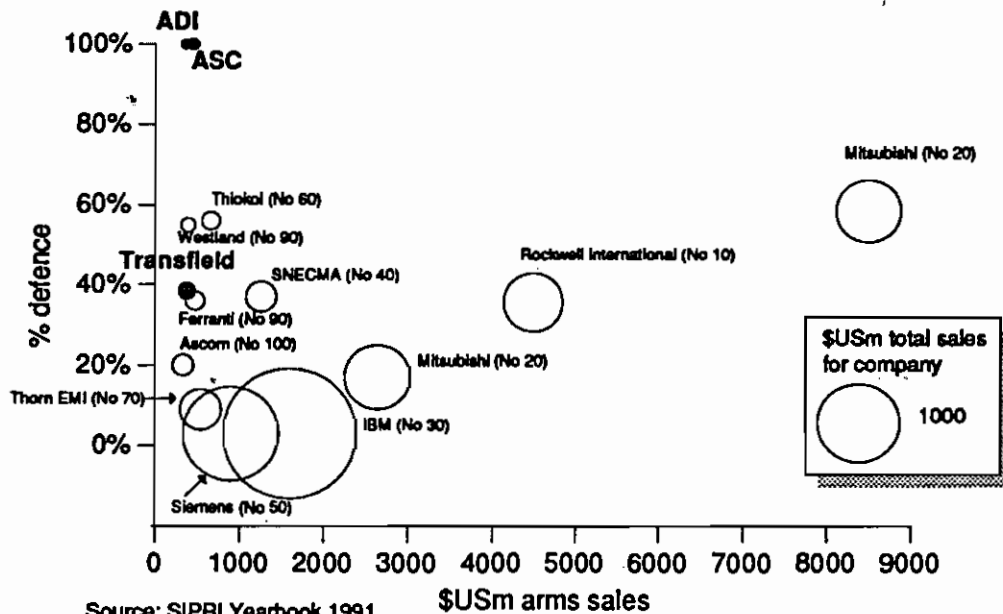
Ac = Aircraft
 El = Electronics
 MV = Motor vehicles
 Eng = Engines
 Mi = Missiles
 SAO = Small arms/ordnance
 Sh = Ships

Source: SIPRI Yearbook 1991

Australia's largest defence related organisations are the Transfield companies, Australian Submarine Corporation (ASC) and Australian Defence Industries (ADI). By way of example, ADI's 1990-91 turnover of \$A446m (\$US343m) places it outside the world's top 100 producers yet its high defence dependence is matched by only 5 of the top 100 companies, 4 of whom are shipbuilders.

Figure 8.6

ADI, ASC and Transfield Relative to the Top 100 Defence Manufacturers



Source: SIPRI Yearbook 1991

Company survey

Australia's larger defence suppliers fall outside the world top 100

9. Trends in the Arms Market

A detailed assessment of likely trends in the international arms market is beyond the scope of this Report. Such an assessment would require specific analysis of likely political and strategic developments and country by country procurement patterns and intentions. It is possible to identify some general trends which will be important to the defence procurement process in Australia, to defence industry policy and to the future relationship between Defence and Australian industry.

The most important trend is world over-capacity which is likely to lead to major rationalisation on the supply side. Other trends, such as expansion of regional defence expenditure, will work in favour of expanding niche and regional exports by Australian defence industry.

9.1 Global Political Developments

The last five years has witnessed unprecedented global political changes. Many of these were not expected, at least in the timeframe in which they occurred. Major events have included the Gulf War, Tiananmen Square, the Conventional Armed Forces in Europe (CFE) Treaty which officially signalled the end of the Cold War and more recently the break up of the USSR.

That latter event has, in turn, created new uncertainties as the former republics of the USSR move from controlled to market economies and deal with an upsurge in traditional (and long suppressed) territorial and nationalist pressures. While overall arms expenditure has been reduced, the potential upsurge in regional conflict may affect arms expenditure.

9.2 Implications for Arms Markets

A number of broad implications can be identified for the international and Australian arms market. On the *supply* side it has been widely foreshadowed that expected cuts in military spending in former Soviet countries combined with their need for hard currency, will see "surplus" Soviet weapons systems, platforms and ordnance offered on the world market at bargain basement prices.

Whilst such products seem unlikely to be of direct interest to Australia, at least for the foreseeable future, they may prove attractive to some arms importers in Asia and the Middle East with implications for Australia's potential, if not existing, export market.

It was widely reported to the consultants by Australian defence experts that this has already put downward pressure on spot prices

for many military goods – a development which, were it to persist and spread to contract prices generally, could have implications for the competitive pressures on Australian defence industry.

The surplus former Soviet capacity can be expected to have implications for the size and structure of the world arms industry. In particular, combined with the downward pressure on military spending, it is likely to lead to rationalisation of defence industry capacity around the world during the 1990s.

On the *demand* side, the net effect of world political developments in recent years is expected by virtually all Australian defence experts to translate into widespread downward pressure on military spending, certainly in terms of proportion of GDP and probably even in absolute terms. A dominant driver of the arms market in the 1990s, therefore, is expected to be the pressure on defence forces around the world to "do more with less". This pressure has led questioning of defence budgets in nations with traditionally high expenditures:

"The recent events in Eastern Europe and the associated reduction in tension between East and West have led many politicians in Sweden to question the need for large defence forces. This again is not peculiar. The effects of democracy spreading throughout Eastern Europe may be seen in reduced force levels of the West's projected military organisations for the next decade".³

Current Australian strategic assessment suggests any *peace dividend* will be limited by regional factors. Nevertheless, fiscal pressure on military budgets seems likely to have a number of implications, some of which are not unlike the competitive pressures to which private businesses around the world, and in Australia, have been subject for the last decade or so.

- The most obvious, perhaps, will be pressure to cut manning levels in standing defence forces.
- There will be pressure to find efficiencies wherever possible, leading, for example, to contracting out of more and more functions.
- Pressures can be expected to mount also for increasing efficiency and flexibility in administrative support for defence forces. In the Australian context this could well lead to much closer scrutiny of management and work practices, work patterns, penalty rates and the like.

³ T.Nash "The New Shape of the Swedish Defence Industry" *Military Technology* (MILTECH) Issue 8/1991.

Of course, to some extent these pressures are already manifest in Australia.⁴ If corporate experience is any guide they can be expected to persist and intensify.

As the pressures mount on defence forces they will, of course, also look outside for ways to do more with less. Some of the likely implications for arms markets include:

- Pressures to prolong the life of weapons platforms and other capital equipment. One effect of this in Australia could be to make the procurement cycle even longer, with all the implications that could have for the continuity of demand on Australian defence industry.
- An associated increase in the emphasis given to performance enhancing technologies in surveillance, fire control, range finding and so on. The same pressures will apply to consumables including ordnance.
- The emerging pressures to remove separate military specifications for some products to intensify. This would potentially open up the supply of goods and services to the military to a wider range of business units. It may also enable defence forces to access more of the latest technological developments while simultaneously obtaining more competitive pricing.
- Some experts expressed the view that this shift in emphasis – and military spending – to performance enhancing technologies would create more and more niche opportunities at the expense (in market share terms) of the larger, allegedly slower moving arms supply giants (see Figure 9.1).

⁴ See *The Defence Force and the Community*, A.K.Wrigley, 1991 (Canberra: AGPS 1991).

Figure 9.1

Forms of Military Industrial Enterprise (MIE)

	Traditional	Modern	Emerging
Attributes	Predisposition to produce warships and ordnance Many have long history of involvement in defence manufacture Evolved in tandem with changing technologies for traditional weapons systems Multidisciplinary - embracing skills and competencies from several areas Resent the growth of "traditional" MIE's in NIC's because technological barriers to entry are low in this area and civil/commercial skills are readily adaptable to defence ends	Focus on armoured fighting vehicles and aircraft weapons systems Substantial technological barriers to entry	Centred on defence electronics Predominantly in advanced industrialised countries Some seen in USSR/CIS and Israel Frequently involved in both defence and civil to try to smooth demand
Examples	Vickers Armstrong Krupp Bethlehem	British Aerospace McDonnell Douglas Northrop Grumman General Dynamics Boeing	Motorola Raytheon Honeywell IBM Ericsson GEC-Marconi

Source: Adapted from D.Todd "Defence Industries - A Global Perspective" 1988

9.3 Trends in the Asia-Pacific Region

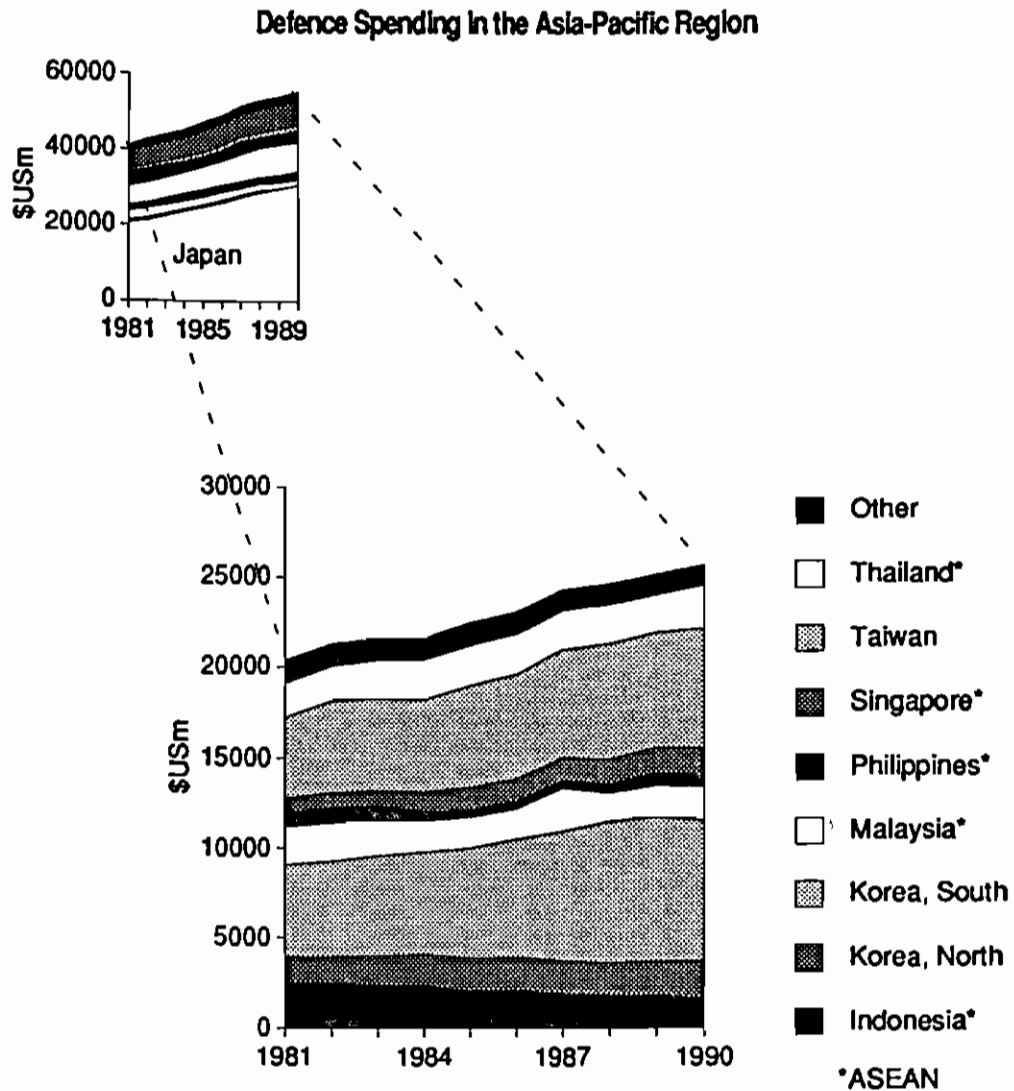
Many countries in the Asia-Pacific region are continuing to enjoy generally high rates of economic growth and most are maintaining or increasing their level of defence expenditure.

The ASEAN countries are collectively responsible for around 1% of world defence spending (1989 figures) and defence imports in the five years to 1990 valued at around \$US5.8b (1985 constant prices) or about 3.5% of world arms traded.

Although there has been substantial development of defence industry in the ASEAN countries, most notably in Indonesia and Singapore, it has tended to reflect the dual political needs of achieving a strategic degree of self reliance whilst at the same time not being seen to be driving military industrialisation at the expense of the rest of the economy.

Industry development is generally in support of repair, overhaul and maintenance capabilities rather than manufacturing, although the countries with more developed defence industries, Indonesia and Singapore, have developed significant manufacturing capabilities.

Figure 9.2



Source: SIPRI Yearbook 1991

Regional defence spending has increased

It is a mistake to treat ASEAN as a bloc in either trade or defence terms. Despite the conduct of some joint military exercises, the ASEAN countries maintain quite separate purchasing arrangements for their imported defence needs and in some cases quite different relationships with their suppliers. These differences reflect a national rivalry as much as differing defence strategies and orientations.⁵

⁵ B.Singh "ASEAN's Arms Industries: Potential and Limits," *Competitive Strategy*, 2/1989.

PART FOUR

Defence and the Wider Economy

Summary of Main Points

- ❑ Government purchases (including Defence purchases from the defence industries), stimulate GDP in the short run, but have a broadly neutral effect on GDP in the long run, as different industry sectors compete for a limited national supply of labour. From a long run perspective, an assessment of the desirability of any particular government consumption purchase is likely to depend chiefly on whether its subjectively estimated national benefit is greater or less than its value used in calculating GDP under standard national accounting conventions, namely its cost.
- ❑ Input-output analysis is a tool which can be used to analyse the economic effects of government purchases, including Defence purchases. Long run results show the effects on the industrial structure, while short run results also show effects on the aggregate level of economic activity. These results can be obtained using the most recent ABS input-output table - for 1986-87 - as a database.
- ❑ After allowing for import leakages, an across-the-board increase in Defence purchases from defence industries of \$100 million is estimated to raise GDP by \$65 million in the short run. In the long run, when a national labour supply constraint is factored in, there is little effect on GDP, as expected. The five defence industries and other sectors feeding off them - such as the transport sector and the finance and property sector - still expand, but other sectors more distantly related to Defence purchases tend to contract slightly as labour is drawn away.
- ❑ In the short run, the defence industry delivering the largest boost in national employment from an additional \$100 million of Defence purchases is shipbuilding where employment increases by \$41 million. Relative to other defence industries, it has a low import content and is labour-intensive. By way of contrast, an additional \$100 million of purchases of electronic equipment raises employment by only \$13 million because of high import content and capital-intensive production.
- ❑ In the long run, additional expenditure of \$100 million on any of the five defence industries has a broadly neutral effect on GDP, as expected. The worst results are from increased spending on shipbuilding, where GDP falls slightly, by \$19 million. The national capital stock declines slightly as a result of shipbuilding drawing labour away from capital-intensive industries. These small long run effects on GDP underline the conclusion that the critical issue in evaluating specific Defence purchases - and government purchases more generally - is likely to be whether the subjectively estimated national benefit is greater or less than the financial cost.

10. Defence Spending and the Economy

This chapter assesses the linkages from Defence spending to the industrial structure of the economy and national economic performance. More specifically, input-output analysis is used to estimate the effects of the level and pattern of Defence spending on national GDP and employment, as well as the contribution to those national effects from each industry.

This involves considering in turn:

- the pattern of Defence spending;
- a short-run input-output analysis;
- a long-run input-output analysis; and
- further possible refinements to the modelling methodology.

10.1 Pattern of Defence Spending

The input-output table (ABS Cat. No. 5209.0), the most recent of which is for 1986-87, gives a detailed picture of the industrial structure. A more up-to-date picture will be provided by the next table, which will relate to 1989-90 and is due for release in the second half of 1993. In the meantime, this report uses the 1986-87 table for its analysis, but qualifies the results where there are identified reasons for believing they might be different if the 1989-90 input-output table were available.

The input-output table is based on 109 industry sectors, one of which is "defence", which refers to spending by the Department of Defence. Results from an analysis based on the 109-industry split would show a large amount of fine detail of only marginal relevance to this study. The industry classification needs to be aggregated to a broader level to make the results more easily comprehensible, while still continuing to separate out the industries most closely related to defence.

There are alternative ways of deciding which industries should be separated out because they are closely related to defence. Chapter Three provides a core definition of defence industry:

Defence industry is that part of Australian industry providing goods and services or capabilities which are strategically important to Defence

Defence industry was subsequently identified as involving firms in these five industry sectors:

- information technology, electronics and communications;
- shipbuilding;
- aerospace;
- vehicles; and
- ordnance.

It should be noted that on the core definition, defence industry does not encompass *all* activity within these five industries – only those which provide strategically important goods and services and capabilities. And Defence is only one of the customers of these industries.

Nevertheless, it is useful to distinguish these five industries for the purposes of the economic analysis presented here. Each of these five defence industries fits within one of the 109 industries in the ABS industry classification used in the input-output table.

Figure 10.1

Defence Industries in the ABS Industry Classification

Defence Industry	ABS Code	ABS Description
Information technology, electronics and communications	3302	Electronic equipment
Shipbuilding	3202	Ships and boats
Aerospace	3204	Aircraft
Vehicles	3201	Motor vehicles etc
Ordnance	2707	Chemical products not elsewhere classified (nec)

Figure 10.2

Defence Spending on Defence Industries

ABS Description	Defence Exp. 1986-87 (\$m)	Total Supply 1986-87 (\$m)	Defence Share %
electronic equipment	256	6661	4
ships and boats	341	1067	32
aircraft	111	2053	5
motor vehicles etc	404	12358	3
chemical products nec	114	1245	9

In some cases an ABS industry is broader than the defence related industry contained within it. For example, ordnance (ammunition and explosives) accounts for only 17% of the supply of the chemical products nec sector. On the other hand, there is a near one-to-one matching for each of shipbuilding, aerospace and vehicles.

The interpretation of the data in Figure 10.2 is affected by two important points. First, "total supply" for an industry includes both domestic and imported production. More than 60% of total supply is imported for both electronic equipment and aircraft. Second, Defence expenditure on different categories of equipment is highly variable from one year to the next, which particularly affects the interpretation of the data for Defence spending on ships and boats as well as aircraft. In particular, Defence expenditure on aircraft has been much higher in other years.

For the purposes of analysing the economic effects of Defence on the industrial structure, an alternative economically-oriented definition of defence related industries might be favoured:

Defence industries are those industries where Defence spending absorbs more than "x" per cent of the industry's total supply of goods and services

Figure 10.2 shows that Defence spending absorbs at least 3% of total supply for each of the defence industries identified under the earlier strategically-oriented definition. It turns out that this is not true for any of the other 103 industries (other than Defence itself) in the ABS industry classification. Thus, whether we adopt the strategically-oriented definition:

Defence industry is that part of Australian industry providing goods and services or capabilities which are strategically important to Defence

or the economically-oriented definition:

Defence industries are those industries where Defence spending absorbs more than 3 per cent of the industry's total supply of goods and services

we are left with the same five defence industries under the ABS industry classification:

- electronic equipment;
- ships and boats;
- aircraft;
- motor vehicles etc; and
- chemical products nec.

These five industries are each separately identified in the industry classification scheme used for the input-output analysis undertaken for this chapter. In all, 27 industries are distinguished.

Figure 10.3

Industry Classification Scheme

Industry Number	ABS Codes	Description
1.	0101-0400	agriculture, forestry, fishing & hunting
2.	1101-1600	mining
3.	2101-2201	food, beverages & tobacco
4.	2301-2403	textiles, clothing & footwear
5.	2501-2605	wood, paper and printing
6.	2707	chemical products nec
7.	2701-2706,2708	other chemicals, petroleum, coal products
8.	2801-3103	mineral products
9.	3201	motor vehicles etc
10.	3202	ships and boats
11.	3203	railway rolling stock etc
12.	3204	aircraft
13.	3302	electronic equipment
14.	3301,3303-3307	other machinery nec
15.	3401-3405	miscellaneous manufacturing
16.	3601-3701	electricity, gas and water
17.	4101	residential building
18.	4102	construction nec
19.	4701-4902	wholesale, retail trade, repairs
20.	5101-5701	transport
21.	5901	communication
22.	6101-6105	finance, property etc
23.	6106	ownership of dwellings
24.	7101	public administration
25.	7201	defence
26.	8101-8301	community services
27.	9101-9301	recreational etc services

In Figure 10.3, the five defence industries are distinguished by bold italics, as is "defence", which refers to spending by the Department of Defence.

The remaining 103 industries in the ABS classification scheme have been aggregated into the other 21 industries shown in the figure. As well as publishing input-output tables using a fine classification into 109 industries, the ABS also publishes tables using a broader classification into 28 industries. We began with the 28 industries and obtained 30 industries after separating out residential building from total construction, and the communication sector from transport and communication. These two additional sectors were distinguished because they figure prominently in discussions of the structure of the Australian economy. We then aggregated up from the 30 industries to 21 industries. This step in reducing the level of detail makes it easier to survey the overall results from the input-output analysis. However, any further aggregation would begin to diminish the coherence of the classification scheme as a representation of the broad industrial structure of the Australian economy.

The column in the input-output table for defence, reproduced here as Figure 10.4, shows how the total Defence budget for 1986-87 of \$7011 million was allocated to:

- purchases from the other 108 Australian industry sectors (or 26 sectors under the broader industry classification scheme used here);
- wages, salaries and supplements of Defence Force and Defence civilian personnel; and
- direct imports.

Figure 10.4 also shows these expenditure as percentages of total Defence purchases (from industries other than the Defence establishment itself). For example, 3% of Defence budget was spent on ordnance (ammunition and explosives) which is included in "6. chemical products nec". It therefore might be concluded that if \$100 million were added to Defence purchases, while keeping the composition unchanged, the value-added of the Australian ordnance equipment industry, and therefore its contribution to GDP, would rise by \$3 million. However, this simple calculation of the *direct* effect of Defence purchases on the ordnance industry ignores important indirect effects.

Part of Defence expenditure on industries immediately upstream, will pass on to other industries even further upstream. For example, part of the \$3 million additional expenditure on ordnance, will ultimately pass on to industries supplying the ordnance industry such as the basic chemicals industry. The basic chemicals industry in turn relies on the mining industry, generating a further pass-on effect even further upstream.

As well as this pass-on effect, there will also be leakage effects to imports along the length of the supply chain, eroding the contribution to domestic value-added. In the ordnance example, there would be import leakages of both ordnance and basic chemicals.

Input-output analysis is now applied to show the industry effects of Defence purchases, allowing for the industry pass-on and import leakage effects.

Figure 10.4

Defence Purchases in the 1986-87 Input-Output Table

Ind. No.	Description	\$ million	Percentage of Purchases
1.	agriculture, forestry, fishing & hunting	5	0
2.	mining	27	1
3.	food, beverages & tobacco	6	0
4.	textiles, clothing & footwear	63	2
5.	wood, paper and printing	124	3
6.	<i>chemical products nec</i>	114	3
7.	other chemicals, petroleum, coal products	201	5
8.	mineral products	101	2
9.	<i>motor vehicles etc</i>	405	10
10.	<i>ships and boats</i>	341	8
11.	railway rolling stock etc	0	0
12.	<i>aircraft</i>	111	3
13.	<i>electronic equipment</i>	257	6
14.	other machinery nec	167	4
15.	miscellaneous manufacturing	101	2
16.	electricity, gas and water	126	3
17.	residential building	0	0
18.	construction nec	48	1
19.	wholesale, retail trade, repairs	357	9
20.	transport	358	9
21.	communication	91	2
22.	finance, property etc	310	8
23.	ownership of dwellings	0	0
24.	public administration	62	2
25.	<i>defence</i>	0	0
26.	community services	70	2
27.	recreational etc services	69	2
	direct imports	557	14
	total Defence purchases	4070	100
	wages, salaries and supplement	2942	-
	total Defence budget	7011	-

10.2 Short-Run Input-Output Analysis

Input-output analysis provides a formal means of properly taking into account industry interactions, as well as import leakages. The technical background on how input-output analysis is used to estimate total supply for each industry, given final demand for each industry, is summarised in Attachment 1.

Once results for the total supply of each industry are available, it is relatively straightforward to calculate results for industry employment, imports and value-added. An industry's employment and imports can be assumed to vary proportionately with its total supply. Value added is then calculated as follows:

$$\begin{aligned} \text{Industry Value Added} = \\ \text{Industry Supply} - \text{Industry Imports} - \text{Inputs from Other Industries} \end{aligned}$$

An industry's value-added can in turn be decomposed into the income paid to its primary factors: wages, salaries and supplements paid to labour; and gross operating surplus paid to capital.

Value added summed across all industries is equal to Gross Domestic Product.

Rather than considering the effects of an across-the-board increase in Defence final demand, which includes both Defence purchases and the wage bill for the Defence force and Defence civilian personnel, we confine the across-the-board increase to Defence purchases from industries other than Defence itself, in keeping with the general focus of this report.

Separately varying Defence purchases requires a slight modification to the standard input-output analysis approach. Specifically, the assumption that the composition of Defence spending is fixed is dropped, and replaced with the assumption that spending in each area is specified individually.

A. Higher Defence Purchases Across-the-Board

The short-run effects of an illustrative increase in Defence purchases of \$100 million are shown in Figure 10.6. The interpretation of the long-run effects, also shown in the figure, is discussed in section 10.3.

Figure 10.5

Illustrative \$100 Million Addition to Defence Purchases

Addition to Defence Purchases	\$ million
Direct imports	14
Purchases from defence industries:	
chemical products nec	3
motor vehicles	10
ships and boats	8
aircraft	3
electronic equipment	6
Total	30
Purchases from other industries	56
TOTAL	100

There is no change to the composition of these purchases, with the increase spread equi-proportionately across all components, using the composition of purchases in 1986-87. This gives the composition for the \$100 million increase shown in Figure 10.5, which of course matches the percentage composition of Defence purchases reported in the last column of Figure 10.4.

Our main interest is in comparing the short-run effects shown in the industry value-added column of Figure 10.6, which total to the effect on GDP, with the *direct* Defence spending increases shown in Figure 10.5 (and the last column of Figure 10.4). This allows us to ascertain how the results are affected by allowing for import leakage and industry pass-on effects.

GDP rises by \$65 million compared with the increase in Defence spending of \$100 million. Imports must account for this difference, because GDP is identically equal to final demand less imports, so the smaller increase in GDP implies a rise in imports of \$35 million. In fact, Figure 10.6 shows that imports are up by \$41 million, the small discrepancy being due to a rise in commodity taxes on final demand. That minor complication is put to one side here.

In summary, the import leakage effect reduces the effect of the Defence spending increase on GDP from \$100 million to \$65 million.

Figure 10.6 also indicates that \$32 million - or about half of the additional \$65 million of GDP - takes the form of higher labour income ie higher employment.

Figure 10.6

Defence Purchases
Effects of Additional Expenditure of \$100 million
(\$ million)

Industry	Short Run			Long Run		
	Employment	Imports	Value Added	Employment	Imports	Value Added
1. agriculture etc	0	0	1	-0	-0	-2
2. mining	1	0	2	-0	-0	-1
3. food, beverages etc	0	0	0	-1	-0	-2
4. TCF industries	0	1	1	-0	-0	-0
5. wood, paper, printing	1	1	2	0	0	1
6. chemical products nec	0	1	1	0	1	1
7. chemicals, petrol. etc	1	2	2	0	1	1
8. mineral products	1	1	3	0	0	0
9. motor vehicles etc	2	4	3	1	4	2
10. ships and boats	2	2	3	2	2	3
11. railway rolling stock	0	0	0	-0	-0	-0
12. aircraft	1	2	1	0	2	1
13. electronic equipment	0	5	1	0	4	1
14. other machinery nec	1	3	1	0	1	0
15. misc. manufacturing	1	2	1	0	1	1
16. electricity, gas, water	1	0	4	1	0	1
17. residential building	0	0	0	-0	-0	-2
18. construction nec	0	0	1	-2	-0	-3
19. wholesale & retail	5	0	9	-0	-0	-0
20. transport	4	1	7	2	0	3
21. communication	1	0	2	1	0	1
22. finance, property etc	5	1	10	2	0	3
23. dwellings ownership	0	0	0	0	0	-6
24. public administration	1	0	1	-1	-0	-1
25. defence	0	14	0	0	14	0
26. community services	1	0	2	-6	-0	-7
27. recreational services	1	0	1	-1	-0	-1
TOTAL	32	41	65	-0	29	-3

By allowing for pass-on effects to other industries, the input-output analysis produces more diffuse effects than the direct effects presented in the last column of Figure 10.4. Some of the gains in value added are shifted from the five defence industries to the more closely connected upstream industries such as "2. mining", "16. electricity, gas and water" and "22. finance, property etc".

The overall result from allowing for both the import leakage and pass-on effects is to about half the estimate of the gain in value-added for the defence industries, while increasing the estimated gains in value added for certain upstream industries.

The results shown in Figure 10.6 are interesting, but are unlikely to be specific enough for analysing the economic effects of any particular Defence spending proposal, because they only refer to the effects of an across-the-board expansion of Defence purchases. In practice, perhaps most flexibility in Defence purchases is in the area of major equipment. Such equipment is mostly obtained from the five defence industries identified earlier. Further, in practice the composition of Defence spending on the defence industries does vary considerably from year-to-year, so the 1986-87 composition shown in the input-output table and used in the preceding analysis, may not be a good guide to the composition in any particular year. This qualifies the results shown in Figure 10.6. These two considerations suggest a need to consider the effects of separately varying Defence spending on each of the five defence industries. The results for the five industries are discussed below in sections B-F and are supported by detailed tables displayed at Figures A.1-A.5 of Attachment 1. Unfortunately, the results from this more detailed analysis are more affected by the use of the rather dated 1986-87 input-output table. Accordingly, the results are qualified where there are identified reasons for believing they may be different if the 1989-90 input-output table were available.

B. Higher Ordnance Spending

Figure A.1 of Attachment 1 shows the effects of additional expenditure of \$100 million on ordnance.

Import leakages are estimated to absorb about 40% of this increase, leaving an increase in GDP of \$63 million. There is significant uncertainty surrounding this estimate, because the methodology relies on ordnance being a representative component of the "chemical products nec" industry, which it may not be as it only account for 17% of its total supply. Separate data (ABS Cat. No. 5215.0) indicates that competing imports are only 5% of total supply for ammunition and explosives, compared with 33% of total supply for the broader "chemical products nec" industry identified in the input-output table. It seems likely that the model overstates the import leakage for ordnance.

About half of the increase in GDP - \$28 million - is retained as value-added in "6. chemical products nec industry", which includes ordnance, while the remainder dissipates to other industries further upstream, such as "7. other chemicals, petroleum etc" and "2. mining" where values-added are up by \$4 million and \$3 million respectively.

Less than half of the GDP increase of \$63 million is absorbed by a higher wages bill due to higher employment. The low labour share reflects the capital-intensive nature of the chemical products industry.

C. Higher Vehicles Spending

Figure A.2 of Attachment 1 shows the effects of additional Defence expenditure of \$100 million on Vehicles.

In this case the import leakage is around 50%, so GDP rises only \$54 million. Most of the leakage is quite direct, taking the form of higher imports of vehicles.

The pass-on effect transfers just over one-half of the increase in value-added to other industries, which rises by \$28 million compared with \$26 million for "6. motor vehicles etc." Further up the supply chain, value-added is up \$4 million for "8. mineral products", while further down the supply chain, value-added is up \$4 million for "19. wholesale and retail trade" and \$5 million for "22. finance, property etc".

Around 54% of the increase in GDP - \$29 million out of \$54 million - is reflected in a higher wage bill through higher employment, rather than an increase in gross operating surplus. While the wage bill absorbs 65% of the increase in value-added in "9. motor vehicles etc", this is diluted at the national level by a lower labour share in most industries benefiting from pass-on effects.

D. Higher Shipbuilding Spending

Figure A.3 of Attachment 1 shows the effects of additional Defence expenditure of \$100 million on shipbuilding and repairs.

The import leakage is around one-third, bringing the addition to GDP down to \$67 million. Most of the additional imports are ships, although imports of machinery and equipment used in producing ships, "other machinery nec", are up \$4 million.

Around one-half of the increase in GDP is retained as value-added in "10. ships and boats" rather than passed on to other industries. Among the major beneficiaries outside of the shipbuilding industry itself are "8. mineral products" and "2. mining" where values-added are up by \$5 million and \$2 million respectively. The detailed ABS 109-industry input-output table indicates that most of the increase in mineral products consists of metal products and basic iron and steel.

Surprisingly, the results show no pass-on effect from higher Defence spending on shipbuilding to the electronic equipment industry, even though electronic equipment is now a major part of the cost of construction of military ships. The input-output table for 1986-87 shows almost no spending on electronic equipment by the "ships and boats" industry. The ABS advises that the composition shown in the 1986-87 input-output materials purchases in manufacturing – including in shipbuilding – is actually based on the 1983-84 Manufacturing Census. While no definitive explanation for the low level of expenditure on electronic equipment by shipbuilding in 1983-84 recorded in the input-output table is yet available, the possibilities are: military ships under construction in 1983-84 were not to the stage where electronic equipment is installed; such equipment was directly furnished by the Defence department and hence was recorded as expenditure by Defence; the data recording systems did not properly identify expenditure on electronic equipment in the construction of military ships. Whatever the true explanation, users of the input-output model should compensate by re-allocating part of the expenditure on military ships to electronic equipment. AMECON advises that electronic equipment may account for around 55% of the cost of the ANZAC frigates. The effects of varying expenditure on electronic equipment are discussed in part F below.

Over 60% of the increase in GDP is absorbed by a higher wage bill due to higher employment. The labour share is as high as 77% in "10. ships and boats", but much lower in industries benefiting from pass-on effects.

E. Higher Aircraft Spending

Figure A.4 of Attachment 1 shows the effects of additional Defence expenditure of \$100 million on aircraft. As was the case with shipbuilding, there would be additional associated expenditure on electronic equipment which is not apparent in the aircraft column of the underlying input-output table for 1986-87. Users of the input-output model should compensate by re-allocating part of the expenditure on aircraft to electronic equipment.

The import leakage is high at around two-thirds, eroding the increase in GDP to \$36 million. Virtually all of the import leakage takes the form of direct imports of aircraft. "Local content" in military aircraft has risen significantly since 1986-87, seemingly indicating that the import leakage would now be significantly less. However, in many cases the local suppliers rely heavily on imported components, so the fall in import leakage would not be so large as the official local content statistics might seem to imply.

A relatively high proportion - about two-thirds - of the increase in GDP is retained as value-added in the aircraft industry where value-added is up \$23 million, compared with an increase in value-added of \$13 million spread thinly through the rest of the economy.

More than 60% of the increase in GDP is absorbed by a higher wage bill due to higher employment, the labour share in "12. aircraft" being as high as 78%.

F. Higher Electronic Equipment Spending

Figure A.5 of Attachment 1 shows the effects of additional Defence expenditure of \$100 million on electronic equipment (for simplicity this term is used here to refer to information technology, electronics and communications).

In this case the import leakage is over 70%, so GDP increases by only \$29 million. Most - around 90% - of the extra imports take the form of direct imports of electronic equipment. For some specific purchases, the import leakage may be less than this. For example, AMECON estimated that only about 57% of value of the electronic equipment for the ANZAC frigates may be imported.

Just under half of the increase in GDP - \$13 million out of \$29 million - is retained as value-added in the domestic electronic equipment industry rather than passed on to other industries. A significant share of the remaining \$16 million is passed on to "19. wholesale and retail trade", and "22. finance, property etc".

Less than half of the increase in GDP - \$13 million out of \$29 million - is reflected in a higher wage bill due to higher employment, the electronics industry being relatively capital-intensive.

10.3 Long-Run Input-Output Analysis

The results in Figures A.1-A.5 of Attachment 1 indicate that an additional \$100 million in Defence purchases could add between \$13 million and \$41 million to national employment (expressed in terms of the extra wages) in the short-run, the amount depending on the direction of those purchases.

The industries benefiting directly from higher Defence purchases will be competing with other industries for a limited national supply of labour. While this is not a major concern for short-run analysis, particularly at a time of high unemployment, it is a crucial consideration in analysis of the long run. Given a return to a "normal" rate of unemployment in the second half of the 1990s, stimulation of growth in employment in any particular sector of the economy will ultimately be at the expense of growth in employment in other sectors.

In practice, this concern about government stimulation of one sector "crowding-out" other sectors can be relevant even in the short-run. Ultimately, higher government spending in one area will need to be financed by lower government spending in other areas, or tax increases, in both cases to offset the initial stimulus. Higher government borrowing can postpone this hard choice, but

itself will tend to crowd out other sectors through upward pressure on interest rates and the exchange rate. In any case, there are limits to the size of the government borrowing program.

In this section long-run results are discussed which are obtained by superimposing a constraint of unchanged national employment on the short-run results. "Unchanged" does not imply that employment will not grow; rather that total employment in a future year is about the same regardless of the precise level of Defence spending. Higher growth in employment in some sectors will therefore be offset by lower growth in employment in other sectors.

The constraint of unchanged national employment is imposed by reimposing the Defence spending increases of Figure 10.6 and Figures A.1-A.5 of the Attachment, but this time down-scaling all components of final demand by the same proportion until the short-run employment gains are precisely offset. More sophisticated approaches to imposing the national employment constraint are possible, but the broad tenor of the results would be similar.

In addition to a national employment constraint, a trade balance constraint is also likely to apply in the long-run. This raises more complex issues than the national employment constraint, and would require considerable embellishment to a standard input-output model to impose. For present purposes, it is sufficient to note that the long-run results all imply a deterioration in the trade balance – exports are held fixed but imports rise. In practice this would eventually engender a real depreciation of the exchange rate, leading to some re-allocation of value-added away from non-tradeable sectors and towards tradeable sectors. However, the overall impact on the results of imposing a trade balance constraint would be less significant than the impact from imposing the national employment constraint.

The second panel of Figure 10.6 shows that, even after the imposition of the constraint of unchanged national employment, an across-the-board increase in Defence purchases of \$100 million produces an expansion in all five defence industries. Value-added in those industries increases by \$8 million, compared with \$9 million in the short-run results. Pass-on effects also deliver higher value-added in certain other industries, notwithstanding import leakages and the employment constraint. The biggest gains outside the five defence industries are in "20. transport" and "22. finance, property etc". On the other hand, the employment constraint dominates for industries with a more tenuous connection with Defence purchases, which contract slightly. Overall, GDP (total value-added) is virtually unchanged, showing a fall of \$3 million.

The long-run results in Figures A.1-A.5 of Attachment 1 convey a similar picture of large increases in value-added for the defence

industries where the increases in purchases are directed, with small increases for closely associated industries from pass-on effects, and small declines elsewhere.

One interesting result is the estimate shown in Figure A.3 that an increase in Defence purchases of ships of \$100 million leads to a fall in GDP in the long-run of \$19 million. Shipbuilding is a relatively labour-intensive industry, so as it draws employment away from more capital-intensive industries, the additional physical capital it puts in place is more than offset by reductions in physical capital used elsewhere. The implied reduction in the national capital stock in use leads to the decline in GDP.

Ordnance is a relatively capital-intensive industry, and, by the same line of reasoning, an increase in Defence purchases of ordnance of \$100 million yields an increase in GDP in the long-run of \$5 million, as shown in Figure A.1.

However, the main general conclusion to be drawn is that additional government purchases in any area - not just defence - are likely to stimulate GDP in the short run, but have a broadly neutral effect on GDP in the long run, as different industry sectors compete for a limited national supply of labour.

10.4 Further Refining the Modelling Methodology

The input-output model developed for this study has been supplied to the Department of Defence. It can reproduce the results reported here in Figure 10.6 and Figures A.1-A.5 of Attachment 1, as well as stimulate other scenarios.

While the results presented here are indicative of the likely broad effects of Defence purchases on the national economy, there are three main areas where the modelling methodology could be further refined.

First, the time frame of the analysis is not very specific, distinguishing only a "short-run" and a "long-run". It would be more satisfying to be able to trace the year-by-year effects of a change in Defence spending.

Second, the "long-run" results use only a simple method of imposing a national employment constraint, and neglect a national trade balance constraint. A further development of the input-output model to a general equilibrium model (such as the well-known ORANI model) would be needed for a refined treatment of the employment and trade balance constraints.

Third, the underlying input-output table is rather dated. At best, it uses data for 1986-87, and the import data for the composition of materials purchases by the defence industries is based on the 1983-84 Manufacturing Census.

Both of the first two problems will be addressed in a new version of the Access Economics Murphy (AEM) model currently nearing completion. The new AEM model will include industry detail using a dynamic general equilibrium approach in what was formerly a pure macroeconomic model. The new industry detail will make it possible to investigate the effects of varying Defence purchases, not only in long-run equilibrium but over time. AEM model results are on a quarter-by-quarter basis, and include long-run results with a strong economic foundation.

The third problem could be addressed after the release of the 1989-90 input-output table, due for September 1993 and to incorporate the 1989-90 Manufacturing Census.

10.5 Summary

Figures 10.7 and 10.8 summarise the short-run and long-run economy-wide effects of an additional \$100 million of spending on each of the five defence industries.

These results are set out in more detail in Figures A.1-A.5 of Attachment 1.

Figure 10.7

Short-Run Effects of Expenditure of \$100 million on Defence Industries (\$ million)

Defence Industry	Employment	Imports	GDP	Total Supply
Ordnance	28	43	63	277
Vehicles	29	52	54	295
Shipbuilding	41	39	67	269
Aerospace	22	70	36	225
Electronic equipment	13	77	29	230

Figure 10.8

Long-Run Effects of Expenditure of \$100 million on Defence Industries (\$ million)

Defence Industry	Employment	Imports	GDP	Total Supply
Ordnance	0	33	5	165
Vehicles	0	41	-7	178
Shipbuilding	0	23	-19	104
Aerospace	0	62	-10	138
Electronic equipment	0	72	3	179

The *short-run effects* are summarised first.

Spending of \$100 million on *shipbuilding* gives the biggest boost to national employment both because its import leakage is the lowest, and because it is relatively labour-intensive. Of each \$100 million in additional spending on shipbuilding, \$41 million flows through into higher employment, \$27 million of which is located in the shipbuilding industry itself.

Spending on *aerospace* and *electronic equipment* give the lowest boosts to GDP and employment because of very high import leakages. The employment boost is especially low for electronic equipment, at \$13 million, because it is also capital-intensive, compared with \$22 million for aerospace.

Spending on *ordnance* and *vehicles* rates in the middle in terms of boosting employment, with close to \$30 million in every \$100 million of spending flowing through to employment. Ordnance has a lower import leakage but is more capital-intensive. As noted earlier, the estimates probably overstate the import leakage for ordnance.

Special care is needed in making use of these estimates as they only refer to short-run effects. The long-run economic effects, as well as the estimated value of the contribution to the defence effort, should probably be more important in considering Defence expenditure policy. The long-run effects are considered next, while any quantification of the value of contributions to the defence effort from different patterns of Defence expenditure is outside the scope of this Report.

The long-run effects incorporate a national labour supply constraint but do not allow for the national trade balance constraint. For that reason, the results shown in the imports column have limited significance.

With a national employment constraint imposed, the estimated long-run effects on national employment are zero by assumption. With national employment fixed, the effect on GDP depends on the effect on the national capital stock. Defence purchases will therefore increase or reduce GDP in the long run, depending on whether they impact on industries which are more capital-intensive than the national average. These purchases from the capital-intensive defence industries of ordnance and electronic equipment raise GDP, while purchases from the labour-intensive defence industries, such as shipbuilding, reduce GDP.

These GDP effects, however, are fairly marginal ranging between -\$19 million and +\$5 million for an increase in Defence purchases of \$100 million. These calculations value Defence purchases at cost, in keeping with national accounts conventions. The issue in assessing whether a particular Defence purchase is worthwhile is

whether the value of its contribution to the defence effort is considered to be greater or less than its cost.

Results of this kind are not unique to Defence spending. Broadly similar results are likely to be obtained when applying the same method of analysis to other government consumption purchases. Additional government purchases in any area are likely to stimulate GDP in the short run, but have a broadly neutral effect on GDP in the long run, as different industry sectors compete for a limited national supply of labour. From a long run perspective, an assessment of the desirability of any particular area of government consumption spending is likely to depend chiefly on whether its estimated benefit to the nation, is greater or less than its value used in calculating GDP under standard national accounting conventions, namely its cost.

PART FIVE

Defence Industry and the Role of Defence

Part Five

Defence Industry Development and the Role of Defence

Summary of Main Points

- ☐ Available information shows that companies in the aerospace and electronics and communications sectors account for nearly all Australian defence related exports.
- ☐ The electronics and communications sector is the centre of most Australian defence related research and development. Many of these companies have a strong interest in links to Defence through the DSTO. Australia's level of funding for defence research and development is significant though below that of countries such as the USA, France, UK, Germany and Sweden, the homes of the world's most significant arms manufacturers.
- ☐ Prospects for the significant expansion of the Australian defence industry appear modest but can be strengthened. Defence's potential role in the development of each sector is different in important details (see Figure 11.14 for a detailed discussion of the prospects for each industry sector and key roles for Defence).
- ☐ Two important issues stood out in discussions with companies about their view of the appropriate role for Defence. Companies considered that tender processes needed to be improved and costs reduced. They were also strongly concerned with increasing collaboration and information flow in Defence planning.
- ☐ The issues raised by companies and other results of the study suggest Defence would benefit from introducing improved supplier management approaches. The risk of close commercial relationships between Defence and its suppliers becoming "cosy" and fostering inefficiency can be reduced by a range of management strategies such as benchmarking, periodic competitive retendering and transparent processes.
- ☐ The consultants were asked to advise on regular monitoring activities by Defence. Before such monitoring activities can be properly focused, some organisational and management changes are needed, including improved knowledge of supplier management best practice and refocusing organisation attention on supplier management.
- ☐ As an initial step, Defence should undertake a study of best practice supplier management in industry. The most important regular monitoring activity should be an annual survey of key suppliers. (See Figure 13.7 for a detailed summary of monitoring and management issues.)

11. The Future Development of Australia's Defence Industry

Part Five examines Defence's role in the management, assessment and monitoring of the "Australian arms economy". Again this term is taken as synonymous with the core definition of defence industry outlined in Part One – that part of Australian industry supplying goods and services or capabilities which are strategically important to Defence. As noted, the definition of the Australian arms economy includes export activity as well.

This Chapter examines the prospective development of the Australian arms economy, based on the analysis presented earlier in this Report. Of the sectors considered, the electronics and communications companies have the greatest strategic importance for Defence industry policy since it is in this area that medium and long term technologies significant to Australia's defence are developed. With Defence expenditure shaping this sector, particular attention needs to be paid to the way in which procurement policies influence industry outcomes and potential industry development – all assessed against Defence objectives.

The aerospace, shipbuilding and ordnance sectors are primarily important because they provide repair, overhaul and maintenance capabilities or produce strategic consumable products. The role of Defence industry policy will consequently be different in these areas from its form in the electronics and communications sector. Important issues concern planning and efficient procurement processes and how these can assist company and industry development, in the interests of Defence objectives.

Chapter 12 broadly examines the Defence and supplier relationship taking into account the views of industry and results of this study. Chapter 13 proposes management and monitoring steps, consistent with the development of improved Defence industry relations, for assessing the continuing development of Australia's defence industries.

11.1 Defence Industry and the Arms Market

The analysis in Part One led to a core definition of defence industry as that part of Australian industry providing goods and services or capabilities which are strategically important to Defence.

It is not possible to be precise, but on this definition defence industry (including export activity) probably accounts for about 0.6% of GDP, with the main business units concerned comprising more than 1.2% of GDP when their total activities are taken into account.

Part Two discussed defence industry in five main industrial sectors. Companies in these sectors are likely to provide the most important strategic capabilities for Defence.

Figure 11.1

Defence Industry in Australia

Sector	Defence as % of Total
Shipbuilding	68%
Ordnance	30%
Electronics and communications	15%
Aerospace	12%
Information technology	2%
Vehicles	2%

Note: Expenditure on shipbuilding and aerospace includes a high component of electronics related expenditure

Source: These estimates are compiled from a variety of industry sources

They should be used as broad indicators rather than precise measures

All figures have been quoted elsewhere in this Report

This approach does not mean that key military commodities such as petroleum are not vital for military operations. It assumes that because of the wide availability of the particular product in the economy, Defence will be able to reduce the vulnerability of its operations to a shortage, removing the commodity from the classification of strategic.

Of the five sectors listed, the electronics and communications sector is judged to be most important. This is because it is in this sector that most of Australia's medium and long term technologies are developed to meet our special defence requirements.

Over the 1980s the proportion of Defence capital equipment sourced in Australia has increased, leading to an increase in the size and capability of the defence industry. Despite that, none of our three largest defence suppliers is in the top 100 on a world scale.

Existing capacity in key capabilities, such as shipping and related systems design and integration, is linked directly to specific procurement programs with finite lives.

11.2 Current Export Performance

Part Two of the Report detailed exports as reported by companies. These figures are useful for illustrating orders of magnitude and the broad export picture, though they are not considered precise measures (see Figure 11.2 concerning data problems).

Figure 11.2

Defence Export Data Issues

There are currently major gaps in knowledge about defence related exports. The Statistician records exports of defence services (totalling \$80.6m in 1986-87) which are effectively the provision of defence to foreign customers and include cost recovery for US military bases, defence services for non-residents and defence services deployed to foreign administrations.

As such, they do not represent the export of defence related goods and services of Australian industry. In the official statistics these are recorded (and hidden) in the export figures for various other industry sectors.

One direct source of information on defence related exports is the system of export controls on restricted and dual use technologies covered by Schedules 13B and 13E of the Customs (Prohibited Exports) Regulations. This approach has coverage and accuracy deficiencies.

- A section 13B export permit covers goods that are directly related to defence applications including inherently lethal, incapacitating or destructive goods, other military or related goods, military cryptographic and related electronic equipment and software, and non military lethal goods. A 13B permit allows for the export of a specific shipment of a restricted good to a specific location, or for shipment up to a specified maximum quantity of a specified good to a specified location.
- Section 13E covers "Dual Use Technologies" which encompass a wide range of general industrial and specialist technologies including missile, nuclear and chemical goods. A licence granted under 13E permits the unrestricted export of specified goods covered by that licence to a prescribed destination or group of destinations during the (usually) 12 month life of that permit.

The coverage problems arise because the schedules do not apply to all categories of defence related goods. They exclude, for example, defence related product technologies, repair, overhaul and maintenance and other services. The value of some repair work may in fact be captured under Schedule 13B because an export permit must be obtained to re-export, say, a jet engine that was brought into the country specifically for the purpose of overhaul.

The problem is that the value of the "export" may be grossly overstated because it could include the engine as well as the overhaul. Equally, a 13B permit is required for the "one off" export of surplus military equipment which, while contributing to the total value of exports, would not necessarily represent any Australian value-added. Further accuracy problems arise because not all export permits are fully utilised. The Exports and International Programs Group (EIP) within Defence estimates that only about 90% of the potential value of permits issued are utilised.

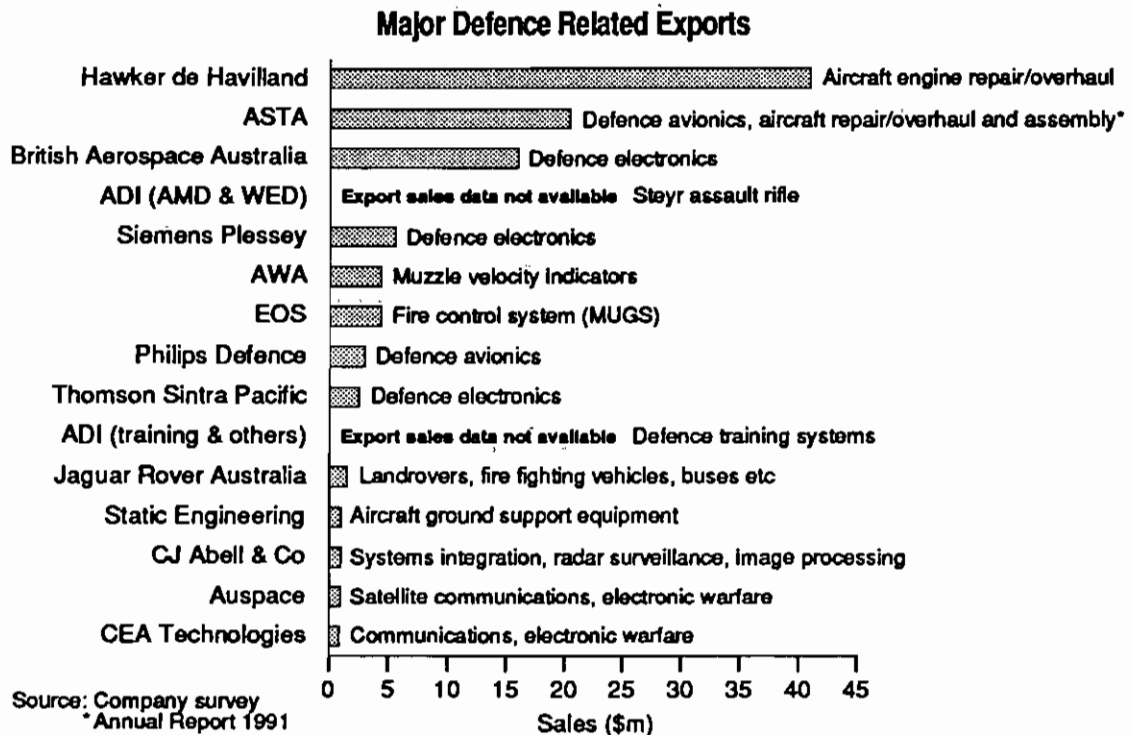
Nonetheless, the export control figures provide some information. Recent analysis of this data by EIP suggests that exports under Schedule 13B totalled around \$120 million during the 1990-91 financial year. The estimate for exports under Schedule 13E is around \$160 million in 1990-91. Total defence related exports or exports that are a spin-off from defence production may be considerably higher than the \$280 million estimated from the export control data.

Source: EIP

Of the 103 companies surveyed in the preliminary phone survey and the more detailed follow-up survey, 24 indicated that they had undertaken defence related exports in the last year which totalled around \$135m. Of these companies, 13 were in the electronics sector, six in aerospace, one in information technology and four in other

categories. Most of the exports in other categories related to ADI's arms exports although Jaguar Rover Australia and Static Engineering also exported.

Figure 11.3



*Most defence exports are from either aerospace or electronics
and communications companies*

The survey results appear to correlate, in terms of order of magnitude, with the \$120m of section 13B exports estimated by the Exports and International Programs Group (EIP) within Defence .

While the aerospace and electronics and communications sectors are both important exporters of defence related goods, the electronics and communications companies have greater focus in this area.

Electronics and communications companies exported around \$0.44 of defence related goods for every \$1.00 of civilian exports. Aerospace companies exported around \$0.22 of defence related goods for every \$1.00 of civilian exports.

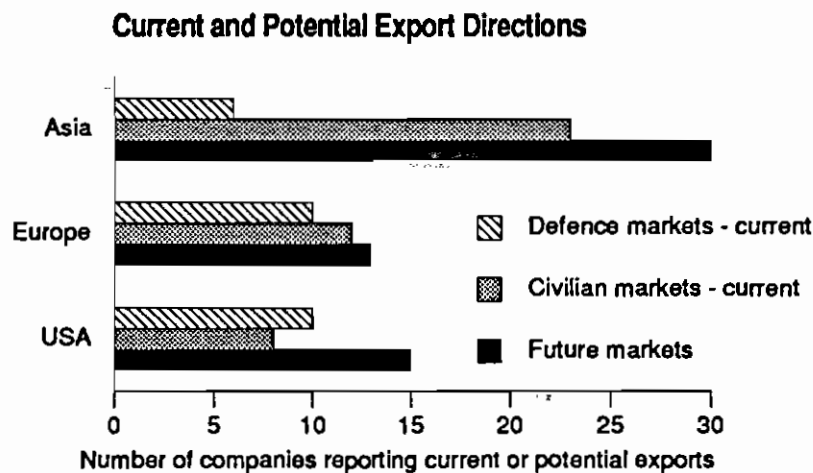
Aerospace companies, however, appear to be more effective exporters of defence related goods. Aerospace companies reported \$0.30 of defence exports for every \$1.00 of Australian defence revenue. On the other hand, electronics and communications

companies reported around \$0.07 for every \$1.00 of defence revenue.¹

Companies contacted during the formal survey indicated that the USA and Europe are currently the major markets for Australian defence related exports. Of the 58 companies contacted, ten indicated that they had undertaken defence related exports to the USA in the past year and ten to Europe, but only six reported defence related exports to Asia.

Although Asia is not currently a major defence market, it is a major civilian market and is perceived as being an important future market for both civilian and defence related exports. Thirty companies indicated that they expect to export to Asia in the future while 15 companies expect to export to the USA and 13 to Europe.

Figure 11.4



Source: Company survey

Defence, through its emphasis on its own particular requirements as a customer, has assisted the development of company skills and capabilities with export potential. Anecdotal evidence highlights this.

¹ It is again important to note particular problems associated with "exports" in areas such as systems integration. Some companies' reports suggest that they are claiming exports for work for overseas primes developing systems for Defence. More thorough analysis is needed to identify the extent of any distortion created by this approach.

Figure 11.5

Development of Company Capability from Defence Requirements

AUSPACE (Canberra) develops and manufactures satellites and satellite related communications equipment. Much of its work has been involved with communications and remote sensing surveillance via satellites and communications networks which ultimately find at least part of their capacity used in secure military communications networks. AUSPACE also built the Endeavour space telescope which was launched with the NASA space shuttle Discovery in January 1992.

AUSPACE's most recent development is in the field of Global Positioning Systems (GPS) a system that uses a network of satellites to provide very accurate location determination (+/- 0.5m) anywhere on the globe (ie. latitude, longitude and altitude). AUSPACE's developments have overcome problems associated with vibration sensitivity and their product offers superior battery life and much faster "reacquisition time" (the time taken to lock on to the satellite signals after they have been interrupted) of around 3 *nano-seconds* compared to 1.5 *minutes* for a competing Japanese product. Ultimately, commercial applications are expected to outnumber defence applications by around 75/25 with anticipated uses in fleet management and aircraft tracking.

GPS has stimulated much interest in the South East Asian region. The first production run is due in November/December with full scale production due to commence early in 1993.

AUSPACE's GPS device was developed in co-operation with Defence who funded part of the development under the Defence Industry Development (DID) scheme. DSTO acted in an advisory capacity to review the R&D process.

Source: Interview with AUSPACE & Asia-Pacific Defence Reporter June-July 1992

The development of the SAS anti-terrorist training facility at Pearce involved Defence in the development of special target system and facility designs. This facility is the only one of its kind and the design expertise and some of the target technology is now being sold to ASEAN countries for their counter terrorist training programs.

Source: Interview with Defence Facilities and Property Division personnel

"Bonded repair technology or 'crack patching' developed by the Defence Science and Technology Organisation to prolong the life of RAAF aircraft will soon be used by civilian airlines in Australia after successful testing by Qantas"

Source: Asia-Pacific Defence Reporter June-July 1992

The full development of a successful defence export sector will depend on many of the factors that will determine our future as a manufacturing and related exporter generally.

Figure 11.6

Keys to Manufacturing Exports

- Competitive policy and inflation environment, and taxation
- Continued micro-economic reform
- Flexible labour market
- Outward looking, aggressive management
- Increased innovation
- Increased management emphasis on international marketing skills and infrastructure

The development of export companies will also be influenced by many of the trends affecting exports identified in Chapter 9 and summarised in Figure 11.7.

Figure 11.7

Factors Influencing Future Australian Defence Related Exports

PLUSES	MINUSES
Global Factors • Emphasis on performance enhancement may provide important niches for non-traditional, emerging, technology-based players • Traditional defence manufacturers may be slow to adapt • Specialist, niche, technology based systems products may not suffer same diseconomies of scale as more conventional defence capital equipment and consumables Regional Factors • Asian NICs one of few growth areas for defence products • Australia is well located including for repair and overhaul role • Defence interface with countries in the region should expand • Australian procurement is on a scale and at a level of technology fairly well suited to these countries • Australian expertise in low intensity, hot climate control systems • Australian has high procurement standards • Countries may wish to diversify away from traditional suppliers	• Military spending declining around the world • Excess supply capacity in the former Soviet countries and more generally • Traditional defence manufacturers will look to diversify and have relative financial muscle • Systems technology tends to remain linked to basic platform construction • Countries in the region can be expected to maximise indigenous content, particularly in traditional construction and assembly • Australian industry may not be competitive, for example in repair and overhaul • Growth in military spending in the region will not go unnoticed by defence suppliers elsewhere in the world • Over-capacity around the world will make for tough competition

The market will remain highly competitive with barriers to the development of dual use technology.

Figure 11.8

Sweden's Defence Industry Approach

Sweden's defence policy is built around the concept of "Total Defence" and is based on the use of civilian medical, rescue and communications facilities as well as regular and reserve military forces and capabilities.

Sweden's major defence manufacturers include Swedish Ordnance (the result of a merger between AB Bofors and FFV Ordnance in January 1991), Nobeltech (whose Australian subsidiary is a major subcontractor on the ANZAC frigate program), Saab-Scania's defence divisions (Aircraft, Missiles, Instruments and Training Systems), Hagglunds Vehicle AB, Ericsson Radar Electronics AB and Kockums AB (a prime source of technology transfer and design skills on the Collins submarine project). The notable thing is that despite all these being private sector companies there is a very close liaison between the manufacturers and the defence force.

So close, in fact, that faced with reduced ordnance needs it was the Swedish Government that instigated the formation of Swedish Ordnance by "indicating" that the conflict of interest posed by having two companies (Bofors and FFV Ordnance) bidding for the same procurement budget was counterproductive. Here we see a (possibly justifiable) example of defence strategic imperative overshadowing economic rationalism.

For all these producers, the prospect of a shrinking domestic market is faced with a degree of pragmatism. Although the domestic market will continue to be the primary focus, the export market is seen as being of increasing importance. Unfortunately, this export drive is being encouraged in other countries also and the result will be the existing defence manufacturing base trying to fill a shrinking world market.

With a substantial capability in design and provision of electronics, sensors and command control systems, Sweden's defence manufacturers appear to be in a position to benefit from the market segment that is enjoying at least zero shrinkage (if not some growth) compared to the observed decline in the traditional "bombs and bullets" market.

Source: T. Nash "The New Shape of The Swedish Defence Industry", *Military Technology*, Issue 8/1991

Figure 11.9

Barriers to Finding Civilian Markets for Defence Products

Barrier	Description
Industry structure	Civilian industry may offer no profitable opportunities Defence companies with high overheads cannot compete in price-sensitive industries
Different specifications	Products designed to Milspecs are over-engineered for civilian markets
Marketing skills	Selling to civilian markets requires different skills
Licence limitations	Overseas licence holders preclude commercial development
Security controls	Many state-of-the-art defence products may not be made commercially available for security reasons

11.3 Research and Development

Research and development of new products is an important base for the development of export industries (commercialisation skills are equally important).

Company Activity

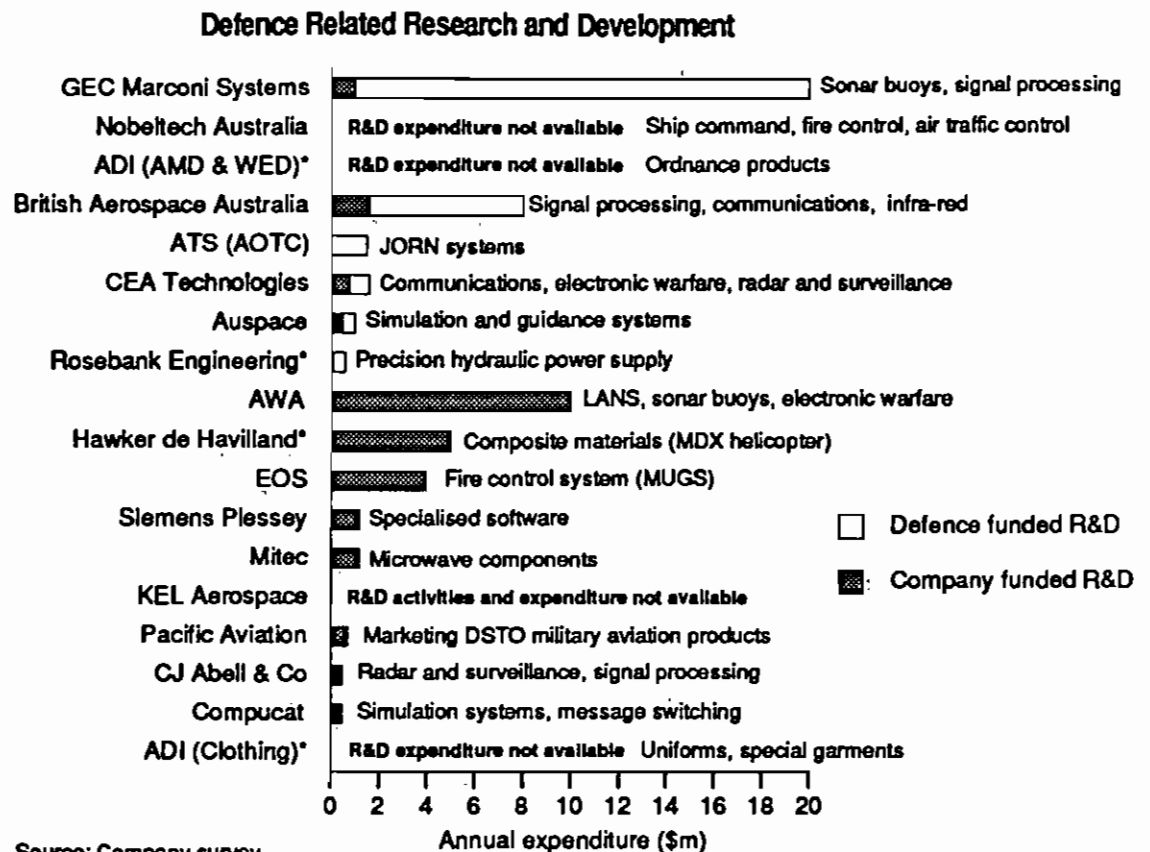
The majority of defence related research and development activity is undertaken in the electronics and communications sector. Companies' comments suggest that they are concentrating on niche technologies and product development with limited overlap of research and development activities from one company to another. The level of Defence funding for research and development activities in this sector is much higher than for other sectors.

Larger companies in the information technology sector such as IBM, DEC and Unisys invest substantial amounts in research and development. However, there is little evidence to suggest that it is defence specific and no Defence funding was reported. In general, research and development activity undertaken by these companies is part of a global operation and is directed towards product development and applied technologies.

The companies in the aerospace sector reported modest levels of investment in research and development compared with the electronics and communications and information technology sectors. The types of activity undertaken broadly fall into two groups - applied technologies, such as composite materials technology; and niche product development. The level of Defence funding was reported as low which is not surprising given the general focus on civilian applications.

Few companies in the shipbuilding sector reported investment in research and development. Instead, research and development appears to take the form of on-going product and process development.

Figure 11.10



Most research and development activity appears to take place in the electronics and communications sector

The companies in each sector reported a variety of sources of research and development information. These included affiliations with international parent companies; other international companies through joint venture arrangements; and a range of academic and government institutions. DSTO was considered an important source of research and development information in the electronics and communications sector.

DSTO Role

DSTO has a range of important roles, only some of which relate to the development of defence related industry. Research and development activities often have quite separate strategic and operational requirements, although they are linked through specialist knowledge and continuity of involvement by key personnel. Analysis of potential industry interaction with DSTO must take account of the iterative and complex flow from research to development. Security and alliance considerations also constrain DSTO-industry collaboration in the research area.

Figure 11.11

Roles of DSTO

Role	Purpose	Industry Interfaces
Conduct strategic research	Keep abreast of leading edge technologies through in-house research and liaison with foreign defence research bodies	• Description of future technologies of Defence importance
Provide policy advice	Ensure all major equipment and force development decisions receive input on technological trends	Nil
Enhance the effectiveness of the ADF	Specific R&D for Defence procurement – develop products to fill particular needs	• Development cycle • Government furnished R&D for capital equipment projects • Diagnostic and repair techniques
Encourage transfer of selected technology	Civil and Defence exploitation of spin-offs	• Assist Defence-dependent companies to find civilian markets • Make commercial profits from joint venture activities in civilian markets

Source: Defence Report 1990-1991, Defence and industry interviews

Interaction between DSTO and industry is mainly through development projects intended for Defence procurement. A few projects are aimed at commercialising DSTO innovations for other markets but this represents less than 1% of budget.

The development process may be utilised more effectively to enhance relationships between Defence and industry. Changes in this direction would imply that DSTO have both the mission and the budgetary incentives to focus additional resources on commercialisation activities. As noted in Chapter 4, electronics and communications companies have a strong interest in this relationship.

Figure 11.12

Commercialising DSTO Projects

Project	Original motivation	Wider applicability
Enhancements to Aircraft Operations or Repair and Maintenance		
Smoke reduction and improved fuel efficiency for T56 engines	Improve operation of Defence Orion and Hercules aircraft	All civilian and military users of T56 engines
Automated hydraulic test system	Improve in-country maintenance capabilities	All owners of F111's, especially the USAF
Boron fibre repair techniques ("crack patching")	Increase longevity of Defence aircraft	All military and civilian aircraft
Helicopter gearbox monitoring system	Enhance self-reliance of ADF	Any large transmission system which is mission critical (eg high speed turbines)
Air traffic control tower simulator	Reduce cost of ADF training	Any air traffic control authority
Other Projects		
RADAR target generator	Reduce cost of developing RADAR recognition patterns	Military exports
Elastomer tailoring technology	Adapt overseas designed tanks for Australian conditions	Any leading edge user of elastomer compounds, especially in the automotive industry
C-Scanner	Increase longevity of Defence equipment	All applications where metal fatigue is critical: military and civilian aircraft, pressure vessels, etc
Rare-earth corrosion resistant materials	Increase longevity of Defence equipment	Any application where corrosion is mission critical
Welding techniques for micro-alloy steels	Reduce cost of submarine construction program	Specialist welding applications only
Triple ejector bomb racks	Commercial work for ASTA	Military exports

Source: Defence Report 1990-1991, Defence and industry interviews

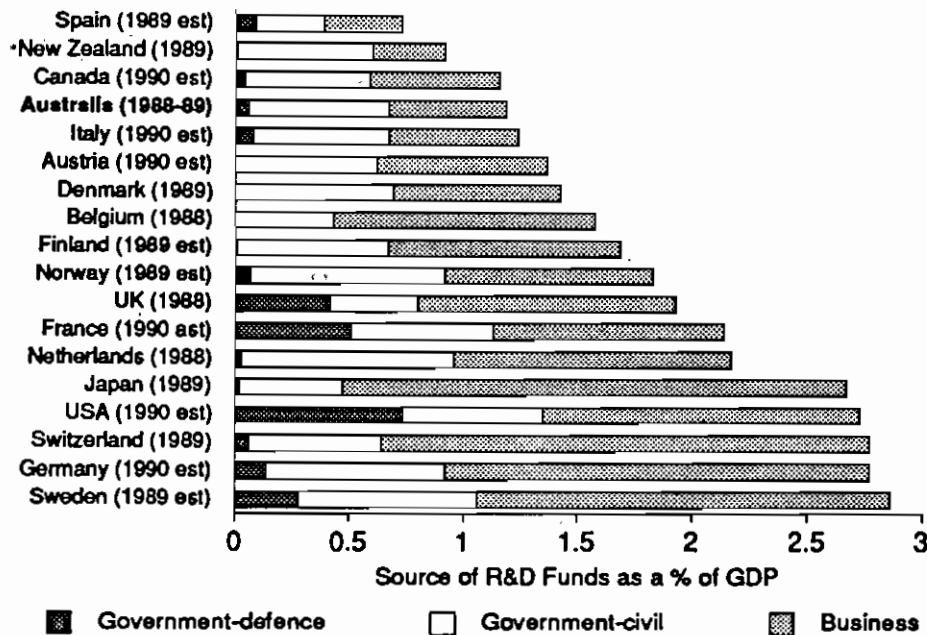
Comparative Government R&D Funding

The commercialisation of DSTO research and companies' expenditure on research and development needs to be placed in the context of international patterns of defence research and development. Figure 11.13 shows that Australia has significant levels of government funded defence research and development compared to most other nations of its size.

Australia's level of defence research and development is an order of magnitude below that of countries such as the USA, France, UK, Germany and Sweden. It is in these countries that the world's most significant arms manufacturers are located. An implication of this is that substantial levels of government defence funding may be a foundation for the success of major international arms companies.

Figure 11.13

Defence Research and Development and Sources of Funding



Source: DITAC Science & Innovation Resources Brief

The USA, France, UK, Germany and Sweden, the homes of major international arms companies, have very high levels of government funded defence research and development

11.4 Development Prospects and Defence Role

The analysis contained in Part Two of the Report drew together information about each sector to reach conclusions about prospects for defence industry development and Defence role in that development. Figure 11.14 summarises conclusions taking into account the range of factors indicated earlier.

Exports are a possible avenue for expansion of defence industry. Demand from the expanding regional economies should assist this growth although, as previously noted, defence markets are strongly contested and distorted by national government interventions.

The overall export position described by the survey results is that the aerospace and defence electronics and communications sectors are the only sectors with defence export track records. The aerospace sectors defence related exports, largely of aircraft repair, overhaul and maintenance services, should continue to expand. The major role of Defence in this area is as a leading demonstration customer.

Defence electronics and communications are likely to grow slowly. The reasons cited by companies for the current, relatively low, level of exports are noted in Section 4.2 – they include the need to build credibility overseas, access to capital, constraints on exports of

security related products, lack of overseas distribution links, small company size and high defence related cost structures.

The nature of Australian procurement of defence electronics and communications may pose particular problems for companies wishing to export. Because local procurement is focused on uniquely Australian strategic needs this may limit the potential for export. Defence collaboration with companies may assist to overcome this problem (collaborating through normal management processes where this contributes to the achievement of objectives such as reducing dependence on Defence sales).

Turning to the shipbuilding sector, there is no significant track record to suggest major sales of larger craft. The prospects for developing exports of naval vessels do not appear strong. This impression should be offset against the success of some small ship and boat builders in exports.

Defence should have a role across all sectors in supporting companies seeking greater access to overseas defence markets. This support may take the form of leading user endorsements, providing information to companies about foreign defence markets or supporting government to government negotiations about defence goods and services trade. Assistance in the form of recommendations or provision of specialist market information would seem to be most effectively provided by Defence users (as distinct from a central unit) in the course of dealings with suppliers.

Defence assistance in promoting collaboration with other national defence forces would also clearly assist the development of Australian defence industry companies. In particular, it may promote the development of specialised activities which are internationally competitive.

Figure 11.14

Prospects for Defence Industry Expansion and Defence Role

DEFENCE RELATED SECTOR	PROSPECTS FOR CIVILIAN AND NON-ADF/DOD RELATED EXPANSION	ADF/DOD ROLE
Information Technology	- Continued expansion of existing civilian sector with increasing emphasis on services and software - No evidence to suggest significant expansion of defence related exports	- Defence has a leading edge customer role in demanding extremely low levels of defects, high quality and adherence to management processes - Defence may seek to maintain relevant application specific skills and knowledge - General benefits to Defence and firms through improved contracting and related processes
Electronics and Communications	- Continuation of levels of defence related exports (low compared to civilian exports by the same group of companies) based around companies' particular skills and capabilities (often developed through Defence intervention) - Some additional prospect of niche based exporters (eg EOS) succeeding outside Defence mainstream - Possible development around DSTO based capabilities and associated company and institution networks	- Defence necessarily drives development of business units/companies producing strategic technologies to meet special Australian needs - Greater definition of Defence requirements and planning in consultation with industry will contribute to stable development, increased prospects for investment and for improved electronics and communications capability - Defence procurement practices will shape the development of industry capability to secure a domestic skill base or player/s sufficiently able to undertake major projects - Continued co-development and commercialisation approaches to develop Defence and industry skills and increase prospects for commercialisation - Continued potential for Defence to tailor specification and development to assist in commercialisation of non-sensitive technologies - General benefits to Defence and firms through improved contracting and related processes
Systems Integration	- Continued exports of systems integration services from a range of sectors based on relatively widely held skills - No evidence to suggest significant expansion of defence related exports	- Defence has a leading edge customer role in demanding extremely low levels of defects, high quality and adherence to high project management standards - Defence may seek to maintain relevant application specific skills and knowledge - General benefits to Defence and firms through improved contracting and related processes

Figure 11.14 (Continued)

DEFENCE RELATED SECTOR	PROSPECTS FOR CIVILIAN AND NON-ADF/DOD RELATED EXPANSION	ADF/DOD ROLE
Shipbuilding and repair, and related supplier industries	• Potential for development and export of purpose built, small military and civilian craft (strongly dependent on continued high levels of productivity) • Possible government to government naval sales • Continued development of shipbuilding related components with prospects of niche based technology exporters	• Defence has created substantial capacity which is unlikely to be maintained without successful diversification by major companies • Further definition of Defence strategic requirements and the means through which these capabilities will be maintained will assist in industry planning • Continued potential for Defence to consider suitable modifications of specifications as a means of assisting commercialisation to maintain industry base • Development of companies providing specialised capabilities through close working relationships focused on Defence strategic needs • General benefits to Defence and firms through improved contracting and related processes
Aerospace (excluding electronics) and related supplier industries	• Continued export of civilian airframe components provided high present levels of productivity maintained and market access continued • Likely expansion of HdH design and development capability based on MDX approach • Continued development of aerospace component manufacture with prospects of niche based technology exporters • Continued growth in exports of repair, overhaul and maintenance services	• Development of companies providing specialised capabilities through close working relationships focused on Defence strategic needs • General benefits to Defence and firms through improved contracting and related processes • Continued potential for Defence to consider suitable modifications of specifications as means of assisting commercialisation to maintain industry base
Vehicle and related supplier industries	• Sector driven by civilian industry, prospect of increasing specialisation of exports and continued rationalisation of industry capacity • Continued prospects of niche based technology exporters based on products developed to meet Defence strategic needs	• Key Defence task to assess production and procurement processes which will meet continuing strategic requirements in a cost effective manner • Development of companies providing specialised capabilities through close working relationships focused on Defence strategic needs
Ordnance	• Wholly Defence dependent facilities with unclear prospects for diversification into civilian areas or defence related exports	• Key Defence task is to define the level of local capability required to meet strategic needs and the associated premium
Other sectors	• Driven by civilian market except for particular companies producing specialised goods and services to meet unique Defence needs	• Key Defence task to assess production and procurement processes which will meet continuing strategic requirements and other needs in a cost effective manner • Potential for development of companies providing highly specialised, strategic capabilities through close working relationships focused on Defence needs

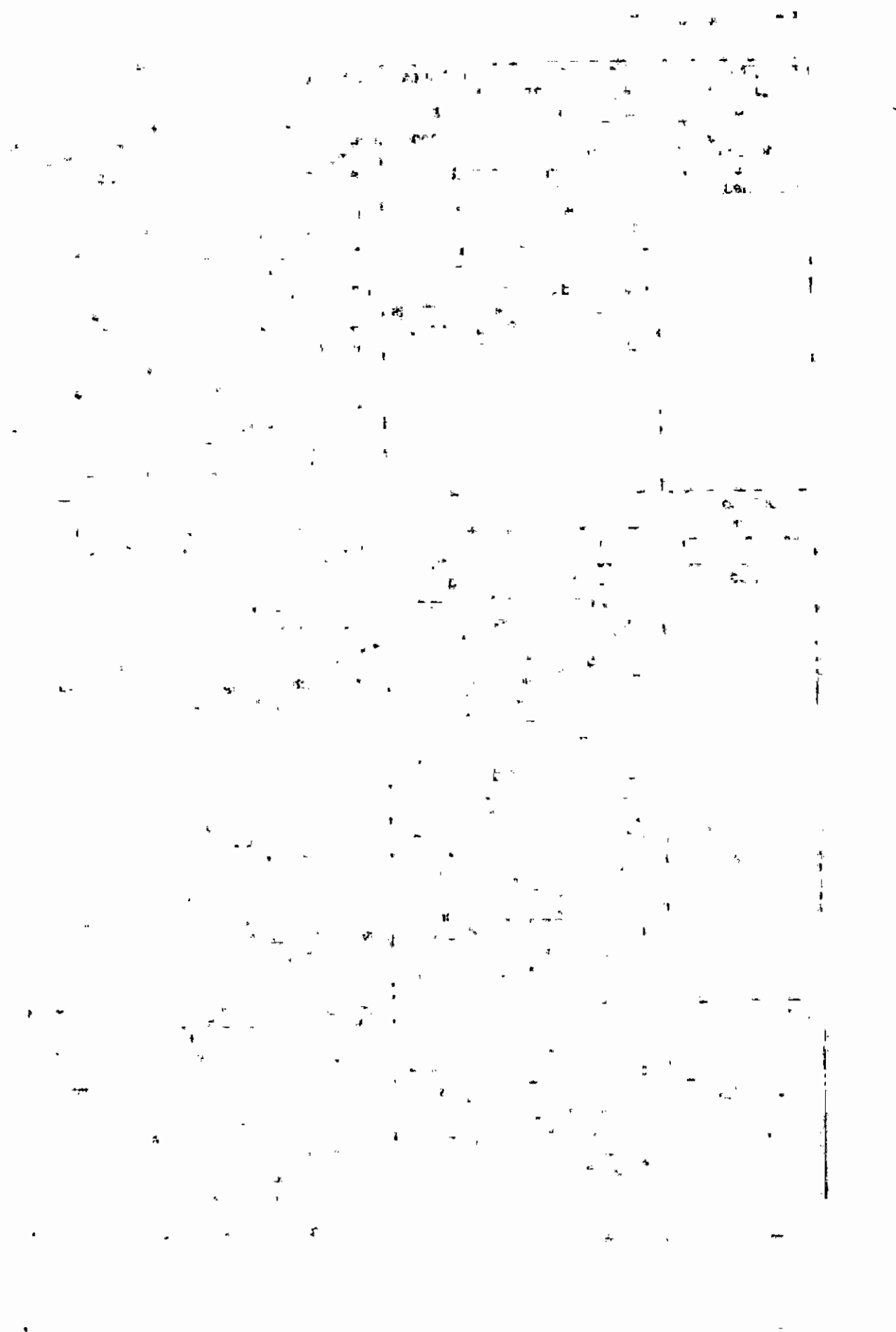


Figure 11.14 (Continued)

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12. Defence Supplier Relations

Important management issues relating to the relationship between industry and Defence were identified by companies during the survey (these are described in detail in Attachment 2 and in full in the separate Survey document). At the broadest level these issues concerned the ways in which Defence, in its own procurement and supplier management, can attain best practice – to produce the greatest benefit for Defence itself and for industry.

12.1 Company Issues

Companies were asked the question "Are there changes you would like to see in the way in which ADF/DoD deals with your company/industry?". Responses were in the form of recommendations for change.

The most important set of issues identified across all companies related to tender processes – many companies considered that tender processes could be improved to reduce costs for companies and Defence. Defence planning and collaboration with industry also stood out as an important group of concerns for companies. A number of companies commented favourably on the steps currently being taken by Defence to address concerns in both areas.

Other important issues raised by the companies, but which received less attention related to procurement policy, broad support for industry, knowledge of companies, development (and research), contract administration and the organisation of Defence.

Figure 12.1



A common thread through many of the comments was a desire for closer collaboration with Defence, within a competitive framework. Such a direction would potentially address many of the issues associated with tender processes, planning and procurement policy.

12.2 Closer Collaboration with Companies

Chapter 3 proposed a simple model with suppliers grouped into three categories. Of the three categories, we are concerned with the Close Commercial and Direct Support categories where special, long term relationships may be developed between Defence and its suppliers.

Figure 12.2

Characteristics of Supplier Relationships

Category	Characteristics
Direct Support Relationship	Important strategic products/capabilities Defence applications only May require Defence subsidisation
Close Commercial Relationship	Strategic products/capabilities Defence applications usually
Normal Commercial Relationship	Commercially available products No strategic value

The reasons for why Defence would enter such relationships with particular suppliers were noted in Chapter 3. These reasons are shown in Figure 12.3.

Figure 12.3

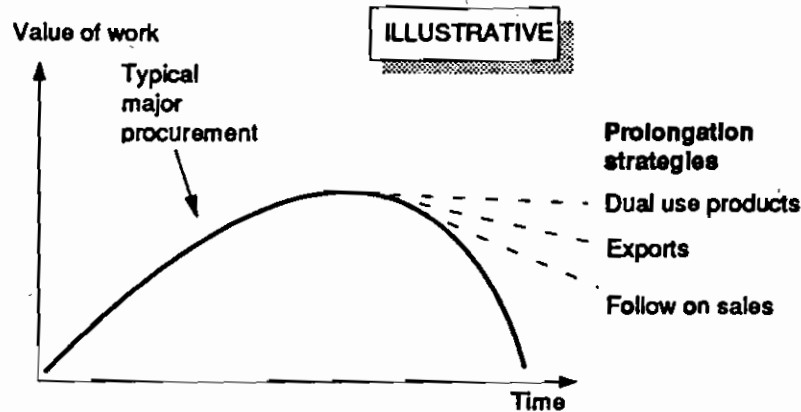
Justifications for Close Commercial Relationships

• Inevitability of close commercial relationships in large, complex projects • Maintenance of strategic capabilities • Increased Defence knowledge of company and industry capability and particular technology • Reduced transaction (procurement/management) costs • Better supplier knowledge of Defence requirements and processes • Improved supplier learning about particular technologies of importance to Defence • Increased company investment in processes, personnel and equipment with increased certainty • Increased potential for development of new technologies meeting Defence's particular needs • Potential for developing dual use applications, exports and follow-on sales to reduce Defence dependency • Enhanced company capability to reduce Defence costs

A particular problem in managing and maintaining desired Defence capabilities within Australian industry is the discontinuity of major capital procurement programs. Closer working relationships between companies and Defence may offer potential for offsetting these discontinuities (see Figure 12.4).

Figure 12.4

Offsetting Procurement Discontinuity



Long-term supplier relationships will help sustain key capabilities

The success of special supplier relationships has been studied in the commercial world. Xerox in the early 1980s reduced its supplier base from 5000 companies to 400 by single sourcing and close commercial relationships. It chalked up some impressive gains.

Figure 12.5

Results of Working with Suppliers at Xerox from 1981 to 1984

Reduced:

- net product cost by 10% per year
- rejects of incoming materials by 93%
- new product development time and cost by 50%
- production lead times from 52 to 18 weeks

Source: Burt (1989) "Managing Suppliers Up To Speed", *Harvard Business Review*, July-August 1989

12.3 Close Commercial Relationships in the Automobile Industry

Relevant models of close commercial relationships exist in other parts of the commercial world, notably in industries such as the automotive industries where supplier capabilities contribute strongly to the success of major companies. These models are based around close relationships with fewer, highly skilled suppliers. Figure 12.6 sets out some of the requirements that have been found necessary for developing and managing such special supplier relationships.

Figure 12.6

Requirements for Developing Close Commercial Supplier Relations

- Select suppliers based on commercial, financial & technical criteria
- Involve suppliers in the design process
- Get suppliers to address quality up-front
- Ensure suppliers earn a fair profit
- Manage supplier relations to ensure long term growth of supplier skills

Source: Burt (1989) "Managing Suppliers Up To Speed", *Harvard Business Review*, July-August 1989

The selection of suppliers would normally be based on the potential supplier's capabilities in research and development, production, quality management, finance, purchasing and industrial relations. Transparency can be assisted by utilising selection teams with the skills necessary to evaluate all of the above criteria. Suppliers are selected on their capabilities as well as on their products. As an example, General Motors had a list of six major criteria, focused on characteristics of strategic importance to them.

Figure 12.7

General Motors' Criteria for Evaluating a Potential Supplier

- Organisational effectiveness and commitment
- Planning systems and documentation
- Cost awareness, monitoring and reduction
- Scheduling and delivery compliance
- Technology capabilities and research and development
- Financial status

Source: Burt (1989) "Managing Suppliers Up To Speed", *Harvard Business Review*, July-August 1989

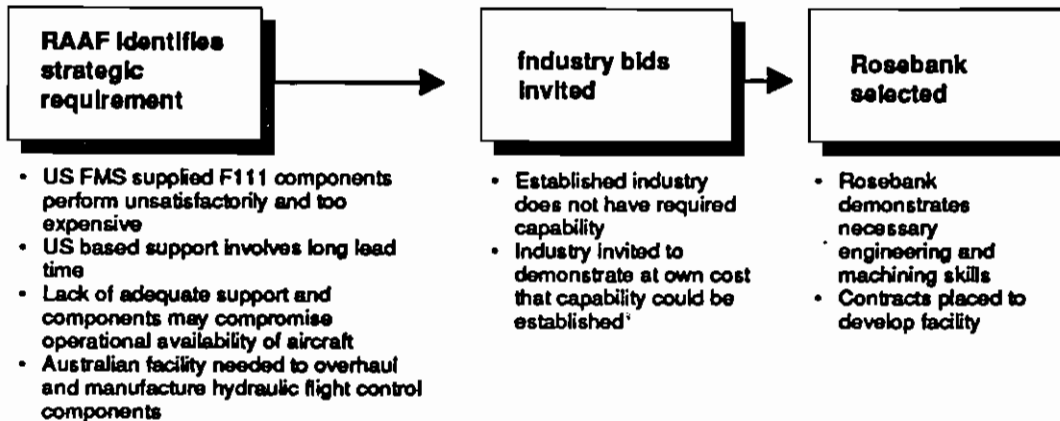
12.4 Defence Strategic Supplier Management

Defence has developed some processes to manage suppliers through close commercial relationships. A particularly interesting example is that of Rosebank Engineering where a close working relationship has been developed between the RAAF and the company.

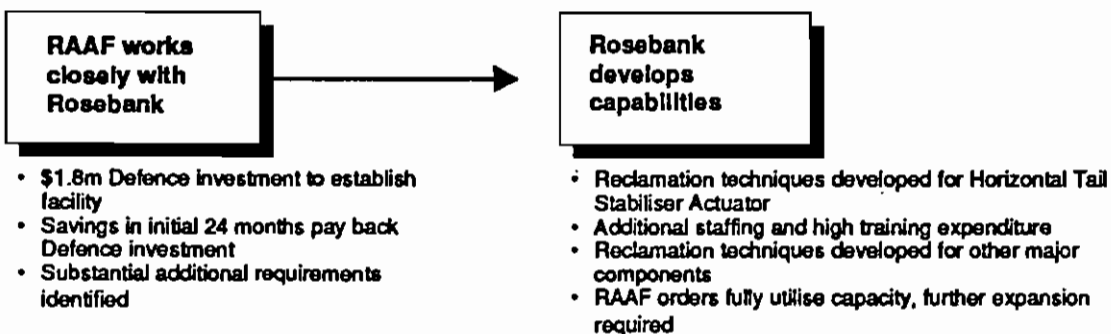
Figure 12.8

Rosebank Engineering - An example of Defence Strategic Supplier Management

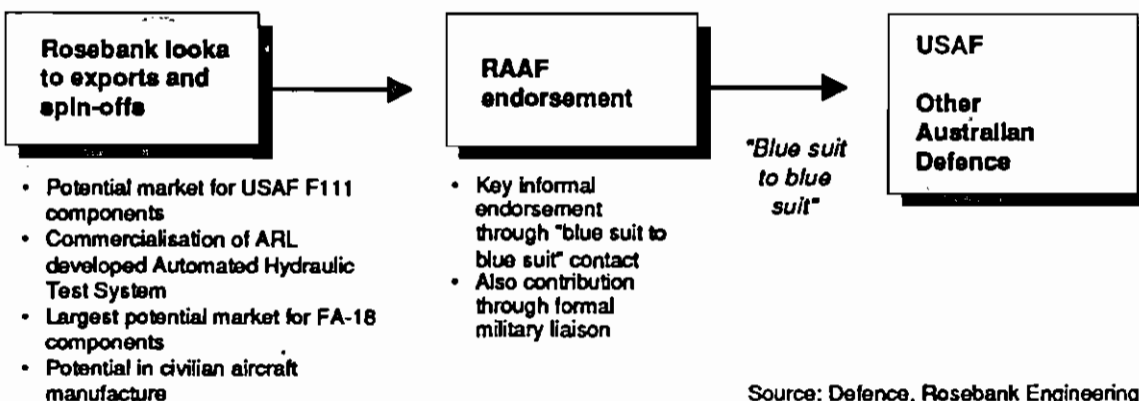
STAGE 1: STRATEGIC NEED IDENTIFIED



STAGE 2: STRONG CONTINUING WORKING RELATIONSHIP ESTABLISHED



STAGE 3: CUSTOMER SATISFACTION PROMOTES COMPANY EXPANSION



Source: Defence, Rosebank Engineering

The RAAF has developed an internationally competitive company by working closely with a skilled supplier and focusing on strategic requirements

According to many of the criteria set out in Figure 12.6, Defence's relationships have many of the characteristics of close commercial relationships. These criteria, matched against Defence's current approach are set out in Figure 12.9.

Figure 12.9

**Requirements for Developing Close Commercial
Supplier Relations – Defence Status**

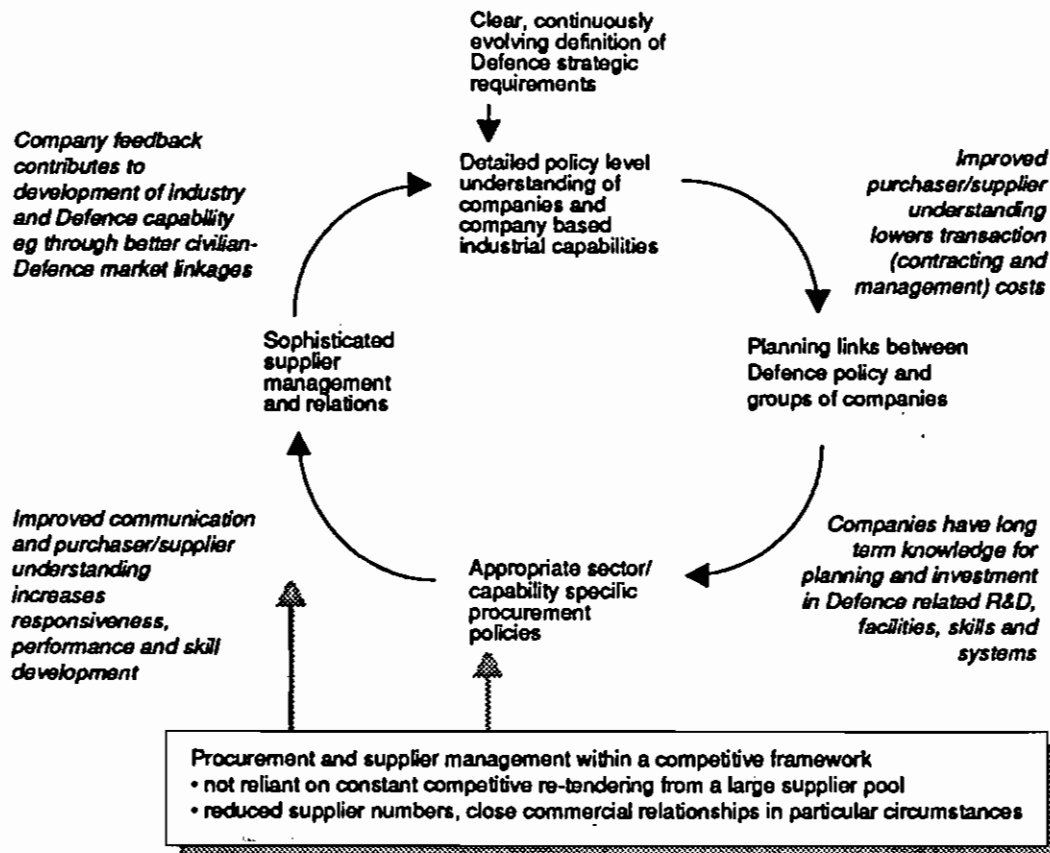
CRITERIA	DEFENCE
Select suppliers based on commercial, financial & technical criteria	Defence employs a wide range of project specific criteria (including "whole of life costing")
Involve suppliers in the design process	Some supplier involvement in preliminary stages. Defence commissions development projects for the study of particular capabilities. Retendering of development projects once completed is usual
Get suppliers to address quality up-front	Defence places a high priority on quality standards and project management processes - an Australian leader
Ensure suppliers earn a fair profit	Competition through tender processes establishes project profitability. Defence, operating within government guidelines, cannot determine what is a "fair" profit
Manage supplier relations to ensure long term growth of supplier skills	Contact with suppliers is based around specific projects or specific supply contracts

Even within a government procurement framework, it should be possible for Defence to achieve most of the benefits of best practice, strategic supplier management as practiced in industry.

The key elements in such an approach should be to achieve a detailed understanding of companies, develop better planning links with companies, tune procurement policies to sector characteristics and develop sophisticated supplier management and relations. Competitive pressures or other arrangements to maintain efficient performance are also important. Many of these attributes can be seen in the example of Rosebank Engineering. Through such a process, a procurement cycle which reinforces Defence and company knowledge, can be built.

Figure 12.10

A Potential Strategic Supply Procurement Cycle



12.5 Maintaining Competitive Pressure

Close commercial relationships are driven by the common interest of supplier and customer to achieve success. The threat of customer failure and/or of losing a close commercial relationship, are strong incentives for suppliers to meet customer price and performance criteria.

Potential close commercial relationships between Defence and suppliers should also be disciplined by competitive pressure and the threat of a contract loss. If competitive pressure is absent, Defence runs the risk of paying too much or even of military performance being compromised. Pressure can be maintained through a range of management strategies (Figure 12.11), reducing the high costs of frequent retendering processes.

Figure 12.11

Risk Reduction in Close Commercial Relationships

Risk	Management Strategy
"Cost plus" mentality	Review and audit, benchmarking
Being locked into obsolete technology	Maintain internal technological advice structure
Exclusion of new, dynamic firms	Periodic re-tendering, sunseting
Low competitive pressure	Benchmarking, continual improvement
Lack of innovation	Encourage innovation through tender evaluation process
Preferential relationships	Clear, transparent processes

Provided rigorous quality control mechanisms are applied, significant direct benefits could be expected to accrue from more effective supplier relationships in the Defence arena.

13. Monitoring and Management Issues

The terms of reference for this study requested the consultants to advise on monitoring the Australian arms economy. As in Chapter 8 we take "arms economy" to mean Defence industry including export activity.

Monitoring cannot be considered in isolation from Defence policy objectives. Its purpose is to provide information on how well Defence is meeting its aims.

Although Defence's broad objectives in acquisition and logistics policy are relatively clear, we believe improvements are needed in the way in which these objectives are achieved through organisation processes.

These improvements centre on focusing the management task on better supplier relations. Without such a focus, industry monitoring activities may not be properly directed to measuring the achievement of Defence goals.

13.1 Defence Objectives and Organisation Issues

Defence broad industry policy objectives are primarily to meet ADF procurement requirements in an economic manner and to encourage the involvement of Australian industry. This objective is illustrated in the Acquisition and Logistics Program Objective.

Figure 13.1

Acquisition and Logistics Program Objective

To realise the Government's priorities for the development of Australia's defence capabilities, through the economic acquisition of capital equipment and facilities and the provision of logistic services for the ADF and by encouraging the involvement of Australian industry where appropriate

Source: Defence Report 1990-91

Improvements in Defence organisation and management could promote the achievement of this objective. Areas for improvements are shown in Figure 13.2.

Figure 13.2

Improving Defence Supplier Relations

1. Better knowledge of best practice supplier management in industry is needed to develop improved Defence approaches
2. Organisation and management processes should focus on best practice supplier relationships as this is most likely to maximise benefits to Defence and industry
3. Better processes for cooperative planning with companies should be developed where this will improve the development of strategic capabilities
4. Closer definition of Defence requirements for strategic capabilities will assist industry to adapt its investment and development to meet future demand
5. Industry policy should take greater account of how Defence procurement, within a competitive framework, may affect the development of strategic capabilities
6. Greater knowledge of company characteristics and sector capabilities is needed to assist in Defence planning, industry policy and procurement
7. Procurement policy and related tender and contract management practices should have greater emphasis on the development of strategic Defence capabilities

As some companies noted to the consultants, Defence is already making major steps in some areas; for example, through the current study of costs of tendering.

The proposed directions focus Defence on meeting its procurement requirements within a framework of strategic supplier management. It is worth stressing that this approach is a move *away* from direct support policies.

The argument in favour of this shift is that the most effective way for Defence to play an important developmental role in those industry sectors in which it has influence, is to work more closely with companies to meet its strategic needs in an informed and knowledgeable fashion.

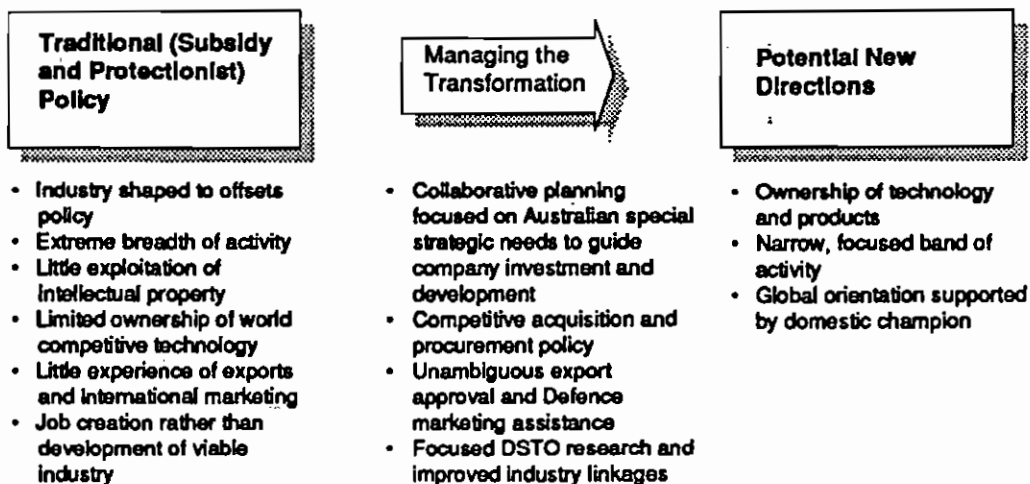
Direct support policies, in contrast, do not appear to have produced benefits to return the investment which has been made in the past. The evidence of limited benefits is the absence of significant examples of company development arising from policies which were not closely focused on meeting Defence needs.

Aerospace companies' development of civilian airframe components business may be an exception. This exception can be traced to strategic opportunities in the international airframe market arising at that time because of the industry's rapid development. This business will be maintained by high levels of company productivity and continued market access.

Only a few companies indicated that they favoured direct subsidy approaches to development. As the survey indicated, industry was overwhelmingly concerned about developing better relations with Defence. In some companies' opinion, this is an essential pre-condition for improving their prospects for development (see Figure 13.3).

Figure 13.3

British Aerospace Australia Proposals for New Industry Directions



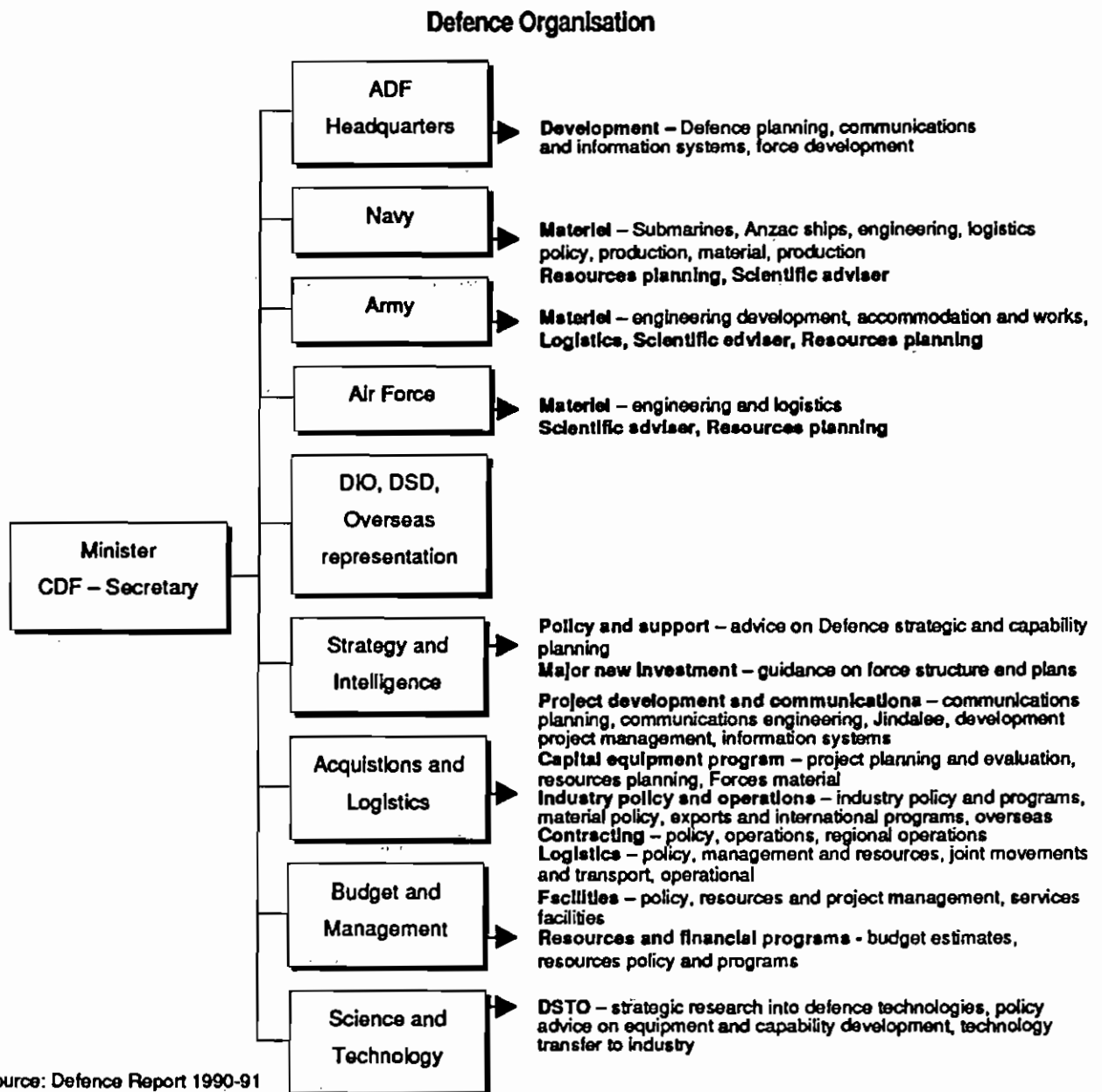
Source: Adapted from British Aerospace Australia

Better outcomes will arise from collaborative efforts focused on meeting Defence needs

The development of improved approaches to industry development and Defence procurement involves changes to organisation roles, management and monitoring.

The consultants are able to offer only broad views about these areas. Defence is necessarily a huge and complex organisation. A detailed understanding is required as a basis for recommending change. The present organisation does not, however, appear focused on managing relationships with companies (see Figure 13.4).

Figure 13.4



Source: Defence Report 1990-91

From a company perspective, Defence organisation does not appear to have a focus on managing supplier relationships

13.2 Monitoring

Monitoring activity, reflecting Defence objectives, will be different at each level of the organisation. At the central policy level, key monitoring activities should be aimed at improving the management of Defence suppliers and understanding broad company and sector capability.

Improved supplier management and understanding of company and sector capability cannot be achieved in a single step but will be accomplished over time. Improvements will take place in tandem with the evolution of Defence's understanding of its current and potential demands on companies. Some initial recommendations can be made about specific monitoring and related industry study activities (Figure 13.5).

Figure 13.5

Key Monitoring Activities and Related Industry Studies

1. Evaluate best practice supplier relations in industry
 - Include in the evaluation comparative case studies of Defence and industry approaches to large procurements
 - Select case study industries which deal with similar issues to those faced by Defence (eg telecommunications)
 - Include in the case studies evaluation of key supplier-purchaser performance criteria such as supplier performance, tendering costs and monitoring costs
2. Carry out a regular annual survey of key Defence industry companies. This survey should cover the same areas as those dealt with in this report:
 - Company sales including type of activities, civilian and Defence revenues
 - Exports and future markets including civilian and Defence export sales, major markets and product types
 - Research and development activities including company expenditures, government funding and nature of projects

The industrial sectors concerned are the five identified earlier, and the business units concerned (see Figure 13.6) would be those producing goods and services of high strategic defence value and at least some of those in the medium category.

Figure 13.6

Key Business Units to Monitor

Category	Supplier Relationship	Monitoring Priority
High Defence priority	Direct Support	High
Medium	Close Commercial	High/Medium
Low	Normal Commercial	Nil

The strategic importance of a business unit determines the nature of the relationship and the monitoring priority

A risk in carrying out monitoring activities is that they will take place in isolation from managers responsible for dealing with suppliers. Primary responsibility for understanding companies should rest at the level of those managers responsible for dealing with them. This is the basis of developing company capability through supplier relationships.

The most important monitoring responsibility of managers dealing with suppliers will be based around normal management processes, used to evaluate supplier performance. Regular contact between suppliers and responsible Defence managers built through this process leads to the development of in-depth knowledge of company capability and market opportunity. Detailed knowledge built up in this way is critical for assisting companies to diversify their activities, reducing the need for direct Defence support of particular industry capabilities.

Managers' regular working relationships should be complemented by central policy-makers' and planners' contact with companies over directions and issues in Defence procurement and supplier management. This approach allows policy-makers and planners to develop a direct appreciation of the companies on which the Defence industrial base is founded.

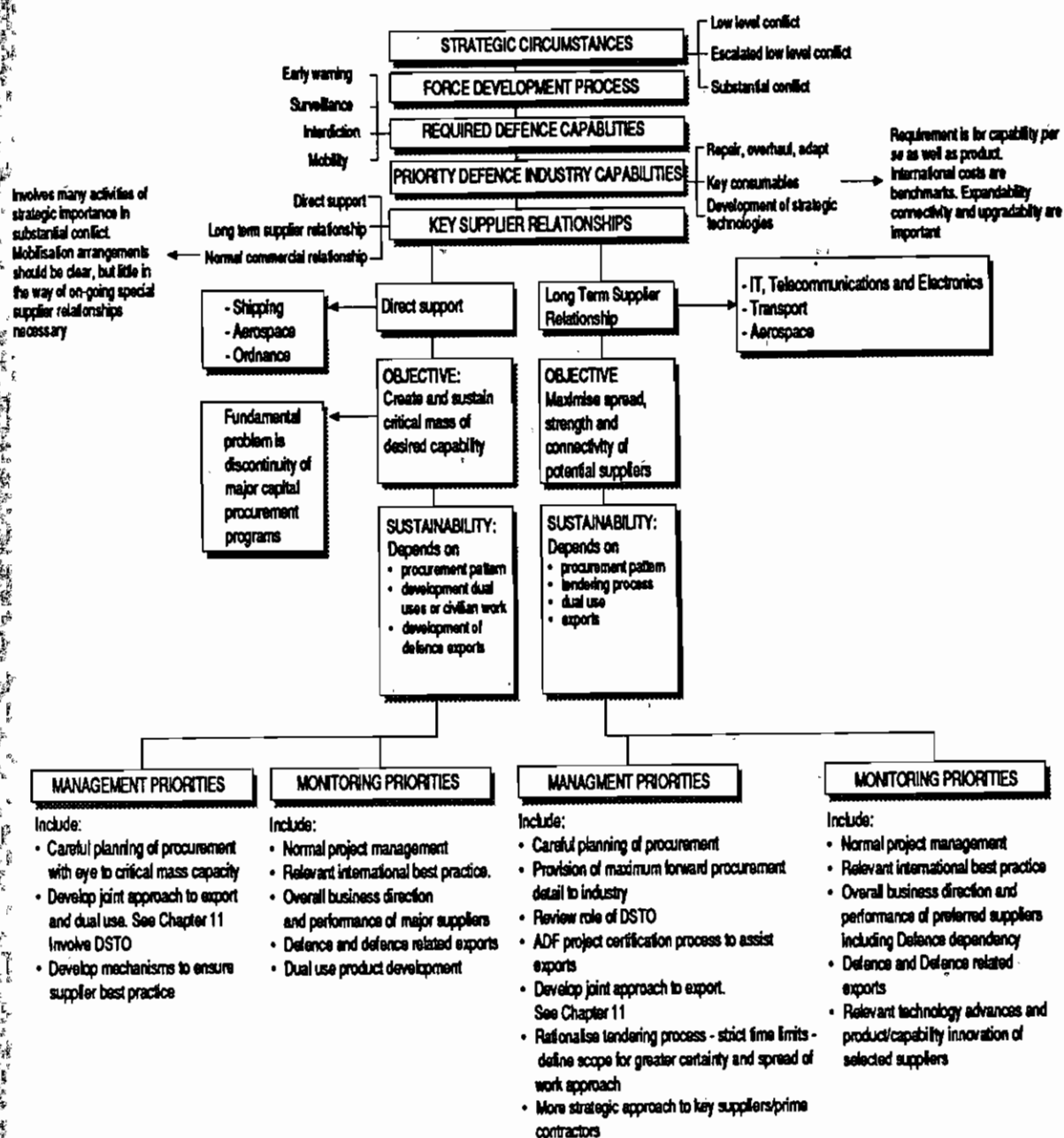
Policy-makers and planners will also be concerned to understand the broader economic effects of Defence purchasing, although, as this Report suggests, their major concern should be to manage the wide range of suppliers that is the Defence industrial base. Monitoring activities will assist in developing an understanding of the broader economic effects of Defence spending but should not be directed to this end.

Existing economic models, and models currently being developed, based on rigorously collected statistics provide a sound base for exploring the effects of Defence spending on the economy. Defence policy-makers should therefore work with leading specialist modellers and economists to investigate particular issues in question rather than duplicate expensive, highly specialised resources that are widely available.

The indicated type of relationship between monitoring priorities, management process and strategic circumstances is set out in Figure 13.7.

Figure 13.7

Monitoring Priorities



ATTACHMENTS

Attachment 1

Defence Spending and the Economy

Input-Output Analysis

The vector of industry supplies, x , will equal the vector of **final demands** for each industry's output, y - obtained by aggregating, for each industry, final demand for private and public consumption and investment as well as for export - plus **intermediate demands** from other industries. The intermediate demand of industry A for industry B's output is assumed to equal a fixed proportion of the final supply of industry A. These proportions for industry A are arranged in its column of the matrix A . For example, the column for Defence shows spending by Defence on each industry as a proportion of total Defence supply. The same information, but expressed in \$million rather than as proportions of total Defence purchases, has already been displayed in the last column of Figure 10.4. There is a similar column for each industry, so A is a square matrix of so-called input-output coefficients. When A is multiplied by x , the result obtained is the vector of intermediate demands for each industry's output.

$$x = Ax + y$$

The assumption that the input-output coefficients are fixed actually implies two economic assumptions: that inputs are always used in fixed proportions in a particular industry and that there are constant returns to scale in production. The former assumption, in particular, is open to question. We can solve the equation given above to obtain the vector of industry supplies, x .

$$x = (I - A)^{-1}y$$

This equation can be used to calculate the effects of changes in the final demand of any industry's output, on the total supply for every individual industry. There is another important economic assumption beneath the surface here - namely, that final demands are independent of industry supplies. That assumption is varied in the long-run analysis reported later in this chapter, partly to illustrate its impact.

Tables of Results of Input-Output Analysis for Each Defence Industry

Figure A.1

Ordnance Effects of Additional Expenditure of \$100 million (\$ million)

Industry	Short Run			Long Run		
	Employment	Imports	Value Added	Employment	Imports	Value Added
1. agriculture etc	0	0	1	-0	-0	-2
2. mining	1	0	3	-0	-0	-0
3. food, beverages etc	0	0	0	-1	-0	-1
4. TCF industries	0	0	0	-0	-0	-0
5. wood, paper, printing	1	1	2	0	0	0
6. chemical products nec	14	33	28	14	32	28
7. chemicals, petrol. etc	1	5	4	1	4	3
8. mineral products	1	1	2	-0	-0	-0
9. motor vehicles etc	0	0	0	-0	-1	-0
10. ships and boats	0	0	0	-0	-0	-0
11. railway rolling stock	0	0	0	-0	-0	-0
12. aircraft	0	0	0	-0	-0	-0
13. electronic equipment	0	0	0	-0	-1	-0
14. other machinery nec	0	0	0	-0	-1	-1
15. misc. manufacturing	0	1	1	0	0	0
16. electricity, gas, water	1	0	2	-0	-0	-0
17. residential building	0	0	0	-0	-0	-1
18. construction nec	0	0	0	-2	-0	-3
19. wholesale & retail	2	0	4	-2	-0	-4
20. transport	1	0	2	-1	-0	-1
21. communication	0	0	1	-0	-0	-0
22. finance, property etc	4	0	7	0	0	1
23. dwellings ownership	0	0	0	0	0	-5
24. public administration	0	0	0	-1	-0	-1
25. defence	0	0	0	0	0	0
26. community services	0	0	0	-6	-0	-7
27. recreational services	0	0	0	-1	-0	-2
TOTAL	28	43	63	0	33	5

Note: Ordnance (ammunition & explosives) is part of the industry of "chemical products nec"

Figure A.2

Vehicles
Effects of Additional Expenditure of \$100 million
(\$ million)

Industry	Short Run			Long Run		
	Employment	Imports	Value Added	Employment	Imports	Value Added
1. agriculture etc	0	0	0	-0	-0	-2
2. mining	0	0	1	-0	-0	-1
3. food, beverages etc	0	0	0	-1	-0	-1
4. TCF Industries	0	0	0	-0	-0	-0
5. wood, paper, printing	0	0	1	-0	-0	-1
6. chemical products nec	0	0	0	-0	-0	-0
7. chemicals, petrol. etc	0	1	1	-0	-0	-0
8. mineral products	2	1	4	1	1	2
9. motor vehicles etc	17	44	26	17	43	25
10. ships and boats	0	0	0	-0	-0	-0
11. railway rolling stock	0	0	0	-0	-0	-0
12. aircraft	0	0	0	-0	-0	-0
13. electronic equipment	0	0	0	-0	-1	-0
14. other machinery nec	0	1	0	-0	-1	-1
15. misc. manufacturing	1	2	2	1	1	1
16. electricity, gas, water	1	0	1	-0	-0	-1
17. residential building	0	0	0	-0	-0	-1
18. construction nec	0	0	0	-2	-0	-3
19. wholesale & retail	2	0	4	-2	-0	-5
20. transport	1	0	2	-1	-0	-2
21. communication	0	0	1	-0	-0	-1
22. finance, property etc	3	0	5	-1	-0	-1
23. dwellings ownership	0	0	0	0	0	-5
24. public administration	0	0	0	-1	-0	-1
25. defence	0	0	0	0	0	0
26. community services	0	0	0	-6	-0	-7
27. recreational services	0	0	0	-1	-0	-2
TOTAL	29	52	54	0	41	-7

Figure A.3

Shipbuilding & Repair
Effects of Additional Expenditure of \$100 million
(\$ million)

Industry	Short Run			Long Run		
	Employment	Imports	Value Added	Employment	Imports	Value Added
1. agriculture etc	0	0	0	-1	-0	-3
2. mining	0	0	2	-1	-0	-2
3. food, beverages etc	0	0	0	-1	-1	-2
4. TCF industries	1	1	1	0	0	0
5. wood, paper, printing	1	1	2	0	0	0
6. chemical products nec	0	0	0	-0	-0	-0
7. chemicals, petrol. etc	0	1	1	-0	-0	-0
8. mineral products	3	1	5	1	1	2
9. motor vehicles etc	0	0	0	-0	-1	-1
10. ships and boats	27	28	35	27	28	35
11. railway rolling stock	0	0	0	-0	-0	-0
12. aircraft	0	0	0	-0	-0	-0
13. electronic equipment	0	0	0	-0	-1	-0
14. other machinery nec	1	4	2	0	1	1
15. misc. manufacturing	0	0	0	-0	-1	-0
16. electricity, gas, water	1	0	2	-1	-0	-1
17. residential building	0	0	0	-1	-0	-2
18. construction nec	0	0	0	-3	-0	-4
19. wholesale & retail	2	0	5	-4	-0	-7
20. transport	1	0	2	-2	-0	-4
21. communication	0	0	1	-1	-0	-1
22. finance, property etc	2	0	4	-3	-0	-5
23. dwellings ownership	0	0	0	0	0	-7
24. public administration	0	0	0	-2	-0	-2
25. defence	0	0	0	0	0	0
26. community services	0	0	0	-9	-0	-11
27. recreational services	0	0	0	-2	-0	-3
TOTAL	41	39	67	0	23	-19

Figure A.4

Aerospace
Effects of Additional Expenditure of \$100 million
(\$ million)

Industry	Short Run			Long Run		
	Employment	Imports	Value Added	Employment	Imports	Value Added
1. agriculture etc	0	0	0	-0	-0	-2
2. mining	0	0	0	-0	-0	-2
3. food, beverages etc	0	0	0	-1	-0	-1
4. TCF industries	0	0	0	-0	-0	-0
5. wood, paper, printing	0	0	0	-1	-0	-1
6. chemical products nec	0	0	0	-0	-0	-0
7. chemicals, petrol. etc	0	0	0	-0	-1	-1
8. mineral products	1	0	1	-0	-0	-1
9. motor vehicles etc	0	0	0	-0	-1	-0
10. ships and boats	0	0	0	-0	-0	-0
11. railway rolling stock	0	0	0	-0	-0	-0
12. aircraft	18	67	23	18	67	23
13. electronic equipment	0	0	0	-0	-1	-0
14. other machinery nec	0	0	0	-0	-1	-1
15. misc. manufacturing	0	0	0	-0	-0	-0
16. electricity, gas, water	0	0	1	-0	-0	-1
17. residential building	0	0	0	-0	-0	-1
18. construction nec	0	0	0	-1	-0	-2
19. wholesale & retail	1	0	1	-3	-0	-5
20. transport	0	0	0	-1	-0	-2
21. communication	0	0	0	-0	-0	-1
22. finance, property etc	1	0	3	-1	-0	-2
23. dwellings ownership	0	0	0	0	0	-4
24. public administration	0	0	0	-1	-0	-1
25. defence	0	0	0	0	0	0
26. community services	0	0	0	-5	-0	-6
27. recreational services	0	0	0	-1	-0	-2
TOTAL	22	70	36	-0	62	-10

Figure A.5

Information Technology, Electronics and Communications
Effects of Additional Expenditure of \$100 million
(\$ million)

Industry	Short Run			Long Run		
	Employment	Imports	Value Added	Employment	Imports	Value Added
1. agriculture etc	0	0	0	-0	-0	-1
2. mining	0	0	0	-0	-0	-1
3. food, beverages etc	0	0	0	-0	-0	-1
4. TCF industries	0	0	0	-0	-0	-0
5. wood, paper, printing	0	0	1	-0	-0	-0
6. chemical products nec	0	0	0	-0	-0	-0
7. chemicals, petrol. etc	0	0	0	-0	-0	-0
8. mineral products	1	0	1	0	0	0
9. motor vehicles etc	0	0	0	-0	-0	-0
10. ships and boats	0	0	0	-0	-0	-0
11. railway rolling stock	0	0	0	-0	-0	-0
12. aircraft	0	0	0	-0	-0	-0
13. <i>electronic equipment</i>	7	72	13	7	71	13
14. other machinery nec	0	1	0	-0	-0	-0
15. misc. manufacturing	1	1	1	0	1	1
16. electricity, gas, water	0	0	1	-0	-0	-0
17. residential building	0	0	0	-0	-0	-1
18. construction nec	0	0	0	-1	-0	-1
19. wholesale & retail	1	0	2	-1	-0	-1
20. transport	0	0	1	-1	-0	-1
21. communication	0	0	0	-0	-0	-0
22. finance, property etc	1	0	3	-0	-0	-0
23. dwellings ownership	0	0	0	0	0	-2
24. public administration	0	0	0	-1	-0	-1
25. defence	0	0	0	0	0	0
26. community services	0	0	0	-3	-0	-3
27. recreational services	0	0	0	-0	-0	-1
TOTAL	13	77	29	0	72	3

Attachment 2

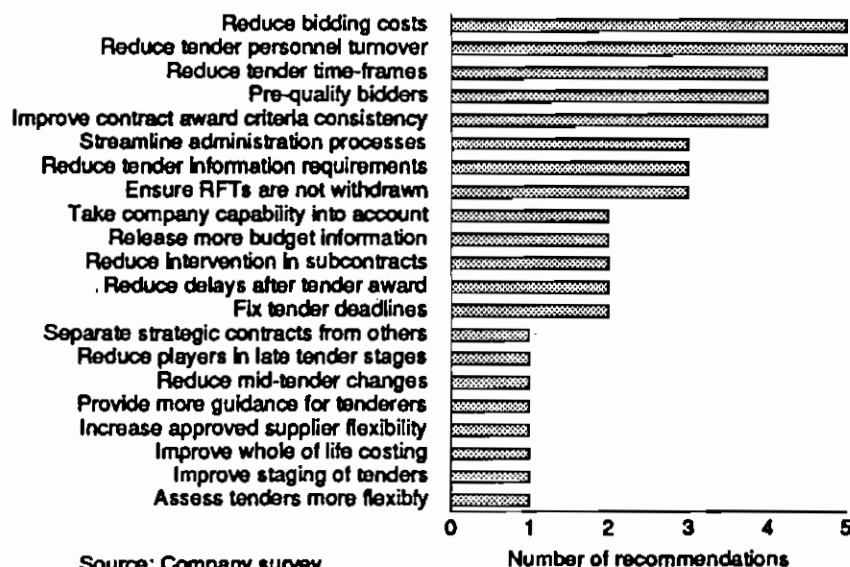
The Role of Defence – Company Perspectives

The company perspectives contained in this Attachment are compiled from the survey of companies (see separate Survey document). Companies were asked the question "Are there changes you would like to see in the way in which ADF/DoD deals with your company/industry?". Responses were in the form of recommendations for change.

The responses were analysed by identifying common messages for changes and grouping them according to broad areas of concern. Some companies made many recommendations in particular areas while others made few. The way in which the results are aggregated indicates these key concerns for companies but may be misleading in some areas where a few companies made detailed comments on particular issues. These areas are noted in the text.

Tender Processes

Tender Processes Views



Two major themes stand out from companies' comments. The most important of these are that tender timelines can be better defined and shorter, with fewer delays. The second is that the number of tender competitors can be managed more closely to reduce the number of

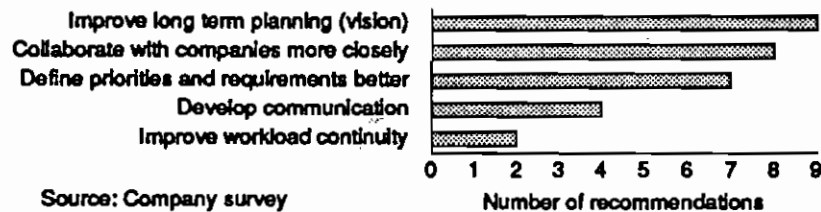
companies investing effort in pursuing work which they are unlikely to win.

In addition, there were consistent recommendations that high turnover of Defence personnel during tendering be prevented, contract award criteria better defined, tender information requirements reduced and administration processes streamlined.

A range of other recommendations were also made which were not commonly supported by companies. Examples of these recommendations were suggestions that budget information for tenders be increased or that generally more guidance be provided to companies.

Defence Planning and Company Links

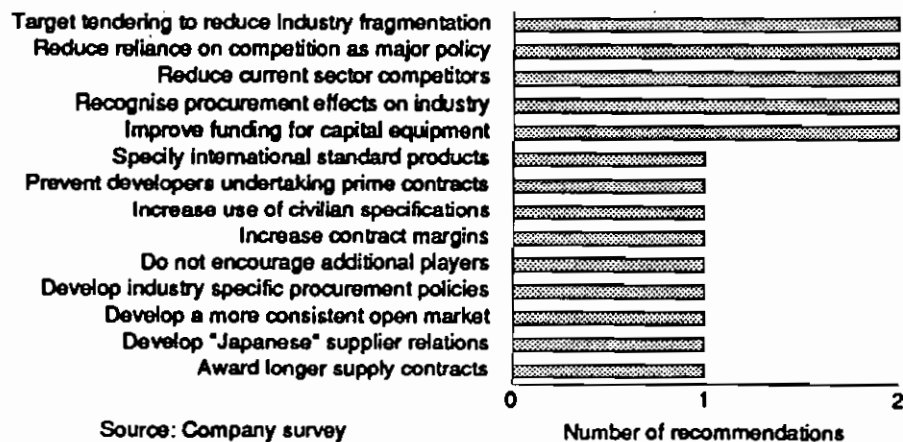
Planning Views



Many companies recommended that Defence collaborate with industry more closely in planning development and procurement processes and that Defence planning should provide a clear picture of Defence requirements. Recommendations that Defence-company communication be further developed received a lower, though still significant, level of support. Only two comments were made that workload continuity should be improved.

Procurement and Supplier Policy

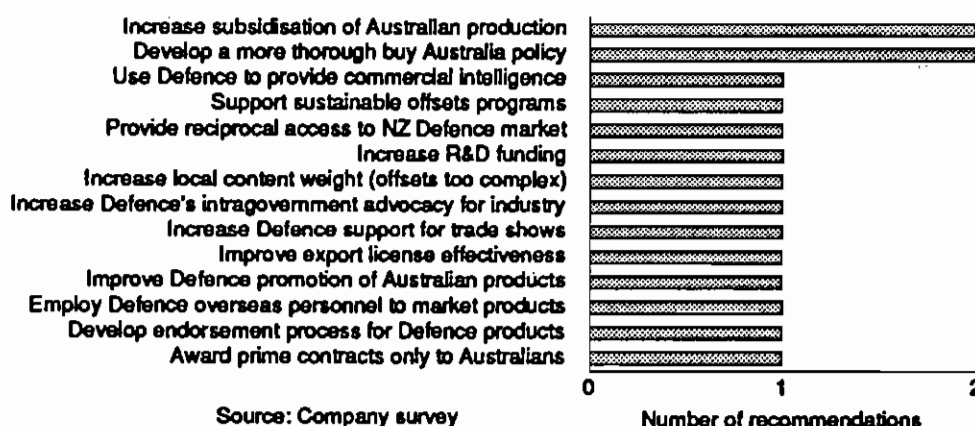
Procurement and Supplier Policy Views



The major theme of comments in this area concerned competition and its effects on industry structure. Companies recommended that the number of competitors in particular sectors be decreased, that strong competition that fragmented industry capability be reduced and that a broader range of supplier relations be developed to complement the open tender system. A warning about the risks in less open approaches was fired by a company which believed that a more open Defence market was needed.

Broad Industry Support

Broad Industry Views

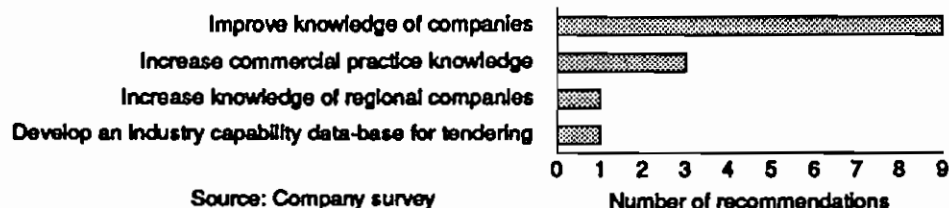


Recommendations concerning broad support for industry fell into two areas. The first, supported by a few companies, related to increasing various forms of direct government assistance to defence industry – a more thorough buy Australian policy, increased subsidisation and restrictions on overseas prime contractors.

The second area which attracted comments from a few companies involved a more active Defence role in promoting companies. Suggestions were made about Defence providing market intelligence, employing Defence attachés to market defence related products, improve Defence funding of promotion and increasing support for trade shows.

Company Knowledge

Company Knowledge Views

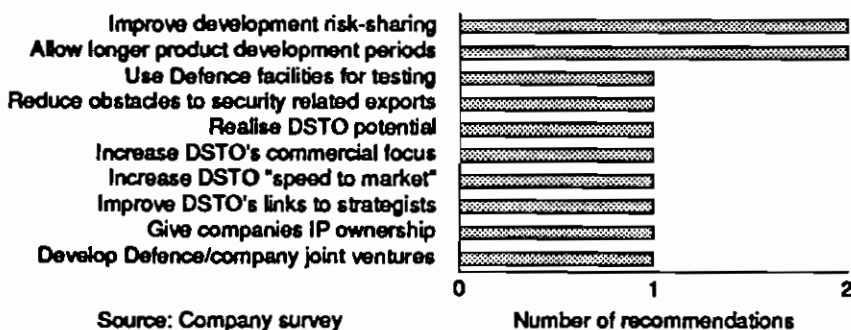


The most strongly supported single proposition which emerged in discussions with companies was that Defence needed to increase its knowledge of individual companies and their capabilities. It was felt that increased information about company capability would lead to more effective procurement policies, tender processes and continuing contract administration. Some companies suggested that increased knowledge would result in Defence acquiring a better informed view of Australian industry capability.

Related to this recommendation was the less common view that Defence should increase its knowledge of commercial practices in particular sectors.

Development

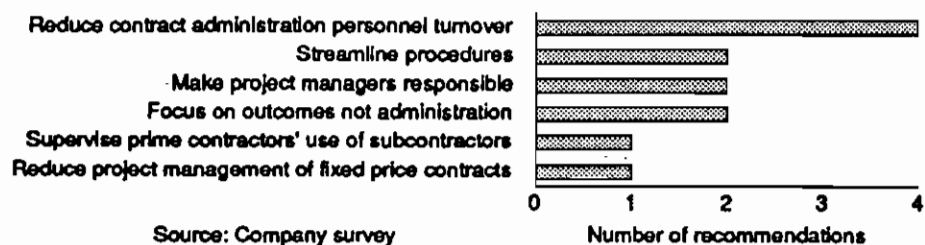
Development and R&D Views



Recommendations relating to research and development and the DSTO were almost exclusively the concern of military electronics and communications companies (ten out of twelve comments in this area). The key emerging themes emphasised appropriate risk-sharing and timing for development projects, and improved links between DSTO and industry.

Contract Administration

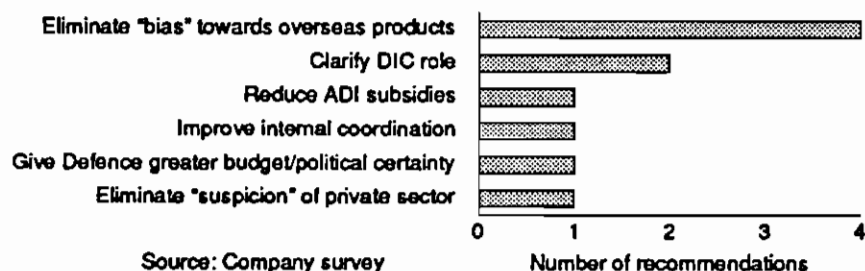
Contract Administration Views



Contract administration received relatively little attention from companies. The most important recommendations were to reduce the high turnover of Defence personnel and to give project managers greater authority. Project managers were seen by some companies as primarily administrative staff rather than decision-makers.

Defence

Defence Organisation Views



Relatively few comments concerned Defence itself. A number of companies felt that Defence officers were "biased" in favour of overseas products. Clarification of the Defence Industry Committee's role also attracted comments from two companies.

Concluding Note

While some of the comments summarised in this Attachment reflect a natural and understandable self-interest by companies, the comments as a whole clearly indicate that there are shortcomings in the way Defence manages the interface with its suppliers - notably in respect of the tender process and flows of information. At a more basic level, there are indications that Defence does not know its suppliers as well, or take as much interest in their development, as it could advantageously do. These issues of how Defence manages its supplier relations are taken up in Part 5 of the Report.

Attachment 3

List of Companies and Persons Contacted

Mr Mike Terlet A.O.		
Mr Dennis Colombo	Asst General Manager	ACS - Asset Services
Mr Ewen Hazekine	General Manager	ACS - Interiors
Mr Trevor Moody	Project Manager (3)	ACS - Project Services
Mr Ross Jarmon	Managing Director	AEOS
Sir Brian Inglis	Chairman	Aerospace Technologies of Australia
Mr Peter Thom	Accountant	Aerospace Technologies of Australia
Ms Margaret Rouault	Administration Manger	Airflite
Mr Homer Constantinides	Director of Engineering	Airflite
Mr Peter Bowler	Business Development Manager	Amecon
Dr John White	Chief Executive	Amecon
Professor Paul Dibb	Head-Strategic and Defence Studies Centre	ANU
Dr Mike Gilligan	Visiting Fellow, Strategic and Defence Studies Centre	ANU
Mr John Gerrand	General Manager	Applied Technology Systems
Mr Graham White	Manager Commercial & Defence Projects	ASI
Mr Eddie Low	Financial Controller	ASI (Transfield Group)
Mr Geoff Mitchell	Executive Director	Association of Australian Aerospace Industries
Mr David Stephens	Financial/Commerical Manager	Auspace
Mr Greg Hull	National Manager, Aerospace and Defence	Austrade
Professor Wolfgang Kasper	Professor of Economics	Australian Defence Forces Academy
Mr Russell Fynmore	Chairman	Australian Defence Industries
Mr Nigel Berlyn	Group General Manager, Development	Australian Defence Industries
Mr John McMahon	Group General Manager, Defence Liaison and Operations	Australian Defence Industries
Mr Alex Gosman	Executive Director	Australian Electrical and Electronic Manufacturers' Association
Mr David Ipkendantz	Company Secretary	Australian Submarine Corporation
Mr Ross Milton	Corporate Affairs Manager	Australian Submarine Corporation
Dr Don Williams	Managing Director	Australian Submarine Corporation
Mr Frank Kent	Corporate Strategic Development Manager	AWA
Mr Bruce Cooper	Corporate Marketing Manager	AWA

Mr Mike Williams	General Manager, NSW Operations	AWADI
Mr Bob Boorman	Marketing Manager - Bldg Division	Boulderstone Hornibrook
Mr John Clark	General Manager	BHP Engineering
Mr Russ Lamb	Manager of IT- Canberra	BHP Information Technology
Mr Peter Littlejohn	CEO	BHP Information Technology
Mr Peter Rowland	Business Development Manager	British Aerospace Australia
Mr Chris J Saines	General Manager Manufacturing	British Aerospace Australia
Mr Bruce Trebilcock	Finance Director	British Aerospace Australia
Mr Rick Young	Marketing Manager	BTR Aerospace
Mr Michael Giurovich	Marketing Manager	BTR Aerospace
Mr Kevin O'Brien	Commercial Director	Buchanan Aircraft
Mr Ray Mizzi	Accounting Manager - Operations	Caterpillar
Mr David Gaul	Managing Director	CEA Technologies
Mr Chris Milner	Financial Controller	CJ Abell
Mr David Maycock	Accountant	Colan Products
Mr Allan Lister	Business Manager	Compucal
Mr Peter James	General Manager, Federal Region	Computer Power Group
Mr Jeremy Matterson	Commercial Manager	Concrete Constructions
Mr Wayne Jordan	Accountant	Condor Engineering
Mr Ross Shilston	Accountant	Consolidated Tool & Die
Mr Peter Rehn	CEO	CSA
Mr Keith Doble	Technical Services Manager	Dawson Group
Mr Geoff James	National Resource Manager - Defence	DEC
Mr Phil Purcell	JMPD	Defence
Mr Rod Dunne	JMPD	Defence
Mr Peter Howe	JMPD	Defence
Mr Adrian Fielding	DJR(EF)	Defence
Mr Ross Martin	ASEJP	Defence
Mr Tony Moleta	ASEJP	Defence
Mr Doug Thomson	Study Team	Defence
Dr Warren Harch	Study Team	Defence
Mr Mike Lyons	Study Team	Defence
Mr John Wilmot	Study Team	Defence
Mr Greg Johannes	Study Team	Defence
Mr Andrew Spong	Study Team	Defence
Dr Guy Verney	ASJPP	Defence

WGCDR Ray Smith	FA-18 Project	Defence
WGCDR Peter Rentell	Capital Acquisitions	Defence
WGCDR Jim Gray	Capital Acquisitions	Defence
RADM Hunt	Assistant Chief Materiel, Navy	Defence
Mrs Marilyn McPherson	ASPPE	Defence
Mr William Drysdale	Submarine Project	Defence
Mr Tony Taylor		Defence
Mr Tony Bartos	Submarine Project	Defence
Mr Sava Momcilovic	Facilities and Property Division	Defence
Mr Robin Stanier	FA -18 Project	Defence
Mr Rick Belt	Industry Policy and Operations Division	Defence
Mr Peter Moran	Facilities and Property Division	Defence
Mr Nanda Koban	DSTO	Defence
Mr Mike Walsh	Assistant Secretary, Development Projects Branch	Defence
Mr Ken Miley	ONA	Defence
Mr Ian Wridgeway	Director, Science Commercialisation Sector	Defence
Mr Ian Hagen	First Assistant Secretary, Science and Policy	Defence
Mr Hugh White	ONA	Defence
Mr Geoff Miller	Director General, ONA	Defence
Mr Eric Beaman	ANZAC Ship Project	Defence
Mr Don Wood	FAS, Industry Policy and Operations	Defence
Mr David Reese	ONA	Defence
Mr B J Coyle	Navy Minor Capital Supply	Defence
Mr Andrew Podger	Deputy Secretary, Acquisitions and Logistics	Defence
MAJGEN Steve Gower	Assistant Chief Defence Force Logistics	Defence
MAJGEN John Baker	Director, Defence Intelligence Organisation	Defence
LTCOL McLucas	Raven Project	Defence
Hon Roger Price MP	Parliamentary Secretary for Defence	Defence
Hon Robert Ray	Minister for Defence	Defence
Hon Gordon Bilney	Minister for Defence Science and Personnel	Defence
Dr Bob Ward	Chief Defence Scientist	Defence
COL D Jamieson	Capital Procurement, Army	Defence
CMDR Ward Gainey	Director, ILS Policy Navy	Defence

Mr Doug Powell	First Assistant Secretary, Project Development and Communications	Defence
COL Bernie Sullivan (Rtd)	President	Defence Manufacturers' Association
Mr Peter Allford	Project & QA Manager	Delta Hydraulics
Mr Ted Mathews	FAS, Defence and Industry	Dept of Finance
Mr John Stanford	FAS Policy and Projects	DITAC
Mr Eddie Low	Financial Controller	Eglo Engineering
Mr Mick Ryan	Group Administration Manager	Eglo Engineering
Dr Ben Greene	Managing Director	Electro Optic Systems
Mr Brian McKay	Corporate Affairs Manager	Ericsson Australia
Mr Jeff Vale	Engineering Manager	Ericsson Defence Systems
Mr Fred Sanders	Marketing Manager	Ericsson Defence Systems
Mr Errol Lawson	Principal	Errol Lawson and Associates
Mr Bill Chyra	Financial Controller	Ferranti Computer Systems
Mr Peter Ketley	General Manager	Gas Tech (Aust)
Mr Grant Fitzgerald	General Manager- Marketing	GEC Marconi
Mr John Bagshaw	Managing Director (Retired)	General Motors Holden
Mr Philip Dowd	Technical Manager	GNB Batteries
Mr Peter Egan	Manager Finance Administration	Godfrey Howden
Mr Laurie Horton	Accountant	Haulmark Trailers
Mr Peter Smith	Commercial Director	Hawker de Havilland
Mr Ian Meibusch	Manager, Canberra Office	Hawker de Havilland
Mr Paul Bisson	Technical Manager	Hawker Pacific
Mr Dan O'Neill	Technical Manager	Hawker Pacific
Mr Stan Harris	Managing Director	HCB Marine
Mr Joe Moharich	Managing Director	Helitech Industries
Mr Greg Soghomonian	A & D Division Director	Honeywell
Mr Nicholas Day	Marketing Manager - Defence	IBM
Mr David Usher	Client Relationship Manager, Defence	IBM (Canberra)
Mr Mark Thorpe	Commercial Manager	Interscan International
Mr Mike Jacobs	Director	Jacobs Radio
Mr Phil Davis	Company Secretary	JRA
Mr Jack Heaven	Senior Director	JRA
Mr Terry Kelly	Managing Director	KEL Aerospace
Mr Harold Ainsworth	General Manager, NSW	Logica
Mr Trevor Loader	Financial Controller	Lucas Aerospace
Mr Graeme Wilson	Marketing Director	Mackay Consolidated Industries

Mr Mark Summergreene	Financial Controller	Memtec
Dr John Ness	Managing Director	Mitec
Dr Keith Richmond	Secretary, Defence Industry Council	MTIA (Canberra)
Mr Kevin Hines	Financial Controller	National Textiles
Mr Tony Gross	Sales Manager	National Valve & Eng'g
Mr Bertel Thalen	Deputy Managing Director	Nobeltech Australia
Mr Eddie Graham	Financial Controller	NQEA
Mr Wayne Pilkington	Project Manager	Olin Australia
Mr Philip Hughes	Accountant	Oliver & Stevens
Mr Ken Howard	Government Contracts Manager	Pacific Aviation
Mr Allan Plant	Management Financial Controller	Phillips Defence Systems
Mr Jeff Chafer	Sales Manager	Promet Valve
Mr Barry McBride	Accountant	Quin Marine
Mr John Punter	Director, Operations	Rockwell Electronics
Mr Rick Neilson	Deputy Managing Director	Rockwell Systems Aust.
Mr Gordon Kennett	Director	Rosebank Engineering
Mr Ian Shelton	Company Secretary	Seismic Supply Intern1
Mr Klaus Lahr	Managing Director	Siemens
Mr Ed Matiuk	Managing Director	Siemens Plessey
Mr Andy Morehouse	Marketing Manager Communications Systems	Siemens Plessey
Professor Henry d'Assumptio	Director	Signal Processing Research Institute
Mr Ross Williams	Financial Controller	Simon-Abbey
Mr Peter Fowler	Financial Advisor	Stanilite Pacific
Mr Lawrence Ng	Finance Manager	Static Engineering
Mr Allan Steber	Managing Director	Stebcraft
Mr Richard Timms	Marketing Manager	Steedman Science & Eng'g
Mr Brendan Kearney	Mill Controller	Textile Industries Australia
Mr Bruce Teoh	Company Secretary	Thomas Electronics
Mr Philip Usher	Business Development Manager	Thomson Sintra Pacific
Mr Chris Vickers	Engineering Manager	Thompsons Kelly and Lewis
Mr Eddie Low	Financial Controller	Transfield Construction
Mr Julian Quinn	State Manager, ACT	Unisys
Mr Alan Roberts	Account Executive, Defence	Unisys
Mr Bob McNabb	Financial Controller	Varley Engineering
Mr Alan Platt	General Manager	W & E Platt
Mr Peter Hill	Business Manager	Wormald Advanced Systems Engineering

Attachment 4

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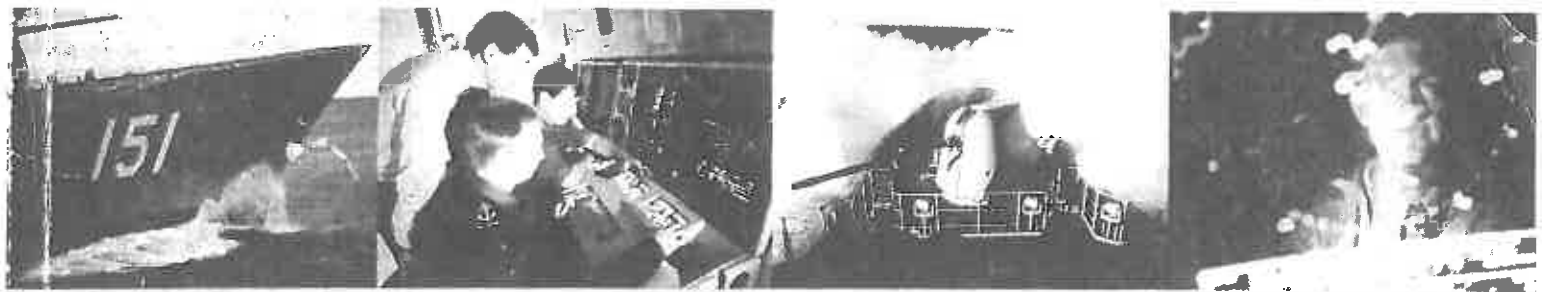
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IMPACT OF MAJOR DEFENCE PROJECTS: A CASE STUDY OF THE ANZAC SHIP PROJECT

FINAL REPORT

FEBRUARY 2000

PREPARED FOR THE AUSTRALIAN INDUSTRY GROUP DEFENCE COUNCIL

SPONSORED BY:



Department of
State and Regional Development



Australian Industry Group



DEFENCE COUNCIL



IMPACT OF MAJOR DEFENCE PROJECTS: A CASE STUDY OF THE ANZAC SHIP PROJECT

Final report

by Denise Ironfield

Prepared for

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February 2000

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ANZAC SHIP CASE STUDY — KEY FINDINGS

In addition to increasing the defence capability of our armed forces, the \$5.6 billion (in 1999 dollars) ANZAC Ship Project (ASP) with its high level of Australian industry involvement is making a substantial contribution to the Australian economy. By constructing the frigates in Australia instead of purchasing similar vessels from overseas, Australia is:

- generating between \$200 million and \$500 million in additional, annual GDP. Over the fifteen year construction phase, this means **GDP will grow by at least \$3 billion.**
- generating between \$147 million and \$300 million in additional, annual consumption. (Consumption is a good indicator of the improvement in the Australian community's material well-being.) Over the fifteen year construction phase, this means **consumption in Australia will grow by at least \$2.2 billion.**
- generating around 7,850 full time equivalent jobs.

The growth in Australia's GDP resulting from major defence projects such as the ASP is greater than the entire cost of constructing the Darwin to Alice Springs rail link.

As work on the ships continues, the additional GDP generated each year will be sufficient to fund the equivalent of over 18,000 aged care beds in regional Australia.

And by reducing the unemployment queue, the ASP has reduced the Government's annual social security payments by \$66 million.

The growth in economic activity resulting from the ASP arises from a range of factors which have increased ASP businesses' productivity and competitiveness. Through their participation in the project, companies have:

- become more innovative through their own research and development, and access to foreign technology;
- improved their business practices, leading to a culture of continuous improvement;
- increased their export opportunities; and
- acquired new defence capabilities enabling them to play a greater role in Australia's national security.

The high level of Australian industry involvement in the ANZAC Ships contracts will lead to similarly high-levels of local participation in the ships' through-life support. In net present value terms, Australia stands to save in the order of \$520 million over the service life of the ships by being able to obtain support from local suppliers.

EXECUTIVE SUMMARY

Over the past twenty years, successive Australian governments have embarked on a series of major defence projects utilising large numbers of local companies. However, to date very little is known about the impact of these projects on the participating firms and the Australian economy.

In 1999, the Australian Industry Group's (Ai Group) Defence Council commissioned Tasman Asia Pacific to examine the impact of major defence projects on the Australian economy. Tenix Defence Systems (Tenix), the Victorian Department of State and Regional Development, ISONET and the Industry and Procurement Infrastructure Division of the Department of Defence (Defence) sponsored the study.

The Ai Group and Tasman selected the ANZAC Ship Project (ASP) for an in-depth case study. The ASP is a collaborative project between the Australian and New Zealand governments for the construction of ten frigates over a period from 1989 to 2005. By February 2000, the Royal New Zealand Navy (RNZN) had commissioned two ANZAC frigates and the remaining eight are progressively being commissioned by the Royal Australian Navy (RAN).

At \$5.6 billion, in 1999 dollars, the ANZAC Ship contract is the largest single defence contract ever awarded in Australia. It is one of many projects subject to Defence's Australian Industry Involvement (AII) program. This program has operated under various guises since the early 1980s and continues today.

The ASP case study was conducted in three broad stages:

- **Stage One** involved the development of an input-output database of the Australian economy that separately identified the ASP. This stage enabled identification of the project's contribution to national output, value-added and employment;
- **Stage Two** involved a major survey of over 600 ASP contractors (eliciting more than 200 responses). The survey facilitated a better understanding of the impact of the project on individual business and also assisted in the identification of dynamic impacts on business and the economy of a major defence project; and
- **Stage Three** used the information obtained from the survey, in conjunction with a general equilibrium model linked to the ASP input-output database, to examine the longer-term dynamic impact of the ASP on the economy as a whole.

AUSTRALIAN INDUSTRY INVOLVEMENT — A SNAPSHOT

It has been estimated that the ASP calls on the resources of over 1,300 Australian and New Zealand companies (DoD 1997). Over 60 per cent of ASP subcontractor companies are based in Australia. Victorian firms receive over three-quarters of the value of the Australian subcontracts. Over 75 per cent of the Australian companies involved are from the manufacturing sector, and about 90 per cent could be considered small to medium enterprises (SMEs).

Over the life of the project, value added from Australian and New Zealand companies will represent over 72 per cent (\$4 billion) of the contract's value. A substantial proportion of this value added is generated in the Australian economy.

A partnership approach has been instrumental in the ASP's success. In particular, a productive working relationship between the prime contractor Tenix, the Industrial Supplies Office in Victoria, the Department of Defence, the Victorian Government, and the participating ASP sub-contractors has underpinned the achievements of the ASP industry program.

THE ASP'S CONTRIBUTION TO THE AUSTRALIAN ECONOMY

Beyond its direct and immediate impact, the ASP is yielding substantial benefits to the Australian economy (see Chapter 7). By constructing the frigates in Australia instead of purchasing similar vessels from overseas, Australia is:

- generating between \$200 million and \$500 million in additional, annual GDP. Over the fifteen year construction phase, this means **GDP will grow by at least \$3 billion;**
- generating between \$147 million and \$300 million in additional, annual consumption — an indicator of a community's material well-being. Over the fifteen year construction phase, this means **consumption in Australia will grow by at least \$2.2 billion;** and
- generating around **7,850 full time equivalent jobs** (see Section 7.2.1).

The growth in Australia's GDP resulting from the major defence projects such as the ASP is greater than the entire cost of constructing the Darwin to Alice Springs rail link. As work on the ships continues, the additional GDP generated each year will be sufficient to fund the equivalent of over 18,000 aged care beds in regional Australia, and the full package of new education initiatives and capital works announced by the Victorian Government in 1999. And

by reducing the unemployment queue the ASP has reduced the Government's annual social security payments by \$66 million (see Box 7.2).

Looked at another way, each additional \$100 million spent by the Australian and New Zealand Governments on the ASP will generate a further \$195 million increase in national output and 1022 jobs in the Australian economy (see Section 7.1).

Benefits to the economy will continue over the 25 to 30 year life of the ships, as the high levels of local industry participation secured during ship construction will result in a correspondingly high level of participation during their through-life support.

Given that the ASP has a strong Victorian focus it can be expected that a significant proportion of the economic benefits associated with the ASP would be generated in Victoria (see Appendix 2).

BUILDING STRONGER AND MORE PRODUCTIVE AUSTRALIAN BUSINESSES

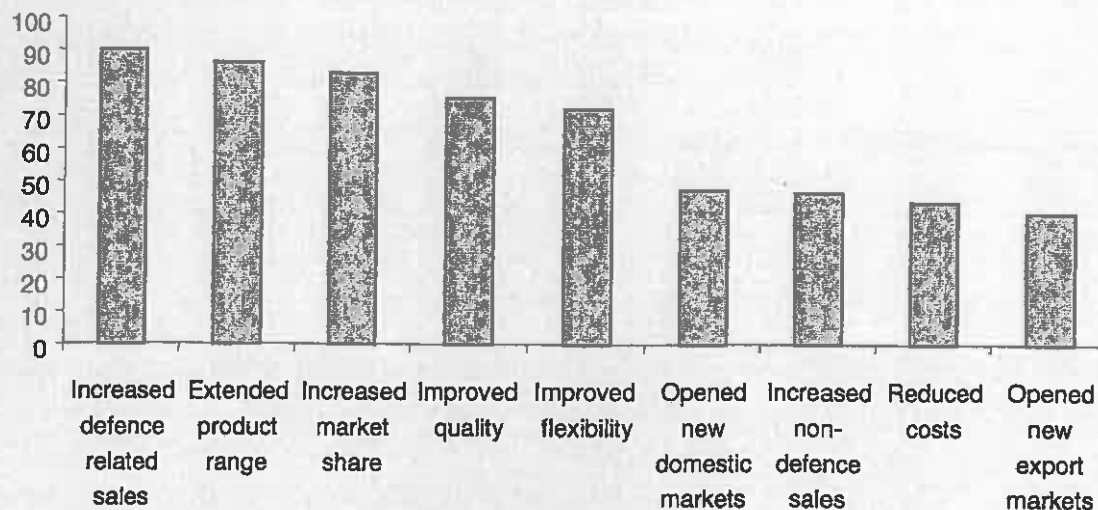
The growth in economic activity resulting from the ASP arises from a range of factors which have increased ASP businesses productivity and competitiveness. Through their participation in the project, companies have:

- become more innovative through their own research and development, and access to foreign technology (see Chapter 3);
- improved their business practices, leading to a culture of continuous improvement (see Chapter 4);
- increased their export opportunities (see Chapter 5); and
- acquired new defence capabilities enabling them to play a greater role in Australia's national security (see Chapter 6).

New Technology

One in five Australian businesses involved with the ASP has obtained new technology. This technology has enabled those companies to increase their commercial and defence-related sales by extending their product range, opening up new markets, and improving the quality of their products and the flexibility of their business (Figure A).

Figure A: **Impact of new technology** (per cent of firms with new technology)



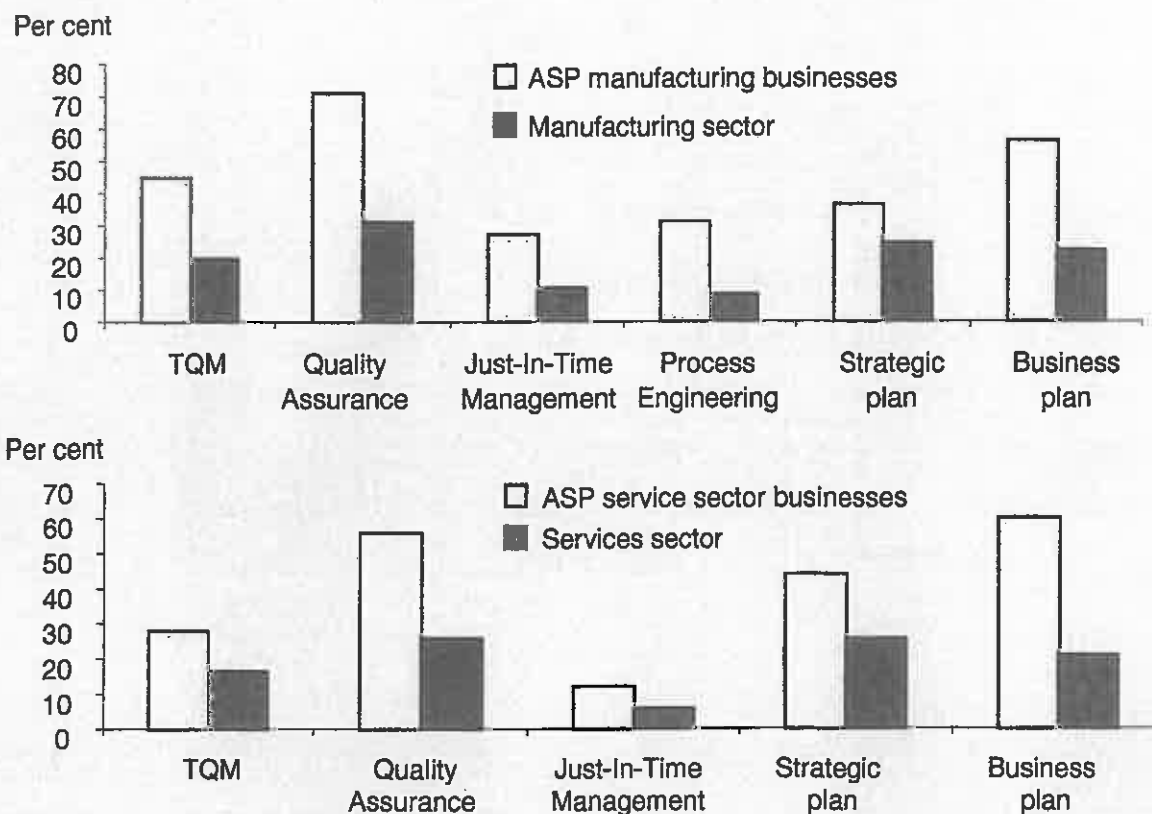
Many of these firms obtained their new technology through original research and development. Notably, the study found that a higher proportion of ASP manufacturers conduct original R&D than companies in the broader manufacturing sector.

Better Business Practices, More Productive and Dynamic Firms

There is a strong link between the adoption of best-practice business and management techniques, such as total quality management and improved business performance. Unfortunately, as a group, relatively few Australian businesses have implemented best practice business programs and practices, to the detriment of the Australian economy. Defence contractors provide an important exception.

The high quality standards required by Defence from its prime contractors also affect sub-contractors, as these requirements flow down the supply chain. The study shows that involvement with defence work, including the ASP, is a major factor in a company's decision to implement best practice programs and techniques. As a result, both manufacturing and services companies involved with the ASP are two to three times more likely to implement such programs and techniques than their counterparts in the wider business population (Figure B).

Figure B: Businesses implementation of certain programs and practices



As a result of adopting these new practices, companies have experienced substantial improvements in the quality of their processes and products, increased sales, higher productivity and the development of a culture of continuous improvement.

As higher productivity is an important driver of growth and improved living standards, the study concludes that defence projects make a major contribution to the nation's economic welfare by encouraging defence contractors to be at the cusp of best practice in Australia.

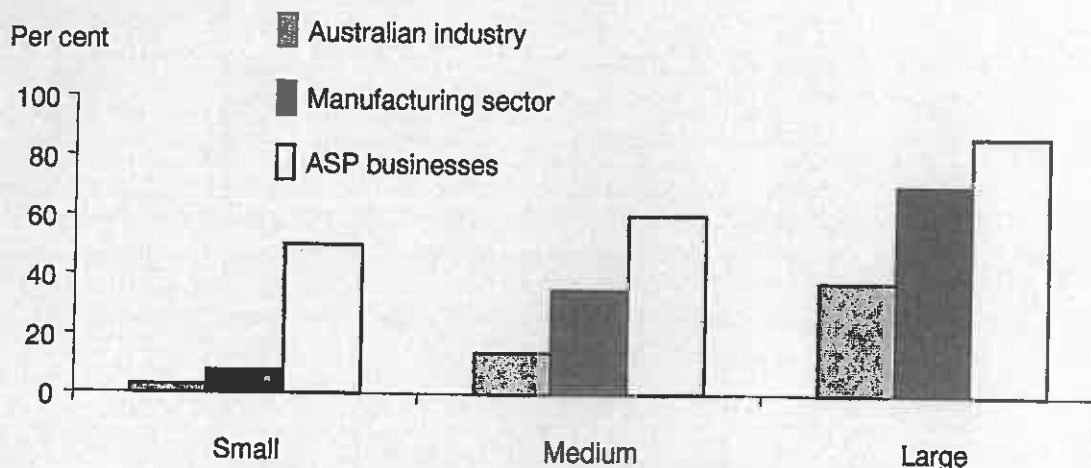
As new companies become involved in the through-life support of the ANZACs, this process of defence related productivity growth will continue and produce ongoing benefits to the economy.

Increased Exports

Increasing the export orientation of Australian companies is a Government priority. The ASP, through the sale of two frigates to New Zealand, is directly generating exports to the value of \$1.05 billion in current year dollars. However, the project has also indirectly generated export opportunities for participating businesses.

Almost 60 per cent of businesses involved with the ASP are exporters. ASP businesses are more than five times more likely to export than Australian businesses. The differential is particularly apparent among small and medium businesses (Figure C).

Figure C: Export propensity by size (per cent of exporting businesses in size grouping)



Involvement with the ASP has been a major factor in the export success of these contractors. More than 20 per cent of ASP contractors have improved their ability to export as a result of participating in the project, and a large number have already experienced a significant increase in their exports since commencing their involvement in the ASP. The development of new business links under the project, and the ability of companies to demonstrate their capacity to satisfy Defence's stringent demands, have been particularly important.

From this study, it is possible to identify the generic characteristics of a modern Australian defence contractor. In comparison with their purely civil counterparts, defence companies in Australia undertake more research and development, are more likely to implement best practice business processes and techniques, and tend to be export oriented. Importantly, these attributes characterise defence service providers and manufacturers of all sizes — small, medium and large. Australian participation in major defence projects is the prime catalyst through which these traits are developed.

Improved Defence Capability

As considerable as they are, this study demonstrates that the benefits that accrue to Australia from high levels of local industry participation in major projects are not just economic. Participation in the ASP has improved the capability of Australian companies to contribute to the defence of Australia.

Almost half of the ASP's contractors have improved their ability to supply Defence as a result of working on the ANZAC Ships. Victorian companies, in particular, are now better placed to supply Defence as a result of participating in the ASP. Through the ASP, Australia has contributed to a base of sustainable companies able to support Defence. Importantly, few ASP contractors depend on defence contracts for their survival.

Lower Through-Life Costs

High levels of Australian industry involvement in the construction of the ANZAC Ships will ensure similarly high-levels of local participation in the ships' through-life support. The ability of Defence to rely on local sources for repairs, maintenance and spares will lead to substantial reductions in repair turn around times. In turn, this will have a major impact on the quantity and overall costs of stock holdings.

Based on past experience, Defence estimates that these costs would be two or more times greater if the ANZACs had been purchased from overseas. Given that the ANZAC ships have 25 to 30 year service life, in terms of net present value, Australia stands to save in the order of \$520 million over the service life of the ships by being able to obtain support from local suppliers (see Sections 6.2 and 7.3).

Beyond repair and maintenance, involvement in the construction phase will position many Australian companies to play an active role in subsequent upgrades of the ANZAC Ships. Local industry involvement in these upgrades will bring benefits similar to those identified during the construction phase.

1 INTRODUCTION

1.1 BACKGROUND TO STUDY

Tasman Asia Pacific has been commissioned by the Australian Industry Group's (Ai Group) Defence Council to examine the impact of major defence projects on the Australian economy. The project also had the support of a number of organisations including the Industry and Procurement Infrastructure Division of the Department of Defence, the Victorian Department of State and Regional Development, ISONET and the ASP prime contractor Tenix Defence Systems (Tenix).

After some consideration it was decided that the analysis would use a case study methodology. The ANZAC Ship Project (ASP), a collaborative project between the Australian and New Zealand Governments, was selected for in-depth study. The ASP is the largest single defence contract ever awarded in Australia. It is one of many projects funded by the Department of Defence entailing a major commitment from Australian industry via the Australian Industry Involvement (AII) program.

The study has been conducted in three stages. In stage one, Tasman developed an input-output database of the Australian economy, which separately identified the ASP (Tasman 1999). (Traditional input-output databases such as those released by the Australian Bureau of Statistics do not separately identify the inputs and outputs of the ASP.) The ASP database developed in stage one allowed the project's contributions to Australia's output, value added, and employment could be better understood. Stage two, which is the primary focus of this report, builds on this analysis and involves a company-level study of the ASP. The major strength of the survey approach is that it can facilitate identification of differential impacts across firms. The survey was also designed to assist in the identification of any dynamic impacts on businesses. In stage three this survey information was used in conjunction with the ASP input output database and a general equilibrium model to examine longer-term impacts of the ASP on the economy as a whole.

1.2 METHODOLOGY

As noted above, a survey methodology was used to obtain information on the impact of the ASP. Tasman developed the survey questionnaire in consultation with the Ai Group and the ASP prime contractor, Tenix. The survey questionnaire is reproduced in Appendix 1. Tenix also assisted by providing the address list for ASP firms. The Ai Group undertook the mail out of the questionnaire and processed the raw data, which was then passed over to Tasman for analysis.

The survey questionnaire was mailed out to 613 Australian firms identified in Tenix's database as having some involvement with the ASP since the project commenced in 1989. Involvement was quite broadly defined and ranged from large subcontractors supplying highly technical communications and weapons equipment to those providing garbage bags at the launch of the first ship. Two hundred of these firms responded to the survey. After adjusting the survey population to take account of firms that were no longer operating, this represents a response rate of 36 per cent. This is an excellent response rate for a privately run non-compulsory survey.

Of the 201 firms that responded to the survey, 127 indicated that they had an involvement in the frigate project. This lower number can be explained by a number of factors — including a loss of corporate memory due to staff turnover and the relatively indirect or relatively minor involvement in the project by many firms. A non-response bias survey subsequently conducted as part of this project also found that the list used for the survey mail out included a number of businesses whose involvement with the project was restricted to an unsuccessful tender. The views reported in Box 1.1 were typical of many of the businesses that elected to return the survey uncompleted or alternatively indicated no involvement with the project in the course of the non-response bias telephone survey.

The 127 survey responses of businesses that had indicated that they had been or are currently involved in the ASP formed the principal data source for this project. The majority of these businesses were represented in Victoria. Appendix 2 summarises survey findings for these Victorian businesses. Additional information was also obtained from face-to-face and telephone interviews with a number of respondents. Box 1.2 presents a snapshot of these 127 respondents. As mentioned above, a telephone survey of non-respondents was also undertaken in order to assess whether the respondents answers were representative of the wider ASP business population. The non-response bias survey questionnaire is reproduced in Appendix 1. The findings of this telephone survey, which are summarised in Appendix 3,

indicate that there was no significant bias in the mail out questionnaire's results. It can therefore be inferred that the responses to the survey questionnaire are representative of the total population of ASP businesses.

Box 1.1: Typical responses of businesses reporting no involvement or not officially responding to the questionnaire

Multicore Solders (Australia) Pty Ltd, a South Australian firm, chose not to respond to the survey on the grounds that the company's involvement in the project was confined to supplying soldering materials to some of the contractors who made electronics for the frigates. The company pointed out that soldering materials required were specified to internationally recognised standards to which the company was already routinely supplying. Hence no special product development was required. In addition, the volumes of materials required were very small compared with overall production so that no additional investment or employment was required to meet the requirements of the ASP. Management assessed that, as supplying materials for the project did not require any special development or activity on the company's part, the survey questionnaire did not relate to their situation. Consequently, management did not complete the questionnaire.

Australian Solenoid Company Pty Ltd's, a Victorian company, did not respond to the survey and was contacted by Tasman as part of the non-response bias survey. Tasman was advised by management that the company's involvement with the ASP was limited to the pre-qualification process. The company had aimed to supply the ASP project with switches. As part of the pre-qualification process, the company undertook a number of measures and spent approximately \$30,000 with the goal of satisfying the prime contractor that the switches would qualify as Australian made. Ultimately, the contract was won by another tenderer. Australian Solenoid has had no further involvement with the project.

Another company preferred not to be mentioned by name returned the questionnaire after answering "no involvement" to the first survey question which asked whether the business had an involvement with the ANZAC ship project. The company indicated that they had decided on this "no involvement" response because their involvement in the project had occurred some years ago and had only required the supply of a relatively small amount of items.

Whenever possible, the survey results have been compared with outcomes in the wider business population. For example, data from the Business growth and performance survey conducted by the Australian Bureau of Statistics (ABS) on behalf of the Department of Employment Workplace Relations and Small Business (DEWR&SB), is an important source for comparison. This longitudinal survey has been conducted annually since 1995. The

survey covers the mining and manufacturing sectors as well as most private sector service industries. Survey results are regularly published by the ABS (see, for example, ABS 1998) and by the DEWR&SB (see, for example, DEWR&SB 1998a and 1998b). In some instances the data required for comparison with ASP survey respondents was not publicly available. In these instances special data requests were made to the ABS.

Box 1.2: A snapshot of ASP respondents

Of the 201 businesses responding to the ANZAC Ship Project Survey, 127 indicated that their business had an involvement with the project. The majority (103) of the businesses reporting an involvement in the project were represented in the state of Victoria. This high proportion of Victorian respondents is consistent with their representation in the ASP subcontractor population (see Appendix 2).

The vast majority (88 per cent) of businesses reporting an involvement indicated that the ASP accounted for less than 10 per cent of turnover. Very few (less than 4 per cent) businesses indicated that 50 per cent or more of their turnover was associated with the ASP.

As might be expected, manufacturing was the primary activity of the majority of respondents. Seventy five per cent of responding ASP businesses were from the manufacturing sector.

In total, 121 of the 127 businesses reporting an involvement with the project provided information on their levels of employment. In total, these businesses employed over 11,000 full-time employees. Assuming that these business's employment levels are representative of all reporting an involvement with the ASP, we estimate the size breakdown of respondent's businesses is:

- 54 small businesses (1 to 19 employees) — 42 per cent of ASP respondents;
- 58 medium businesses (20 to 199 employees) — 46 per cent of ASP respondents; and
- 15 large businesses (200 or more employees) — 12 per cent of ASP respondents.

This breakdown suggests that majority of businesses associated with major defence projects, such as the ASP, are small and medium enterprises.

1.3 OUTLINE OF REPORT

The following chapter briefly outlines the nature and scope of the ANZAC frigate project. The chapter also describes the role of the Australian Industry Involvement program in the project and highlights how the Industrial Supplies Office assisted the prime contractor in the identification of Australian industry's defence capability. Chapters 3 to 6 report survey findings. Specifically, Chapter 3 reports on the extent and impact of technology obtained as a consequence of respondents' involvement with the ASP. Chapter 4 reports on the implementation of best practice techniques by ASP businesses and examines the impact of implementing these techniques on a range of outcomes. The chapter also benchmarks ASP businesses' implementation rates against the wider business community. Chapter 5 examines how the ASP has impacted on respondents' export potential. Chapter 6 reports respondents' views on how their involvement with the ASP has changed their defence capability, as well as Defence's views on the link between industry involvement and through life support capabilities. Chapter 6 also reports respondents' views on the importance of defence work for their business's sustainability. Finally, Chapter 7 uses input-output multipliers and general equilibrium analysis to examine the wider impacts of the ASP on the Australian economy.

2 THE ANZAC SHIP PROJECT

In late 1989, the Australian Government and Tenix, as prime contractor, entered into a contract for the supply ANZAC frigates. The \$A3.77 billion (\$A5.6 billion in 1998–99 dollars) ANZAC Ship contract is the largest single defence contract ever awarded in Australia. The fifteen-year contract requires Tenix to design, construct, test and trial ten ANZAC Class guided missile frigates. The contract also required development of an integrated logistic support system for the ANZAC Ships including the supply of spares, programming, documentation, training and shore facilities at:

- a RAN combat system tactical trainer in Sydney, which became operational in 1996;
- a RNZN combat system support facility in New Zealand, which became operational in 1997; and
- a RAN combat/platform support centre at Williamstown, which became operational in 1999.

The shore facilities feature ship-fit combat system equipment and training simulators. The Williamstown shore facility also includes ship platform system equipment and simulators.

By February 2000, the project had delivered four frigates, HMAS ANZAC and HMAS Arunta to the RAN and HMNZS Te Kaha and HMNZS Te Mana to the RNZN. Currently five frigates are in various stages of construction, testing and trialing. The prime contractor is on schedule to deliver a ship a year until 2005.

The ASP also involves the participation of many Australian and New Zealand subcontractors in addition to the prime contractor. SMEs make up a significant proportion (nearly 90 per cent) of the Australian firms. Subcontractor suppliers are situated in all states and the ACT. However the prime contractor, Tenix, and a substantial number of ASP subcontractors are located in Victoria (see Appendix 2).

2.1 ASP — TECHNOLOGY

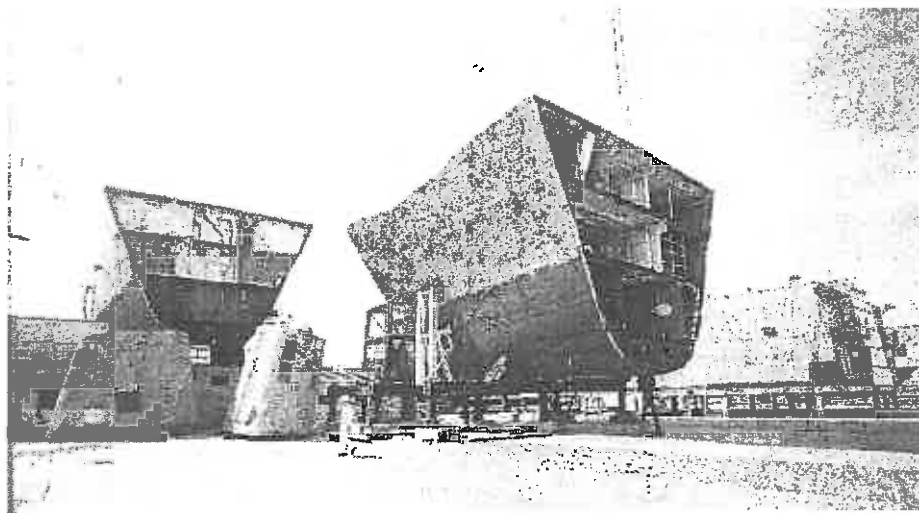
The ANZAC frigates have been developed using an existing MEKO Class hull designed by a German firm Blohm+Voss. However, major elements of the ships' detailed design required a considerable level of indigenous Australian input and intellectual property. For example, the physical design of the hull, electrical and auxiliary systems was primarily undertaken in

Australia. In addition, the combat system in the ANZAC ships was developed locally using software kernels developed by a Swedish firm.

The ANZAC Class frigates also incorporate other modified equipment and systems that were not traditional to the MEKO Class. For example, the propulsion of the ANZAC frigates is via a single 30,000 horse power gas turbine engine and twin 8,500 horse power diesel engines driving two controllable pitch propellers. Another design innovation was the use of a sonar suite — this was the first time a sonar suite had been used on the MEKO type of frigate. The detailed design changes that were necessary to incorporate these features and meet particular requirements of the RAN and RNZN were undertaken in Australia.

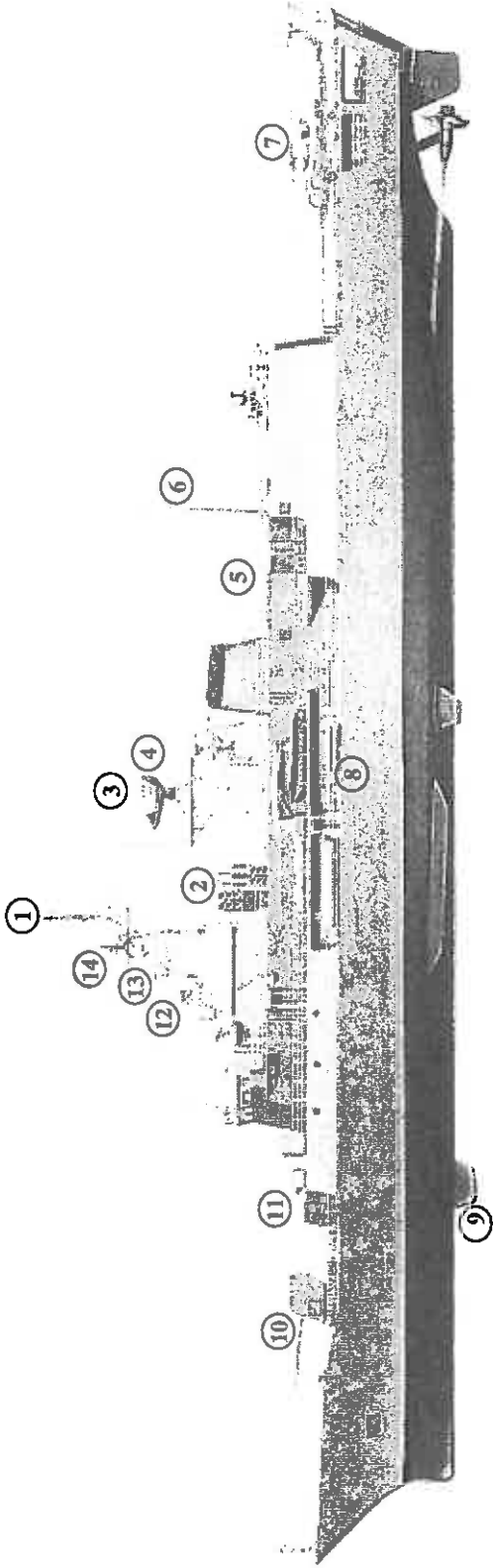
The ships are constructed using a unique level of modular construction which permits rapid installation of equipment and dramatically reduces the time and costs associated with through-life maintenance and upgrade costs (Figure 2.2). Modules are constructed in Australia and New Zealand. Prior to this project this enhanced modular construction technology had not been used in the Australian shipbuilding industry.

Figure 2.1: The ANZAC's Modular Construction



While the technology associated with the construction of the frigates is impressive, it was the development and integration of the array of sensors, radars, weapons and communications systems that presented the greatest technological challenges for the project (see Figure 2.3). These individual systems each with their own complexities had to be drawn together into an integrated whole. The decision to construct a combat support centre using the equipment scheduled to be installed on ship 06 allowed the prime contractor and subcontractors, such as CSC Australia and CelsiusTech Australia, to refine and test the combat system prior to its installation in the first ANZAC frigate.

Figure 2.2: The ANZAC ship



SPECIFICATIONS					
Length:	118 metres	Draft:	4.4 metres	Maximum Speed:	>27kts
Beam:	14.80 metres	Maximum Range:	6,000 nm at 18kts	Complement:	163
		Full Load Displacement:	3,600 tonnes		
SHIP WEAPONS AND SENSOR ARRANGEMENT					
1	Electronic Support Measures (ESM)	6	External Communications	11	Chaff
2	Surface to Surface Missile (SSM)	7	Helicopter	12	Fire Control Director
3	Search Radar	8	Torpedo Tubes	13	Navigation Radar
4	Identification Friend or Foe Radar	9	Sonar	14	Target Indicating Radar
5	Point Defence Missile System	10	5" Gun		

This innovation played an important role in the delivery of the first ANZAC frigate on time with a fully functional combat system. The success of this effort was recognised by the then ANZAC Ship Project Director, Commodore Richard Lamacraft RAN, who stated:

... it is a remarkable achievement by world shipbuilding standards delivering the first ship in a new class ahead of schedule, with a functional combat system (Lamacraft 1996)

The Department of Defence (Defence), recognising the benefits of the combat support centre in systems integration, has adopted a similar approach for other military procurements.

2.2 OVER 70 PER CENT LOCAL CONTENT ACHIEVED THROUGH A COOPERATIVE EFFORT

An effective Australian Industry Involvement (AII) program is a central component of the ASP contract. The Australian Industry Involvement Manual states that the purpose of the AII program is to:

... facilitate Australian industry development through Defence's capital equipment projects. The AII Program has two primary goals:

- a to develop and sustain specific Australian industry capabilities that are considered to be strategically important for the defence of Australia, including modification, adaptation and through-life support of key assets; and
- b to broaden the capability and capacity of defence-related industrial infrastructure to further enhance Australia's defence self-reliance (DoD 1998a p. 2-1).

The program aims to achieve these goals by encouraging cost effective local content in major defence contracts. Local content is defined as that part of the supply of major defence projects which is value added by Australian and/or New Zealand industry. Imported content in items supplied locally is not treated as local content. Locally supplied content should, over the project's life, cost no more than similar work done overseas.

There are a number of reasons why it is difficult to estimate premiums associated with major defence contracts such as the ANZAC frigate contract. In many cases it is not possible to compare like with like and in some instances relevant price data might not even exist. In addition, life cycle costing (covering the construction and through life support costs) could lead to a different outcome to a comparison of construction costs alone. The prime contractor Tenix after reviewing available information advised the Ai Group that anecdotal evidence put the premium somewhere between -5 per cent and +5 per cent of the contract value. Defence advised Tasman and the Australian Industry Group that there had been no recent assessments of the actual premium associated with the ASP contract. However, their records indicate that when the contract was originally awarded the Department of Defence considered that the

direct premium paid by Defence was about 3.5 per cent. This issue and the link to through life support costs is considered in chapters 6 and 7.

Defence has advised the Australian Industry Group that:

The cost-benefits of local supply are partly price driven but the need for independence of action when defending Australian interests is of paramount importance. However, Australia must carefully plan its sourcing patterns for defence equipment and related services having regard for the size of the local economy, the needs arising from Australia's operating environment, and the length of our supply lines to major overseas producers of defence technologies.

Recognising the benefits of local involvement and the government's desire to maximise cost effective local content, the prime contractor made a commitment to achieve Australian and New Zealand value added by local suppliers worth at least 72.3 per cent of the total contract price. A further 8.5 per cent of the value of the ANZAC Ship contract was to be committed as technology related offsets in Australia and New Zealand.

On award of the ASP contract in 1989, the prime contractor established a dedicated Industry Development Unit and implemented processes and procedures to ensure Industry Involvement commitments given would be achieved. Tenix considers that the activities of this unit helps minimise their risk of non-achievement by carrying out a clearly defined role during the sub-contract formation/evaluation process and continuous monitoring and reporting of projects against schedule and objectives. The Industrial Supplies Office (ISO), via its extensive network, knowledge and database on Australian industry, assisted in the identification of Australian businesses' defence capabilities. The ISO is a network of organisations throughout Australia and New Zealand, which is coordinated by ISONET. The ISO's wider contribution to the ASP is described below.

2.2.1 The Industrial Supplies Office's Role

The Victorian ISO's charter is to promote Victorian and Australian industry by identifying and informing Australian businesses of opportunities for import replacement or participation in overseas projects. In essence, the role of the ISO is to overcome an information failure which inhibits Australian industry's ability to maximise local content in Australian production. The ISO assists purchasers through a free sourcing service that identifies Australian businesses with the capability to supply goods and services that might otherwise be sourced overseas.

Tenix holds the ISO's contribution to achieving the high level of local content in the ASP in high regard. For example, the General Manager of Tenix's Commercial Naval Projects and Support Division said that:

The ISO played a significant role in identifying Australian business's defence capabilities. Without access to the ISO's industry knowledge and extensive databases, Tenix's commitment to local content would have been achieved at a higher cost and over a longer timeframe.

The ISO's role in the ASP commenced shortly after the announcement of the successful ASP tenderer. The ISO contacted the prime contractor and offered to assist in finding capable firms to achieve the local content commitment. The prime contractor accepted the offer and an ISO officer was seconded to work with the Industry Development Unit on site at Williamstown. Since this groundbreaking secondment a number of major defence and commercial projects have implemented a similar approach. Box 2.1 outlines some typical examples of the ISO's role in enhancing Australian content in the ASP.

Box 2.1: The ISO contribution — Two case studies

Foreign design standard hurdles

The ANZAC frigates Blohm+Voss design specified that fasteners should meet Germany's DIN standards. DIN standards cover a range of fastener attributes such as the size of the head on a bolt and the length of the bolt thread. These attributes did not necessarily impact on the quality of the product in terms of its durability or strength. However, the size standards were completely different to the standards used in Australia to manufacture fasteners. Manufacturing fasteners to DIN standards in Australia would have required a major investment in retooling which could not be justified for a single customer, even one as large as the ASP.

A Victorian based company, Sweetman Fasteners (Previously Delta Fasteners), won the contract to import and supply the prime contractor with thousands of DIN standard fasteners for the first two frigates. Importing the required numbers and types of fasteners proved to be a logistical nightmare involving a huge paper trail. In addition, the arrival of the required fasteners was at the mercy of the shipper and the loading and unloading ports.

Around this time the ISO, which had been working closely with the prime contractor to assist it in meeting the local content requirements specified in its ASP contract, approached Sweetmans. The ISO, through its extensive network and database, had found that a local company — Ajax Fasteners — could make fasteners of the required quality which would be more than suitable for the task at hand. The only problem was that the fasteners did not exactly satisfy some of the DIN requirements with regard to head size, etc. However, after discussions with the prime contractor and the ship designers Blohm+Voss it was agreed that the Australian manufactured fasteners would be more than adequate for the majority of fastening jobs associated with the construction of the ANZAC frigates.

The switch to locally-made fasteners produced a win-win situation for the prime contractor, the Australian fastener manufacturer and its subcontractor Sweetman. The prime contractor won because the local product could be supplied at a lower cost than the DIN standard fastener. Ajax Fasteners won because the company now had a major long-term contract to supply fasteners which would have otherwise have gone to a foreign competitor.

Continued next page

Box 2.1: The ISO contribution — Two case studies (continued)

Sweetmans, to a lesser extent, also won because the logistics of supplying the diverse range of fasteners to the prime contractor was greatly simplified which in turn reduced its supply costs. In addition, as outlined in Chapter 3, Sweetman's involvement with the ASP created opportunities for the company to obtain new technology and new business opportunities.

Recognising capabilities

As part of its commitment to increase the local content in the ANZAC Frigates, the prime contractor with the assistance of the ISO contacted Australia's valve manufacturers with a view to them producing valves under licence to a German manufacturer. The ISO advised Tasman that at that time none of the valve manufacturers expressed an interest in the work. However, the ISO recognised that other firms had the capability to manufacture the prime contractor's requirements even though they were currently not in the valve business. The ISO used its extensive database and industry knowledge to identify potential manufacturers. Frontline Australasia, a company based in Dandenong Victoria, was one of those firms. At that stage the company was a general engineering firm with a focus on work for the automotive and aerospace industries.

Frontline, agreed that it was capable of producing the valves and with the support of the prime contractor investigated the feasibility of manufacturing the valves under licence. Frontline under licence now supplies virtually all the ANZAC's marine valves. (The company has a commitment to provide through life support for the frigate's valves.) Once Frontline's defence capabilities were better understood, the company was contracted to manufacture other equipment for the frigates. The longer-term impact of Frontline's ASP involvement is discussed in Chapter 5.

3 TECHNOLOGY AND THE ASP

Technological advance is an important immediate determinant of improved productivity. Technological advance brings new and improved products and new and improved ways to produce goods and services; and thereby provides opportunities to produce more output from available inputs (Productivity Commission 1999, p.164).

Chapter 2 highlighted that a considerable amount of high technology is embodied in the ANZAC frigates. Much of this technology was initially developed overseas and Australian business's large involvement in the ASP under the AII program created a potential for technology transfer. In addition, the nature of the work at hand and Defence's stringent demands as a customer can also create an incentive for firms to seek out new innovative ways of working. This chapter examines whether businesses obtained new technology as a result of their involvement in the ASP.

3.1 EXTENT AND SOURCE OF THE NEW TECHNOLOGY

Survey responses indicate that over 20 per cent of businesses involved in the ASP obtained technology as a consequence of their involvement (Figure 3.1a). Small, medium and large firms alike obtained technology through their involvement in the project. The proportion of small, medium and large firms obtaining technology through their involvement in the project is not significantly different to their overall composition in the group of respondents reporting an involvement with the ASP (Figure 3.1b). This suggests that the size of a firm did not have any major bearing on its ability to obtain technology from an association with the project.

The up take of new technology was also similar among ASP firms in the manufacturing and services sectors.

Businesses used a variety of methods to obtain or diffuse the ASP-related technology. Figure 3.2 highlights that internally-generated factors (such as seeking out information from existing published material, staff training and original research and development) were particularly important means for obtaining and/or diffusing the technology.

Figure 3.1: **New Technology and involvement in the ASP**

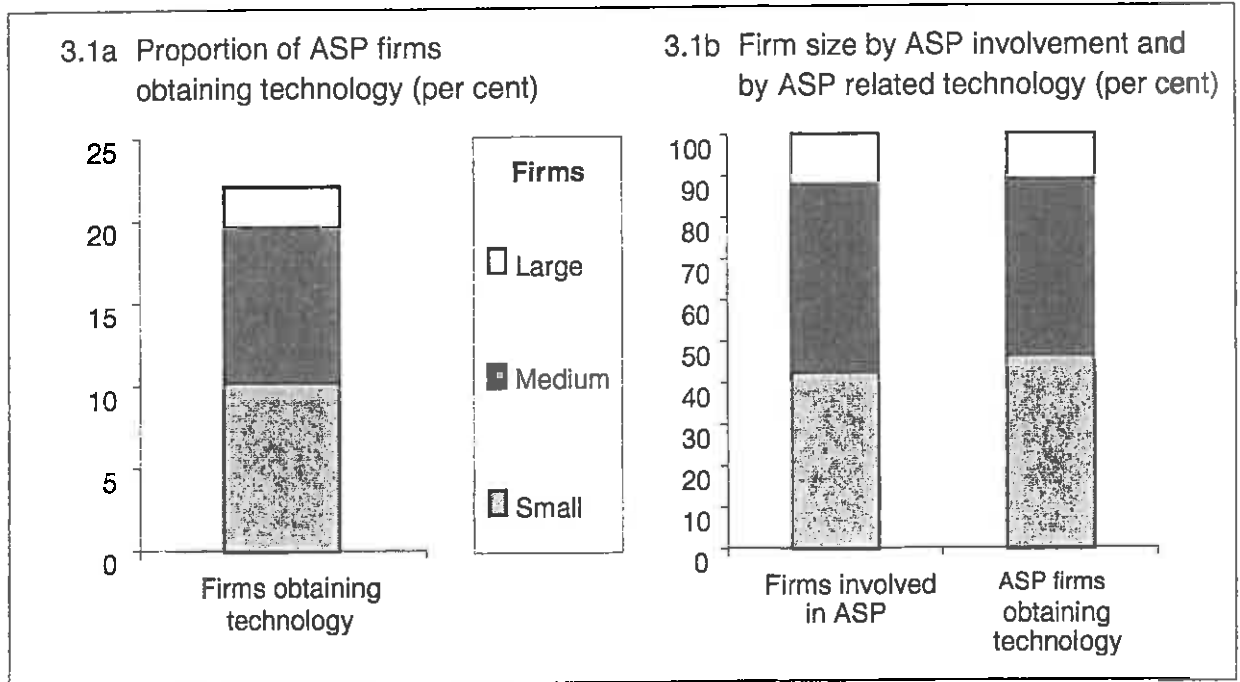
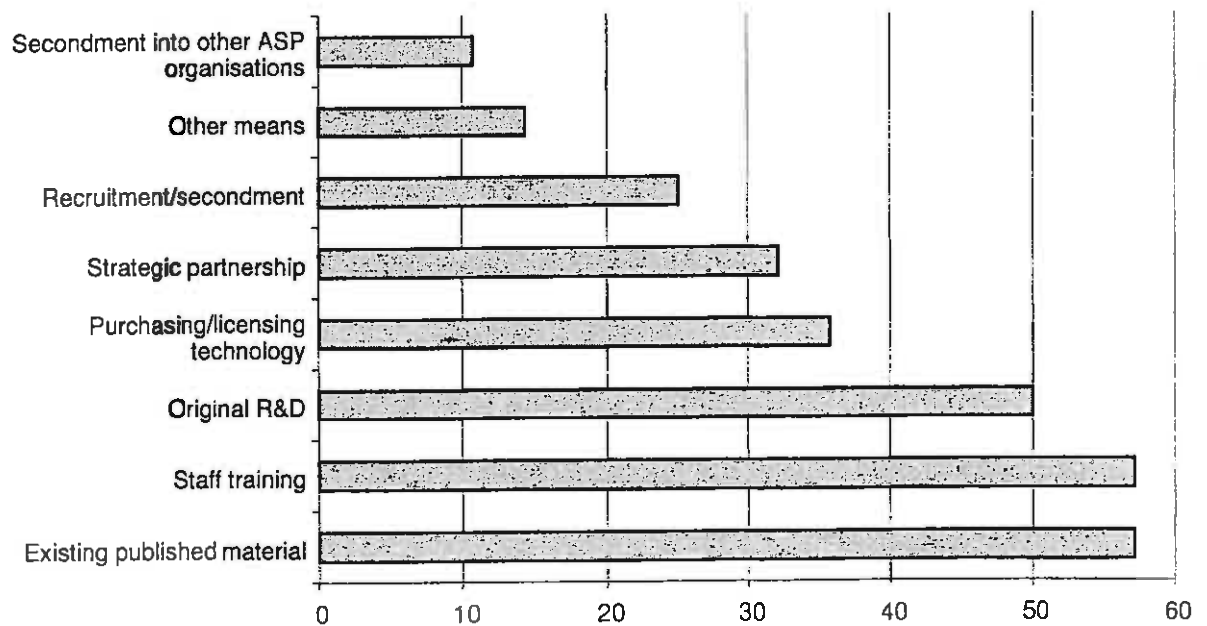


Figure 3.2: **Source of new technology** (per cent of firms obtaining new technology)



The importance of internally generated factors in obtaining the new technology may at first sight seem surprising. However, ABS (1998) research on technological innovation supports this finding. The ABS found that while internal and external sources were important for manufacturing businesses undertaking technological innovation, in-house sources tend to be utilised more frequently. Around two-thirds of businesses acquire technological knowledge or ability through their own staff by using their own equipment or technical information in different ways or through their own research (ABS 1998).

While there are similarities between the ASP firms and the wider business community, two contributors to the development or transfer of new technology stand out as being more important for the ASP businesses. The first of these is the greater use of research and development among the ASP businesses reporting new technology. Fifty per cent of ASP firms obtaining a new technology due to their association with the ANZAC ship project indicated that research and development was a contributing factor. (The proportion undertaking research and development was the same across the manufacturing and services sectors.) By contrast, the ABS found that research and development undertaken in-house or under contract provided the knowledge or ability to perform innovation in only 36 per cent of manufacturing businesses undertaking technological innovation.

Secondly, the ABS found that 8.7 per cent of firms undertaking technological innovation acquired or purchased their innovation capabilities. By contrast, around one third of ASP respondents which obtained new technology due to involvement with the ASP reported that they had purchased or licensed technology.

Many ASP businesses used a combination of methods to obtain and diffuse the new technology. For example, in-house factors were also important for many of the businesses reporting technology had been purchased or obtained under license. Nearly 80 per cent of these businesses also relied on staff training to obtain the technology and 40 per cent undertook original research and development.

The higher proportion of ASP firms obtaining technology via purchase or licensing is not unexpected given that many of the original designs associated with the ANZAC frigates originated outside of Australia. However, the more intensive reliance on original research and development by ASP firms is somewhat more surprising and suggests that companies involved in Defence work are more likely to undertake research and development than their civil counterparts.

3.2 IMPACT OF THE NEW TECHNOLOGY

All but one of the firms reporting they had obtained new technology as a result of their involvement with the ASP indicated that the new technology had some form of positive impact on their business. Impacts most commonly reported by the survey respondents obtaining new technology were:

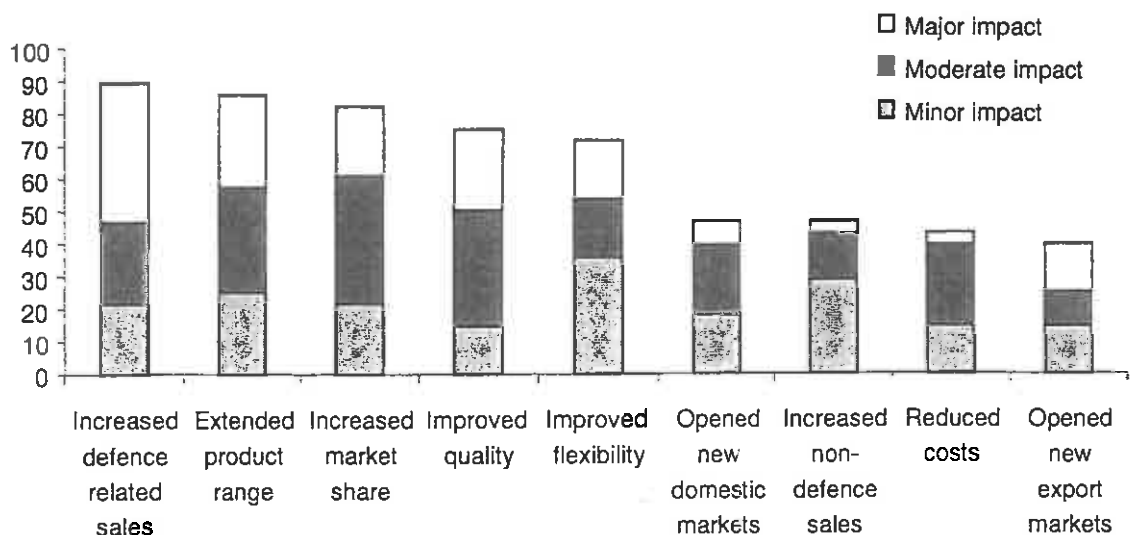
- increased defence-related sales (89 per cent)
- extended product range (86 per cent);
- increased market share (82 per cent);
- improved quality (75 per cent); and
- improved flexibility (71 per cent).

A substantial number of businesses obtaining new technology also reported it had:

- opened new domestic markets (46 per cent);
- increased non-defence sales (46 per cent)
- reduced costs (43 per cent); and
- opened new export markets (39 per cent).

However, the intensity or importance of these impacts varied considerably between respondents (see Figure 3.3). Box 3.1 highlights the diversity of the technology transfers and nature of the positive impacts which have arisen. Interestingly, firm size had little impact on a firm's likelihood of experiencing substantial positive impacts from the new technology.

Figure 3.3: **Impact of new technology** (per cent of firms with new technology)



Box 3.1: ASP related innovation — some examples

Amiga Engineering is a small Melbourne based Victorian heavy and general engineering firm. The company originally became involved with the ANZAC project in 1989 as a supplier to ASP subcontractors, but is currently supplying the prime contractor on a tender basis. Amiga has engineered a diverse range of small to medium projects for the frigates including fuel nozzles, hand wheels and springs for gun carriages (which required Amiga to develop speciality tooling). In the case of the hand wheels, the company implemented a number of design innovations which were not outlined in the specifications but were required to meet Defence standards.

Amiga's work for the petrochemical industry, like its ASP and other defence work, requires compliance with high standards and the ability to engineer to tight specifications. Over time it became clear to the company that the nature of this defence and petrochemical work justified an investment in state-of-the-art computer assisted design and computer assisted machinery (CAD/CAM) technology. This new technology has improved product quality and production flexibility and has opened new markets both in Australia and overseas. The company believes that this high technology investment has improved its ability to undertake work on the ANZAC frigates and other defence projects. It has also improved its competitiveness in commercial markets.

R. Edmonds and Sons Pty Ltd is also a small Melbourne-based company. The company, which trades as "Edson", specialises in the manufacture of water heaters for the domestic, commercial and maritime market. At the time the Industrial Supplies Office approached the company it had limited experience in manufacturing products to military specifications. Edson visited the German designer of the vessel for discussions regarding water heater and hydrophore specifications. Once Edson's defence capabilities became appreciated, they were invited to tender to manufacture radiant heaters for the project even though a German product had been specified for the frigates. Edson found that the specified German heater had some design shortcomings and had been adapted from an older design that was more suitable for steam usage. Edson redesigned the product (whilst keeping the same footprint) which then provided considerable operational savings compared to the German unit. Edson tendered the new design and were awarded the contract.

Edson's involvement in the ASP has led to a number of positive impacts for the firm. The company's proven design ability and manufacturing capability to meet military standards has opened new defence opportunities in Australia and overseas. In addition the credibility gained by Edson with its involvement with the ASP has enabled it to become involved in winning larger commercial projects. It has also led to winning a number of other defence contracts.

Continued next page

Box 3.1: ASP related innovation and technology transfer — some examples (continued)

Alfa Laval Pty Ltd is a medium-sized Australian subsidiary of a Swedish-based company. Alfa-Laval supply fuel and lube oil purifiers to the ASP. (Approximately 60 per cent of the value added in its supplies to the ASP are Australian local content.) Alfa-Laval has experienced two major technology impacts as a result of its involvement with the ASP. The company's involvement with the ASP improved the commercial viability of the company's existing Sydney facilities that are used for balance testing naval equipment to military specifications. This facility is the only one of its kind in Australia. In the absence of Alfa Laval's ASP contract, it would have been more difficult for the company to commercially justify offering this service locally and the technology could have been lost to Australia. Secondly, through its ASP involvement, the company now has the knowledge and capability to undertake shock and vibration testing to military specifications. This technology and associated knowledge has been beneficial for the company in Australia and has also been diffused to its subsidiaries.

Sweetman Fasteners (previously Delta Fasteners) won the contract to supply thousands of different sized fasteners for the ANZAC frigates (see Box 2.1). Subsequently, the Melbourne based company took on a partnering role with the prime contractor and took over the management of the total stock of fasteners on Tenix's behalf. At the time, Sweetman's stocktaking and ordering were mainly manual in nature. As a consequence of its new role in the ASP, Sweetman introduced computerised bar coding technology to increase the efficiency and cost effectiveness of the process. This new technology was later introduced into Sweetman's non-ASP work. It has led, amongst other things, to cost savings and increases in productivity. Sweetmans have also used their value adding experience with the ASP prime contractor to develop new services for other clients, which has opened new markets and increased sales.

4 BEST PRACTICE AND THE ASP

Over the last decade a range of studies have shown that there is a strong link between the adoption of best practice business and management techniques and improved business performance. For example, a study by the Australian Manufacturing Council (AMC 1994) found that leaders in the adoption of best practice enjoy superior export growth. Similarly a Commonwealth Government sponsored study by Harrison and Samson (1997) found a positive correlation between organisational culture and the use of management tools such as total quality management and a business ability to adopt and manage new technology. More recently a study by Hausner (1999) found a strong link between achieving high scores in the Australian Quality Awards for business excellence and good performance. Despite this important link, relatively few Australian businesses have implemented best practice business programs and practices such as just-in-time management and total quality assurance (DEWR&SB 1998).

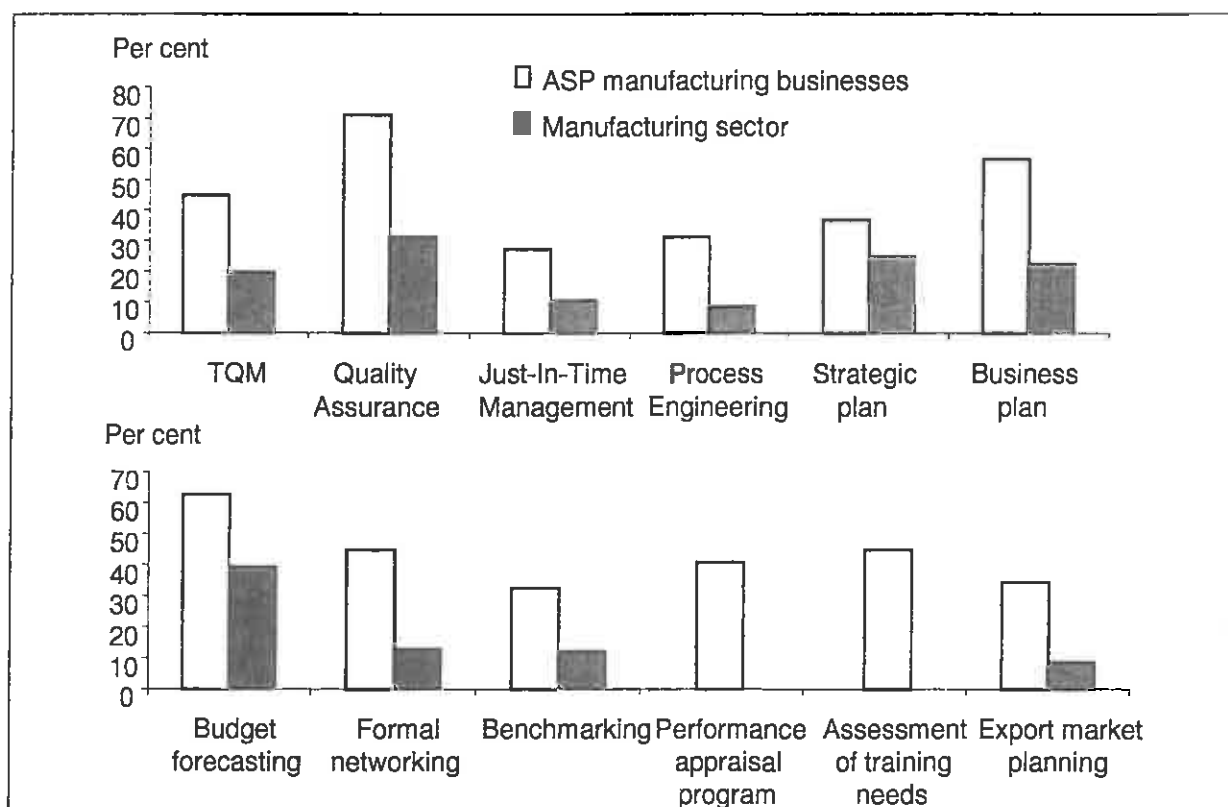
The high quality standards required by the Australian Department of Defence from its prime contractors supplying major defence projects often affects lower tier suppliers, as these standards flow down the supply chain. With this in mind the ASP survey questionnaire asked businesses involved in the project to indicate whether they had implemented a number of business programs and practices commonly associated with best practice techniques. The survey results indicate that 88 per cent of businesses involved with the ASP had implemented one or more of the 12 business programs and practices detailed in Figure 4.1.

Figure 4.1: Business Programs and Practices implemented by ASP businesses



The majority of ASP business had implemented these programs and practices prior to 1 July 1996. At that date the rate of implementation by ASP firms was significantly higher than the implementation rate in the wider business population. Figures 4.2 and 4.3 compare ASP businesses' implementation rates with the implementation rates in the manufacturing and services sectors.¹

Figure 4.2: Manufacturing businesses implementation of programs and practices (as at June 1996)^a



^a The business longitudinal survey did not request information on businesses implementation of performance appraisal programs or regular assessment of employees training needs, hence there is no data for benchmarking the take up of these practices.

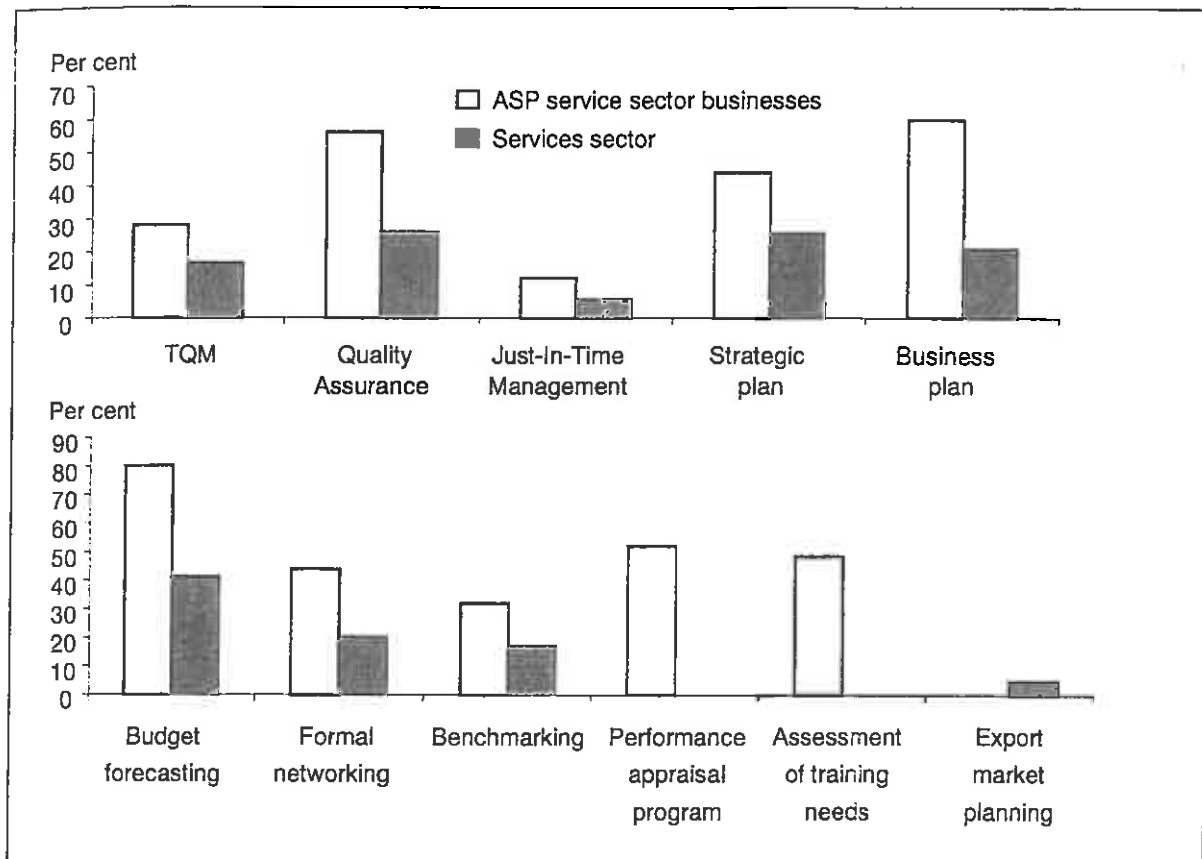
Source: ASP survey and DEWR&SB (1998).

In virtually all cases ASP businesses were more likely than the wider business community to implement best practice programs and practices. In many cases the proportion of ASP businesses implementing a program or practice was two to three, and for export market planning, four times higher than the proportion in the wider manufacturing sector. For example, over 70 per cent of ASP manufacturing respondents indicated their business had implemented quality assurance practices prior to July 1996 compared to only 31 per cent of businesses in the manufacturing sector. Similarly, nearly 45 per cent of ASP manufacturing

¹ In this analysis we have benchmarked the implementation rates of ASP businesses in the services sector against services sector businesses in the Business services sector and the wholesale sector.

businesses undertook formal networking with other businesses, a rate more than three times higher than the businesses in the manufacturing sector as a whole.

Figure 4.3: Services businesses implementation of programs and practices (June 1996)^a



^a the business longitudinal survey did not request information on businesses implementation of performance appraisal programs or regular assessment of employees training needs.

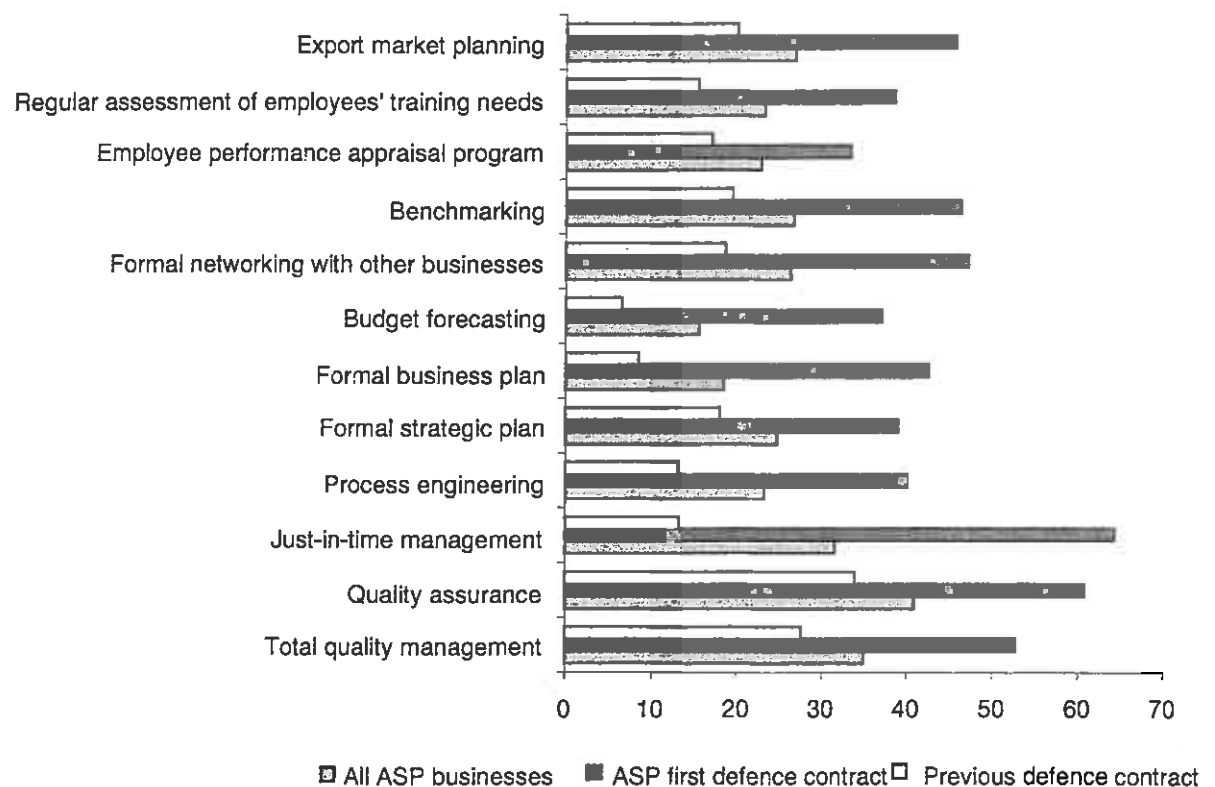
Source: ASP survey and DEWR&SB (1998).

ASP businesses in the services sector were also more likely to report implementing best practice business programs and practices than their contemporaries. The only exception to this general rule was the implementation of export market planning by ASP services sector businesses. While a few of the services sector businesses responding to the ASP survey had implemented export market planning by 1999, none had implemented this business practice prior to 1 July 1996. By comparison 4.5 per cent of service sector businesses in the wider business community indicated they had implemented export market planning by that date.

For many businesses their involvement with the ASP was a catalyst in the decision to implement these business programs and practices. However, the importance of the ASP in the implementation decision varied considerably between programs and practices and between firms (Figure 4.4).

The ASP role in the implementation decision was more frequently considered as important for the implementation of quality assurance. Just over 40 per cent of business considered their involvement with the ASP was important in the decision and a quarter of these businesses considered their involvement with ASP was very important. By comparison only 16 per cent of businesses using budget forecasting considered that their involvement with the ASP had been important in the introduction of this practice.

Figure 4.4: **Importance of ASP in the implementation of programs and/or practices** (per cent of businesses with program or practice)



The importance of the ASP in the implementation decision also varied with the level of experience with defence work. Those respondents reporting that the ASP was their business's first defence contract were more likely to report that ASP was important in the implementation decision (Figure 4.4). This outcome suggests that defence work, not just the ASP, is important in the implementation of best practice programs and practices. This result, particularly for business practices such as quality assurance is understandable. For example, one respondent with a long history of defence work and ISO 9000 accreditation indicated that the decision to implement quality assurance arose because it was virtually impossible to win large defence contracts without it. Another respondent indicated that the company had been preparing for ISO 9001 Quality accreditation at the time the ASP contract was put out to tender. In this instance the potential for winning the ASP contract gave impetus to the process

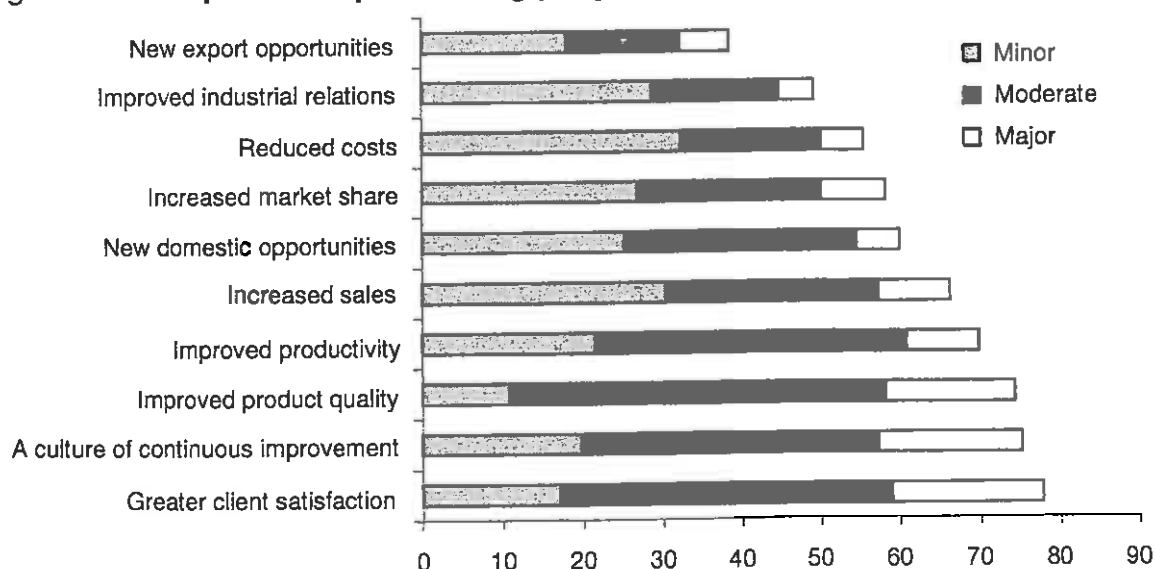
of gaining accreditation. Another respondent, with a number of other defence contracts, indicated that its defence work, including the ASP, was important in its decision to implement process engineering. The company's management said that process engineering had helped the company to achieve the high quality and control standards required by defence by making all team members aware of systems and flows.

However, in some instances the decision to implement programs such as quality assurance and total quality management was driven by clients other than defence. For example, Alfa-Laval indicated that as defence was one of their major customers the company was happy to introduce quality assurance practices. However, another deciding factor was that other major clients such as power stations were also starting to demand the take up of these practices by their suppliers.

4.1 IMPACT OF PROGRAMS AND PRACTICES

Businesses implementing one or more of the programs and practices reported a number of benefits, with the most commonly reported benefit being greater client satisfaction — 78 per cent of businesses reported this outcome (Figure 4.5).

Figure 4.5: Impact of implementing programs and practices



Over 50 per cent of businesses considered that the implementation had increased sales, led to new domestic business opportunities and reduced costs. Just under 50 per cent considered that their relations with their employees had improved and nearly 38 per cent reported that implementing one or more of the programs and practices had led to new export opportunities. Box 4.1 provides some insights into the benefits experienced by individual ASP firms.

Box 4.1: Implementing programs and practices — some outcomes

H.B. Fuller Company Australia Pty Ltd supplies many of the sealants used in the ANZAC frigates through its Victorian facilities in Dandenong. The company has implemented all of the programs and practices examined in the ASP survey questionnaire. The company's Managing Director pointed out that, as the Australian subsidiary in a large multinational business, H. B. Fuller must meet international quality standards. Notwithstanding this many of the practices put in place to meet the ASP prime contractor and the Department of Defence's requirements are different from those used for most other clients. The ASP contract and the regular efficiency and timeliness checks by the prime contractor have created an environment for continuous improvement at H.B. Fullers. This continual reassessment of operations often leads to quality and productivity improvements for the company's defence work but also flows through to its civilian contracts. In addition, the ability to meet Defence's stringent requirements is an excellent means of demonstrating that the company has the ability and know-how to meet the quality demands of prospective clients.

R. Edmonds and Sons Pty Ltd, trading as Edson, is a Melbourne firm which has contracts to supply water heaters, hydrophores and radiant heaters for the ANZAC frigates. Its ASP related contracts were the first major defence work won by the company. The company is ISO 9000 accredited. Its decision to implement quality assurance practices was directly linked to these ASP contracts. The implementation of quality assurance practices led to an increase in productivity, formalised systems and testing procedures and clarification of employees' roles and responsibilities. Morale has favourably increased as employees have become interested and appreciative of the process and they continue to seek more efficient ways of doing things. Quality assurance has also improved communication in the workplace and this has flowed through to better industrial relations.

The decision to implement a quality assurance program has led to Edson being awarded with Australian Standards Watermark certification. Edson reports that its quality assurance practices and Watermark certification have helped the business generate additional work both in Australia and overseas.

Dane and Associates Pty Ltd, a small Sydney-based distribution company reported that the ASP was the company's biggest contract at the time it was won. Dane was keen to conform to the prime contractor's quality and performance requirements and introduced an informal quality assurance process, which is now used in all its operations. The company's proven ability to provide a quality service to the ASP has led on to other defence and commercial contracts.

4.1.1 Higher Productivity and a culture of continuous improvement

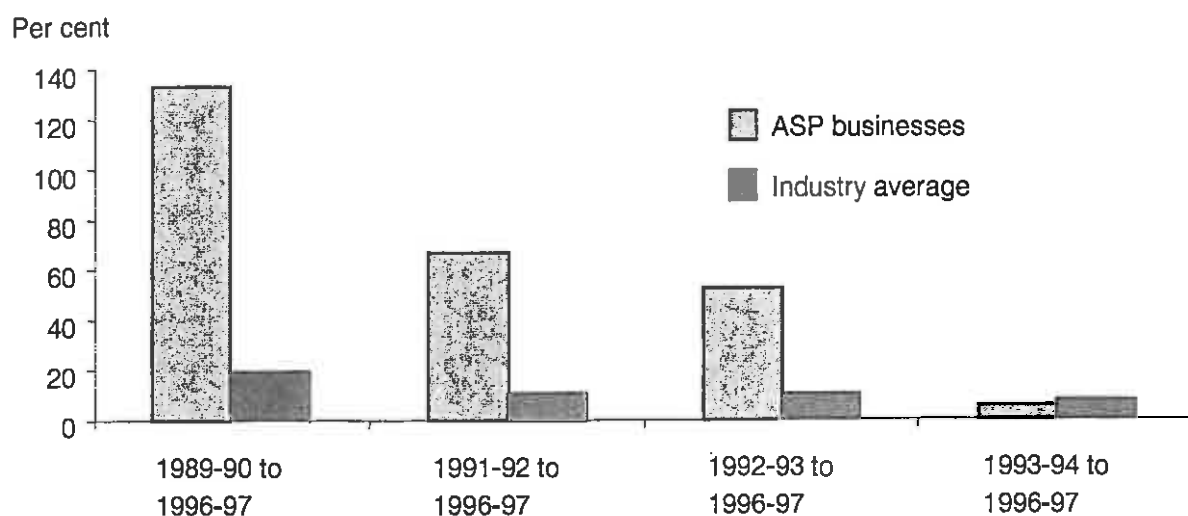
The implementation of these programs and practices also had positive impacts on many ASP businesses operations and outputs. Between 70 and 75 per cent of businesses believed that implementing one or more of the programs and practices had helped create a culture of continuous improvement with improvements in the quality of their products or services and higher productivity.

Productivity growth is an important contributor to improvements in Australia's GDP and general standard of living. In fact it has been estimated by the Industry Commission that productivity growth contributed about two-thirds of the increase in Australia's living standards over the period 1964-65 to 1995-96 (IC 1997).

Around 20 survey respondents from the fabricated metal products and other machinery and equipment manufacturing industries provided sales and employment data for the financial year prior to the commencement of their involvement with the ASP as well as for subsequent years. Since their involvement with the ASP commenced, the majority of these ASP businesses experienced higher growth in sales than the industry average. They also experienced considerably higher growth in productivity than the industry average and, in some instances, the productivity growth experienced by ASP businesses was substantially higher than the industry average (Figure 4.6).

Figure 4.6 also highlights that an exception to this positive trend was found among businesses whose involvement with the ASP has been relatively recent. This result suggests that the benefits of association with the ASP can take sometime to accrue. For example, in the early years of implementing quality assurance practices, businesses may find that the costs may be greater than the benefits. However, once processes are in place and fully understood by all parties the benefits quickly outweigh the costs and a process of continuous improvement is engendered which in turn flows through to productivity improvements.

Figure 4.6: **Average labour productivity growth** (year prior to involvement with the ASP to 1996-97)

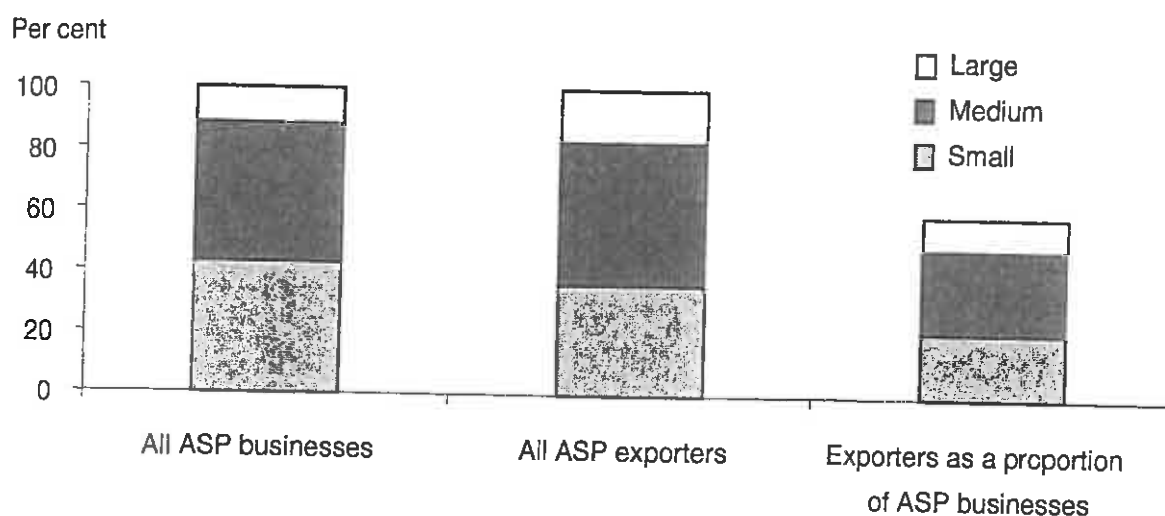


While the relatively limited number of responses means that care should be taken in their interpretation, this labour productivity analysis supports the perceptions of improved performance and the culture of continuous improvement reported by the majority of ASP businesses. It can be expected that as new businesses become involved in the project's construction and/or through life support stages this process of defence related productivity growth will continue to be observed and produce on going benefits for the economy. The General equilibrium analysis presented in Chapter 7 examines the contribution of ASP sub contractors' productivity growth to the economy as a whole.

5 EXPORTS AND THE ASP

Given Australia's relatively small defence industry, diversifying into 'non-defence' activities and/or exporting can improve the long-term viability of businesses supplying the Department of Defence and its prime contracts. Around 60 per cent of the businesses associated with the ASP supply goods or services to export markets. Many of these exporters are small to medium-sized businesses (Figure 5.1).²

Figure 5.1: **Size composition of ASP businesses and ASP exporters**



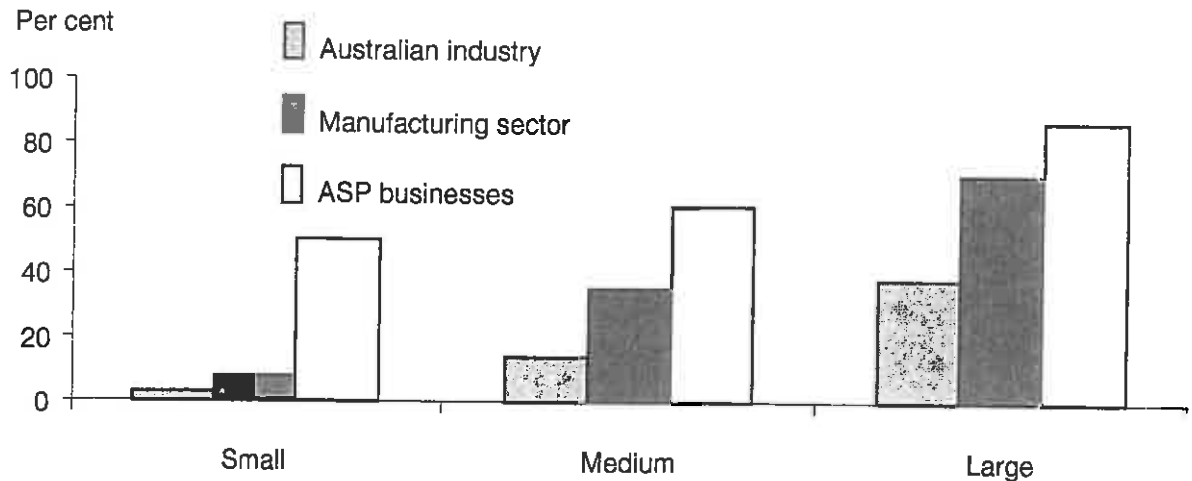
In all three size groupings, a higher proportion of ASP business were likely to export than might be expected by observing the same size groupings in the Australian business population.³ For example, Figure 5.2 shows that half of the ASP's small businesses export, this contrasts with only three per cent of all Australian small businesses. This lower propensity to export in the wider business community is, in part, explained by the large number of service sector businesses in the wider community (service sector businesses are traditionally less likely to export). However, a similar outcome is observed when we

² The proportion of small (large) businesses among the exporters is slightly less (more) than the proportion of small (large) business in the ASP population. However, significance testing of these proportions does not support the notion that there are important differences in the size composition of export firms compared to their make up in the responding ASP businesses (see appendix 3 for a discussion of significance testing).

³ Unpublished data from the ABS 1996-97 business longitudinal survey has been used as the export benchmark. This annual survey covers small, medium and large businesses in most industries but excluded non-employing businesses as well as government business enterprises and businesses in the agriculture, health and community services and education industries.

compare the export propensity of the ASP's manufacturing businesses to the export propensity of the manufacturing sectors small, medium and large businesses.

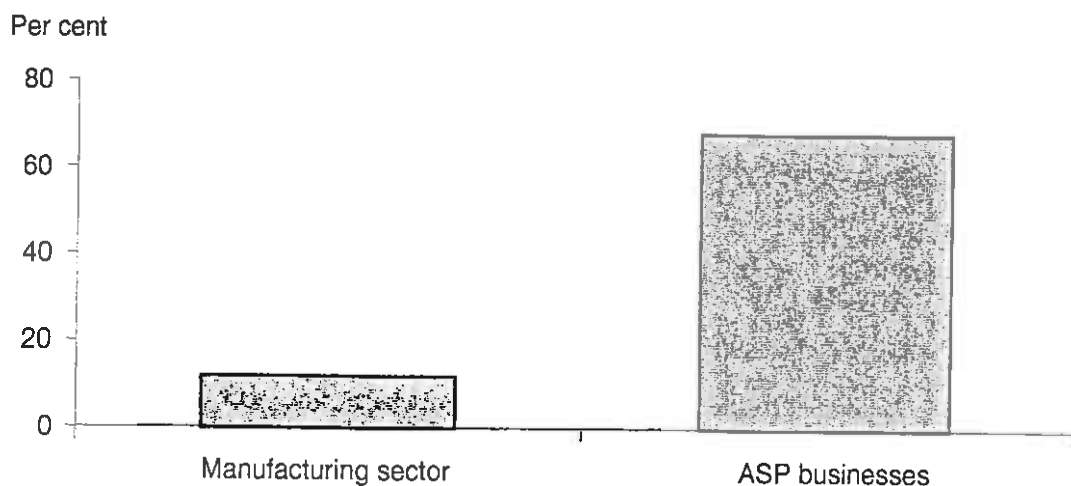
Figure 5.2: **Export propensity by size** (per cent of exporting businesses in size grouping)



Source: Unpublished data from ABS (1998) and ASP survey.

It is also apparent that the proportion of all ASP businesses that export is substantially higher than the proportion of exporters among Australian firms. ABS data from the 1996-97 business longitudinal survey indicates that only three per cent of Australian businesses export. However, even if the focus of the comparison moves to the manufacturing sector, the proportion of exporting ASP manufacturing businesses is considerably greater than the proportion of exporters in the sector as a whole (Figure 5.3).

Figure 5.3: **Exporting businesses** (per cent of total)



While businesses associated with the ASP were more likely to export it appears that, as a group, they are less reliant on exports than exporting businesses in the wider community. Unpublished data from ABS (1998) indicates that, on average, exports account for around 20 per cent of exporter's income from the sale of goods and services. By contrast ASP survey data indicates that around nine per cent of ASP exporters income was generated by exports. However, as the following discussion highlights, the importance of export income for many ASP exporting businesses has increased since they have been associated with the project.

5.1 A DEFENCE — EXPORT NEXUS?

There are a number of factors which may help explain the higher proportion of exporters among the ASP businesses. One factor may be that businesses that are prepared to seek out defence work, despite its stringent requirements for quality and documentation, are also more likely to seek out opportunities overseas. Another explanation is that the ASP businesses were from more export-oriented industries than the manufacturing sector as a whole. And yet another explanation may be that the association with defence work provides spin offs for exporting. With this later explanation in mind, ASP respondents where asked:

- if involvement in the ASP improved the business's current or future ability to export; and
- what factors had contributed to any change in export sales since the business became involved in the ASP.

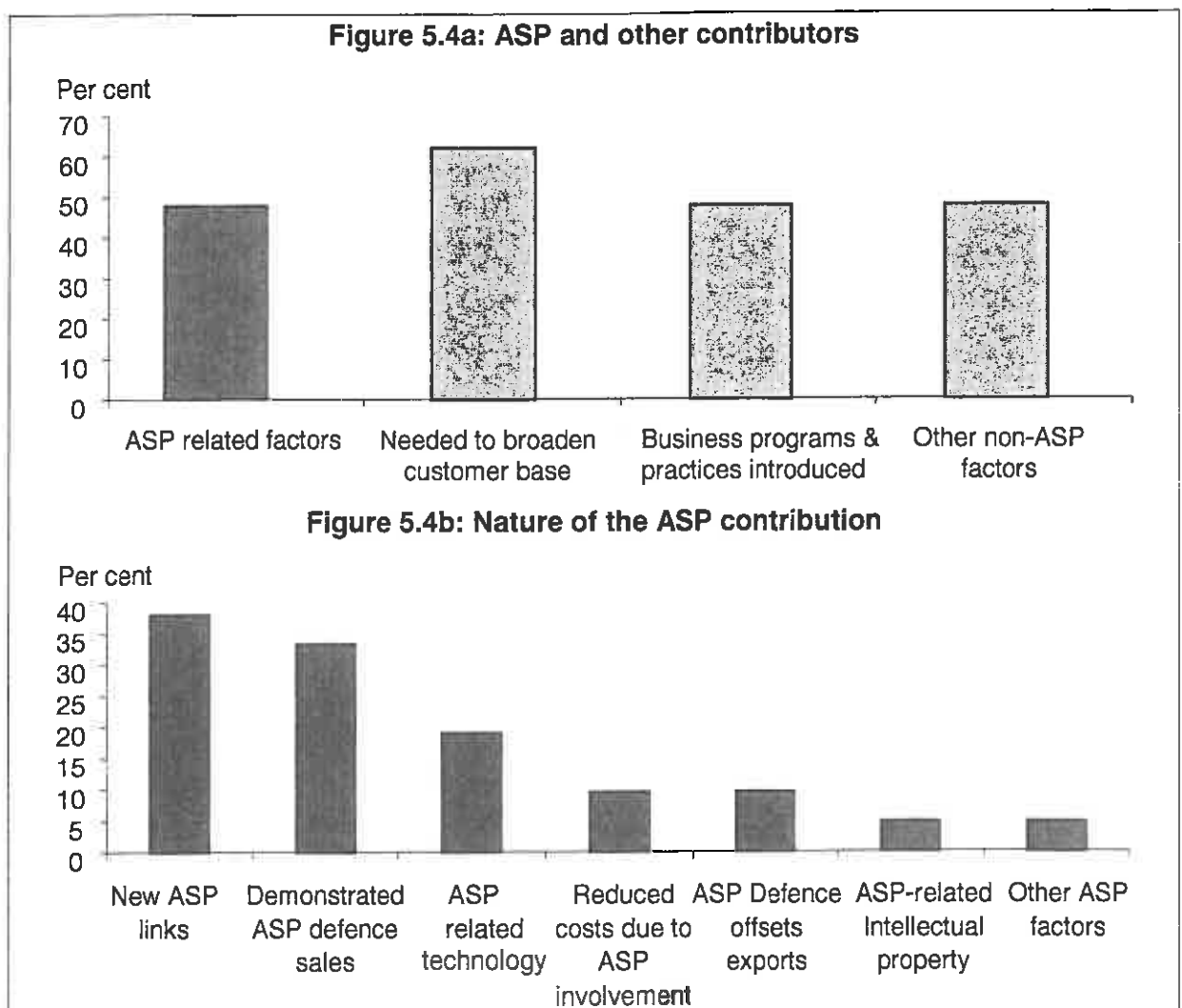
Just over 20 per cent of respondents indicated that their business's current or future ability to export had improved as a result of being involved with the ASP. In a few cases the improvement was directly associated with the ASP via defence offsets contracts. In other cases the improvement was indirectly associated with the ASP.

The exports of around 30 per cent of exporting ASP businesses increased since the commencement of their involvement with the project. Around half of these businesses considered that the ASP had in some way contributed to the increase (Figure 5.4a).

The ASP's contribution to the increase varied and in some instances was multifaceted. A number of businesses indicated that the demonstration effect associated with successfully undertaking the ASP had improved the export environment. For example, Compair Australasia Pty Ltd said that its involvement with the ASP had improved its image in the region as a supplier of modern reliable defence compression equipment and this augurs well for future defence export contracts. Compair also indicated that its association with other defence projects, for example, the Mine Hunters, had led to export contracts to supply the

Royal Thai Navy. Others indicated that the technology and new business link obtained from the project had contributed to the increase in exports. However, the new business links or networks obtained from the involvement with the project stood out as the most commonly reported ASP contributor to the export increase (Figure 5.4b). The two case studies presented in Box 5.1 and Box 5.2 provide insights into the complex way a major defence project such as the ASP can have a positive impact on a business' exports and operations.

Figure 5.4: Contributors to ASP businesses increased exports



As might be expected the increase in exports varied considerably between firms. However, while the data is limited, due the number of respondents providing dollar values for exports and total income, it appears that the longer the association with the ASP the more likely that exports as a proportion of the total value of income increased. For example, exporters who commenced their involvement with the ASP in 1991 on average generated around 12 per cent of their income from exports, by 1996–97 this proportion had increased to around 22 per

cent. By comparison these export proportions were 13 per cent and 15 per cent, respectively, for exporters which had commenced their involvement with the project in 1994. This finding is not unexpected as the diffusion of new technology and development of export markets can involve relatively long lead times. It also supports labour productivity estimates and respondents' view that the implementation of business programs and practices discussed in Chapter 4 has engendered a culture of continuous improvement in their business which through time can flow through to improved international competitiveness via on going productivity and quality improvements.

Box 5.1: Export case studies

CEA Technologies Pty Limited has been designing radar and communications systems for commercial and defence use since the early 1980s. The company has experienced substantial growth in turnover, exports and employment since it became involved with the ASP in 1991. Prior to its involvement with the ASP, CEA Technologies employed 20 full time staff in Canberra and its exports amounted to less than 10 per cent of its turnover. The company's turnover has increased by nearly ten fold since it became involved with the ASP and its exports account for around 30 per cent of this turnover. The company has extended its Australian operations and now has facilities in Melbourne and Adelaide in addition to its Australian Capital Territory based headquarters. CEA also maintains an office in San Diego to support its US clients. The CEA group currently has a combined workforce of over 125 full-time permanent employees.

The company's ASP contracts have contributed to this growth. For example, the contracts were an important factor in the company's decision to strengthen process engineering techniques and assisted in the development of networks. The company's management report that as a consequence of its involvement with the ASP it was necessary to enhance all aspects of CEA's project management capability. The business links created through the company's involvement with the ASP as well as the company's clear demonstration that it can supply a high quality product have been instrumental in achieving substantial export growth.

The ANZAC frigates utilise a Solid State Continuous Wave Illuminator designed by CEA. This technology is now being marketed worldwide as an alternative to, or replacement of existing non-solid state systems. Tenders are being provided to a wide range of Navies in Europe and Asia. These opportunities are directly related to CEA's involvement in the ASP.

Continued next page

Box 5.1: Export case studies (continued)

Since its involvement with the ASP the company has come to concentrate on niche markets. When seeking out new work the company now focuses on its capabilities rather than the industry sectors, which in the past, would have been its focus for generating work.

The communications surveillance system jointly developed by CEA Technologies and Daimler Chrysler Aerospace for the Australian Navy is an integral part of the ANZAC Frigates communications systems. As the equipment interfaces with other equipment on the frigates it was important that the company formed a good working relationship with all the parties involved. Daimler Chrysler Aerospace through this ASP generated partnership became aware of CEA's wider range of products, its extensive research and development program and defence capability. As a direct consequence of this ASP generated business link, CEA Technologies now supplies antennas to Daimler Chrysler Aerospace.

CEA management believes that the company's ASP involvement helped demonstrate to other governments that the company had the capability to design and develop high quality systems at the forefront of radar and communications technology. Since its involvement with the ASP, CEA's radar surveillance systems have been recognised as world class by the United States Navy. CEA now successfully exports a range of high technology radar and communications systems to several countries throughout the world. CEA has also developed a strong local defence capability and has supplied many other major Australian Defence projects including the Mine Hunters.

Frontline Australasia Pty Ltd is a Victorian based company which has achieved outstanding export success from its involvement with the ASP. As outlined in Box 2.1, prior to Frontline's involvement with the ASP, the company undertook specialist work for the automotive and aerospace industries. This work and the exacting standards required to work in the aerospace and automotive industries meant that Frontline had the capability to undertake work on the frigates but limited experience undertaking defence or marine engineering. With the support of the prime contractor and the Industrial Supplies Office, Frontline investigated the feasibility of manufacturing marine valves for the ASP. Frontline eventually entered into a partnership with the German manufacturer of the valves specified in the ASP contract. As a consequence of this involvement with the frigates Frontline now has the expertise to build and test marine valves.

Continued next page

Box 5.1: Export case studies (continued)

Frontline, under licence from the German manufacturer, now manufactures and supplies virtually all the ANZAC's marine valves. The company also has a commitment to provide through life support for the frigates' valves.

The company is now, under Defence offsets, exporting valves into Europe through the German licensor. The company sees these export offsets as giving it the opportunity to prove to its licensor that it can provide a high quality and price competitive product. Frontline is also seeking out new regional markets for the valves in Asia and is hopeful that it will eventually succeed in achieving orders.

Once Frontline's defence capabilities became clear other overseas suppliers associated with the ASP approached the company. As a result of these approaches Frontline won contracts to manufacture the frigates helicopter landing system components and hangar doors for a Canadian supplier and decoy winches for a United States company under licence. Both licences have generated exports for Frontline. However, the manufacture of the winches has proved to be a major success.

Initially, Frontline was contracted by a United States company Frequency Engineering Laboratories (FEL) to manufacture ten winches, one for each of the ANZAC frigates. The contract also involved a defence offset arrangement which required Frontline to produce a number of additional winches for export on behalf of FEL. FEL found that Frontline could supply the winches cheaper, faster and to a better quality standard than its United States supplier. After meeting its offset's obligations FEL approached Frontline with a view to making the company the sole manufacturer of its winches worldwide. Frontline has now signed a five-year contract with FEL and manufactures winches to supply six defence forces around the world. The company is currently exploring other opportunities in the winch area.

Frontline had many business programs and practices in place before it became an ANZAC Ship component supplier. In part this was driven by the quality and standards required by its customers in the automotive and aerospace industries. However, Frontline's involvement with the ASP reinforced the need to have quality certification practices in place. The company's involvement with the ASP has led to the further development of its quality assurance systems.

Continued next page

Box 5.1: Export case studies (continued)

Frontline believes that the most important benefit of its involvement with the ASP is that it has opened up many opportunities in Defence related work. Frontline has proven that it can meet the high quality standards required by Defence and has the capabilities necessary to supply a diverse range of defence requirements both in Australia and overseas.

Frontline's management considers that its involvement with the ASP was a golden opportunity to move into the defence market. This market would otherwise have been outside its reach. However, the company's management considers that it cannot rely on defence contracts alone and continues to have a strong customer base in the automotive and aerospace industries.

6 DEFENCE CAPABILITY AND SUSTAINABILITY

The Government's vision is for a technologically advanced Defence Force focused on its core business of fighting and winning.

The Defence Force will be supported by a sustainable defence industry in-country, which best supports the ADF's war fighting capabilities.

We will realise this vision in close partnership with efficient, innovative and durable industries that are able to meet the needs of the ADF wherever it is deployed (DoD 1998, p.1).

... The AII program develops and sustains strategically important capabilities in Australian industry. These capabilities are critical both to support specific ADF systems and as key elements of the broader national support base (DoD 1998, p.34).

6.1 THE CAPABILITY ENVIRONMENT

The ASP represents a major opportunity for Australian industry to support Defence's war fighting capability, it also represents an opportunity for Australian industry to improve its defence capability. Forty nine per cent of survey respondents reporting involvement with the ASP consider that their business's involvement with the project improved their ability to supply Defence or its contractors. However, respondents with ASP turnover actually generated in Victoria ("Victorian businesses") were more likely to report that their involvement with the project had improved their defence capability. Over half of Victorian businesses considered that their defence capability had improved as a result of the ASP, where as only 20 per cent of businesses generating ASP related turnover outside of the state indicated that their defence capability had increased (see Appendix 2).

While the overall improvement in capability is impressive it needs to be borne in mind that a similar number reported that their involvement with the project had led to no change in defence capabilities. For some ASP respondents with a long history of defence work, such as Wattyl Australia Pty Ltd, a company which has supplied the Australian navy for many years, this response is readily understood. However, the reasoning behind negative responses from respondents reporting that the ASP was their company's first defence contract is less obvious. A small sample of these businesses were contacted to identify why they considered their defence capabilities had not improved as a consequence of involvement with the ASP (see Box 6.1).

Those businesses reporting that their involvement with the ASP had improved their defence capability considered that the project had impacted on many facets of their capability (Figure 6.1). For example, around 90 per cent of these respondents reported that, as a result

of their business' involvement with the ASP, they had greater knowledge, capacity and resources to supply Defence. Over 70 per cent reporting an improvement in their defence capability considered that their businesses as a consequence of the ASP could now provide a better quality product, and/or work with new defence technology or perform new functions.

Box 6.1: Improved defence capability was not universal

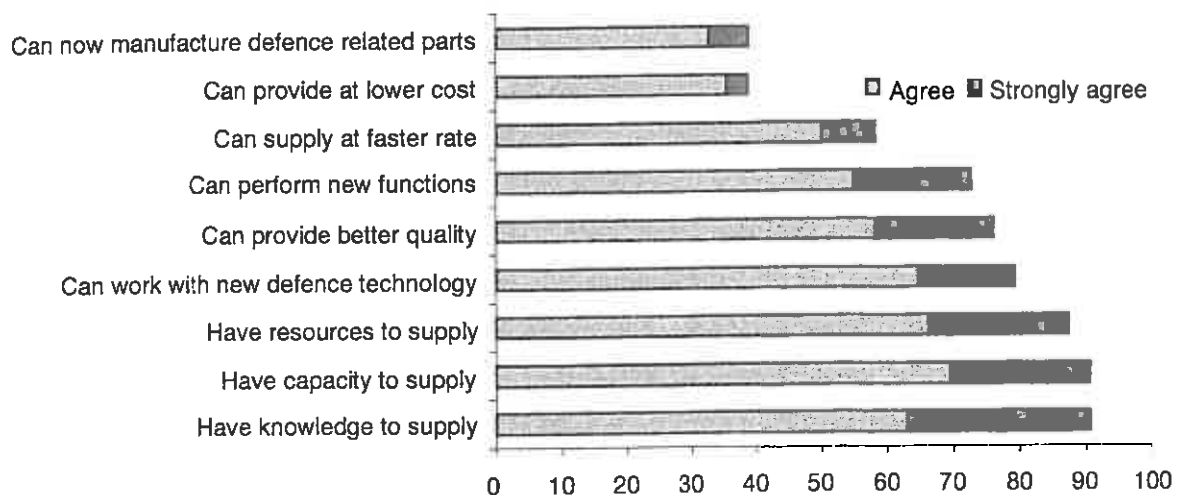
Stallman Pty Ltd is a small company, based in Matraville New South Wales. Stallman supplied pipe and fittings to the ASP. The ASP was the company's first defence contract and its involvement with the project commenced in 1994. While the company's management fought hard to win the contract, in terms of price and quality etc, they believe that its overall impact on the business was negligible. The company has subsequently won a number defence contracts unrelated to the ASP. Management said that these projects, like the ASP contract, were found and won through their own efforts and capabilities. They consider that very few, if any, lessons were learnt from supplying the ASP. In part this is because of the very different requirements, in terms of tenders, quality assurance etc. required by the many divisions of Defence involved in procurement.

Davis Engineering Pty Ltd, a Queensland firm based in Clifton, became involved with its first defence project, the ASP, in 1995. The company contributions to the project were made on an ad hoc basis, the work tended to be one off orders which had to be supplied in a relatively short time frame. Although the company was keen to undertake more work for the ASP and had the necessary quality assurance systems in place, it was not given the opportunity to supply the ASP in a major way. The company's management believes that they had the capability to supply Defence and its contracts before their involvement with the ASP. In their view the ASP work was too sporadic and created little opportunity to build up a rapport with the prime contractor or the Department. The company has not pursued any further defence work although one small job has followed on from their involvement with the ASP.

Improvements in the defence capability of ASP respondents covered a wide spectrum of defence related activities that are not necessarily drawn out by the responses reported in Figure 6.1. For example, Tenix reports that when the company commenced the ANZAC ship project it had the capabilities to construct a warship and integrate the combat and communications systems. As a result of their involvement with the project the company now have a proven capability to design warships. In addition the company's systems integration capabilities have been extended. Other businesses such as Frontline (see Box 5.1) and Edson (see Box 4.1) were not aware of their potential defence capabilities prior to their involvement

with the ASP. Both companies have gone on to supply other defence projects. In Frontline's case its improved defence capabilities have lead to the company winning a five year contract to supply winches to six defence forces. At the other extreme, Compair Australasia's management believes that the company's involvement with the ASP has improved its defence capability by giving it a better understanding of the workings of modern defence contracts. As a consequence the company is now better able to meet the needs of Defence and its downstream support.

Figure 6.1: **Areas of capability improvement**
(proportion of ASP businesses with improved capability) ^a



The results for the question covering businesses' capability to manufacture parts they could previously only assemble 'Can now manufacturer defence related parts' represents the proportion of manufacturing respondents.

For some businesses the sporadic nature of defence work can make it difficult to maintain employees' defence ready expertise and capability. One respondent who did not wish to be named in this report is a case in point. The multinational company has long been involved in defence work in Australia and internationally and is enthusiastic about undertaking Australian defence work, but finds that the orders are too infrequent to sustain a business based on defence work. While the company's parent undertakes a wide range of defence work around the globe it finds that defence contracts in Australia are few and far between, and this has ramifications for investments and employee skills. The company reported that it undertook substantial investments in employee training and skill accreditation to win and successfully undertake its work for the ASP. However, management reports that past experience has shown that unless there can be some continuity of defence work, the skills accreditation and the associated investment are lost.

6.2 THROUGH LIFE SUPPORT CAPABILITIES

Defence has advised Tasman and the Ai Group that Australian industry involvement in major defence projects aims to cost effectively achieve independence in operations and a national integrity to support a key security capability.

The Department's representative said that:

Defence policy for industry seeks to extend capabilities within local industry (to produce and integrate original equipment and provide support services) where this will materially enhance the operational effectiveness of the Australian Defence Force and other national defence assets. The ANZAC ship project is a case in point where the ship vessel and many of its systems will be supported locally to ensure the operational availability and future effectiveness of the ships.

In practice the choice of local or overseas supply is determined on a case by case basis. For example, some items (such as stock 'circuit boards') that are part of pools through which components are rotated (or even 'repaired by replacement') may be most economic to acquire for stock from overseas. On the other hand, uniquely developed or configured systems (like sonar systems) are often sourced locally. Another factor in the sourcing choice is timeliness of supply of new product, in-service support and consumables (like gun ammunition).

However, while the actual saving to the Commonwealth Budget are often obvious, it is virtually impossible to put a dollar value on the strategic benefit associated with Australia having a Defence capable domestic industry.

The Department's representative pointed out that:

Although the effective 'length' of supply lines is reduced by advances in equipment and logistic management systems, there are instances where overseas suppliers as a matter of policy do not afford Australian needs a high priority. One reason can be the supplier's perception that other customers (sometimes the home government) have higher priority needs. Delays may also occur in the clearance by foreign governments of arms and technology transfers to Australia.

For these and economic reasons, Australia has long history of indigenously owned companies such as Tenix producing for Defence, and often in some form of corporate relationship with major overseas providers of defence technologies (for example Tenix and Lockheed Martin in the RLM joint venture). Similarly, it often makes business sense for international defence companies to establish enterprises in Australia. Such operations not only provide an immediate measure of defence self-reliance, but also provide channels for the enhancement of skills and technologies in industry to address the future defence needs of Australia.

Defence has advised Tasman and the Ai Group that past experience indicates that there are often substantial financial as well as security benefits to be had from a defence capable Australian industry. The financial benefits are particularly apparent in the area of through life support and running costs. Defence indicated that while most categories of running costs for ships are independent of the original source of supply, repairs, maintenance and spares are an exception and local supply can have a major impact of these costs. For example, the ships

closer proximity to local suppliers often means that the repair turn around time (RTAT) for locally produced items is as low as 30 days. Whereas for overseas items, returned for repair the RTAT may be 9 to 18 months. This differential has a major impact on the quantity of and overall cost of spares that need to be held. Defence advised that the annual running cost for the ANZAC ships when all eight are in service is expected to be in the order of \$133 million — \$45 million of this expenditure can be attributed to repairs, maintenance and spares. However, going on past experience these later costs could be higher by a factor of two if the original source of supply had been overseas.

6.3 SUSTAINABILITY

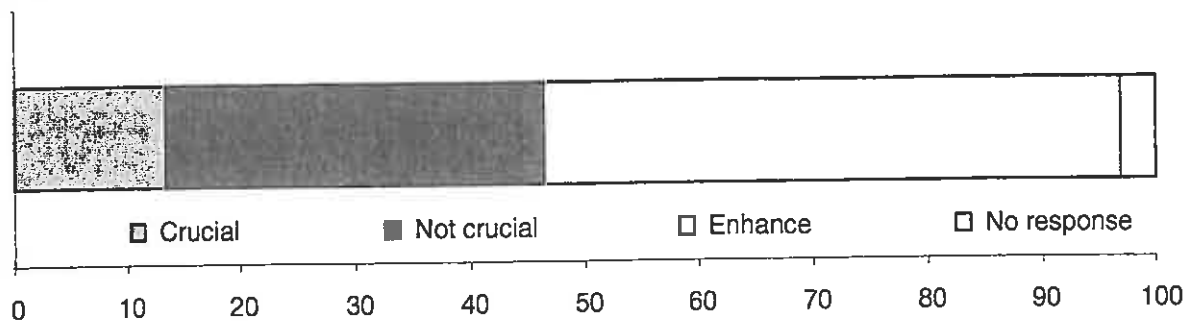
As the quote at the beginning of this section explains Defence is concerned that its in-country defence industry is sustainable over the longer term. The, then, Minister for Defence Industry, Science and Personnel Bronwyn Bishop in the Foreword to the Government's Defence and Industry Strategic Policy Statement said:

My definition of a sustainable Defence industry is one comprised of firms, which can afford to lose a defence contract and stay in business (DoD 1998, p. iv)

Given the importance of a sustainable defence industry to Defence and to the industry itself, the ASP questionnaire also asked businesses to indicate how crucial defence related contracts were to their viability. The majority of ASP businesses reported that their businesses would remain viable in the absence of defence related work. Around one third of ASP businesses indicated that defence related contracts were not crucial to the business's viability. While half of the ASP businesses indicated their defence related contracts enhance their viability. Only 13 per cent of responding ASP businesses reported that their defence related contracts were crucial to their viability.

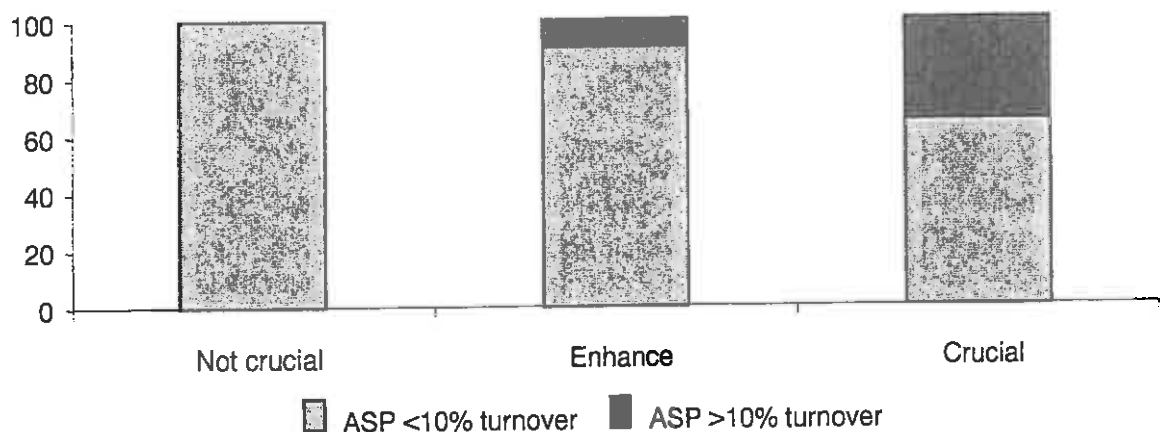
There were some notable differences in the characteristics of the respondents reporting that their defence related contracts were crucial to their viability. For example, the responses to the sustainability question varied slightly between small/medium and large businesses. Only six per cent of businesses employing 200 or more indicated that defence related contracts were crucial to their viability, while a larger proportion of small and medium respondents (13 per cent and 16 per cent, respectively) reported that defence-related contracts were crucial to their viability. However, the differences were not statistically significant (see Appendix 3 for a discussion of the theory behind and the methodology used for significance testing).

Figure 6.2: Importance of defence contracts to viability (all ASP respondents)



On the other hand, ASP businesses were much more likely to report that defence related contracts were not crucial or enhanced their businesses viability if the ASP contributed less than 10 per cent of turnover. The ASP accounted for less than 10 per cent of turnover for all businesses reporting that defence contracts were not crucial to their viability. Similarly, more than 90 per cent of businesses reporting that defence contracts enhanced their viability had ASP turnover of less than 10 per cent (Figure 6.3).

Figure 6.3: Sustainability and ASP contribution to respondents' turnover (proportion within each grouping)



While these results are not surprising they do point to the importance of diversification for businesses operating in the defence industry. Indeed the manager of one small to medium business contacted as part of this study said that 'it would be a very brave company that relied on defence contracts for their viability'. However, as the case study in Box 6.2 highlights it can be extremely difficult for prime contractors responsible for long term major defence contracts, such as the ASP, to avoid being heavily reliant on a single defence contract.

Box 6.2: Sustainability — Tenix Defence Systems (Tenix) — a case study

In 1988, the Williamstown Naval Dockyard was privatised. The purchase included the takeover of a project to construct two FFG Perry class frigates. At that stage the project was running behind schedule and well above cost and substantial changes in workplace relations were introduced. This led to increases in productivity and improved the yard's competitiveness. The two frigates were completed in 1992 and 1993. By this time the new owners had won the prime contractor role for the ASP.

In 1996 the prime contractor's company underwent a reorganisation. The defence operations were consolidated under the Tenix banner. At the time defence work was the Tenix Group's dominant area of business and naval defence projects were the primary focus of its capabilities. The ANZAC frigate contract was the company's major generator of business. This contract will be completed in 2005.

It was clear to management that large new contracts must be won to ensure the viability of the Williamstown dockyard. It was also clear that the Tenix's long-term sustainability would be threatened without further diversification. Senior management decided to utilise the capabilities developed and extended as a result of its involvement in the ANZAC contract in a two-pronged attack to further diversify the company and secure the company's sustainability.

The Tenix Group's progress over the last few years indicates that Tenix is well on the way to reducing its reliance on a single defence contract. It is now involved in the delivery of defence capability across all services and has entered the civilian aerospace market. It continues to pursue commercial vessel construction projects and is entering adjacent civil markets in construct and support sectors.

Building on its capabilities the Tenix Group, in 1997, formed a strategic alliance with Lockheed Martin — a large international defence, technology and aerospace company. The Tenix and Lockheed Martin partnership operates under a new umbrella company — RLM Holdings Pty Ltd. RLM Holdings subsequently took over the management and software development and integration for the Jindalee Operational Radar Network (JORN) on Telstra's behalf.

Continued next page

Box 6.2: Sustainability — a case study (continued)

In 1998 the Tenix Group acquired the Hawker De Havilland company, previously owned by BTR. Hawker de Havilland undertakes airframe development, design, manufacture and support. The company has a strong export orientation and currently most of its turnover is generated from civilian projects.

While the sustainability of the Tenix Group has been much enhanced by these acquisitions a sustainability problem for the Williamstown dockyard, the key site for the frigates construction and systems integration, remains an important issue for Tenix.

7 ECONOMIC IMPACT OF THE ASP

This case study of the ANZAC frigate project highlights that significant benefits can accrue to the Australian economy from major defence projects. Survey responses indicate that a substantial number of businesses associated with the ASP have, as a consequence of their involvement, obtained new technology and implemented best practice techniques. These changes flow through to higher quality outputs and new business opportunities. In addition the implementation of best practice programs has engendered a culture of continuous improvement which has spin offs into the wider economy.

The case study indicates that Australian companies involved with the defence projects such as the ASP have improved their international competitiveness. ASP businesses are also more export orientated and have experienced greater productivity increases than their non-defence counterparts. As a result of their experience with defence projects they are also better placed to win new civil and defence business. However, these positive outcomes while important do not fully highlight the overall impact of the ASP on the economy.

Two approaches can be used to clarify the economy wide impacts of a major defence project such as the ASP. One approach is to estimate input-output multipliers directly from an input-output database. An alternative approach is to use an input-output database in conjunction with a general equilibrium model of the Australian economy. As outlined in Appendix 4, the assumptions underlying input-output multipliers mean that they should be treated as upper limits of the economic impact. On the other hand, the results from general equilibrium analysis can be considered as providing a more conservative estimate of the economy wide impacts of a project such as the ASP. General equilibrium analysis also facilitates a better understanding of the dynamic impacts, particularly the growth in productivity, that are associated with the ASP.

7.1 INPUT-OUTPUT MULTIPLIERS

As outlined in Chapter 2, over 70 per cent of the \$5,600 million (\$1998–99) ANZAC Ship contract represents value added local content by Australian and New Zealand suppliers. Much of this value added flows to Australia as GDP. In addition, the project through the sale of two frigates to the New Zealand Government is also directly generating exports to the value of \$1.05 billion in 1998–99 year dollars. However, these contributions do not take into account the projects linkages to the wider community.

The ASP is not separately identified in the official input-output databases developed by the ABS. Tasman, with the assistance of the prime contractors accounting records and extensive knowledge of ASP sub-contractors, developed a new ASP database. This database, which is underpinned by the latest ABS input-output table, identifies the linkages between the ASP and other Australian industries. This input-output database provides us with a 1994-95 snapshot of the project's cost structures and linkages to the wider economy. Appendix 4 outlines the nature of the work undertaken during this period. Consistent with the ABS methodology the new ASP database treats New Zealand ASP local content as imported inputs.

As outlined in Appendix 4, multiplier analysis can be used for predicting the total impact on all industries of the change in demand for the output of a particular industry. For example, an industry's output multiplier estimates the total value of production by all industries required to satisfy an extra unit of final demand for that industry's output.

Multiplier analysis using the new ASP database indicates that each additional \$100 million the Australian Government (or other governments, such as New Zealand) spends in Australia on a major defence project like the ANZAC frigates, generates:

- \$195 million in national output; and
- 1,022 Australian jobs per annum (see Appendix 4).

Given that expenditure over the life of the ANZAC Ship construction contract is \$5,600 million (\$1998-99), these estimates suggest that the project could generate up to \$10,900 million in national output and support up to 57,000 full-time equivalent jobs.

Given that the project has a strong Victorian focus — Williamstown in Victoria is the major site for the building of the ANZAC frigates and more than 75 per cent of subcontractor suppliers, by contract value and in number, are also situated in Victoria — it can be expected that a significant proportion of the economic benefits associated with the ASP would be generated in Victoria.

Further, as two of the ten frigates being constructed under the contract were purchased by the New Zealand government, around 20 per cent of this increase in output and employment is funded from outside of Australia. However, this finding should not be interpreted as implying that ASP benefits were restricted to the Australian economy. A previous study by Kriegsmann Research (1997) on the impact of New Zealand companies involvement with the ASP found positive benefits flowing to New Zealand subcontractors and through them to the wider New Zealand economy.

The benefits to the Victorian and national economy will continue over the 25 to 30 year life of the ships because of the high levels of local industry participation that will be realised in the through-life support stage. This issue is discussed further in section 7.2.

However, given the assumptions underlying input-output multipliers, these estimates must be considered as upper limits — particularly if the change in demand is large relative to the economy as whole and there is full employment. General equilibrium analysis can provide an indication of the lower boundary of economy wide benefits that can be expected from undertaking a major defence project like the ASP in Australia rather than importing the frigates from a foreign source.

7.2 GENERAL EQUILIBRIUM ANALYSIS

General equilibrium models mimic the working of Australia's economy through a system of interdependent behavioural and accounting equations. General equilibrium analysis is a well-established analytical technique for examining alternative policy scenarios. For example, they can be used to analyse the effect of a change in the sales of an industry and the direct and indirect flow-on effects this has on the rest of the economy. Using a general equilibrium approach also facilitates an understanding of the inter-relationships between the ASP and other industries in the economy. However, unlike input-output analysis, the general equilibrium approach also takes into account constraints that can apply in an economy (for example, economic impacts may be constrained by access to capital or access to a pool of qualified labour).

The STATE general equilibrium model, which is described in Appendix 5, has been used to assess the economic impact of some policy scenarios associated with constructing the ANZAC frigates in Australia. The ASP input-output database provides the STATE model with the detail on the underlying structural relationships between industries in the Australian economy. Appendix 5 explains how the results reported below should be interpreted. In brief, the results report the difference in the change in economic variables, such as GDP and consumption, which can be expected to occur if a new policy is implemented rather than maintaining the status quo.

7.2.1 Domestic supply versus imports

Constructing the ANZAC frigates in Australia was only one of the options available to Defence when it awarded the contract to an Australian prime contractor. An alternative option would have been to award the contract to a foreign manufacturer/supplier and import

eight fully constructed and fitted out frigates. As noted in Chapter 2, this alternative option may have allowed Defence to obtain the frigates at a slightly lower construction cost. On the other hand, results from the ANZAC ship survey reported in Chapters 3 to 6 demonstrate that there have been positive benefits for many businesses from building the frigates in Australia. If the import option had been followed, the ASP-related opportunities for obtaining technology and increasing productivity, product quality and exports would have been lost. In addition, survey results indicate a decision to import the frigates would also have impacted negatively on the current defence capability of Australian industry. General equilibrium analysis facilitates an examination of this trade off between imports and import replacement (see Box 7.1).

Box 7.1: Background to the general equilibrium analysis

The ANZAC ship project has generated activity within the Australian economy since 1989 and the input-output table which has been linked to the STATE model identifies the linkages the ASP subcontractor and prime contractor industry has to the wider economy. As outlined in section 7.1 the multiplier analysis indicates that the project has contributed employment, value added and output to the economy. The ANZAC Ship survey also indicates that the project has also produced a number of other benefits for the economy. One important benefit has been higher productivity for many participating businesses (see Chapter 4). However, some commentators may argue that the ASP related productivity benefits identified in this study have come at the cost of a price premium paid by Defence on the contract and that Australia would have been better off if the frigates had been fully imported. In order to assess the impact of constructing the frigates in Australia we have compared the existing situation with the alternative policy option of importing the frigates. We have assumed that the frigates could be imported with a saving of 3.5 per cent on the Australian contract price. In effect this alternative policy means that the demand currently faced by the ANZAC ship building industry in the STATE model is shifted to imports. It also means that ASP subcontractors' productivity in their other (non-ASP) activities will be lower because of the lost opportunity to work under the exacting specifications and quality standards required by Defence. For the purposes of the simulation we have assumed that ASP subcontractors' productivity in their other (non-ASP) activities would have been lower by around 3 per cent. This productivity change is considerably smaller than the estimates of the change in labour productivity derived from the ANZAC ship survey data and reported in Chapter 4. However, given the small number of respondents that provided data suitable for productivity analysis it was decided that the productivity shock for the general equilibrium analysis should be conservative.



Analysis using the STATE model indicates that if Defence had chosen the alternative option and imported the frigates Australia would have been worse off. Compared to the import alternative Australia now enjoys a higher level of:

- GDP⁴ — Australia's annual GDP is \$200 million (\$1998–99) higher. Over the fifteen year construction program this equates to \$3,000 million (\$1998–99) of GDP, which is equivalent to more than half of the total value of the frigate contract;
- Consumption — as a nation, Australia's annual consumption is \$147 million (\$1998–99) higher. (Consumption is an indicator of a community's material well-being, as ultimately all income is consumed increased consumption is a good indicator of how the construction of the frigates in Australia has improved the communities well-being.)

Of course higher GDP and higher consumption also translates into higher revenue from taxation for Australian Governments.

It should be borne in mind that these general equilibrium estimates are based on a long run closure of the model (see Appendix 5). This model closure assumes, amongst other things, that: capital stocks are flexible; labour is mobile and fully employed; and that all markets clear. Given the high levels of unemployment experienced during the first ten years of the ASP construction contract the results presented above should be considered as very conservative.

For this reason the simulation was also run using a short run model closure, which allows for unemployment. This short run closure indicates that the decision to construct the frigates in Australia rather than import them has:

- increased Australia's GDP by as much as \$500 million (\$1998–99) per year — over a fifteen year construction period this equates to gains to the economy of \$7,500 million (\$1998–99) in GDP which is considerably more than the total contract value of \$5,900 million (\$1998–99);
- increased consumption by over \$300 million per annum; and
- increased employment — in the absence of the ASP contract around 7,850 full time equivalent jobs would have been lost to the economy. As a consequence unemployment would have been considerably higher. (Given the major role played by Victorian suppliers in the ASP contract a substantial proportion of these jobs would be in Victoria.) Higher unemployment would have lead to increased government outlays. For example, adding

⁴ GDP is the Government's major statistical summary measure of economy activity. GDP can be considered as a measure of value a project adds to the economy. Unlike measures such as national output GDP includes no double counting.

7,850 single adults to the unemployment queue would increase current annual social security payments under the Newstart Allowance by \$66 million. Higher unemployment would also indirectly increase the social costs associated with unemployment for the community as a whole.

To help put the GDP estimates in context, Box 7.2 compares the lower bound more conservative estimate with some recently announced outlays by Commonwealth and State Governments.

Box 7.2: ASP benefits in context

Comparing the general equilibrium results to some recently announced outlays by Commonwealth and State Governments can help to highlight the magnitude of the contribution major defence projects, such as the ASP, make to the economy. As outlined above, the most conservative general equilibrium modelling of the benefit of constructing the ANZAC frigates in Australian indicates that, in 1998–99 dollars, Australia's annual GDP is \$200 million higher than it would have been had Defence chosen the alternative option and imported the frigates. How does this annual on going benefit to the economy compare to some recent expenditure announcements by Australian Governments?

Infrastructure — in October 1999, the Prime Minister announced that the long awaited construction of the Alice Springs to Darwin rail link was to proceed. This rail link, which will be constructed over a period of three years, will cost in the order of \$1,230 million. State, Territory and Commonwealth Governments will contribute approximately \$480 million to the cost of this project, with the Commonwealth capping its contribution at \$165 million. The Commonwealth Government's contributions to this important rail link are more than covered by a single year of the on going \$200 million dollar ASP related increase in GDP. All government contributions are covered by less than three years of the ASP's GDP benefits. Importantly the aggregate GDP benefits flowing from less than seven years of the construction phase of the ASP would cover the construction cost of the entire Alice Springs to Darwin rail link.

Education — Victoria's 1999–2000 Budget Papers indicate that over \$5,500 million was to be outlaid on education in the state. This outlay included \$63 million in new education initiatives and \$130 million in capital works. These new initiatives are more than covered by the \$200 million rise in GDP that Australia has enjoyed as a consequence of electing to have a major Australian industry involvement in the ANZAC frigates project.

Continued next page

Box 7.2: ASP benefits in context *(continued)*

Aged Care — the Commonwealth Government in the 1999–2000 Budget announced funding of 100 additional residential aged care places for Regional Health Service Centres. In 2002–03 Government expenses associated with the increased beds is projected to be \$1.1 million. By way of comparison, the \$200 million increase in GDP currently enjoyed by Australia as a result of the ASP construction project, would fund at least 18,180 aged care beds for older Australians in rural and remote areas.

The results from the long run and short run model closures should be considered as forming an upper and lower bound for the benefits flowing from the construction phase of the ASP. However, the benefits to the Australian economy do not end with the construction phase. There are financial as well as security benefits to be had from Australia's defence capable industries. As outlined in section 7.3, the financial benefits are particularly apparent in the area of through life support, particularly for repairs, maintenance and spares.

7.3 THROUGH LIFE COSTS

The benefits to the economy of major defence projects such as the construction of the ANZAC frigates extend past the construction phase. As outlined in Chapter 6, Defence estimates that the annual costs for repairs, maintenance and spares for the eight Australian frigates will be in the order of \$45 million. A substantial proportion of this work will be undertaken in Australia and will provide further opportunities for businesses to improve their defence capability and productivity.

Defence also advises that experience with other major defence projects constructed in Australia is that sourcing locally, rather than overseas, achieves substantial savings in repair turn around times and spare stock savings for a comparable operational availability. These savings can flow through to cost and productivity savings for Defence which in turn translates into improved welfare for the economy as a whole. Given the ANZAC ships have a twenty five to thirty year service life the savings of sourcing repairs maintenance and spares locally would be substantial. For example, assuming overseas sourcing doubled annual costs for repairs, and maintenance, and spare holdings for the ANZAC ships, the saving to the Australian economy in net present value terms of sourcing locally for a 25 year period would

be in the order of \$518 million.⁵ This saving would more than outweigh the 3.5 per cent premium that was estimated to have been associated with the ANZAC ship contract.

Beyond repair and maintenance, involvement in the construction phase will position many Australian companies to play an active role in subsequent upgrades of the ANZAC Ships. Past experience indicates that these upgrades, over the life of the ships, can be expected to cost an amount equivalent to the original acquisition costs which total \$5.6 billion, in 1999 dollars. Local industry involvement in these upgrades can be expected to bring benefits similar to those identified during the construction phase.

⁵ This net present value estimate uses an interest rate of 7.12% which was equal to the long term bond rate in December 1999.

APPENDIX 1: THE SURVEY QUESTIONS

This appendix presents copies of the mail out questionnaire as well as a copy of the telephone survey questionnaire used for the non-response bias analysis reported in Appendix 2.



THE IMPACT OF THE ANZAC FRIGATES PROJECT ON PARTICIPATING FIRMS

Australian Industry Group



↓ In correspondence, please quote this number.

← Please complete this survey for the Australian-based activities of the business shown on this label.

Purpose of this survey

This survey is being conducted by Tasman Asia Pacific on behalf of the Australian Industry Group's Defence Council (Ai Group). The survey will help us to examine the impact of the ANZAC Ship Project (ASP) on participating Australian firms. Your completion of this survey will help provide important insights for Government and industry into the benefits Australian firms can obtain through their participation in major defence contracts.

The survey has the support of a number of organisations including the ASP prime contractor Tenix Defence Systems (Tenix), formerly known as Transfield Shipbuilding. Tenix has assisted in the development of the survey and provided the address list for ASP firms. Other key supporters of the survey are the Department of Defence, Business Victoria and ISONET.

While these organisations have provided important support for the survey the Ai Group guarantees that your firm's individual responses to this questionnaire will be treated as Commercial-in-Confidence by the Ai Group and the survey consultant.

The Ai Group, along with the survey sponsors, requests that you allocate some of your valuable time to complete this questionnaire. On reading the questionnaire you will see that most of the questions will be relatively simple to complete. However, some financial questions may require the involvement of the business's accounts section. We stress that all the questions are important to the success of this study.

Please return the completed questionnaire by **26 July 1999** to the Ai Group in the enclosed prepaid addressed envelope.



Please read this before completing survey

Who should complete this questionnaire?

It is envisaged that the Chief Executive Officer or a member of the Senior Management Team is the appropriate person to complete this questionnaire. However some questions, particularly the financial questions in Parts 4 and 5, are likely to require consultation with others in the business.

Background on the ANZAC Ship Project (ASP)

The ASP is a collaborative project between the Australian and New Zealand Governments. The fifteen year fixed price contract, valued at over \$5 billion in current dollars, requires Tenix, as prime contractor, to design, construct, test and trial ten ANZAC Class guided missile frigates and associated infrastructure. The contract also requires the prime contractor to provide through-life support for the frigates.

The Australian Industry Involvement program, which operates in conjunction with the acquisition of significant military capital equipment and related services by the Department of Defence, is an important component of the ASP. Over the life of the acquisition project, Australian and New Zealand suppliers are to supply at least 72.3 per cent of the total contract value. A further 8.5 per cent of the value of the contract is to be committed as technology related offsets in Australia and New Zealand.

Financial year data

Ai Group recognises that the provision of the financial data requested in this questionnaire will require some effort on your business's part. However, we urge you to take the time to provide this information as it is crucial for benchmarking the performance of ASP companies against the performance of firms in the wider economy. If the exact figures are not readily available careful estimates will be acceptable.

The questionnaire requests data for the financial years ending in June. If this business has a different end of financial year please report data for a similar 12 month financial period. For example, a financial year ending on 31 December 1996 would be reported in the June 1997 space in the Questionnaire.

Due date

Please complete this questionnaire and return by 26 July 1999. The questionnaire may be returned in the reply paid envelope to **The Australian Industry Group, GPO Box 817, Canberra ACT 2601.**

Help is available

If you have any problems or queries or feel you may have difficulty meeting the due date, please contact:

- Denise Ironfield, Senior Policy Analyst, Tasman Asia Pacific on (02) 6247 0866 or dironfield@tasman.com.au; or
- Greg Johannes, Executive Officer, Ai Group Defence Council on (02) 6217 9188 or gregj@aiact.aigroup.asn.au.

Part 1 Background Information

Please indicate the person we should contact regarding this form.

Name			
Telephone number	()	Facsimile number	()

1. Does this business have an involvement in the ANZAC Ship Project (ASP)?

Note

Involvement may be direct or indirect. For example your business may be a subcontractor or, alternatively, your business may supply a subcontractor.

Yes ☐

No..... ☐ Thank you for completing this survey please return in the envelope supplied.

2. This business commenced its involvement with the ASP in.....

19	-	-

3. Did this business's first Australian defence related contract involve the ASP?

Yes ☐

No..... ☐ Please provide details
.....

4. Approximately what proportion of this business's turnover is currently associated with the ASP?

Please tick one box

Less than 10 per cent.....	☐	50 per cent to less than 75 per cent.....	☐
10 per cent to less than 25 per cent.....	☐	75 per cent to less than 100 per cent.....	☐
25 per cent to less than 50 per cent.....	☐	100 per cent.....	☐

5. Approximately what proportion of this business's current ASP related turnover is generated in Victoria?

Please tick one box

Zero.....	☐	50 per cent to less than 75 per cent.....	☐
1 per cent to less than 25 per cent.....	☐	75 per cent to less than 100 per cent.....	☐
25 per cent to less than 50 per cent.....	☐	100 per cent.....	☐

6. What is this business's primary activity?

Please tick one box

The manufacture of goods or products.....	☐
The provision of services.....	☐

Part 2 Technology

7. Did this business obtain technology as a result of its involvement with the ASP?

Yes ☐

No..... ☐ Go to question 10

8. This technology was obtained via:

Please tick one box per row

	No	Yes
existing published material.....	☐	☐
original research and development.....	☐	☐
recruitment or secondment into this business.....	☐	☐
secondment of this business's staff to other ASP organisations.....	☐	☐
staff training	☐	☐
purchasing or licensing of technology.....	☐	☐
strategic partnership(s) with other ASP organisation(s).....	☐	☐
other means (please specify below)		

9. This technology:

Please tick one box per row

	No/Not applicable	Minor impact	Moderate impact	Major impact
extended this business's product range....	☐	☐	☐	☐
increased this business's defence related sales	☐	☐	☐	☐
increased this business's non-defence related sales.....	☐	☐	☐	☐
reduced production costs.....	☐	☐	☐	☐
improved product quality.....	☐	☐	☐	☐
improved production flexibility.....	☐	☐	☐	☐
increased market share.....	☐	☐	☐	☐
opened new domestic markets.....	☐	☐	☐	☐
opened new export markets.....	☐	☐	☐	☐
had other impacts (please specify below)				

	...	☐	...	☐	...	☐

Part 3 Business operations

10. Does this business use any of the following business programs and practices:

- Total Quality Management;
- Quality assurance;
- Just-in-Time Management;
- Process Engineering;
- Documented formal strategic plan;
- Formal business plan;
- Budget forecasting;
- Formal networking with other businesses;
- Comparison of performance with other businesses (benchmarking);
- Employee performance appraisal program;
- Regular assessment of employees' training and further education requirements; and/or
- Export market planning?

Yes ☐

No..... ☐ Go to question 14

11. When were these business programs and practices first implemented?

Please tick one box per row	Not applicable	In the last 3 years	Prior to 1 July 1996
Total Quality Management.....	☐	☐	☐
Quality Assurance.....	☐	☐	☐
Just-in-Time Management.....	☐	☐	☐
Process Engineering.....	☐	☐	☐
Documented formal strategic plan.....	☐	☐	☐
Formal business plan.....	☐	☐	☐
Budget forecasting.....	☐	☐	☐
Formal networking with other businesses.....	☐	☐	☐
Comparison of performance with other businesses (benchmarking).....	☐	☐	☐
Employee performance appraisal program.....	☐	☐	☐
Regular assessment of employees' training and further education requirements.....	☐	☐	☐
Export market planning.....	☐	☐	☐

Commercial-in-Confidence

12. How important was this business's involvement in the ASP in the decision to implement these business programs and practices?

Please tick one box per row	Not applicable	Not important	Important	Very important
Total Quality Management.....	☐	☐	☐	☐
Quality Assurance.....	☐	☐	☐	☐
Just-in-Time Management.....	☐	☐	☐	☐
Process Engineering.....	☐	☐	☐	☐
Documented formal strategic plan.....	☐	☐	☐	☐
Formal business plan.....	☐	☐	☐	☐
Budget forecasting.....	☐	☐	☐	☐
Formal networking with other businesses...	☐	☐	☐	☐
Comparison of performance with other businesses (benchmarking).....	☐	☐	☐	☐
Employee performance appraisal program.....	☐	☐	☐	☐
Regular assessment of employees' training and further education requirements.....	☐	☐	☐	☐
Export market planning.....	☐	☐	☐	☐

13. Did the implementation of any of the above business programs or practices lead to:

Please tick one box per row	No	Minor impact	Moderate impact	Major impact
Improved productivity.....	☐	☐	☐	☐
Improved product quality.....	☐	☐	☐	☐
Greater client satisfaction.....	☐	☐	☐	☐
Improved industrial relations.....	☐	☐	☐	☐
Reduced costs	☐	☐	☐	☐
Increased sales.....	☐	☐	☐	☐
Increased market share.....	☐	☐	☐	☐
A culture of continuous improvement	☐	☐	☐	☐
New domestic opportunities.....	☐	☐	☐	☐
New export opportunities.....	☐	☐	☐	☐
Other outcomes (please specify below)				

Part 4 Exports

14. Has this business's involvement with the ASP improved its current or future ability to export?
Yes ☐

No..... ☐

15. Does this business export?

Yes ☐

No..... ☐ Go to question 20

16. What happened to this business's export sales since it became involved with the ASP?
Please tick one box

Remained relatively stable..... ☐ Go to question 18

Decreased..... ☐

Increased..... ☐

17. What factors contributed to this change?

Please tick one box per row

Negative
impact

No impact

Positive
impact

Not applicable

Business programs and practices
introduced (see question 10 for listing)....

☐ ☐ ☐ ☐

Demonstrated ASP related domestic
defence sales

☐ ☐ ☐ ☐

ASP related licensed intellectual
property.....

☐ ☐ ☐ ☐

Other technology transfer from ASP

☐ ☐ ☐ ☐

New ASP business links and/or alliances..

☐ ☐ ☐ ☐

Reduced costs due to ASP involvement...

☐ ☐ ☐ ☐

ASP exports under Defence offsets
program.....

☐ ☐ ☐ ☐

The need to broaden customer base.....

☐ ☐ ☐ ☐

Change in foreign governments' military
expenditure.....

☐ ☐ ☐ ☐

Other factors not related to the ASP.....

☐ ☐ ☐ ☐

Other ASP factors (please specify below)

☐ ☐ ☐ ☐

18. Please provide details of the value of exports.
Careful estimates are acceptable.

Financial year ending

June 1997

June 1995

June prior to ASP
involvement

19__

(please show year)

Exports..... \$A ,000

\$A ,000

\$A ,000

Commercial-in-Confidence

19. Approximately what proportion of this business's exports in the June 1997 financial year were defence related?

Please tick one box

Zero.....	☐	50 per cent to less than 75 per cent.....	☐
1 per cent to less than 25 per cent.....	☐	75 per cent to less than 100 per cent.....	☐
25 per cent to less than 50 per cent.....	☐	100 per cent.....	☐

Part 5 Employment and financial data

Note

The Ai Group recognises that the provision of this employment and financial data will involve some effort on this business's part. However, the data will be an important — even crucial — input for our analysis of the impact of the ASP on participating firms' performance. We will use the data to benchmark the performance of ASP companies against the performance of firms in the wider economy. The Ai Group guarantees that all your firm's individual responses to this questionnaire will be treated as Commercial-in-Confidence.

If the data requested are not readily available, please provide careful estimates.

If this business's financial year does not end in June please report for a similar 12 month period. For example, a financial year ending 31 December 1996 would be reported in the June 1997 space.

20. How many persons worked for this business during the last pay period in June?

Include: • Full-time and part-time employees; • Permanent, temporary and casual employees • Managerial and executive employees • Employees absent on paid or prepaid leave; • Working proprietors and partners; and • Employees on workers' compensation who continue to be paid through the payroll.	Exclude: • Volunteers; • Non-salaried directors; and • Self employed persons such as consultants, contractors and persons paid solely by commission without a retainer.

	June 1997	June 1995	June prior to ASP involvement 19__ (please show year)
Full-time.....			
Part-time/casuals...			

21. Please provide details of income from the sale of goods and services.

Include: • Rent leasing and hiring income; • Repair and service income and fees; • Contract, sub-contract and commission income; • Sales or transfers to related businesses; • Management fees/charges from related and unrelated businesses; • Export sales; • Delivery charges not separately invoiced to customers; and • Royalties income — under licensing arrangements.	Exclude: • Sales of fixed tangible assets; • Export freight charges; • Interest income; • Royalties from mineral leases; • Income from finance leases; • Payments received under hire purchase arrangements.

	June 1997	June 1995	June prior to ASP involvement 19__ (please show year)
Financial year ending	\$A ,000	\$A ,000	\$A ,000
Income.....			

Commercial-in-Confidence

22. Please provide details of the wages and salaries paid by this business.

Include:

- Severance, termination and redundancy payments;
- Wages or salaries paid to all full-time and part-time employees;
- Salaries and fees of directors and executives;
- Overtime earnings penalties payments and shift allowances;
- Retainers and commissions of persons who received a retainer;
- Payments made under incentive or profit sharing arrangements;
- Amounts paid through the payroll to employees on workers' compensation; and
- Provisions for long service, sick and annual leave, leave bonus, severance, termination and redundancy payments.

Exclude:

- Drawings from profits;
- Payments to self-employed persons such as consultants, contractors and persons paid by commission without retainer;
- Payments to proprietors/partners of unincorporated businesses;
- Reimbursements or allowances to employees for travel, entertainment, etc.; and
- Payroll and Fringe benefits taxes.

Financial year ending	June 1997	June 1995	June prior to ASP involvement 19__ __ (please show year)
Wages and salaries...	\$A _____,000	\$A _____,000	\$A _____,000

23. Please provide details of depreciation and amortisation recorded in this business's financial or management accounts.

Financial year ending	June 1997	June 1995	June prior to ASP involvement 19__ __ (please show year)
Depreciation and amortisation.....	\$A _____,000	\$A _____,000	\$A _____,000

24. Please provide details of operating profit or loss (surplus or deficit) before tax and extraordinary items.

Financial year ending	June 1997	June 1995	June prior to ASP involvement 19__ __ (please show year)
Profit or (loss).....	\$A _____,000	\$A _____,000	\$A _____,000

Part 6 Defence capability

25. Has this business's involvement with the ASP improved its capability to supply the Department of Defence (DoD) or its contractors?

- Yes ☐
- No..... ☐ Go to question 27

Commercial-in-Confidence

26. As a result of this improved capability this business:

	Strongly disagree	Disagree	Agree	Strongly agree
has the knowledge to supply DoD's capability requirements.....	☐	☐	☐	☐
has the resources to supply DoD's capability requirements.....	☐	☐	☐	☐
has the capacity to supply the DoD's capability requirements.....	☐	☐	☐	☐
can now perform new functions required by the DoD or its contractors.....	☐	☐	☐	☐
can work in/with new areas of defence related technology	☐	☐	☐	☐
can manufacture defence related parts and equipment it could previously only assemble (manufacturers only).....	☐	☐	☐	☐
can provide defence equipment/services at a lower cost than previously.....	☐	☐	☐	☐
can supply the DoD or its contractors at a faster rate than previously.....	☐	☐	☐	☐
can provide a better quality defence product or service than previously.....	☐	☐	☐	☐

Other (please specify below)

27. Which of the following statements most accurately reflects the position of this business in relation to defence related contracts?

Please tick one box only

This business's defence related activities are crucial to its viability.....	☐
This business's defence related activities are not crucial to its viability.....	☐
This business's defence related activities enhance its viability.....	☐

28. Thank you for your cooperation. Please return the form in the envelope supplied.



THE IMPACT OF THE ANZAC FRIGATES PROJECT ON PARTICIPATING FIRMS

Australian Industry Group



DEFENCE COUNCIL

Non-response Bias Survey

Firm Name, phone and Survey Number

1. Has this business had an involvement in the ANZAC Ship Project (ASP)?

Note

Involvement may be direct or indirect. For example your business may be a subcontractor or, alternatively, your business may supply a subcontractor.

Yes ☐

No..... ☐ Thank you for your assistance.

2. Did this business obtain technology as a result of its involvement with the ASP?

Yes ☐

No..... ☐

3. Did this technology have a positive impact on the business:

Yes ☐

No..... ☐

4. Does this business use any of the following business programs and practices:

- Total Quality Management;
- Quality assurance;
- Just-in-Time Management;
- Process Engineering;
- Export market planning
- Formal networking with other businesses;
- Documented formal strategic plan;
- Formal business plan;
- Budget forecasting;

Yes ☐

No..... ☐ Go to question 7

5. Was this business's involvement in the ASP in the decision to implement any of these business programs and practices?

Yes ☐

No..... ☐

6. Did the implementation of any of the above business programs or practices lead to:

No

Yes

Please tick one box per row

Improved productivity..... ☐ ☐

A culture of continuous improvement ☐ ☐

7. Has this business's involvement with the ASP improved its current or future ability to export?

Yes ☐

No..... ☐

8. Does this business export?

Yes ☐

No..... ☐

9. Has this business's involvement with the ASP improved its capability to supply the Department of Defence (DoD) or its contractors?

Yes ☐

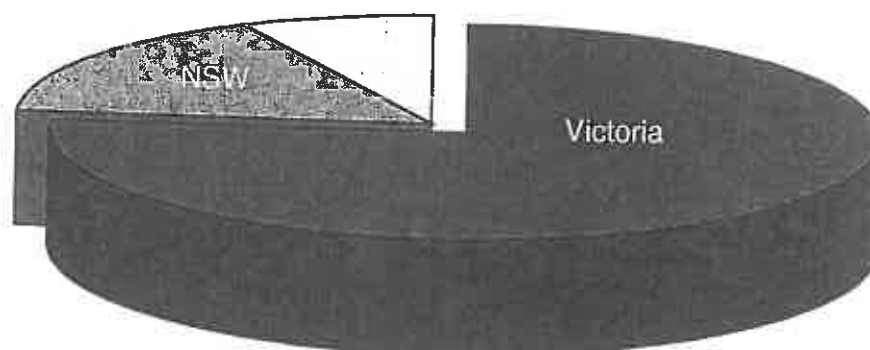
No..... ☐

Thank you for your cooperation.

APPENDIX 2: VICTORIAN SURVEY RESULTS

Williamstown, Victoria is the primary construction site for the ANZAC frigates. Over the life of the ASP, Victorian firms will supply around 76 per cent (see Figure A2.1) of the subcontracted inputs required to complete the \$A5.6 billion (\$1998-99) contract. This appendix summarises survey results from Victorian businesses.

Figure A2.1: **Australian ASP subcontractors, by State**



Source: Tenix. Subcontractor database.

VICTORIAN ASP BUSINESSES — A SNAPSHOT

The high proportion of Victorian businesses contributing to the ASP is also found among respondents to the ASP survey. Of the 127 survey responses indicating an involvement with the ASP, 103 were represented in Victoria. A "Victorian business" for the purpose of the survey analysis was defined as a business that generated some or all of its ASP turnover in the state of Victoria. More than half of the 103 Victorian businesses indicated that all of their ASP related turnover was generated in Victoria and over 60 per cent indicated that 50 per cent or more of their ASP related turnover was generated in the state. Around 30 per cent of the 103 Victorian businesses reported that less than 25 per cent of their ASP related turnover was generated in Victoria.

Ninety-nine of the 103 Victorian businesses reporting an involvement with the project provided information on their levels of employment. On the basis of these business's full time employment levels in 1997 the size breakdown of ASP business in Victoria is:

- 46 small businesses (1 to 19 employees) — 44.5 per cent;
- 46 medium businesses (20 to 199 employees) — 44.5 per cent; and

- 11 large businesses (200 or more employees) — 11 per cent.

Manufacturing was the primary activity of three-quarters of Victorian respondents.

Given the large number of Victorian businesses among the respondents to the survey it should not be surprising that the survey findings for Victorian businesses are very similar to the survey findings for Australian businesses as a whole, which are described in the chapters of this report. However, significance testing carried out on a number of key responses indicates two areas where there does appear to be a difference between Victorian and other Australian firms. As outlined in Table A2.1, the data indicate that respondents with a presence in Victoria were more likely to report that their involvement with the ASP had improved their export potential and their capability to supply the DoD and/or its contractors.

The following sections present some other key survey results for Victorian respondents.

Table A2.1 Victorian and other Australian businesses Survey Responses

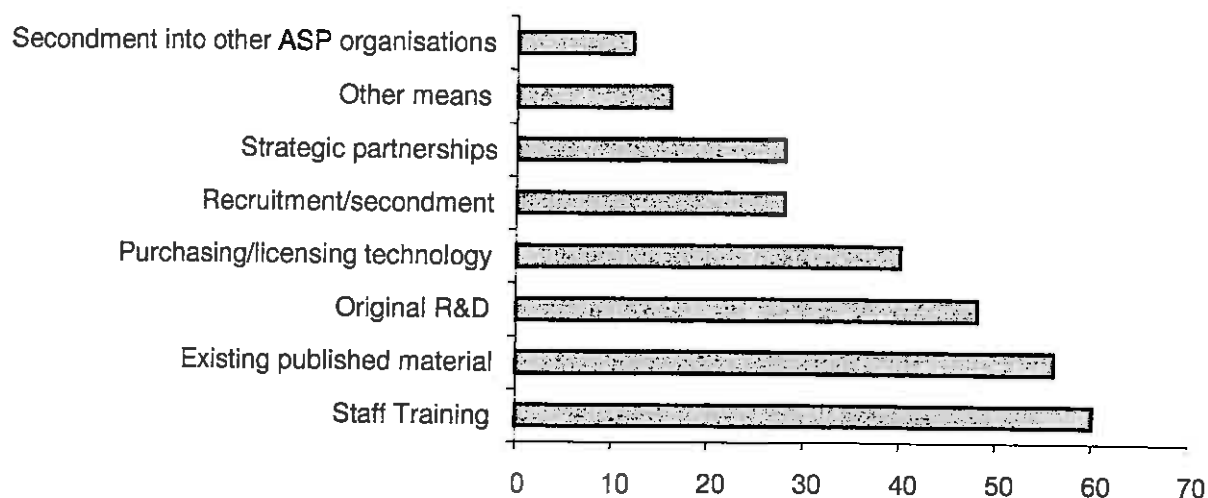
	<i>Victorian businesses (103 responses)</i>	<i>Other Australian businesses (24 responses)</i>	<i>Is there a significant difference in proportions? (a)</i>
	(per cent)	(per cent)	
First Defence contract	36.0	33.0	No
Obtained new technology	24.0	12.5	No
Business programs and practices	88.3	87.5	No
Improved export potential	24.2	8.3	Yes
Currently export	59.2	58.3	No
Increased exports since involvement	26.2	35.7	No
Improved defence capability	55.3	20.8	Yes
Sustainability, DoD contracts			
Crucial to viability	14.6	8.3	No
Not crucial to viability	32.0	37.5	No
Enhance viability	51.5	45.8	No

a Appendix 3 outlines the significance testing methodology.

NEW TECHNOLOGY

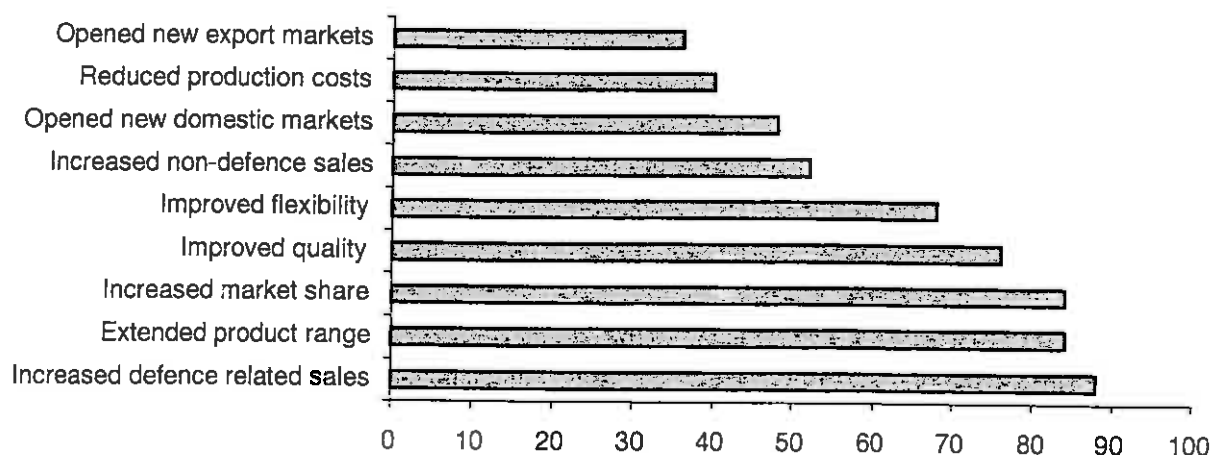
Just under a quarter of Victorian respondents indicated they obtained new technology as a result of their business's involvement with the ASP (Table A2.1). Staff training, existing published material and original research and development were the most commonly reported methods used by Victorian businesses to obtain or diffuse this ASP related technology (see Figure A2.2). As outlined in Chapter 3, these three sources were also the most commonly reported by survey respondents as a whole.

Figure A2.2: **Source of new technology** (per cent of Victorian firms obtaining new technology)



Only one of the Victorian businesses obtaining new technology failed to experience positive impacts from the technology. Increased defence related sales, extension of product range and increased market share were the most commonly reported impacts of the new technology. However, more than half of firms obtaining new technology also reported the technology had improved their product quality and production flexibility (Figure A2.3).

Figure A2.3: **Impact of new technology** (per cent of Victorian firms with new technology)

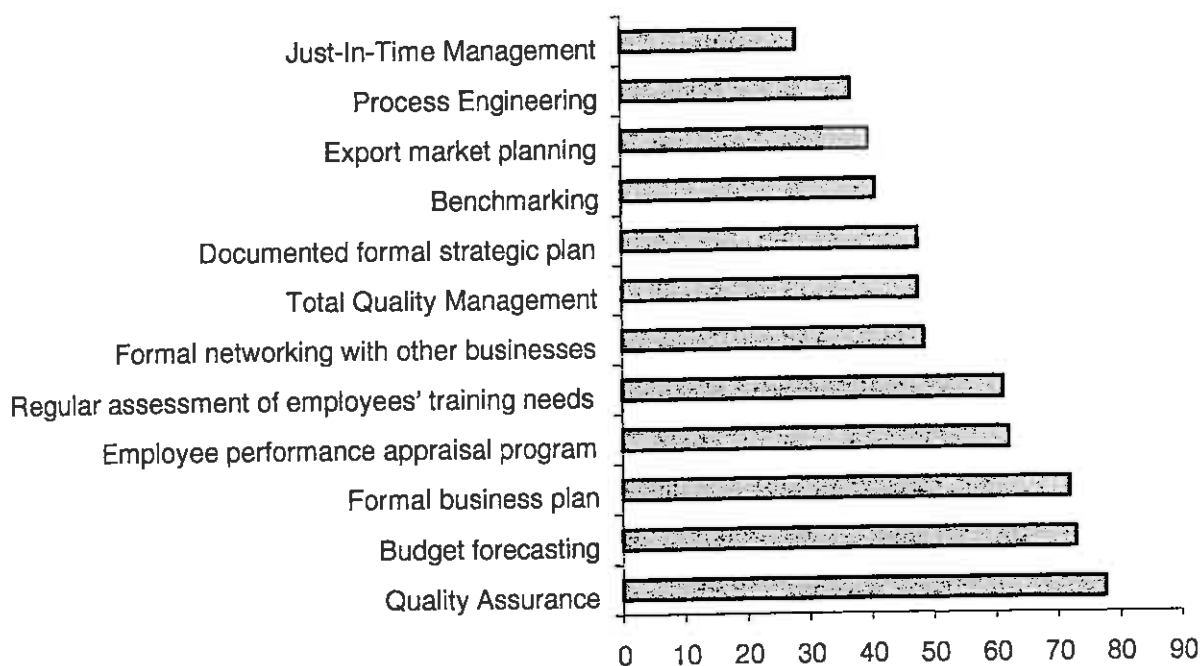


BEST PRACTICE

A high proportion (over 88 per cent) of Victorian businesses associated with the ASP have implemented one or more programs or practices which are commonly associated with best practice techniques (see Table A2.1).

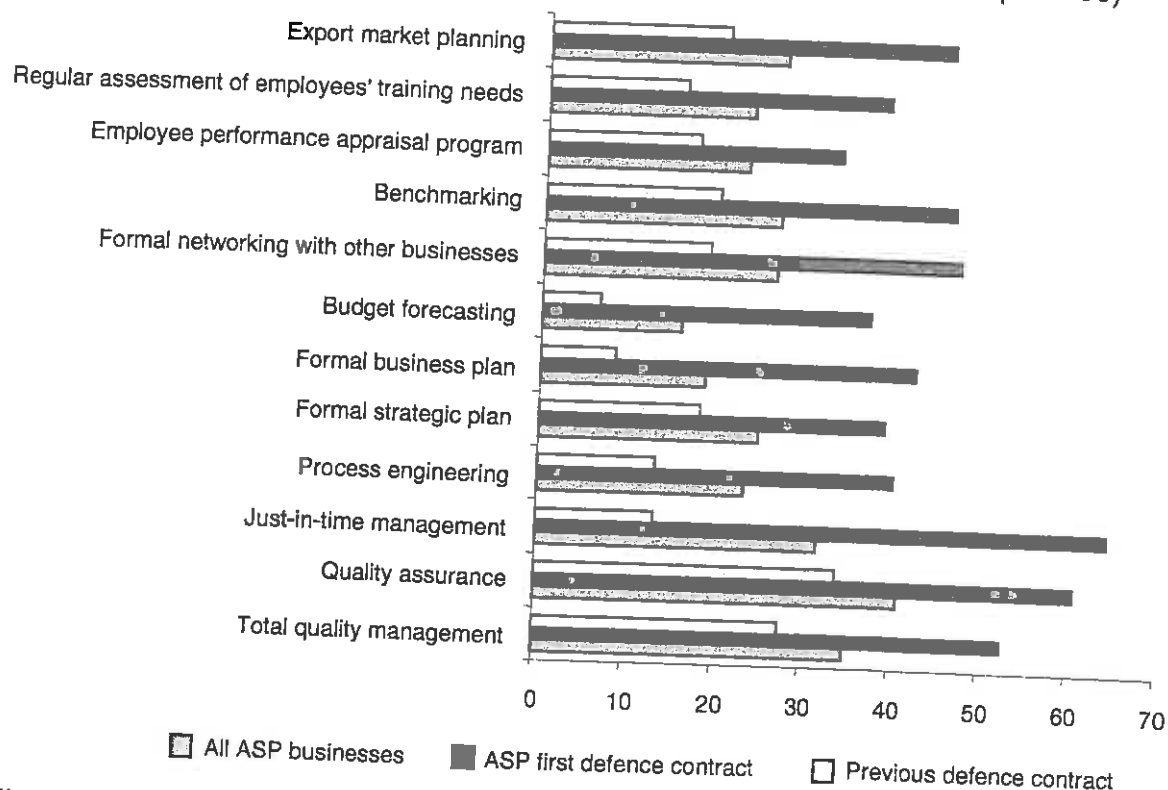
Nearly 80 per cent of Victorian respondents indicated their business has quality assurance techniques in place (Figure A2.4). While over 70 per cent indicated that they undertook budget forecasting and developed formal business plans. Around 60 per cent of Victorian ASP businesses had implemented an employee performance appraisal program and/or undertook regular assessments of employees' training needs. Less than 50 per cent of respondents indicated their business had taken up a number of other programs and practices. However, as noted in Chapter 4, the take up rate of programs and practices by ASP businesses is substantially higher than the take up rate in the wider business population. This finding is equally true for Victorian ASP businesses.

Figure A2.4: **Business Programs and Practices implemented by Victorian ASP businesses**



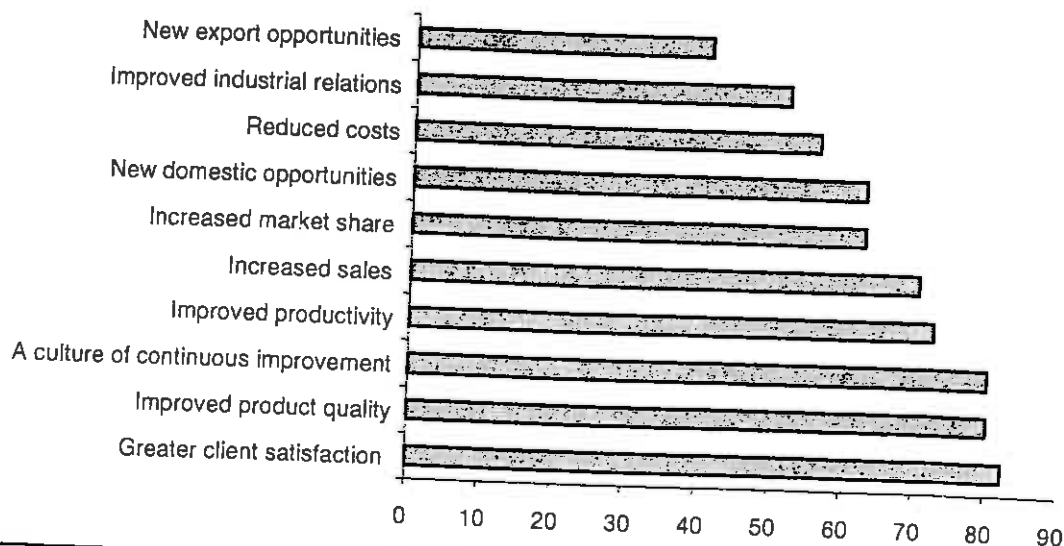
Many businesses considered that their involvement with the ASP was an important factor in the decision to implement these business programs and practices. As outlined in Chapter 4 and reproduced in Figure A2.5, involvement with the ASP was more likely to be associated with a business's decision to implement total quality management, quality assurance and just-in-time management than a number of other programs and practices. However, respondents reporting that the ASP was their business's first defence contract were more likely to consider that the ASP was an important catalyst in the implementation decision. This finding suggests that defence contracts as a group, rather than the ASP contract in particular, are important in the decision to implement best practice techniques.

Figure A2.5: Importance of ASP in the implementation of programs and/or practices (per cent of ASP businesses with program or practice)



Victorian businesses have obtained a range of benefits from the decision to implement these best practice techniques (see Figure A2.6). The most commonly reported benefits were greater client satisfaction (82 per cent), improved product quality (80 per cent), the creation of a culture of continuous improvement (80 per cent) and improved productivity (73 per cent).

Figure A2.6: Benefits to Victorian ASP businesses from implementing programs and practices

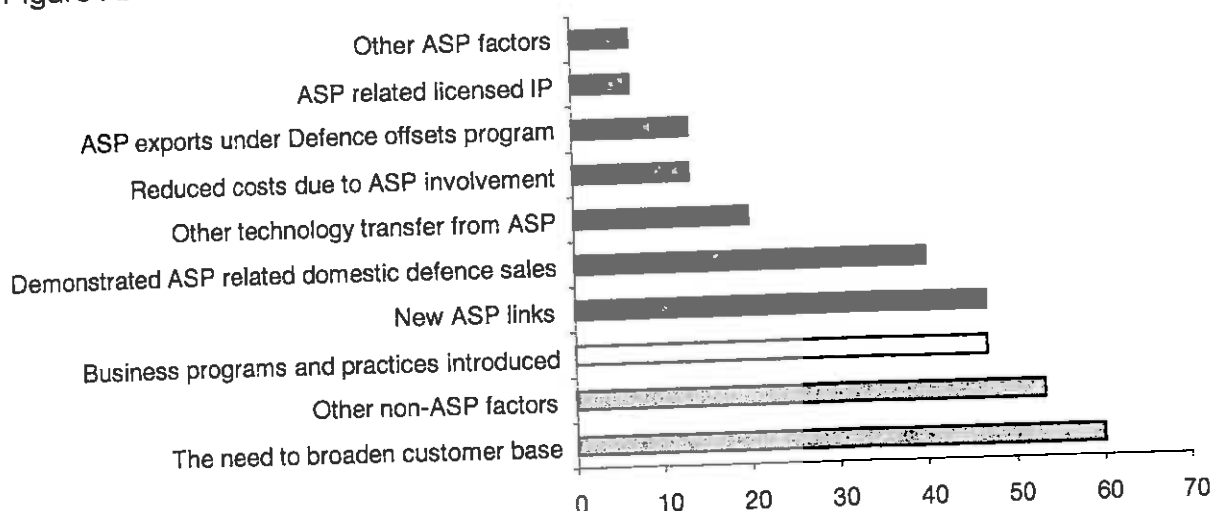


EXPORTS

One quarter of Victorian respondents believed that their business's association with the ASP had improved its current or future ability to export. As shown in Table A2.1, this proportion is substantially higher than reported by other respondents whose businesses had no operations in Victoria.

Just over a quarter (26 per cent) of Victorian respondents that currently export reported that the value of their export sales had increased since involvement with the ASP commenced. As Figure A2.7 highlights, the most commonly reported contributors to the increase were factors not related to the ASP. However, a significant number of respondents did identify an ASP link. For example, 47 per cent of these respondents considered that the new links developed through their business's involvement with the ASP had contributed to the increased export sales. The introduction of best practice techniques was another important contributor to the increased export sales. Analysis presented in Chapter 4 and discussed above suggests that there is a link between the introduction of these techniques and defence contracts in general, rather than with ASP alone.

Figure A2.7: Contributors to Victorian businesses increase in export sales



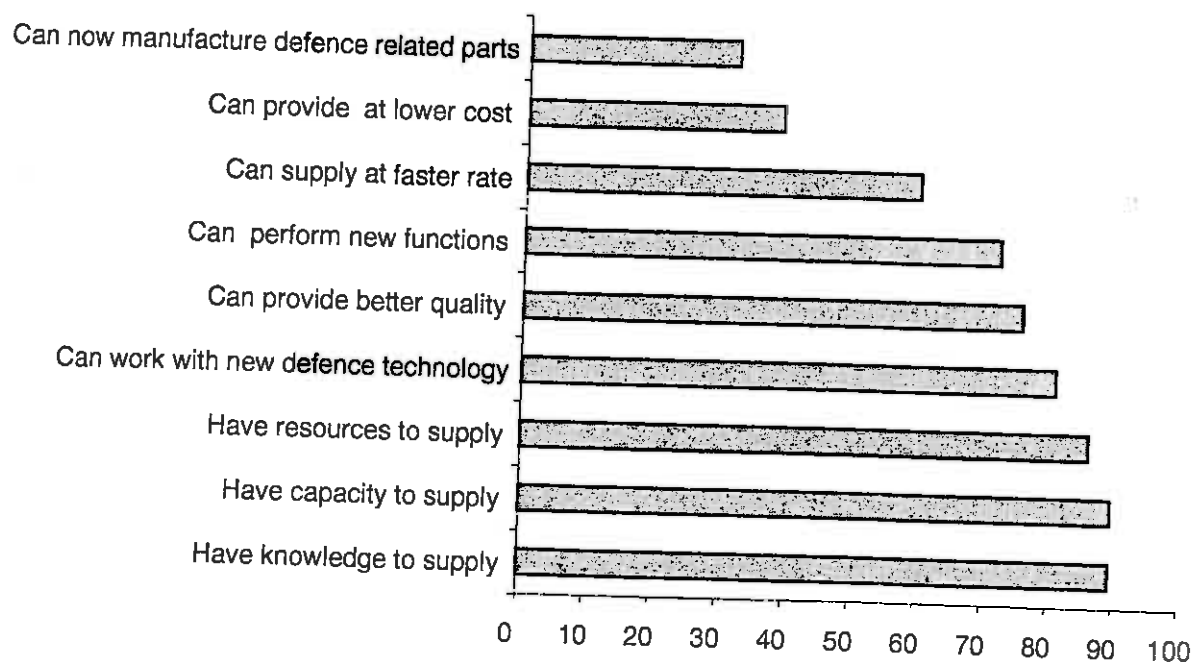
DEFENCE CAPABILITY AND SUSTAINABILITY

Just over half (55 per cent) of the respondents from Victorian ASP businesses indicated that the businesses involvement with the ASP had lead to an improvement in its defence capability. By comparison less than 21 per cent of respondents from ASP businesses with no representation in Victoria considered their defence capability had improved. Significance testing indicates that we can be fairly confident that the difference between these proportions

is real (see Appendix 3). The closer proximity to the prime contractor may be one factor which helps explain this capability outcome for Victorian businesses.

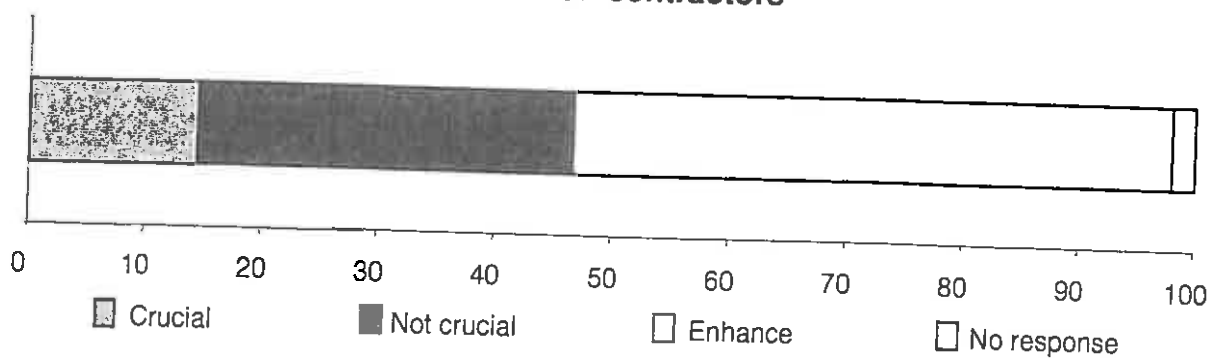
Involvement with the ASP has improved many facets of these Victorian businesses defence capability. As a result of the ASP the majority of these businesses now have the knowledge, capacity and resources to supply the DoD or its contractors (Figure A2.8).

Figure A2.8: **Areas of capability improvement** (proportion of Victorian ASP businesses with improved capability)



The majority of Victoria's ASP contractors consider that defence contracts enhance or are not crucial to their viability (Figure A2.9). Only 15 per cent of Victorian contractors reported that their defence contracts were crucial for their survival.

Figure A2.9: **Viability of Victoria's ASP contractors**



APPENDIX 3: TECHNICAL ASPECTS OF THE SURVEY ANALYSIS

SIGNIFICANCE TESTING

Throughout the report we compare the responses of different groups, such as those of small, medium and large businesses, to see if there are any statistically significant differences between them. For example, in section 5 we found that the representation of small, medium and large businesses in the group of ASP exporters was slightly different to their representation among all ASP respondents.

Given that these are survey results, the question arises: to what extent does this finding apply more generally? After all, this result is based on 127 responses out of a population of more than 600 businesses. How confident can we be about a result based on these responses? If another survey was taken of a different group of ASP companies would it too find that the proportion of small medium and large businesses in the export group was slightly different to their proportions in the wider ASP population?

Testing the statistical significance of results provides a basis for answering these types of questions. It provides a measure of how sure we can be that the size composition of exporters is different to their relative proportions in the overall group of ASP respondents. Our significance testing on the size composition of ASP exporters relative to the size composition of all ASP respondents did not identify any significant difference between the two groups. On the other hand, significance testing supported a finding that ASP businesses were more likely to report that that defence related contracts were crucial to their businesses viability if the ASP contributed more than 10 per cent of turnover.

Significance testing is particularly useful when apparently important differences are identified but these are based on fairly small samples. In these cases the chances that the result simply reflects sampling variation is relatively high.

The significance test used is based on the hypothesis that two observed proportions are, in reality, the same. A test statistic is calculated based on the difference between the two proportions and their standard errors. The larger the test statistic, the more confident we can be that this hypothesis is false — that is, the observed difference between the two proportions is a 'real' difference (see Box A3.1).

Box A3.1: What is a significance test?

The probability of rejecting a hypothesis when it is not true is called the level of significance. The level of significance can be tested using a *z* test.

Specifically, the formula is:

$$Z = \frac{p_a - p_b}{\sqrt{\frac{p_a(1-p_a)}{n_a} + \frac{p_b(1-p_b)}{n_b}}}$$

where p_a is the observed proportion for group a and n_a is the number of firms in group a , and p_b is the observed proportion for group b and n_b is the number of firms in group b .

The value of the test statistic Z is compared to the relevant figure from tables of values for the distribution of the standard normal curve to give the level of significance. For example, if we wish to be 95 per cent confident that the proportions are truly from different populations (that is, tariff-assisted firms have experienced a greater increase in competition than other firms) then the Z statistic would need to be 1.96 or greater. If on the other hand we are satisfied with a lower confidence interval the statistic would be lower. A Z statistic of 1.65 represents a confidence level of 90 per cent. The level of significance is usually specified before a test is made. Otherwise the result obtained from the test may influence the decision concerning the hypothesis. In practice, the value of five per cent (corresponding to a confidence level of 95 per cent) is frequently used to set the level of significance, although other values may also be used.

CHECKING FOR RESPONSE BIAS

As outlined in chapter one, approximately 36 per cent of the 613 businesses identified in Tenix's database as having some form of involvement with the ASP responded to the survey. While this is a relatively good response rate for a privately conducted survey, the possibility of bias in the results should not be discounted. For example, a high proportion of managers which believed their company had negative experiences from their association with the ASP may have elected not to respond to the survey. If this was the case, the survey results would not be representative of the general population of businesses associated with the ASP.

A telephone survey covering 36 companies was undertaken to test for such bias amongst non-respondents. The questions covered by the survey related to: involvement with the project, technology, implementation of a range of business programs and practices and their impact on productivity and the development of a culture of continuous improvement, as well as the impact of the project on export potential and defence capability. The actual questions covered in the telephone survey are reproduced in appendix 3. The companies chosen for

interview were randomly selected from the group that did not respond to the survey questionnaire.

There were no statistically significant differences in the results across the two samples (see Table A3.1). From this result we can infer that the responses to the survey questionnaire are representative of the total population of ASP businesses. In other words there was no significant bias in the results reported in this study.

Table A3.1: Comparison of main survey and non-respondent bias survey results

	<i>Non-response bias survey</i>		<i>Results from mail out Questionnaire survey</i>		<i>Z statistic</i>	<i>Statistically significant difference (a)</i>
	<i>%</i>	<i>No in sample</i>	<i>%</i>	<i>Number in sample</i>		
Prop. Involved with ASP	55.6	36	63.2	201	-0.85	No
Prop with technology	20.0	20	22.0	127	-0.21	No
Prop. with positive impacts	100.0	4	99.0	99	1.01	No
Prop. with programs & practices	75.0	20	88.2	127	-1.31	No
Improved performance	73.3	15	71.4	112	0.16	No
Improved export potential	35.0	20	21.3	127	1.22	No
Currently exports	55.0	20	59.1	127	-0.34	No
Improved defence capability	50.0	20	48.8	127	0.10	No

a As outlined in Box 4.1 we can be confident the proportions from the two samples are from the same population, ie there is no significant bias, if the Z statistics are less than 1.95.

APPENDIX 4: INPUT-OUTPUT ANALYSIS

Traditional input-output databases such as those released by the Australian Bureau of Statistics (ABS) do not separately identify the inputs and outputs of the ASP. ASP inputs and outputs are aggregated within the more broadly defined input-output industries. Tasman used the prime contractor's accounting records and extensive database of ASP subcontractors to help identify the ASP's inputs and outputs in the ABS's latest available official input-output database of the Australian economy for the period covering 1994–95. These data were extracted from the relevant input-output industries and aggregated into two ASP industries — the ASP subcontractor supplier industry and the prime contractor industry. These two industries define the cost structure of the ASP.

The new ASP input-output database of 109 industries identifies the linkages between the ASP and other Australian industries. New Zealand local content has been treated in the database as imported inputs, along with other ASP imports.

THE ASP — A 1994–95 SNAPSHOT

The ASP project, as outlined earlier, extends from 1989 to 2004. The earlier years in the ASP cycle are more heavily weighted toward design with the latter periods more heavily weighted to construction. Systems work tends to occur early in a ship's production cycle.

In a build program of fifteen years with ramp up in the first four or five years and ramp down in the last four or five years it is difficult to choose a typical year for our analysis of the ASP. After some consideration it was decided that the input-output analysis would be based on the ASP project as it stood in 1994–95. That year also represents the latest available official input-output table of the Australian economy.

The 1994–95 year includes a blend of costs including the ramping down of design activities and the ramping up of production work. In terms of the prime contractor's manning profile, 1994–95 was slightly below the ASP's fully ramped up peak production workforce of approximately 1,580 in 1999. Given the troughs at either end of the project, it was considered that 1994–95 is as close to a "typical" year as is possible when such a long-term project is under examination.

As outlined in Figure 1, the following four frigates were in various stages of production in 1994–95:

- Ship 01 was launched in September 1994 and fit out had commenced for delivery in March 1996;
- Ship 02 the Keel was laid in September 1994 and construction was advanced;
- Ship 03 the first steel was cut in May 1994 and module construction was advanced; and
- Ship 04 the first steel was in February 1995 and module construction commenced.

In the fully ramped up stage it can be expected that five ships will be at various stages of production at any point in time. Although only four ships were in production in 1994–95 the period encompasses elements of all major disciplines and inputs required to successfully undertake the ASP.

INPUT–OUTPUT MULTIPLIERS

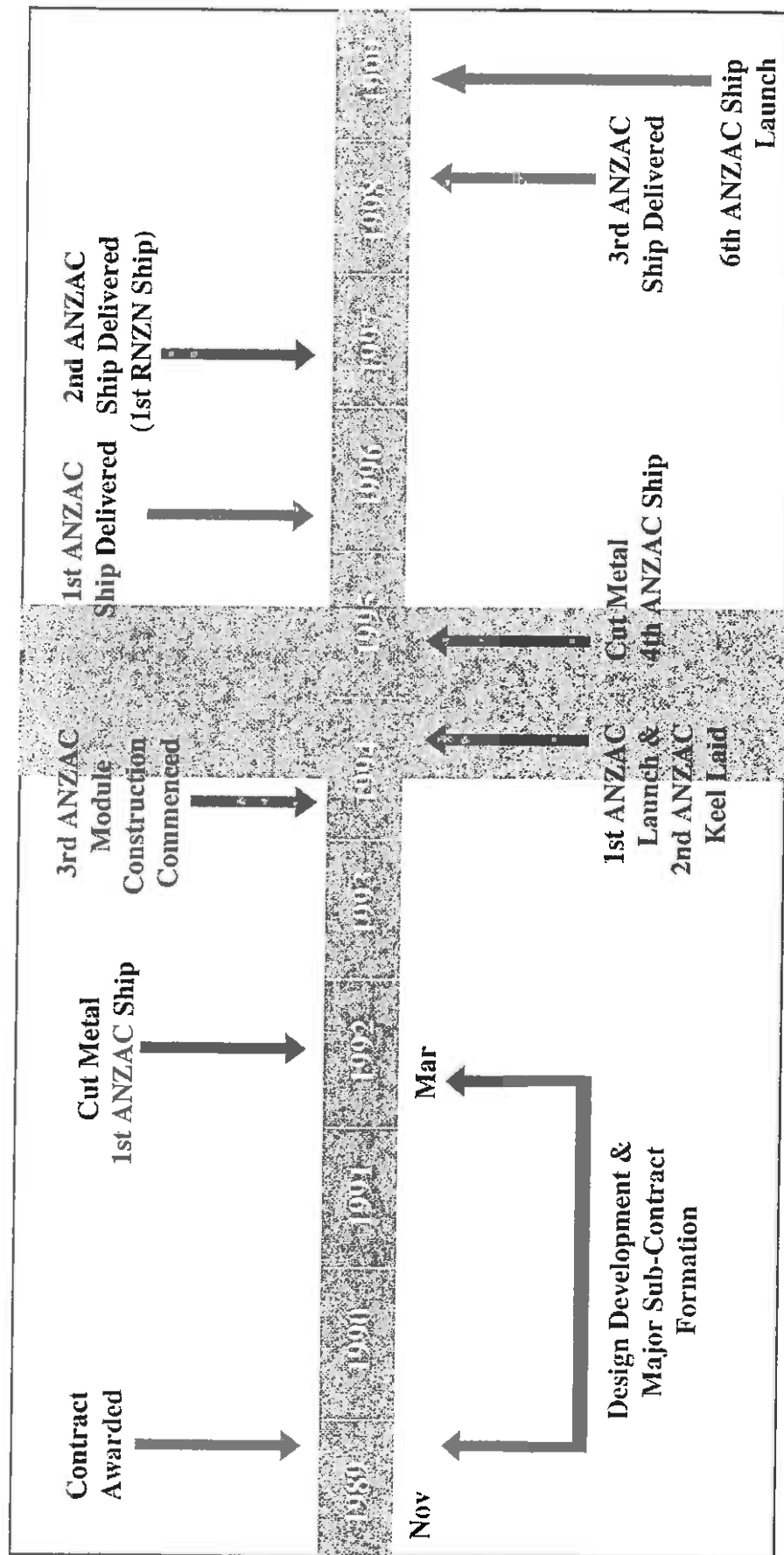
The ASP database has been used to estimate input-output multipliers for the ASP subcontractor industry and the ASP prime contractor industry. Input-output multipliers are summary measures that are used for estimating the total impact on all Australian industries of a change in the output of a single industry. In this context they highlight the direct and indirect flow-on effects that are associated with the ASP. For ease of understanding, we have expressed the multipliers in terms of an extra \$100 million of output for each ASP industry and for the sector as a whole.

It should be borne in mind that there are a number of assumptions underlying multiplier analysis (see Box A4.1). The assumptions underlying the analysis mean that multipliers should be considered as indicative upper limits of the impact of a change in an industry's output on the economy.

National Output

In an input-output data base an industry's output is equal to the total value, or cost, of a series of inputs including goods and services produced by other industries, imports, wages and salaries, returns to land and capital costs such as the depreciation of assets. National output is the sum of all outputs produced by the Australian economy. The outputs of the ASP directly contribute to the total value of national output. However, because of the linkages between the ASP and the wider economy, the total impact of the ASP on national output is greater than ASP industry output. This can be demonstrated using input-output multipliers.

Figure A4.1: ANZAC Ship Project Schedule



Box A4.1: Assumptions underlying multiplier analysis

As with any economic analysis, there are a number of simplifying assumptions behind input-output multipliers. These assumptions include:

- the cost structure of industries remain constant over time;
- all industries exhibit constant returns to scale in production;
- there is no substitution between inputs;
- the economy is in equilibrium at given prices;
- there are no capacity constraints arising from an increase in demand — there is unlimited labour and capital; and
- there are no other constraints such as those that might arise from balance of payments induced effects.

Because multipliers can not take into account economies of scale or the impact of a change in demand when there is no excess capacity or full employment they describe average rather than marginal effects. The assumptions also mean that multiplier analysis does not take into account all forms of interdependence between industries. The ABS notes:

- The input-output tables underlying multiplier analysis only take account of one form of *interdependence*, namely the sales and purchase links between industries. Other interdependence such as collective competition for factors of production, changes in commodity prices which induce producers and consumers to alter the mix of their purchases and other constraints which operate on the economy as a whole are not generally taken into account.
- The combination of the assumptions used and the excluded interdependence means that input-output multipliers are higher than would realistically be the case. In other words, they tend to *overstate* the potential impact of final demand stimulus. The overstatement is potentially more serious when large changes in demand and production are considered (ABS 1996, p. 24).

Table A4.1 presents output multipliers for the ASP subcontractor supplier industry and the prime contractor industry. The first column of the table indicates that the multipliers are calculated by assuming an initial \$100 million expansion in the particular industry's output.

The second column shows the initial (direct) effect on each industry's output (by definition, the initial effect on output is equal to the increase in demand). In the process of producing these additional ASP outputs the prime contractor and subcontractors will demand a wide range of additional inputs from other Australian firms. These first round effects are shown in column 3 of the table. For example, in order for the ASP prime contractor to increase its

output by \$100 million, it will require additional inputs from its suppliers. This increase in demand for ASP related inputs leads to a \$59 million increase in output for its suppliers.

Table A4.1: Output generated by a \$100 million increase in ASP industry and sector output

<i>Industry/sector</i>	<i>Increase in demand</i>	<i>Initial effect</i>	<i>First round multiplier</i>	<i>Industrial support multiplier</i>	<i>Total multiplier</i>
	\$m	\$m	\$m	\$m	\$m
ASP subcontractor supplier industry	100	100	22	20	142
Prime contractor industry	100	100	59	36	195

Source: Tasman Asia Pacific estimates.

In order for the supplying firms to produce this additional output they require more inputs from other firms. These firms will in turn require more inputs from their own suppliers. This process continues until all the output effects arising from the initial increase in demand are included. This impact is known as the industrial support multiplier. The fourth column in table A4.2 presents estimates of the increase in output associated with this industrial support chain reaction. For example, the industrial support multiplier indicates that the firms producing the extra \$59 million of outputs necessary to allow the ASP prime contractor to increase its output, induces a further increase in the economy's output of \$36 million. When all of these effects are added together, we obtain the total input-output production multipliers presented in the final column of Table A4.1.

The output multipliers indicate that a \$100 million increase in demand for the outputs of the ASP subcontractor suppliers industry leads to an increase in output for the whole economy of just over \$140 million dollars. Similarly, a \$100 million dollar increase in the output of the prime contractor industry leads to a total increase in national output of \$195 million.¹

A significant proportion of the initial increase in national output associated with the ASP project would be generated in Victoria. Williamstown in Victoria is the major site for the building of the ANZAC frigates. In addition, more than 75 per cent of subcontractor suppliers, by contract value, are also situated in Victoria. Responses to the ANZAC frigate survey support this finding.

¹ When analysing these outcomes it should be borne in mind that the multipliers for each of the two ASP industries are not cumulative. For example, a \$100 million increase in the output of the prime contractor industry would not result in a \$100 million increase in the output of the ASP subcontractor supplier industry.

While these national output effects are notable it should be borne in mind that the concept of output embodies an element of double counting because one industry's output can become another industry's input. For this reason an industry's overall impact on the economy is often considered in terms of the value added or GDP it contributes to the economy. The ASP's contribution to national value added is considered in the following section.

Value added

The value an industry adds to the economy can be measured with reference to its payments to labour and its returns land and capital. Value added multipliers can be interpreted in a similar fashion to output multipliers. As outlined in table A4.2, a \$100 million dollar increase in the output of the ASP prime contractor industry would directly generate a \$27 million increase in the economy's value added (table A4.2 column 2). Reflecting the ASP's linkages to other industries, \$31 million in additional value added is also generated throughout the whole economy via the first round and industrial support effects (table A4.2 columns 3 and 4). Thus a \$100 million increase in the output of the prime contractor industry would generate a \$58 million dollar increase in the economy's value added. The same increase in output for the ASP subcontractor supplier industry would generate a total of \$39 million in value added.

Table A4.2: Value added generated by a \$100 million increase in ASP industry and sector output

<i>Industry/sector</i>	<i>Increase in demand</i>	<i>Initial effect</i>	<i>First round multiplier</i>	<i>Industrial support multiplier</i>	<i>Total multiplier</i>
	\$m	\$m	\$m	\$m	\$m
ASP subcontractor supplier industry	100	21	9	9	39
Prime contractor industry	100	27	16	15	58

Source: Tasman Asia Pacific estimates.

Employment

ASP businesses are substantial employers of highly qualified staff. Examples of the skills required to design and construct ANZAC frigates include engineers, computer scientists, electricians, combat system engineers and shipwrights.

Tasman estimates that in 1994–95 approximately 2,560 persons were directly employed by Tenix and its subcontractors in the production of the ANZAC frigates and related equipment. Of these, some 1,223 persons were employed directly by the prime contractor, Tenix on the ASP project.

However, ASP's linkages to the wider economy mean that there are further employment effects. Table A4.3 shows that a \$100 million dollar increase in output in the ASP prime contractor industry would see the sector's employment increase by 404 persons. The employment impact increases once the first round and industrial support effects are taken into account. In total, input-output multipliers indicate that we could expect the \$100 million increase in the ASP prime contractor industry's output to generate over 1,000 jobs nationally.

Table A4.3: Full time equivalent employment generated by a \$100 million increase in ASP industry and sector output

<i>Industry/sector</i>	<i>Increase in demand</i>	<i>Initial effect</i>	<i>First round multiplier</i>	<i>Industrial support multiplier</i>	<i>Total multiplier</i>
	\$m	Persons	Persons	Persons	Persons
ASP subcontractor supplier industry	100	367	143	122	632
Prime contractor industry	100	404	321	297	1022

Source: Tasman Asia Pacific estimates.

If the output of the ASP subcontractor industry increased by \$100 million, the increase in full time equivalent employment would be in the order of 630 persons. (see table A4.3). Given the major role played by Victorian suppliers in the ASP contract it can be expected that a substantial proportion of these jobs would be generated in Victoria.

As noted above, multiplier analysis is based on a number of simplifying assumptions that in certain circumstances mean that the multiplier estimates should be treated as upper limits. An important assumption in the case of employment multipliers is that there is a substantial pool of unemployed persons who can take up the new positions without putting a strain on the wage rate of those already employed. In situations of full employment this assumption may not hold.

To the extent that the rise in employment generated from a growth in the ASP businesses' output was directly or even indirectly sourced from the pool of unemployed we could expect that Government outlays for social security payments would decline.

APPENDIX 5: THE STATE MODEL

BACKGROUND

The STATE model used in this study is an extended version of the ORANI model produced by Dixon et. al. (1982). It employs some of the latest features incorporated in refined versions of ORANI, such use of a more refined investment theory. The development of the STATE model has also drawn on work carried out by the Industry Commission in developing their model of the world economy, the SALTER model (see Industry Commission 1994), and by Stoeckel et. al. (1990) in developing the world trade model for the Centre for International Economics.

The STATE model has been used to examine the impact of sport on the Australian economy (Tasman et. al 1998). Other applications of the STATE model include examinations for the Queensland Commission of Audit of the effect of transport infrastructure upgrades; for the Office of Major Projects of the return to the economy from a zinc smelter/refinery; and for Queensland Treasury of the impact of introducing a carbon tax (see Economic Insights 1996, 1995 and Economic Insights and Swan Consultants Canberra 1995).

STATE is a multi-sector, computable general equilibrium model of the Australian economy. It has been designed with the primary aim of estimating the macroeconomic and sectoral impacts of economic policies and development projects. A model simulation provides estimates of the impact of a policy or investment change on a range of economic variables including industry output and price, employment and investment, trade flows, government revenue and expenditure, gross domestic product and income.

STATE can be run as a multi-region model. However, the version used in this analysis identifies Australia as a single region or economy with fully modelled economic structures, a simpler, less detailed, structure is employed to explain the "Rest of the World".

MODEL PARAMETERS

The STATE model's database includes a series of parameters that help explain the responsiveness of industries, consumers, etc to changes in economic conditions. Most of the parameters are drawn from the database of the ORANI model of the Australian economy. The version of the model used in this study consists of numerous equations that explain the behaviour of consumers, firms and government. In brief:

- Australia and the Rest of the World comprise producers and consumers. To manufacture their product, producers combine factors (ie. labour, capital and land) with material inputs (ie. intermediate usage). Material inputs can be produced within Australia or imported.
- The government equations treat the fiscal activities of the Commonwealth Government, State governments and local government as a single entity. Government revenues and expenditures are described, leading to the calculation of Government's budget balance.
- Firms, consumers and the government can choose between domestically produced or imported goods.
- A number of 'final' demands are identified. They comprise household demands, government demands, demand for investment purposes and demand for exports. Consumers allocate disposable income between savings and consumption and choose among goods and services based on preferences and relative prices.
- The model allows for changes in aggregate and industry specific investment with changes in investment normally determined by industry profitability. Investment can be funded by householders, government, or the Rest of the World.
- Other macro-economic variables are also defined by aggregating industry and consumer activities. Changes to the capital stock and the level of gross and net liabilities to the Rest of the World are defined by a simple dynamic structure. Rental payments are also identified based on domestic and overseas rates of return and the level of savings.
- Each industry produces one commodity, so the industry classification matches the commodity classification.

The Zero profits condition

The STATE model, like most general equilibrium models, assumes that the economy is in a state of perfect competition. The assumption of perfect competition means that business are not permitted to earn more than a normal rate of return. Perfect competition is an abstraction from reality and results in the basic prices of output being set equal to the weighted sum of industry costs plus/less any indirect tax/subsidy an industry may pay/receive. Changes in input prices comprise changes in the prices of intermediate inputs, primary factors, other costs, miscellaneous indirect taxes and cost savings induced by productivity improvements.

Model Closure

The general equilibrium analysis presented in this study primarily draws upon what is termed a long run environment, which is envisaged as the period ten years after the economy has been subject to a shock. However, the export analysis presented in Chapter 6 considers the economic impact of an increase in exports in a short run environment.

The following sections discuss the characteristics of the long run and short run closures of the model.

Long run model closure

The long run is characterised by a high degree of factor mobility in the economy. The standard assumption is that each industry's use of capital adjusts to maintain the original rates of return. That is, an improvement in the rate of return on capital leads to an increase in investment until the rate of return is returned to its original level and vice versa.

Like capital, labour is freely mobile across industries. We make the standard assumption for this type of modelling that wages adjust to "clear" the labour market, or in other words to ensure a constant level of frictional unemployment. The assumption is important because it means that any change in the demand for labour is reflected in the wage rate and not the aggregate level of usage. The assumption reflects the view that in Australia the long run unemployment rate is not determined by the level of economic activity but by structural features of the economy. For example, structural features such as the industrial relations system, the behaviour of unions and the effect of the social security system on the incentive to work are the drivers of the long run rate of unemployment.

The standard long-run environment assumes that the Government maintains transfers to households as a fixed proportion of gross regional income. The budget deficit is also fixed as a fraction of gross regional income. Under such an environment, tax rates are altered to meet the budget deficit constraint. A wide range of tax rates can be used to ensure budget balance. The assumption of balanced budgets is adopted to ensure a stable level of government debt.

The other important features of the long run relate to the determination of savings and the related issue of the funding of investment. The household average propensity to save (which defines the change in savings as income changes), is held fixed in the standard environment and net capital inflow is left free to adjust to any savings-investment gap.

Short run closure

The short run closure of the model is characterised by a high degree of rigidity in the economy. Aggregate real investment is held constant and rates of return adjust to maintain capital stocks in each industry at their original level. Nominal wage rates are held fixed and the rate of unemployment adjusts to reflect movements in the demand for labour. The model assumes that initially labour supply is greater than labour demand and the resulting pool of labour can be hired at the wage rate determined by the user.

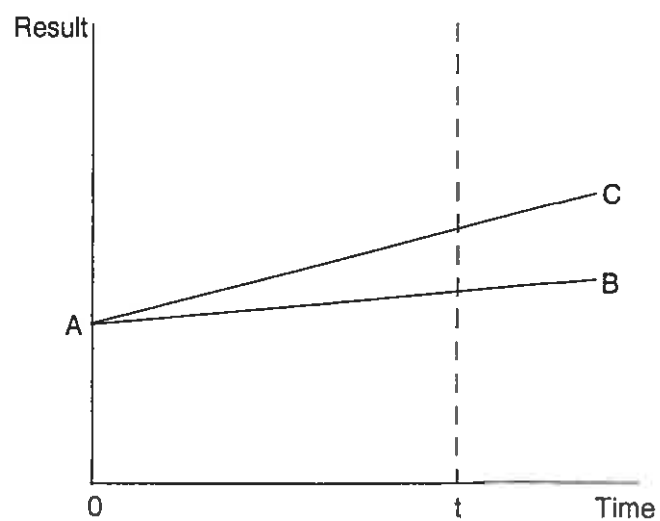
At the industry level, producers are very constrained in the short run as they cannot adjust their capital stock. Any changes in the demand for capital are countered by movements in the rental price of capital and to a lesser extent the creation price of capital. As a result, a simulation that increases a firm's demand for capital leads to an increase in the rental price of capital.

In the standard short run closure the householder's average propensity to save is held fixed, the budget deficit is variable and net capital inflow adjusts to offset in change in regional savings (given the standard assumption of fixed aggregate investment).

INTERPRETING RESULTS

In interpreting analysis with the STATE model, it is important to understand the meaning of the percentage change results reported in Chapter 7. These results are reported in the context of a "typical year". The STATE model, like many other models of the Australian economy, is a comparative static model. Comparative static models, as depicted in Figure A5.1, compare two different environments at the same point in time. Path AB shows the underlying time path of a particular variable, say the level of production of a good expected in a region over time. Suppose that at time 0 the awarding of the ASP contract to Australian industry leads to a productivity increase which flows through to higher GDP. The result of this change is that GDP grows at a rate represented by the line AC. In the absence of the productivity change GDP would have grown at a rate represented by the line AB. A comparative static analysis involves comparing the variable results at point in time t , which is interpreted as a typical year. Therefore, when discussing the results of the model the consideration is the size of the gap between vector AB and AC.

Figure A5.1: **Obtaining results from a comparative static model**

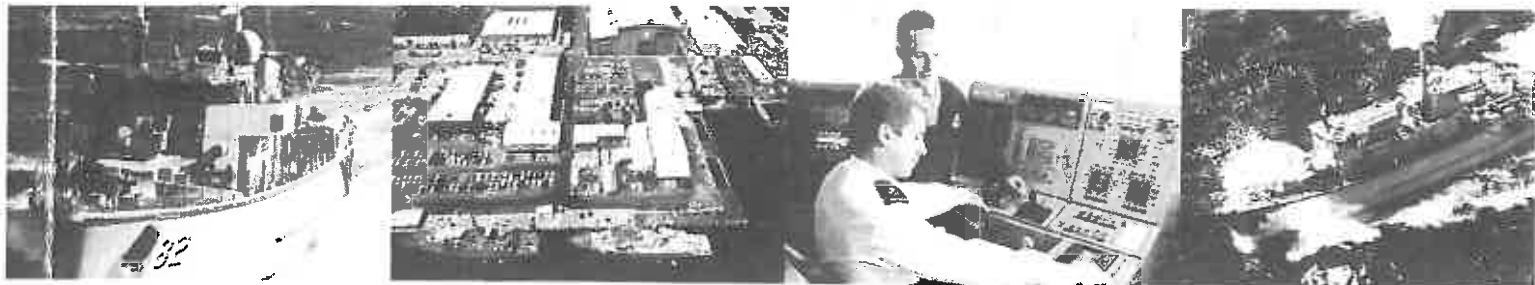


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FINAL REPORT

JANUARY 2002

PREPARED FOR THE AUSTRALIAN INDUSTRY GROUP DEFENCE COUNCIL

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MHC CASE STUDY — KEY FINDINGS

Defence's decision to source its new Minehunter Coastal capability from Australian industry rather than from overseas suppliers has been:

- a win for the economy and regional Australia;
- a win for Australian industry; and
- a win for Defence.

The Economy

Over the nine years of the construction phase, the Minehunter Coastal project will have:

- contributed up to \$887 million to Gross Domestic Product;
- contributed up to \$492 million to Consumption; and
- directly and indirectly generated (or sustained) an average of more than 1,800 full-time equivalent jobs each year.

As a comparison, the project's contribution to Gross Domestic Product is more than sufficient to fund the Federal Government's:

- National Action Plan to address salinity (\$700 million); as well as
- recent initiatives to increase the number of nurses practicing in rural and regional Australia (\$104 million) and improve Australian's access to after hours medical care (\$43 million).

Regional Australia

The Minehunter Coastal Vessels are being constructed in Newcastle, New South Wales. The construction of the vessels has directly and indirectly (through flow on effects) generated economic activity and employment for the Newcastle region. For example, over the period of the construction phase the project will have created at least 3,180 jobs in the Newcastle region.

Industry and Defence

The opportunity to be involved in a major Defence project, such as the MHC project, has had positive long-term impacts. For example, many participating Australian businesses have:

- become more productive and competitive as a result of project-related technology transfers;
- adopted tools that have enhanced productivity and other aspects of performance in order to conform to Defence's stringent risk mitigating requirements; and
- acquired capabilities which enhance and extend Australian industry's integral role in the national defence effort.

Consultations with key stakeholders also indicate that, at this early stage, the involvement of Australian industry in the ship's in-service support is producing significant benefits including:

- savings in the amount of money and resources Defence needs to outlay on in-service support; and
- shorter repair turn around times, which in turn flows through to improved operational capability.

The importance of having a strong in-country industry capability to support Defence becomes particularly obvious in periods of international crisis, such as the current War on Terrorism.

SUMMARY

Debate about the merits of sourcing complex defence capabilities offshore or in Australia has been an issue for decades.

The MHC project case study is the second in a series of reports designed to shed light on this important issue.



Ship 01 - HMAS HUON

This report on the Minehunter Coastal (MHC) project is the second in an Australian Industry Group Defence Council/Tasman Economics series of Defence industry case studies. These studies are designed to help shed light on the impact of Department of Defence decisions to acquire a major new Defence capability using Australian based suppliers. The first study in the series examined the economic impact of constructing the ANZAC frigates in Australia (Tasman 2000). This study builds on, and substantively adds to, the earlier study's positive findings. It puts forward new quantitative and qualitative data to give more rigour to the policy debate and provide a sound basis for future industry policy development.

Consistent with the earlier ANZAC frigate case study, the analysis for the MHC project case study is based on industry level analysis (using national input-output statistics and a general equilibrium model of the Australian economy) and firm level analysis (using a mail out survey questionnaire* and firm level interviews).

The Australian Industry Group Defence Council has initiated both case studies. However, support from other organisations, including the prime contractor (ADI Limited) and the Commonwealth Department of Defence has been crucial to the case study's success. Chapter 1 provides a full listing of the organisations that provided financial or other support for the project.

The MHC project

In 1994, the Department of Defence awarded ADI Limited a contract to build six Italian designed minehunter vessels at a total contract value of \$917 million — the contract value in 2001 dollars is over \$1 billion.

Dubbed the 'Huon Class' in Australia, the ships are sometimes

* The survey response rate was 47.8 per cent, a very high rate for a privately conducted survey.

To meet the RAN's requirements over 80 per cent of the original design was changed in some way.

The Australian Huon Class Minehunter is a unique vessel.

Local involvement in the MHC project exceeds 68 per cent of the contract value.

The ISO played an important role in ADI achieving the high level of local content.

considered as an "off-the-shelf" purchase. However, ship modifications under the contract impacted on over 80 per cent of the original Italian design. This redesign work was done by ADI and in the process, established the company as the in-country design authority for the vessel.

The Australian Huon Class Minehunter, based on its original design and as modified for the RAN, is a unique vessel. For example:

- the composite hull design does not require ribs, frames or stiffeners, giving it unparalleled resistance to shock caused by sea mine explosions;
- the on-board equipment is specially isolated from the hull, further enhancing its shock resistant capabilities and lessening noise transmitted through the hull;
- the completed vessel has a lower magnetic signature than originally specified by the RAN;
- the purpose designed and built command and control system incorporates a state-of-the-art mine hunting sonar;
- the precision positioning system keeps the vessel on station above a fixed point on the sea bed while it hunts for mines;
- the ship is equipped with two Saab Double Eagle mine disposal vehicles, and
- the on-board recompression chamber has been designed and built to RAN specifications.

Although based on a foreign ship design, ADI achieved a level of Australian Industry Involvement (AII) in excess of 68 per cent of the contract value. Achieving such a high level of AII was, in part, due to the involvement of the New South Wales Industrial Supplies Office (ISO).

The ISO, through its extensive network, had the ability to identify Australian businesses which could supply many of Minehunters' components and related products and services, often at a significant cost and/or quality advantage. In some cases, the ISO assisted the prime contractor to identify high quality substitutes for the foreign original equipment specified in the ship's Italian design.

Small, medium and large businesses have been directly or indirectly involved in the MHC project

Many Australian business units are or have been directly or indirectly involved in the MHC project. Businesses from Australia's manufacturing and services sector played important roles in the MHC project. Even though the ANZAC and MHC projects were based in quite different geographic areas both had a high level of Small to Medium Enterprise (SME) involvement and a high level of first time participants in a defence contract.

The MHC case study's findings

The MHC case study demonstrates that the project has been:

- a win for the economy and regional Australia;
- a win for Australian industry; and
- a win for Defence.

A win for the economy

Defence's decision to construct the Minehunters in Australia rather than purchase similar vessels offshore has improved Australia's economic wellbeing.

Australia would have been worse off if Defence had sourced its minehunter capability requirements "off the shelf" from an overseas supplier rather than from Australian industry. Over the construction period and compared with the import replacement alternative, Australia had higher annual levels of Gross Domestic Product, consumption and employment.

The MHC project is a win for the economy on a number of fronts. First, the project generated demand for locally produced goods and services. Second, the project created opportunities for technology transfers and for participating businesses to improve many aspects of their export and overall performance.

Over the nine years of the MHC construction phase, the project has:

- contributed up to \$887 million to Gross Domestic Product;
- contributed up to \$492 million to consumption; and
- directly and indirectly generated (or sustained) an average of more than 1,800 full-time equivalent jobs each year.

The construction of the Minehunters in Australian has contributed positively to Australia's current levels of GDP, consumption and employment.

Looked at another way, each additional \$100 million spend by the Australian Government on the MHC project will generate a

further \$195.6 million increase in national output and 836 Australian jobs.

To help put these estimates in perspective, the MHC project's contribution to Gross Domestic Product is more than sufficient to fund the Federal Government's:

- National Action Plan to address salinity (\$700 million); as well as
- recent initiatives to increase the number of nurses practicing in rural and regional Australia (\$104 million) and improve Australian's access to after hours medical care (\$43 million).

• Regional benefits

Most of the businesses participating in the MHC project are located in New South Wales. Many of these New South Wales subcontractors and suppliers are located in the Newcastle region, which is also the location of the prime contractor's MHC facilities.

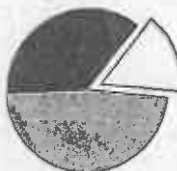
The ANZAC ship case study also identified a similar link between the prime contractor's location and the location of its Australian suppliers. Together these case studies indicate that the State in which the prime contractor's work is carried out enjoys a significant proportion of the economic activity generated by the project.

The benefits of the MHC project are particularly apparent in the Newcastle region of New South Wales. Input-output multiplier analysis indicates the MHC project would have generated (or sustained from year to year) at least 3,180 full-time equivalent jobs in this region. This contribution to the region's employment does not take into account the flow on employment effects that are associated with such a major project.

The Newcastle region suffers much higher rates of unemployment than the national average. In the absence of the MHC project the unemployment rate for the Newcastle region would have been even higher, putting further pressure

MHC suppliers by location

Other regions
in NSW



Other
States

Newcastle
region

The MHC directly generated 3,180 full-time equivalent jobs in the Newcastle region.

on the local community and the State and Federal Governments' budgets. For example, if the ships had been purchased overseas Federal Government outlays on the Newstart Allowance (or its equivalent) alone could have, in net present value terms, been around \$21 million higher.

A fillip for Australian industry

The opportunity to be involved in a major Defence project such as the MHC project has had positive long-term impacts on many of the businesses participating in the project.

Respondents to the MHC survey indicated that their businesses association with the project had led to:

- technology transfers;
- the take-up of practices to enhance performance;
- enhanced exports or improved export potential; and
- higher productivity.

• Many business obtained technology transfers

Around 25 per cent of MHC businesses surveyed obtained a technology transfer as a result of being involved with the project. Once again these results had a high correlation rate with the ANZAC study. Small, medium and large firms were equally likely to obtain a transfer of technology.

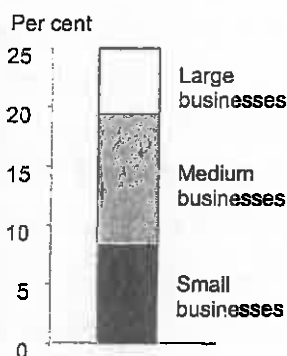
Commercial partnerships and staff training and research and development were the most frequently reported means of obtaining the transfer.

Improved productivity was the most commonly reported benefit of the technology transfer. Other benefits gained from technology transfer included broadening of product range, increased sales to Defence, quality improvements and greater production flexibility.

• Take-up of performance enhancing practices

As part of its approach to mitigating risk, Defence contracting stipulates that a range of leading edge standards and processes be adopted by its contractors.

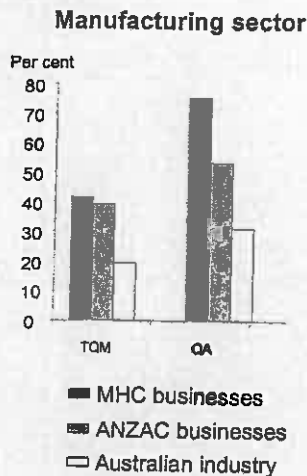
**MHC businesses
obtaining technology**



Technology transfers improved productivity, broadened Defence sales opportunities and improved product and service quality.

Defence businesses are much more likely to use processes to enhance performance than their

non-Defence counterparts.



There is a strong link between Defence work and exporting.



Case study findings suggest that industry conformance to these Defence requirements has a 'pull' effect leading many businesses to adopt tools that enhance productivity and other aspects of performance.

A comparison of data from the MHC and the ANZAC frigate studies, against similar data collected by the Australian Bureau of Statistics, highlights that Defence businesses introduced processes to enhance performance such as total quality management and quality assurance programs at a consistently higher rate than the Australian industry average.

The most common benefits MHC survey respondents gained from implementing these practices were greater client satisfaction, the development of a culture of continuous improvement and increased opportunities for new business. A substantial number of businesses also reported their businesses achieved quality and productivity improvements as a result of the changed practices.

• Export potential enhanced

Around 47 per cent of respondents to the MHC survey were involved in export activity. This high export propensity is consistent with the findings of the ANZAC study and contrasts markedly with an Australian industry average of 4 per cent and a manufacturing industry average of 13 per cent.

The higher export propensity of Defence industry firms suggests that businesses involved in Defence contracts may be characterised by a greater willingness to take risks for the sake of commercial gain than the industry population at large. It may also indicate that Defence work is an important export catalyst of itself.

One-third of MHC businesses reported that involvement with the project had improved current or future export prospects. Survey findings also indicate that a business' ability to demonstrate it has successfully satisfied Defence's stringent conditions can lead to new defence business and non-defence related business in Australia and overseas. Small, medium

and large businesses were all equally likely to report this view.

- **Productivity improved**

Association with a major Defence project, such as the Minehunters, has a positive impact on the productivity of many businesses.

Around 35 per cent of responding businesses experienced an increase in their "overall" productivity as a consequence of being associated with the MHC project.

On average, these MHC businesses enjoyed a 2.24 per cent MHC project induced increase in the productivity of their entire operations. However, productivity increases varied and ranged from less than one per cent to around 10 per cent. As the increase in productivity applied to "overall" activity it can be expected to have a positive on-going benefit to Australia's economic wellbeing.

The ANZAC ship case study also identified a link between improved productivity and Defence work.

Improved Defence capability — a bonus for industry and Defence

As a result of their involvement in the MHC and other Defence projects, 80 per cent of survey respondents believed they were now better placed to undertake work on subsequent Defence projects.

Less than 30 per cent of respondents reported that defence work was crucial to the sustainability of their business. The majority considered that defence work either enhanced sustainability or was not crucial to sustainability. Most reported that involvement with the MHC project had contributed to net profit.

Australian industry is now able to provide the high quality, high technology equipment, training and support that Defence requires.

- **The Minehunters' in-service support**

The involvement of Australian businesses in the MHC project has enhanced the capability of Australian industry to provide in-service support. Recognising this capability, the Department of Defence in 2000 awarded two Australian companies, ADI Limited and Thales Underwater Systems, in-service support contracts for the Minehunter Coastal Vessels.

Australian industry has

the capability to support the Minehunters throughout their operational life.

In-country through-life support is improving RAN's operational capability and is saving money and resources.

Consultation with stakeholders indicates that the gap between the awarding of the construction and in-service support contacts created some problems for Defence and the prime contractor in the transition to in-service support. However, these risks have been managed and recent changes in Defence's contracting philosophy on through-life support, should enhance the transition and long-term support outcomes for future projects.

Consultations with key stakeholders also indicate that the Australian industry involvement in the ships' in-service support is producing significant benefits including:

- savings in the amount of money and resources Defence needs to outlay on in-service support; and
- shorter repair turn around times, which in turn flows through to improved operational capability.

Also, in-country through-life support creates opportunities for "value adding" which would be less likely to be obtained through an out-of-country arrangement.

The importance of having a strong in-country through-life support capability becomes particularly obvious in periods of international crisis, such as the Gulf War and the War on Terrorism.

PART A: BACKGROUND

This case study report on the impact of the Minehunter Coastal (MHC) project is presented in three parts.

Part A provides background to the study. Chapter 1 briefly describes the methodology used in the case study. Chapter 2 outlines the nature and scope of the MHC project and identifies the contribution played by the New South Wales Industrial Supplies Office (ISO) in its success.

Part B presents key findings from the MHC survey conducted by the Australian Industry Group Defence Council (Ai Group Defence Council) and Tasman Economics in June 2001. Issues covered in this part are:

- the extent of technology transfer associated with the MHC and its impact on individual businesses;
- the extent that MHC businesses compared with the wider business community have implemented programs and practices which have been linked to improved performance;
- the role of the MHC in improving participating businesses export performance; and
- the capability and sustainability of 'Defence industry' businesses.

Part C considers how a project such as the MHC project impacts on the economy. Chapter 8 considers how the improved ability of Australian industry to supply the Department of Defence and its contractors has impacted on through-life support for major acquisitions such as the MHC vessels. Finally, Chapter 9 examines how the decision to construct the vessels in Australia rather than purchase similar vessels overseas has impacted on national output, value added (GDP) and employment. The Chapter and its accompanying appendix also considers how the benefits gained from the MHC project by individual participating businesses have affected a regional centre and the economy as whole.

1. INTRODUCTION

Currently, there is very little information on the impact of sourcing major Defence acquisitions in Australia rather than from overseas. This report is the second in a series of case studies which aims to help fill this information gap.

In 1999, the Ai Group Defence Council commissioned Tasman to examine the economic impact of constructing the ANZAC frigates in Australia. This study into the Minehunter Coastal Project (MHC project) was designed to explore further the results of the first study and also provide more information about the impact on Australian industry of Defence related spending.

In addition to the Ai Group Defence Council, the MHC project case study has the support of a number of organisations. These are the MHC prime contractor ADI Limited (ADI), the Commonwealth Departments of Defence and Industry, Tourism and Resources, the New South Wales Department of State and Regional Development and the ISONET, assistance was also provided by the Commonwealth Department of Finance and Administration and the NSW Industrial Supplies Office.

1.2 METHODOLOGY

This report draws together the findings from a four-phase project.

In phase one, businesses associated with the MHC were surveyed to obtain information about the impact of their involvement on various aspects of their business environment.

In phase two, Tasman Economics developed an input-output database of the Australian economy, which separately identified the MHC. This database has been used to estimate the project's contributions to Australia's output, value added and employment.

In phase three, the survey information was used in conjunction with the input-output database and a general equilibrium model to examine some of the more dynamic impacts of Australian industry involvement with a major defence project.

The final phase of the study focused on the impact of Australian industry involvement on the through-life support of a major defence acquisition.

2. THE MINEHUNTER COASTAL PROJECT

In 1991, the Defence Force Structure Review recommended that the Department of Defence acquire new minehunter vessels as a matter of priority. These new vessels would need to operate in deeper and more exposed waters and remain on station longer than the Royal Australian Navy's (RAN's) inshore minehunters.

In August 1994, the Department of Defence awarded ADI Limited (ADI) a \$917 million — more than \$1 billion in 2001 dollars — contract for the supply of six high technology HUON Class Minehunter Coastal vessels and associated support to the Royal Australian Navy. By May 2001, ADI had delivered four ships on schedule and within budget. The construction program is on schedule for the delivery of the last ship in late 2002. In 1999, ADI and Thales Underwater Systems were awarded contracts for the in-service support of the ships and their platform and combat system elements.

2.1 THE DESIGN

Mine hunting is an inherently dangerous, highly specialised activity. Minehunters enter minefields and use high frequency sonar to search for, detect and classify mine-like objects. Remotely controlled disposal vehicles or navy divers are then used to identify and neutralise the mines. The dedicated vessels needed to carry out these tasks must have a very high resistance to shock and extremely accurate manoeuvring and positioning systems. Minehunters also need low magnetic and acoustic signatures so that operations can be carried out with confidence that mines are not detonated by accident. In the event of accidental detonation, the vessel design should ensure a high level of survivability for the ship and the crew. Minehunters also need effective air and surface surveillance systems and self-defence capabilities. All of these features had to be accommodated in ADI's proposed design.

As part of its recommendation to acquire new minehunters, the Defence Force Structure Review also stressed that the new vessels should be appropriate for Australian conditions and of proven design. To help meet Defence's tender requirements ADI formed a partnership with Intermarine, an Italian firm. Intermarine has an extensive background in designing minehunters and five navies have variants of its Lerici Class of minehunter vessels in service or on order.

While the MHC ships are based on a proven design they cannot be considered as being "off-the-shelf". Modifications to the Italian design undertaken by ADI in conjunction with its subcontractors include:

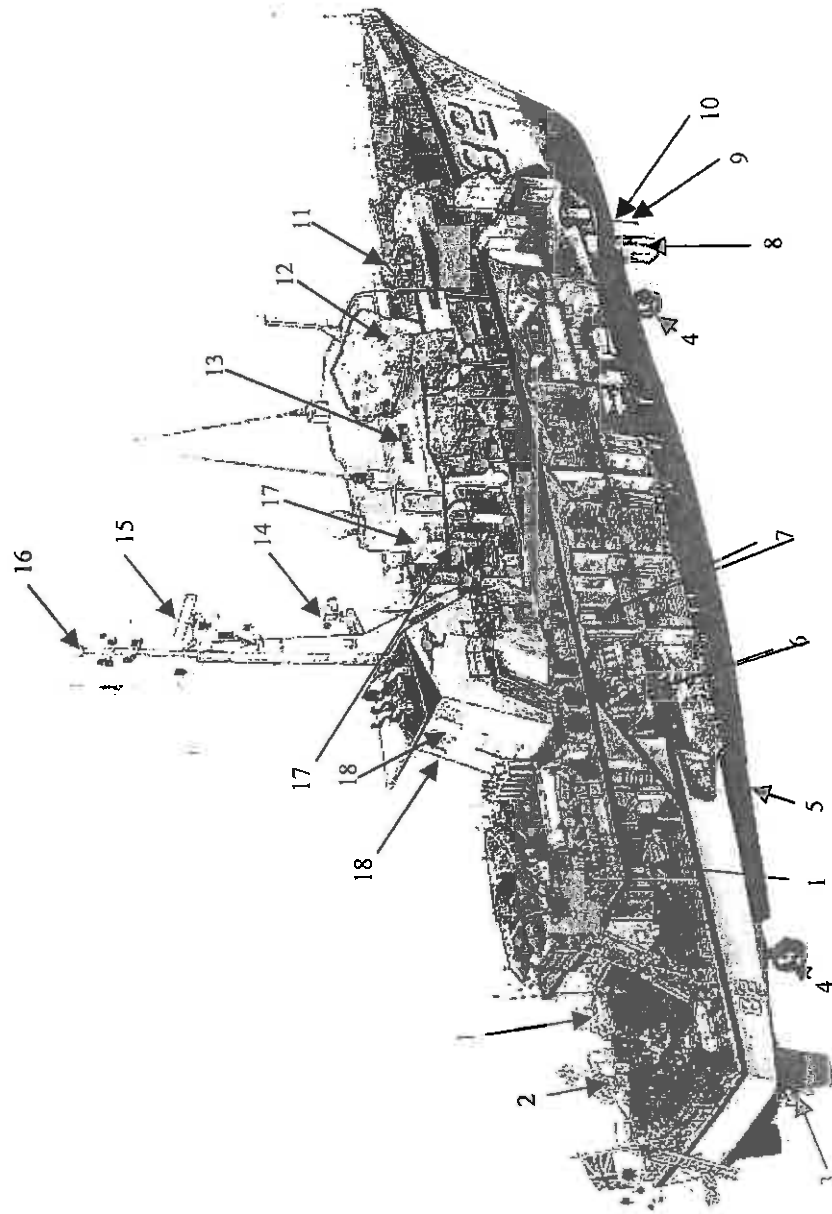
- the upgrading of the sonar;
- a new combat system;
- upgrading of the air conditioning system to improve operations in a tropical environment;
- improved accommodation; and
- extension of the upper deck to provide cover for the mine disposal vehicle and increased stowage for boats and a recompression chamber.

The MHC project is the first major Australian sourced naval defence project where the prime contractor was given design authority. As a consequence, most of the detailed design work for the MHC was carried out in Australia and by Australians. ADI advised the consultant that this detailed design work accounted for 80 per cent of the total ship design and included design definition, integration, installation and testing requirements.

Figure 1 presents a schematic diagram of ship 01 HMAS Huon. Key design features of the HUON class vessels include:

- the unique composite structure hull, which achieves a high level of shock resistance. In order to avoid local stress points (which could separate under shock conditions) the hull has been designed with no ribs, frames or stiffeners (see Figure 2);
- the mounting of sensitive equipment and machinery on cradles suspended from bulkheads and deckheads and the mounting of fuel and water tanks between watertight bulkheads, clear of the hull. When the ship's hull flexes under shock the equipment and tanks remain clear and unaffected. The machinery cradles also act to minimise the overall underwater radiated noise generated by the ship;
- the extremely low magnetic signature of the hull and equipment. The Royal Australian Navy measured the magnetic signature of the first ship and found that it was better than that required under the contract;
- a new command system, which integrates the tactical data system with the major platform and operational systems. This highly integrated system ensures that all operation and control equipment can be operated in a coordinated manner;
- a variable depth Thales Underwater Systems (TUS) mine hunting sonar, which has a dual frequency search and classification capability and is capable of deploying below any thermal layers in water. The sonar is also designed to perform in the extreme environments found in the northern and southern waters around Australia;

Figure 1: Key features of the Huon Class design



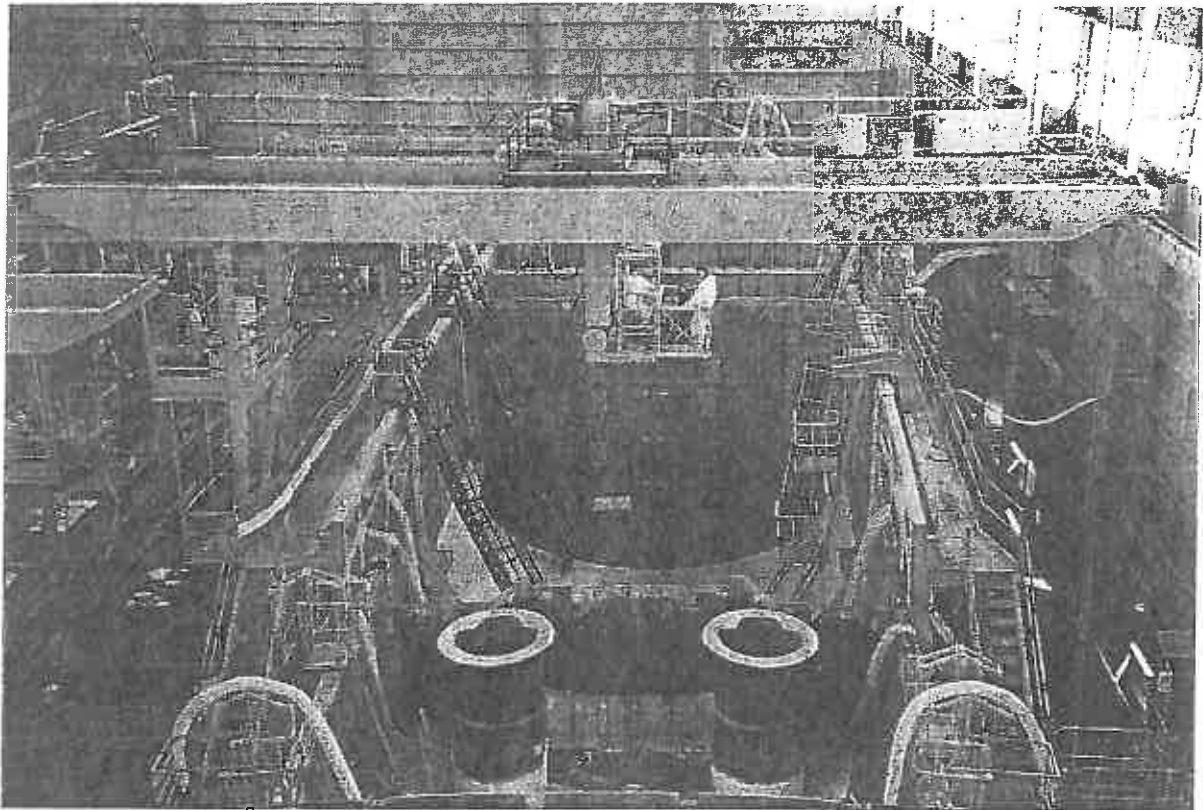
1. 2 x Saab Double Eagle Mine Disposal Vehicles
2. ADI Mine Sweeping System
3. acb Lips Controllable Pitch Propeller
4. 3 x 124kW Calzoni Auxiliary Propulsion Units
5. 1 x 1460kW Fincantieri GMT Diesel Engine
6. 3 x 350kW Isotta Fraschini Generating Sets

7. SEPA Control & Monitoring System
8. TUS Type 2093 (Aust) Sonar
9. TUS 2093 Monitor Transducer
10. Nautronix Acoustic Tracking System
11. MSI DS30B 30mm Gun
12. BAE SYSTEMS Nautis - IIM (Aust) Tactical Data System

13. CEA Integrated Internal/External Communications System
14. RADAMEC Electro Optical Surveillance System
15. Kelvin Hughes 1007 Radar
16. BAE SYSTEMS Prism III Electronic Support Measures
17. FRL Super Barricade Electronic Counter Measures
18. SITEP Closed Circuit Television System (4 Cameras)

- three retractable auxiliary propulsion units which assist in the critical manoeuvring and precise positioning of the ship in order to maintain **safe** hovering positions while mine identification is made and destruction measures are implemented; and
- two electrically powered Saab Underwater Systems Double Eagle mine disposal vehicles which can be deployed at distances of more than 500 metres from the ship. A fibre optic link between the vehicle and the ship is used to control the vehicle and is also used to relay images for display on the ships' multi-function consoles.

Figure 2: Construction of the composite structure hull



2.1.1 Construction innovations

ADI introduced a number of innovations in the construction of the MHCs that are not used in the Italian built vessels. The company introduced a Product Work Breakdown Structure (PWBS) to plan and control production tasks. The use of a PWBS allowed ADI to introduce modern shipbuilding methods which included:

- construction by stage;
- block outfitting; and
- zone outfitting.

These methods allow hull construction and outfitting tasks to be carried out in parallel, which significantly reduces the risk of falling behind the construction schedule. These methods also simplify tasks such as the laying of the ship's 63,000 metres of cables.

The construction strategy has been refined as the multiple build program has proceeded. One important development in the parallel hull construction and outfitting process was the block pre-outfitting of the engine room. This development resulted in significant improvements in the efficiency of the engine room outfit and in the quality of the workmanship.

2.2 PROJECT CHALLENGES

2.2.1 *A tight delivery schedule*

The contract schedule called for a very short period between the signing of the contract and the delivery of the first Minehunter Coastal Vessel. To meet this schedule ADI undertook a concurrent design and build program.

To start up the MHC Project, ADI had to: develop an understanding of the unique mine warfare needs of the customer; establish a design office, systems integration, and project management capability; and construct a purpose built construction facility. This facility is on a greenfield site at Carrington, a suburb of Newcastle, New South Wales. At the same time, ADI had to construct the first of this new class of warships, develop training facilities, train the crew and, finally, put the first vessel through a nine-month program of performance trials.

To meet the tight schedule ADI had the first composite hull manufactured in Italy, all subsequent hulls were constructed on site using an Australian made mould. The delivery of this first hull coincided with the effective completion of the new Carrington facility and construction and outfitting of ship 01 commenced.

ADI delivered the first vessel, HMAS Huon, on time and on budget in March 1999, four and a half years after signing the contract.

• Quality management

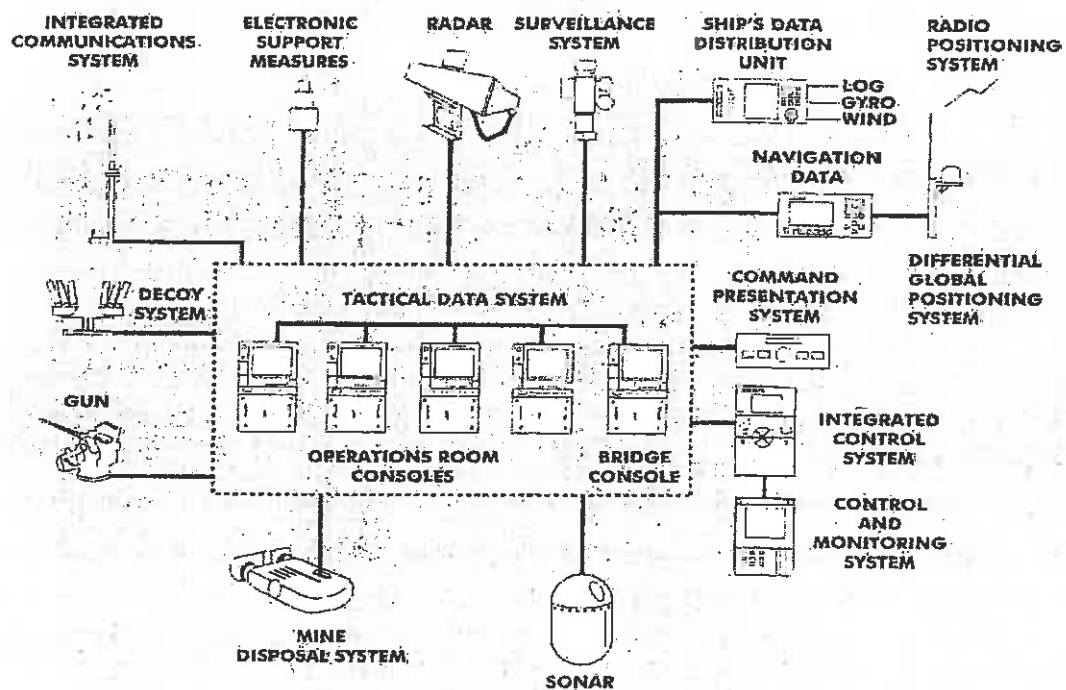
The Australian Department of Defence demands a high standard of quality from its prime contractors and subcontractors. The prime contractor is well aware of these requirements and has strict quality management systems in place. However, as the prime contractor **was** undertaking the MHC project's whole ship design and build program for the first time and on a greenfield site, an entirely new set of management processes and systems had to be

developed. Within six months of commencing the development of procedures ADI's quality management system was certified as complying with AS/NZS ISO 9001.

2.2.2 The new combat system

An array of complex electronic equipment and software intensive information processing systems had to be brought together for the first time in the MHC's new integrated combat system (see Figure 3). To help mitigate the risks associated with such a major integration project ADI invested in a shore-based integration facility at its Carrington site. The facility was able to make extensive use of simulation and simulation technology to replicate the environment that a vessel, undertaking minehunting activities, could be expected to experience.

Figure 3: The integration of the combat system



Integrated Ship System

Source: ADI Limited.

The shore integration facility was initially used to simulate the combat system in order to establish and verify installation issues, interfaces, and data exchange protocols. The facility was also used to test the complex software functionality and integration.

ADI's decision to use a shore-based facility for the integration of the first combat system minimised the risk associated with this complex task and enabled the conduct of the first-of-class trials to be undertaken within a tight contract schedule.

In addition to these important roles, the facility is also used to support the training component of the MHC contract.

2.2.3 Australian Industry Involvement - a contractual requirement

Access to the industry capabilities needed to support and enhance Australia's Defence Force is a key policy objective of the Government. This policy objective was set out in the 1998 *Defence and Industry Strategic Policy Statement* and enunciated again in the recent *Defence 2000 White Paper* (Commonwealth of Australia 2000). The White Paper stated:

.... we want a sustainable and competitive defence industry base, able to support a technologically-advanced ADF. This calls for efficient, innovative and durable industries - and a close partnership between Defence and those industries (Commonwealth of Australia (2000) p.99).

The Australian Industry Involvement (All) Program is the key tool for developing strategically important capabilities in Australian industry and for ensuring that in-country capacity exists to provide through-life support to Defence's capabilities. The *Australian Industry Involvement Manual* (DoD 2001, p. 2-1) states that:

The goal of the All program is to involve Australian industry in Defence's equipment acquisition projects so as to:

- a. develop a capability in Australian industry to support the equipment;
- b. sustain and develop strategically important capabilities in Australian industry that are identified in *Defence Needs of Australian Industry*;
- c. enhance the capability of defence-related industrial infrastructure to further develop Australia's defence self-reliance; and
- d. maximise the amount of involvement where this is cost effective.

Local content which sustains or enhances Australian industry's capability is an important focus of the All program. Local content is defined as that part of the supply of major defence projects which is value-added by Australian and/or New Zealand industry. Imported content in items supplied locally is not treated as local content.

High local content (or value added) is significant for a number of reasons. First, it extends or enhances industry capability, which has positive flow on effects for effective in-country through-life support. Second, it assists Australian industry obtain a better understanding of the new equipment.

An Australian Industry Involvement plan formed a part of ADI's MHC contract. Under the terms of the MHC contract 68.4 per cent of the contract value must be local content. As a consequence of the re-design work required by the RAN, ADI had a high degree of flexibility in achieving this high level of local content. Ultimately ADI achieved a level of All in excess of its target of 68.4 per cent. Part of this success was due to the assistance of the ISO and

its ability to source Australian suppliers for many products and services and, in some cases, substitute products for foreign original equipment at a significant cost and/or quality advantage.

2.3 THE ISO'S ROLE

ADI's close association with the ISO assisted the company in achieving this high level of local content. A consultant from the ISO worked closely with ADI from the tender period and in an on-going role for five years. The ISO helped ADI to identify local Hunter, New South Wales and Australian businesses which had the capability to supply ADI or its subcontractors with goods or services which would otherwise have been sourced from overseas. ADI commented that:

The NSWISO consultant made an important contribution to the Minehunter Coastal project's import replacement program. As a direct result of the combined efforts of NSWISO and ADI staff, at least \$55 million of the initially proposed imports were replaced with products manufactured by local industry. The NSWISO performed an invaluable service that ADI was not resourced to do. Their assistance was a win for ADI, a win for Australian industry and a win for Defence in the short and long term.

More than 20 per cent of MHC survey respondents reporting an involvement with the MHC project indicated that the ISO had played a role in their company becoming involved in the project. In the majority of cases these businesses believed that the ISO's role was a major one. As outlined in Box 1, the ISO played an important role in recognising the Defence capabilities of Australian businesses and in creating links between individual businesses and the prime contractor.

Box 1: Some businesses experiences and perspectives on the ISO's role

Transform Composites, a Newcastle company, specialises in the design and manufacture of glass reinforced plastic (GRP) products. The company's main area of work focuses on the design and construction of components for passenger railway carriages. However, in 1993 the ISO approached the company's management and drew their attention to the GRP requirements of the MHC project. Transform Composites was subsequently awarded a contract to design and construct the minehunters' water and gas tight GRP doors and hatches. The company also constructed air conditioning ducting for the minehunters. The company's management considers the ISO, by first recognising their capability and then liaising between the MHC prime contractor and themselves, played a major role in the company winning its first defence project.

(continued)

**Box 1: Some businesses experiences and perspectives on the ISO's role
(continued)**

Novamarine, a Newcastle firm whose primary activity pre-MHC was the supply and service of commercial marine equipment, was introduced to the MHC prime contractor by the ISO. Novamarine's CEO said that the ISO played a very important role in the company's involvement with the MHC project:

'Novamarine's capabilities could have been overlooked if the ISO had not made the initial introductions to ADI. The ISO opened the door, it was then up to Novamarine to prove themselves as being capable of undertaking Defence work. The company's work on the minehunters has created opportunities for it to work on other Defence projects. This would not have occurred without the ISO's initial involvement.'

Baker and Provan, a mechanical engineering business in St Mary's New South Wales, reported that the Industrial Supplies Office played a major role in the company becoming a supplier for the MHC project. The ISO contribution was particularly important in the early stages of the project, the company's management said, "the ISO's assistance in the tender's preparation was invaluable".

Maxwell Engineering, a medium sized company operating in the Newcastle region, and **Spunaloys Castings** a small company in Ourimbah, New South Wales, were approached by the ISO in 1994. The ISO believed that together the companies had the capability to manufacture 30,000 copper nickel flanges from cast rather than the more usual wrought bar. Both companies agreed to be involved in a test run with Spunaloys producing the alloy in a variety of sizes and shapes and Maxwell Engineering using the alloy to manufacture the flanges to an Italian design. Tests of the alloy and the original batch of flanges indicated that not only could the imported components be replaced by this substitute Australian product but that the quality of the Australian product would meet all technical requirements including its magnetic signature.

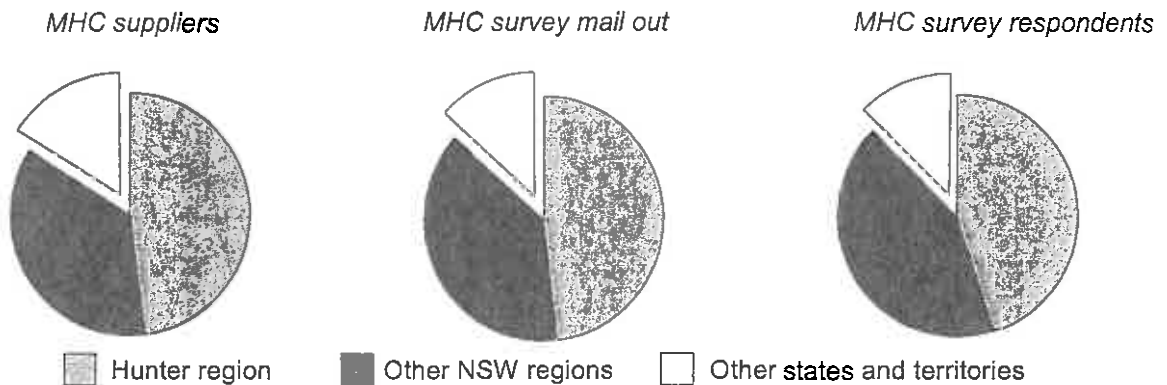
After the success of the tests full-scale production commenced. However, difficulties arose with subsequent deliveries of flanges, a major problem being cracking when the flanges were welded. Both Maxwell Engineering and Spunaloys advised the prime contractor that procedures used to produce subsequent batches were identical to the test run. After extensive investigations metallurgists identified a minute amount of impurity in the alloy, which was associated with the "wash" process used to clean the crucible. Once identified, the problem was resolved relatively simply by using a dedicated crucible for the manufacture of the minehunters' copper nickel castings. Maxwell Engineering and Spunaloys Casting's management consider that the ISO officer assigned to the MHC project put in an enormous amount of time and effort to help all parties resolve the problem.

2.4 SUPPLIERS AND SUBCONTRACTORS

Many Australian business units are or have been directly or indirectly involved in the MHC project. While businesses from all Australian states and territories are involved the majority are located in New South Wales (Figure 4). ADI's database of suppliers indicates that nearly 85 per cent of businesses supplying the MHC project are located in New South Wales — more than half of these are located in the Newcastle/Hunter Valley region of New South

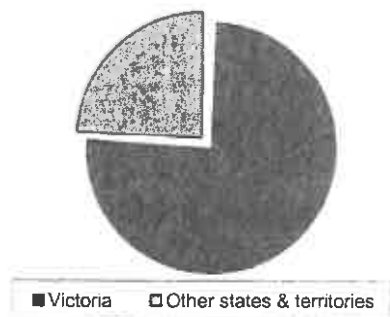
Wales. The location of MHC project survey respondents was also broadly consistent with the composition of MHC project suppliers and the MHC survey mail out (Figure 4).

Figure 4: Location of MHC Australian suppliers



The predominance of New South Wales businesses in the list of Australian MHC project suppliers is in large part explained by the location of the MHC prime contractor in Newcastle, New South Wales. A similar link between the prime contractor location and Australian suppliers was identified in the ANZAC ship case study. In that instance, approximately 75 per cent of Australian subcontractor businesses were located in Victoria where the vessels were constructed (Figure 5).

Figure 5: ANZAC ship Australian subcontractors



Source: Tasman (2000).

Australian MHC project suppliers come from a diverse range of industries including the:

- Plastic Product Rigid Fibre Reinforced Manufacturing Industry;
- Non-Metallic Mineral Product Manufacturing Industry;
- Non-Ferrous Basic Metal Product Manufacturing Industry;
- Structural Metal Product Manufacturing Industry;
- Sheet Metal Product Manufacturing Industry;
- Fabricated Metal Product Manufacturing Industry;
- Photographic and Scientific Equipment Manufacturing Industry;
- Electronic Equipment Manufacturing Industry;
- Electrical Equipment and Appliance Manufacturing Industry;
- Industrial Machinery and Equipment Manufacturing Industry;
- Furniture Manufacturing Industry;
- Building Construction Industry;
- Computer Services Industry;

- Machinery and Equipment Hiring and Leasing Industry; and
- Marketing and Business Management Services Industry.

Activities undertaken by MHC project suppliers are also diverse as the responses to the survey question, reported in Box 2, illustrate.

Box 2: Primary activities undertaken by MHC survey respondents

Participants in the MHC survey were asked to describe the main activity undertaken by their business. The following is a listing of the responses to this question.

- Integrated logistic support;
- Systems management and integration of communications equipment;
- Manufacturing engineered textiles and agency importers;
- Ship repair and refit;
- Manufacture of fire detection and suppression products;
- Mechanical engineering;
- Manufacturing and servicing of recompression chambers and hyperbaric equipment;
- Drafting and technical services;
- Manufacturing and support of complex large equipment;
- Manufacturing of wires cables and electrical interconnect components;
- Supply of marine equipment;
- Design and manufacturing of specialist glass reinforced plastic products;
- Design and manufacturing of galley equipment;
- Engineering and IT services;
- Supply of industrial products;
- Design and manufacturing of large diesel gas turbine exhaust systems, acoustic design and installation, thermal insulation exhaust gas purification equipment;
- Stainless steel fabrication;
- Metal fabrication;
- Supply of industrial fasteners;
- Manufacturing machined or fabricated metal products;
- Manufacturing air systems;
- Design and manufacturing hydraulic cylinders and associated equipment;
- Recruitment of permanent and temporary staff;
- Softwear and support;
- Manufacturing stainless steel pipe, fitting, flanges etc;
- Manufacturing hoses and assemblies;
- Manufacturing and supply of industrial safety equipment including breathing apparatus;
- Engineering technology solutions and services - CAD/CAM;
- Supply of industrial insulation, sheet-metal and marine preservation;
- Manufacturing high pressure gas/liquid systems and equipment;

(Continued)

Box 2: Primary activities undertaken by MHC survey respondents (continued)

- Design, manufacture and supply of hot water systems and associated vessels and equipment;
- Engineering;
- Consulting, supply and servicing of specialised equipment;
- Building and civil engineering construction;
- International freight forwarding customs clearance;
- Computer programming and task analysis;
- Sonar design and manufacturing;
- Supplying building materials;
- Manufacturing communications equipment;
- Precision machining of components;
- Sales and service of diesel engines;
- Sales and service of filtration and separation solutions products;
- Project management;
- Security services;
- Payroll software and support;
- Supply stainless steel;
- Crane hire;
- Manufacturing sealing products;
- Manufacturing and supply of waste-water treatment plants;
- Mechanical engineering and engine reconditioning;
- Sales and manufacturing of hydraulic and pneumatic hoses;
- Management consulting services;
- Supply and service of electronic equipment;
- Manufacturing marine safety goods;
- Manufacturing engineering equipment;
- Supply of catering and other on-site amenities services;
- Testing of materials;
- Supply and installation of floor coverings;
- Supplying purchasing services;
- Manufacturing rubber fendering;
- Supplying protective coatings/paint;
- Manufacturing polyester resin;
- Manufacturing and supply of navigation and infra-red systems;
- Manufacturing of training and simulation products;
- Manufacturing and supply of filters and pumps;
- Manufacturing fibre reinforced plastic products;
- Manufacturing, supply and service of underwater equipment;
- Manufacturing of joinery items — ships furniture;
- Computer software development; and
- Project management and technical support services.

2.5 A SUCCESSFUL PROJECT

The success of the MHC project has been acknowledged by the prime contractor's industry peers, the Government and its client the Department of Defence.

Peer recognition includes:

- a 1999 Engineering Excellence Award, from the Institution of Engineers, Australia Newcastle Division; and
- a 1999 National Engineering Excellence award from the Institution of Engineers, Australia.

The following comments by the (then) Minister for Defence, John Moore at the launch of the fifth ship HMAS DIAMANTINA in December 2000 are an example of the Federal Government's recognition of the project's success. The Minister said:

The Minehunter Coastal Project is delivering world-class capability to Navy and the Australian Defence Force, ...

Managed by the Defence Material Organisation in partnership with ADI, this project has, been very successful, drawing on the best skills and technologies Australia has to offer.

This positive partnership between Defence and industry demonstrates that, with responsible project management, Defence capability can be delivered on time and on budget (The Hon. John Moore 2000).

The Department of Defence's Inspector General Division in a recent audit of the Department's MHC project office and the MHC prime contractor has favourably reported on key performance measures for the project. Key audit findings were:

- since inception, the Project has been well managed;
- at this time, assessed against the conventional measures of project performance, (Cost, Schedule and Performance) the project appears highly successful;
- the major risks appear to have been identified by the Project and are being vigorously managed;
- both the sponsor (Capability Division) and the client (Maritime Command) expressed a high level of satisfaction with the Mine Hunter Coastal platform and its transition into service; and
- once the platform is accepted into service it should provide the ADF with a significant 'cutting edge' capability in the maritime operational environment (DoD 2001, p. 4).

On the release of the audit report Mr Jim Clough, a Director from the Inspector General's Management Audit Branch, said:

The audit found that the MHC project is well managed and is achieving good results. It is better than some similar projects in terms of risk, cost and performance outcomes. It shows good signs of fulfilling the performance requirements stipulated. It's a credit to both the ship building industry and to the DMO [Defence Materiel Organisation] (On Target, 2001, p.3).

PART B: FIRM LEVEL IMPACTS OF THE MINEHUNTER PROJECT

Many Australian businesses have directly or indirectly been involved with the MHC project. This part of the MHC project case study examines how participation in the project has impacted on individual businesses' operations. A survey questionnaire and firm level interviews were important sources of information for this analysis.

THE MHC SURVEY

The MHC survey follows on from a previous survey of businesses involved in the ANZAC Ship Project (Tasman 2000). Like the previous survey the MHC survey questionnaire, was designed to help identify any dynamic or spin off impacts of major Defence projects on individual business. The questionnaire explored the impact of the MHC project on technology transfer, uptake of business practices, exports, productivity and defence capability. Tasman Economics developed the survey questionnaire with the assistance of the Ai Group Defence Council and a number of key supporters of the project including the MHC prime contractor, ADI Limited, and the Commonwealth Departments of Defence, Industry Science and Resources and Finance and Administration. The survey questionnaire is reproduced in Appendix 1.

Where possible the MHC survey findings have been compared with outcomes in the wider business population through firm level information collected in the Australian Bureau of Statistics Business Longitudinal Surveys that were undertaken in 1995-96 and 1997-98 (the last year of the survey).

Survey Respondents

The MHC survey questionnaire was dispatched to 179 Australian businesses identified in the prime contractor's database as having an involvement in the MHC. The businesses included in the survey mail out accounted for around 95 per cent of the total value of supplies to ADI's Minehunter operations in Carrington, NSW. The extent of individual businesses involvement in the MHC project varied significantly with contract values (in \$A1993) ranging from just over \$150,000 to more than \$200 million.

Eighty businesses responded to the survey questionnaire. This number of responses (after adjusting the survey population to take account of businesses that had merged or were no longer operating at the address in the prime contractor's database) represents a response rate of 47.8 per cent. This is an excellent response rate for a privately conducted survey. The New South Wales Industrial Supplies Office's role in contacting non-respondents and

urging them to respond was an important factor in achieving this high response rate. Seventy-two respondents indicated that their business had been involved in the MHC project. The small disparity between survey respondents and the number reporting involvement in the MHC project can be explained by a number of factors. For example, some businesses involved in the early stages of the project may have lost corporate memory through staff turnover. Also some businesses may have not been aware of their involvement in the project because the involvement was indirect, in the sense that some businesses contacted had been contractors to a MHC project sub-contractor.

Respondents reporting an involvement with the MHC project were from the Manufacturing sector (40 respondents — 55.5 per cent) and from the Services sector (32 respondents). Breakdowns of the businesses reporting an involvement in the project by employment size (72 businesses) and by annual turnover (71 businesses) are outlined below:

Employment

- 9 micro businesses (less than 5 employees) – 12.5 per cent;
- 22 small businesses (5 to less than 20 employees) – 30.5 per cent;
- 31 medium businesses (20 to less than 200 employees) – 43 per cent; and
- 10 large businesses (200 or more employees) – 14 per cent.

Annual turnover

- No more than \$5 million - 29 businesses;
- More than \$5 million but no more than \$10 million – 15 businesses;
- More than \$10 million but no more than \$50 million – 14 businesses;
- More than \$50 million but no more than \$100 million – 9 businesses;
- More than \$100 million but no more than \$200 million – 2 businesses;
- More than \$200 million but no more than \$500 million – 1 business; and
- More than \$1,000 million – 1 business.

Interestingly the size composition of survey respondents was very similar to the size composition of the responses to ANZAC ship case study survey.

Seventeen of the 72 respondents reporting an involvement with the MHC project indicated that the project was their business' first defence-related contract. Eight of these first time defence suppliers were from the manufacturing sector.

The five Chapters in this part present key survey findings covering:

- Technology transfer (Chapter 3);
- Business programs and practices (Chapter 4);
- Exports (Chapter 5);
- Industry — Defence Relationships (Chapter 6); and
- Businesses MHC project related changes in productivity (Chapter 7).

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Appendix 3 presents survey findings for the 31 respondent businesses located in the Newcastle and Hunter Valley region.

Non-response bias survey

A short telephone non-response bias survey was also undertaken to help assess whether the respondents answers to the MHC survey questionnaire were representative of the wider ASP business population. The businesses contacted in this telephone survey were randomly selected from the non-respondents. Significance testing was then used to compare the responses from this telephone survey with the responses from the main survey, in only one instance, which related to MHC project-related improvements in exports, was there a statistically significant difference between the findings of the two surveys. This finding gives us some confidence that the survey results are not biased due to businesses choosing not to respond to the mail out survey. Appendix 2 presents the findings of the non-response bias survey and the significance testing.

3. TECHNOLOGY TRANSFER

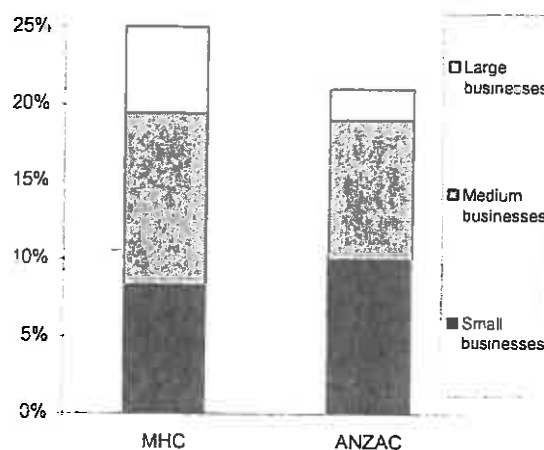
Although the Minehunter Coastal Vessels are based on a proven design they are by no means "off-the-shelf". As outlined in Chapter 2, the high level of Australian content and the design improvements required by the Department of Defence meant that many aspects of the design, including the design of the combat system, had to be reworked. While the MHC project imposed challenges for the prime contractor and its subcontractors it also presented opportunities for technology transfers.

3.1 MANY FIRMS OBTAINED TECHNOLOGY TRANSFERS

Defence projects such as the MHC project provide an excellent opportunity for participating firms to obtain a technology transfer. The MHC survey results indicate that 25 per cent of businesses involved in the project obtained a technology transfer as a result of the involvement. This level of technology transfer is similar to the level achieved by businesses involved in the ANZAC frigate project (Figure 6).

Respondents from large (businesses employing 200 or more employees) and medium (businesses employing 20 to 199 employees) sized businesses were more likely to report a technology transfer than were smaller businesses. However, significance testing indicates that we cannot

Figure 6: Technology transfer
(per cent of businesses)



Source MHC survey and Tasman (2000).

be confident that the lower level of technology transfer reported by smaller businesses actually reflects a lower level of technology transfer obtained by the wider population of participating small businesses (see Appendix 2).

MHC respondents from the manufacturing sector and services sector businesses were equally likely to report obtaining a technology transfer.

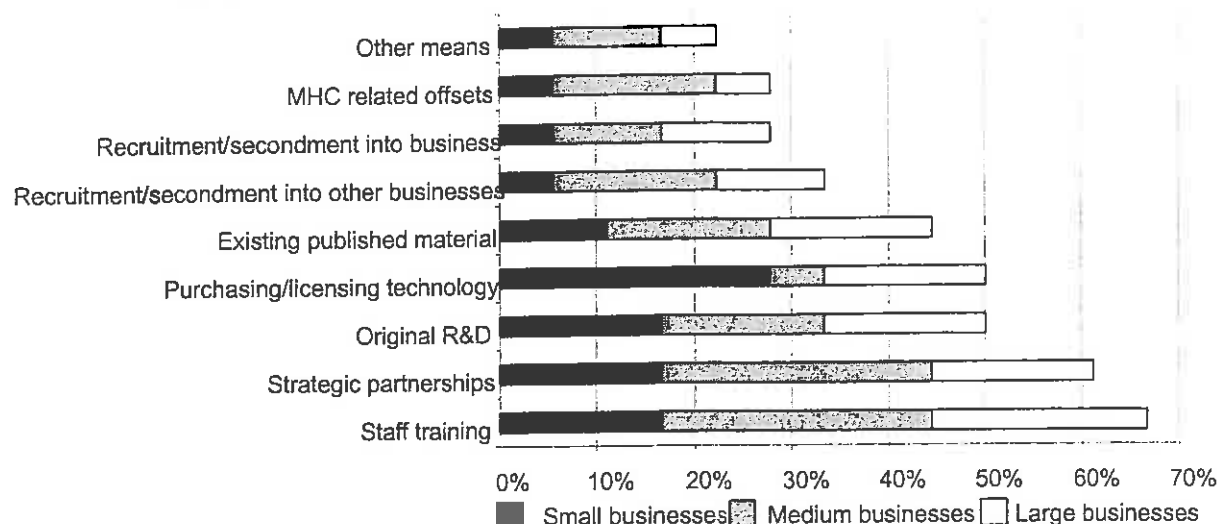
Around 27 per cent of respondents with previous Defence experience obtained a technology transfer from involvement with the MHC project. On the other hand only 18 per cent of first time Defence businesses reported obtaining a technology transfer from involvement with the MHC project. However, significance testing of these two proportions indicates that we can

not be certain that this lower proportion actually represents a real difference in the uptake of technology by the two groups.

In most instances businesses used a combination of measures to obtain the technology transfer. Overall, staff training and strategic partnerships with other organisations were the most frequently reported methods. However, a significant number of businesses also reported the purchasing or licensing of technology, original research and development and existing published material as sources of the transfer (see Figure 7).

Interestingly, respondents from smaller businesses were more likely to report that their business obtained the transfer by purchasing or licensing the technology, while larger businesses were more likely to report that staff training was a means of obtaining the technology transfer.

Figure 7: Sources of technology transfer, by firm size
(proportion of all businesses that obtained technology)



Source: MHC survey.

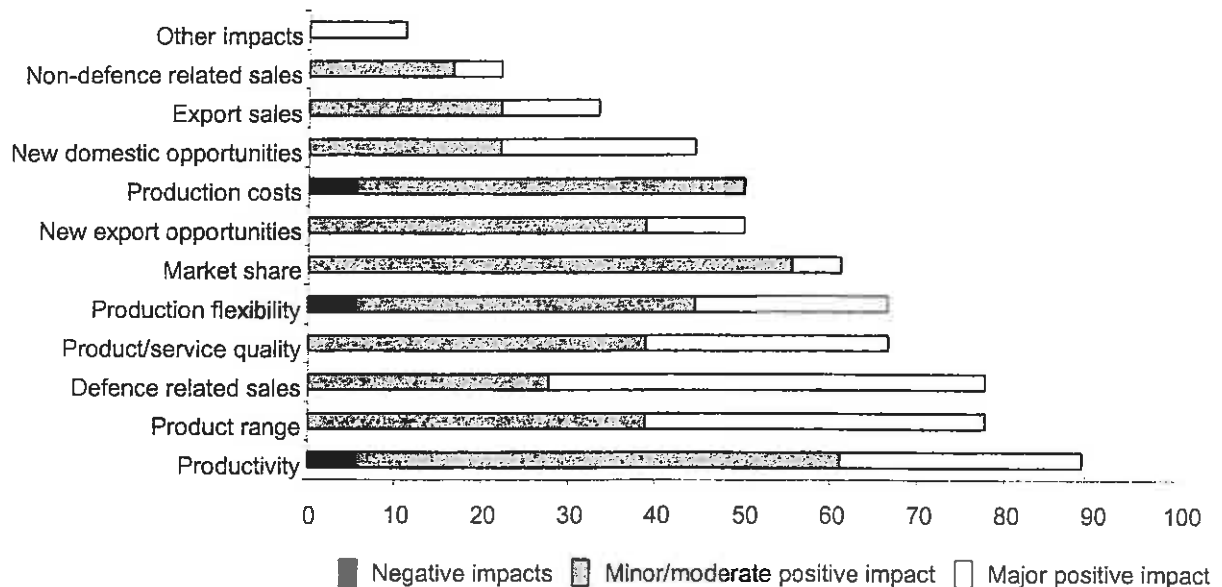
The sources of the technology transfers obtained by firms participating in the MHC project were similar to those reported by businesses responding to the earlier ANZAC frigate survey. However, there was some difference in the ranking of sources. For example, existing published material followed by staff training were the most commonly reported sources of the transfer among ANZAC frigate businesses. Strategic partnerships were much less likely to have been a source of the transfer for business associated with the ANZAC frigate project — less than 30 per cent of ANZAC frigate business which obtained a technology transfer reported that a strategic partnership was a source of the transfer.

3.2 TECHNOLOGY TRANSFER OUTCOMES

Survey responses indicate that the technology transfers obtained by most businesses participating in the MHC project were beneficial for performance and growth (Figure 8). Only one firm reporting a technology transfer indicated any negative impacts from the transfer. However, as outlined in Box 3 these negative effects were of a short-term nature. In the longer term, the company's involvement with the MHC project led to improvements in quality and productivity.

Improved productivity was an important outcome of the technology transfer (see Figure 8). Just under 30 per cent of businesses obtaining a transfer reported it had a major positive impact on productivity. A further 55 per cent considered the transfer produced minor to moderate improvements in productivity.

Figure 8: Impact of technology transfer
(proportion of all businesses reporting a technology transfer)



Source: MHC survey.

Technology transfer can impact on productivity in a number of indirect ways. For example, new technology can allow a business to produce new or improved products or services. New technology can also provide opportunities for a business to produce its outputs at a lower cost. Not surprisingly the businesses enjoying a technology transfer driven increase in productivity also experienced improvements in their:

- product range; and/or
- production costs; and/or
- product or service quality; and/or
- production flexibility.

Other important impacts of the technology transfer included increased sales, and improved market share.

Box 3: The negative productivity cloud had a silver lining

Transfield Reinforced Plastics/Composites (Transfield RP/C) is a division of the Transfield Group. Transfield RP/C manufactures fibre reinforced plastic products. Although Transfield RP/C had undertaken many complex projects its work on the Collins Class submarines and the Minehunter Coastal Vessels was, at that time, the most challenging encountered.

Transfield RP/C's work for both the Collins Class submarines project and the MHC project involved technology transfers. These transfers were obtained through strategic partnerships with overseas original equipment suppliers. In the case of the submarines the technology transfer led to positive spinoffs for the company, in terms of additional business. However, the outcomes from the company's involvement with the MHC project were not all positive.

Transfield RP/C was awarded the contract to manufacture fibreglass tankage for the Minehunters. Given the short lead times for the project Transfield elected to manufacture the tankage to the original Italian design — this required Transfield to enter into a strategic partnership under a once-off licensee agreement with an Italian company Selip, Fontanellato. As part of this licensing arrangement Transfield obtained manufacturing technology from Selip, to enable it to manufacture tankage in Australia.

Unfortunately differences in manufacturing equipment in the Australian and Italian plants led to a number of problems. Some of these problems were overcome by fine tuning the design to suit the equipment. However others, while addressed, resulted in a decline in productivity and a loss making venture for Transfield RP/C.

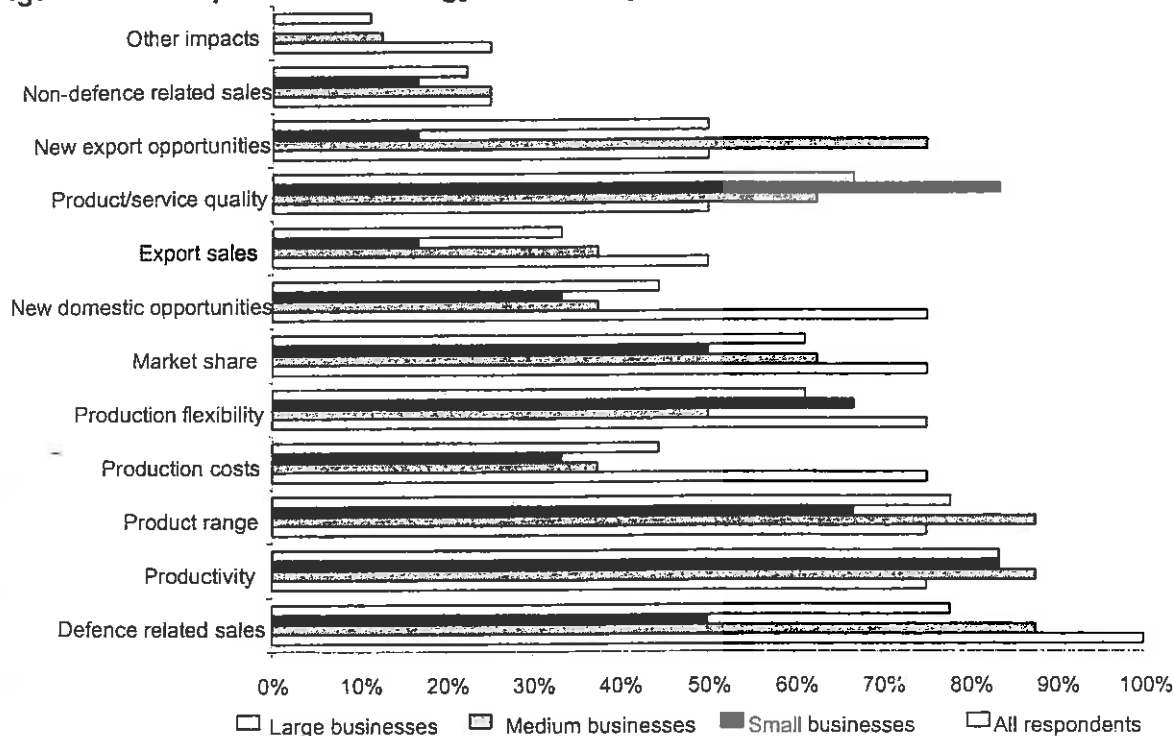
Transfield RP/C's management reports that a number of factors contributed to this outcome. One related to the nature of the technology transfer. Another related to Transfield RP/C's own quality assurance and internal inspection practices. Transfield RP/C became aware that the level of quality assurance it had in place for its industrial reinforced plastics/composites work, whilst an ISO 9002 endorsed system, needed to be upgraded to deal with the Minehunter contracts complex and stringent requirements. The company accordingly increased the level of its quality assurance standards and methods. These new standards are now applied to all Transfield RP/C's Defence and general manufacturing work.

Transfield RP/C's management considers that early negative impacts of the company's involvement with the Minehunter project have in the long run produced dividends. Management said:

The Minehunters involved a learning experience that has paid off. Our experience with the Minehunters and the Collins class submarines has forced us to develop higher level quality assurance processes which has helped Transfield obtain new business both onshore and offshore.

The nature of technology transfer impacts varied to some extent by firm size (Figure 9). All of the large businesses that obtained a technology transfer from involvement with the MHC project reported that the transfer had positively impacted on the level of defence-related sales. However, only half of the small businesses that obtained a technology transfer reported this impact. Significance testing indicates that, with at least 95 per cent confidence, the difference between these two proportions reflects a real difference in the impact of the technology transfers on the two size groups. New export business opportunities was the only other statistically significant difference in technology transfer impacts by business size. In this case, medium sized businesses that had obtained a technology transfer were statistically more likely than small businesses to have experienced improved export opportunities as a result of the transfer.

Figure 9: Impact of technology transfer, by size of business



Source: MHC survey.

Box 4 presents some examples of how the MHC related technology transfers have positively impacted on individual businesses.

Box 4: Examples of MHC related technology transfers and innovations and their impacts

MCM Manufacturing Pty Ltd is a medium sized engineering business situated in Cardiff, New South Wales. The company is building stainless steel rudders for the MHC project. The project was the company's first major defence contract.

Like other Minehunter Coastal Vessel components, it is important that the rudders have a very low magnetic signature. Normal stainless steel welding technology was unsuitable for the rudders manufacture, as it would increase rather than decrease the magnetic field. The company undertook extensive research and development and purchased new computer controlled welding technology in order to resolve some of these magnetic field issues. Management reports that the new technology has "taken the company to a new level of performance in terms of productivity, quality and production flexibility".

MCM Manufacturing's involvement with the MHC project has also had positive demonstration effects, which generated work using its new technology in the private sector. The company's success with the MHC project contract has also led to further defence-related work — the company is currently manufacturing steering components for the ANZAC frigates.

Transform Composites, a Newcastle company, which was initially contracted to construct the MHC's water and gas tight doors and hatches from glass reinforced plastic (GRP). GRP has been used extensively in the MHC project because the material has a very low magnetic signature, which helps to minimise risks of the ships accidentally detonating mines. Other key uses of GRP in the MHC project include the hull and numerous components such the tankage. However, in the original Intermarine design for the minehunters, aluminium was the material specified for the air conditioning ducting. With the intention of further reducing the ships' magnetic signature ADI approached Transform composites to manufacture the ducting from GRP. Although Transform composites had a long history in the production of specialised GRP products, the company did not have the technology to manufacture GRP ducting. After assessing likely possibilities Transform Composites devised a special GRP ducting manufacturing technology. This technology was successfully used to produce the vessels' air conditioning ducting.

In addition to supplying the ducting within the original ducting budget the GRP substitute has the advantage of being equally efficient but much lighter than the original equipment. This innovation in the design of the Huon class Minehunter will consequently produce fuel saving benefits for the Royal Australian Navy. The innovation has also assisted Transform Composites' management to develop new areas of work in the company's private sector lines of business.

Transform Composites' management reports that the company's overall productivity has increased slightly as a result of its involvement with the MHC project. Management said that the ducting contract required Transform Composites to develop procedures to allow them to efficiently produce the 600 different ducting components in a semi-production line environment. The lessons learned from this have been applied across the company's other non-defence GRP projects and have resulted in a long-term increase in productivity for the business.

(continued)

Box 4: Examples of MHC related technology transfers and innovations and their impacts (continued)

Baker and Provan is a medium-sized mechanical engineering business in St Marys, New South Wales. The MHC project gave the company an opportunity to obtain the technology and know how to design defence equipment. Baker and Provan, in a strategic partnership with an Italian business, were contracted to design and manufacture the multipurpose cranes for the vessels. This contractual arrangement provided Baker and Provan with opportunities to observe the Italian company's design process in operation, the insights obtained led to major advances in the company's design, which in turn has increased the company's ability to supply the Department of Defence and its prime contractors.

Baker and Provan's management reports that the company's involvement in the MHC project has had a slight but significant impact on its manufacturing business' productivity. Further, the company is now better able to manage complex projects and the skill base of management and staff has been extended and improved.

Marine Plant Systems, prior to its involvement with the MHC project, was a micro business operated by a husband and wife team in Western Australia. The company currently employs three full-time employees, three contract engineers and one contract designer and its prospects for future growth are excellent. This growth is largely due to the MHC project.

Prior to its involvement with the project, Marine Plant Systems operated as an importer of marine equipment for a number of European manufacturers. Through these contacts Marine Plant Systems became the agent for the MHC project's supplier of sewage treatment plants and chlorinators. This strategic partnership with the original equipment supplier has opened the door to a number of new opportunities for the company.

For example, Marine Plant Systems will shortly commence manufacturing sewage treatment plants and chlorinators in Australia under licence. The company obtained the technology to undertake this major step from the original equipment supplier. The technology transfer came through a range of mechanisms including training and the transfer of the necessary technical information by way of CAD and electrical drawings, classification and certification.

The company has also expanded its operations into Asia and New Zealand. The company's Managing Director said:

As a result of our involvement with the Minehunter Coastal project Marine Plant Systems has gone from strength to strength. The company is now recognised as leaders in Sewage Waste Systems in Australia and New Zealand.

4. DEFENCE PROJECTS AND BEST PRACTICE

Numerous national and international studies have found a strong link between the adoption of best practice business programs and practices and improvements in firm performance. For example, the United States National Institute of Standards and Technology has found through numerous case studies and other analysis that:

investing in quality principles and performance excellence pays off in increased productivity, satisfied employees and customers, and improved profitability — both for customers and investors (NIST 2001).

The NIST website presents numerous case studies of businesses which have embraced the United States Government's national quality program and experienced substantial increases in productivity, turnover and profits as well as higher retention rates for employees and customers.

Australian studies have also identified positive impacts from implementing best practice programs and practices such as quality assurance and benchmarking. For example,

- the Australian Manufacturing Council (AMC 1994) found a link between the adoption of best practice programs and superior export growth;
- Harrison and Samson (1997), in a Commonwealth government sponsored study found a positive correlation between organisational culture and the use of management tools such as total quality management; and
- Hausner (1999), in a study of 22 manufacturing businesses found a strong link between achieving high scores in the Australian Quality Awards for business excellence and improvements in a range of performance variables including productivity improvements, increased sales and profit, improved employee satisfaction and reduced defect and injury rates.

Despite this important link, Australian Bureau of Statistics data indicates that relatively few Australian businesses have implemented best practice business programs and practices such as benchmarking and quality assurance (DEWR&SB (1998) and ABS unpublished data).

4.1 IMPLEMENTATION OF BEST PRACTICE BY DEFENCE BUSINESSES

The high standards demanded by the Department of Defence from its contractors could be expected to increase participation in best practice programs such as quality assurance and total quality management by defence businesses. Indeed, the ANZAC ship case study

(Tasman 2000) found that businesses associated with the project were much more likely than the wider business community to have implemented a range of programs and practices commonly associated with best practice. The ANZAC ship case study found that participation in Defence work was a major factor in a business' decision to implement these programs and practices.

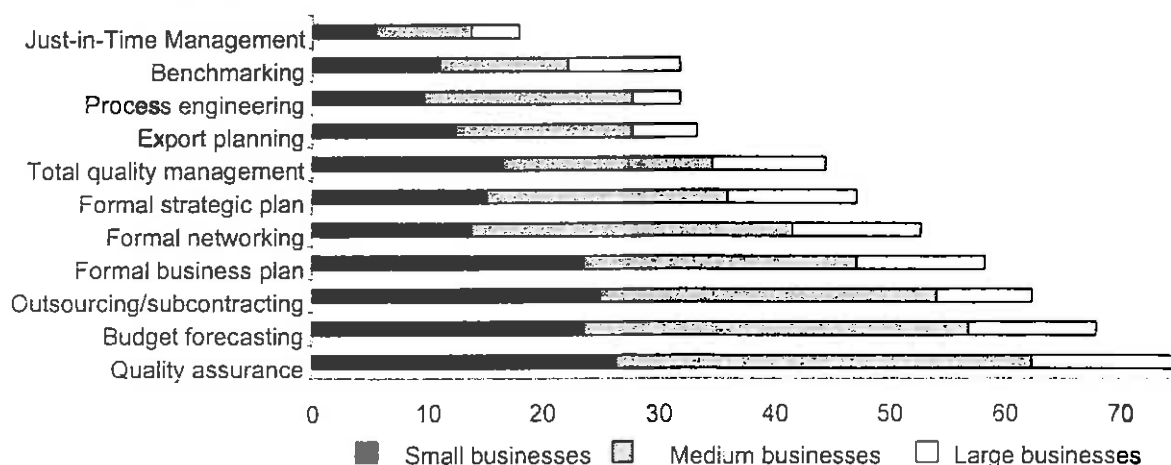
To further advance these results MHC survey respondents were asked to indicate if they had implemented any of the following business programs or practices:

- Total Quality Management;
- Quality assurance;
- Just-in-Time Management;
- Process Engineering;
- Formal strategic plan;
- Formal business plan;
- Budget forecasting;
- Formal networking with other businesses;
- Comparison of performance with other businesses (benchmarking);
- Export market planning; and
- Outsourcing/subcontracting.

Sixty-four MHC businesses indicated that they had implemented one or more of these programs and practices. As might be expected smaller businesses were less likely to have implemented these practices than larger businesses — one hundred per cent of large businesses compared to 86 per cent of small businesses indicated they had implemented one or more programs and practices.

Quality assurance and budget forecasting were the most commonly implemented of the programs and practices examined — with 75 per cent and more than 65 per cent, respectively, of MHC respondents indicating that these programs had been introduced into their business. Just-in-time management, benchmarking and process engineering were the programs and practices least likely to have been implemented by MHC project respondent business (Figure 10).

Figure 10: Business programs and practices implemented by MHC businesses
(proportion of all businesses reporting a technology transfer)



Source: MHC survey.

Large MHC project businesses were more likely to have implemented each of the eleven programs and practices than medium sized businesses. Similarly, medium sized MHC businesses were more likely to have implemented a particular program or practice than smaller sized businesses.

In most instances, the implementation of the various programs and practices occurred more than six years ago.

4.1.1 Comparisons with the wider business community

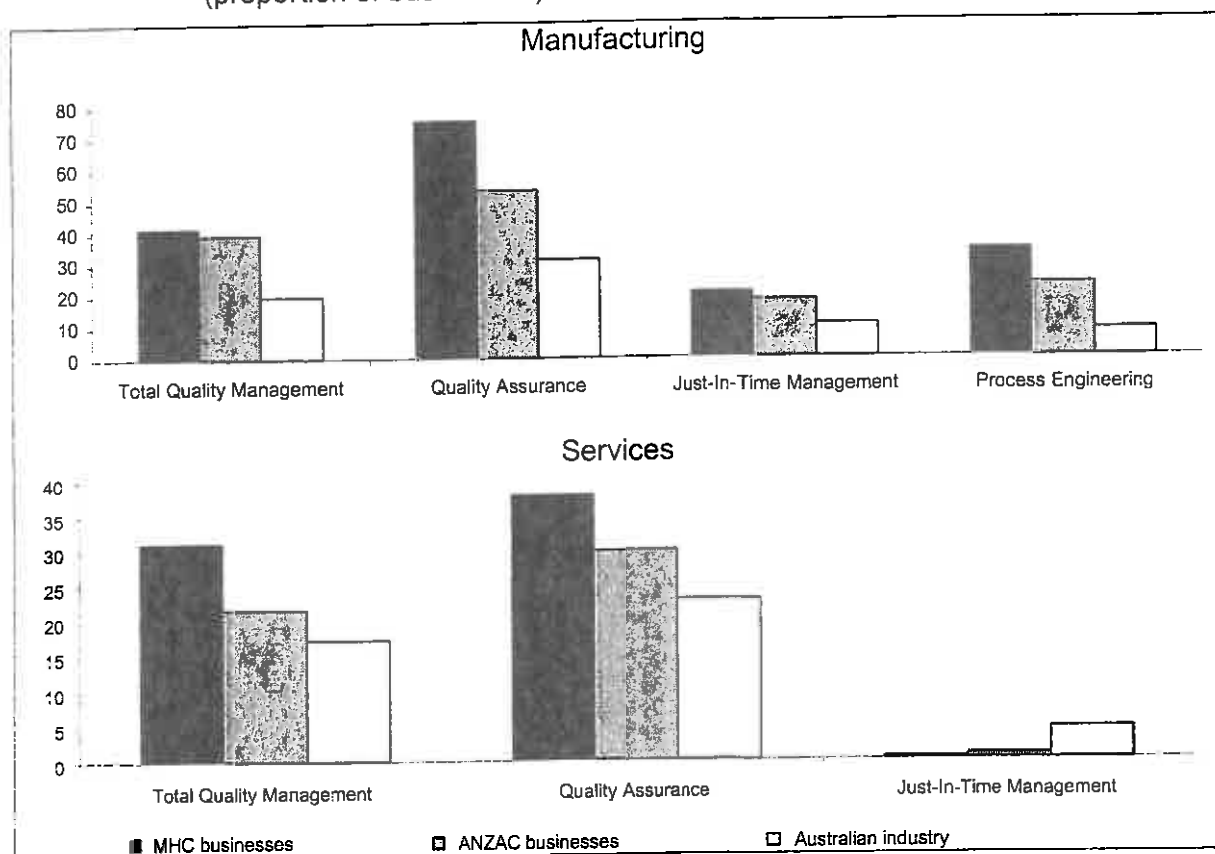
Surveys undertaken by the Australian Bureau of Statistics in 1996 and 1998 on the uptake of certain business programs and practices by industry have been used to benchmark the uptake of business programs and practices by MHC businesses (Australian Bureau of Statistics (1998) and (1999). In the majority of cases businesses participating in the MHC project and the ANZAC ship project were more likely than the wider population to have implemented those programs and practices which are commonly associated with improvements in productivity and performance.

In the case of business programs MHC manufacturing firms were more likely to have implemented total quality management, quality assurance, just-in-time management and process engineering than businesses in the manufacturing sector as a whole. For example, by June 1996 more than 75 per cent of MHC manufacturing businesses had implemented quality assurance programs where as only 31 per cent of businesses in the wider manufacturing sector had implemented such programs (Figure 11).

In most instances MHC services businesses were also more likely to have implemented these programs and practices than their counterparts, the one exception being just-in-time management.¹ However, in this instance the implementation rate for just-in-time management was very low for all industry groups.

¹ Process engineering data was not collected by the ABS for services sector businesses.

Figure 11: Businesses' implementation of best practice programs by June 1996
(proportion of businesses)



Note: Adjustments have been made to the results to account for the larger proportion of small businesses in the ABS survey sample. In this analysis MHC and ANZAC ship services businesses have been benchmarked against implementation rates in the Business services industry.

Source: MHC survey, ANZAC ship survey and ABS survey results reported in DEWR&SB (1998).

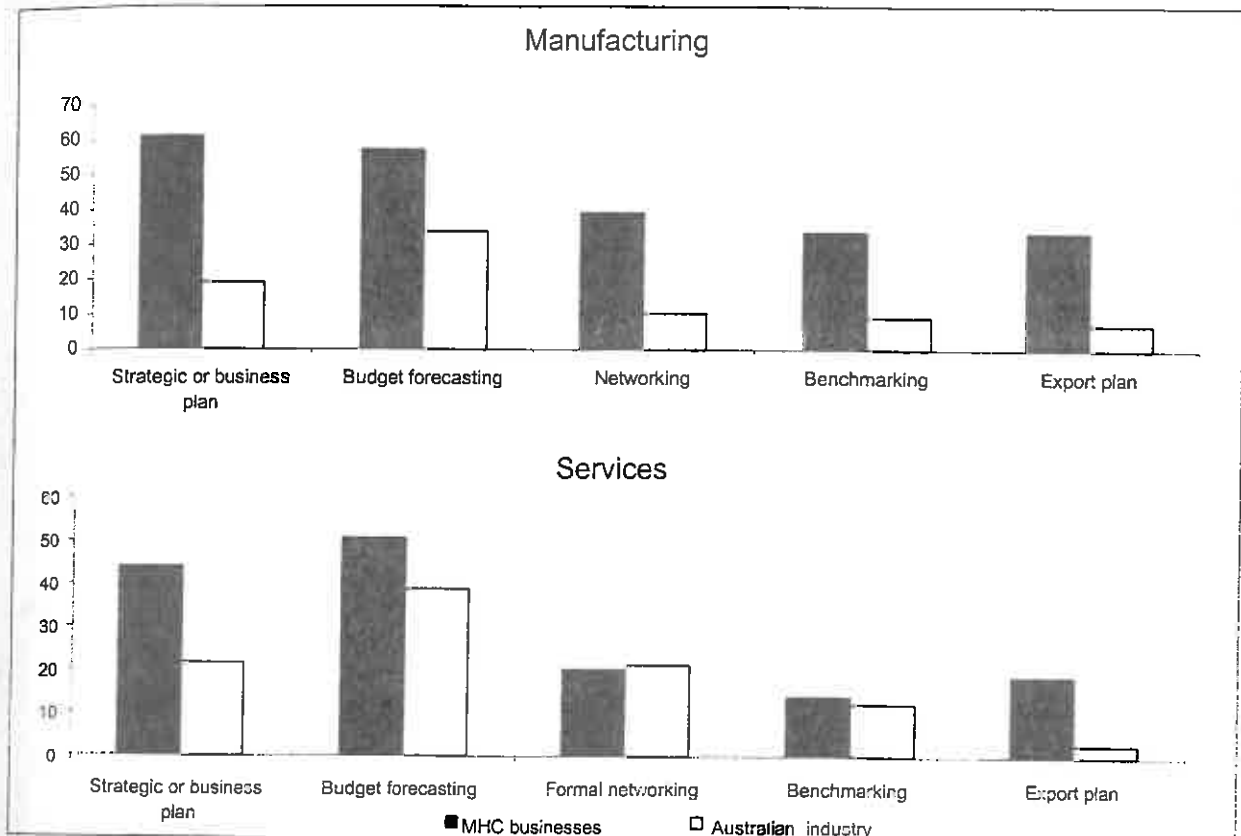
More recent results on the implementation of business practices collected in the 1998 ABS Business Growth and Performance Survey also confirm that businesses associated with Defence work are more likely to have implemented a range of best practice techniques associated with improved performance and productivity (Figure 12).²

Figure 12 highlights that MHC businesses in both the manufacturing and services sector were much more likely to have in place strategic or business plans. They are also more likely to undertake budget forecasting than their counterparts in the wider business community. Respondents from MHC manufacturing firms were also much more likely to report that their business used networking and benchmarking techniques in their business.

² The 1996 ABS survey is the latest available data on the implementation of best practice programs by the wider business community and the 1998 ABS survey is the latest available data on the uptake of best practice techniques by the wider business community.

Both MHC manufacturing and services businesses were more likely than industry as a whole to use an export plan to help manage their business.

Figure 12: Implementation of best practice techniques by June 1998
(proportion of businesses)



Note: Adjustments have been made to the results to account for the larger proportion of small businesses in the ABS survey sample. In this analysis MHC and ANZAC ship services businesses have been benchmarked against implementation rates in the Business services industry.

Source: MHC survey and unpublished data from Australian Bureau of Statistics (1999).

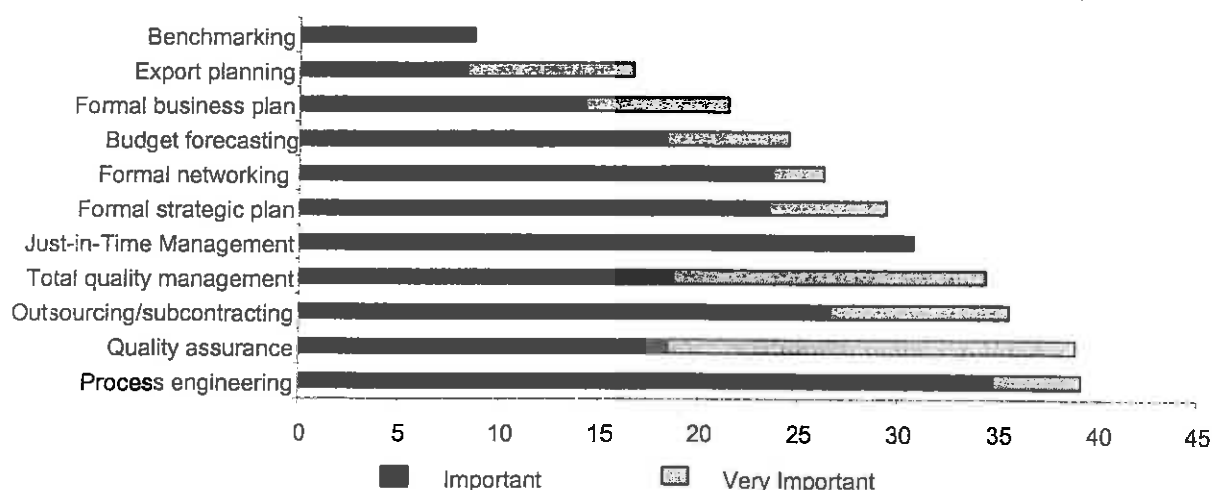
4.1.2 The role of Defence work in the implementation decision

By insisting on high quality standards from its contractors, Defence has played a lead role in many businesses decisions to implement performance improving programs and practices. The MHC and ANZAC ship survey findings support this hypothesis. More than two-thirds of the MHC businesses that had implemented these programs and practices reported that the involvement with defence-related projects had been important in the implementation decision.

Given that a large number of responding firms had previously been involved with other Defence work, it is not surprising that the importance of the MHC project in the implementation decision was less pronounced than the importance of Defence projects as a whole. Nonetheless a significant number of businesses indicated that the MHC project had

played a role, and in many instances a very important role in the implementation decision (Figure 13). For example, nearly 40 per cent of respondents with process engineering and quality assurance programs and practices in place in their business indicated that the MHC project had been an important factor in the implementation decision. In the case of quality assurance around half of these respondents reported that the MHC was very important in the implementation decision.

Figure 13: Role of the MHC project in decision to implement programs and practices
(proportion of businesses reporting program or practice implemented)



Source: MHC survey.

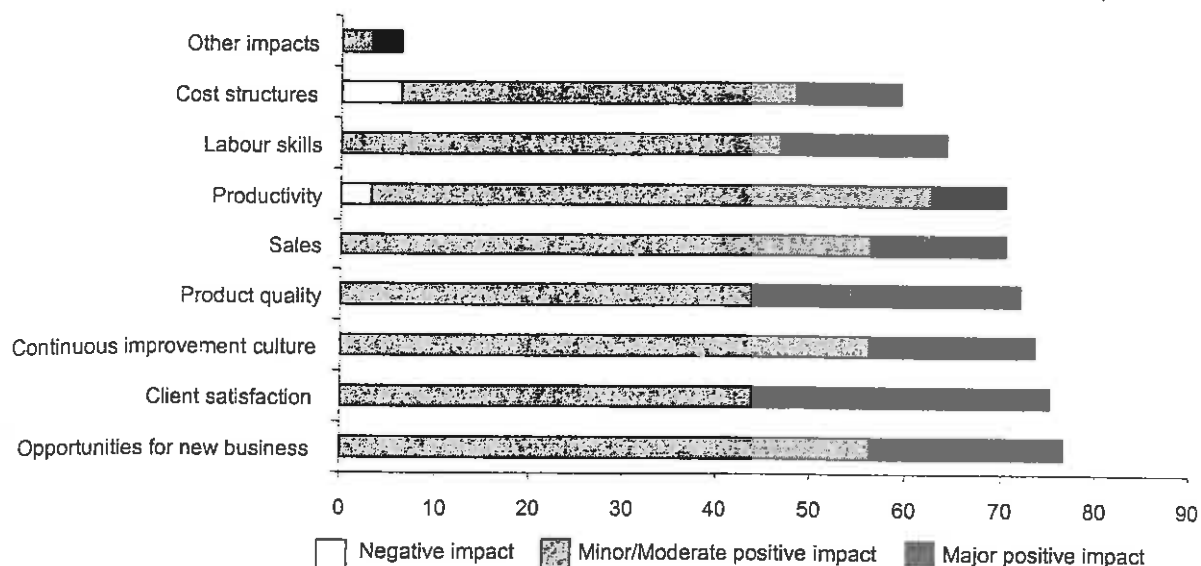
4.2 IMPLEMENTATION OF PROGRAMS AND PRACTICES LINKED TO IMPROVED OUTCOMES

The majority of business that had implemented all or some of these programs and practices reported that they have, as a consequence, experienced a variety of improvements in the business environment. The most commonly reported positive impacts were related to:

- opportunities for new business;
- client satisfaction;
- the ability to implement a culture of continuous improvement;
- product quality;
- sales; and
- productivity (Figure 14).

Box 5 presents some insights into the benefits MHC businesses have obtained from implementing these business programs and practices.

Figure 14: Impact of business programs and practices
(proportion of businesses reporting one or more program implemented)



Source: MHC survey.

Box 5: Implementation of business programs and practices — Some outcomes

Colpro Engineering is a medium sized business in Pendle Hill, New South Wales. The company currently employs 30 people. Prior to its involvement with defence-related projects the company employed 11 people. The MHC project was the company's second Defence project; the company had previously been awarded a contract to undertake work for the ANZAC Ship Project. The company is quality assured. It was taking steps toward quality assurance before its ANZAC ship contract was awarded. However, accreditation became imperative for its work on both the ANZAC Ship Project and the MHC project because accreditation was, in both cases, a contract requirement. Company management believes that quality assurance has had a major impact on the business. In addition to improvements in product quality, the quality assurance process has improved Colpro Engineering's labour skill base and has opened up many new business opportunities.

Colpro's management points out that quality assurance is not a costless process. However, over the longer run it brings rewards, which more than compensate for these costs. Indirectly quality assurance has improved productivity, for example, through less waste, less duplication of work and a more skilled workforce. Company management said that "Defence work has shown the company the benefits that quality assurance can bring".

CompAir (Australasia) Limited is a compressed air specialist. The company's head office is in Mount Waverly Victoria, with branches in all states. CompAir has a long tradition of working with Australia's Defence Forces. The company was an early supplier of compressors to Cockatoo Dockyard in Sydney and Williamstown Naval Dockyard in Melbourne. More recently the company has supplied compressed air systems for the ANZAC class frigates, the Collins Class Submarines and the Huon Class Minehunters.

(Continued)

Box 5: Implementation of business programs and practices — Some outcomes
(continued)

CompAir is quality assured to ISO 9001 and JAZ-ANZ ISO 9002. CompAir management considers that the company's quality assurance practices have enabled it to supply a world standard quality product in front of its competitors. The need to meet Defence's stringent standards was an important factor in the company's decision to obtain quality accreditation.

CompAir management reports that the implementation of quality assurance processes and practices has done much more than improve the quality of the company's products, the company has also been able to improve its productivity and its overall performance. CompAir management reports that:

Quality assurance means that we now implement processes and practices that in the past would have, at best, been done on an ad hoc basis. Factory test performance of new equipment is a case in point. In the old days we would have simply installed the equipment and started manufacturing. As a consequence of this quality assurance driven procedure we now have less down time, fewer faults and we are less likely to be called out to correct errors that should not have occurred in the first place. Thus we are now producing a higher quality product which in turn improves our productivity and overall performance.

Quality assurance practices have helped make CompAir Australasia's compressors the best in the world. Our credibility in overseas and Australian markets has increased, we are now known for the quality product and service that we provide.

Cowan Manufacturing is a medium sized company operating from Warners Bay in New South Wales. The company commenced operations around 30 years ago as a sheet metal, general fabrication business. The company now specialises in stainless steel and aluminium fabrication and has particular expertise in the design and construction of recompression chambers, hyperbaric medical chambers and underground pressure vessels and mine survival units.

In the mid to late 1980s Cowan Manufacturing, well ahead of its time, decided to implement quality assurance practices. Cowan Manufacturing now is accredited to the highest international quality standards and is an accredited supplier to both the United States and Australian Departments of Defence.

In addition to becoming quality assured in the late 1980's Cowan Manufacturing's management decided to expand their businesses horizons and commenced designing and constructing transportable recompression chambers. After many years of satisfying the United States Department of Defense of its credibility as a high quality supplier Cowan Manufacturing was awarded a contract to supply the Cowan transportable recompression chamber system. This relationship with the United States Department of Defense continues today. At this stage the company has supplied the US Navy with over 90 transportable recompression chamber systems. Cowan Manufacturing has subsequently been contracted to supply the Australian Department of Defence with 16 transportable recompression chambers and six twin lock recompression chambers for the MHC project.

While the majority of businesses reported positive impacts, a small number reported some negative impact of the programs and practices on productivity (3 per cent of respondents) and cost structures (6 per cent of respondents). Implementation dates help explain these negative outcomes for at least one of these businesses. In the early years of implementing programs such as total quality management and quality assurance businesses some

businesses may perceive that the costs outweigh the benefits. However, once processes are fully understood and fully implemented benefits become more obvious as a culture of continuous improvement becomes the norm. This continuous improvement culture will in turn flow through to improved productivity, product quality and greater client satisfaction.

Interestingly, not one of the respondents reporting negative impacts on cost structures and/or productivity considered that their business' overall productivity had declined as a result of being involved with the MHC project. Indeed some of these respondents indicated that the business' overall productivity had actually increased as a result of being involved with the MHC project. The experience of one of these companies, MCM Manufacturing Pty Ltd is reported in Box 6 below.

Box 6: Short-term pain for long-term gain

MCM Manufacturing Pty Ltd, a medium sized engineering business in Cardiff, New South Wales. The company implemented total quality management, quality assurance and just-in-time management business practices to help meet the high quality standards of its large private sector clients, such as BHP. These practices also played an important role in the company being able to meet the high quality standards required by Minehunter Coastal project's prime contractor for the manufacture of the vessels' rudders.

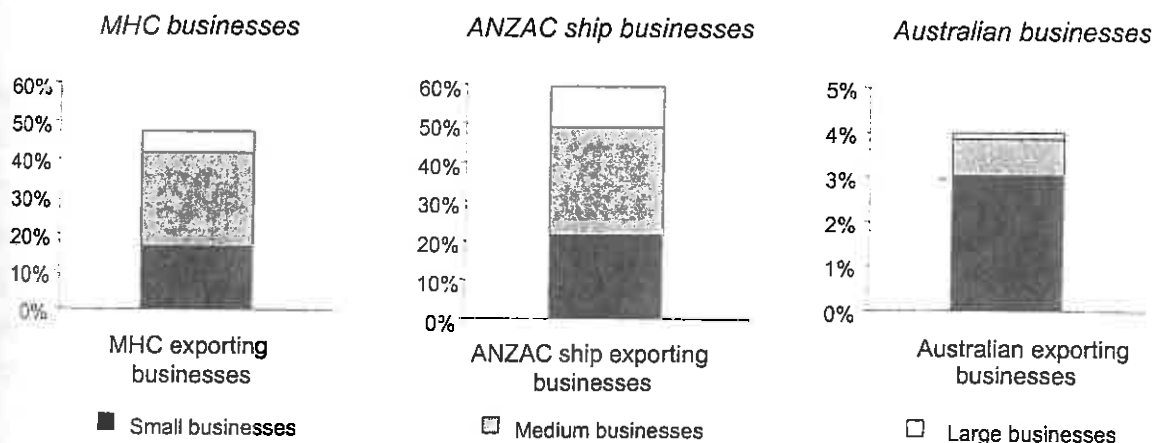
MCM's management reported in its response to the MHC survey that the use of these practices for its Minehunter Coastal work led to a reduction in productivity. However, consultation with management has clarified that the very slight reduction in productivity referred to in their response had more to do the company's access to magnetic signature testing equipment, which was an important component in the project's quality assurance arrangements, rather than the business practices themselves. This lack of access to the testing equipment meant that work on the project had to periodically stop until testing equipment became available. This had a short-term negative impact on productivity. However, management reports that, from a company wide perspective, involvement with the MHC project and the implementation of business practices such as quality assurance has had a long-term positive impact on productivity and overall performance.

5. EXPORTS

Exports are an important source of income for many Australian businesses. In addition, our export trade increases Australia's standard of living by allowing us to take advantage of the gains from trading with other countries. In the context of Australia's relatively small defence industry, exports also create an opportunity for businesses to diversify their activities and clients. This diversification can in turn help improve defence businesses long-term viability and capability to supply the Department of Defence or its prime contractors.

Responses from the MHC survey indicate that just under half (47 per cent) of the MHC survey respondents currently export. The majority of these exporting businesses were small and medium businesses. This result is consistent with the earlier ANZAC ship case study, (Figure 15 and Tasman 2000). By way of comparison the ABS found that only 4 per cent of Australian businesses surveyed are exporters (Figure 15). Thus it appears that firms associated with major defence projects have a much higher propensity to export than Australian businesses as a group.

Figure 15: Percentage of exporting businesses



Source: MHC survey, Tasman (2000) and ABS (2000).

As might be expected the proportion of exporters varies by sector. MHC survey results indicate that around 60 per cent of MHC manufacturing businesses and around 30 per cent of MHC services businesses were in the export business. These proportions are much higher than in the wider economy. For example, the ABS reports that around 13 per cent of manufacturing businesses and around 4 per cent of businesses in the Property and business services industry were exporters.

5.1 INCREASED EXPORT ORIENTATION - THE MHC'S ROLE

A range of factors may contribute to the 'defence industry' having a higher propensity to export than other Australian businesses. It may be that defence businesses and export businesses have similar characteristics. For example, their managers may be more prepared than the wider business population to undertake the often time consuming preparatory work necessary to develop new international markets or meet the Department of Defence's stringent requirements for quality and documentation. Another explanation may be that the defence work of itself is an export catalyst. The MHC survey, like the ANZAC ship survey was designed to find out if businesses participating in these major defence projects experience any positive spin offs which could improve their export performance.

Survey results suggest that there is an important link between defence work and exports. One-third of MHC businesses reported that involvement with the project had improved current or future export prospects. Small, medium and large businesses were all equally likely to report this view.

Respondents from just over 35 per cent of exporting businesses reported that exports had increased since the business' involvement with the MHC project had commenced; no exporters reported a decline in exports. All of the businesses reporting an increase in exports were in the small and medium sized employment size categories.

Many the factors that contributed to MHC businesses increase in exports were directly or indirectly related to the MHC project or Defence projects more generally (Figure 16). For example, the implementation of best practice programs and practices was considered as an important contributor to the increase by around half of those businesses with increased exports (Figure 16). Interestingly, the ABS has also recently identified a correlation between the use of business practices and exporting (ABS 2000). In around 30 per cent of cases exporters reported that MHC related productivity improvements, technology transfers and business links contributed to the export increase (Figure 16).

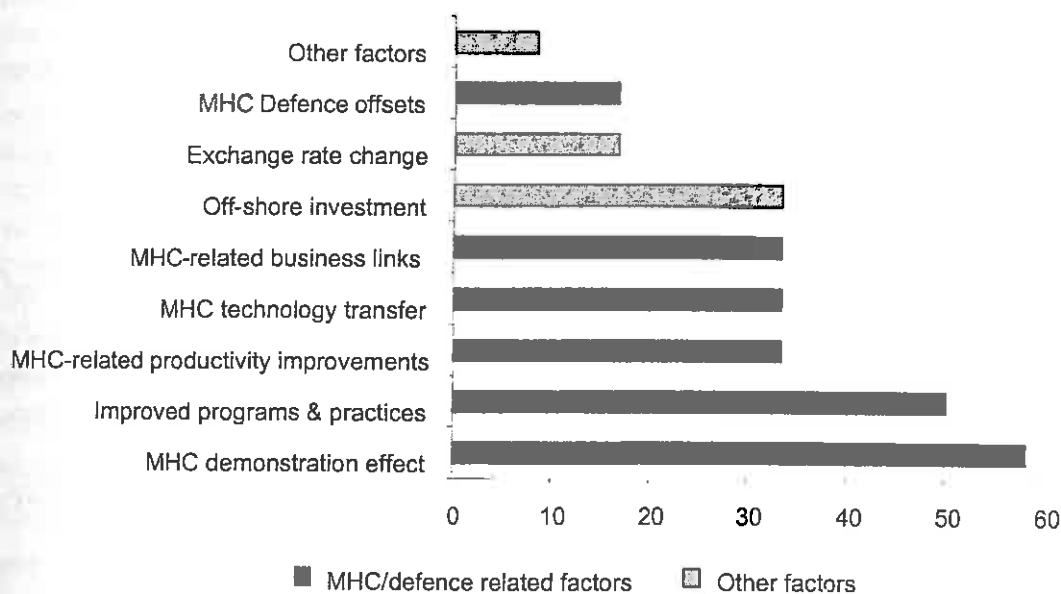
However, the most commonly reported contributor to the increase in exports was the MHC demonstration effect. Nearly 60 per cent of MHC respondents with increased exports reported that their business was able to increase exports because of their business' proven track record on the MHC project (Figure 16). The demonstration effect was also identified as being important among exporters involved in the ANZAC ship project (Tasman 2000).

This MHC demonstration effect has, amongst other things, created opportunities for Australian industry to work with Intermarine, the Italian designer of the Lerici Class minehunter, to supply minehunters for the Royal Thai Navy. The New South Wales Industrial Supplies Office Deputy Director points out that:

Intermarine, through their experience with the MHC project, had an opportunity to see Australian industry's capability first hand. Intermarine is very impressed with our industry's capability, its level of innovation and the quality of its work. When Intermarine decided to tender to supply minehunters to the Royal Thai Navy they naturally considered Australian input.

The ISO worked with Intermarine to identify opportunities for Australian businesses in Intermarine's bid. The ISO on behalf of Intermarine contacted approximately thirty Australian manufacturers. The ISO reports that Australian industry was successful in eight tender packages, worth approximately \$2.6 million in Australian export revenue.

Figure 16: Factors contributing to increased exports among MHC project businesses
(proportion of businesses with increased exports)



Source: MHC survey.

Box 7 presents some firm level examples of how individual businesses success in contributing to the MHC project has improved the export potential of Australian industry.

Box 7: The MHC projects role in increasing exports

CompAir (Australasia) Limited supplied the MHC project with medium and high pressure compressors. The company has also supplied compressors and associated equipment for the Collins Class submarines, the ANZAC frigates and more recently the Hydrographic ship project. Company management considers that its involvement with these defence projects has had an important demonstration effect and has led to the company supplying Defence equipment in the Asia and Pacific regions. For example, the company's track record in supplying the MHC project has led to Intermarine contracting with CompAir Australasia to supply compressors for Lerici Class minehunters Intermarine sold to the Royal Thai Navy.

(Continued)

Box 7: The MHC projects role in increasing exports (continued)

Colpro Engineering's involvement in the MHC project has had an important demonstration effect. Company management said that its Defence work has allowed it to prove to other clients that it is a credible company that can build quality equipment. The company has subsequently been involved in Defence's hydrographic ship project and is now supplying equipment for a company manufacturing ferries in Tasmania. Colpro Engineering is also exporting defence-related equipment to Hong Kong and New Zealand as a consequence of its involvement with Australian Defence projects such as the MHC project.

Cowan Manufacturing's involvement with the MHC project commenced at the bidding stage. The company has formed a close association with the prime contractor ADI Limited and has supplied numerous stainless steel components for the Minehunters Coastal Vessels. However, its major MHC project was the design and manufacture of six stainless steel four-man twin lock recompression chambers. These chambers are designed to meet strict shock and vibration tests and have a low magnetic signature.

Cowan Manufacturing's management considers that the MHC project has had important flow on effects for the company. The company, as a result of the MHC project, has a higher profile both nationally and internationally. One important spin off was the opportunity to demonstrate its capabilities to Intermarine. This led to Cowan Manufacturing's recompression chambers being included in Intermarine's bid to supply its Lerici Class minehunters to the Thai Government. The success of this bid has created a stepping stone to other Thai work including the construction of a Cowan designed recompression chamber for a Phuket hospital. The company is also exporting recompression chambers and other equipment to Malaysia, the Philippines and Hong Kong.

6. INDUSTRY — DEFENCE RELATIONSHIPS

Australian industry through its direct contribution to the development and acquisition of new capability and through its contribution to Defence's national support base plays a key role in Australia's defence capability. Industry's role is important in times of peace but is crucial in wartime. Major Defence contracts such as the MHC project provide Australian industry with an opportunity to build on and improve their defence capability.

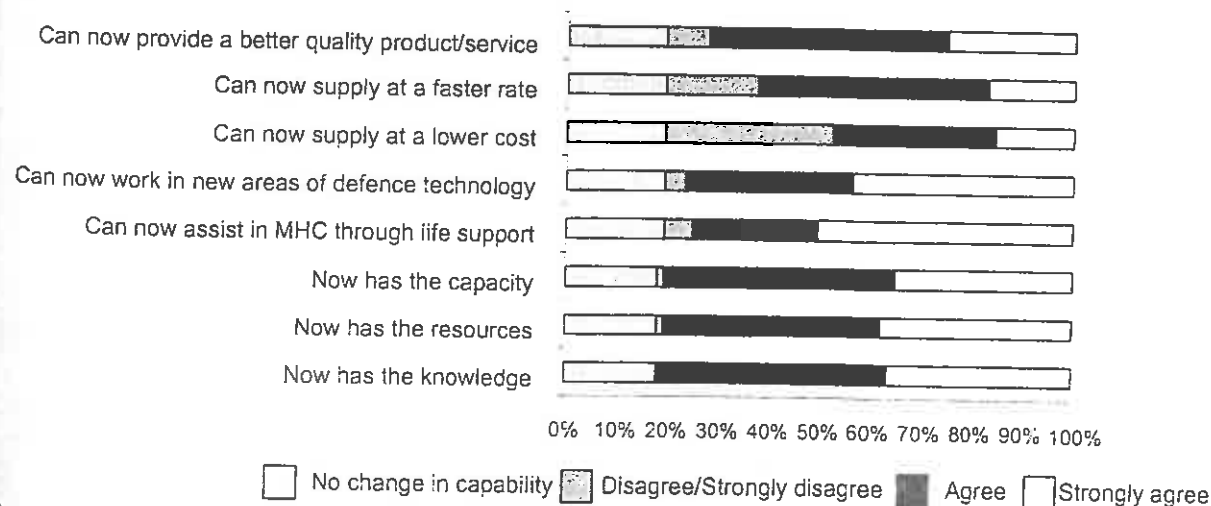
6.1 DEFENCE CAPABILITY

Previous chapters have outlined how Australian businesses participation in the MHC has positively impacted on business through a range of mechanisms and instruments including:

- technology transfer; and
- usage of performance improving programs and practices.

The firm level benefits arising from industry involvement in major Defence projects are, in turn, acting to improve Australia's defence capability. Over 80 per cent of MHC businesses report that they have improved capability to supply the Department of Defence or its contractors as a result of involvement in the MHC build program and/or other Defence contracts. Manufacturing and service sector businesses were both equally likely to have improved capability. As a result of this improved capability, the majority of these businesses have the resources, the knowledge and the capacity to supply the Department of Defence and its contractors. The majority of businesses with improved capability can also now work in new areas of defence technology (Figure 17).

Figure 17: Participating MHC businesses change in defence capability



Source: MHC survey.

Another important survey finding is that 75 per cent of businesses participating in the MHC assessed that as a result of involvement with the MHC and other defence contracts they now have the capability to assist in the through-life support of the Minehunter Coastal Vessels (Figure 17). These through-life support capabilities are considered in more detail in Chapter 8.

Many respondents also report that their businesses are now better able to supply a higher quality product at a faster rate and at a lower cost. While there was some level of disagreement in most of the areas of capability considered, the following two areas had relatively high levels of disagreement about the capability change:

- 33 per cent of respondents disagreed with the statement that 'As a result of improved capability they can supply defence equipment or services at a lower cost than previously'; and
- 18 per cent of respondents disagreed with the statement that 'As a result of improved capability they can supply the Department of Defence or its contracts at a faster rate than previously' (Figure 17).

Box 8 presents some examples of how participating businesses' defence capability has improved. A feature common to many of the businesses is that defence capability is often built up and enhanced through involvement in a range of defence projects.

Box 8: Examples of changes in defence capability

Cowan Manufacturing is a medium sized company operating from Warners Bay, New South Wales. The company's association with Defence work commenced over 20 years ago when the company constructed stainless steel galleys for HMAS Tobruk. The company also played a key role in the construction of the inshore minehunters. The company is now involved in the design of recompression systems, their manufacture and maintenance and the provision of training for their use. Cowan Manufacturing is accredited to the highest international quality standards and is an accredited supplier to both the United States and Australian Departments of Defence. Cowan Manufacturing is also accredited as a Hyperbaric Repair Facility for the Australian Department of Defence and is contracted to undertake maintenance of the RAN's recompression chambers. The company has also recently branched out into providing training operations and daily maintenance of its recompression chambers and is recognised for its capacity to clean oxygen systems to international standards.

The MHC project has had a positive impact on the company's overall productivity. To a large extent the improvement in productivity was linked to the highly specialised requirements of the MHC project. Management said that:

In many respects our work on the Huon class project was more intense than much of our other Defence work. To achieve the high standards required we had to lift our skills base and this has flowed through to improvements in productivity.

(Continued)

Box 8: Examples of changes in defence capability (continued)

Transfield Reinforced Plastics/Composites (Transfield RP/C) manufactures fibre reinforced plastic products. The company considers that its work on the Collins Class submarines and the MHC project was, at that time, the most challenging encountered. Management also points out that Transfield's defence capability in Reinforced Plastics/Composites has substantially improved through its experience with the MHC and the Collins class submarine projects. As a result of its involvement in these projects Transfield RP/C also has the knowledge, the resources and the capacity to assist in the through-life support of the Minehunter Coastal Vessels. Another result of this improved capability in fibre reinforced plastic products is that Transfield/ADI is now the Royal Australian Air Force's authorised contractor for the repair and maintenance of radomes and sonar shields.

Colpro Engineering is a medium-sized business operating in Pendle Hill, New South Wales. The company, among other things, designs and manufactures large diesel and gas turbine exhaust systems. The manufacture of exhaust systems for the ANZAC ships was the company's first Defence project. This project was important for the company as it helped prove that it could manufacture equipment to the strict specifications required by the Department of Defence and its prime contractors. However, the company's management said:

The Minehunter Coastal project was crucial for Colpro as it gave us the opportunity to prove our capabilities not only in manufacturing but, importantly, also in design.

Colpro Engineering designed and manufactured the exhausts for the Minehunter Coastal Vessels' engines and silencers for the pumps. All designs had to meet stringent noise and shock resistant criteria. The stainless steel exhausts also had to be designed to operate with a low magnetic signature. Colpro's team was confident they had the skills and capabilities to meet these design challenges and their involvement with the MHC project allowed them to prove their capability to the Department of Defence but also to private sector clients. Colpro's manager said:

We knew we had the design ability, but the Minehunter Coastal project gave us the opportunity to pull it all together and prove our capability.

Baker and Provan has supplied the Department of Defence and its contractors with slewing arm davits (boat cranes) for over 12 years. The company's capability in supplying the Department of Defence and its contractors has progressively increased over this period. Initially, the company's defence capabilities centered on mechanical engineering such as the machining and fabrication of equipment to a design specified by the Department of Defence. This situation changed with the Minehunter Coastal project.

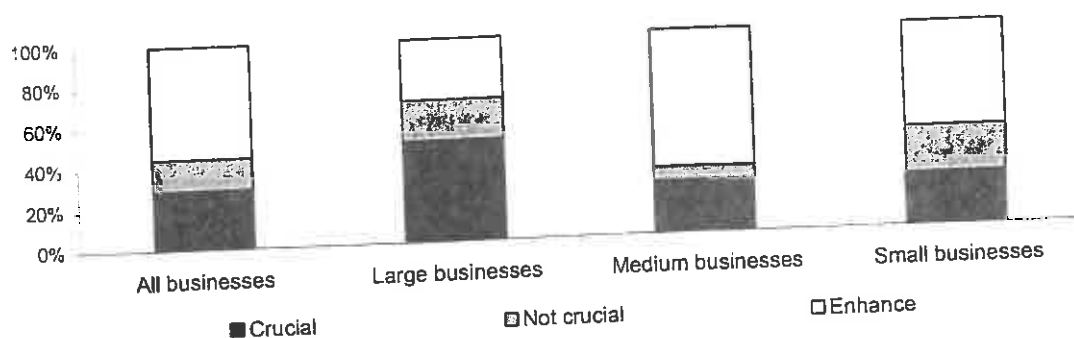
The insights into design technology obtained through Baker and Provan's involvement in the project led to major advances in the company's design capability, which ultimately led to improved defence capability. As a consequence of this improved capability the company successfully tendered to design and manufacture boat cranes for the ANZAC frigates.

6.2 SUSTAINABILITY

Given the importance of Australian industry to our defence capability it is crucial that our in-country defence industry is viable over the long term. More than 90 per cent of the MHC businesses surveyed report that their involvement with the project contributed to net profit. However, the majority of MHC businesses considered that defence-related contracts are not crucial or, alternatively, enhance their business's viability. Just under 30 per cent of respondents maintained that defence-related contracts were crucial to their business viability.

Larger MHC project businesses are more concerned about obtaining defence-related contracts for future viability than smaller businesses. Figure 18 shows that 50 per cent of large businesses (businesses employing 200 or more) considered that defence-related contracts were crucial to business viability, whereas only 25 per cent of small and medium sized businesses had similar views.

Figure 18: Importance of defence contracts to MHC businesses' viability



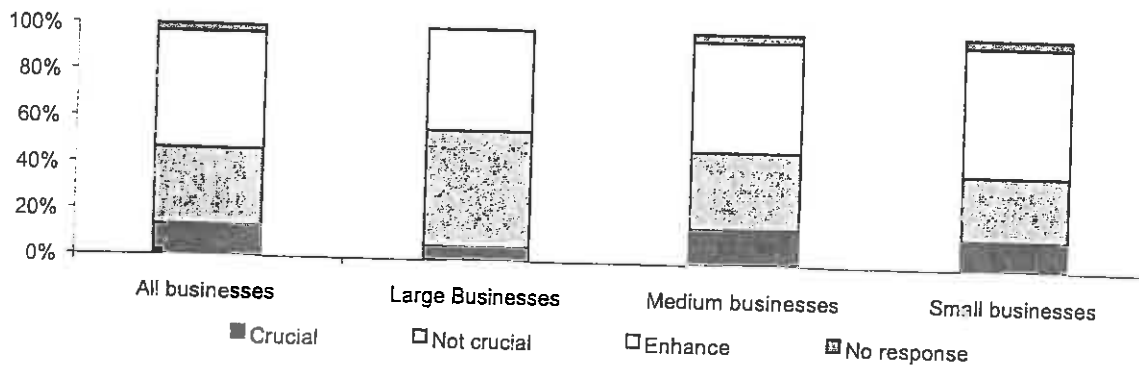
Source: MHC survey.

A different picture emerged in the ANZAC ship case study (Figure 19 and Tasman 2000). Only 13 per cent of respondents to the ANZAC ship survey reported that defence work was crucial to their business' viability. Further, medium and small businesses were more likely to report that defence work was crucial than larger businesses.

ANZAC ship respondents were more likely to report that defence work was crucial to their viability if the ANZAC ship project accounted for more than 10 per cent of their business' turnover. To minimise respondent burden a question on the importance of the MHC project to businesses turnover was not included in the MHC survey questionnaire. However, given the number of respondents reporting Defence work was crucial a number of MHC respondents were followed up by telephone on this issue. Many of the businesses contacted reported that the MHC or other defence work accounted for between 10 per cent and 30 per

be the important factor in respondents' decision to report that defence work is crucial to their business' viability.

Figure 19: Importance of defence contracts to ANZAC ship businesses' viability



6.2.1 The Defence export nexus

As outlined in Chapter 5, businesses participating in the MHC and ANZAC ship projects have a much high propensity to export than industry as a whole. This higher export propensity enhances 'defence industry' sustainability by making businesses less reliant on Defence work. Importantly, Chapter 5 also identified that involvement in Defence work enhances these businesses ability to export. Thus the benefits of the relationship flow in both directions and, in turn, act to further strengthen industry's sustainability and Defence's capability.

7. IMPROVED BUSINESS PERFORMANCE — AN IMPORTANT OUTCOME

The technology transfers achieved through Defence projects such as the MHC and the high level of usage of best practice programs and practices by defence industry businesses has positive implications for industry's ability to support Australia's Defence capability. Industry, as a result of its involvement with major defence projects, is now better able to provide the high quality, high technology equipment, training and support that Defence requires.

While the importance of this improved capability should not be discounted, it is only a part of the overall impact of Australian industry participation in major Defence projects. As outlined in earlier chapters a substantial number of firms participating in the MHC project reported that their involvement in the project has had positive spinoffs for productivity as well as other aspects of performance including improved quality and increased exports.

7.1 PRODUCTIVITY GROWTH

Productivity growth is central to improving Australia's competitiveness and its citizens' standard of living. For example, the Industry Commission (IC 1997, p. xxi) notes:

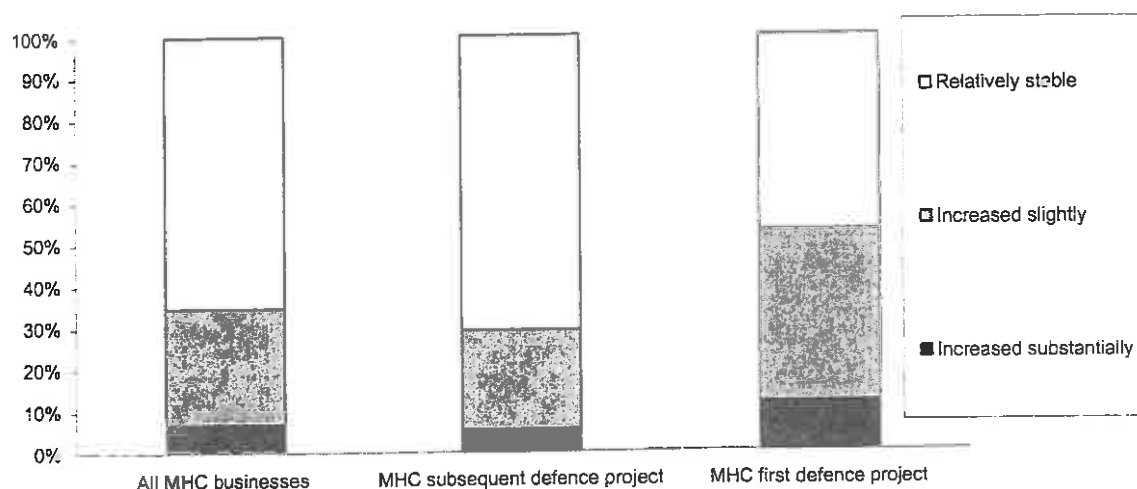
Raising and sustaining productivity growth should continue to be a high priority for policy. The evidence is that strong and sustained productivity growth is essential if Australians are to purchase more, save more, enjoy more leisure, and increase their capacity to meet community objectives and protect the environment.

MHC survey respondents were asked to indicate both qualitatively and quantitatively how their overall business productivity was effected by involvement with the MHC project. No business reported a decrease in its overall productivity/efficiency as a consequence of its involvement with the MHC project. While the majority of businesses considered that productivity had remained relatively stable, 35 per cent reported that involvement with the MHC had led to an increase in productivity (Figure 20).

The proportion of businesses reporting a productivity increase did not vary significantly by business size. However, respondents reporting that the MHC was their business' first time defence-related project were more likely to experience an increase in productivity as a result of their involvement with the MHC project than businesses with more experience in defence work (Figure 20). Nevertheless, a significant number of respondents from businesses with a long record of working on defence projects considered that involvement in the MHC project was important in improving overall productivity performance. The positive productivity experiences of Cowan Manufacturing, a company which has supplied the Australian and

United States Departments of Defence for more than two decades, is a case in point (see Box 8).

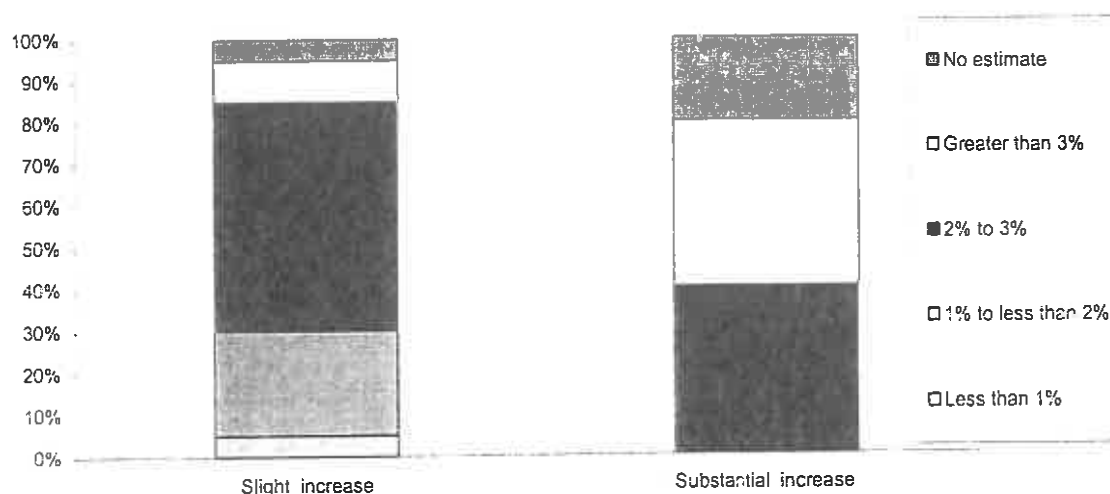
Figure 20: Respondents qualitative estimate of the change in productivity



Source: MHC survey.

In the majority of instances the productivity increase qualitatively reported by firms was assessed to be "slight". However differences in perceptions about the relative magnitude of the increase become apparent when firms quantified the increase. For example, more than half of the businesses reporting a slight increase in productivity estimated that the increase was between 2 per cent and 3 per cent. Forty per cent of businesses reporting a substantial increase also estimated that the increase was in the 2 per cent to 3 per cent range (Figure 21).

Figure 21: Quantitative estimates of MHC related increase in productivity (per cent of firms reporting a productivity increase)



Source: MHC survey.

Businesses reporting a productivity increase of greater than 3 per cent were given the opportunity to estimate the actual increase, these estimates ranged from 5 per cent to 10 per cent. The average change in productivity generated as a result of these businesses involvement with the MHC project was 2.24 per cent.³

The productivity increases generated by Australian industry's participation in the MHC project can be expected to have had positive impacts on Australia's economic wellbeing. Part C considers the impact of this productivity improvement on the Australian economy as a whole.

³ This average productivity increase was estimated by assigning the midpoint of the productivity increase option chosen by each business reporting an increase in productivity. This estimate was then assigned a weight, which was based on the businesses' reported annual turnover. These increases in productivity were then summed to derive an average increase in productivity.

PART C: THE MHC PROJECT'S ECONOMY WIDE IMPACTS

In addition to being a catalyst for technology transfer, improved defence capability and a driver of improved performance for many businesses, Defence projects can have positive impacts on the economy as a whole. This can occur in a variety of ways.

First, the increased capability of Australian businesses to work with the Department of Defence or its prime contractors can have positive implications for the through-life-support of major naval acquisitions, such as the MHC vessels. The benefits of Australian industry involvement in the support of the Minehunter Coastal Vessels include:

- savings in the amount of money and resources Defence needs to outlay on in-service support; and
- shorter repair turn around times which, in turn flows, through to improved operational capability.

These impacts are considered in greater detail in Chapter 8.

Second, the decision to construct the vessels in Australia rather than import similar vessels from overseas has implications for national output, Gross Domestic Product, Australian's consumption and employment.⁴

Finally, the increase in the productivity experienced by many businesses associated with a Defence project, such as the MHC project, has an additional positive impact on the economy. General equilibrium analysis indicates that the stimulus created by the construction of the Minehunter Coastal Vessels in conjunction with the productivity improvement experienced by its subcontractors will have, in net present value terms, contributed up to \$887 million in Gross Domestic Product over the nine year construction phase. While the construction stimulus has a relatively short time frame of nine years the benefits of the MHC-induced productivity improvement will continue long after the project has been completed. These economy wide impacts are considered in greater detail in Chapter 9.

⁴ This report refers to the MHC project's contribution to a number of national aggregates, such as GDP. The definition of these aggregates can be found in Appendix 4.

The analysis presented in this part of the report demonstrates that if the MHC project had not gone ahead and similar ships had been sourced from overseas the Australian economy would have been worse-off in terms of both national income and consumption.

8. THROUGH-LIFE SUPPORT

The Minehunter Coastal Vessels' in-service support contract reflects a change in the RAN's approach to through-life support. This new approach, which was first initiated for the Collins Class Submarine project, relies on a close collaboration between the RAN and Australian industry. In this instance it sees industry, as much as possible taking responsibility for the logistic support of the MHC capability from the RAN. By contrast, in-service support for acquisitions purchased prior to this change in policy required the RAN to undertake all management aspects and arrange for in-service support to be provided through a series of individual contracts. In many cases in-service support services were provided by the overseas original equipment suppliers and foreign navies.

As per Defence contracting guidance at the time of the acquisition, the through-life support contracts for the Minehunter Coastal Vessels were negotiated separately from the acquisition contract. After completion of a tendering process in 2000, Defence awarded ADI Limited the Minehunter Coastal Vessels' in-service support contracts for the platform systems and combat system and Thales Underwater Systems (TUS) was awarded the in-service support contract for the ship's sonar system.

Both ADI's and TUS's through-life support contracts run for a five-year period. Both contracts include an option to extend for a further period. The contracts cover routine and ad hoc in-service support services. The routine in-service support components of the contracts are valued at \$41 million and \$19 million, respectively. ADI estimates that over the first five years the ad hoc component could run to three or four times the value of the routine in-service support component.

A wide range of tasks and services are covered by the contracts. Tasks covered by the ADI routine contract include:

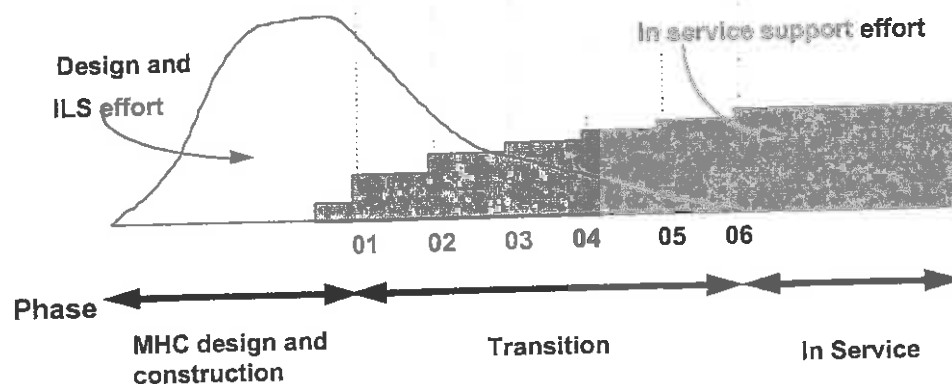
- Program management;
- System engineering and configuration management — including, design change management and implementation, supportability analysis, technical investigations and provision of technical advice to Minehunter Coastal Vessels' personnel and obsolescence management;
- Platform and combat system maintenance, management and planning;
- Inventory management — including warehousing, procurement and distribution of spares; and
- Planning and scheduling technical training of crews and other personnel as required — under the contract, the conduct of training is treated as an ad hoc service.

In regards to Sonar training for the RAN's Minehunter Coastal Vessel crews, TUS reports that its contract was the first in-service support contract where training for a system was contracted to the Original Equipment Manufacturer (OEM) for both training development and implementation. To deliver this training TUS maintains a RAN Training System qualified external training group.

Even though through-life support technically commences on the delivery of the first ship, work must commence much earlier. The through-life support period can be conceptualised as involving the following three distinct phases:

- Design and construction;
- Transition; and
- In service support (Figure 22).

Figure 22: Phases in the provision of through-life support



Thus, the process of developing a through-life support plan commenced in the design phase of the acquisition contract, well before Defence awarded the in-service support contracts. As part of this first phase of in-service support, the prime contractor put in place a comprehensive Integrated Logistics Support (ILS) program. The ILS flow chart (see Figure 23) highlights the interdependencies between the design, construction, training and in-service support activities.

The Minehunter Coastal Vessels' through-life support effort is currently in the transition phase. Four vessels have been delivered to the RAN and the remaining two are nearing completion. As Figure 22 demonstrates, the scale of the through-life support workload progressively increases as each vessel comes into service.

The Transition phase is a high-risk period in the through-life support of a new class such as the Minehunter Coastal Vessels. This is because:

- training of crews and support staff is under way;
- even fully trained crews and support staff have relatively limited experience in operating and supporting the ships;

- In the process of managing these risks, the transition phase provides opportunities for the RAN, ADI and TUS to identify where the vessels' logistics support package may need to be refined or reviewed. Once all of the vessels have been delivered, in-service support enters into a steady state.

The diagram illustrates the architecture of a Logistics Management System, which integrates maintenance management, technical data, and inventory management. The system is organized into several key components and their interactions:

- Input/Output and Planning (Left Side):** A vertical stack of boxes includes "Policy", "Plan", "Supply", "Demand", and "Source Data". These components interact with a central vertical bar representing the "Logistics Management System".
- Resource Management (Middle Left):** A column of boxes lists "Tools", "Test Equipment", "Spares", "Computing", "Operating/Maintenance Procedures", and "Technical Documentation". These feed into a central box labeled "Provisioning".
- Procurement and Inventory (Right Side):** Below "Provisioning" is a box labeled "Procure". To the right of "Procure" is a box labeled "Storing". Below "Storing" is a box labeled "RAN Inventory". Below "RAN Inventory" is a box labeled "Install/set to work".
- Configuration and Integration (Bottom):** A large box at the bottom left is labeled "Configuration Management". It is connected to "Source Data" and the central "Logistics Management System". A large box at the bottom right, labeled "Logistics Management System (Maintenance management system, Integrated electronic technical data, Inventory management system)", is connected to "Technical Documentation", "RAN Inventory", and "Install/set to work".

The flowchart shows the flow of information and materials between these components, highlighting the integration of various systems into a unified logistics management framework.

IMPACT OF MAJOR DEFENCE PROJECTS: MINEHUNTER COASTAL CASE STUDY

8.1 EXPERIENCE TO DATE

During the study, representatives from the Department of Defence, ADI and TUS were contacted to assess the scope and significance of in-country through-life support plans. These discussions and other feedback which are reported below, indicate that the MHC Project is demonstrating to Defence and Australian industry the positive impacts of being both a prime, a design authority, and an original equipment manufacturer, not only during production, but also in the emerging through-life support phase.

8.1.1 Defence's perspective

The Project's Director, is clearly of the view that the RAN, as the customer, will achieve an enhanced through-life outcome because the MHC's in-service support is being provided by local industry. The strong local industry involvement program that was achieved during the acquisition of the vessel further enhances this long-term support outcome.

From the RAN's perspective an in-country through-life support capability has had a positive impact on operational capability. For example, under the contract repair turn around times (RTAT) are required to be in the range of 90 to 180 days. Defence advised that in some instances RTAT of up to a year, or even longer, could be expected when a capability is sourced and serviced from overseas suppliers. Furthermore, in periods of international crisis, such as in the Gulf War or the current War on Terrorism, there is the potential for RTAT to blow out to years as overseas suppliers are under pressure to give the priorities of their own defence organisations the highest weight.

While these benefits are significant, the Project Director also pointed out that the in-service support contracting arrangements present lessons for future acquisition contracts. As noted above, Defence contracting guidance at the time of the MHC's acquisition contract was that through-life support contracts should be negotiated separately from acquisition. The Project Director believes that this has caused some problems not only for Defence but also for the prime contractor. A particular concern is maintaining the specific MHC project-related skills and capabilities developed in Australian industry under the industry involvement program, which would enhance the support outcome, prior to the start of through-life support activity. Unless there is other, similar work being carried out by the company, there is significant potential to lose staff and their skills and knowledge during this period.

Consequently, the Project Director is of the view that the current Defence contracting philosophy, which emphasises the need to put in place arrangements for through-life support when negotiating major acquisition contracts, has significant potential to lead to an enhanced transition and long-term support outcome. He is of the view that a number of the

problems faced during the transition period would not have appeared if the acquisition and support contracts had been negotiated at the same time.

8.1.2 Industry's perspective

Both ADI and TUS consider that Australian industry's involvement in the MHC project has provided Defence with an excellent (best practice) indigenous capability to support the ships' throughout their operational lives. That said, the gap between awarding the acquisition contract and the in-service support contract has presented some complications to the provision of the Minehunter Coastal Vessels' in-service support. For example:

- since the acquisition contract was awarded a number of Defence companies in Australia and offshore have been the subject of mergers and acquisitions as the global defence industry adjusts to changing demands. Such structural change occurs from time to time in all industry sectors and the defence sector is no exception. However, these mergers and acquisitions have to some extent complicated the negotiations for the provision of through-life support. The contractual responsibilities of all parties would have been much clearer if the through-life support contract had been agreed to at the same time as the acquisition contract;
- because through-life support was not a requirement of the acquisition contract ADI could not give its subcontractors a guarantee that they would have work in the through-life support phase. As a result of this uncertainty some subcontractors were reluctant to undertake the necessary steps in the acquisition phase to prepare and invest for through-life support. In this period of transition to through-life support, invaluable expertise can be lost. For example, some subcontractors' staff, uncertain of their future, moved on to other projects or to other employers. ADI reports that in some areas, the uncertainty created by the through-life support contracting philosophy led to a loss of through-life support capability in the short term; and
- the segmentation of acquisition and through-life support contracting arrangements means that the prime contractor must negotiate with two Defence customers (acquisition and support) in order to resolve issues that transcend both contracts. There can be no guarantee that these two clients have the same views on the most appropriate approach to the resolution of a particular issue. This can result in trade-offs, which may not necessarily be ideal from a through-life support perspective. For example, opportunities for design changes that would realise through-life benefits have not been pursued in the interests of complying with the acquisition contract's cost and schedule constraints.

While these issues and problems have been managed, they have increased the risks associated with the transition phase of the Minehunter Coastal Vessels' in-service support. Notwithstanding this, ADI's Minehunter In-Service Support Manager, points out that:

The transition challenges have been addressed. It is clear that the Minehunter Coastal project has built up Australian industry's in-service support for Defence capability. And, as a consequence, Defence is achieving savings, in terms of lower procurement and maintenance costs and increased operational availability.

Furthermore recent changes in Defence's through-life support contracting philosophy should lead to even higher savings for capability acquired under the new arrangements.

As outlined below, savings have been achieved through the management of inventories, repairs and maintenance and through low RTAT.

• **Inventories**

A range of inventory management techniques in conjunction with short turn around times and the valuable input of staff who have a high level of knowledge about all aspects of the equipment, have reduced Defence's capital procurement costs. For example, in relation to the platform and combat systems in-service support contract, ADI estimates that:

- the inventory savings achieved to date through alternate sourcing would be in the order of \$6 million to \$8 million over the vessels' 20 year life;
- improved repair turn around times are resulting in inventory holding savings in the order of \$7 million to \$8 million over the vessels' 20 year life; and
- savings achieved through inventory distribution and collection procedures are in the order of \$300,000 per annum.

• **Repairs and maintenance**

As part of the in-service support function, both ADI and TUS have each set up a multi-functional service team. These two teams have enabled ADI and TUS to provide the RAN with a unique service. The teams comprise people who have experience in systems engineering, test and trials, logistics analysis and training. With their overall multi-system knowledge, the teams can provide advice and instruction over the telephone to the ships' crews. If the team's attendance at a ship is required this can be arranged seven days a week.

ADI points out that its Routine Services Team can often diagnose problems that transcend a number of systems. In addition to providing a speedier solution to such problems the Routine Services Team is also a cost effective alternative to involving individual equipment suppliers (at high hourly rates) who cannot have the overall knowledge necessary to resolve system integration or whole of ship type problems.

TUS reports that in addition to providing a speedier solution to problems its In Service Support Team has been providing valuable assistance to the RAN during the conduct of ship trials.

Examples of TUS's speedy response to urgent MHC repairs include:

- notification of a fault in the Sonar system on a ship in Darwin was received at 1200 hours on a Saturday. By 2200 hours a member of the company's In-service Support team in Sydney was in attendance at the ship; and
- a ship on exercise north of Sydney reported a sonar problem and was going to terminate its participation. The ship called into TUS's Technical inquiry service, the defect was investigated with the use of a system in TUS's facility, a work around was discussed and agreed with the ship and the ship successfully completed the exercise.

Examples of ADI's speedy response to urgent MHC repairs include:

- notification of a fault in the communications system on a ship in Cairns was received at 1200 hours. By 2300 hours the same day an ADI person (from Sydney) was in attendance at the ship;
- a ship transiting north from Sydney reported a defect on a main engine. The ship called into ADI's Minehunter facility in Newcastle at 1800 hours. The defect was repaired and a trial conducted, at midnight the ship continued its passage north.

This type of industry interaction with the RAN and the establishment of the multi-functional system team approach to in-service support, requires a deep-seated system knowledge of a capability. Australian industry can only obtain this knowledge, and thus provide this type of in-service support, by having a major involvement in the acquisition phase. The MHC Project has been important to Defence and Australian industry in demonstrating the positive impacts of being both a prime and a design authority, not only during production, but now in the emerging through-life support phase.

• Preventive Maintenance and training

Preventative maintenance is a key component of effective through-life support. For example, as at October 2001, the ADI and TUS teams planned and managed 23 Funded Maintenance Availabilities (FAMPs). FAMPs are typically of two weeks duration and occur at approximately three-monthly intervals, depending upon the ship's program. They are used to conduct the preventive maintenance, which is beyond the capacity of ship's staff, as well as to carry out repairs (or corrective maintenance) of a non-urgent nature. The ability to plan and provide for a regular cycle of preventive and corrective maintenance requires a degree of communication, flexibility and responsiveness that is made much easier by having a highly skilled in-country team. The concept of transitioning this type of maintenance from

RAN crews to industry, without having an adverse impact on operational requirements, requires the closest of working relationships that will need to endure for the lifetime of the vessel.

TUS reports that, at the RAN's request, the company has on several occasions, provided experienced staff to work on board ships during major exercises. TUS reports that this on board support has been beneficial to the crew who gained valuable operational training. This "on-tap" support can also enhance the ship's performance during an exercise. It is unlikely that this support would be available from an offshore original equipment supplier.

• Turn around times

Over the period since the first ship was delivered in early 1999 to October 2001 ADI received around 700 notifications of requests for assistance and/or repair action from the in-service vessels. Over the same period TUS received 50 notifications of requests for assistance with the Sonar system.⁵

These requests are given a priority rating. Under the in-service support contracts, requests rated as Priority 1 require an immediate (or as soon as practicable) response. Priority 2 requests, which form the majority of requests received by ADI, have a longer response time frame. ADI and TUS advise that on all occasions their multi-functional service teams have provided the customer with a rectification plan within the response time frame specified in the in-service support contract. ADI reports that in its case over 300 of its notifications were cleared in less than 30 days and 27 were cleared before an official notification and request for assistance had been received.

ADI and TUS are both working to, wherever possible, further reduce the ships repair turn around times. RTAT has been improved over past projects by:

- utilising a rigorous approach to establishing Australian depot level requirements through techniques such as repair analysis and industry support plans;
- utilising ADI's Routine Services Team and TUS's In-service Support team and local industry capability, rather than a foreign original equipment manufacturer, to find faults and repair capability;
- working to maintain good direct relationships with ADI's original equipment manufacturers;

⁵ Taken in isolation, the number of notifications cannot provide an accurate representation of ship reliability or availability. Nonetheless, the response times to these notifications provides a useful measure of the responsiveness of contractor (and RAN) support infrastructure and a measure of the robustness of the in-service support philosophy and its implementation.

- identifying problems in items to be repaired prior to despatching to a repair agent and encouraging repairers not to operate a 'first-in, first-out' regime or queuing system; and
- streamlining the administration process and fast tracking acceptance or rejection of quotations.

Some examples of local industry arrangements that have reduced repair turnaround times or have matched the RAN's in-house repair capability are listed below:

- gyros are repaired through an arrangement between ADI Services and Sagem in Australia. These items would previously have been repaired by Sagem in France which could result in a RTAT of months rather than weeks;
- the use of a local company in the acquisition phase for the build of the mine disposal vehicles has helped facilitate the vehicles' Swedish original equipment manufacture awarding an Australia company a licence to conduct in-country repair and service. This licence has given ADI and its subcontractors the ability to comply with a subsequent in-service support contract requirement that the RTAT for the vessels' mine disposal vehicles should be no longer than two weeks;
- BAE SYSTEMS has developed a test rig and methodology to test electro luminescent panels in-country. Prior to developing this in-country capability items needing repair had to be returned to the UK at a cost of \$9000 and RTAT of 12 weeks. Utilising the new test rig, a similar repair was conducted locally in 1 hour at a cost of \$200;
- communication system equipment repairs on headsets and the like are undertaken in-country and are available for use within hours rather than weeks; and
- repairs to valves are undertaken by a local engineering company and, in some circumstances, are back with the RAN on the same day a fault is identified. This RTAT is equivalent to the standard of service achieved by the RAN's in-house repair capability.

8.1.3: In-country through-life support — a win-win strategy

The discussion above highlights that the benefits to Defence of a major in-country acquisition such as the MHC project extend past the construction phase. The Australian industry involvement in the MHC project has developed or enhanced the capability of Australian industry to provide in-service support. Many Australian businesses are currently working with the Australian prime contractor providing in-country through-life support for the ships. The in-service support benefits of Australian industry involvement are many and include:

- savings in the amount of money and resources Defence needs to outlay on in-service support;

- shorter repair turn around times, which in turn flows through to improved operational capability; and
- increased effectiveness during operations through the provision of 24 hour technical inquiry services.

In-country through-life support also creates opportunities for "value adding" which would be less likely to be obtained through an out-of-country arrangement. The multi-functional system team approach used by ADI and TUS to support the Minehunter Coastal Vessels is an example of these "value adding" opportunities. This approach can only be contemplated when Australian industry has a deep-seated system knowledge of a capability. This can only be gained through either the experience of being the prime, or by achieving design authority status.

The importance of having a strong in-country through-life support capability becomes particularly obvious in periods of international crisis, such as the current War on Terrorism. Past experience indicates that in times of international crisis out-of-country through-life support repair turn around times can blow out because overseas suppliers are under pressure to give the priorities of their own organisations the highest weight. An in-country capability means that Australia's Department of Defence requirements are treated as 'priority number one'.

While the experience to date with the Minehunter Coastal Vessels' transition into in-service support has been positive there are nonetheless lessons for future Defence contracting. The MHC Project Director in Defence and the ships' In-service Support Managers in ADI and TUS consider that the management of the risks associated with the transition phase of in-service support have been complicated by the through-life support contracts being negotiated some considerable time after the acquisition contract. However, they are all of the view that recent changes in Defence's contracting philosophy on through-life support should enhance the transition and long-term support outcomes, which can only increase the benefits to be gained from in-country through-life support arrangements.

9. THE MHC PROJECT'S IMPACT ON NATIONAL AGGREGATES

Since 1994 the MHC project has generated output, employment and Gross Domestic Product (value added) for the Australian economy. This Chapter focuses on the MHC's contributions to these economic variables.

9.1 THE MHC INPUT-OUTPUT DATABASE

The actual quantum of the economic effects of the MHC project is not just related to the direct employment and increased demand in Australia that the project has created. This is because these initial impacts have flow on effects, which should also be included in the analysis. Input-output activity multipliers, which are derived from an input-output database, are an established method for estimating these flow-on effects. To help estimate these direct and indirect effects Tasman Economics has developed an input-output database, which separately identifies the MHC project.

In a project such as the MHC it is difficult to identify a year which could be considered as "typical". For this reason the MHC input-output database developed for this study is based on the latest available Australian Bureau of Statistics input-output table of the Australian economy. This database, which represents the economy's inputs and outputs for the year 1996-97, contains 106 highly aggregated Australian primary, manufacturing and service sector industries (see ABS 1999). The high level of aggregation in the Australian Bureau of Statistics input-output table means that the inputs and outputs of projects such as the MHC project cannot be readily identified. However, with the assistance of the prime contractor's financial records and extensive supplier database, Tasman Economics has been able to estimate and separately identify the MHC project inputs and outputs for 1996-97. These data were extracted from the relevant industry in the input-output table and then aggregated into two input-output industries — the MHC prime contractor industry (comprising the activities of ADI's Minehunter facilities in Newcastle) and the MHC subcontractor industry.

The new MHC input-output database identifies the linkages in 1996-97 between the MHC prime contractor, its suppliers and the rest of the economy and, through imports, the rest of the world. Consistent with the ABS input-output methodology, New Zealand content in the MHC project has been treated as imports. However, under the Australian Industry Involvement program local content in major Defence projects includes value added from New Zealand as well as Australian industry. Figure 24 sets out the key milestones in the MHC to date to highlight the activity in the selected year 1996-97.

Figure 24: MHC project production - key milestones, to date

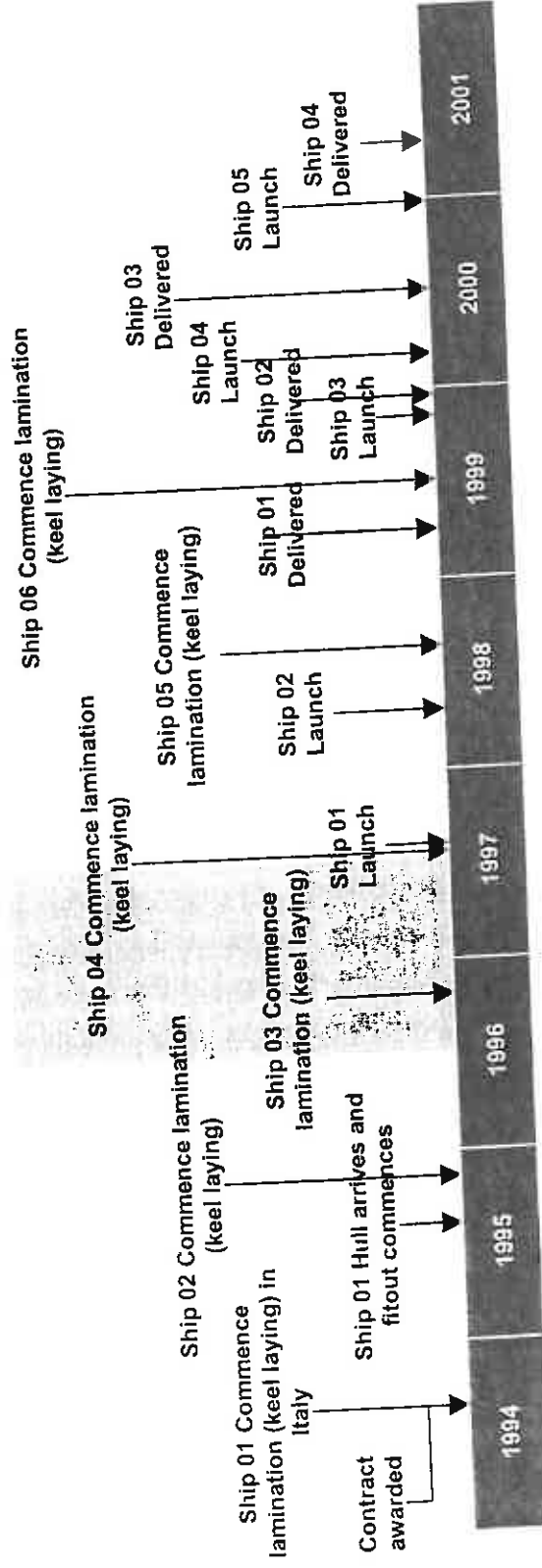


Figure 24 illustrates that a range of activities were under way in 1996-97 including:

- fitting out of ship 01;
- fitting out of ship 02; and
- keel laying and lamination of ship 03.

The current planned dates for major future milestones are:

- Ship 06 to be launched - January 2002;
- Ship 05 to be delivered - January 2002; and
- Ship 06 to be delivered - September 2002;

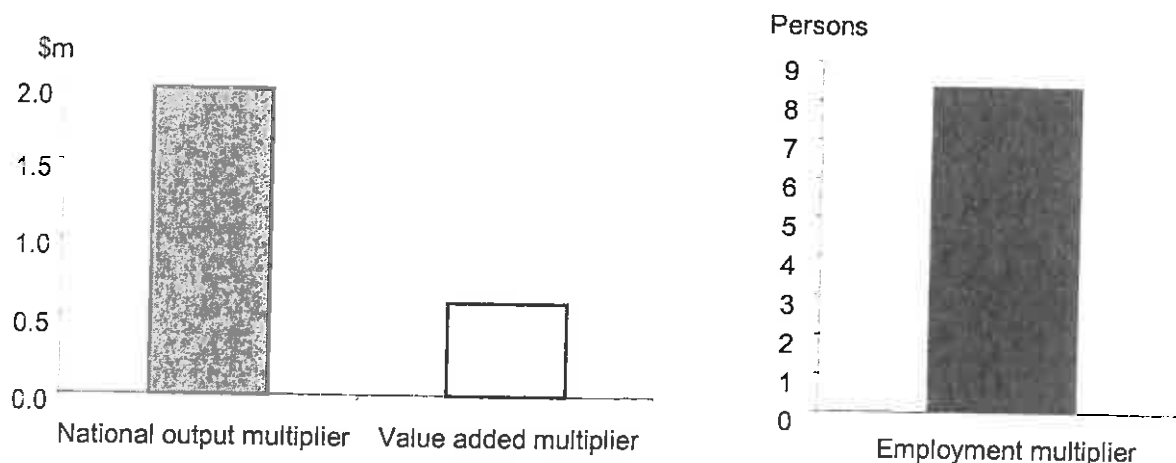
The construction contract is expected to be completed in March 2003.

The MHC input-output database separately identifies the MHC project and its linkages to the Australian economy. It has been used to calculate output, employment and value added multipliers. These multipliers represent a well-established analytical approach for assessing the extent of the direct and indirect linkages between an industry and the rest of the economy. Appendix 4 outlines some of the key assumptions underlying multiplier analysis and presents more detail on the MHC multipliers, which are summarised below.

Multiplier analysis indicates that for every dollar of MHC output there will be a significantly larger increase in national output, value added (or Gross Domestic Product) and employment in Australia (Figure 25).

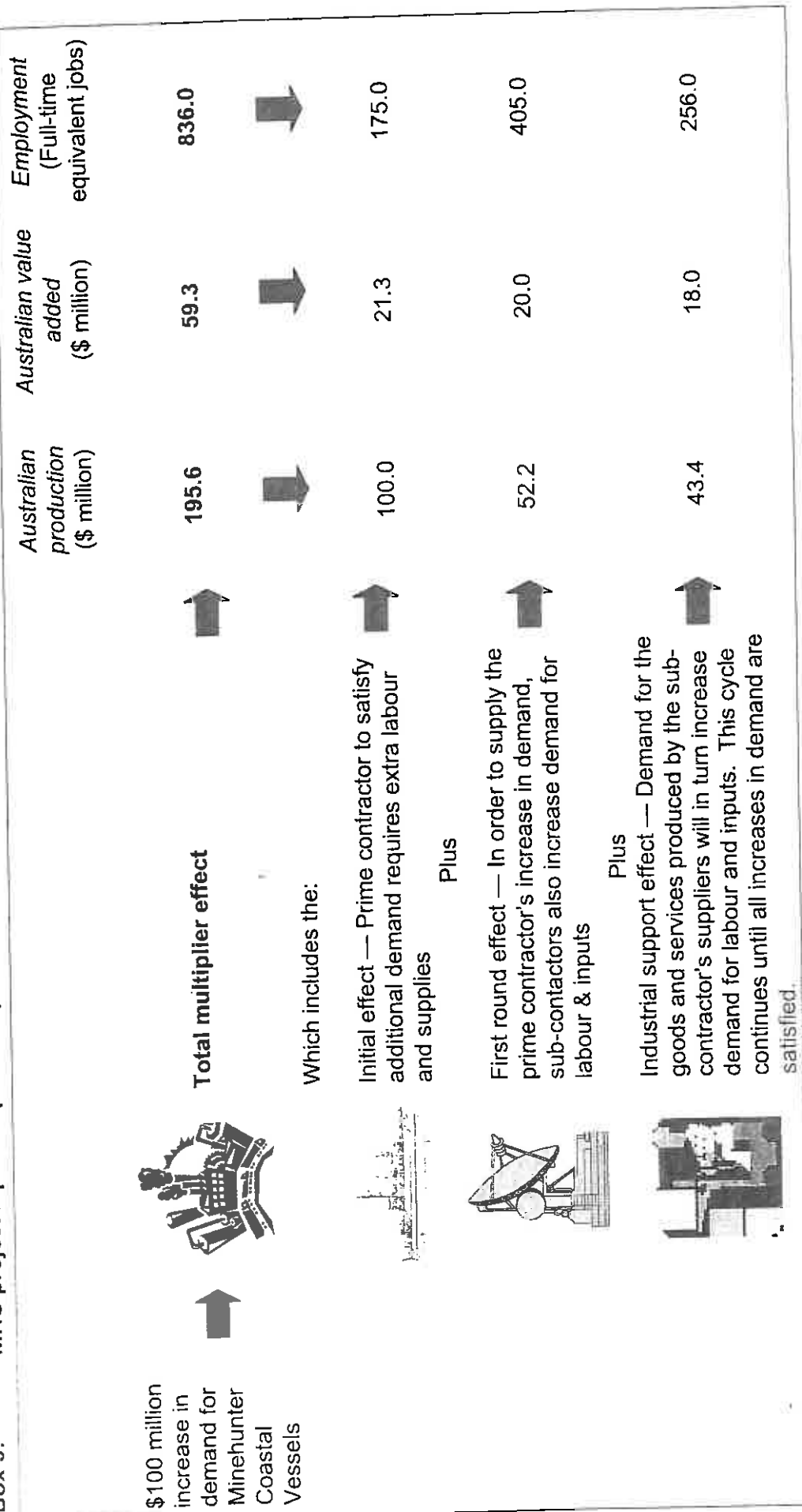
As explained in Box 9 this multiplier effect is due to the linkages between the MHC project and the rest of the economy. In the following section these multipliers have been applied to the outputs of the MHC project to help assess the wider impact of the project on the economy.

Figure 25: MHC project input-output multipliers
(economic activity generated by a \$1 million increase in MHC project output)



Source: Tasman economics estimates.

Box 9: MHC project input-output multipliers for Australian output, value added and employment



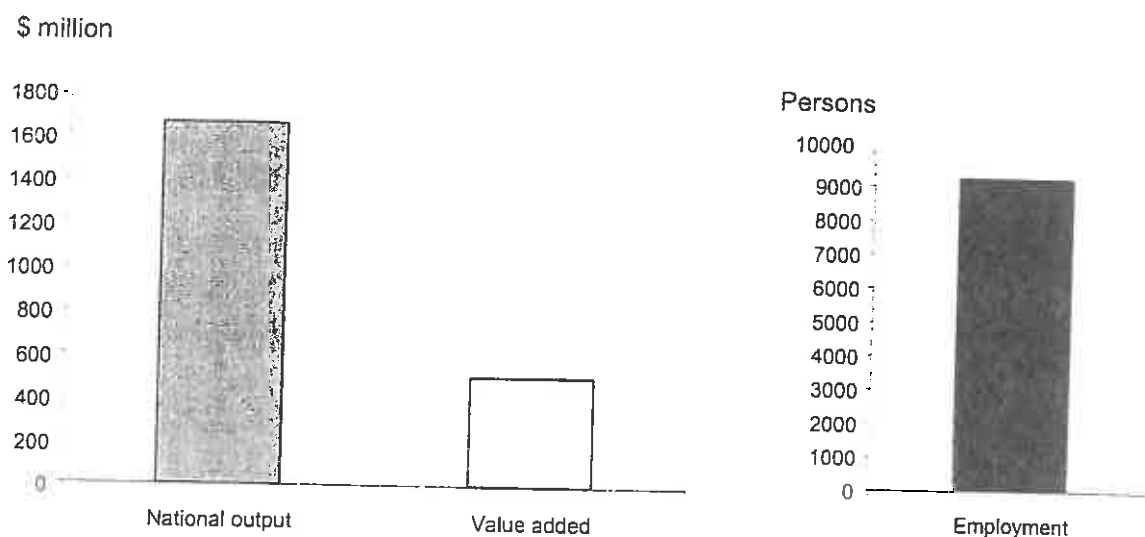
9.2 CONTRIBUTION TO NATIONAL ECONOMIC ACTIVITY

The construction of the Minehunter Coastal Vessels spans a period of around nine years. Over this period the MHC prime contractor will deliver vessels with a contract value of just under \$917 million in 1993 dollars, or more than \$1 billion in 2001 dollars. The contract directly contributes to the total value of national output, value added and employment. However, because of the linkages between the prime contractor, its subcontractors and the wider economy, the project's contribution to national aggregates is greater than the contract value might suggest. Applying the input-output multipliers reported above to the contract value indicates that over its nine year life the MHC project will, in net present value (NPV) terms:

- contribute \$1,665 million (2001 dollars) to national output; and
- contribute \$505 million (2001 dollars) to national value added (Figure 26).

In addition, over the nine year construction period MHC project directly and indirectly generated (or sustained from year to year) around 9,250 full-time equivalent jobs (Figure 26).

Figure 26: Impact of the nine year MHC project on national aggregates

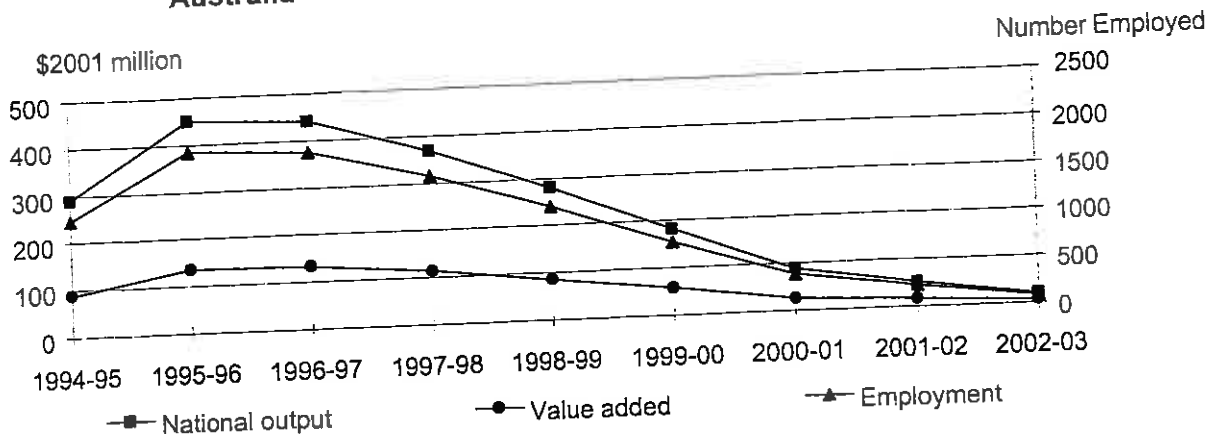


Note: Australian production and value added estimates are reported in terms of their net present values.
Source: Tasman Economics estimates.

As might be expected the annual value of output, value added and employment generated by the construction of the Minehunter Coastal Vessels in Australia was at its peak in the early years of the project's life. For example, in 1995-96 the project directly and indirectly generated more than 1,900 jobs and around \$135 million in value added (2001 dollars). Even in the project's later years its contribution to the economy is still substantial. For

example, input-output multipliers indicate that the project in 2000-01 generated around 370 jobs and \$26 million of value added for the economy (Figure 27).

Figure 27: Annual impact of constructing the Minehunter Coastal Vessels in Australia



Source: Tasman Economics estimates.

Given the large involvement of New South Wales businesses in the MHC project, a substantial proportion of this employment and value added will have been generated in the State. The Newcastle region of New South Wales, the construction site for the ships, will have enjoyed a significant proportion of this activity. Analysis presented in Appendix 3 indicates that the MHC project will have generated (or sustained from year to year) at least 3,180 full-time equivalent jobs in the Newcastle region. This contribution to employment in the Newcastle region does not take into account the flow on employment effects that are associated with such a major project.

Throughout the vessels' construction the Newcastle region has had consistently higher rates of unemployment than the national average (see figure in Box 10). In the absence of the MHC project the unemployment rate for the Newcastle region would have been even higher, putting further pressure on the local community and the State and Federal Governments' budgets. For example, if the ships had been purchased overseas Federal Government outlays on the Newstart Allowance (or its equivalent) alone would have, in net present value terms, been at least \$21 million higher.

9.3 DYNAMIC IMPACTS OF THE MHC PROJECT

The multiplier analysis reported above focuses on the impact of the increase in demand for goods and services generated by the construction of the Minehunter Coastal Vessels in Australia. However, the analysis does not take into account the more dynamic impacts of the project, such as technology transfers, which have improved participating businesses' productivity and performance. As outlined in Part B, around 35 per cent of survey

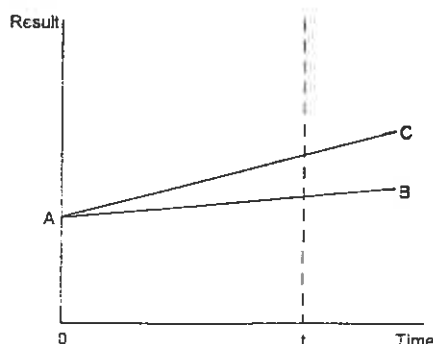
respondents reported obtaining MHC project-related improvements in their businesses overall productivity. A general equilibrium model, such as the STATE model, can help shed some light on these dynamic effects.⁶

Tasman Economics has used the STATE general equilibrium model of the Australian economy to help identify how the MHC project and the related productivity improvements have impacted on national consumption and Gross Domestic Product. Box 10 provides some information on general equilibrium models and their results. Appendix 5 presents more detail on the STATE model and the results reported in this section.

Box 10: Understanding the results of a general equilibrium model

General equilibrium models mimic the workings of the economy through a system of interdependent behavioural and accounting equations. These models initially assume that the economy is in equilibrium. The implications of a particular policy or change in demand or supply can be examined by "shocking" the model from this equilibrium position. Unlike input-output multiplier analysis general equilibrium models take into account constraints on the supply of labour, capital and other inputs that will apply in an economy like Australia. Because of these constraints the results from a general equilibrium model tend to be more conservative than those derived from an analysis based on input-output multipliers.

The STATE model has been used in this study. The STATE model is a comparative static model. As the figure below demonstrates, the STATE model's results allow comparison of the steady state and shocked environments at the same point in time. For example, assume path AB in the figure below shows the underlying time path of a particular variable, say Gross Domestic Product. Suppose that at time 0 a MHC project induced change in productivity occurs, this higher productivity flows through to higher wages and returns to capital and thus higher Gross Domestic Product. The result of this change is that Gross Domestic Product grows at a rate represented by the line AC. In the absence of the productivity change output would have grown at a rate represented by the line AB. A comparative static analysis involves comparing the size of the gap at point in time t .



(continued)

⁶ General equilibrium models, unlike input-output multipliers, include a series of parameters that help explain the responsiveness of industries, consumers and the government to a change in economic conditions. For these reasons these models tend to produce more conservative results than those derived from multiplier analysis.

Box 10: Understanding the results of a general equilibrium model (continued)

Short run vs long run results

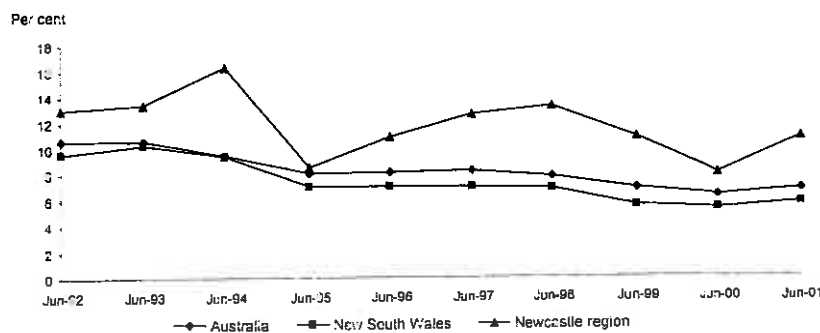
The STATE general equilibrium model provides short run and long run estimates of the impact of a "shock".

For the short run analysis nominal wage rates in the model are fixed and the rate of unemployment adjusts to reflect changes in the demand for labour. Short run results are often used to reflect a situation when the economy is not in a period of full employment. The results of a short run model closure can be considered as reflecting the situation around two or three years after the "shock" occurred.

To derive the long run results all markets, including markets for labour, in the STATE model clear — that is supply in each market equals demand for its goods or services. Thus in the long run closure of the model any increase in unemployment associated with the removal of demand for locally manufactured Minehunter Coastal Vessels is addressed by changes in prices, including real wage rates. For example, if there is disequilibrium in the labour market the change in wage rates could continue until the demand for labour is equal to the supply of labour. For this to occur wages rates need to be flexible downwards and upwards and labour needs to be prepared to move from region to region within Australia to obtain work. The results from the long run closure of the model are generally considered as reflecting the situation when the economy returns to an equilibrium position, which could be at a time some ten years or more after the "shock" occurred.

Given the high levels of unemployment experienced in Australia and particularly in the Newcastle region for much of the MHC projects life, the short run closure may be a better reflection of the MHC project's impact on the economy, particularly over the nine year construction period (see figure below). For this reason the general equilibrium results reported in this study are based on the short run closure of the STATE model.

Unemployment rates (June 1992 to June 2001)



To help assess the MHC project's wider effects on the Australian economy the STATE model, which separately identifies the MHC prime contractor industry and the MHC subcontractor industry, was given the following "shock":

- rather than constructing the Minehunter Coastal Vessels in Australia with a high level of Australian industry involvement the Department of Defence purchased similar valued ships from overseas.⁷ The construction of these imported ships required no Australian industry involvement. Under this scenario the MHC project prime contractor industry and the MHC project subcontractor industry disappear; and
- because the minehunters were imported Australian industry's productivity declines. This occurs for two reasons. First, Australian businesses no longer have the opportunity to obtain MHC related technology transfers (see Chapter 3). Second in the absence of the MHC project, fewer Australian businesses would have implemented performance enhancing programs and practices such as quality assurance (see Chapter 4). Reflecting the survey findings on productivity reported in chapter 4, this negative impact on productivity has been modelled as a 2.24 per cent decline in the productivity of 35 per cent of MHC project subcontractors "non-Defence" work.

The results

Australia would have been worse off if Defence had sourced its minehunter capability requirements offshore rather than from Australian industry. Compared with the import replacement alternative, Australia over the construction period had higher annual levels of Gross Domestic Product and consumption. Importantly, more Australians had employment than would have otherwise been the case. For example, around three years after the commencement of the MHC project, the decision to construct the ships in Australia rather than purchase them from an offshore supplier increased:

- Gross Domestic Product by \$234 million (\$2001 dollars);
- Consumption by \$130 million (\$2001 dollars); and
- employment by more than 3,000 full-time equivalent jobs.

These contributions are particularly important when it is remembered that Australia experienced high levels of unemployment for much of the 1990s. Further the Newcastle

⁷ This analysis assumes that there was no strategic cost associated with Defence's decision to invest in a minehunter capability rather than some other non-minehunter capability. As outlined in Chapter 2, the acquisition of new minehunter vessels by the Department of Defence had been considered a matter of priority by the 1991 Defence Force Structure Review. Further, representatives from the Department of Defence contacted in the course of this study did not indicate that the Department paid a premium for the new Australian sourced minehunter capability.

region of New South Wales, which is the construction site for the ships, has higher unemployment rates than the national average. For example, in June 1996-97 the national unemployment rate was 8.3 per cent, whereas the unemployment rate in the Newcastle region was 12.6 per cent (see Box 10).

Extrapolating these short run results across the MHC project's construction phase provides an indication of the project's value to the economy. Over the nine years of the MHC construction phase the project, through the construction stimulus and the projects positive impact on participating businesses performance, would have (in net present value terms) contributed up to:

- \$887 million to Australia's Gross Domestic Product; and
- \$491 million in higher consumption levels for Australian households.

The project's contribution to annual employment will have varied over the life of the MHC project. However, on average, the project during the construction phase will have directly or indirectly contributed 1,860 full-time equivalent jobs each year.

These contributions to economic activity and employment are due to the demand associated with the construction of the Minehunter Coastal Vessels as well as the improved productivity of many businesses participating in MHC project.

To help put these estimates in perspective, the MHC project's contribution to Gross Domestic Product is more than sufficient to fund the Federal Government's:

- National Action Plan to address salinity (\$700 million); as well as
- recent initiatives to increase the number of nurses practicing in rural and regional Australia (\$104 million) and improve Australian's access to after hours medical care (\$43 million).

Appendix 5 presents more detail on the general equilibrium estimates reported in this section.

9.4 CONCLUDING COMMENTS

This MHC case study builds on, and substantively adds to, the earlier ANZAC Ship project case study's positive findings. This case study demonstrates that the MHC project has been:

- a win for the economy and regional Australia;
- a win for Australian industry; and
- a win for Defence.

Australia would have been worse off if Defence had sourced its new minehunter capability requirements "off the shelf" from an overseas supplier rather than from Australian industry. Over the nine years of the MHC construction phase the project, through the construction

stimulus and the projects positive impact on participating businesses performance, would have (in net present value terms) contributed up to:

- \$887 million to Australia's GDP; and
- \$491 million in higher consumption levels for Australian Households.

The project has also contributed to employment. The project during the construction phase will have directly or indirectly contributed an average of 1,860 full-time equivalent jobs each year. A significant number of these jobs will have been in the relatively depressed economy of the Newcastle/Hunter region.

The opportunity to be involved in a major Defence project such as the MHC project has had positive long-term impacts on many of the businesses participating in the project.

Respondents to the MHC survey indicated that their businesses association with the project had led to:

- technology transfers;
- the take-up of practices to enhance performance;
- enhanced exports or improved export potential; and
- higher productivity.

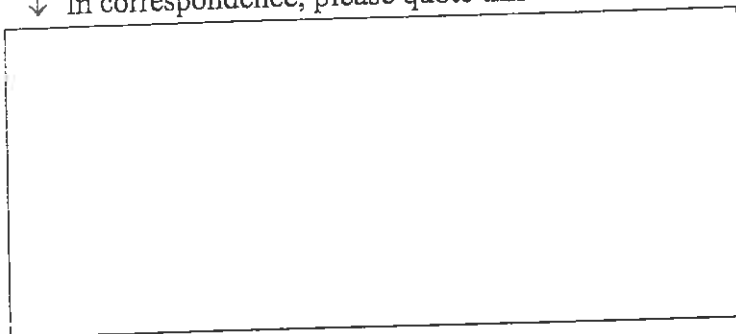
Australian businesses' involvement in the MHC project has enhanced the capability of Australian industry to supply the Department of Defence. Consultations with key stakeholders indicates that the Australian industry involvement in the Minehunter Coastal Vessels' in-service support is producing significant benefits including:

- savings in the amount of money and resources Defence needs to outlay on in-service support; and
- shorter repair turn around times, which in turn flows through to improved operational capability.

APPENDIX 1: THE SURVEY QUESTIONNAIRE

THE IMPACT OF THE MINEHUNTER COASTAL SHIP PROJECT ON PARTICIPATING FIRMS

↓ In correspondence, please quote this number.



← Please complete this survey for the
Australian-based activities of the
business shown on this label.

About this survey

Currently, there is very little information on the impact of sourcing major Defence acquisitions in Australia rather than from overseas. Tasman Economics, on behalf of the Australian Industry Group is helping to fill this information gap. In 1999 the two organisations conducted a survey into the economic impact of the ANZAC Ship Project. This survey into the Minehunter Coastal Project (MHC) aims to validate the results of the first survey and provide more information about the impact on Australian industry of defence-related spending.

Your completion of this survey will provide hard evidence for Government and industry as to the benefits Australian companies can obtain through their participation in major defence contracts. Your involvement in the survey will also help facilitate high levels of Australian industry involvement in future Defence work.

The survey has the support of a number of organisations including the MHC prime contractor ADI Limited (ADI). ADI has assisted in the development of the survey and provided the address list for MHC firms. Other key supporters of the survey are the Commonwealth Departments of Defence, Industry, Science and Resources and Finance and Administration, the New South Wales Department of State and Regional Development, the ISONET and the NSW Industrial Supplies Office.

The Ai Group, along with the survey sponsors, requests that you allocate some of your valuable time to complete this questionnaire. A high response rate will be important to the success of this study.

The Ai Group guarantees that the Ai Group and the survey consultant, Tasman Economics, will treat your firm's individual responses to this questionnaire as **Commercial-in-Confidence**.

Due date

Please complete and return the completed questionnaire by as soon as possible by facsimile to (02) 6247 0876 or by mail to the **Minehunter Coastal Study, Australian Industry Group, GPO Box 817, Canberra ACT 2601**.

Help is available

If you have any problems or queries or feel you may have difficulty meeting the due date, please contact Denise Ironfield, Senior Consultant, Tasman Economics on (02) 6247 0866 or dironfield@tasman.com.au or Ainslie Barron, Executive Officer, Ai Group Defence Council on (02) 6217 9188 or ainslieb@aiact.aigroup.asn.au

Part 1 Background Information

Please indicate the person we should contact regarding this form.

Name			
Telephone number	()	Facsimile number	()

1. Does this business have an involvement in the Minehunter Coastal Ship Project (MHC)?

Note: Involvement may be direct or indirect. For example your business may be a subcontractor or may supply a subcontractor or may have involvement through a Defence offsets agreement.

Yes ☐

No..... ☐ Thank you for completing this survey please return it in the envelope supplied.

2. This business commenced its involvement with the MHC in.....

19	-	-

3. Was the MHC the first Australian defence related contract for this business?

Yes ☐

No..... ☐

4. Did the Industrial Supplies Office play a role in this business becoming involved in the MHC?

Yes a minor role..... ☐

Yes a major role..... ☐

No ☐

5. What is this business' main activity?

Please tick one Box

The manufacture of goods or products..... ☐

The provision of services..... ☐

6. Please briefly describe the main activity undertaken by this business.

Note: For example, your business' main activity may be manufacturing paint or supplying accounting services.

This business' main activity is



Part 2 Technology

7. Did this business obtain a technology transfer as a result of its involvement with the MHC?

Yes ☐

No..... ☐ Go to question 10

8. This technology was obtained via:

Please tick one Box per row

	No	Yes
Existing published material.....	☐	☐
Original research and development.....	☐	☐
Recruitment or secondment into this business.....	☐	☐
Secondment of this business' staff to other organisations.....	☐	☐
Staff training	☐	☐
Purchasing or licensing of technology.....	☐	☐
Strategic partnership(s) with other organisation(s).....	☐	☐
MHC related Defence offsets agreement.....	☐	☐
Other means (please specify below)		

9. How did this technology transfer impact on this business':

Please tick one Box per row

	Negative impact	No impact	Minor to Moderate positive impact	Major positive impact
Productivity.....	☐	☐	☐	☐
Product range.....	☐	☐	☐	☐
Level of defence related sales.....	☐	☐	☐	☐
Level of non-defence related sales.....	☐	☐	☐	☐
Level of export sales.....	☐	☐	☐	☐
Production costs.....	☐	☐	☐	☐
Product/service quality.....	☐	☐	☐	☐
Production flexibility.....	☐	☐	☐	☐
Market share.....	☐	☐	☐	☐
Opportunities for new domestic business.....	☐	☐	☐	☐
Opportunities for new export business.....	☐	☐	☐	☐
Other impacts (please specify below)				



Part 3 Business operations

10. Does this business use any of the following business programs and practices?

- Total Quality Management;
- Quality assurance;
- Just-in-Time Management;
- Process Engineering;
- Formal strategic plan;
- Formal business plan;
- Budget forecasting;
- Formal networking with other businesses;
- Comparison of performance with other businesses (benchmarking); and/or
- Export market planning;
- Outsourcing/subcontracting.

Yes ☐

No..... ☐ Go to question 15

11. When were these business programs and practices first implemented?

Please tick one Box per row	Not applicable	Prior to 1 July 1996	After 30 June 1996 and Prior to 1 July 1998	Since 30 June 1998
Total Quality Management.....	☐	☐	☐	☐
Quality Assurance.....	☐	☐	☐	☐
Just-in-Time Management.....	☐	☐	☐	☐
Process Engineering.....	☐	☐	☐	☐
Formal strategic plan.....	☐	☐	☐	☐
Formal business plan.....	☐	☐	☐	☐
Budget forecasting.....	☐	☐	☐	☐
Formal networking with other businesses	☐	☐	☐	☐
Comparison of performance with other Businesses (benchmarking).....	☐	☐	☐	☐
Export market planning.....	☐	☐	☐	☐
Outsourcing/subcontracting.....	☐	☐	☐	☐

12. Was this business' involvement with Defence related projects important in the decision to implement any of the above business programs or practices:

Please tick one Box

Yes some..... ☐

Yes all..... ☐

No none..... ☐



13. How important was this business' involvement in the MHC in the decision to implement these business programs and practices?

Please tick one Box per row	Not applicable	Not important	Important	Very important
Total Quality Management.....	☐	☐	☐	☐
Quality Assurance.....	☐	☐	☐	☐
Just-in-Time Management.....	☐	☐	☐	☐
Process Engineering.....	☐	☐	☐	☐
Formal strategic plan.....	☐	☐	☐	☐
Formal business plan.....	☐	☐	☐	☐
Budget forecasting.....	☐	☐	☐	☐
Formal networking with other businesses...	☐	☐	☐	☐
Comparison of performance with other Businesses (benchmarking).....	☐	☐	☐	☐
Export market planning.....	☐	☐	☐	☐
Outsourcing/Subcontracting.....	☐	☐	☐	☐

14. How did these programs or practices impact on this business':

Please tick one Box per row	Negative impact	No impact	Minor/Moderate impact	Major impact
Productivity.....	☐	☐	☐	☐
Product quality.....	☐	☐	☐	☐
Client satisfaction.....	☐	☐	☐	☐
Cost structures	☐	☐	☐	☐
Sales.....	☐	☐	☐	☐
Labour skills base.....	☐	☐	☐	☐
Ability to implement a culture of continuous improvement	☐	☐	☐	☐
Opportunities for new business.....	☐	☐	☐	☐
Other impacts (please specify below)				
	☐	☐	☐	☐



Part 4 Exports

15. Has this business' involvement with the MHC improved its current or future ability to export?

Yes ☐

No ☐

16. Does this business currently export?

Yes ☐

No ☐ Go to question 19

17. What happened to this business' annual export sales since it became involved with the MHC?

Please tick one Box

Remained relatively stable..... ☐ Go to question 19

Decreased..... ☐

Increased..... ☐

18. What factors contributed to this business' change in exports?

Please tick one Box per row	Negative impact	No impact	Positive impact	Not applicable
Improved business programs and practices (see question 10 for listing).....	☐	☐	☐	☐
Demonstration effect associated with MHC involvement	☐	☐	☐	☐
Productivity improvements related to MHC involvement.....	☐	☐	☐	☐
Technology transfer associated with MHC involvement.....	☐	☐	☐	☐
New business links or alliances gained through MHC.....	☐	☐	☐	☐
MHC related Defence offsets	☐	☐	☐	☐
Off-shore investments.....	☐	☐	☐	☐
Change in exchange rate.....	☐	☐	☐	☐
Other factors (please specify below)				

☐ ☐ ☐ ☐



Part 5 Changes in Productivity and investment

Note: This business' productivity has changed if it uses more (or less) inputs - labour hours, skills, work effort, raw materials, machinery, management, land etc. - to produce a given level of the goods and/or services this business sells.

19. As a result of being involved in the Minehunter Coastal Project this business' overall productivity/efficiency has:

Please tick one Box in each column

Direction of change

Increased substantially	☐	
Increased slightly	☐	
Remained relatively stable	☐	Go to Question 21
Decreased slightly.....	☐	
Decreased substantially....	☐	

20. The magnitude of this increase or decrease in overall productivity/efficiency was approximately

Please tick one Box

Greater than zero and less than 1 per cent.....	☐
1 per cent to less than 2 per cent.....	☐
2 per cent to less than 3 per cent.....	☐
Greater than 3 per cent (please specify below)	☐

21. Has this business undertaken any major additional domestic investment(s) as a consequence of its involvement with the Minehunter Coastal project?

- Yes ☐
- No..... ☐

Part 6 Employment and financial information

22. Approximately how many full-time and part-time persons worked for this business during the last pay period in May 2001?

Please tick one Box

Zero.....	☐	20 to 49.....	☐
1 to 4.....	☐	50 to 199	☐
5 to 19.....	☐	200 or more.....	☐



23. Last year this business' annual turnover from the sale of goods and/or services was?

Please tick one Box

No more than \$5 million.....	☐	More than \$100 million but no more than \$200 million.....	☐
More than \$5 million but not more than \$10 million.....	☐	More than \$200 million but not more than \$500 million.....	☐
More than \$10 million but not more than \$50 million.....	☐	More than \$500 million but not more than \$1,000 million.....	☐
More than \$50 million but not more than \$100 million.....	☐	More than \$1,000 million.....	☐

24. Approximately what proportion of this business' total MHC related turnover is or was generated/produced in the Hunter Valley?

Please tick one Box

Zero.....	☐	50 per cent to less than 75 per cent.....	☐
1 per cent to less than 25 per cent.....	☐	75 per cent to less than 100 per cent.....	☐
25 per cent to less than 50 per cent.....	☐	100 per cent.....	☐

25. Did/Does this business' involvement with the MHC contribute to its net profit?

Please tick one Box

- Yes..... ☐
- No..... ☐

Part 6 Defence capability

26. Which of the following statements most accurately reflects the position of this business in relation to defence related contracts?

Please tick one Box only

- This business' defence related activities are crucial to its viability..... ☐
- This business' defence related activities are not crucial to its viability..... ☐
- This business' defence related activities enhance its viability..... ☐



27. Has this business' involvement with the MHC or other Defence contracts improved its capability to supply the Department of Defence (DoD) or its contractors?

Yes ☐

No..... ☐ Please return questionnaire to the Australian Industry Group

28. As a result of this improved capability this business:

Please tick one Box per row	Strongly disagree	Disagree	Agree	Strongly agree
has the knowledge to supply DoDs capability requirements.....	☐	☐	☐	☐
has the resources to help supply DoDs capability requirements.....	☐	☐	☐	☐
has the capacity to help supply the DoDs capability requirements.....	☐	☐	☐	☐
can now assist in the through life support of the Minehunter vessels.....	☐	☐	☐	☐
can work in/with new areas of defence related technology	☐	☐	☐	☐
can supply defence equipment/services at a lower cost than previously.....	☐	☐	☐	☐
can supply the DoD or its contractors at a faster rate than previously.....	☐	☐	☐	☐
can provide a better quality defence product or service than previously.....	☐	☐	☐	☐

Other (please specify below)

Thank you for your cooperation. Please return this form to the Minehunter Coastal Study, Australian Industry Group, GPO Box 817, Canberra ACT 2601 or send by Facsimile to (02) 6247 0876.



APPENDIX 2: SIGNIFICANCE TESTING

Throughout this report we compare the responses of different categories of businesses. For example, we compare the responses of small businesses with those of large businesses. How confident can we be that the different responses of these groups actually reflect a real difference? If another survey of a different group of MHC companies was taken would it reach similar conclusions?

Testing the statistical significance of results provides a basis for answering these types of questions. Significance testing is particularly useful when apparently important differences are identified and these differences are based on fairly small samples. In these cases the chances that the result simply reflects sampling variation is relatively high.

The significance testing used in this study is based on the hypothesis that two observed proportions are, in reality, the same. A test statistic is calculated based on the difference between the two proportions and their standard errors. The larger the test statistic, the more confident we can be that this hypothesis is false — that is, the observed difference between the two proportions is a "real" difference (see Box A2.1).

Box A2.1: What is a significance test?

The probability of rejecting a hypothesis when it is not true is called the level of significance. The level of significance can be tested using a z test.

Specifically, the formula is:
$$Z = \frac{p_a - p_b}{\sqrt{\frac{p_a(1-p_a)}{n_a} + \frac{p_b(1-p_b)}{n_b}}}$$

where p_a is the observed proportion for group a and n_a is the number of firms in group a , and p_b is the observed proportion for group b and n_b is the number of firms in group b .

The value of the test statistic Z is compared to the relevant figure from tables of values for the distribution of the standard normal curve to give the level of significance. For example, if we wish to be 95 per cent confident that the proportions are from different populations then the Z statistic would need to be 1.96 or greater. If on the other hand we are satisfied with a lower confidence interval the statistic would be lower. A Z statistic of 1.65 represents a confidence level of 90 per cent. The level of significance is usually specified before a test is made. Otherwise the result obtained from the test may influence the decision concerning the hypothesis. In practice, the value of five per cent (corresponding to a confidence level of 95 per cent) is frequently used to set the level of significance, although other values may also be used.

CHECKING FOR RESPONSE BIAS

Many of the results reported in this case study are from a survey of businesses that have participated in the MHC project. Some readers may query the extent to which these findings apply more generally.

There is a chance of bias in the results of any survey that has a response rate of less than 100 per cent. As outlined earlier, the MHC survey had a response rate of around 48 per cent. To help ascertain if the responses of businesses which completed the MHC survey questionnaire were biased a telephone non-response bias survey was conducted.

The 21 businesses contacted in this telephone survey were randomly selected from the list of non-respondents. Representatives from these businesses were asked to respond to a number of key survey questions. Significance testing techniques were then used to test whether the responses from this telephone survey were significantly different from the responses from the main survey. The results of this testing are outlined in the table below. They show that the results across the two samples were very similar. In only one instance, which related to the link between the MHC project and improved export potential, was there a statistically significant difference between the results of the two surveys. This finding suggests that the survey results reported in the Part B are not biased due to businesses choosing not to respond the mail out survey.

<i>Proportion reporting</i>	<i>Mail out survey</i>	<i>Non-response bias survey</i>	<i>Z statistic</i>	<i>A Statistically significant difference?</i>
MHC was first defence contract	24%	19%	0.4598	No
Technology transfer obtained?	25%	33%	-0.725	No
Technology transfer had a positive impact	80%	71%	0.4394	No
Some or all programs and practices in place	89%	95%	-1.068	No
Defence work important in the decision to implement programs & practices	69%	45%	1.893	No
Involvement with the MHC project improved current or future export potential	33%	14%	2.017	Yes
Business currently exports	47%	38%	0.752	No
MHC project helped improve business' overall productivity	35%	19%	1.530	No
Defence capability improved	82%	81%	0.102	No

Note: As outlined in Box A2.1, the Z statistic would need to be 1.96 or higher to be 95 per cent confident that the proportions are from different populations.

APPENDIX 3: REGIONAL IMPACTS

ADI Limited chose a green-field site in Carrington, a suburb in Newcastle, New South Wales, to design and construct the Minehunter Coastal Vessels. The Newcastle region has a long history in shipbuilding. Newcastle's excellent harbour and skilled labour force made it a logical choice for a challenging project such as the MHC project. The Carrington site, which was completed in just over a year after the MHC contract was signed, encompasses a construction hall, ship launch and recovery facilities, support trades workshops, a systems integration facility and a program management and engineering office facility (Figure A3.1).

Figure A3.1: The Minehunter Construction site at Carrington, Newcastle, New South Wales



This appendix presents estimates of "direct" employment generated by the MHC project in the Newcastle region and summarises the Newcastle region businesses' responses to key questions in the MHC survey.

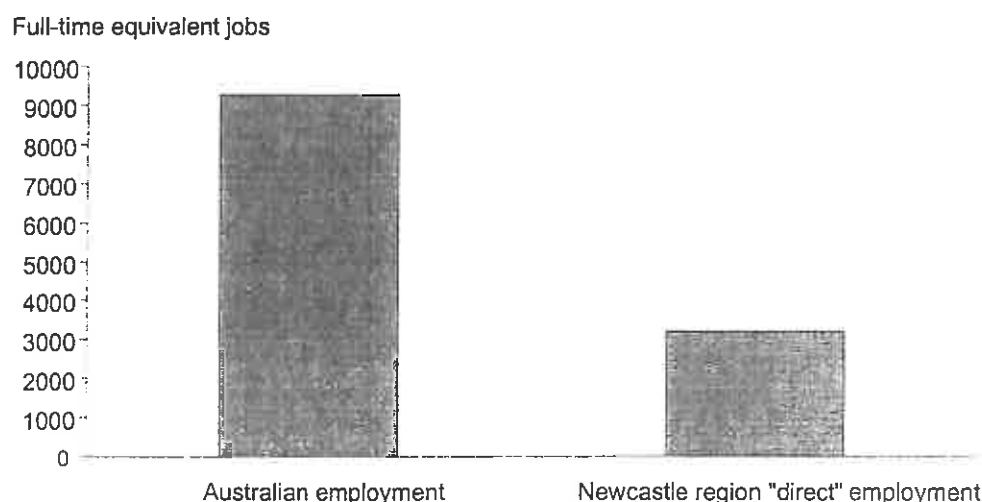
A3.1 *Contribution to the Newcastle region's employment*

The MHC project has generated economic activity and employment in Newcastle and the Hunter Valley (the Newcastle region). This has occurred directly through the prime contractor's operations at its Carrington site and through MHC contracts awarded to local business. ADI Limited estimates that the company has awarded more than \$160 million in contracts to businesses in the Newcastle region.

In Chapter 9, national input-output employment multipliers, which identify the direct and indirect linkages between an industry and the rest of the Australian economy, were used to estimate that the MHC project, directly and indirectly, generated more than 9000 full-time equivalent Australian jobs (see chapter 9 and Figure A3.2 below).⁸ Because MHC project contracts were awarded to businesses throughout New South Wales and to a lesser extent throughout Australia, not all of these jobs will have been generated in the Newcastle region. Even if all contracts had been awarded to businesses in the Newcastle region, the employment multipliers take into account the indirect employment effects and some of these would have been generated outside of the region.

However, the initial employment effect multipliers for the prime contractor and sub-contractor industries can be used in conjunction with their respective outputs to provide a lower estimate of the regional employment generated by the MHC project. These employment estimates, which are presented in Figure A3.2, indicate that the MHC project will have generated (or sustained from year to year) at least 3,180 full-time equivalent jobs in the Newcastle region. It should be borne in mind that this estimate of the regional employment generated by the MHC project does not take into account the indirect employment generated via the prime contractor and the subcontractors linkages to other businesses in the Newcastle region.⁹

Figure A3.2: Australian employment and Newcastle region "direct" employment generated by the MHC project



Source: Tasman Economics estimates.

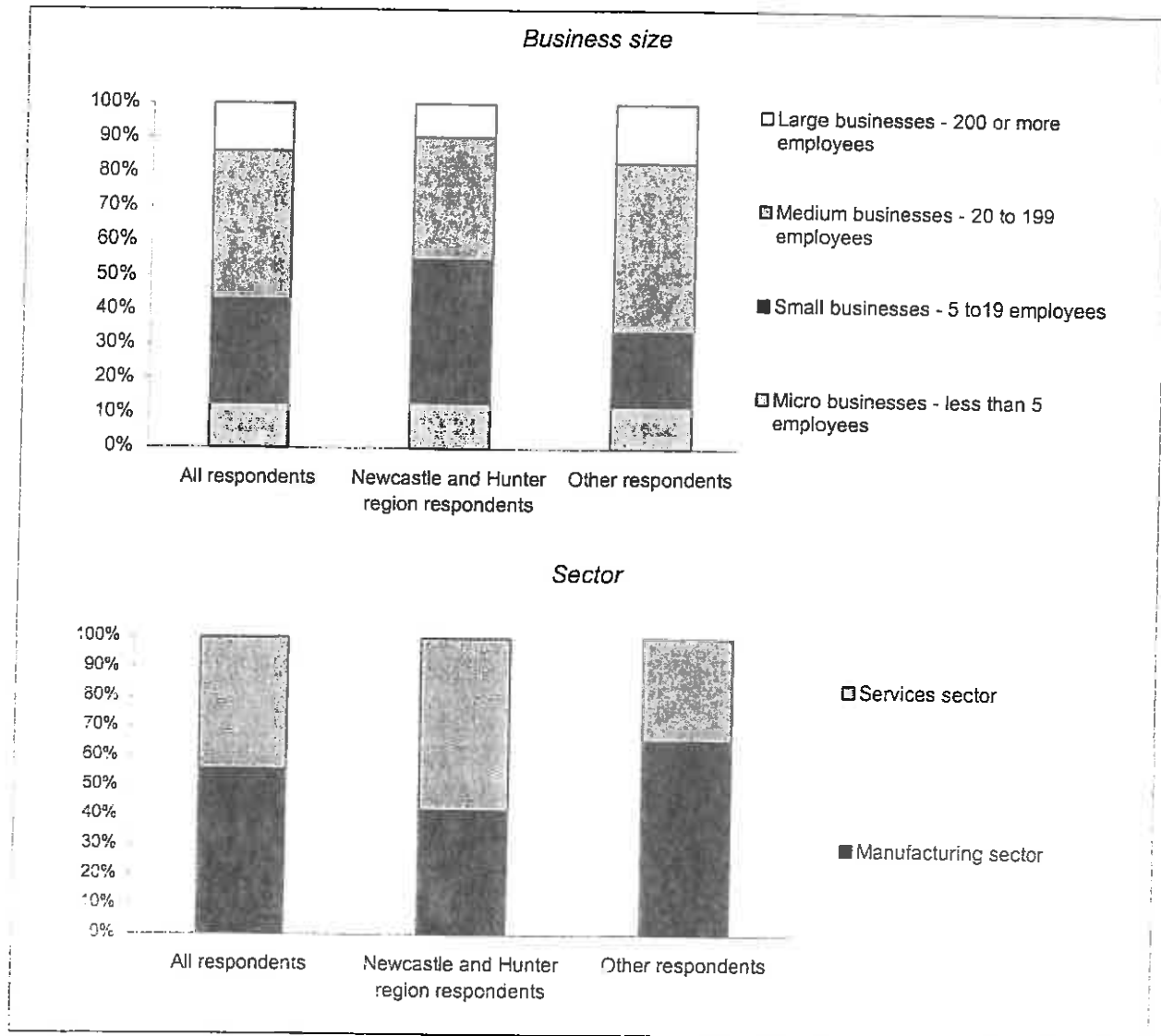
⁸ Employment multipliers estimate the initial "direct" employment effects, as well as the subsequent flow on or "indirect" employment effects (known as the first round and industrial support effects) of an increase in demand (see Chapter 9, Box 10). The subcontractor industry multipliers are presented in Appendix 5.

⁹ Multipliers derived from a Newcastle region MHC input-output table would be necessary to take this further step in the analysis.

A3.2 Survey findings

Just over 40 per cent of the MHC survey respondents businesses were located in the Newcastle region of New South Wales. This relatively high proportion is broadly consistent with the region's representation in the prime contractor's supplier database and in the survey mail out (see Figure 4, Chapter 2). However compared to the respondents from the survey as a whole, there are a number of differences in the respondent businesses from the Newcastle region. Firstly, just over 58 per cent of Newcastle region respondents were from the services sector, whereas for the survey only 44 per cent of respondents were from the services sector. Secondly compared to the survey as a whole, a larger proportion of Newcastle region respondent businesses were "micro or small" (Figure A3.3).

Figure A3.3: Characteristics of Newcastle region and other respondents



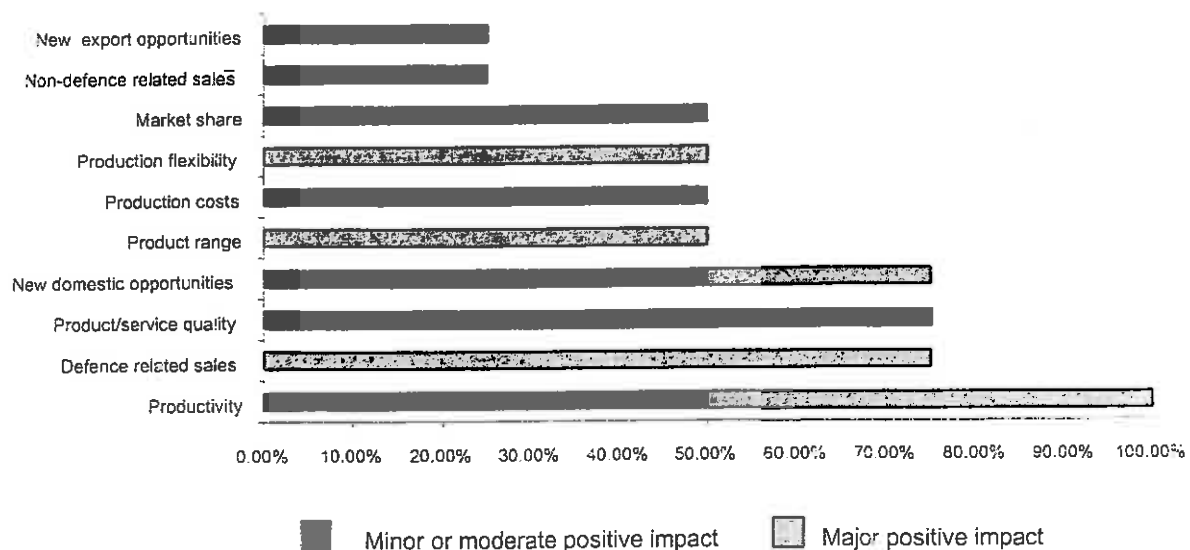
Source: MHC survey.

• Technology

Only 13 per cent of Newcastle region respondent businesses reported obtaining a technology transfer as a result of being involved in the MHC project. By way of comparison over 30 per cent of respondents operating outside of the Newcastle region obtained a technology transfer. The much lower take up of new technology among Newcastle region respondent businesses may in large part reflect the nature of the work done for the MHC project. For example, Newcastle region businesses reporting no technology take up provided services such as site security, provision of on-site amenities, supply & installation of floor coverings and crane hire, the potential to obtain Defence related technology transfers from these types of activities is understandably relatively low.

Although the level of technology transfer obtained by Newcastle region participating businesses was lower than the MHC survey average, those businesses which did obtain a transfer reaped positive benefits from the transfer. For example, all Newcastle region businesses that obtained a technology transfer found that the transfer led to improvements in productivity. In addition, the majority of Newcastle region businesses with a MHC project-related technology transfer reported improvements in product and/or service quality and sales levels (Figure A3.4).

Figure A3.4: Impact of technology transfer on Newcastle region businesses
(per cent of businesses reporting technology transfer)



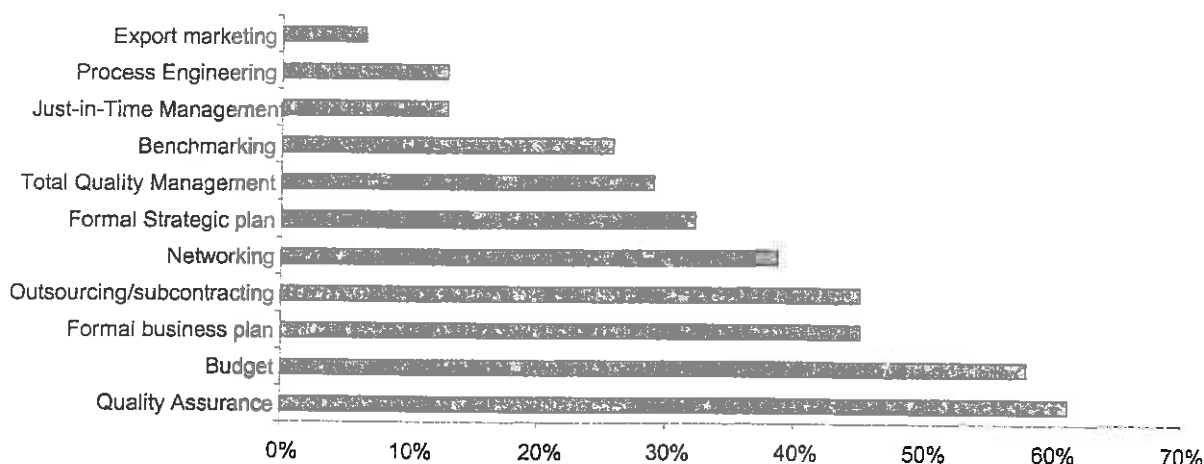
Source: MHC survey.

• Uptake and impact of best practice programs and practices

Over 75 per cent of MHC project survey respondents from the Newcastle region reported that their business had implemented one or more of the eleven business programs and

practices which are often associated with improved performance. Implementation rates varied, with the highest implementation rates being reported for quality assurance and the lowest for export market planning (figure A3.5).

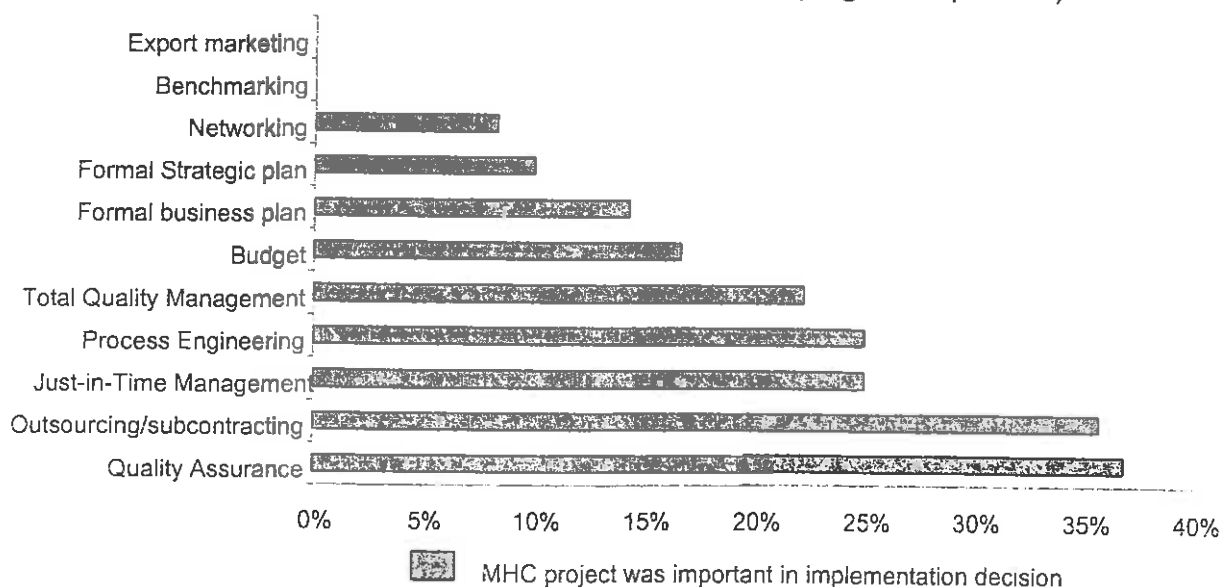
Figure A3.5: Implementation of programs and practices by Newcastle region respondents



Source: MHC survey.

Involvement in the MHC project was an important factor in the implementation decision for a significant number of Newcastle region businesses. The MHC project's role was mentioned most often in relation to the decision to implement quality assurance and out-sourcing (Figure A3.6).

Figure A3.6: The Minehunter project's role in the implementation decision
(per cent of businesses that implemented each program or practice)



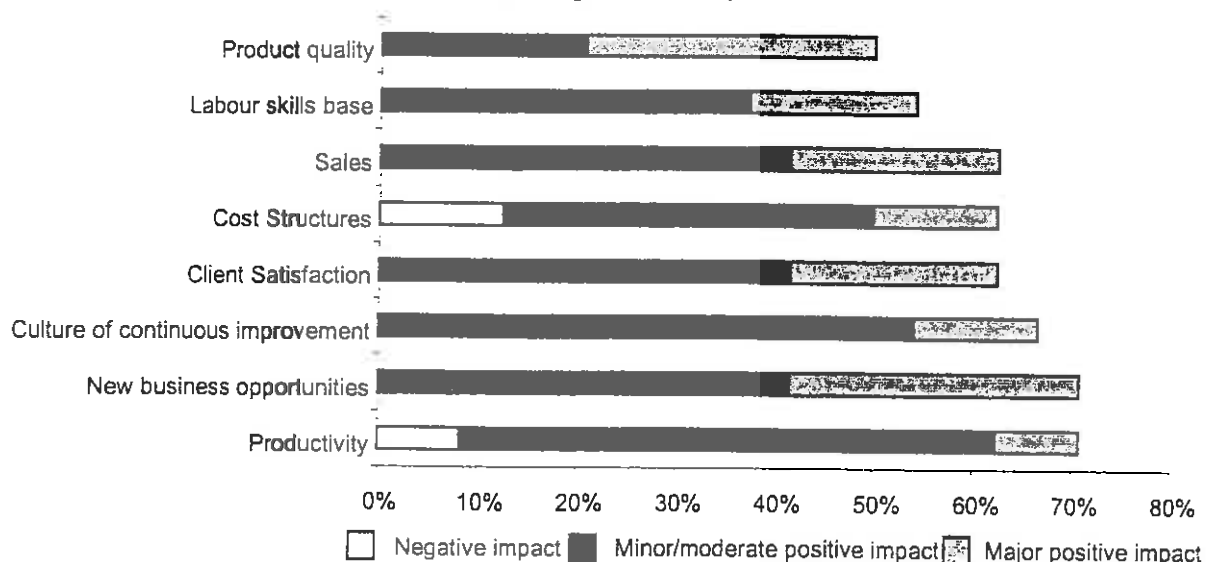
Source: MHC survey.

In most instances the implementation of these business programs and practices has had a positive impact on MHC project survey respondents in the Newcastle region (figure A3.5). For example, more than 60 per cent of respondents report that the implementation of the programs and practices has:

- helped generate new businesses;
- given them the ability to implement a culture of continuous improvement;
- increased sales;
- increased client satisfaction; and
- increased productivity.

However, a small number of respondents reported experiencing negative impacts from the implementation of the programs and practices. For example, two respondents indicated that productivity had actually declined as a result of the implementation decision. Nonetheless, as outlined below, no respondent considered that the business' overall productivity had declined as a result of being involved with the Minehunter project. The experience of MCM Manufacturing Pty Ltd, a business in the Lake Macquarie suburb of Cardiff, is a case in point (see Box 6, Chapter 4).

Figure A3.7: Impact of Implementing programs and practices



Source: MHC survey.

• Improved export potential

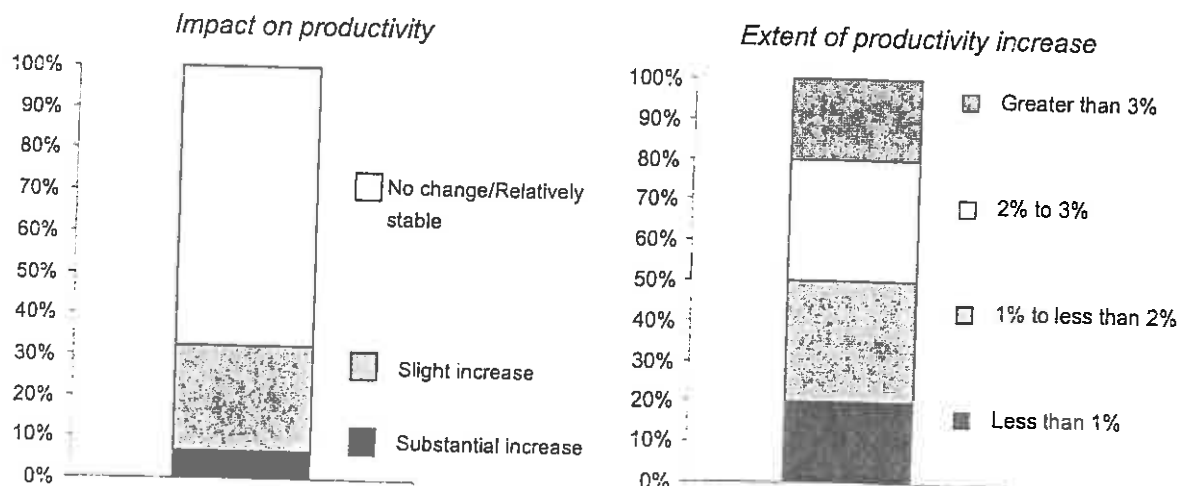
Around 20 per cent of MHC project survey respondents from the Newcastle region reported that their current or future potential to export had improved as a result of being involved with the Minehunter project. Factors contributing to the change in exports included:

- Improved programs and practices;
- Minehunter related demonstration effect;
- Minehunter related productivity improvement;
- A technology transfer obtained from involvement with the MHC project; and
- Changes in the exchange rate.

• Improved productivity

Around one third of Newcastle region MHC project survey respondents reported that their business's overall productivity had increased as a result of their association with the project (Figure A3.8). No business experienced a decline in overall productivity as a result of its involvement with the project. Productivity increases ranged from relatively slight changes of less than one per cent to relatively large changes, with some being greater than 3 per cent (Figure A3.8).

Figure A3.8: Minehunter related change in Newcastle region businesses' productivity



Source: MHC survey.

• **Defence capability and business viability**

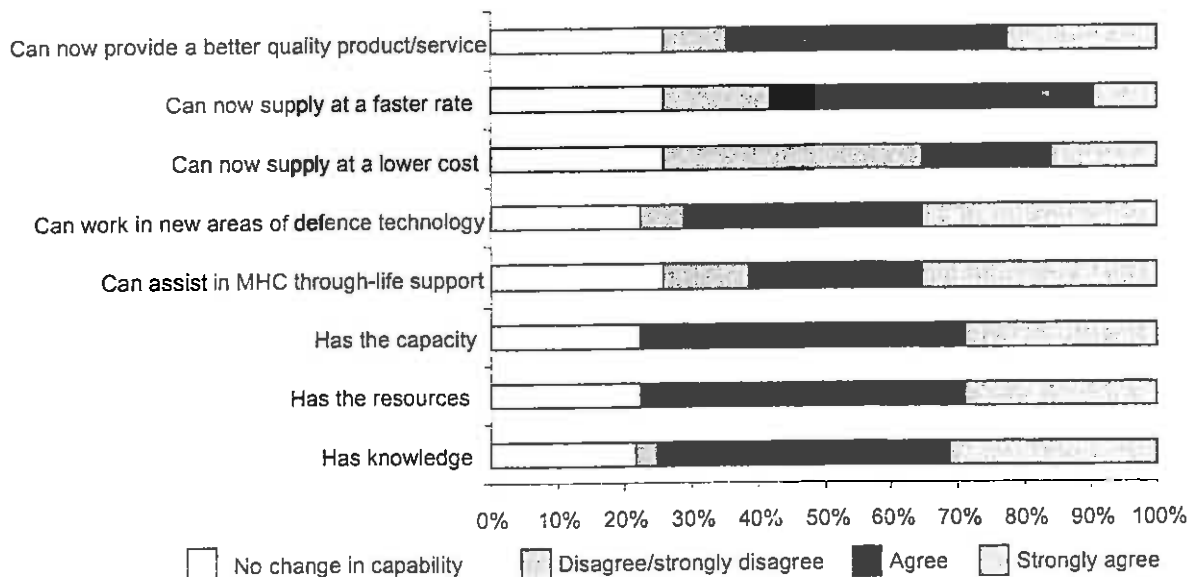
Nearly 80 per cent of Newcastle region respondents to the MHC project survey reported that they now have improved capability to supply the Department of Defence and its contractors.

As a result of this improved capability Newcastle region businesses:

- have the knowledge, resources and capacity to supply the Department of Defence's capability requirements;
- can in a variety of ways assist in the through-life support of the Minehunters; and
- can now work in or with new areas of defence related technology (Figure A3.9)

The majority of Newcastle region respondents also considered that involvement with the MHC project and/or other Defence related work had resulted in their businesses being able to supply the Department of Defence or its contractors at a faster rate, with a better quality product or service. On the other hand, only a third of respondents considered that they could now supply Defence capability at a lower cost (Figure A3.9).

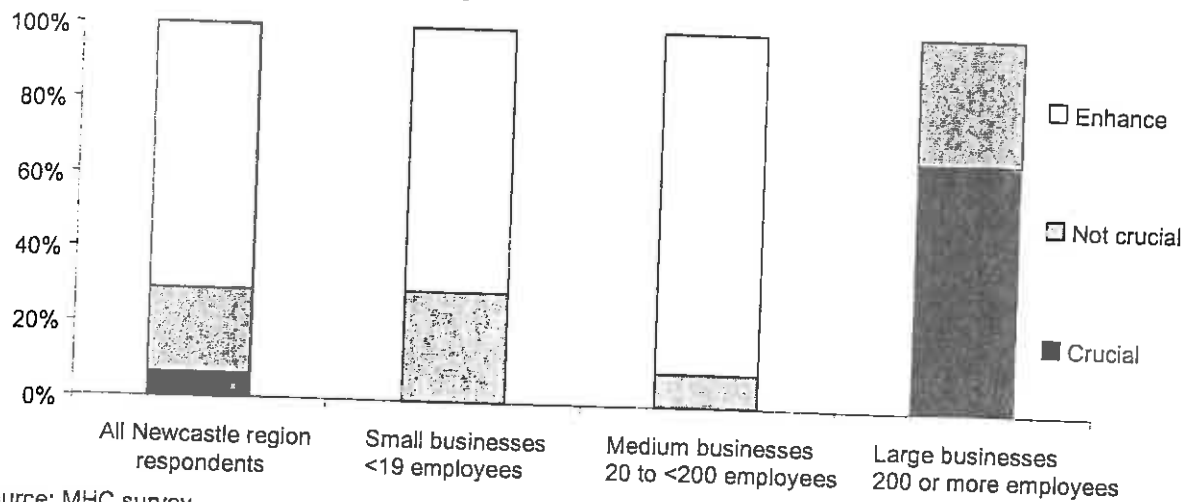
Figure A3.9: Change in the defence capability of Newcastle region MHC survey respondents



Source: MHC survey.

More than 90 per cent of survey respondents from the Newcastle region reported involvement with the MHC project had contributed to their businesses' profitability. However, for the majority of respondents, defence related work was not considered as "crucial" to viability. Most Newcastle region respondents reported that defence related work enhanced their business' viability or was, at least, not crucial to business viability (Figure A3.10).

Figure A3.10: Importance of defence related work to Newcastle region MHC survey respondents' viability



Source: MHC survey.

Six per cent of Newcastle region respondents considered that defence related contracts were "crucial" to their business viability. While this is a relatively small proportion of firms the importance of their views should not be down played as they were among the larger Newcastle region businesses which responded to the MHC survey (Figure A3.10). Thus any significant loss of defence related work could have a significant impact on employment in the region.

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APPENDIX 4: INPUT-OUTPUT MULTIPLIERS

This study uses MHC project costs in conjunction with the latest Australian Bureau of Statistics input-output table to develop a database of the Australian economy which separately identifies the MHC project. In Chapter 7 this input-output database has been used to derive activity multipliers. These multipliers which can be used to estimate the MHC project's contribution to national aggregates — national output, value added and employment.¹⁰

As with any economic analysis, there are a number of **assumptions** underlying input-output databases and the derived multipliers. These assumptions include:

- the cost structure of industries remain constant over time;
- all industries exhibit constant returns to scale in production;
- there is no substitution between inputs;
- the economy is in equilibrium at given prices;
- there are no capacity constraints arising from an increase in demand; and
- there are no other constraints such as those that might arise from balance of payments induced effects.

Because multipliers cannot take into account economies of scale or the impact of a change in demand when there is no excess capacity or full employment they describe average rather than marginal effects. The assumptions also mean that multiplier analysis does not take into account all forms of interdependence between industries. The ABS (1996, p.24) notes:

The input-output tables underlying multiplier analysis only take account of one form of *interdependence*, namely the sales and purchase links between industries. Other interdependence such as collective competition for factors of production, changes in commodity prices which induce producers and consumers to alter the mix of their purchases and other constraints which operate on the economy as a whole are not generally taken into account.

¹⁰ National output is equal to the total value of a series of inputs. As with other industries the national output of the Minehunters is made up of intermediate inputs supplied by other Australian industries as well as imported components, wages and salaries, depreciation and returns to land and capital. Value added, on the other hand is the value an industry's activity adds to the economy. Value added is equal to an industry's gross output (its sales and other operating income, plus commodity taxes and changes in inventory) less its intermediate inputs purchased from other Australian industries or from overseas. Value added comprises the payments to labour plus returns to land and capital as well as any taxes on production, it is an industry's contribution to Australia's Gross Domestic Product (GDP). GDP is the sum of all industries value added plus any production taxes and minus any production subsidies. GDP can also be measured by adding final consumption and gross fixed capital formation expenditures on goods and services plus any changes in inventories plus the value of exports and less the value of imports. Thus consumption is a component of GDP.

The combination of the assumptions used and the excluded interdependence means that input-output multipliers are higher than would realistically be the case. In other words, they tend to *overstate* the potential impact of final demand stimulus. The overstatement is potentially more serious when large changes in demand and production are considered.

As a consequence of these assumptions the results of multiplier analysis should be considered as upper limits. Treating the estimates as upper limits is particularly important, if the change in demand is large relative to the economy as whole and there is full employment of labour and capital.

THE RESULTS

Table A4.1 presents the multipliers that have been estimated from the Minehunter input-output database that was developed for this project. This database identifies the MHC project prime contractor industry and the MHC project subcontractor industry, which supplies the prime contractor industry. The Minehunter prime contractor multipliers have been used to estimate the impact of the project on the Australian economy (see chapter 9). As outlined in Appendix 3, the initial effect component of the multipliers for the Minehunter prime contractor industry and the Minehunter subcontractor industry have been used to estimate the employment effect for the Newcastle region.

Table A4.1: Minehunter industry multipliers

<i>Industry</i>	<i>Minehunter prime contractor industry \$ million</i>	<i>Minehunter subcontractor industry \$ million</i>
Increase in demand per annum	1	1
<i>Output</i>		
Initial effect	1	1
First round multiplier	0.522	0.414
Industrial support multiplier	0.434	0.402
Total Output Multiplier	1.956	1.815
<i>Value added</i>		
Initial effect	.213	0.379
First round multiplier	.200	0.161
Industrial support multiplier	.180	0.176
Total value added multiplier	.593	0.716
<i>Full-time equivalent employment</i>	<i>Persons</i>	<i>Persons</i>
Initial effect	1.75	7.84
First round multiplier	4.05	2.58
Industrial support multiplier	2.56	2.25
Total employment multiplier	8.36	12.67

APPENDIX 5: GENERAL EQUILIBRIUM ANALYSIS

The STATE model used in this study is an extended version of the ORANI model. It employs some of the latest features incorporated in refined versions of ORANI, such use of a more refined investment theory. The development of the STATE model has also drawn on work carried out by the Industry Commission in developing their model of the world economy, the SALTER model, and by Stoeckel in developing the world trade model for the Centre for International Economics.

The STATE model has been used to examine the impact of constructing the ANZAC frigate in Australia (Tasman 2000). Other applications of the STATE model include examinations of:

- the impact on the economy of increasing the sport's participation rate (Tasman 1998);
- the effect of transport infrastructure upgrades (Economic Insights 1996,);
- the return to the economy from a zinc smelter/refinery (Economic Insights 1995); and
- the impact of introducing a carbon tax (Economic Insights and Swan Consultants Canberra 1995).

STATE is a multi-sector, computable general equilibrium model of the Australian economy. It has been designed with the primary aim of estimating the macroeconomic and sectoral impacts of economic policies and development projects. A model simulation provides estimates of the impact of a policy or investment change on a range of economic variables including industry output and price, employment and investment, trade flows, government revenue and expenditure, Gross Domestic Product and income. An input-output database provides the STATE model with the detail on the underlying structural relationships between industries in the Australian economy. This database separately identifies the MHC prime contractor industry and the MHC subcontractor industry cost structures.

STATE can be run as a multi-region model. However, the version used in this analysis identifies Australia as a single region or economy with fully modelled economic structures, a simpler, less detailed, structure is employed to explain the "Rest of the World".

MODEL CLOSURE

The general equilibrium modelling results reported in this study are based on long run and short run closures of the STATE model. Box 8 presented a brief description of the assumptions underlying these closures, the following section present more detail on the characteristics of two alternative closures of the model.

Long run model closure

The long run is characterised by a high degree of factor mobility in the economy. The standard assumption is that each industry's use of capital adjusts to maintain the original rates of return. That is, an improvement in the rate of return on capital leads to an increase in investment until the rate of return is returned to its original level and vice versa.

Like capital, labour is freely mobile across industries. The standard assumption for this type of modelling is that wages adjust to "clear" the labour market, or in other words to ensure a constant level of frictional unemployment. The assumption is important because it means that any change in the demand for labour is reflected in the wage rate and not the aggregate level of usage. The assumption reflects the view that Australia's long run unemployment rate is not determined by the level of economic activity but by structural features of the economy. These structural features include the industrial relations system, the behaviour of unions and the effect of the social security system on the incentive to work are the drivers of the long run rate of unemployment.

In the standard long-run environment it is assumed that the Government maintains transfers to households as a fixed proportion of gross regional income. The budget deficit is also fixed as a fraction of gross regional income. Under such an environment, tax rates are altered to meet the budget deficit constraint. A wide range of tax rates can be used to ensure budget balance. The assumption of balanced budgets is adopted to ensure a stable level of government debt.

The other important features of the long run relate to the determination of savings and the related issue of the funding of investment. The household average propensity to save (which defines the change in savings as income changes), is held fixed in the standard environment and net capital inflow is left free to adjust to any savings-investment gap.

Short run closure

The short run closure of the model is characterised by a high degree of rigidity in the economy. Aggregate real investment is held constant and rates of return adjust to maintain capital stocks in each industry at their original level. Nominal wage rates are held fixed and the rate of unemployment adjusts to reflect movements in the demand for labour. The model assumes that initially labour supply is greater than labour demand and the resulting pool of labour can be hired at the wage rate determined by the user.

At the industry level, producers are very constrained in the short run as they cannot adjust their capital stock. Any changes in the demand for capital are countered by movements in the rental price of capital and to a lesser extent the creation price of capital. As a result, a

simulation that **increases** a firm's demand for capital leads to an increase in the rental price of capital.

In the standard short run closure the householder's average propensity to save is held fixed, the budget deficit is variable and net capital inflow adjusts to offset in change in regional savings (given the **standard** assumption of fixed aggregate investment).

THE RESULTS

The STATE model, like many other models of the Australian economy, is a comparative static model. Comparative static models, compare two different environments at the same point in time. The model provides no indication of the path taken by the economy to achieve this result. The results are reported as percentage changes in national aggregates (see below).

**Table A5.1: Impact of importing Minehunters rather than sourcing locally
(Percentage change)**

	<i>Short run closure</i>
Real Gross Domestic Product	-0.023
Real Household Consumption	-0.021
Aggregate labour usage (Employment)	-0.030

The results reported in Chapter 8 are reported as \$2001 dollar values. These results were derived by applying the percentage changes reported above to Australian Bureau of Statistics official estimates of the respective national aggregates. For example, the short run estimates of the change in real Gross Domestic Product and consumption reported above were applied to the official estimates of Gross Domestic Product and Household Consumption in \$2000-01. This short run estimate was assumed to apply for each year of the construction phase. However, because the construction of the Minehunter Coastal Vessels involved a speedy ramp up and then a ramp down over the nine years of the project these annual results were adjusted by using weights which reflect the changing value of the outputs of the Minehunter project across the nine years. This adjusted stream was then discounted to report a net present value of estimate of the MHC project's impact on the economy during the construction phase.

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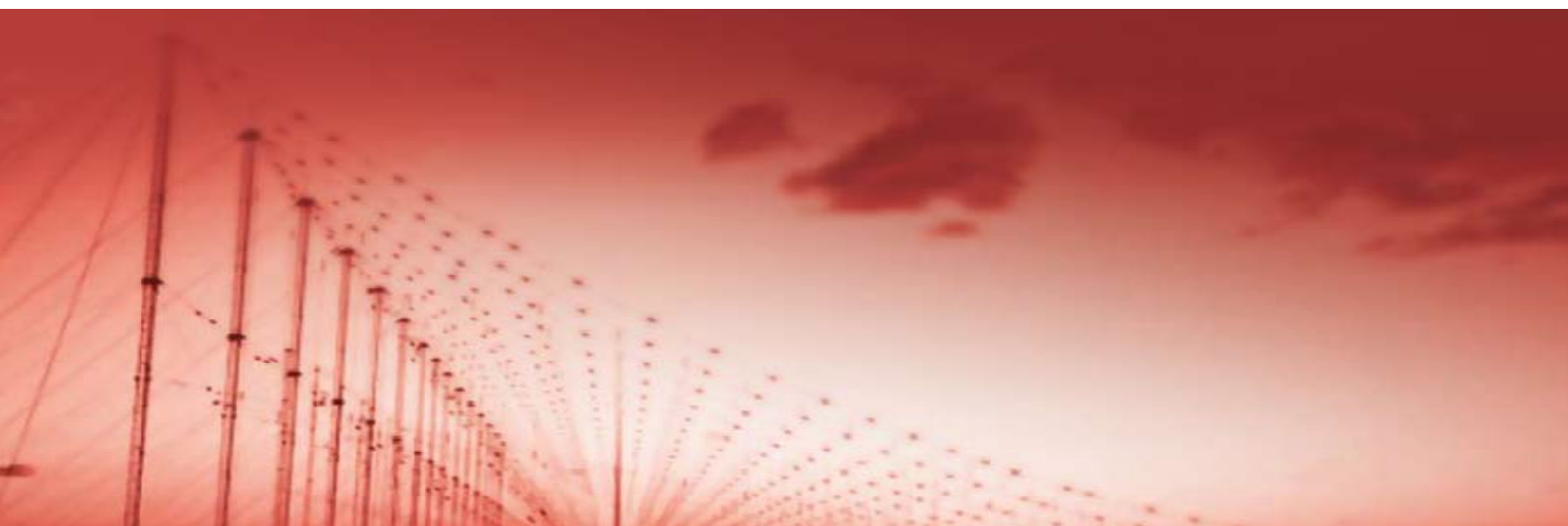
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The Economic Contributions of Five Defence Air Bases

Final Report

Australian Government Department of Defence

June 2008



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Glossary of Terms

To assist with interpretation of this report, a glossary of terms is provided. These are the key concepts and terms used throughout the description of the modelling results presented in this study.

Consumption-induced Contribution: This is one component of an *indirect contribution* to economic activity. It is the *indirect effect* of the consumption-related expenditure of a base e.g. expenditures such as those on retail and other services.

Contribution: In this study, this term simply refers to an increase or decrease in economic activity contributed by the presence of a base.

Direct Contribution: This is the direct contribution made by a base to an economy. This is usually interpreted using three common measures: *Direct Output* (turnover); *Direct Value Added* (profits and wages); and *Direct Employment* (number of people employed). The direct contribution is best thought of as all economic activity that has a direct relationship with the base (for example, the value of on-base employment, supply contracts, etc).

Economic Catchment Region: To model the economic contributions of each base at the regional level, *economic catchment regions* were defined. For data collection and modelling purposes, these regions are based on Australian Bureau of Statistics Census statistical areas, and were formulated during discussions with the Department of Defence about the approximate physical, demographic and geographic connections between each base and its surrounding area.

Employment: In this study, employment refers to the full time equivalent jobs created and supported within a region by a base's activities.

Indirect Contribution: An indirect contribution arises because a base and all those who interact economically with a base spend money in the broader economy. Base expenditure induces further expenditure by suppliers on their inputs, which in turn spend this money on their inputs and so on. In doing so, this process creates further output and value added in an economy, and supports a number of additional jobs in an economy. The indirect contribution is a measurement of this additionally induced expenditure and additional employment. An indirect contribution is composed of *production induced effects* and *consumption induced effects*. In this study, examples of indirect contributions would include housing and retail expenditure, which occurs because of the presence of the base (that is, the base employees spending their wages on home purchases, rentals and shopping).

Input-Output Table: This is an accounting table that represents a summary of all financial transactions in an economy. It is a matrix comprising of demand-related financial data, that is, which industries are 'buying' which goods and services and at what value (represented by columns in the table) and supply-related financial data, that is, which industries are 'selling' which goods and services and at what value (represented by rows in the table). An input-output table outlines the amount of money flowing:

- Into the economy (e.g. household consumption, government consumption, exports);
- Between the industries in an economy; and
- Out of the economy (gross surplus to owners, wages, imports).

Location Quotient: The *location quotient* for a region is a number derived by comparing the percentage of employment in a particular industry in the region with the percentage of employment in the same industry at the national level. The location quotient is a guiding measure that identifies which industries in a region are relatively concentrated (in employment terms) compared to the rest of a country.

Multiplier: A 'multiplier' is sourced from an *input-output table* and indicates the level at which the direct contribution (in terms of *output*, *value added* and *employment*) is multiplied to create the overall economic effect. It is a measure of how much \$1 invested in a particular industry impacts the entire economy. That is, a multiplier of 1.33 means that for every \$1 of direct contribution a further 33 cents of economic value is indirectly created in the wider economy.

Output: This is similar to the gross turnover of a company. It includes the value of all incomes and expenditures generated within a base. While output can be sizeable, on its own this is not reflective of economic contribution. Other measures such as value added and employment also have to be accounted for when analysing the total economic contribution, because these measures value a base's contribution to the broader economy.

Production-induced Contribution: This is one component of an indirect contribution. It relates to the contribution resulting from the production-related expenditure of a base e.g. expenditures such as those on equipment purchases, maintenance, stock purchase etc

Regional Economy: Not to be confused with the term *economic catchment region* used for this study, the term *regional economy* is a term of standard usage in discussion about regional economic interactions generally. In this study, it is used to differentiate between the economy of a region and the economy of a state.

Total Contribution: This is equal to the sum of a base's direct and indirect contributions to an economy.

Value Added: Value added is profits plus wages. It makes adjustments for production expenses such as imports into a region and represents only the extra value that is created by an economic activity. The greater the value added, the greater the returns delivered to regional employers and employees.

1 Introduction

In August 2007, SGS Economics and Planning (SGS) was commissioned to undertake a study of the economic contributions of five defence air bases, on behalf of the Australian Government Department of Defence (Defence).

1.1 The Purpose of this Study

Though it is broadly understood that Defence bases make economic contributions to regional and state economies, some bases face threats to the scale of their activities from the incompatible development of nearby land (urban encroachment). Urban encroachment can cause pressure upon an air defence base to restrict or scale back its operations: e.g. in the case of residential land use, to restrict operating hours or to change flight paths. If restrictions occur they may lead to reduced activity at these bases. Since air defence bases contribute to economies, scaling them down may not only impose costs upon Defence (costs associated with relocating air base activities, for example) but could also have adverse impacts for regional and state economies.

Thus, the purpose of this study was to examine the economic contributions made by five air defence bases to regional and state economies, in order to more clearly articulate and quantify the scale of contribution made by each base. This would enable Defence to present information to various levels of government and to argue for maintaining the broader economic value of its bases and activities.

1.2 Background

Many studies point to the substantial economic contribution made by defence bases. Amongst Australian studies, two are particularly relevant to this project, both commissioned by Defence (and more extensive in their scope): *The Socio-Economic Impact study for the Rationalisation of Borneo Barracks*,¹ and *The Economic and Social Impacts of the Royal Australian Air Force Base Richmond on The Hawkesbury and Surrounding Region*.²

SGS's research into the economic contribution of the Borneo Barracks in Queensland found that if the barracks was to close in 2013, the direct and indirect annual adverse economic impacts to the area would exceed \$90 million. The study concerning RAAF Base Richmond found that the base directly and indirectly accounted for 8.6% of total value added in the Hawkesbury region, and 19.9% of total Hawkesbury jobs (in 2003, after including the contribution of partners and children of RAAF employees).

¹ SGS Economics and Planning (for the Department of Defence), *Socio-Economic Impact study for the Rationalisation of Borneo Barracks*, January 2006. Note that this figure has been inflated to matched expected price levels in 2013.

² Price Waterhouse Coopers (for the Department of Defence), *The Economic and Social Impacts of the Royal Australian Air Force Base Richmond on The Hawkesbury and Surrounding Region*, May 2003.

1.2.1 Types of Economic Contribution

Defence bases create economic contributions at several levels. Their most significant direct contribution to an economy usually comes through paying the wages of employees, and this can be quite substantial. This contribution is then further increased when we factor in the income earned elsewhere by the partners of base employees, who would be likely to move out of the region should base employees be relocated. Other studies (such as the two mentioned above) show that a substantial proportion of the total wages bill paid at a base is later spent in the surrounding economy: at RAAF Base Richmond, total private spending on consumption in the Hawkesbury region by base employees and contractors was estimated at \$24.8 million (in 2003).

Defence bases also directly increase the revenue available to national, state and local governments. The base and many of its employees directly pay rates and taxes. Also, to the extent that defence bases directly fund the provision of public goods that are used by the broader community, the community receives an additional economic benefit. An economy also benefits from the provision of infrastructure to a defence base. Providing services such as roads, sewage, water and electricity to a base reduces the subsequent cost of other forms of development nearby.

If a base closes or is significantly scaled back, not only are these benefits reduced, but additional costs can be imposed upon the community through infrastructure mismatch. For example, a significant fall in school enrolments can lead to pressure to close schools, or push up the cost of education per student. Similar effects can also occur in the health sector.

Direct contributions lead to indirect contributions, through the additional payments a base generates in an economy. For example, the retail spending attributable to base employees supports the employment of additional retail staff in the region. Indirect contributions to an economy also occur because a base spends some of its direct expenditure in the economy. For example, say a base spends an amount each year on food catering services with a locally-based catering company. This expenditure will result in further expenditure by the catering company, some of which will also be spent in the local economy. Examples of local purchases by the catering company could include foodstuffs from local suppliers, vehicles from a local car dealership, fuel from a local petrol station and uniforms from a local clothing supplier. In turn, these local providers of goods to the catering company will also spend some of their money in the local economy. An assessment of indirect contributions therefore traces this flow of money through the local economy.

Base employees and their families also bring other less tangible benefits to community life. While this falls beyond the scope of the present study, it is important to note that both the Borneo Barracks and RAAF Richmond studies document a wide range of contributions to what might be termed 'social capital' that would be lost without the presence of a defence base.

1.3 The Five Bases

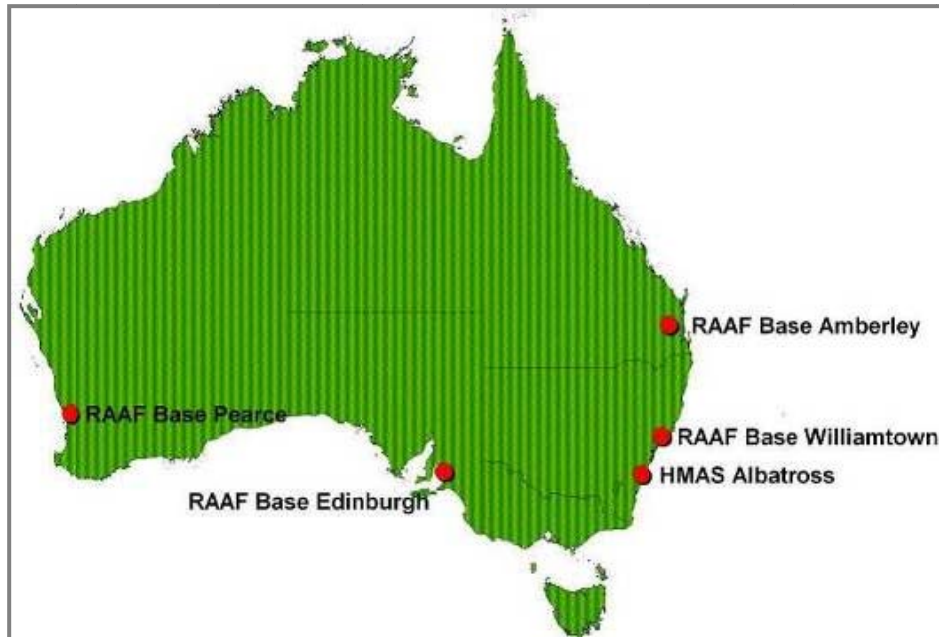
The five defence air bases included in this study are:

- RAAF Base Amberley, QLD;

- RAAF Base Edinburgh, SA;
- RAAF Base Pearce, WA;
- HMAS Albatross, NSW; and
- RAAF Base Williamtown, NSW;

These bases were selected as examples where urban encroachment is seen as an immediate and future threat to the scale of air defence base operations.

Figure 1. Locations of the Five Air Defence Bases Included in this Study



1.4 Methodology in Brief

1.4.1 Literature Review

Before commencing data collection and analysis, SGS undertook a short literature review to uncover existing information concerning the economic contributions of defence bases in Australia and elsewhere. This review informed the development of some of the assumptions used in the economic modelling.

1.4.2 Data Collection

To inform the assumptions behind our econometric models, the socio-demographic and economic characteristics of each base and the regions they are located in were explored.

Economic Catchment Region Data

For the purpose of modelling the economic contributions of the bases to regional economies, it was necessary to define **economic catchment regions** for each base. This primarily involved selecting appropriate Australian Bureau of Statistics (ABS) statistical districts. The catchment regions for the five bases were then profiled (at a basic level) using data from the ABS 2006 Census.

As it was beyond the scope and budget of this project to build regional input-output tables by using detailed surveys and analysis of regional dynamics, national input-output tables were used to source technical data for tailoring economic models for the economic catchment regions.

Defence Air Base Data

To understand and analyse the economic activity at each base in a consistent way, a data template was developed. The data template was tailored to acquire key economic data and other information held by the bases. Once the template was established, it was then used to collect information from the bases. This process was managed by Defence. The data that was collected for each base included:³

- Permanent Staff No (APS & ADF)
- Non-Permanent Staff No (Reserves, Cadets, etc)
- Salaries 06/07 \$
- Contractor No (Approx.)
- Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)
- Area
- Capital Works Last 10 years
- Future Capital Works
- Capital Works 06/07
- Defence Housing 06/07
- Private Rental Assistance 06/07
- Maintenance/Facility Operations (FACOPS) 06/07
- National Operations Division (NOD)/Operational Costs 06/07

Some data that would have been useful in further developing and refining the econometric modelling was not available. This led to some limitations to the modelling as outlined in Section 1.4.4.

1.4.3 Modelling and Analysis

Once collected, the data was then used to build assumptions about the economic links between each base and their respective catchment region. Regional input-output models were built around these assumptions, in order to quantify direct economic contributions and to determine multipliers

³ Notes clarifying these data items can be found at the end of the report beneath the heading *Appendix 2 – Key References and Sources of Key Data*.

for estimating and quantifying indirect contributions. Models were developed and applied at the economic catchment region level and the state level.

1.4.4 Assumptions and Limitations

In preparing the modelling, there were some assumptions to be made and limitations to take note of. These assumptions and limitations should be kept in mind when interpreting the results of the analysis. The assumptions and limitations can be divided into two main groups. These are:

- Assumptions and limitations associated with the available data for the bases; and
- Assumptions and limitations associated with the economic modelling in general.

Data Availability Assumptions and Limitations

The data availability assumptions and limitations concern difficulties associated with not being able to obtain the ideal data set (for modelling purposes) for each base due to unavailability at the time of the study and limitations to the scope and budget for this study. This affected the modelling process during the stage where economic models were being tailored to understand the air base as a separate economic entity within the economic catchment region and state. Specific assumptions and limitations include:

- **An exact classification of base expenditures to industry sectors was not always achievable.** During the study we classified expenses that were described only in general terms by combining our understanding of the general nature of the expense items with further clarification from Defence. However, for those cases where there was no option but to aggregate an expense into one general industry sector classification, it is possible that such aggregations contained some classes of expenditure that would in reality flow to a number of different industry sectors, not a single industry sector. The cost of equipment maintenance supply contracts is a good example, as the nature and extent of the maintenance performed may determine the correct industry classification. This is a common problem faced in doing such an analysis, and this limits the accuracy of the model's estimation of industry sector linkages.
- **An understanding of the exact geography of base expenditure patterns was not always achievable.** The bases were not always able to provide a clear indication of how base expenditures are distributed geographically (is a supplier local, regional, state, national, or international?). Further, some expenses flow to national suppliers but there is no way of knowing without a detailed survey whether a national supplier has a local or regional business servicing the contract. Therefore, it has been difficult to precisely determine the economic geography of each base. This kind of limitation would best overcome by a detailed survey of suppliers.
- **Data reflecting the actual spending behaviour of base employees was not available.** This information would be useful for more accurately understanding the economic contributions of the bases arising through the expenditure of their employees in the economic catchment region and in the state economy.

- **Data reflecting the spending behaviour of the general residents of economic catchment regions was not available.** This information would assist with a more accurate understanding of how self-contained a region is with regard to providing its resident population with the goods and services it needs. This information would also be useful to further analyse the contributions resulting from defence base expenditure on housing and rental assistance, by more accurately isolating expenditure staying in the region.
- **The accuracy of estimated economic contributions would be further improved if a more exhaustive and detailed record of base expenditures was available.** This would also influence and improve the tailoring of a regional economic input-output model for each of the bases. Because we have not obtained a sufficiently exhaustive level of expenditure information, we haven't been able to be more precise about the relationships between each base and regional industry sectors. When developing input-output models for each base, we have relied upon the national level input-output tables to make assumptions about the general relationships between the defence industry and other industry sectors.

Economic Modelling Assumptions and Limitations

- **Though it was requested by Defence, meaningful sensitivity testing was not achievable within the scope and budget for this study.** A simple sensitivity test would involve arbitrarily increasing or decreasing the output of each base (more or less reflecting changes in the scale of activity at each base). However, because the multipliers used in the model would remain constant, the effect of any increase or decrease in output would be more or less 'one for one'. That is, a 10% increase or decrease in output would result in a 10% increase or decrease in total economic contribution. A more sophisticated test would involve re-calculating the multipliers to more fully analyse and reflect relationships between particular base activities and the economy. This exercise would require far more detailed data than was available and was beyond the budget and scope of this study.
- **The linkages between the bases and the industries in their regional economy are analysed at a high level.** This is because the analysis is based on the broadest (highest level) of the ABS's Australia and New Zealand Standard Industrial Classifications, which are broad descriptions of industry sectors only. The broad classifications capture a variety of more detailed industrial activity, which is identified in more refined sub-classifications. For example, the 'Other Services' broad classification, includes 3 second level sub-classifications, and each one of these has at least 1 and up to 5 further sub-classifications of activity. Because of data limitations, we have conducted our modelling at the broad classification level and this places a limitation on the level of detail at which industry linkages can be analysed.
- **We had no choice but to work with static industry dynamics and multipliers. The assessment is based on ABS national input-output tables for 2001-02.** These were

the latest available tables at the time the modelling was developed. Although they have been scaled to reflect 2007 values, the industry dynamics embedded in these tables remain as they were forecast in 2001-02. It is likely that there will have been some change in inter-industry dynamics since then, but we have no way of knowing what these changes may have been without using refreshed national tables. As mentioned a number of times, having regional input-output tables built up from detailed customised surveys of local business, government and household expenditure behaviour would be the ideal basis for predicting the value of each base's economic contribution with greater accuracy, because such an approach would provide a base-specific - and therefore a more accurate - multiplier.

- **The *industry sector distribution of economic contributions at the state level was not assessed*.** The modelling set out to analyse both the *value* and the *industry sector distribution* of the economic contributions of each base. While it has been possible to predict the *value* of economic contributions at both the regional and state levels, the *industry sector distribution* of economic contributions at the *state level* was not assessed, due to limitations with obtaining data about the industry sector distributions of base expenditure at this level. This means that the industry sector distribution of the economic contributions was calculated for the regional level only.

2 RAAF Amberley, Queensland

2.1 An Overview of RAAF Amberley

Location and Operational Background

RAAF Amberley is located in the City of Ipswich, sited along the northern alignment of Cunningham Highway, approximately 5 km south-west from the Ipswich city centre and 50 km south-west of Brisbane CBD. The Bremer River forms the property boundary from west to east. RAAF Amberley was developed as a RAAF base during World War II. A major redevelopment of the base was undertaken in the 1960s, to provide facilities for the introduction of the F-111 aircraft. The property comprises a number of separate allotments and attached properties, with a total land area of some 2,570 ha.

The Australian Government has made two announcements of unit relocations to this base. The RAAF's 33 Squadron will relocate from RAAF Richmond when its Boeing 707 aircraft are replaced in 2009 with the A330 Multi Role Tanker Transport aircraft. The Army's 9th Force Support Battalion, an Army logistic support unit, has relocated from Randwick Barracks. RAAF Amberley is also the home base for the heavy air lift aircraft (C-17). The Government has announced that the F-111 aircraft are to be withdrawn from service by 2012 and replaced with the Super Hornet by 2010. Construction of approximately 295 additional 'living in' accommodation units at the base has almost been completed.

The RAAF Amberley Economic Catchment Region

For data collection and economic modelling purposes, the RAAF Amberley economic catchment region (referred to as the *Amberley Region* from here) has been defined by ABS Census statistical areas. This makes it easier to match statistical information with the economic catchments used in this study. The selection of areas to include within the Amberley Region was based upon an assumption about the degree of interaction and influence between the base and surrounding areas. This assumption was informed by discussions with Defence. The following statistical areas form the Amberley Region:

- Ipswich City Statistical Subdivision (SSD);
- Laidley, Gatton and Boonah Statistical Local Areas (SLAs); and
- Beaudesert Shire (S), Parts A, B and C.

As mentioned above, RAAF Amberley falls within the local government area of the Ipswich City Council, but nearby local government areas include Brisbane City Council, Logan City Council, Scenic Rim Council, Lockyer Valley Regional Council and Somerset Regional Council.

Figure 2. RAAF Amberley: location and economic catchment region



2.2 Profile of the Amberley Region

The purpose of this profile of the Amberley Region is to provide some contextual understanding about the region in which the base is operating. The profile provides information about the region as a whole compared to Queensland and Australia. It also provides information specific to Ipswich City SSD, which is the most populous area within the catchment. The source of all data used in the profile is the ABS Census 2006.

2.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

The population growth rates for both Ipswich City SSD and the Amberley Region as a whole increased substantially over 2001-2006, exceeding the Queensland and Australian growth rates.

Table 1. Amberley Region - 2006 Population

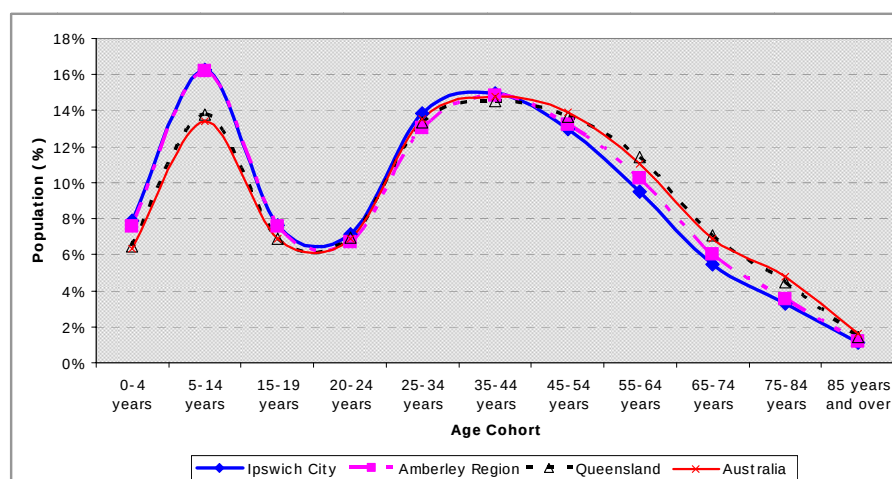
	Population in 2006	% of Australia's Population
Ipswich City SSD	140,368	0.7%
Amberley Region	179,367	0.9%
Queensland	4,119,800	20.3%
Australia	20,268,010	

Table 2. Amberley Region - Rates of Population Growth, 1996 to 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Ipswich City SSD	0.72%	2.50%	1.60%
Amberley Region	0.62 %	2.30 %	1.46 %
Queensland	1.73%	2.04%	1.88%
Australia	1.24%	1.11%	1.18%

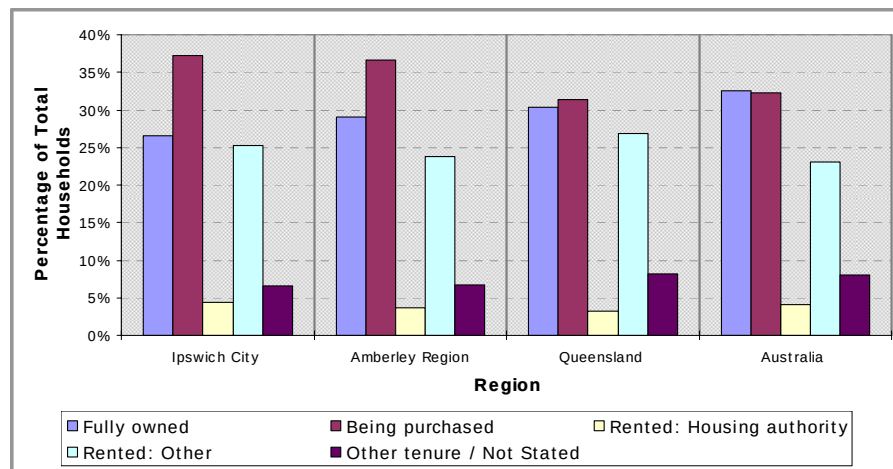
Age Structure

Both Ipswich City SSD and the Amberley Region as a whole have a larger proportion of children compared to Queensland and Australia, and fewer older people, reflecting the presence of a relatively young population.

Figure 3. Amberley Region - Age of Residents, 2006

Household Tenure

Both Ipswich City SSD and the Amberley Region as a whole contain a larger proportion of households purchasing a home compared to Queensland and Australia, again reflecting the younger population in the region.

Figure 4. Amberley Region - Household Tenure 2006

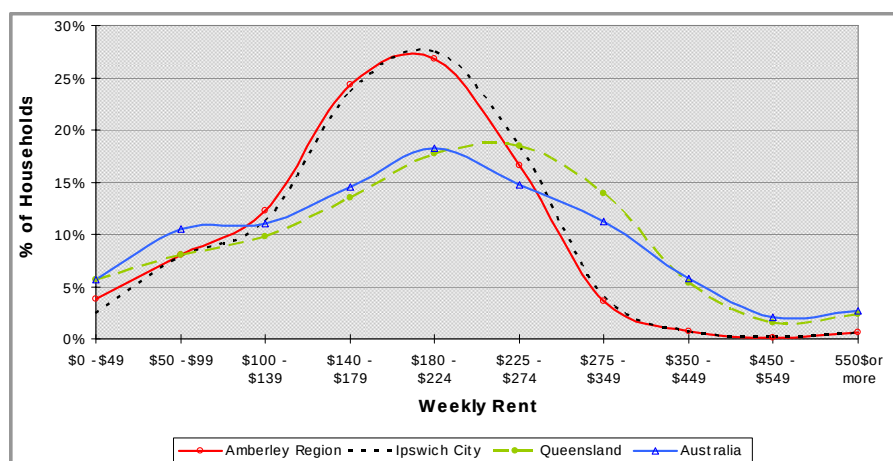
Rental Payments

The median weekly rent in Ipswich City SSD is a little lower than the medians for Queensland and Australia. However, there is less variation in rents charged for both the Ipswich City SSD and the Amberley Region as a whole.

Table 3. Ipswich City SSD - Median Rental Payments 2006

	Ipswich City SSD	Queensland	Australia
Median Weekly Rent	\$180	\$200	\$190

Note: Aggregated median rental payments data for the RAAF Amberley catchment region as a whole was not available.

Figure 5. Amberley Region - Distribution of Rental Payments, 2006

Income Profile

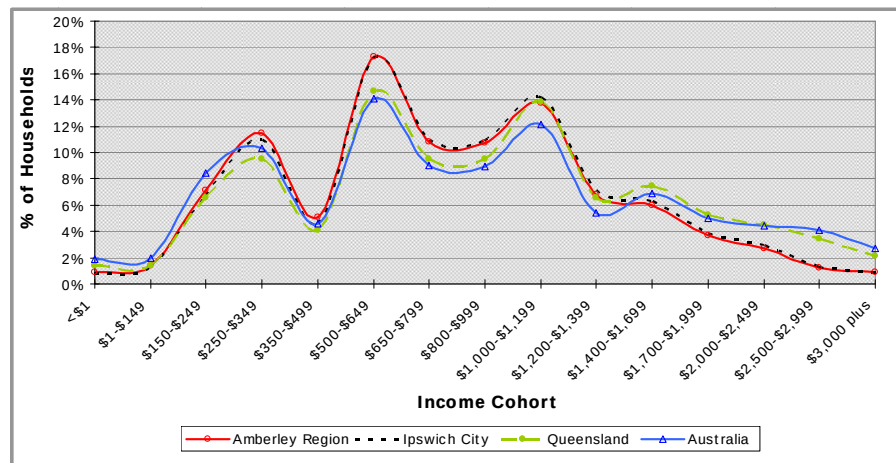
The median weekly household income in Ipswich City SSD closely matches the median for Australia. However, incomes are more equally distributed within Ipswich City SSD and the Amberley Region as a whole compared to Queensland and Australia.

Table 4. Ipswich City SSD - Median Weekly Household Incomes 2006

	Ipswich City SSD	Queensland	Australia
Median Weekly Household Income	\$1,025	\$1,033	\$1,027

Note: Aggregated median weekly household incomes data for the RAAF Amberley catchment region is not available.

Figure 6. Amberley Region - Distribution of Income, 2006



2.2.2 Employment and Occupation

Labour Force Participation and Unemployment

Labour force participation rates for Ipswich City SSD and Amberley Region as a whole are similar to the Queensland and Australian averages.

Table 5. Amberley Region - Labour Force Participation, 2006

	Ipswich City		Amberley Region		Queensland		Australia	
	No.	% of pop	No.	% of pop	No.	% of pop	No.	% of pop
Total labour force	13,065	62.1 %	83,387	61.0 %	1,915,947	61.8 %	9,607,987	60.4 %
Not in the labour force	9,652	32.0%	45,022	32.9%	971,828	31.4%	5,271,120	33.1%
Labour force status not stated	1,440	5.9%	8,258	6.0%	210,220	6.8%	1,038,973	6.5%
Total	24,157		136,667		3,097,995		15,918,080	

Unemployment in Ipswich City SSD and the Amberley Region as a whole was similar to the Queensland and Australian levels in 2006. This rate of unemployment is relatively low in recent historical terms.

Table 6. Amberley Region – Unemployment, 2006

	Ipswich City		Amberley Region		Queensland		Australia	
	No.	% of total	No.	% of total	No.	% of total labour force	No.	% of total labour force
Total Employed	62,785	94.9 %	79,187	95.0 %	1,824,997	95.3 %	9,104,185	94.8 %
Total Unemployed	3,382	5.1 %	4,200	5.0 %	90,950	4.7 %	503,802	5.2 %

Occupations

In both Ipswich City SSD and the Amberley Region as a whole, a substantially smaller proportion of the total workforce are employed as professionals compared to Queensland and Australia, while a higher proportion are employed as labourers, technicians and trades workers, and machinery operators and drivers. This indicates that trades and heavy industry are more concentrated in the region, compared to more knowledge-intensive industry.

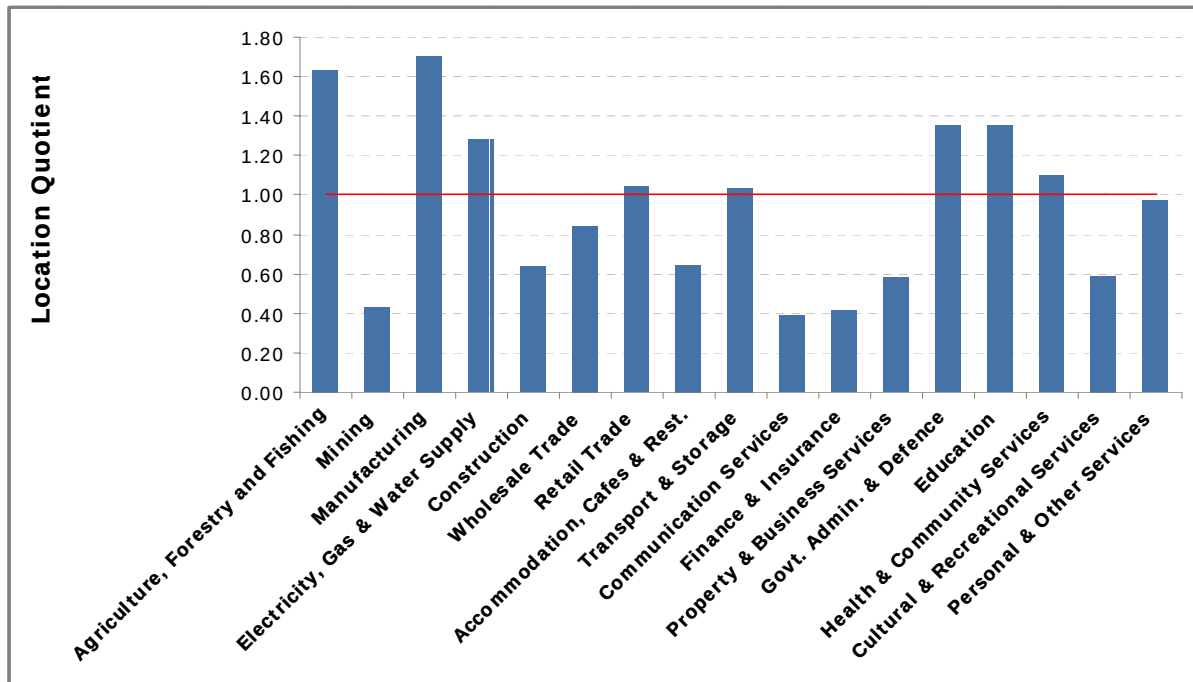
Table 7. Amberley Region - Occupational Profile, 2006

	Ipswich City		Amberley Region		Queensland		Australia	
	No.	% of total employment	No.	% of total employment	No.	% of total employment	No.	% of total employment
Managers	5,393	9%	7,890	10%	225,695	12%	1,202,261	13%
Professionals	7,407	12%	9,131	12%	312,865	17%	1,806,016	20%
Technicians & trades workers	10,916	17%	13,381	17%	280,343	15%	1,309,256	14%
Community & personal service workers	6,573	10%	7,952	10%	166,400	9%	801,902	9%
Clerical & administrative workers	9,595	15%	11,474	14%	269,199	15%	1,365,810	15%
Sales workers	5,854	9%	7,317	9%	189,041	10%	896,209	10%
Machinery operators & drivers	6,232	10%	7,754	10%	132,114	7%	604,616	7%
Labourers	9,685	15%	12,868	16%	217,251	12%	952,519	10%
Inadequately described/Not stated	1,132	2%	1,426	2%	32,093	2%	165,595	2%
Total	62,787		79,193		1,825,001		9,104,184	

2.2.3 Industry Profile

Figure 7 shows 'location quotients' (LQ) for the Amberley Region for each industry sector, in order to give an indication of which industry sectors are significant in the region. Put simply, a LQ greater than 1 indicates that an industry is relatively concentrated (and therefore strong) in the region, compared to Australian averages.

Figure 7. Location Quotients for the Amberley Region, 2006



The analysis indicates that the Amberley Region is a significant provider of government administration and defence services (with an LQ of around 1.35) - both within and beyond the region - suggesting that the base forms an important part of the regional economy. Other industries that are significant in the Amberley Region include: agriculture, forestry and fishing; manufacturing; electricity, gas and water supply; and education.

2.3 The Economic Contribution of RAAF Amberley

2.3.1 Summary of Key Economic Data

The following table summarises key economic data for RAAF Amberley. The economic contribution modelling for RAAF Amberley uses much of this data as a foundation for further analysis.

Indicator	2006 – 2007 Financial Year
Permanent Staff No (APS & ADF)	2,250
Non-Permanent Staff No (Reserves, Cadets, etc)	620
Salaries 06/07 \$	\$115,536,299
Contractor No (Approx)	1,325
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	\$686,691,286
Area	2,570 ha
Capital Works Last 10 years	- Amberley Redevelopment Stage 1 - \$77.4m 1998-99 - Amberley Redevelopment Stage 2 - \$285.6m 2005-2007 (250 jobs) - Amberley 6 SQN Facilities - \$8m 1996-97 - Heavy Air Lift C-17 – Interim facilities \$6m
Future Capital Works	- Amberley Redevelopment Stage 3 - \$331m 2008-2011 (200 jobs) - MRTT Aircraft Facilities - \$132.5m 2008 - Amberley Infrastructure Upgrade - \$83m 2008 - C-17 Heavy Air Lift Facilities – 268.2m 2008-10 (150 jobs) - Single LEAP – (120 workers per day) (295 Rooms) – 2006-08 Estimate approx \$135m (figure includes ongoing management costs over 25yrs).
Capital Works 06/07	\$139.0 million
Defence Housing 06/07	535 properties - Total annual rent - \$7,871,552
Private Rental Assistance 06/07	362 instances of private RA - Annual RA Cost - \$5,424,992
Maintenance/FACOPS 06/07	\$2,827,202
NOD/Operational Costs 06/07	\$8,335,000

2.3.2 Economic Contribution to the Amberley Region

Using the key economic information about RAAF Amberley and a regional input-output model for the Amberley Region, the economic modelling identifies the estimated interaction between RAAF Amberley and all industry sectors in the economic catchment region.

The model estimates the total contribution that the base makes to the Amberley Region economy, which is the sum of:

- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the base's activities. This is best thought of as all economic activity that has a direct relationship with the base (for example, the value of on-base employment, supply contracts, etc); and
- **Indirect contributions⁴** - which result from the additional output, value added and employment generated in the catchment region due to the presence of the base. Examples of indirect contributions would include housing and retail expenditure in the catchment region that occurs because of the presence of the base (that is, base employees spending their wages on home purchases, rentals and shopping).

Figure 8 provides a diagrammatic summary of the economic contribution of RAAF Amberley to the Amberley Region economy in 2007.

Figure 8. The Contribution of RAAF Amberley to the Amberley Region Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

⁴ It is important to note that indirect contributions may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

Output / Turnover

The output / turnover of RAAF Amberley is estimated to be \$561.9 million in 2007. The modelling calculates that the multiplier for the economic relationship between the base and Amberley Region is estimated to be 1.87.⁵ That is, for every \$1 spent, a further 87 cents of economic value was created in the Amberley Region economy. As a result of the \$561.9 million of direct output created by the base (the direct contribution), other industries in the catchment region will produce an additional \$487.1 million worth of output (the indirect contribution). The total contribution of RAAF Amberley to the Amberley Region economy is therefore approximately \$1.05 billion. This is the highest contribution a regional economy amongst the five bases included in this study.

Value Added

Value added is an important measure as it does not focus solely on the size of the base's annual Defence expenditure budget, but also highlights the contribution that passes directly or indirectly into other industry sectors in the catchment region – through profits and wages.

The modelling demonstrates that RAAF Amberley's direct contribution to the value added component of the Amberley Region economy is estimated to be \$168.8 million in 2007 - 30% of the base's direct output - and the indirect contribution to value added is estimated to be \$201.8 million. This is a total contribution of \$370.6 million to the value added component of the Amberley Region economy.

Employment

The modelling estimates the direct and indirect contributions made to employment in the Amberley Region. The direct contribution to employment is simply the number of employees (permanent and non-permanent, excluding contractors) at RAAF Amberley. The indirect contribution of jobs is an estimate of the additional jobs that are being generated in the catchment region as a result of the presence of RAAF Amberley. These are jobs that are generated because RAAF Amberley spends some of its income buying goods and services from within the regional economy. The base directly employs 2,870⁶ people, and an additional 2,294 jobs are generated in the Amberley Region. The total employment generated by RAAF Amberley is therefore 5,164 jobs.

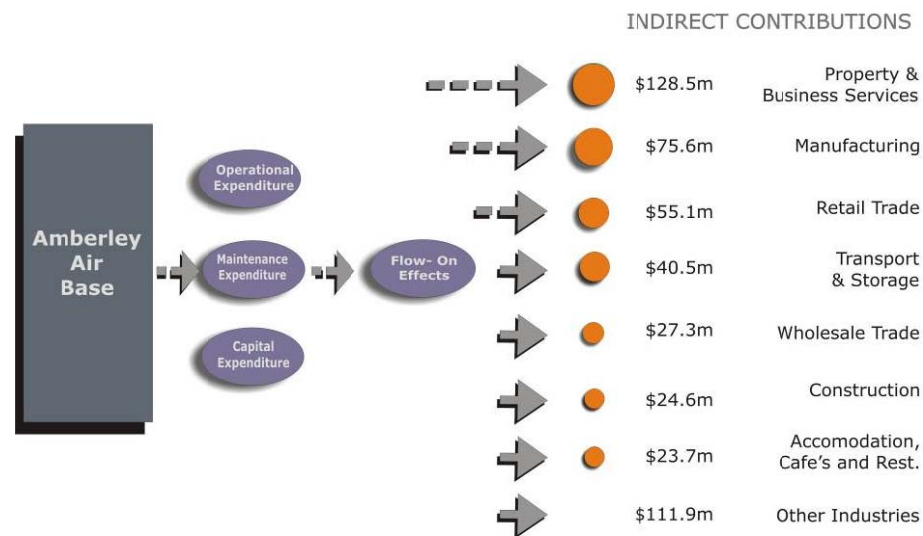
⁵ All Defence sector multipliers have generally remained under 2. According to the data gathered from Department of Defence in conjunction with the economic modelling, the multipliers of the Defence sector can be explained partly by the generally lower integration in the local economy. That is, they operate in a more independent manner and the level of imports to bases from outside the catchment region tends to be higher.

⁶ Note that for this assessment the number of permanent (full time) and non-permanent (part time and casual) staff have been used to represent the *total* job numbers for each base. This assumes that at any time non permanent staff would be required at the base and to exclude them from the total would understate the economic contribution.

2.3.3 The Distribution of the Indirect Contribution to the Amberley Region

The direct contribution of RAAF Amberley is more or less counted as the value of the Defence industry sector in the Amberley Region. However, the *indirect contribution* is distributed across other industries within the region, and demonstrating this distribution highlights industries with a key economic relationship to the base. Figure 9 summarises the distribution of RAAF Amberley's indirect contribution across various industries in the catchment region.

Figure 9. RAAF Amberley – Distribution by Industry Sector of Indirect Contributions to the Amberley Region, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

RAAF Amberley's most significant indirect contribution is to the property and business services sector (\$128.5 million). This linkage between the base and the property and business services sector is not an uncommon one for defence bases. The property and business services sector includes a variety of sub-sectors, from specialised services such as equipment maintenance and technical services, to general maintenance and cleaning services. Therefore, a significant component of the operating expenditure and maintenance expenditure of the base flows into this sector. The second most significant contribution is to the manufacturing sector, a contribution of \$75.6 million.

2.3.4 Further Contributions through Housing Assistance

It is important to note that through direct expenditure on housing assistance for employees, RAAF Amberley provides a further direct and indirect economic contribution to the catchment region. As part of its normal operations, RAAF Amberley provides Defence housing and rental assistance to some employees. The annual direct expenditure for RAAF Amberley in 2006 / 07 was \$7.9 million in total rent for Defence housing, and \$5.4 million for general rental assistance.

The indirect economic effect of this direct expenditure is twofold. First, the provision of subsidised housing and rental assistance increases the disposable income of those assisted (because they pay less rent than they otherwise would), a proportion of which is then spent in the Amberley Region. Secondly, the paying of rental assistance to private renters transfers money to landlords in the Amberley Region, a proportion of which is then spent in the region. Analysis of general expenditure patterns suggests that, as a guide, this indirect effect applies a factor of 2 to direct rental expenditure.⁷ This means that the total contribution of Defence housing and rental assistance expenditure is approximately double the direct expenditure on housing and rental assistance. For RAAF Amberley therefore, the total further contribution of the Defence housing and rental assistance is \$24.8 million.⁸

2.3.5 Economic Contribution to the Queensland Economy

The modelling was expanded to examine the contribution of RAAF Amberley to the Queensland economy. By widening the base's economic catchment from the regional to the state level, the scale of imports accounted for in the modelling is reduced. That is, goods and services sourced from outside the Amberley Region but within the state are no longer counted as imports, as they would have to be at the regional level. A defence base may or may not source a large amount of goods and services from its local region, but can be expected to be more highly integrated with its state economy. Therefore, the value of the direct and indirect economic contributions made by the base increase when RAAF Amberley's relationship to the Queensland economy is modelled. Figure 10 summarises the economic contribution to the Queensland economy, resulting from the operations of RAAF Amberley.

Figure 10. The Contribution of RAAF Amberley to the Queensland Economy, 2007



⁷ Expenditure behaviour surveys for the catchment region were outside the scope of this project, so a general rule is applied based on previous SGS research in other contexts.

⁸ Note that this is only indicative, as the aim is simply to explain the indirect contribution resulting from the Defence housing and rental assistance expenditure. It is possible for this to be an overestimate of the real indirect impact as it assumes that 100% of the rental income earned will flow into the catchment region.

Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

The effect of broadening the economic catchment of the base to the state level is significant. The direct contribution of RAAF Amberley increases to an estimated \$638.8 million and the indirect contribution increases to an estimated \$656.4 million, resulting in an estimated total economic contribution of \$1.3 billion to the Queensland economy. This also can be interpreted to mean that an extra contribution of approximately \$246.2 million flowed beyond the catchment region but into the Queensland economy.

Value Added and Employment

RAAF Amberley directly contributes \$200 million to the value added component of the Queensland economy. With an indirect contribution of approximately \$272 million, the total contribution to the value added component of the Queensland economy was \$472.3 million in 2007.

RAAF Amberley employed approximately 2,870 people in 2007. At the state level, the further indirect employment generated was 3,474 jobs, making the total contribution to employment in Queensland approximately 6,344 jobs in 2007.

Note that it was not possible to model the industry sector distribution of indirect contributions at the state level because of data limitations and general limits to the scope and budget of this study.

3 RAAF Edinburgh, South Australia

3.1 An Overview of RAAF Edinburgh

Location and Operational Background

RAAF Edinburgh, incorporating the Defence Science and Technology Organisation (DSTO), is located in the northern suburbs of Adelaide approximately 25 km from the Adelaide CBD. The RAAF Edinburgh precinct is divided between an 890 ha site for the air base, and a 280 ha site containing the DSTO premises, and forms the entire suburb of Edinburgh.

RAAF Edinburgh makes a significant contribution to the Royal Australian Air Force's capability. It provides operational training, engineering, administrative and logistical assistance that support RAAF squadrons around Australia.

In the next decade significant changes will occur at RAAF Edinburgh, with the establishment of a Army Mechanised Battle Group by 2011 (1,200 additional people by 2011 and \$600m in capital works by 2011), the completion of RAAF Base Redevelopment Phase 2 (\$80 million construction 2008-11), and future living in accommodation of 500 units plus DHA housing.

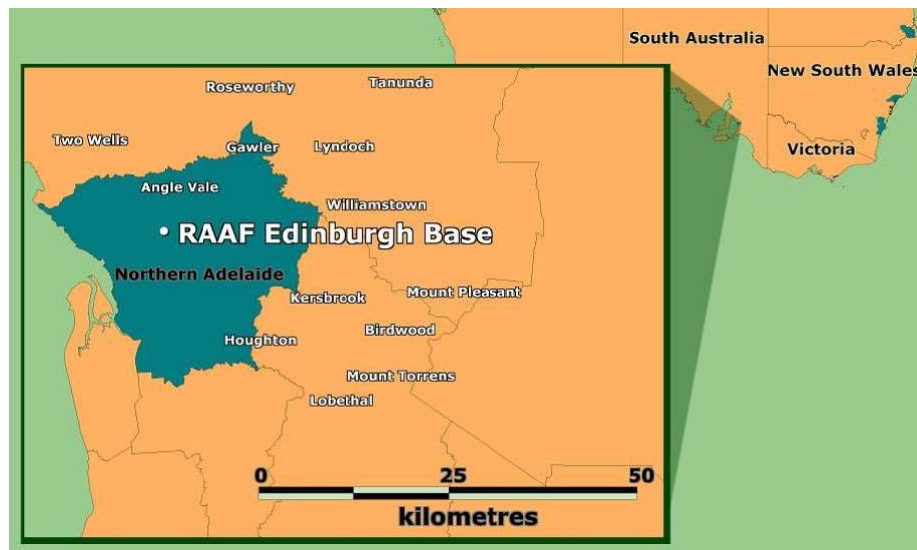
New aircraft types will also operate and access RAAF Edinburgh following implementation of AIR 7000 Phases 1 and 2, and the introduction of new aircraft and systems under projects AIR 5077, AIR 5402, AIR 6000 and AIR 8000 Phase 3.

In addition, the SA Government has almost finalised a large scale industrial land use strategy surrounding the base which will have a defence industry / defence science and technology focus.

The RAAF Edinburgh Economic Catchment Region

For data collection and economic modelling purposes, the RAAF Edinburgh economic catchment region (referred to as *Northern Adelaide* from here) has been defined by the ABS Census Northern Adelaide Statistical Subdivision. This makes it easier to match statistical information with the economic catchments used in this study. The selection of this area was based upon an assumption about the degree of interaction and influence between the base and surrounding areas. This assumption was informed by discussions with Defence.

The base lies within the local government area of the City of Salisbury, but adjacent local government areas include the City of Playford, the City of Tea Tree Gully, and the City of Port Adelaide Enfield.

Figure 11. RAAF Edinburgh: location and economic catchment region

3.2 Profile of Northern Adelaide

The purpose of this profile of Northern Adelaide is to provide some contextual understanding about the region in which the base is operating. The profile provides information about Northern Adelaide compared to South Australia and Australia. The source of all data in the profile is the ABS Census 2006.

3.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

Northern Adelaide has a large population that has grown a little more strongly than South Australia. However, this rate is still quite slow in general terms.

Table 8. Northern Adelaide - 2006 Population

	Population in 2006	% of Australia's Population
Northern Adelaide	352,144	1.7 %
South Australia	1,518,250	7.5%
Australia	20,268,010	

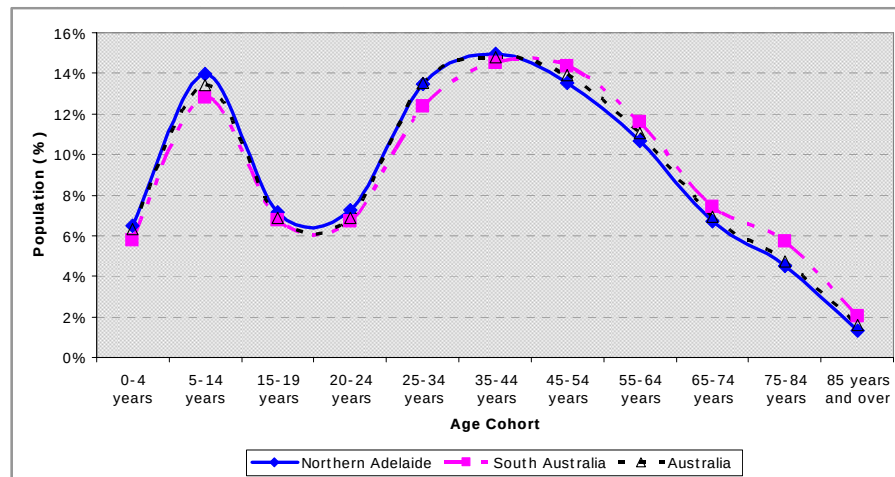
Table 9. Northern Adelaide - Rates of Population Growth, 1996 to 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Northern Adelaide	0.77 %	0.78 %	0.78 %
South Australia	0.58%	0.57%	0.58%
Australia	1.24%	1.11%	1.18%

Age Structure

Northern Adelaide has a very similar age structure to Australia as a whole, and a marginally younger population than South Australia in general.

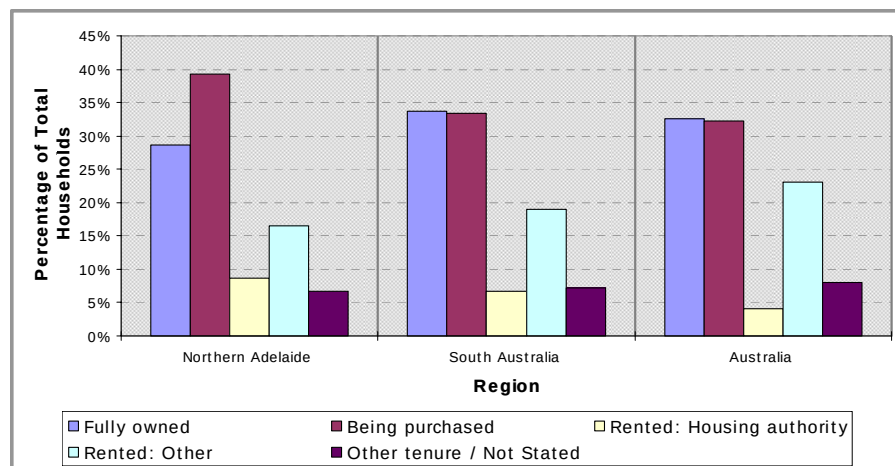
Figure 12. Northern Adelaide - Ages of Residents, 2006



Household Tenure

Northern Adelaide is largely a suburban area, and accordingly contains a larger proportion of households purchasing a home compared to South Australia and Australia.

Figure 13. Northern Adelaide - Household Tenure, 2006



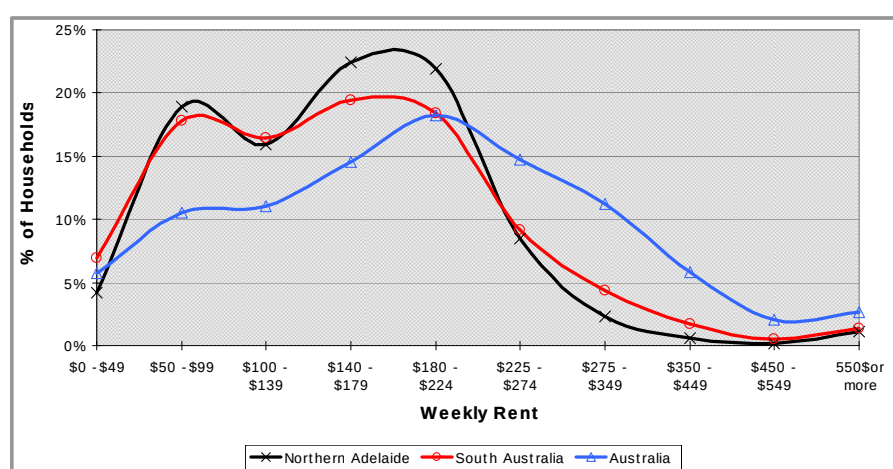
Rental Payments

The median rental payment in Northern Adelaide is similar to the South Australian median, which is substantially below the Australian figure. However, Figure 14 shows that there is significantly less variation in rental payments in Northern Adelaide than in South Australia and Australia.

Table 10. Northern Adelaide - Median Rental Payments, 2006

	Northern Adelaide	South Australia	Australia
Median Weekly Rent	\$154	\$150	\$190

Figure 14. Northern Adelaide - Distribution of Rental Payments, 2006



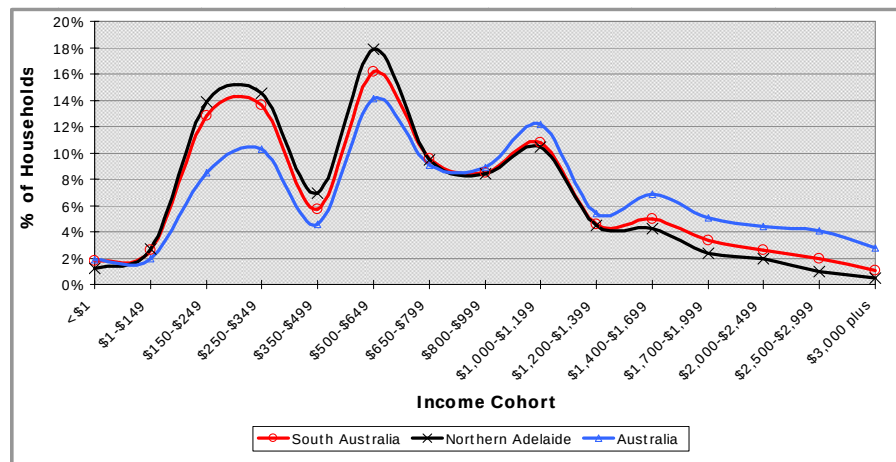
Income Profile

Incomes in South Australia are lower than in Australia as a whole, and the income distribution in Northern Adelaide is slightly lower still. Therefore, it can be said that Northern Adelaide is suffering a mild degree of income disadvantage relative to Australia as a whole.

Table 11. Northern Adelaide - Median Weekly Household Incomes, 2006

	Northern Adelaide	South Australia	Australia
Median Weekly Household Incomes	\$879	\$887	\$1,027

Figure 15. Northern Adelaide - Distribution of Income, 2006



3.2.2 Employment and Occupation

Labour Force Participation and Unemployment

Labour force participation in Northern Adelaide and South Australia is similar to the rate for Australia as a whole.

Table 12. Northern Adelaide - Labour Force Participation, 2006

	Northern Adelaide		South Australia		Australia	
	No.	% of total	No.	% of total	No.	% of total
Total labour force	166,162	58.9 %	728,076	59.0 %	9,607,987	60.4 %
Not in the labour force	101,016	35.8%	441,818	35.8%	5,271,120	33.1%
Labour force status not stated	14,714	5.2%	63,622	5.2%	1,038,973	6.5%
Total	281,892		1,233,516		15,918,080	

Unemployment and participation in the labour market in Northern Adelaide were similar to the national and state averages in 2006. This rate of unemployment is relatively low in recent historical terms.

Table 13. Northern Adelaide - Unemployment, 2006

	Northern Adelaide		South Australia		Australia	
Total Employed	156,362	94.1 %	689,896	94.8 %	9,104,185	94.8 %
Total Unemployed	9,800	5.9 %	38,180	5.2 %	503,802	5.2 %

Occupational Profile

In Northern Adelaide a smaller proportion of the workforce are employed as managers and professionals than in South Australia and Australia overall. A higher proportion is employed as technicians and trades workers, machinery operators and drivers, and labourers. This suggests that knowledge intensive industry is less concentrated in Northern Adelaide, and that industries such as construction and manufacturing are relatively larger employers.

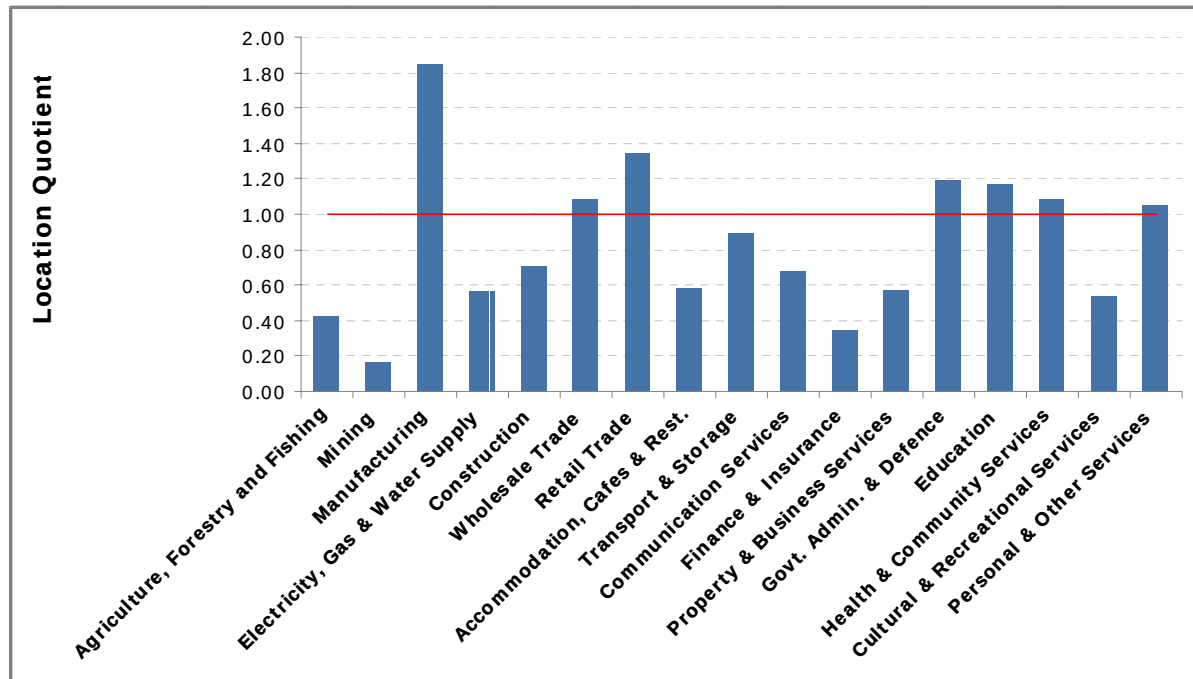
Table 14. Northern Adelaide - Occupational Profile, 2006

	Northern Adelaide		South Australia		Australia	
	No.	%	No.	No.	No.	%
Managers	14999	10%	92,582	13%	1,202,261	13%
Professionals	21120	14%	127,152	18%	1,806,016	20%
Technicians & trades workers	24965	16%	97,742	14%	1,309,256	14%
Community & personal service workers	15401	10%	65,098	9%	801,902	9%
Clerical & administrative workers	24764	16%	100,239	15%	1,365,810	15%
Sales workers	16082	10%	66,443	10%	896,209	10%
Machinery operators & drivers	13630	9%	44,091	6%	604,616	7%
Labourers	22611	14%	85,885	12%	952,519	10%
Inadequately described/Not stated	2790	2%	10,669	2%	165,595	2%
Total	156362		689,901		9,104,184	

3.2.3 Industry Profile

Figure 16 calculates 'location quotients' (LQ) for each industry sector in Northern Adelaide, in order to give an indication of which industry sectors are significant in the region. Put simply, a LQ greater than 1 indicates that an industry is relatively concentrated (and therefore strong) in the region, compared to Australian averages.

Figure 16. Location Quotients for Northern Adelaide, 2006



The analysis indicates that Northern Adelaide is a significant provider of manufacturing, and retail trade – both within and beyond the catchment region. This heavy reliance upon manufacturing puts the regional economy at some risk if there is a downturn in the manufacturing sector. The economic contribution of RAAF Edinburgh therefore helps to diversify the regional economy, and to mitigate against this risk. Northern Adelaide also exports government administration and defence services, reflecting the presence of the base.

3.3 The Economic Contribution of RAAF Edinburgh

3.3.1 Summary of Key Economic Data

The following table summarises key economic data for RAAF Edinburgh. The economic contribution modelling for RAAF Edinburgh uses much of this data as a foundation for further analysis.

Indicator	2006 – 2007 Financial Year
Permanent Staff No (APS & ADF)	4,204
Non-Permanent Staff No (Reserves, Cadets, etc)	288
Salaries 06/07 \$	\$143,880,563
Contractor No (Approx)	720
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	\$437,049,400
Area	1170ha
Capital Works Last 10 years	- RAAF Base Edinburgh Stage 1 1999-00 - \$41m - OTHRSP0 Accommodation (Jindalee) - \$5.2m - No 1 AFDS Working Facilities - \$3.5m - Jindalee Building - \$11m - Explosive Ordnance Facilities - \$3.2m - Fire Protection to Facilities - \$4.7m - Aviation Medicine Facilities - \$3.2m - New Instrument Landing System - \$3.3m - Engineering Services Upgrades - \$3.1m - No 492SQN Hanger - \$5.3m - Runway & Tarmac Upgrade - \$4.85m - Fuel Installation Upgrade - \$3.2m - Flight Simulator Facility - \$3.1m - Aircraft Signature Turntable - \$1.9m
Future Capital Works	- Edinburgh Redevelopment Stage 2 - \$90m - 100 jobs at peak 2009-2010 - HNA Facilities \$620m 2008-2011 – 500 jobs at peak (HNA is Hardened Networked Army – Many staff being relocated from Northern Australia – will also impact on housing supply/local expenditure – approx 1200 new staff)
Capital Works 06/07	\$65.8 million
Defence Housing 06/07	635 properties - Total annual rent - \$8,977,465
Private Rental Assistance 06/07	604 instances of private RA - Annual RA Cost - \$8,794,422
Maintenance/FACOPS 06/07	\$10,549,244
NOD/Operational Costs 06/07	\$4,888,000 (excluding utility costs)

3.3.2 Economic Contribution to Northern Adelaide

Using the key economic information about RAAF Edinburgh and a regional input-output model for Northern Adelaide, the economic modelling identifies the estimated interaction between RAAF Edinburgh and all industry sectors in the economic catchment region.

The model estimates the total contribution that the base makes to the Northern Adelaide economy, which is the sum of:

- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the base's activities. This is best thought of as all economic activity that has a direct relationship with the base (for example, the value of on-base employment, supply contracts, etc); and
- **Indirect contributions**⁹ - which result from the additional output, value added and employment generated in the economic catchment region due to the presence of the base. Examples of indirect contributions would include housing and retail expenditure in the catchment region that occurs because of the presence of the base (that is, base employees spending their wages on home purchases, rentals and shopping).

Figure 17 summarises the economic contribution made by RAAF Edinburgh to the Northern Adelaide economy.

Figure 17. The Contribution of RAAF Edinburgh to the Northern Adelaide Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

⁹ It is important to note that the flow-on contribution may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

Output / Turnover

The output / turnover of RAAF Edinburgh is estimated to be \$706.8 million in 2007. The modelling calculates that the multiplier for the economic relationship between RAAF Edinburgh and the Northern Adelaide region is 1.75.¹⁰ That is, for every \$1 spent, a further 75 cents of economic value is created in the regional economy. As a result, the \$706.8 million direct contribution made by the base leads to an indirect contribution of an additional \$533.1 million worth of output in the Northern Adelaide region. The total contribution of output / turnover is approximately \$1.24 billion.

Value Added

Value added is an important measure as it does not focus solely on the size of the base's annual Defence expenditure budget, but also highlights the contribution that passes directly or indirectly into other industry sectors in the catchment region – through profits and wages.

The modelling demonstrates that RAAF Edinburgh's direct contribution to the value added component of the Northern Adelaide economy is estimated to be \$228.6 million in 2007 - 32% of the base's direct output. This is the highest direct contribution of value added amongst the bases included in this the study. The indirect contribution to the value added component of the Northern Adelaide economy is estimated to be \$232 million. RAAF Edinburgh's total contribution to the value added component of the Northern Adelaide economy is \$460.5 million.

Employment

The modelling estimates the direct and indirect contributions made to employment in the Northern Adelaide region. The direct contribution to employment is simply the number of employees (permanent and non-permanent, excluding contractors) at RAAF Edinburgh. It is estimated that RAAF Edinburgh directly employed 4,492¹¹ people in 2007 (permanent and non-permanent staff). The modelling estimates that there are 2,605 additional indirect jobs being generated by the presence of RAAF Edinburgh in the catchment region. The total employment generated by the base is therefore 7,097 jobs.

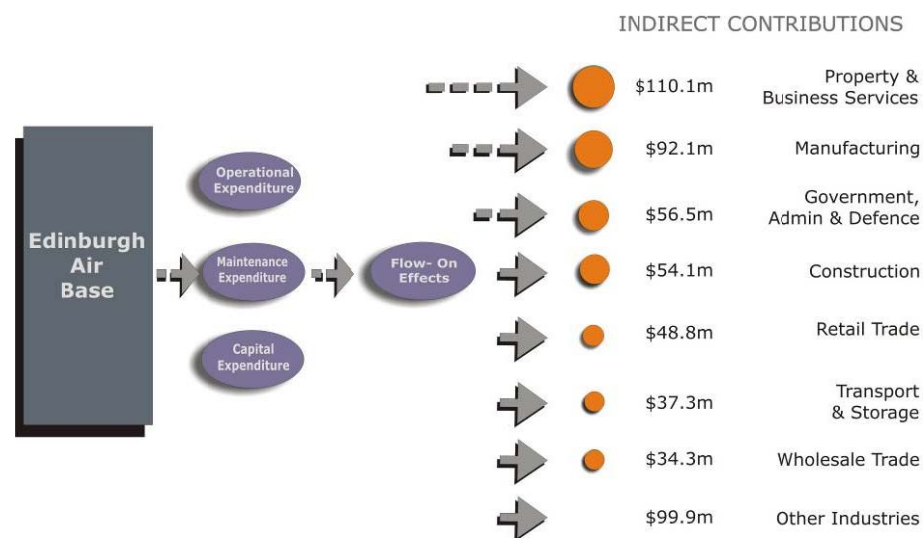
¹⁰ All Defence sector multipliers have generally remained under 2. According to the data gathered from Department of Defence in conjunction with the economic modelling, the multipliers of the Defence sector can be explained partly by the generally lower integration in the local economy. That is, they operate in a more independent manner and the level of imports to bases from outside the catchment region tends to be higher.

¹¹ Note that for this assessment the number of permanent (full time) and non-permanent (part time and casual) staff have been used to represent the *total* job numbers for each base. This assumes that at any time non permanent staff would be required at the base and to exclude them from the total would understate the economic contribution.

3.3.3 The Distribution of the Indirect Contribution to the Northern Adelaide Region

The direct contribution of RAAF Edinburgh is more or less counted as the value of the Defence industry sector in the Northern Adelaide region. However, the *indirect contribution* is distributed across other industries within the region, and demonstrating this distribution highlights industries with a key economic relationship to the base. Figure 18 illustrates the distribution of the indirect economic contribution of RAAF Edinburgh across various industries in the local economy.

Figure 18. RAAF Edinburgh – Distribution by Industry Sector of Indirect Contributions to the Northern Adelaide Region, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

RAAF Edinburgh's most significant indirect contribution is to the property and business services sector, an estimated amount of \$110 million. This is followed by the manufacturing sector with an indirect contribution of \$92 million. The government, administration and defence sector received the third highest indirect contribution, to the value of \$56.5 million.

3.3.4 Further Contributions through Housing Assistance

RAAF Edinburgh provides further economic benefits to the Northern Adelaide region through its provision of housing and rental assistance its employees. For RAAF Edinburgh, in 2006 - 2007 the annual direct expenditure was approximately \$9 million for Defence housing and approximately \$8.8 million for general rental assistance.

The indirect economic effect of this direct expenditure is twofold. First, the provision of subsidised housing and rental assistance increases the disposable income of those assisted (because they pay less rent than they otherwise would), a proportion of which is then spent in the Northern Adelaide region. Secondly, the paying of rental assistance to private renters transfers money to landlords in

the Northern Adelaide region, a proportion of which is then spent in the region. Analysis of general expenditure patterns suggests that, as a guide, this indirect effect applies a factor of 2 to direct rental expenditure.¹² This means that the total contribution of Defence housing and rental assistance expenditure is approximately double the direct expenditure on housing and rental assistance. Therefore, in the case of RAAF Edinburgh, the total further contribution to the Northern Adelaide region arising from Defence housing and rental assistance expenditure is therefore around \$35.6 million.¹³

3.3.5 Contribution to the South Australian Economy

The modelling was expanded to examine the contribution of RAAF Edinburgh to the South Australian economy. By widening the base's economic catchment from the regional to the state level, the scale of imports accounted for in the modelling is reduced. That is, goods and services sourced from outside the Northern Adelaide region but within the state are no longer counted as imports, as they would have to be at the regional level. A defence base may or may not source a large amount of goods and services from its local region, but it can be expected to be more highly integrated with its state economy. Therefore, the value of the direct and indirect economic contributions made by the base increase when RAAF Edinburgh's relationship to the South Australian economy is modelled.

Figure 19 summarises the economic contribution to the South Australian economy, resulting from the operations of RAAF Edinburgh.

Figure 19. The Contribution of RAAF Edinburgh to the South Australian Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

¹² Expenditure behaviour surveys for the catchment region were outside the scope of this project, so a general rule is applied based on previous SGS research in other contexts.

¹³ Note that this is only indicative, as the aim is simply to explain the indirect contribution resulting from the Defence housing and rental assistance expenditure. It is possible for this to be an overestimate of the real indirect impact as it assumes that 100% of the rental income earned will flow into the catchment region.

Output / Turnover

The effect of broadening the economic catchment of the base to the state level is significant. The direct contribution of RAAF Edinburgh to the South Australian economy increases to an estimated \$788.4 million. This was around \$81.5 million higher than the base's direct contribution at the Northern Adelaide region level. The indirect contribution to the state economy increases to an estimated \$720.4 million, resulting in an estimated total economic contribution in terms of output / turnover of around \$1.51 billion.

Value Added and Employment

RAAF Edinburgh directly contributes \$263 million to the value added component of the South Australian economy. The indirect contribution to the value added component of the South Australian economy is approximately \$312.8 million, making the total contribution to value added in the state economy \$575.8 million.

We know that RAAF Edinburgh employed approximately 4,492 people in 2007. The modelling predicts that the indirect employment generated in the state as a result of the presence of the base was 3,891 jobs, making the total contribution to employment in South Australia approximately 8,383 jobs.

Note that it was not possible to model the industry sector distribution of indirect contributions at the state level because of data limitations and general limits to the scope and budget of this study.

4 RAAF Pearce, Western Australia

4.1 An Overview of RAAF Pearce

Location and Operational Background

RAAF Pearce is located adjacent to the Great Northern Highway at Bullsbrook, approximately 32km north-east of the Perth CBD (the travel distance by road is approximately 44km). The base lies within the City of Swan municipality and is situated between the Bullsbrook township to the east and the village of West Bullsbrook immediately adjacent to the Base's western boundary.

RAAF Pearce is the advanced flying training base for RAAF and RAN pilots. The primary roles of RAAF Pearce are to train cadet pilots and to conduct 'jet conversion' training for selected pilot officers. RAAF Pearce is the home base of two RAAF flying training organisations: No 2 Flying Training School (2FTS) with 46 Pilatus PC-9/A aircraft; and No 79 Squadron (79SQN) with 14 BAe Hawk 127 aircraft. Since 1993, RAAF Pearce has also been the main basic flying training base for pilots of the Republic of Singapore Air Force (RSAF).

RAAF Pearce is the only fully manned military aviation base in Western Australia and, therefore, is of high strategic and operational importance.

The RAAF Pearce Economic Catchment Region

For data collection and economic modelling purposes the economic catchment region for RAAF Pearce (referred to as the *Pearce Region* from hereon) has been defined by the ABS Census Statistical Subdivisions of East Metropolitan, North Metropolitan and Moore. This makes it easier to match statistical information with the economic catchments used in this study. The selection of these areas was based upon an assumption about the degree of interaction and influence between the base and surrounding areas. This assumption was informed by discussions with Defence.

As mentioned, RAAF Pearce is within the City of Swan local government area. Neighbouring local government areas include the City of Wanneroo and the City of Joondalup, and the Shires of Chittering, Toodyay, Mundaring and Kalamunda.

Figure 20. RAAF Pearce: location and economic catchment region



4.2 Profile of the Pearce Region

The purpose of this profile of the Pearce Region is to provide some contextual understanding about the region in which the base is operating. The profile provides information about the Pearce Region compared to Western Australia and Australia. The source of all data in the profile is the ABS Census 2006.

4.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

The Pearce Region population has grown more strongly than the rest of WA and Australia. Though the rate of population increase is not dramatic, it does imply that RAAF Pearce is located in a growing region. The Pearce Region also includes a larger population than other bases included in this study.

Table 15. Pearce Region - 2006 Population

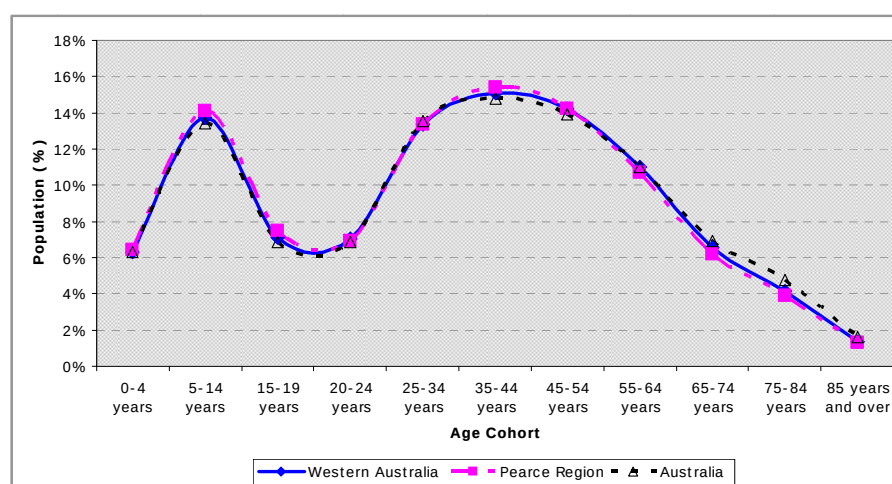
	Population in 2006	% of Australia's Population
Pearce Region	697,038	3.4 %
Western Australia	2,007,515	9.9%
Australia	20,268,010	

Table 16. Pearce Region - Rates of Population Growth

	1996 to 2001	2001 to 2006	1996 to 2006
Pearce Region	1.60 %	1.55 %	1.58 %
Western Australia	1.47%	1.42%	1.45%
Australia	1.24%	1.11%	1.18%

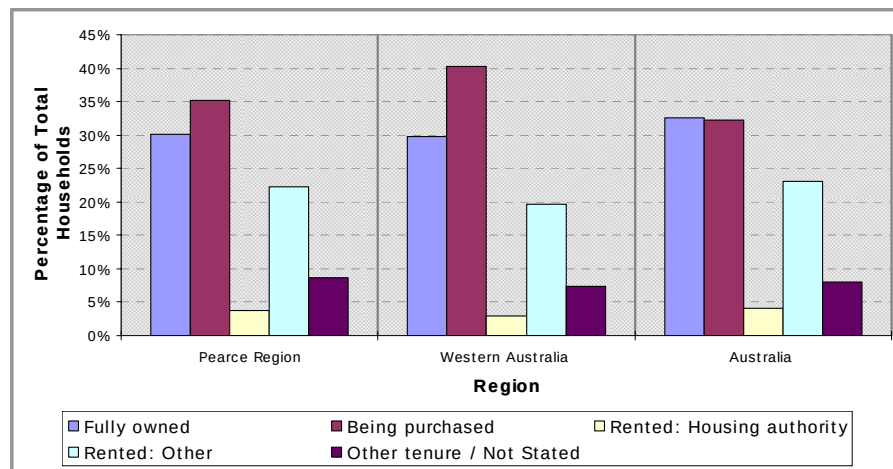
Age Structure

The age structure of the Pearce Region is very similar to that of WA and Australia overall.

Figure 21. Pearce Region - Ages of Residents, 2006

Household Tenure

Western Australia contains a substantially larger proportion of households in the process of purchasing their homes than Australia overall, and a significantly smaller proportion of rental properties. The Pearce Region is more in line with the Australian average for the number of rental properties, but still contains a higher proportion of mortgagees than the rest of Australia.

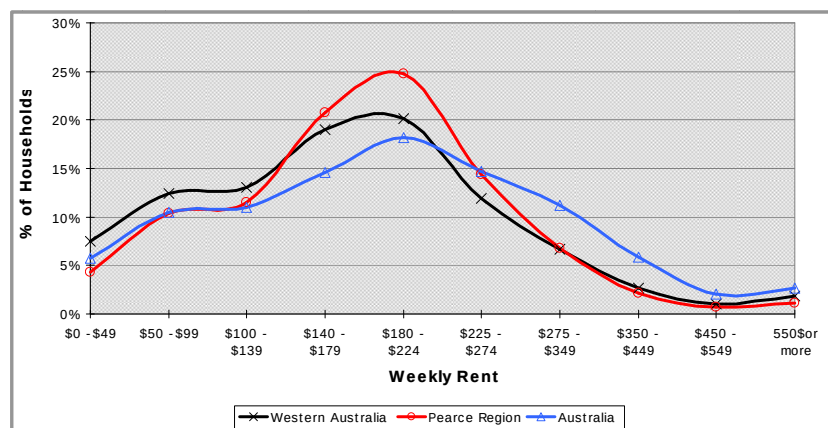
Figure 22. Pearce Region - Household Tenure, 2006

Rental Payments

Table 17 lists the median weekly rental payments for each of the statistical subdivisions within the catchment region, and includes the figures for WA and Australia for comparison. Disaggregating the region for this purpose illustrates the diversity of the property market in the Pearce Region. Moore, the rural area to the North of the base, has a substantially lower median rental payment than the two metropolitan Perth subdivisions. In 2006, all the areas around the base had a lower median rental payment than the Australian average. Rental payments in the Pearce Region are skewed towards the middle of the distribution relative to Western Australia and Australia.

Table 17. Pearce Region - Median Rental Payments, 2006

	Moore	East Metropolitan Perth	North Metropolitan Perth	Western Australia	Australia
Median Weekly Rent	\$100	\$170	\$185	\$170	\$190

Figure 23. Pearce Region - Distribution of Rental Payments, 2006

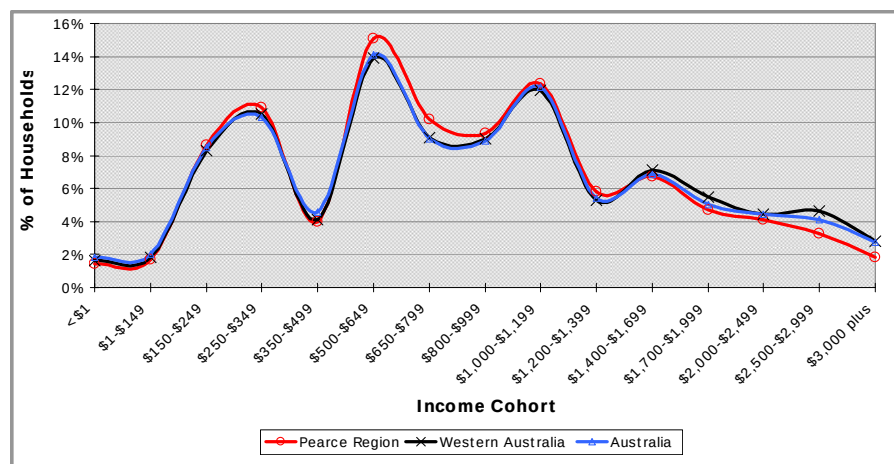
Income Profile

Table 18 demonstrates that within the Pearce Region the more rural area of Moore has a lower median weekly household income than Western Australia and Australia overall. The income profile in the catchment region fits the Western Australian and Australian profiles quite closely, but is slightly more equal in distribution.

Table 18. Pearce Region - Median Weekly Household Incomes, 2006

	Moore	East Metropolitan Perth	North Metropolitan Perth	Western Australia	Australia
Median Weekly Household Income	\$946	\$1,069	\$1,106	\$1,066	\$1,027

Figure 24. Pearce Region - Distribution of Income, 2006



4.2.2 Employment and Occupation

Labour Force Participation and Unemployment

The participation rate in the Pearce Region is significantly higher than for Australia, and a little higher than for WA. This further demonstrates the overall strength of the labour market in the region.

Table 19. Pearce Region - Labour Force Participation, 2006

	Pearce Region		Western Australia		Australia	
	No.	% of total	No.	% of total	No.	% of total
Total labour force	358,805	64.4 %	972,791	62.3 %	9,607,987	60.4 %
Not in the labour force	164,447	29.5%	478,245	30.6%	5,271,120	33.1%
Labour force status not stated	33,755	6.1%	111,617	7.1%	1,038,973	6.5%
Total	557,007		1,562,653		15,918,080	

Unemployment in the Pearce Region is very low, both in recent historical terms and relative to Australia as a whole.

Table 20. Pearce Region - Unemployment, 2006

	Pearce region		Western Australia		Australia	
Total Employed	346,562	96.6%	936,132	96.2%	9,104,185	94.8%
Total Unemployed	12,243	3.4 %	36,659	3.8 %	503,802	5.2 %

Occupational Profile

The occupational profile of the Pearce Region is quite similar to those of Western Australia and Australia, although a significantly larger proportion of the workforce are employed as technicians and trades workers than in Australia overall.

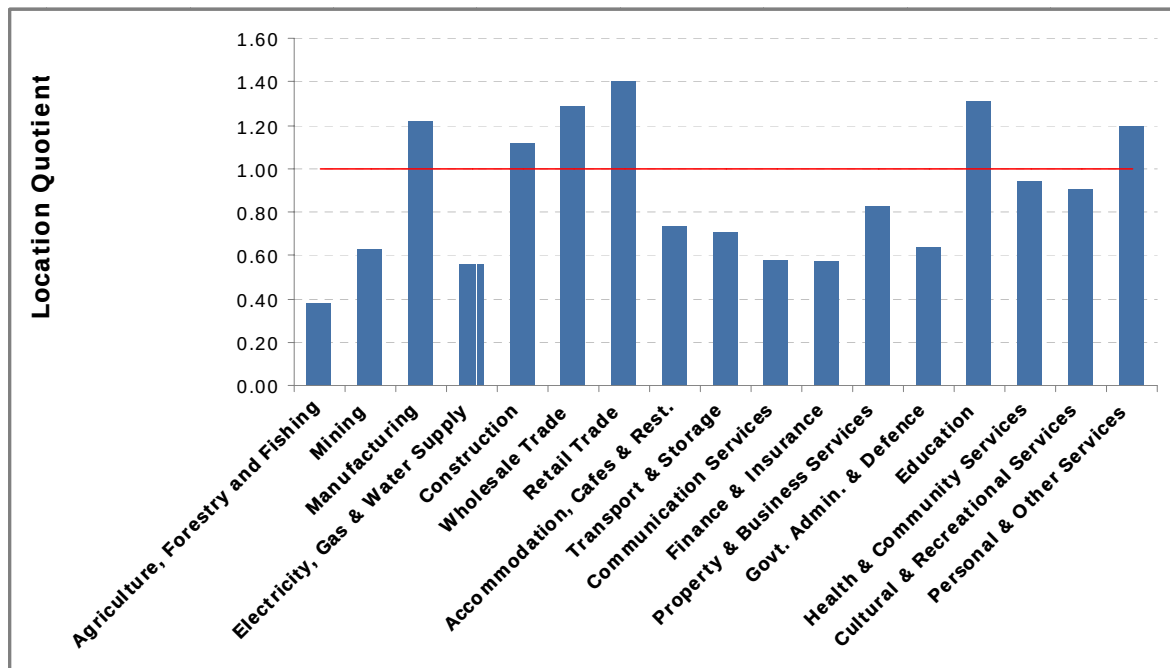
Table 21. Pearce Region - Occupational Profile, 2006

	Pearce Region		Western Australia		Australia	
	No.	% of total labour force	No.	% of total labour force	No.	% of total labour force
Managers	39,158	11%	117,031	13%	1,202,261	13%
Professionals	64,321	19%	173,957	19%	1,806,016	20%
Technicians & trades workers	57,991	17%	153,565	16%	1,309,256	14%
Community & personal service workers	31,473	9%	82,916	9%	801,902	9%
Clerical & administrative workers	56,678	16%	135,980	15%	1,365,810	15%
Sales workers	35,064	10%	88,084	9%	896,209	10%
Machinery operators & drivers	22,092	6%	67,893	7%	604,616	7%
Labourers	34,657	10%	102,020	11%	952,519	10%
Inadequately described/Not stated	5,131	1%	14,685	2%	165,595	2%
Total	346,565		936,131		9,104,184	

4.2.3 Industry Profile

Figure 25 shows 'location quotients' (LQ) for each industry sector for the Pearce Region, in order to give an indication of which industry sectors are significant in the region. Put simply, a LQ greater than 1 indicates that an industry is relatively concentrated (and therefore strong) in the region, compared to Australian averages.

Figure 25. Location Quotients for the Pearce Region, 2006



The analysis indicates that the Pearce Region is a significant provider of manufacturing, wholesale and retail trade, and education – both within and beyond the catchment region. Interestingly, government administration and defence is relatively un-concentrated in the region. However, this does not mean that the base's presence is insignificant, but reflects the fact that the economy of the Pearce Region is quite large (compared to the size of the base) and the region probably does not provide many other government administration and defence services, outside of those provided by RAAF Pearce.

4.3 The Economic Contribution of RAAF Pearce

4.3.1 Summary of Key Economic Data

The following table summarises key economic data for RAAF Pearce. The economic contribution modelling for RAAF Pearce uses much of this data as a foundation for further analysis.

Indicator	2006 – 2007 Financial Year
Permanent Staff No (APS & ADF)	• 560
Non-Permanent Staff No (Reserves, Cadets, etc)	• 210 (excluding approximately 88 RSAF personal)
Salaries 06/07 \$	• \$25,787,134
Contractor No (Approx)	• 373
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$323,190.024
Area	• 963ha
Capital Works Last 10 years	• Pearce facilities for Hawk LIF - \$7m 98-99
Future Capital Works	• Pearce Redevelopment Stage 1 - \$142.2m 08-11 (200 jobs)
Capital Works 06/07	• \$35.5m
Defence Housing 06/07	• 107 properties • Total annual rent - \$1,481,480
Private Rental Assistance 06/07	• 81 instances of private RA • Annual RA Cost - \$1,442,584
Maintenance/FACOPS 06/07	• \$3,796.998
NOD/Operational Costs 06/07	• \$7,356,000 (excludes utilities cost)

4.3.2 Economic Contribution to the Pearce Region

Using the key economic information about RAAF Pearce and a regional input-output model for the Pearce Region, the economic modelling identifies the estimated interaction between RAAF Pearce and all industry sectors in the economic catchment region.

The model estimates the total contribution that the base makes to the Pearce Region economy, which is the sum of:

- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the base's activities. This is best thought of as all economic activity that has a direct relationship with the base (for example, the value of on-base employment, supply contracts, etc); and
- **Indirect contributions¹⁴** - which result from the additional output, value added and employment generated in the catchment region due to the presence of the base. Examples of

¹⁴ It is important to note that the flow-on contribution may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

indirect contributions would include housing and retail expenditure in the catchment region that occurs because of the presence of the base (that is, base employees spending their wages on home purchases, rentals and shopping).

Figure 26 summarises the economic contribution made by RAAF Pearce to the Pearce Region economy.

Figure 26. The Contribution of RAAF Pearce to the Pearce Region Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

The modelling reveals that RAAF Pearce is highly integrated with the economy of the Pearce Region. With a multiplier estimated to be 1.93, it has the largest multiplier in comparison to the other bases assessed in this study.¹⁵ For every \$1 spent a further 93 cents of economic value is created in the regional economy. Given that the value of RAAF Pearce's direct output was approximately \$129.3 million over the year 2007, the indirect contribution stimulated by this is estimated to be an additional \$120.9 million worth of output amongst other industries in the catchment region. The total of the direct and indirect contribution to the economy of output / turnover is approximately \$250.1 million.

Value Added

Value added is an important measure as it does not focus solely on the size of the base's annual Defence expenditure budget, but also highlights the contribution that passes directly or indirectly into other industry sectors in the economic catchment region – through profits and wages.

¹⁵ All Defence sector multipliers have generally remained under 2. According to the data gathered from Department of Defence in conjunction with the economic modelling, the multipliers of the Defence sector can be explained partly by the generally lower integration in the local economy. That is, they operate in a more independent manner and the level of imports to bases from outside the catchment region tends to be higher.

The direct contribution made by RAAF Pearce to the value added component of the Pearce Region economy is approximately \$37.5 million - 30% of its direct output. The indirect contribution is \$50.2 million, for a total contribution to the value added component of the Pearce Region economy of \$87.7 million.

Employment

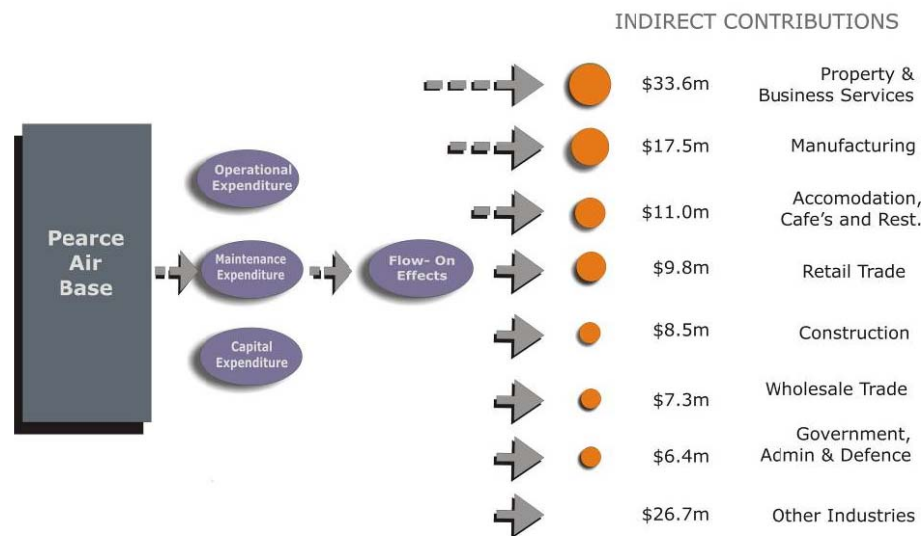
The modelling estimates the direct and indirect contributions made to employment in the Pearce Region. The direct contribution to employment is simply the number of employees (permanent and non-permanent, excluding contractors) at RAAF Pearce. It is estimated that RAAF Pearce directly employed 770¹⁶ people in 2007 (permanent and non-permanent staff). There are 578 additional jobs being generated in the Pearce Region because of the economic activity at RAAF Pearce, bringing the total employment generated in the region by the presence of RAAF Pearce to 1,348 jobs.

4.3.3 The Distribution of the Indirect Contribution to the Pearce Region

The direct contribution of RAAF Pearce is more or less counted as the value of the Defence industry sector in the Pearce Region. However, the *indirect contribution* is distributed across other industries within the region, and demonstrating this distribution highlights industries with a key economic relationship to the base. Figure 27 illustrates the distribution of the indirect economic contribution of RAAF Pearce across various industries in the economy of the Pearce Region.

¹⁶ Note that for this assessment the number of permanent (full time) and non-permanent (part time and casual) staff have been used to represent the *total* job numbers for each base. This assumes that at any time non permanent staff would be required at the base and to exclude them from the total would understate the economic contribution.

Figure 27. RAAF Pearce – Distribution by Industry Sector of Indirect Contributions to the Pearce Region, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

RAAF Pearce makes its most significant indirect contribution to the property and business services sector, followed by the manufacturing sector. In addition, the contribution to the property and business services sector is much higher than any other industry. The indirect contribution to property and business services is approximately \$33.6 million, compared to the next highest indirect contribution to manufacturing of \$17.5 million. The presence of RAAF Pearce is also important to the accommodation, cafés and restaurants, and the retail trade sectors in the catchment region. The indirect contributions to these are \$11 million and \$9.8 million respectively.

4.3.4 Further Contributions through Housing Assistance

Through direct expenditure on housing assistance for employees, RAAF Pearce provides a further economic contribution to the Pearce Region. As part of its normal operations, RAAF Pearce provides Defence housing and rental assistance to some employees. In 2006/07, the annual expenditure for RAAF Pearce for these was \$1.5 million in total rent for Defence housing and \$1.4 million in general rental assistance. This is a total direct contribution of \$2.9 million per year.

The indirect economic effect of this direct expenditure is twofold. First, the provision of subsidised housing and rental assistance increases the disposable income of those assisted (because they pay less rent than they otherwise would), a proportion of which is then spent in the Pearce Region. Secondly, the paying of rental assistance to private renters transfers money to landlords in the Pearce Region, a proportion of which is then spent in the region. Analysis of general expenditure patterns suggests that, as a guide, this indirect effect applies a factor of 2 to direct rental expenditure.¹⁷ This means that the *total* contribution of Defence housing and rental assistance

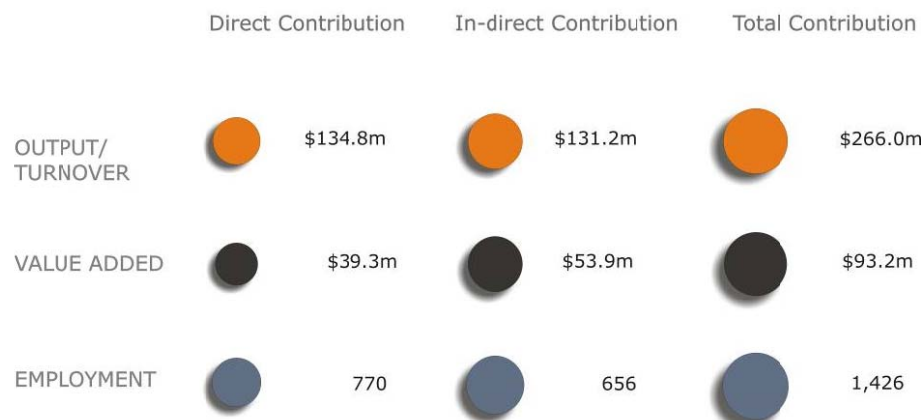
¹⁷ Expenditure behaviour surveys for the catchment region were outside the scope of this project, so a general rule is applied based on previous SGS research in other contexts.

expenditure is approximately double the direct expenditure on housing and rental assistance. In the case of RAAF Pearce therefore, the total further contribution of the Defence housing and rental assistance expenditure is approximately \$5.8 million.¹⁸

4.3.5 Contribution to the Western Australian Economy

The modelling was expanded to examine the contribution of RAAF Pearce to the Western Australian economy. By widening the base's economic catchment from the regional to the state level, the scale of imports accounted for in the modelling is reduced. That is, goods and services sourced from outside the Pearce Region but within the state are no longer counted as imports, as they would have to be at the regional level. A defence base may or may not source a large amount of goods and services from its local region, but it can be expected to be more highly integrated with its state economy. Therefore, the value of the direct and indirect economic contributions made by the base increase when RAAF Pearce's relationship to the Western Australian economy is modelled. Figure 28 summarises the contribution of RAAF Pearce to the Western Australian economy.

Figure 28. The Contribution of RAAF Pearce to the Western Australian Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

In output / turnover terms, the direct economic contribution of RAAF Pearce does not increase significantly when the base's economic catchment region is extended to the state level. The direct contribution increases from \$129 million at Pearce Region level to \$134.8 million at the state level. The indirect contribution in output / turnover to the Western Australia economy is \$131.2 million, resulting in a total contribution to the Western Australian economy of \$266 million. This suggests that approximately only \$16 million of the total contribution of the base flows beyond the Pearce

¹⁸ Note that this is only indicative, as the aim is simply to explain the indirect contribution resulting from the Defence housing and rental assistance expenditure. It is possible for this to be an overestimate of the real indirect impact as it assumes that 100% of the rental income earned will flow into the catchment region.

Region and into the broader Western Australian economy, indicating that RAAF Pearce is heavily integrated with the Pearce Region economy.

Value Added and Employment

RAAF Pearce directly contributes \$39.3 million to the value added component of the Western Australian economy. With an indirect contribution of value added of approximately \$53.9 million, the total contribution to the value added component of the WA economy is \$93.2 million.

We know that the base directly provides 770 jobs. The indirect employment generated at the state level as a result of the presence of RAAF Pearce is 656 jobs, making the total contribution to employment of 1,426 jobs in the Western Australian economy. This is only marginally higher than the total number of jobs created at the Pearce Region level.

Note that it was not possible to model the industry sector distribution of indirect contributions at the state level because of data limitations and general limits to the scope and budget of this study.

5 HMAS Albatross, New South Wales

5.1 An Overview of HMAS Albatross

Location and Operational Background

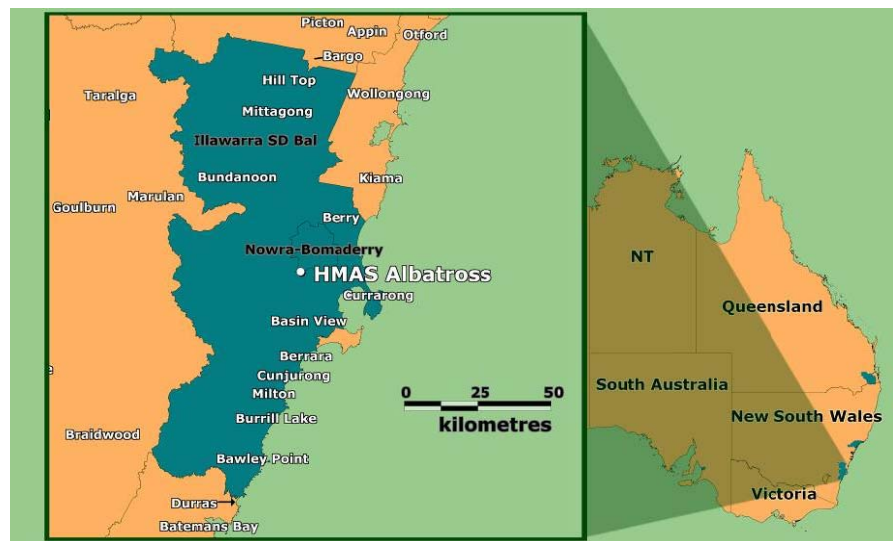
HMAS Albatross is located 10km south of Nowra in the Shoalhaven region of the NSW south coast. It occupies an 876 ha site which is bounded by roads, private property and a steep ravine. Accordingly, operations at the base are not expected to expand significantly, as this would require expanding the site or demolishing existing buildings.

HMAS Albatross makes a significant contribution to the Royal Australian Navy's capability. It provides operational, training, engineering, administrative and logistic support to Navy's helicopter squadrons. It is the only airfield operated by Navy in Australia. Operations at the Base are closely linked with the Jervis Bay Training Area and the Eastern Australian Exercise Area.

The HMAS Albatross Economic Catchment Region

For data collection and economic modelling purposes the economic catchment region for HMAS Albatross (referred to as the *Albatross Region* from hereon) has been defined by the ABS Census statistical areas of Nowra-Bomaderry Statistical Subdivision and Illawarra Statistical Subdivision Bal. This makes it easier to match statistical information with the economic catchments used in this study. The selection of areas to include within HMAS Albatross catchment region was based upon an assumption about the degree of interaction and influence between the base and its surrounding area. This assumption was informed by discussions with the Department of Defence.

HMAS Albatross lies within the local government area of Shoalhaven City Council, but nearby local government areas include the City of Shellharbour, the City of Wollongong, Wingecarribee Shire Council and the Council of the Municipality of Kiama.

Figure 29. HMAS Albatross: location and the catchment region

5.2 Profile of the Albatross Region

The purpose of this profile of the Albatross Region is to provide some contextual understanding about the region in which the base is operating. The profile provides information about the Albatross Region compared to New South Wales and Australia. The Nowra-Bomaderry Statistical Division is also highlighted as this is the more populous area within the region. The source of all data in the profile is the ABS Census 2006.

5.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

The populations of both Nowra-Bomaderry SD and the Albatross Region as a whole are growing slightly faster than the overall populations of NSW and Australia.

Table 22. Albatross Region - 2006 Population

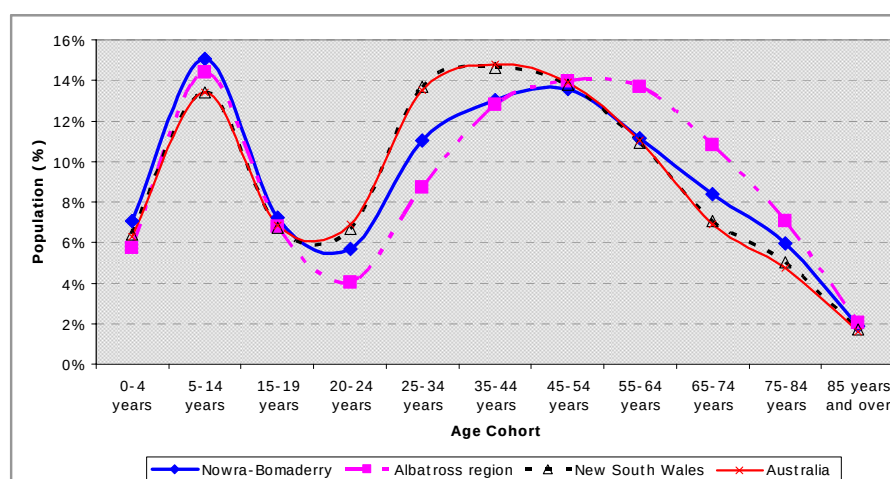
	Population in 2006	% of Australia's Population
Nowra-Bomaderry	30,767	0.2%
Albatross Region	129,187	0.6%
New South Wales	6,642,774	32.8%
Australia	20,268,010	

Table 23. Albatross Region - Rates of Population Growth, 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Nowra-Bomaderry	1.54%	1.23%	1.38%
Albatross Region	1.84 %	0.69 %	1.26 %
New South Wales	1.13%	0.65%	0.89%
Australia	1.24%	1.11%	1.18%

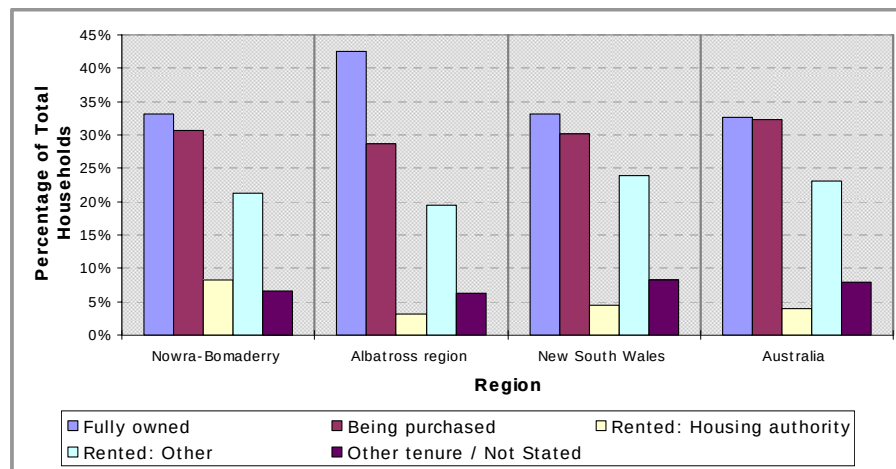
Age Structure

Both Nowra-Bomaderry and the Albatross Region as a whole have fewer residents of working age. That is, they have higher proportions of children and older people than NSW and Australia. As we would expect the population associated with the base to contain a larger proportion of those of working age, this indicates that the base is not dominating the overall demographic measures. However, in another sense it highlights the importance of the base to the local area and broader region, as without the base population the ratio of workers to dependents could be expected to be even lower.

Figure 30. Albatross Region - Ages of Residents, 2006

Household Tenure

The Albatross Region contains a greater proportion of houses fully owned by their occupiers than NSW, Australia overall, and Nowra-Bomaderry. The proportion of occupiers who rent privately is smaller than the NSW average in both the Albatross Region and for Nowra-Bomaderry. However, the Nowra-Bomaderry area contains a higher than state average proportion of those who rent from a housing authority. Defence personnel renting directly from Defence housing may partly explain this result, and / or it may be explained by the lower income levels in the region.

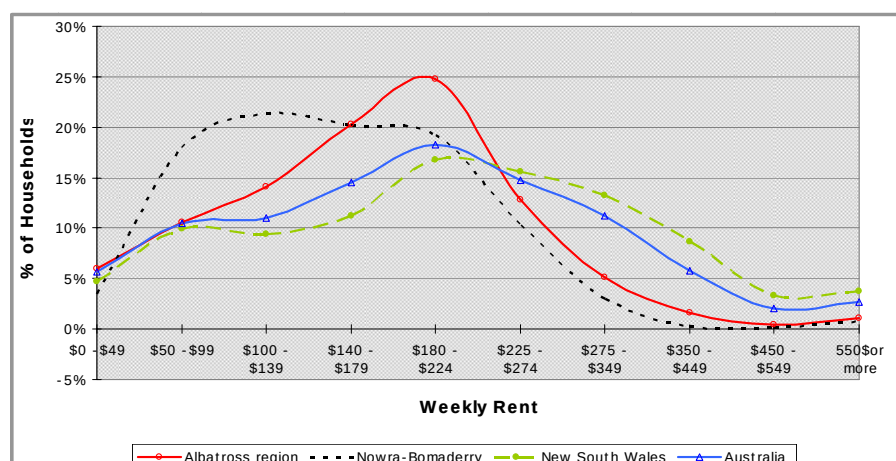
Figure 31. Household tenure, 2006

Rental Payments

Median weekly rents in Nowra-Bomaderry are lower than the overall NSW and Australia figures but they are closer to the Australian average in the remainder of the Albatross Region. Figure 32 also illustrates that rents in Nowra-Bomaderry are skewed towards the lower end relative to NSW, but are more skewed towards the middle once the non-metropolitan Illawarra region is added in.

Table 24. Albatross Region - Median Rental Payments, 2006

	Nowra - Bomaderry	Albatross Region	New South Wales	Australia
Median Weekly Rent	\$150	\$180	\$210	\$190

Figure 32. Albatross Region - Distribution of Rental Payments, 2006

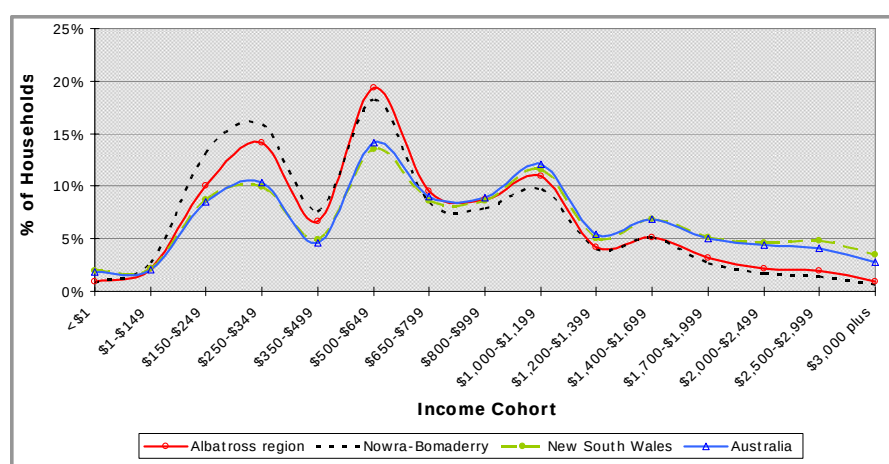
Income Profile

Table 25 shows that median incomes are substantially lower in Nowra-Bomaderry and the surrounding non-metropolitan Illawarra region than in NSW and Australia overall. This is also illustrated in Figure 33, which shows a distinct skew towards the lower end for Nowra-Bomaderry and the Albatross Region as a whole compared to NSW and Australia.

Table 25. Albatross Region - Median Weekly Household Incomes, 2006

	Nowra - Bomaderry	Albatross Region	New South Wales	Australia
Median Weekly Household Income	\$776	\$738	\$1,036	\$1,027

Figure 33. Albatross Region - Distribution of Income, 2006



5.2.2 Employment and Occupation

Labour Force Participation and Unemployment

Participation rates are substantially lower in Nowra-Bomaderry and the Albatross Region as a whole. This probably reflects the smaller proportion of workforce age residents, but may also indicate a higher proportion of long-term unemployed have abandoned the search for work.

Table 26. Albatross Region - Labour Force Participation, 2006

	Nowra-Bomaderry		Albatross Region		New South Wales		Australia	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total
Total labour force	13,065	54.1 %	66,545	51.6 %	3,092,603	58.9 %	9,607,987	60.4 %
Not in the labour force	9,652	40.0%	55,069	42.7%	1,801,010	34.3%	5,271,120	33.1%
Labour force status not stated	1,440	6.0%	7,418	5.7%	356,648	6.8%	1,038,973	6.5%
Total	24,157		129,032		5,250,261		15,918,080	

Unemployment is substantially higher in the catchment region compared to NSW and Australia, and is more concentrated in the Nowra-Bomaderry area. Combined with lower income levels, this further indicates that the catchment region is relatively disadvantaged.

Table 27. Albatross Region - Unemployment, 2006

	Nowra-Bomaderry		Albatross Region		New South Wales		Australia	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total
Total Employed	11,933	91.3%	61,409	92.3%	2,909,444	94.1%	9,104,185	94.8%
Total Unemployed	1,132	8.7 %	5,136	7.7 %	183,159	5.9 %	503,802	5.2 %

Occupational Profile

In both Nowra-Bomaderry and the Albatross Region as a whole, a smaller proportion of the total workforce are employed as professionals and clerical and administrative workers than in NSW and Australia overall. A larger proportion is employed as technicians and trades workers.

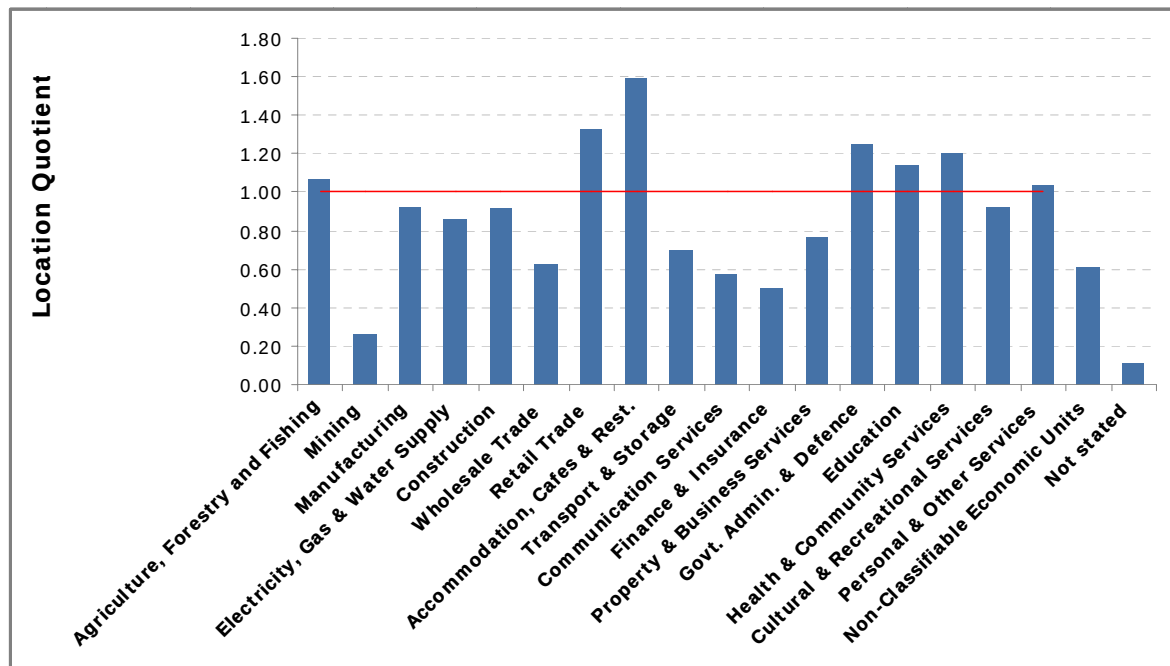
Table 28. Albatross Region - Occupational Profile, 2006

	Nowra-Bomaderry		Albatross Region		New South Wales		Australia	
	No.	% of total employment	No.	% of total employment	No.	% of total employment	No.	% of total employment
Managers	1,339	11%	6,713	14%	396,460	14%	1,202,261	13%
Professionals	1,992	17%	8,587	17%	616,276	21%	1,806,016	20%
Technicians & trades workers	2,080	17%	8,520	17%	396,721	14%	1,309,256	14%
Community & personal service workers	1,371	11%	5,163	10%	249,578	9%	801,902	9%
Clerical & administrative workers	1,541	13%	6,174	12%	447,951	15%	1,365,810	15%
Sales workers	1,294	11%	5,103	10%	282,290	10%	896,209	10%
Machinery operators & drivers	757	6%	2,964	6%	187,135	6%	604,616	7%
Labourers	1,376	12%	5,499	11%	277,549	10%	952,519	10%
Inadequately described/Not stated	187	2%	759	2%	55,480	2%	165,595	2%
Total	11,937		49,482		2,909,440		9,104,184	

5.2.3 Industry Profile

Figure 34 shows 'location quotients' (LQ) for each industry sector for the Albatross Region, in order to give an indication of which industry sectors are significant in the region. Put simply, a LQ greater than 1 indicates that an industry is relatively concentrated (and therefore strong) in the region, compared to Australian averages.

Figure 34. Location Quotients for the Albatross Region, 2006



The analysis indicates that the Albatross Region is a significant provider of retail trade, accommodation, cafés and restaurants and government administration and defence services. As HMAS Albatross constitutes a substantial part of the government administration and defence industry for the region, this analysis indicates that *prima facie* HMAS Albatross forms a significant part of the catchment region's economy. The high figure for accommodation, cafés and restaurants probably reflects the importance of the tourism industry to the region.

5.3 The Economic Contribution of HMAS Albatross

5.3.1 Summary of Key Economic Data

The following table summarises key economic data for HMAS Albatross. The economic contribution modelling for HMAS Albatross uses much of this data as a foundation for further analysis.

Indicator	2006 – 2007 Financial Year
Permanent Staff No (APS & ADF)	• 1,330
Non-Permanent Staff No (Reserves, Cadets, etc)	• 95
Salaries 06/07 \$	• \$75,634,535
Contractor No (Approx)	• 600
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$423,000,000
Area	• 876ha
Capital Works Last 10 years	• Albatross redevelopment Stage 1 – 1996-97 - \$110m
Future Capital Works	• Multi-Role Helicopter Facilities Project - 2008-2011 - \$50m – Approx 50 jobs.
Capital Works 06/07	• \$15.1 million
Defence Housing 06/07	• 362 properties • Total annual rent - \$4,369,457
Private Rental Assistance 06/07	• 270 instances of private RA • Annual RA Cost - \$3,671,512
Maintenance/FACOPS 06/07	• \$7,601,868
NOD/Operational Costs 06/07	• \$6,198,000

5.3.2 Economic Contribution to the Albatross Catchment Region

Using the key economic information about HMAS Albatross and a regional input-output model for the Albatross Region, the economic modelling identifies the estimated interaction between HMAS Albatross and all industry sectors in the economic catchment region.

The model estimates the total contribution that the base makes to the catchment region economy, which is the sum of:

- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the base's activities. This is best thought of as all economic activity that has a direct relationship with the base (for example, the value of on-base employment, supply contracts, etc); and

- **Indirect contributions¹⁹** - which result from the additional output, value added and employment generated in the catchment region due to the presence of the base. Examples of indirect contributions would include housing and retail expenditure in the catchment region that occurs because of the presence of the base (that is, base employees spending their wages on home purchases, rentals and shopping).

Figure 35 summarises the modelling estimates of the economic contribution of HMAS Albatross.

Figure 35. The Contribution of HMAS Albatross to the Albatross Region Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

The modelling reveals that HMAS Albatross's direct contribution to the output of the Albatross Region was approximately \$277 million in 2007. The modelling estimates that the multiplier for the economic relationship between HMAS Albatross and region is 1.33.²⁰ For every \$1 spent a further 33 cents of economic value is created in the regional economy. This is the lowest estimated multiplier of the five bases included in this study.²¹ A multiplier of 1.33 applied to the total direct contribution of \$277 million in output, leads to an indirect contribution of an additional \$91.5 million worth of output across industries in the region. The total of the direct and indirect contribution to the economy is approximately \$368.6 million.

¹⁹ It is important to note that the flow-on contribution may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

²⁰ All Defence sector multipliers have generally remained under 2. According to the data gathered from Department of Defence in conjunction with the economic modelling, the multipliers of the Defence sector can be explained partly by the generally lower integration in the local economy. That is, they operate in a more independent manner and the level of imports to bases from outside the catchment region tends to be higher.

²¹ According to the data gathered from the Department of Defence in conjunction with economic modelling, the multiplier can be largely explained by the higher proportions of imported inputs for the base. Note that imports here refer to inputs purchased outside the catchment region.

Value Added

Value added is an important measure as it does not focus solely on the size of the base's annual Defence expenditure budget, but also highlights the contribution that passes directly or indirectly into other industry sectors in the economic catchment region – through profits and wages.

The modelling demonstrates that HMAS Albatross' direct contribution to the value added component of the Albatross Region economy is \$78 million - 27% of its total direct contribution. The indirect contribution to value added in the catchment region is \$29.3 million, amounting to a total contribution to the value added component of the Albatross Region economy of approximately \$107 million.

Employment

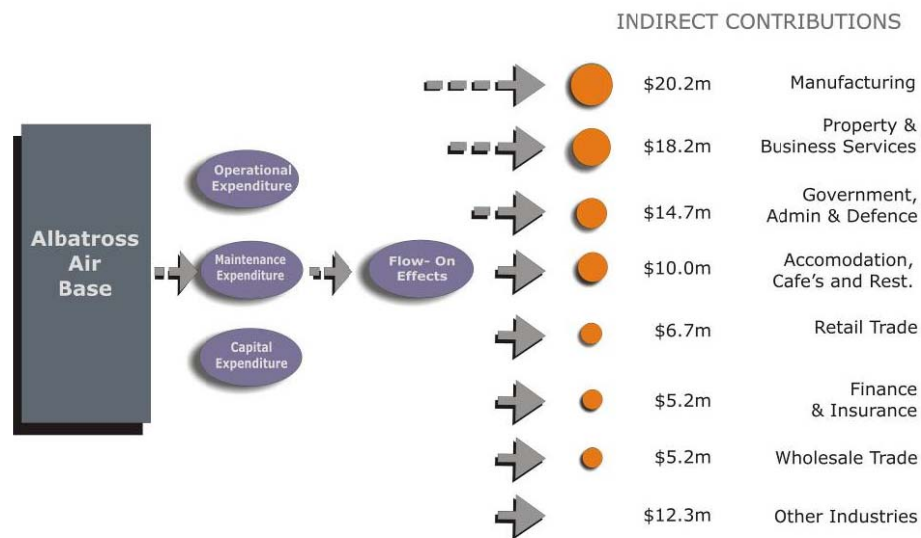
The modelling estimates the direct and indirect contributions made to employment in the Albatross Region. The direct contribution to employment is simply the number of employees (permanent and non-permanent, excluding contractors) at HMAS Albatross. The indirect contribution of jobs is an estimate of the additional jobs that are being generated in the catchment region as a result of the presence of HMAS Albatross.

HMAS Albatross directly employed 1,425 people in 2007 (permanent and non-permanent jobs). Additionally, the modelling estimates that there are 415 jobs being generated in the Albatross Region because of the presence of the base. The total employment generated by the base is therefore approximately 1,840.

5.3.3 The Distribution of the Indirect Contribution to the Albatross Region

The direct contribution of HMAS Amberley is more or less counted as the value of the Defence industry sector in the Albatross Region. However, the *indirect contribution* is distributed across other industries within the region, and demonstrating this distribution highlights industries with a key economic relationship to the base. Figure 36 illustrates the distribution of the indirect contributions of HMAS Albatross across various industries in the catchment region.

Figure 36. HMAS Albatross – Distribution by Industry Sector of Indirect Contributions to the Albatross Region, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

The most significant indirect contribution made by HMAS Albatross to the Albatross Region economy is to the manufacturing sector, to the amount of \$20.2 million. This may be a reflection of the engineering services aspect of HMAS Albatross operations. This is an extra important linkage because manufacturing is a high output industry sector that can generate significant value added. The other significant indirect contribution is to the property and business services sector, to the amount of \$18.2 million. As expected, the indirect contribution to the government administration and defence sector is also significant, amounting to the third highest contribution to the Albatross Region at a value of \$14.7 million. Other strong linkages are with the accommodation, cafés and restaurants and retail trade sectors.

5.3.4 Further Contributions through Housing Assistance

HMAS Albatross also provides economic benefits to the catchment region through the provision of subsidised housing to some of its employees and rental assistance. In 2006/07, the annual direct expenditure from HMAS Albatross for Defence housing was \$4.4 million and \$3.7 million in general rental assistance - or \$8.1 million in total.

The indirect economic effect of this direct expenditure is twofold. First, the provision of subsidised housing and rental assistance increases the disposable income of those assisted (because they pay less rent than they otherwise would), a proportion of which is then spent in the Albatross Region. Secondly, the paying of rental assistance to private renters transfers money to landlords in the Albatross Region, a proportion of which is then spent in the region. Analysis of general expenditure patterns suggests that, as a guide, this indirect effect applies a factor of 2 to direct

rental expenditure.²² This means that the total economic contribution of Defence housing and rental assistance expenditure is approximately double the direct expenditure on housing and rental assistance. Therefore, the total further contribution of HMAS Albatross to the catchment region through the provision of Defence housing and rental assistance is around \$16.2 million.²³

5.3.5 Contribution to the New South Wales Economy

The modelling was expanded to examine the contribution of HMAS Albatross to the New South Wales economy. By widening the base's economic catchment from the regional to the state level, the scale of imports accounted for in the modelling is reduced. That is, goods and services sourced from outside the Albatross Region but within the state are no longer counted as imports, as they would have to be at the regional level. A defence base may or may not source a large amount of goods and services from its local region, but it can be expected to be more highly integrated with its state economy. Therefore, the value the direct and indirect economic contributions made by the base increase when the relationship of HMAS Albatross to the New South Wales economy is modelled. Figure 37 summarises the economic contribution to the New South Wales economy, resulting from the operations of HMAS Albatross.

Figure 37. The Contribution of HMAS Albatross to the New South Wales Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

When the economic catchment of the base is extended to the state level, the direct contribution of output / turnover made by HMAS Albatross to the New South Wales economy is \$294 million. This

²² Expenditure behaviour surveys for the catchment region were outside the scope of this project, so a general rule is applied based on previous SGS research in other contexts.

²³ Note that this is only indicative, as the aim is simply to explain the indirect contribution resulting from the Defence housing and rental assistance expenditure. It is possible for this to be an overestimate of the real indirect impact as it assumes that 100% of the rental income earned will flow into the catchment region.

is around \$16.5 million higher than the contribution to the study area. The indirect contribution to the New South Wales economy is \$126 million, which results in a total economic contribution to the New South Wales economy of \$420 million. This means that an extra contribution of approximately \$52.4 million flows beyond the Albatross Region but into the New South Wales economy.

Value Added and Employment

HMAS Albatross directly contributes \$85 million to the value added component of the New South Wales economy. With an indirect contribution of approximately \$44 million, the total contribution to the value added component of the NSW economy is \$129 million.

We know that HMAS Albatross directly employed approximately 1,425 people in 2007. When the economic catchment is extended to the state level, the indirect employment generated as a result of the presence of the base increases to 657 jobs. This means that in terms of employment HMAS Albatross contributes a total of 2,082 jobs in the New South Wales economy.

Note that it was not possible to model the distribution of indirect contributions at the state level because of data limitations and general limits to the scope and budget of this study.

6 RAAF Williamtown, New South Wales

6.1 An Overview of RAAF Williamtown

Location and Operational Background

RAAF Williamtown is approximately 986 hectares in area with a perimeter of approximately 14.5km. It is located in a semi-rural coastal area about 30 kilometres north of the Newcastle CBD, about 15 kilometres east of Raymond Terrace and about 30 kilometres west of Nelson Bay. Land on the base is generally level and cleared, incorporating some low lying and sandy areas. Salt Ash Air Weapons Range, the base's major training support facility for aircraft air-to-ground bombing (practice bombs) and gunnery training, is also located nearby. In addition, a major air-to-air training area is located off the adjacent coast.

Core base activities include aircraft flying operations and training, aircraft maintenance, air defence command and control, and operational, logistical and infrastructure support services. Numerous contracted services are also located on base, supporting Air Force activities by conducting predominantly maintenance as well as some research and development. The F/A-18 Hornet, Hawk and PC-9 aircraft operate from the base. In the next decade the Hornet will be replaced with New Air Combat Capability (likely to be the Joint Strike Fighter). In 2009, the base will also receive Airborne Early Warning and Control (AEW&C) aircraft.

Defence has leased 26ha of land on the southern side of the runway until 2045 to Newcastle Airport Limited (NAL), which operates a civil terminal. NAL has sub-leased a portion of its leased area to British Aerospace Systems, which established a facility for assembly and maintenance of Hawk aircraft.

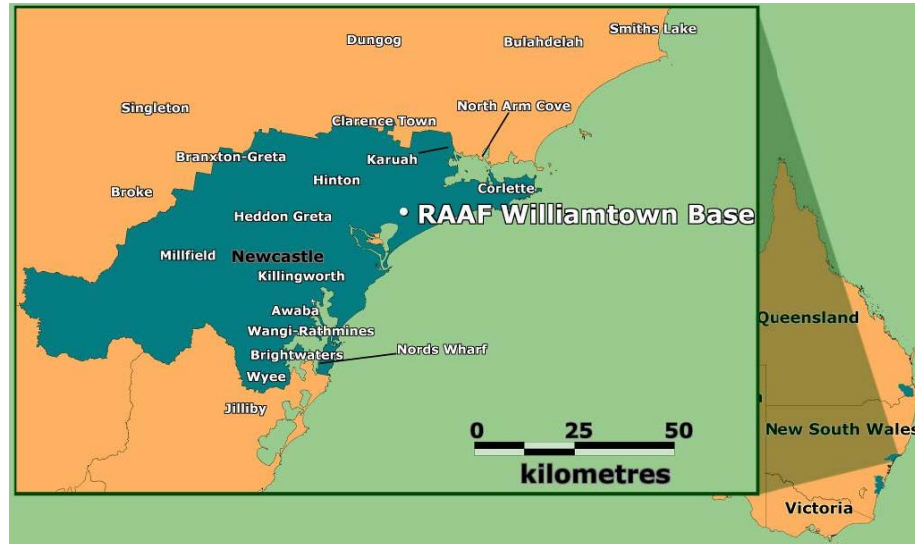
RAAF Williamtown is one of the premier RAAF bases in the country and will be retained into the future. This base will continue to attract significant financial investment. The base has had extensive improvements to accommodation, operational and support infrastructure. There have also been improvements to aircraft shelters, office buildings, workshops, stores, ammunition depots, residential buildings, communication facilities, recreation/mess facilities, runways and fencing. A significant amount of redevelopment is in the pipeline with construction due over the next 5-10 years.

The RAAF Williamtown Economic Catchment Region

For data collection and economic modelling purposes the RAAF Williamtown economic catchment region (referred to as *Newcastle* from hereon) has been defined by the ABS Census statistical area of the Newcastle Statistical Subdivision. This makes it easier to match statistical information with the economic catchments used in this study. The selection of areas to include within the RAAF Amberley catchment region was based upon an assumption about the degree of interaction and influence between the base and surrounding areas. This assumption was informed by discussions with Defence.

The base lies within the Port Stephens Council local government area, but neighbouring and nearby local government areas include the City Councils of Newcastle, Maitland, Lake Macquarie and Cessnock, Dungog Shire Council and Great Lakes Council.

Figure 38. RAAF Williamtown: location and economic catchment region



6.2 Profile of Newcastle

The purpose of this profile of Newcastle is to provide some contextual understanding about the region in which the base is operating. The profile provides information about Newcastle compared to New South Wales and Australia. The source of all data in the profile is the ABS Census 2006.

6.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

Similar to New South Wales, Newcastle has been growing quite slowly. However, current expectations are that the local area around the base is expected to grow significantly in the future.

Table 29. Newcastle - 2006 Population

	Population in 2006	% of Australia's Population
Newcastle	491,495	2.4 %
New South Wales	6,642,774	32.8%
Australia	20,268,010	

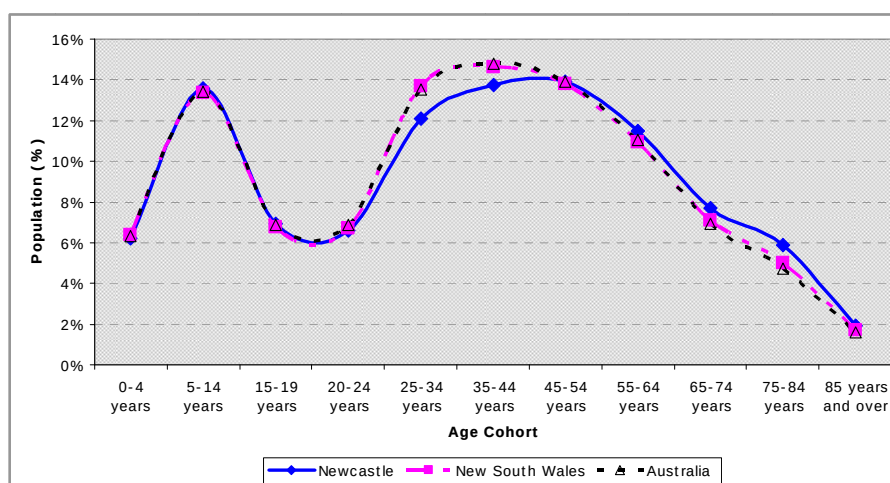
Table 30. Newcastle - Rates of Population Growth, 1996 to 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Newcastle	0.94 %	0.80 %	0.87 %
New South Wales	1.13%	0.65%	0.89%
Australia	1.24%	1.11%	1.18%

Age Structure

Newcastle has a larger proportion of older people than NSW and Australia overall.

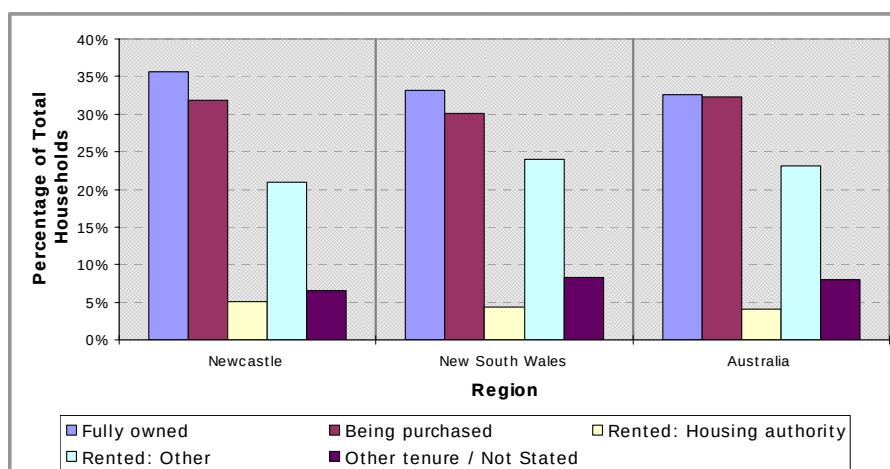
Figure 39. Newcastle - Ages of Residents, 2006



Household Tenure

A slightly larger proportion of households in Newcastle own their own home, which may reflect the slightly ageing structure of the region.

Figure 40. Newcastle - Household Tenure, 2006



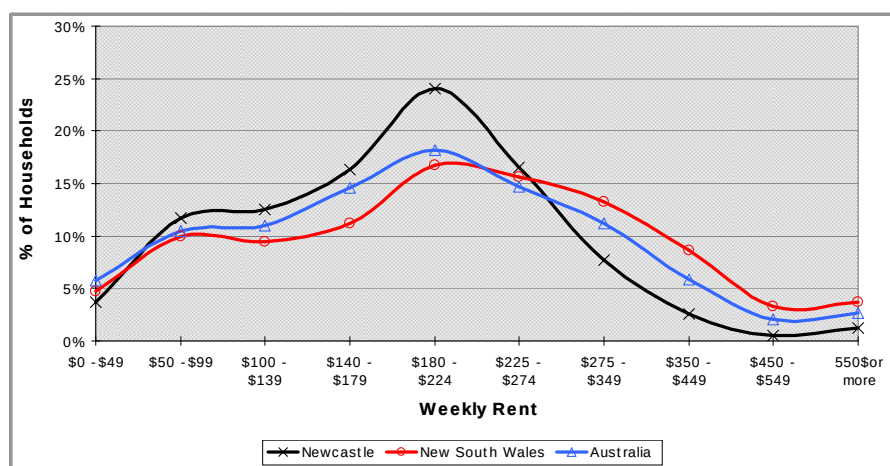
Rental Payments

The median rental payment in Newcastle is around the Australian median, but substantially below the median for NSW (which includes the generally higher rental payments in Sydney). Figure 41 shows that there is significantly less variation in rental payments in Newcastle than for NSW and Australia overall.

Table 31. Newcastle - Median Rental Payments, 2006

	Newcastle	New South Wales	Australia
Median Weekly Rent	\$185	\$210	\$190

Figure 41. Newcastle - Distribution of Rental Payments, 2006



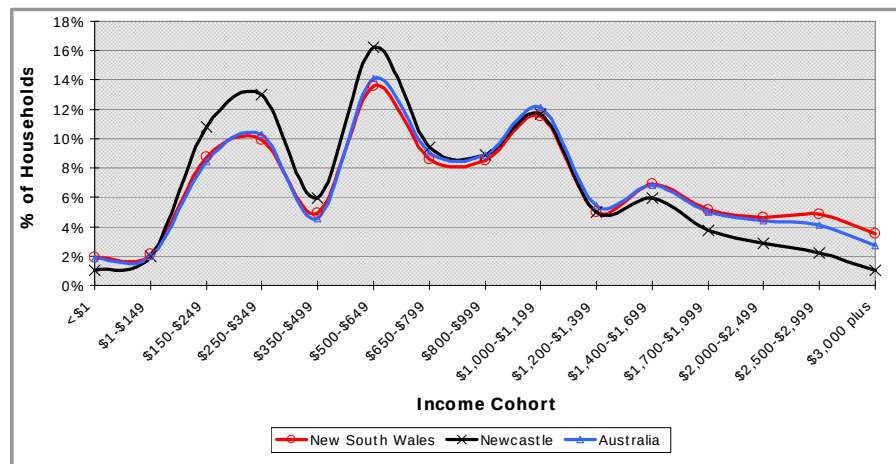
Income Profile

Table 32 shows that median weekly household income in the Newcastle area is significantly lower than the NSW and Australian medians. Figure 42 shows that income levels in Newcastle are a little skewed towards the lower end, but income is more equally distributed within Newcastle compared to New South Wales and Australia.

Table 32. Newcastle - Median Weekly Household Incomes, 2006

	Newcastle	New South Wales	Australia
Median Weekly Household Income	\$900	\$1,036	\$1,027

Figure 42. Newcastle - Distribution of Income, 2006



6.2.2 Employment and Occupation

Labour Force Participation and Unemployment

The participation rate in Newcastle is substantially lower than the NSW and Australian rates. This may in part reflect the slightly older age structure of the city, but also probably indicates that more long-term unemployed have given up the search for work.

Table 33. Newcastle - Labour Force Participation, 2006

	Newcastle		New South Wales		Australia	
	No.	% of total	No.	% of total	No.	% of total
Total labour force	224,090	56.5 %	3,092,603	58.9 %	9,607,987	60.4 %
Not in the labour force	151,997	38.3%	1,801,010	34.3%	5,271,120	33.1%
Labour force status not stated	20,341	5.1%	356,648	6.8%	1,038,973	6.5%
Total	396,428		5,250,261		15,918,080	

Unemployment in Newcastle is high relative to New South Wales and Australia overall. Given that the participation rate is also substantially lower, this underscores the importance of the employment generated by the base.

Table 34. Newcastle - Unemployment, 2006

	Newcastle		New South Wales		Australia	
Total Employed	208,287	92.9%	2,909,444	94.1%	9,104,185	94.8%
Total Unemployed	15,803	7.1 %	183,159	5.9 %	503,802	5.2 %

Occupational Profile

Newcastle's occupational profile to some extent still reflects the region's industrial origins. A larger percentage of the workforce is employed as technicians and trades workers and a smaller proportion as professionals.

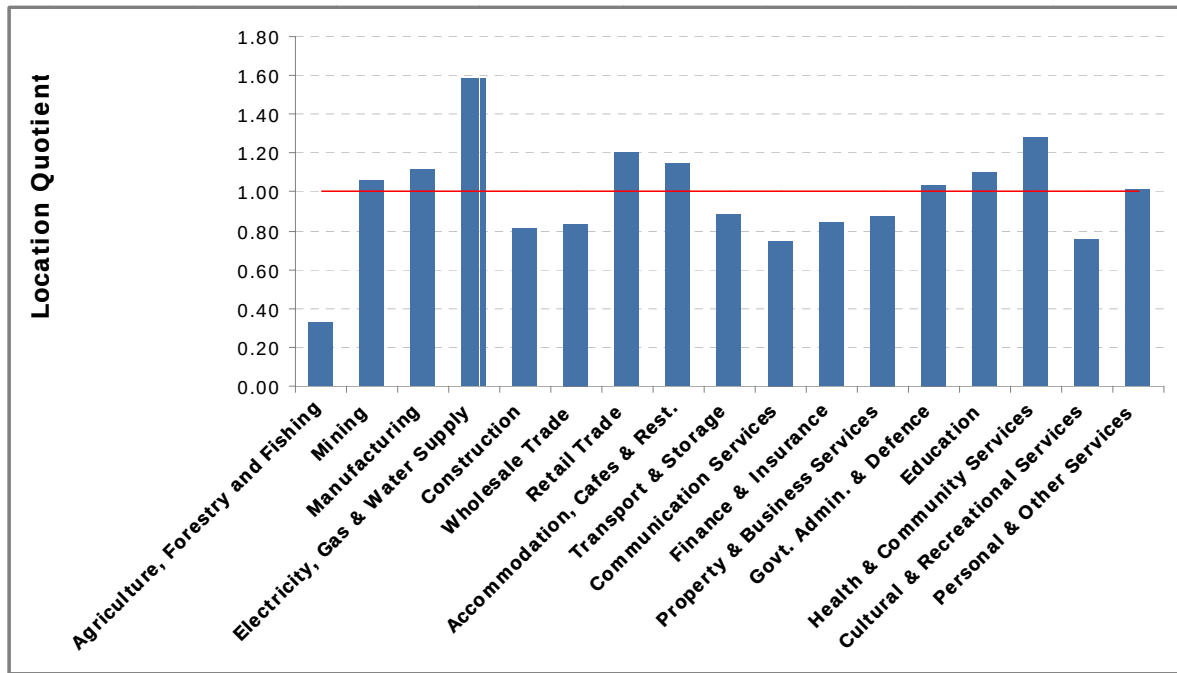
Table 35. Newcastle - Occupational profile, 2006

	Newcastle		New South Wales		Australia	
	No.	%	No.	No.	No.	%
Managers	39,158	10%	117,031	14%	1,202,261	13%
Professionals	64,321	18%	173,957	21%	1,806,016	20%
Technicians & trades workers	57,991	17%	153,565	14%	1,309,256	14%
Community & personal service workers	31,473	10%	82,916	9%	801,902	9%
Clerical & administrative workers	56,678	14%	135,980	15%	1,365,810	15%
Sales workers	35,064	11%	88,084	10%	896,209	10%
Machinery operators & drivers	22,092	8%	67,893	6%	604,616	7%
Labourers	34,657	11%	102,020	10%	952,519	10%
Inadequately described/Not stated	5,131	2%	14,685	2%	165,595	2%
Total	346,565		936,131		9,104,184	

6.2.3 Industry Profile

Figure 43 shows 'location quotients' (LQ) for the Williamstown catchment region, in order to give an indication of which industry sectors are significant in the region. Put simply, a LQ greater than 1 indicates that an industry is relatively concentrated (and therefore strong) in the region, compared to Australian averages.

Figure 43. Location Quotients for Newcastle, 2006



The analysis indicates that Newcastle is a significant provider of electricity, gas and water supply, and health and community services. Most LQs are close to a value of 1, which indicates that the Newcastle economy is relatively self-contained (industry sectors are diverse and regionally well integrated). This may tend to increase the multiplier effect of spending at RAAF Williamstown, as it suggests that less expenditure 'leaks' outside of the region (industry sectors are able to purchase and supply the majority of inputs within the region).

6.3 The Economic Contribution of RAAF Williamtown

6.3.1 Summary of Key Economic Data

The following table summarises key economic data for RAAF Williamtown. The economic contribution modelling for RAAF Williamtown uses much of this data as a foundation for further analysis.

Indicator	2006 – 2007 Financial Year
Permanent Staff No (APS & ADF)	• 2,840
Non-Permanent Staff No (Reserves, Cadets, etc)	• 307
Salaries 06/07 \$	• \$155,858,488
Contractor No (Approx)	• 750
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$495,954,650
Area	• 1,096 ha (Salt Ash WR is 2,460 ha)
Capital Works Last 10 years	- Williamtown Eastern Region Operations - \$17m 97/98 - Williamtown Redevelopment Stage 1 and Airborne Early Warning & Control Works - \$150m 02/03 (200 jobs)
Future Capital Works	- Williamtown Redevelopment Stage 2 - \$90m 09-11 (100 jobs) - Aircraft Rinse Facility – 2007 \$2.7m
Capital Works 06/07	• \$25.8 million
Defence Housing 06/07	833 properties - Annual rent bill - \$13,531,065
Private Rental Assistance 06/07	586 instances of private RA - Annual RA Cost - \$9,314,864
Maintenance/FACOPS 06/07	• \$12,477,462
NOD/Operational Costs 06/07	• \$8,667,000

6.3.2 Economic Contribution to the Newcastle Region

Using the key economic information about RAAF Williamtown and a regional input-output model for Newcastle, the economic modelling identifies the estimated interaction between RAAF Williamtown and all industry sectors in the economic catchment region.

The model estimates the total contribution that the base makes to the Newcastle economy, which is the sum of:

- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the base's activities. This is best thought of as all economic activity that has a direct relationship with the base (for example, the value of on-base employment, supply contracts, etc); and

- **Indirect contributions²⁴** - which result from the additional output, value added and employment generated in the economic catchment region due to the presence of the base. Examples of indirect contributions would include housing and retail expenditure in the catchment region that occurs because of the presence of the base (that is, base employees spending their wages on home purchases, rentals and shopping).

Figure 44 summarises the economic contribution made by RAAF Williamtown to the Newcastle economy.

Figure 44. The Contribution of RAAF Williamtown to the Newcastle Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

The modelling reveals that the direct contribution of RAAF Williamtown to output in Newcastle is approximately \$607 million in 2007. The modelling estimates that the multiplier for the economic relationship between RAAF Williamtown and Newcastle 1.66.²⁵ For every \$1 spent a further 66 cents of economic value is created in the wider economy. The total direct contribution of RAAF Williamtown to economic output in Newcastle is \$607 million, which leads to an indirect contribution of \$401.9 million worth of output that other industries in Newcastle produce. The total of the direct and indirect contribution to the Newcastle economy is thus approximately \$1,008.5 million.

²⁴ It is important to note that the flow-on contribution may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

²⁵ All Defence sector multipliers have generally remained under 2. According to the data gathered from Department of Defence in conjunction with the economic modelling, the multipliers of the Defence sector can be explained partly by the generally lower integration in the local economy. That is, they operate in a more independent manner and the level of imports to bases from outside the catchment region tends to be higher.

The modelling shows that a high proportion of RAAF Williamtown's expenditure on inputs is on imports from outside the region. This probably reflects purchases from the nearby economic region of metropolitan Sydney, and is counter to the trend for the Newcastle economy as a whole.

Value Added

Value added is an important measure as it does not focus solely on the size of the base's annual Defence expenditure budget, but also highlights the contribution that passes directly or indirectly into other industry sectors in the catchment region – through profits and wages.

A significant proportion of RAAF Williamtown's expenditure flows into wages and salaries for base employees. Proportionally, the base has the second highest expenditure on wages and salaries in comparison to the other five bases included in this study - approximately 26% of total expenditure for the base. The modelling demonstrates that the direct contribution of RAAF Williamtown to the value added component of the Newcastle economy is approximately \$171.9 million (28% of its direct contribution to output). The base's indirect contribution to the value added component of the Newcastle economy is \$166 million, making the total contribution made by RAAF Williamtown to the value added component of the Newcastle economy approximately \$338 million.

Employment

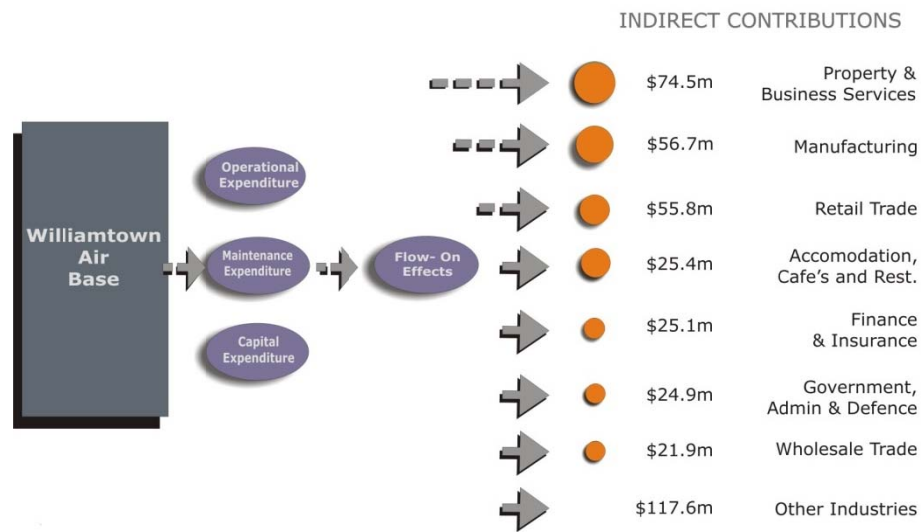
The modelling estimates the direct and indirect contributions made by RAAF Williamtown to employment in the Newcastle region. The direct contribution to employment is simply the number of employees (permanent and non-permanent, excluding contractors) at RAAF Williamtown. The indirect contribution of jobs is an estimate of the additional jobs that are being generated in the Newcastle region as a result of the presence of the base.

RAAF Williamtown directly employed 3,147 people in 2007 (permanent and non-permanent jobs). The modelling estimates that there are 2,051 additional jobs being generated in the Newcastle region by the presence of the base. The total direct and indirect employment in the catchment region generated by the base is therefore approximately 5,200.

6.3.3 The Distribution of the Indirect Contribution to the Newcastle Region

Figure 45 shows the distribution of the indirect contribution of RAAF Williamtown across other industries in the catchment region.

Figure 45. RAAF Williamtown – Distribution by Industry Sector of Indirect Contributions to the Newcastle Region, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

The most significant indirect contribution of RAAF Williamtown to industry in the Newcastle region is to the property and business services sector, to the amount of \$74.5 million. This is partly representative of the large workforce and high proportion of expenditure on wages and salaries. This is followed by other significant indirect contributions to the manufacturing sector (\$56.7 million) and the retail trade sector (\$55.8 million). Accommodation, cafés and restaurants, and the finance and insurance sectors follow.

6.3.4 Further Contributions through Housing Assistance

RAAF Williamtown provides further contributions to the Newcastle economy through the provision of subsidised housing and rental assistance to some of its employees. In 2006/07, the annual direct expenditure from RAAF Williamtown for Defence housing was \$13.5 million, and for general rental assistance was \$9.3 million. This amounts to a total further direct contribution to the catchment region of \$23 million.

The indirect economic effect of this direct expenditure is twofold. First, the provision of subsidised housing and rental assistance increases the disposable income of those assisted (because they pay less rent than they otherwise would), a proportion of which is then spent in the Newcastle region. Secondly, the paying of rental assistance to private renters transfers money to landlords in the Newcastle region, a proportion of which is then spent in the region. Analysis of general expenditure patterns suggests that, as a guide, this indirect effect applies a factor of 2 to direct rental expenditure.²⁶ This means that the total contribution of Defence housing and rental

²⁶ Expenditure behaviour surveys for the catchment region were outside the scope of this project, so a general rule is applied based on previous SGS research in other contexts.

assistance expenditure is approximately double the direct expenditure on housing and rental assistance. Thus, the total further contribution to the catchment region through the provision of Defence housing and rental assistance is around \$46 million.²⁷

6.3.5 Contribution to the New South Wales Economy

The modelling was expanded to examine the contribution of RAAF Williamtown to the New South Wales economy. By widening the base's economic catchment from the regional to the state level, the scale of imports accounted for in the modelling is reduced. That is, goods and services sourced from outside the Newcastle region but within the state are no longer counted as imports, as they would have to be at the regional level. A defence base may or may not source a large amount of goods and services from its local region, but it can be expected to be more highly integrated with its state economy. Therefore, the value of the direct and indirect economic contributions made by the base increase when RAAF Williamtown's relationship to the New South Wales economy is modelled.

Figure 46 illustrates the economic contribution of RAAF Williamtown to the New South Wales economy.

Figure 46. The Contribution of RAAF Williamtown to the New South Wales Economy, 2007



Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2007

Output / Turnover

When the economic catchment of the base is broadened to the state level, the direct contribution in output from RAAF Williamtown to the New South Wales economy is \$655.2 million. This is around \$48.6 million higher than the direct contribution of output at the Newcastle region level. The

²⁷ Note that this is only indicative, with the aim to explain the indirect contribution resulting from the Defence housing and rental assistance expenditure. It is possible for this to be an overestimate of the real indirect impact as it assumes that 100% of the rental income earned will flow into the catchment region.

indirect contribution to the New South Wales economy that flows from this direct contribution is \$503.8 million, resulting in a total economic contribution to the New South Wales economy of \$1.16 billion.

Value Added and Employment

RAAF Williamtown directly contributes \$192.6 million to the value added component of the New South Wales economy. This stimulates an indirect contribution to the value added component of the New South Wales economy of approximately \$209 million, making the total contribution to the value added component of the New South Wales economy around \$402 million.

We know that RAAF Williamtown directly employed 3,147 people in 2007. The modelling predicts the indirect contribution to employment in New South Wales is a further 2,759 jobs, making a total contribution to employment in New South Wales of approximately 5,906 jobs.

Note that it was not possible to model the industry sector distribution of indirect contributions at the state level because of data limitations and general limits to the scope and budget of this study.

7 Conclusions

7.1 Summary of Contributions

Summary of Contributions to Economic Catchment Regions

Table 36 summarises the economic contributions of each base to their respective economic catchment regions.

Table 36. Summary of Defence Air Base Contributions to their Economic Catchment Regions, 2007

Base	Indicator	Direct	Indirect	Total
RAAF Amberley (Qld)	<i>Output</i>	\$561.9M	\$487.1M	\$1,049M
	<i>Value Added</i>	\$168.8M	\$201.8M	\$370.6M
	<i>Employment</i>	2,870 jobs	2,294 jobs	5,164 jobs
RAAF Edinburgh (SA)	<i>Output</i>	\$706.8M	\$533.1M	\$1,239.9M
	<i>Value Added</i>	\$228.6M	\$232M	\$460.5M
	<i>Employment</i>	4,492 jobs	2,605 jobs	7,097 jobs
RAAF Pearce (WA)	<i>Output</i>	\$129.3M	\$120.9M	\$250.1M
	<i>Value Added</i>	\$37.5M	\$50.2M	\$87.7M
	<i>Employment</i>	770 jobs	578 jobs	1,348 jobs
HMAS Albatross (NSW)	<i>Output</i>	\$277.1M	\$91.5M	\$368.6M
	<i>Value Added</i>	\$77.7M	\$29.3M	\$107M
	<i>Employment</i>	1,425 jobs	415 jobs	1,840 jobs
RAAF Williamtown (NSW)	<i>Output</i>	\$606.6M	\$401.9M	\$1,008.5M
	<i>Value Added</i>	\$171.9M	\$166M	\$337.9M
	<i>Employment</i>	3,147 jobs	2,051 jobs	5,198 jobs

In terms of both the direct and indirect contributions of each base at the economic catchment region level, the size of the contributions across the bases varies, reflecting the size of the bases, and the scale and intensity of the regional economies in which each base is located.

It is clear from the above that increases or decreases in base activity could impact regional economies, in some cases heavily depending upon the scale of increase or decrease, or upon which aspects of base activity are affected. For regional economies, increases or decreases in base activities that increase or decrease the residential and / or working population at each base or the services required at each base would have the more significant impact.

Summary of Contributions at the State Level

Table 37 summarises the economic contributions of each base to their respective state economies.

Table 37. Summary of Defence Air Base Contributions to their State Economies, 2007

Base	Indicator	Direct	Indirect	Total
RAAF Amberley (Qld)	<i>Output</i>	\$638.8M	\$656.4M	\$1,295.3M
	<i>Value Added</i>	\$200.2M	\$272.1M	\$472.3M
	<i>Employment</i>	2,870 jobs	3,474 jobs	6,344 jobs
RAAF Edinburgh (SA)	<i>Output</i>	\$788.4M	\$720.4M	\$1,508.8M
	<i>Value Added</i>	\$263.0M	\$312.8M	\$575.8M
	<i>Employment</i>	4,492 jobs	3,891 jobs	8,383 jobs
RAAF Pearce (WA)	<i>Output</i>	\$134.8M	\$131.2M	\$266M
	<i>Value Added</i>	\$39.3M	\$53.9M	\$93.2M
	<i>Employment</i>	770 jobs	656 jobs	1,426 jobs
HMAS Albatross (NSW)	<i>Output</i>	\$293.6M	\$126.3M	\$419.9M
	<i>Value Added</i>	\$84.7M	\$44.0M	\$128.7M
	<i>Employment</i>	1,425 jobs	657 jobs	2,082 jobs
RAAF Williamtown (NSW)	<i>Output</i>	\$655.2M	\$503.8M	\$1,159M
	<i>Value Added</i>	\$192.6M	\$209M	\$401.6M
	<i>Employment</i>	3,147 jobs	2,759 jobs	5,906 jobs

In terms of the direct and indirect contribution to state economies, there is of course some variation across the bases. For RAAF Pearce (WA) and HMAS Albatross (NSW) the contributions are not as profound at the state level as for the other three bases. RAAF Amberley (Qld), RAAF Edinburgh (SA), and RAAF Williamtown (NSW) are 'billion-dollar plus' drivers of state economic activity in terms of both value and employment. In these three cases, the bases are likely to be significant drivers of state economies. For a smaller state economy such as that in SA, a contribution of this scale is in fact massive.

Again it follows that increases or decreases in base activity could have impacts upon state economies. As always, the level or scale of impact would depend upon the nature of the increase or decrease in which kinds of base activities.

7.2 Recommended Further Steps to Enhance the Estimates of Economic Contributions

Earlier in the report, a number of limitations to the study's exploration of economic contributions were discussed. The supportability of the study's assessments of contribution would be enhanced if these limitations were to be further addressed. It is recommended that the following steps be taken in future when assessing or reassessing the economic contributions of Defence bases:

- Develop an exhaustive list of base expenditures that supplies sufficient detail to enable the determination of how and where each expense flows from the base and into the economy. This would enable the development of input-output models that are tailored more accurately;
- Improve the understanding of the geography of base expenditure patterns by accurately tracking where a base's suppliers are located (e.g. local, regional, state, national) and the nature of the supplier (e.g. major national contractors, small local contractors);

- More accurately classify base expenditure to industry sectors by accurately nominating the main industry sector to which an expense should be allocated. This would avoid large general classifications of expenses to provide a more fine-grained analysis of value flows and thus contributions;
- Improve understanding of base employee and resident expenditure patterns by undertaking expenditure surveys for bases. This would enable a more accurate assessment of the flows of contributions at the catchment region level associated with the acquisition of goods and services (such as housing and retail);
- Addressing the above points would enable meaningful sensitivity testing through the re-calculation and analysis of multipliers to more fully understand the relationships between particular base activities and the economy. The effect of changes in the scale of particular base activities on a base's economic contributions could then be studied;
- Reviews of the economic contributions of bases should be carried out frequently. At a minimum, this would be every five years to make use of the ABS Census. However, a review could also be justified whenever a major investment in a base has been completed, or whenever large scale changes in base activities have occurred.

Appendix 1 - The Defence Census 2003

As discussed in the report, the accuracy of a small-scale economic impact assessment of this kind relies heavily upon the validity of the assumptions behind the analysis. Defence payroll statistics allow us to reliably determine the income of personnel at each base. However, in order to determine how this income is spent we need to make assumptions based on the demography of Defence personnel. For this information, we have relied upon the 2003 Defence Census. The census has also been used to determine the economic contribution made by the immediate families of Defence force personnel. The relevant information from this study is summarised below.

Predictors of expenditure patterns

Gender

The gender balance of Defence personnel is highly skewed towards males, and this has implications for base employees' likely patterns of expenditure. 87% of full-time serving personnel are male, consisting of 85% males in the air force, 83% males in the Navy, and 90% males in the Army. 82% of reservists are male, and 65% of Defence APS employees are male.

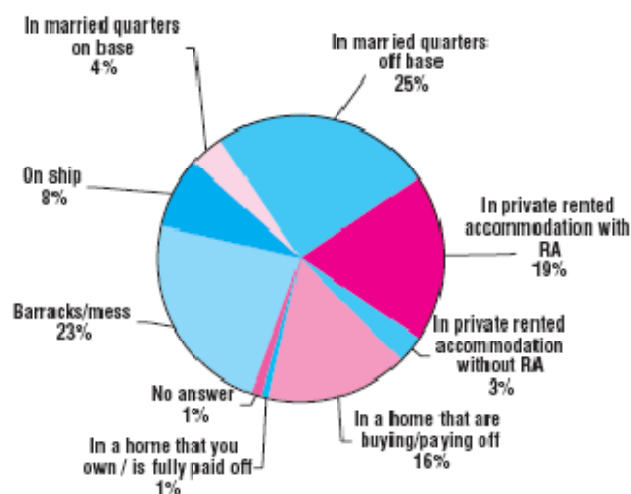
Age

Age is also an important predictor of where income is spent. The Defence Census finds that the mean age of the Permanent Force was 30.1 years; the mean age of the Active Reserve was 34.8 years; and the mean age of Defence APS personnel was 41.3 years.

Housing

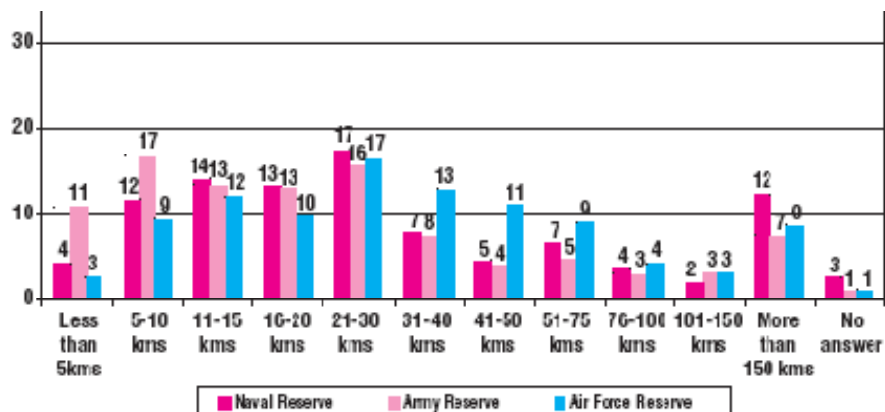
59% of permanent Defence force personnel live in accommodation provided by Defence, and therefore their private expenditure does not contribute directly to local housing demand. This is illustrated in Figure 17, taken from the Defence Census report. However, it is important to note that Air Force members were more likely to live in private accommodation (46%) than Army (40%) or Navy (32%) members.

Figure 47. Full-time serving members' current accommodation



A proportion of Defence personnel could also be expected to live outside the local area of their base, and this not only has implications for their contribution to the local real estate market, but for their contribution to the local economy as a whole. While the Census does not detail this information for full-time or APS personnel, it does include information about the distance reservists travel to get to their base, and this is illustrated in Figure 18.

Figure 48. Distance from home to unit for reservists



Employment outside Defence

6% of Defence APS personnel participate in paid employment outside of the APS, and 3% participate in unpaid voluntary work. If their full-time positions were relocated, we could reasonably expect this additional economic contribution to be lost to the local economy. A much larger proportion of reservists are engaged in employment outside of Defence. However, we would not expect reservists to move out of the local region as a result of the closure of a base, and therefore their external employment is not factored into the economic impact analysis.

Dependents and children

We would expect that the income paid to personnel with dependents would be spent according to a different pattern than for personnel without dependents. The Census finds that 49% of full-time serving personnel classified themselves as members with dependants (MWD), 44% had classified themselves as members without dependants (MWOD), 5% had dependants (but were separated) (MWD(S)), and 2% of personnel did not answer this question. 37% of full-time Permanent members have at least one dependent child living with them, and the mean number of dependent children was 2.0.

For Defence APS personnel, 44% live with at least one dependent child, and the mean number of dependent children is also 2.0.

Predictors of economic contribution of partners

If full-time Defence personnel (including APS personnel) are transferred out of a region, it is reasonable to assume that their partners will move with them. Accordingly, it is important to account for the economic contribution these partners make.

Marital Status

The Census finds that 41% of full-time serving personnel were currently married with a further 16% in a de facto relationship (10% 'ADF recognised', 6% unrecognised). Air Force personnel had a higher proportion of members who were married or in an ADF recognised de facto relationship (57%), compared to 51% of Army personnel and 44% of Navy personnel. Amongst Defence APS personnel, 59% are married, and 11% are in a de facto relationship.

Partners' employment and income

Approximately 9% of partners of full-time military personnel are serving members of the permanent forces themselves, 2% of partners were employed in the Defence APS and 1% were in the Reserves (and therefore, to avoid double counting, this is not to be included as an extra economic contribution). 56% of partners who were not full-time serving members of the ADF worked in other jobs or businesses, and worked on average 36 hours per week. 6% of working partners also received income from government payments.

Appendix 2 – Key References and Sources of Key Data

Key references

Apart from the data supplied by the Department of Defence, the key references used to generate the modelling work within this study include:

Australian Bureau of Statistics (2006), *Census Data*, Canberra

Australian Bureau of Statistics (2006), *Journey to Work Data*, Unpublished, Canberra

Australian Bureau of Statistics (2006), *Input-Output Tables 2001-02*, Canberra

Australian Bureau of Statistics (2001), *Census Data*, Canberra

Australian Bureau of Statistics (2001), *Journey to Work Data*, Unpublished, Canberra

Sources of Key Data

RAAF BASE AMBERLEY

Permanent Staff No (APS & ADF)ⁱ	• 2250
Non-Permanent Staff No (Reserves, Cadets, etc)ⁱⁱ	• 620
Salaries 06/07 \$ⁱⁱⁱ	• \$115,536,299
Contractor No (Approx)^{iv}	• 1325
Gross Replacement Value 06/07 (i.e. land, buildings and infrastructure)^v	• \$686,691,286
Area^{vi}	• 2,570 ha
Capital Works Last 10 years^{vii}	• Amberley Redevelopment Stage 1 - \$77.4m 1998-99 • Amberley Redevelopment Stage 2 - \$285.6m 2005-2007 (250 jobs) • Amberley 6 SQN Facilities - \$8m 1996-97 • Heavy Air Lift C-17 – Interim facilities \$6m
Future Capital Works^{viii}	• Amberley Redevelopment Stage 3 - \$331m 2008-2011 (200 jobs) • MRTT Aircraft Facilities - \$132.5m 2008 • Amberley Infrastructure Upgrade - \$83m 2008 • C-17 Heavy Air Lift Facilities – 268.2m 2008-10 (150 jobs) • Single LEAP^{ix} – (120 workers per day) (295 Rooms) – 2006-08 Estimate approx \$135m (figure includes ongoing management costs over 25yrs).
Capital Works 06/07^x	• \$139.0 million
Defence Housing 06/07^{xi}	• 535 properties • Total annual rent - \$7,871,552
Private Rental Assistance 06/07^{xii}	• 362 instances of private RA • Annual RA Cost - \$5,424,992
Maintenance / FACOPS 06/07^{xiii}	• \$2,827,202
NOD / Operational Costs 06/07^{xiv}	• \$8,335,000

RAAF BASE WILLIAMTOWN

Permanent Staff No (APS & ADF)	• 2840
Non-Permanent Staff No (Reserves, Cadets, etc)	• 307
Salaries 06/07 \$	• \$155,858,488
Contractor No (Approx)	• 750
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$495,954,650
Area	• 1096ha (Salt Ash WR is 2460ha)
Capital Works Last 10 years	• Williamtown Eastern Region Operations - \$17m 97/98 • Williamtown Redevelopment Stage 1 and Airborne Early Warning & Control Works - \$150m 02/03 (200 jobs)
Future Capital Works	• Williamtown Redevelopment Stage 2 - \$90m 09-11 (100 jobs) • Aircraft Rinse Facility – 2007 \$2.7m
Capital Works 06/07	• \$25.8 million
Defence Housing 06/07	• 833 properties • Annual rent bill - \$13,531,065
Private Rental Assistance 06/07	• 586 instances of private RA • Annual RA Cost - \$9,314,864
Maintenance/FACOPS 06/07	• \$12,477,462
NOD/Operational Costs 06/07	• \$8,667,000

RAAF BASE PEARCE

Permanent Staff No (APS & ADF)	• 560^{xv}
Non-Permanent Staff No (Reserves, Cadets, etc)	• 210 (excluding approximately 88 RSAF personal)
Salaries 06/07 \$	• \$25,787,134
Contractor No (Approx)	• 373
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$323,190.024
Area	• 963ha
Capital Works Last 10 years	• Pearce facilities for Hawk LIF - \$7m 98-99
Future Capital Works	• Pearce Redevelopment Stage 1 - \$142.2m 08-11 (200 jobs)
Capital Works 06/07	• \$35.5m
Defence Housing 06/07	• 107 properties • Total annual rent - \$1,481,480
Private Rental Assistance 06/07	• 81 instances of private RA • Annual RA Cost - \$1,442,584
Maintenance/FACOPS 06/07	• \$3,796.998
NOD/Operational Costs 06/07	• \$7,356,000 (excludes utilities cost)

RAAF BASE EDINBURGH (EDINBURGH DEFENCE PRECINCT)

Permanent Staff No (APS & ADF)	• 4204
Non-Permanent Staff No (Reserves, Cadets, etc)	• 288
Salaries 06/07 \$	• \$143,880,563
Contractor No (Approx)	• 720
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$437,049,400
Area	• 1170ha
Capital Works Last 10 years	• RAAF Base Edinburgh Stage 1 1999-00 - \$41m • OTHRSPO Accommodation (Jindalee) - \$5.2m • No 1 AFDS Working Facilities - \$3.5m • Jindalee Building - \$11m • Explosive Ordnance Facilities - \$3.2m • Fire Protection to Facilities - \$4.7m • Aviation Medicine Facilities - \$3.2m • New Instrument Landing System - \$3.3m • Engineering Services Upgrades - \$3.1m • No 492SQN Hanger - \$5.3m • Runway & Tarmac Upgrade - \$4.85m • Fuel Installation Upgrade - \$3.2m • Flight Simulator Facility - \$3.1m • Aircraft Signature Turntable - \$1.9m
Future Capital Works	• Edinburgh Redevelopment Stage 2 - \$90m - 100 jobs at peak 2009-2010 • HNA Facilities \$620m 2008-2011 – 500 jobs at peak (HNA is Hardened Networked Army – Many staff being relocated from Northern Australia – will also impact on housing supply/local expenditure – approx 1200 new staff)
Capital Works 06/07	• \$65.8 million
Defence Housing 06/07	• 635 properties • Total annual rent - \$8,977,465
Private Rental Assistance 06/07	• 604 instances of private RA • Annual RA Cost - \$8,794,422
Maintenance / FACOPS 06/07	• \$10,549,244
NOD / Operational Costs 06/07	• \$4,888.000 (excluding utility costs)

HMAS ALBATROSS

Permanent Staff No (APS & ADF)	• 1330
Non-Permanent Staff No (Reserves, Cadets, etc)	• 95
Salaries 06/07 \$	• \$75,634,535
Contractor No (Approx)	• 600
Gross Replacement Value 06/07 (ie, land, buildings and infrastructure)	• \$423,000,000
Area	• 876ha
Capital Works Last 10 years	• Albatross redevelopment Stage 1 – 1996-97 - \$110m
Future Capital Works	• Multi-Role Helicopter Facilities Project - 2008-2011 - \$50m – Approx 50 jobs.
Capital Works 06/07	• \$15.1 million
Defence Housing 06/07	• 362 properties • Total annual rent - \$4,369,457
Private Rental Assistance 06/07	• 270 instances of private RA • Annual RA Cost - \$3,671,512
Maintenance / FACOPS 06/07	• \$7,601,868
NOD / Operational Costs 06/07	• \$6,198,000

ⁱ Base numbers (with the exception of Pearce) have been sourced from the *Defence Capability Fact Sheets 2007*, and determined as part of the *Force Disposition Review 2004*. Figures have been increased by 5% to account for approximate increase in staff numbers since this time. Figures for Pearce are current at November 2007.

ⁱⁱ Similar to previous, non-permanent numbers have been sourced from the *Defence Capability Fact Sheets 2007* and increased by 5% as above.

ⁱⁱⁱ Salaries have also been determined from the *Defence Capability Fact Sheets 2007*. Similar to base numbers, 5% has been added to account for approximate increases in staff numbers. A further 6% has also been added to account for approximate salary increases since 2004.

^{iv} Source: Contractors numbers have been sourced directly from the respective base.

^v Source: *Defence ICT Property Briefs 2007*.

^{vi} Source: *Defence ICT Property Briefs 2007*.

^{vii} Source: *Defence ICT Property Briefs 2007*.

^{viii} Source: *Defence ICT Property Briefs 2007* and Estate Planning Branch.

^{ix} Source: Single Leap Project Team and Ministerial Briefing Notes. Value for 3 sites is \$406m. Have estimated 1/3 of funding for Amberley (actual figure is commercial in confidence at current time – PPP project)

^x Source: Estate Planning Branch/Infrastructure Financial Planning – Recent and Future Capital Works have been averaged over the period of expenditure to determine average capital works per annum.

^{xi} Source: Directorate of Relocations & Housing.

^{xii} Source: Directorate of relocations & Housing.

^{xiii} Source: FACOPS/DEMS (Note: Assumes 30% of 'Regional' funding has gone to respective Base).

^{xiv} Source: National Operations Division.

^{xv} Base numbers for Pearce are current at November 2007 provided by DS-WA

The Economic Contributions of Three Queensland Defence Precincts

Final Report

Australian Government Department of Defence

July 2010

This Report has been prepared for the:

Australian Government Department of Defence

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Glossary of Terms

To assist with interpretation of this report, a glossary of terms is provided. These are the key concepts and terms used throughout the description of the modelling results presented in this study.

Consumption-induced Contribution: This is one component of an *indirect contribution* to economic activity. It is the *indirect effect* of the consumption-related expenditure of a Defence precinct e.g. expenditures such as those on retail and other services.

Contribution: In this study, this term simply refers to an increase or decrease in economic activity caused by the presence of a Defence precinct.

Direct Contribution: This is the direct contribution made by a Defence precinct to an economy. This is usually interpreted using three common measures: *Direct Output* (turnover); *Direct Value Added* (profits and wages); and *Direct Employment* (number of people employed). The direct contribution is best thought of as all economic activity that has a direct relationship with the Defence precinct (for example, the value of on-base employment, supply contracts, etc).

Economic Catchment Region: To model the economic contributions of each Defence precinct at the regional level, geographic regions were defined. For data collection and modelling purposes, these regions are based on Australian Bureau of Statistics Census local government areas, and were formulated during discussions with the Department of Defence about the approximate physical, demographic and geographic connections between each precinct and its surrounding area.

Employment: In this study, employment refers to the full time equivalent jobs created and supported within a region by a Defence precinct's activities.

Full-Time Equivalent (FTE): This term refers to the ratio of the total number of paid hours in a period as a proportion of the standard working hours for a full time job in that same period.

Indirect Contribution: Indirect contributions are the additional payments a Defence precinct generates in an economy. For example, through retail spending of Defence employees supports the employment of additional people in the region, and through the precinct purchasing services from the local providers. In turn, these local providers will also need to spend some of their money in the local economy. An assessment of indirect contributions therefore traces this flow of money through an economy.

Input-Output Table: The Input-Output Table reproduced below is an accounting table that represents a summary of all financial transactions in an economy. It is a matrix comprising of demand-related financial data, showing which industries are 'buying' which goods and services and at what value (represented by columns in the table), and supply-related financial data, showing which industries are 'selling' which goods and services and at what value (represented by rows in the table). An input-output table outlines the amount of money flowing:

- into the economy or demand (Quadrant 2 – Final Demand);
- between the industries in an economy (Quadrant 1 – Intermediate Usage);
- out of the economy or supply (Quadrant 3 – Primary Inputs to Production); and
- from primary inputs into final demand (Quadrant 4).

		Intermediate Demand						Final Demand								
	From	Agriculture	Mining	Manufacturing, etc	Construction	Services	Intermediate usage (sub-total)	Final consumption expenditure (private)	Final consumption expenditure (govt)	Gross fixed capital expenditure (private)	Gross fixed capital expenditure (govt)	Gross fixed capital expenditure (govt)	Increase in stocks	Exports	Final Demand (sub-total)	Total Supply (grand total)
Intermediate inputs	Agriculture	QUADRANT 1 - INTERMEDIATE USAGE						QUADRANT 2 - FINAL DEMAND								
	Mining															
	Manufacturing, etc															
	Construction															
	Services															
	Intermediate inputs (sub-total)															
Primary inputs	Wages, salaries and supplements	QUADRANT 3 - PRIMARY INPUTS TO PRODUCTION						QUADRANT 4 - PRIMARY INPUTS TO FINAL DEMAND								
	Gross operating surplus															
	Taxes less subsidies on products															
	Taxes less subsidies on production															
	Imports															
Australian Production																

Location Quotient: The *location quotient* for a region is a number derived by comparing the percentage of employment in a particular industry in the region with the percentage of employment in the same industry at the state level. The location quotient is a guiding measure that identifies which industries in a region are relatively concentrated in a particular location (in employment terms) compared to the rest of the state.

Multiplier: A 'multiplier' is sourced from an *input-output table* and indicates the level at which the direct contribution (in terms of *output*, *value added* and *employment*) is multiplied to create the overall economic effect. It is a measure of how much \$1 invested in a particular industry impacts the entire economy. That is, a multiplier of 2.13 means that for every \$1 of direct contribution a further \$1.13 of economic value is indirectly created in the wider economy.

Output: This is similar to the gross turnover of a company. It includes the value of all incomes and expenditures generated within a Defence precinct. While output can be sizeable, on its own this is not reflective of economic contribution. Other measures such as value added and employment also have to be accounted for when analysing the total economic contribution, because these measures value a precinct's contribution to the broader economy.

Production-induced Contribution: This is one component of an indirect contribution. It relates to the contribution resulting from the production-related expenditure of a Defence precinct e.g. expenditures such as those on equipment purchases, maintenance, stock purchase etc.

Regional Economy: Not to be confused with the term *economic catchment region*, which is also used in this study. The term *regional economy* is a term of standard usage in discussion about regional economic interactions generally. In this study, it is used to differentiate between the economy of a region and the economy of a state.

Total Contribution: This is equal to the sum of a precinct's direct and indirect contributions to an economy.

Value Added: Value added is profits plus wages. It makes adjustments for production expenses such as imports into a region and represents only the extra value that is created by an economic activity. The greater the value added, the greater the returns delivered to regional employers and employees. For example if a company's total expenditure is \$100,000 and \$40,000 is spent on inter-industry inputs such as the wholesale or retail trade sector, then after adjusting for taxes and imports, the Value Added component of total expenditure will be \$60,000 (i.e. the remaining expenditure accounts for wages and salaries and gross operating surplus). This can be measured in direct or indirect terms.

1 Introduction

In November 2008, SGS Economics and Planning (SGS) was commissioned by the Department of Defence (Defence) to undertake a study on the economic contributions of three Queensland Defence precincts.

1.1 The Purpose of this Study

Though it is broadly understood that Defence precincts make economic contributions to regional and state economies, some precincts face threats to the scale of their activities from the incompatible development of nearby land (urban encroachment). Urban encroachment can cause pressure on a Defence precinct to restrict or scale back its operations. If restrictions occur they may lead to reduced activity at these Defence precincts, potentially jeopardising the capability of Defence to carry out those activities essential to the viability and sustainability of its ongoing mission to defend Australia.

Furthermore, since Defence precincts contribute to economies, scaling them down may not only impose costs on Defence (for example, costs associated with relocating activities), but could also have adverse impacts for regional and state economies.

The purpose of this study is to examine the economic contributions made by Defence precincts to regional and state economies, in order to clearly quantify and articulate the scale of contributions made by each precinct. This will enable the Department of Defence to have a better understanding of the broader economic value of each of the precincts and their contributions to their respective regional and state economies.

1.2 Background

There have been many studies on the substantial economic contributions made by Defence precincts. Amongst Australian studies, three are particularly relevant to this project, all commissioned by Defence (and more extensive in their scope): *The Economic Contributions of Five Defence Air Bases*¹, *The Socio-Economic Impact study for the Rationalisation of Borneo Barracks*,² and *The Economic and Social Impacts of the Royal Australian Air Force Base Richmond on The Hawkesbury and Surrounding Region*.³

SGS's research into the economic contribution of five Defence Air Bases found that three bases (RAAF Amberley, RAAF Edinburgh and RAAF Williamtown) were 'billion-dollar plus' drivers of state economic activity in terms of both value and employment. An earlier SGS study into the economic contribution of the Borneo Barracks in Queensland found that if the barracks were to close in 2013, the adverse economic impacts of the lost direct and indirect annual contributions to the area would exceed \$90 million⁴.

¹ SGS Economics and Planning (2008) *The Economic Contributions of Five Defence Air Bases*, for the Department of Defence.

² SGS Economics and Planning (2006) *The Socio-Economic Impact study for the Rationalisation of Borneo Barracks*, for the Department of Defence.

³ Price Waterhouse Coopers (2003) *The Economic and Social Impacts of the Royal Australian Air Force Base Richmond on The Hawkesbury and Surrounding Region*, for the Department of Defence.

⁴ Note that this figure has been inflated to match anticipated price levels in 2013.

The Price Waterhouse Coopers study concerning the RAAF Base Richmond in 2003, found that the base directly and indirectly accounted for 8.6% of total value added in the Hawkesbury region, and 19.9% of total Hawkesbury jobs (including the contribution of partners and children of RAAF employees).

1.3 Types of Economic Contributions

Defence precincts create economic value at several levels. The most significant direct contribution usually comes through paying the wages of employees, which can be substantial. This contribution is increased further when the income earned by the partners of Defence employees is counted. Other studies, such as the three mentioned above, show that a substantial proportion of the total wages bill paid at a Defence precinct is later spent in the surrounding economy: at RAAF Base Richmond, total private spending on consumption in the Hawkesbury region by base employees and contractors was estimated at \$24.8 million (in 2003).

Defence precincts also directly increase the revenue available to federal, state and local governments. The precinct and many of its employees pay rates and taxes. Additionally, as Defence precincts directly fund the provision of public goods that are used by the wider community, the community receives an additional economic benefit. An economy also benefits from the provision of infrastructure to a Defence precinct. Providing services such as roads, sewage, water and electricity to a precinct reduces the subsequent cost of other forms of development nearby.

If a Defence precinct closes or is significantly scaled back, not only are these benefits reduced, but additional costs can be imposed on the community through infrastructure mismatch. For example, a significant fall in school enrolments can lead to pressure to close schools, or push up the cost of education per student. Similar effects can also occur in the health sector.

Direct contributions lead to indirect contributions through the additional payments a Defence precinct generates in an economy. For example, the retail spending attributable to Defence employees supports the employment of additional people in the region. Indirect contributions to an economy also occur because a Defence precinct spends some of its direct expenditure in the economy. For example, if a Defence precinct spends an amount on food catering services with a locally-based catering company, additional expenditure from the catering company will be required to sustain the increased demand. Examples of local purchases by the catering company could include foodstuffs from local suppliers, vehicles from a local car dealership, fuel from a local petrol station and uniforms from a local clothing supplier. In turn, these local providers will also need to spend some of their money in the local economy. An assessment of indirect contributions

The direct and indirect contributions can be measured in terms of overall economic activity (output), the value added (profits and wages component) of the overall economic activity and the employment generated to sustain the level of output.

Defence employees and their families also bring other less tangible benefits to community life. While this is beyond the scope of this study, it is important to note that both the Borneo Barracks and RAAF Richmond studies document a wide range of contributions to what might be termed 'social capital' that would be lost without the presence of a Defence precinct.

1.4 The Three Defence Precincts

The three Defence precincts included in this study are:

Cairns Defence Precinct, Queensland:

- HMAS Cairns; and
- Porton Barracks and Queerah Magazine.

Oakey Defence Precinct, Queensland:

- Oakey Army Aviation Centre; and
- Borneo Barracks.

Canungra Defence Precinct, Queensland:

- Canungra Military Area.

These areas were selected as examples where urban encroachment is seen as an immediate and future threat to the scale of Defence operations.

1.5 Methodology

SGS has recently evaluated the economic contributions of six different Defence bases over two separate studies for the Department of Defence. For both these studies, SGS undertook a short literature review to explore existing information on the economic contributions of Defence bases in Australia and elsewhere. SGS has used information gathered in these reviews to inform some of the assumptions used in the economic modelling for this analysis.

For this study, our methodology involves two stages of analysis. The first stage involves collection and collation of information and data about the socio-demographic and economic characteristics of each of the three precincts. The second stage involves the development of regional input-output models to enable the direct economic contributions to be quantified and to determine multipliers for estimating total contributions, and these are then applied to the economic catchment region level and the state level. In preparing the modelling, some limitations and assumptions were made and these are articulated below.

1.5.1 Learning about the bases

To better inform the assumptions behind our econometric models, the socio-demographic and economic characteristics of each Defence precinct and the regions they are located in were explored.

Defence Precinct Data

To better understand and analyse the economic activity within each Defence precinct, a data template was developed. The data template was designed to acquire key economic data and other information about the Defence precincts. Once the template was complete, it was then used to collect information from the precincts. This process was managed by Defence. The data that was collected for each precinct included:

- Permanent Staff Numbers

- Non-Permanent Staff Numbers
- Full Time Equivalent (FTE) – excluding contractors
- Salaries 08/09 \$
- Contractor Numbers (Approx.)
- Gross Replacement Value 08/09 (i.e. land, buildings and infrastructure)
- Area
- Capital Works 08/09
- Defence Housing 08/09
- Private Rental Assistance 08/09
- Maintenance/Facility Operations (FACOPS) 08/09
- National Operations Division (NOD)/Operational Costs 08/09.

Some data that would have been useful in further developing and refining the econometric modelling was not available. This led to some limitations to the modelling as outlined in Section 1.4.3.

Economic Catchment Region Data

For the purpose of modelling the economic contributions of Defence precincts to regional economies, it was necessary to define **economic catchment regions** for each precinct. This primarily involved selecting appropriate Australian Bureau of Statistics (ABS) statistical districts. The catchment regions for the three Defence precincts were then profiled (at a basic level) using data from the ABS 2006 Census of Population and Housing.

As it was beyond the available resources for this project to build regional input-output tables from detailed surveys and analysis of regional dynamics, national input-output tables were used to source data for tailoring economic models for the economic catchment regions.

1.5.2 Modelling and Analysis

Once collected, the data was then used to form assumptions about the economic links between each precinct and their respective catchment regions. To enable the direct economic contributions to be quantified and to determine multipliers for estimating total contributions, regional input-output models were built around these assumptions. Models were then developed and applied to the economic catchment region level and the state level.

1.5.3 Assumptions and Limitations

In preparing the modelling, some limitations and assumptions were made. These assumptions and limitations should be kept in mind when interpreting the results of the analysis. The assumptions and limitations can be divided into two main groups. These are:

- Assumptions and limitations associated with the available data for the Defence precincts; and
- Assumptions and limitations associated with economic modelling in general.

Data Availability Assumptions and Limitations

During the study difficulties associated with not being able to obtain the ideal data set occurred because of the unavailability of data and limitations on the available resources for the project. This affected the modelling process. Specific assumptions and limitations include:

- **Geographical classification of Defence precinct's expenditures.** Defence precincts were not always able to provide a clear indication of how expenditure was distributed geographically (i.e. was a supplier local, regional, state or national?). Furthermore, some expenses flowed to national suppliers but there was no way of knowing without a detailed survey to what extent a national supplier had a local or regional business servicing the contract. Assumptions have therefore been made as to the economic geography of certain precinct expenditure.
- **Industry classification of Defence precinct's expenditures.** During the study we classified expenses that were described only in general terms by combining our understanding of the general nature of the expense items with further clarification from Defence. However, for those cases where there was no option but to aggregate an expense into one general industry sector classification, it is possible that such aggregations contained some classes of expenditure that would in reality flow to a number of different industry sectors, not a single industry sector. The cost of equipment maintenance supply contracts is a good example, as the nature and extent of the maintenance performed may determine the correct industry classification.
- **Historic and future analysis of Defence precinct economic contributions.** Due to data limitations and comparability with specific Defence precinct expenditure, it was not possible to model the historic (previous 10 years) and future (next 10 years) economic contributions made by each precinct. This means that the direct and indirect contributions made as a result of past and future major capital works projects have not been included in this analysis. The nature of capital works projects means that they traditionally require significant levels of expenditure and by not including many recent projects in this analysis, the total economic contributions may be smaller than if the modelling was performed for a different year.
- **Spending behaviour of employees of Defence precincts.** Data on the actual spending behaviour of employees from Defence precincts would have been useful to more accurately understand the economic contributions that flowed from Defence employee expenditure in the economic catchment region and in the state economy.
- **Spending behaviour of the general residents of economic catchment regions.** This data would assist with a more accurate understanding of how self-contained a region was with regard to providing its resident population with the goods and services it needs. This information would have also been useful to further analyse the contributions that resulted from Defence expenditure on housing and rental assistance, by more accurately isolating expenditure that remained in the region.
- **Exhaustive and detailed record of Defence precinct expenditures.** This would also influence and improve the tailoring of a regional economic input-output model for each of the Defence precincts. When developing input-output models for each precinct, we have relied on input-output tables, at the national level, to make assumptions about general relationships between the Defence industry and other industry sectors.

Economic Modelling Assumptions and Limitations

- **The linkages between the Defence precincts and the industries in their regional economy are analysed at a high level.** This is because the analysis is based on the broadest (highest level) of the ABS's Australia and New Zealand Standard Industrial

Classifications, which are descriptions of industry sectors only. The broad classifications capture a variety of more detailed industrial activity, which is identified in more refined sub-classifications. For example, the 'Other Services' classification, includes three second level sub-classifications, and each one of these has up to 5 further sub-classifications of activity. Because of data limitations, we have conducted modelling at the broad classification level which limits the extent that industry linkages can be analysed.

- **The assessment is based on ABS national input-output tables for 2004-05.** These were the latest available tables at the time the modelling was developed. Although they have been scaled to reflect 2008 values, the industry dynamics embedded in these tables remain as they were in 2004-05. As previously mentioned regional input-output tables built from detailed customised surveys of local business, government and household expenditure would have been the ideal basis for predicting the economic contribution made by each Defence precinct.
- **Meaningful sensitivity testing.** Naturally expenditure profiles change over time for any operation. For example, one year might see a flux of construction activity or supply chains may be reorganised with increased efforts to source goods locally (hence decreasing import levels). Potentially, a way in which to improve the analysis would be to assess the year on year changes in expenditure and the implications this has on the economic multipliers. This would involve identifying key areas where expenditure is likely to change as well as re-calculating industry linkages and the economic multipliers based on such changes. The scale of these changes to expenditure profiles would be established in collaboration with Defence, however this process was beyond the scope of this project.

2 Cairns Defence Precinct, Queensland

2.1 An Overview of the Cairns Defence Precinct

2.1.1 Location and Operational Background

For the purposes of this study, the Cairns Defence Precinct includes:

- HMAS Cairns; and
- Porton Barracks and Queerah Magazine.

HMAS Cairns

HMAS Cairns is located in the City of Cairns, on the northern shore of Trinity Inlet and close to the central business district of Cairns. HMAS Cairns was commissioned at its current location in 1982 and underwent a major redevelopment in 2008-09. It is the homeport for fourteen Naval Vessels, including four Armidale-class Patrol Boats and Navy's hydrographic fleet. Employing over 900 civil and military staff, the base provides maintenance, logistic and administrative support to Cairns-based units and visiting vessels. Functions supported by HMAS Cairns include:

- Base Command Element
- Fleet Logistic Support Element - Cairns
- Fleet Support Unit (formerly FIMA) - Cairns
- Laser Airborne Depth Sounding Flight
- Defence Communication Station - Cairns
- Patrol Boat Systems Program Office
- Amphibious and Afloat Support Systems Program Office
- Hydrographic Systems Program Office, and
- Sea Training Group (Minor War Vessels).

Porton Barracks and Queerah Magazine

Porton Barracks and Queerah Magazine

Porton Barracks is located approximately 10km south of the Cairns CBD in a developing industrial estate at Edmonton and is the headquarters for the 51st Battalion Far North Queensland Regiment (51FNQR). Queerah Magazine Complex, located east of Porton Barracks, provides explosive ordnance storage for a variety of purposes.

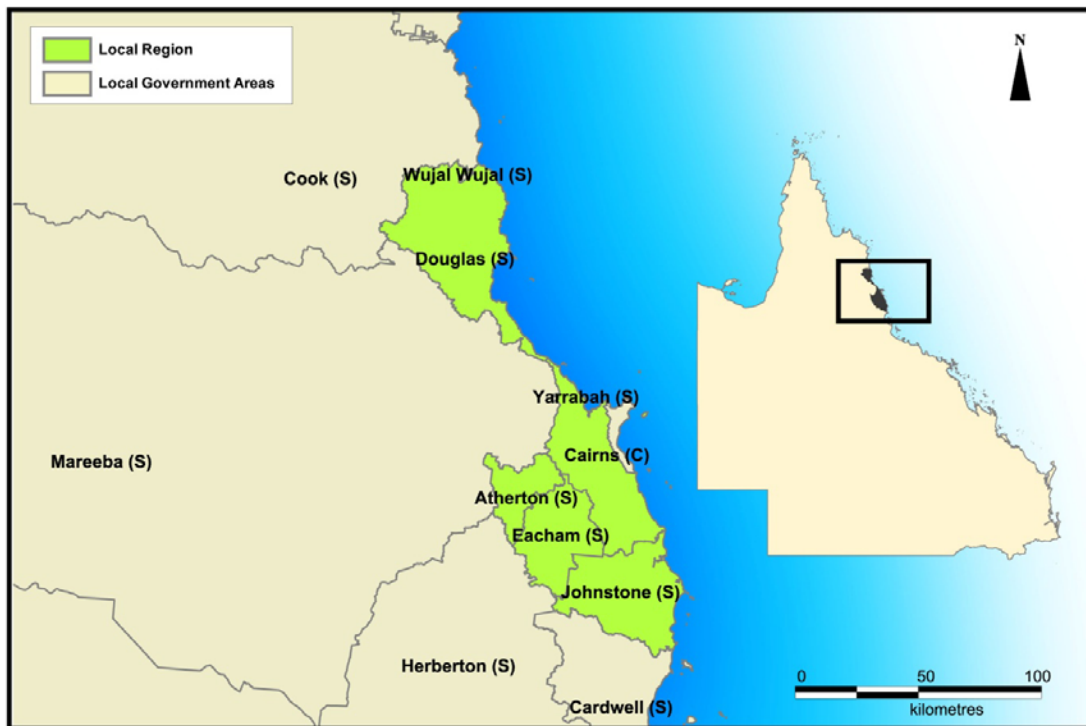
2.1.2 The Cairns Defence Precinct Economic Catchment Region

For ease of data collection and economic modelling purposes, the Cairns Defence Precinct economic catchment region (referred to as the *Cairns Region* from here) has been defined by 2006 ABS Census local government areas. This makes it easier to match statistical information with the economic catchments used in this study. The selection of areas to include within the Cairns Region was based on assumptions regarding the degree of interaction and influence between the Defence precinct and surrounding areas. These assumptions were confirmed by discussions with Defence. The following former⁵ local government areas form the Cairns Region:

⁵ In 2007 the Queensland Government introduced new Local Government boundaries which took effect from March 2008.

- Atherton (S) Local Government Area;
- Cairns (C) Local Government Area;
- Douglas (S) Local Government Area;
- Eacham (S) Local Government Area;
- Johnstone (S) Local Government Area; and
- Yarrabah (S) Local Government Area.

Figure 1. The Cairns Defence Precinct: location and economic catchment region



2.2 Profile of the Cairns region

The purpose of profiling the Cairns Region is to provide some contextual understanding about the region in which the Defence precinct operates. This profile provides information about the region as a whole, compared to both Queensland and Australia. The source of all data used in the profile is the ABS Census of Population and Housing, 1996, 2001 and 2006.

2.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

From 1996 to 2001, the rate of population growth in the Cairns Region was less than Queensland and Australia as a whole. However, from 2001 to 2006, the population of the Region grew at approximately the same rate as Queensland and exceeded the Australian growth rate by 0.82 per cent.

These fluctuations in the rates of population growth could reflect the Region's large transient population which is aligned with longer term tourism cycles.

Table 1. Cairns Region - 2006 Population

	Population in 2006	% of Australia's Population
Cairns Region	200,185	1.0%
Queensland	4,119,800	20.3%
Australia	20,268,010	

Source: ABS Census of Population and Housing, 2006

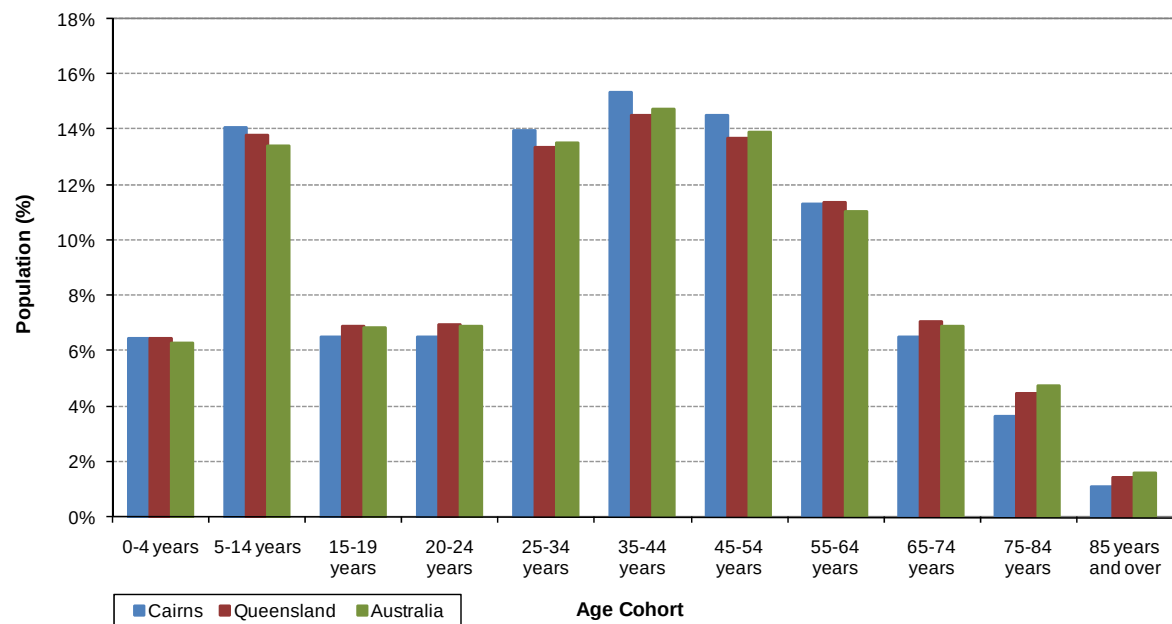
Table 2. Cairns Region - Rates of Population Growth, 1996 to 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Cairns Region	0.76%	1.93%	1.35%
Queensland	1.73%	2.04%	1.88%
Australia	1.24%	1.11%	1.18%

Source: ABS Census of Population and Housing, 2006

Age Structure

The age distribution of the Cairns Region closely matches that of Queensland and Australia as a whole, however the region had a slightly greater proportion of people aged between 25 and 54 compared to both Queensland and Australia.

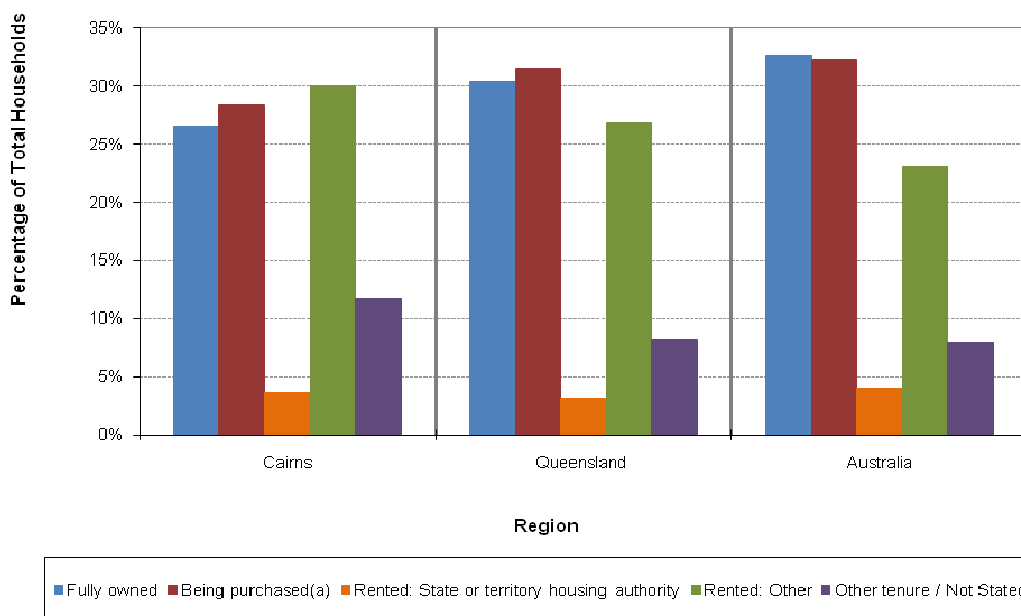
Figure 2. Cairns Region - Age of Residents, 2006

Source: ABS Census of Population and Housing, 2006

Household Tenure

Figure 3 shows that in 2006, a smaller proportion of households were either fully owned or being purchased in the Cairns Region compared to Queensland and Australia. Therefore, a larger proportion of households were being rented compared to Queensland and Australia. Again this could be a function of a largely transient population who are seasonally employed and therefore prefer to rent for the seasons of employment rather than purchase a home.

Figure 3. Cairns Region - Household Tenure 2006



Source: ABS Census of Population and Housing, 2006

Rental Payments

Figure 4 shows that a far greater proportion of households in the Cairns Region paid between \$100 and \$179 per week in rent compared to Queensland and Australia as a whole. On the other hand, a smaller proportion of households in the Cairns Region paid between \$225 and \$599 per week compared to both Queensland and Australia.

Figure 4. Cairns Region - Distribution of Rental Payments, 2006

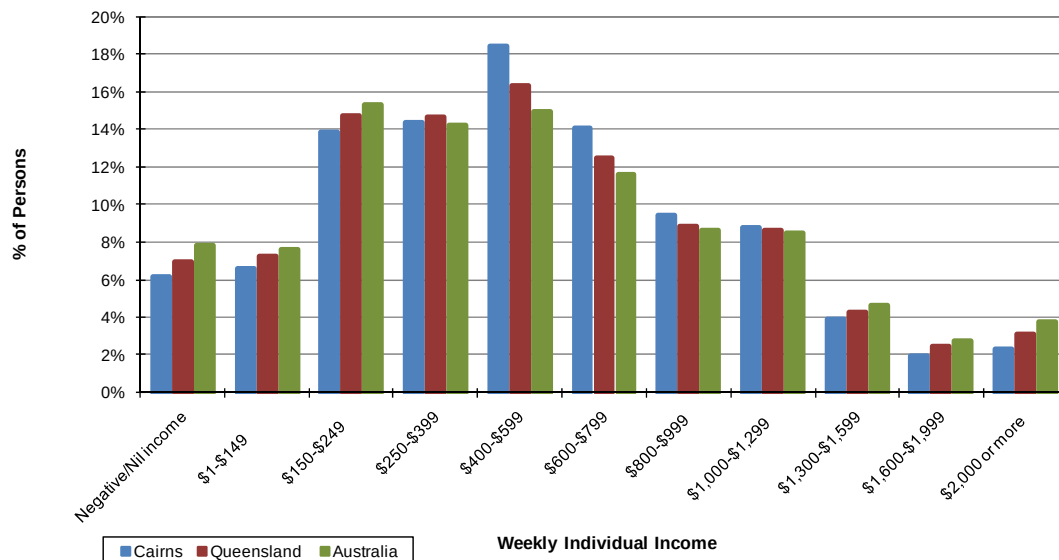


Source: ABS Census of Population and Housing, 2006

Income Profile

In 2006, the median weekly income for the Cairns Region, Queensland and Australia was between \$400 and \$599⁶. However, Figure 5 shows that there was less variation among the levels of income in the Cairns Region compared to Queensland and Australia. For example, a greater proportion of workers in the Cairns Region earned between \$400 and \$1,299 per week, while a smaller proportion of workers earned between \$1 and \$399, and \$1,300 or more, compared to Queensland and Australia.

Figure 5. Cairns Region - Distribution of Income, 2006



Source: ABS Census of Population and Housing, 2006

⁶ ABS Census of Population and Housing, 2006

2.2.2 Employment and Occupation

Labour Force Participation and Unemployment

Table 3 shows that labour force participation was slightly higher in the Cairns Region compared to Queensland and Australia as a whole. However, a higher non-response rate was also recorded in the Cairns Region compared to the state and national aggregates.

Table 3. Cairns Region - Labour Force Participation, 2006

	Cairns		Queensland		Australia	
	No.	% of pop	No.	% of pop	No.	% of pop
Total labour force	82,464	64.0%	1,915,947	61.8%	9,607,987	60.4%
Not in labour force	34,722	26.9%	971,828	31.4%	5,271,120	33.1%
Not stated	11,657	9.0%	210,220	6.8%	1,038,973	6.5%
Total	128,843		3,097,995		15,918,080	

Source: ABS Census of Population and Housing, 2006

Unemployment was slightly lower in the Cairns Region compared to the national and state averages. This unemployment rate (4.4 per cent) is relatively low in recent historical terms.

Table 4. Cairns Region – Unemployment, 2006

	Cairns		Queensland		Australia	
	No.	% of labour force	No.	% of labour force	No.	% of labour force
Total Employed	78,817	95.6%	1,824,997	95.3%	9,104,185	94.8%
Total Unemployed	3,647	4.4%	90,950	4.7%	503,802	5.2%

Source: ABS Census of Population and Housing, 2006

Occupations

Table 5 shows that a higher proportion of workers were employed as managers, technicians and trades workers, community and personal service workers, sales workers and labourers in the Cairns Region compared to Queensland and Australia. On the other hand, there were fewer professionals, clerical and administrative workers, machinery operators and drivers in the Cairns Region compared to state and national proportions.

Table 5. Cairns Region - Occupational Profile, 2006

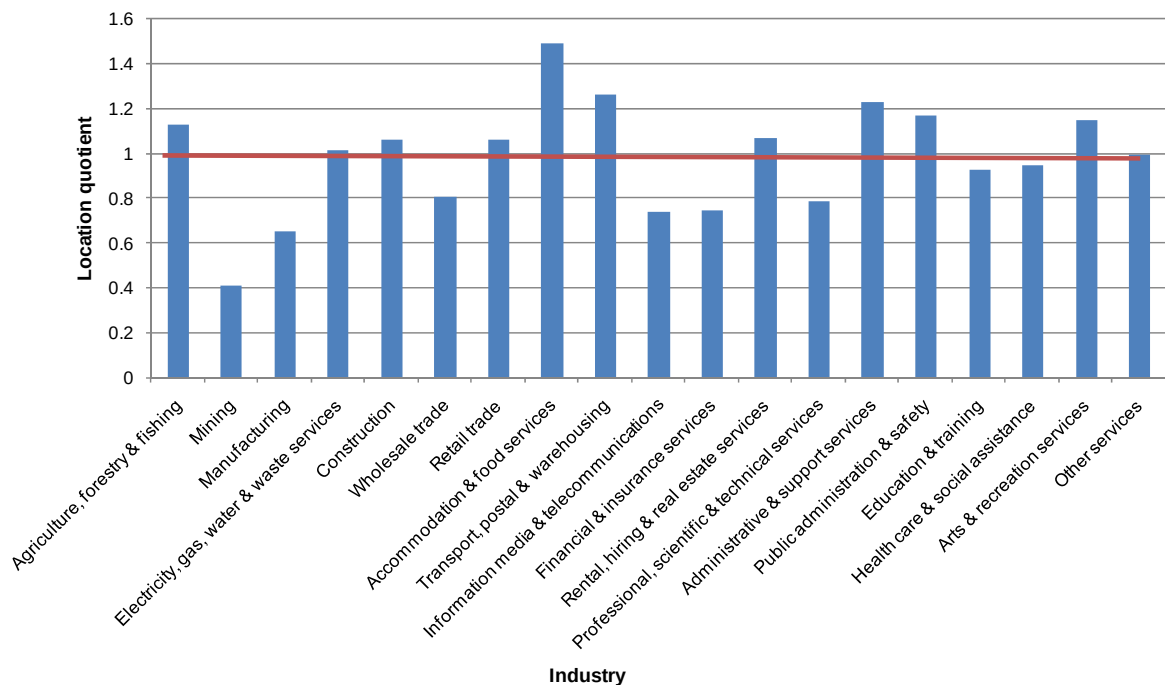
	Cairns		Queensland		Australia	
	No.	% of total employment	No.	% of total employment	No.	% of total employment
Managers	10,809	13%	225,693	12%	1,202,261	13%
Professionals	12,431	15%	312,865	17%	1,806,012	20%
Technicians & trades workers	13,788	16%	280,342	15%	1,309,255	14%
Community & personal service workers	9,184	11%	166,400	9%	801,914	9%
Clerical & administrative workers	11,204	13%	269,198	15%	1,365,810	15%
Sales workers	9,132	11%	189,038	10%	896,201	10%
Machinery operators & drivers	5,246	6%	132,114	7%	604,616	7%
Labourers	10,863	13%	217,251	12%	952,517	10%
Inadequately described/Not stated	1,510	2%	32,095	2%	165,598	2%
Total	84,167		1,824,996		9,104,184	

Source: ABS Census of Population and Housing, 2006

2.2.3 Industry Profile

Figure 6 illustrates the 'location quotients' (LQ) for each industry sector in the Cairns Region. Put simply, an LQ greater than 1 indicates that employment in an industry is relatively concentrated (and therefore strong) in the region, compared to Queensland averages. Figure 6 therefore highlights which industries in the Cairns Region are significant contributors to the greater Queensland economy.

Figure 6. Location Quotients for the Cairns Region, 2006



Source: ABS Census of Population and Housing, 2006

The analysis indicates that the Cairns Region is a significant provider of accommodation and food services, transport, postal and warehousing, administrative and support services and public administration and safety – both within and beyond the catchment region.

The concentration of the tourism accommodation and food services industries reflects the Region's heavy reliance on the tourism sector. Furthermore, the assumption that the Cairns Region is a 'hub' for many surrounding regional areas in Far North Queensland is supported by the concentration of industries such as transport, postal and warehousing, administrative and support and public administration and safety.

2.3 The Economic Contributions of the Cairns Defence Precinct

2.3.1 Summary of Key Economic Data

The following table summarises key economic data for the Cairns Defence Precinct. The economic contribution modelling for the Precinct uses much of this data as a foundation for further analysis.

Table 6. Summary of Key Data – Cairns Defence Precinct

Indicator	2008 / 09 Financial Year
Permanent Staff No.	926
Non-Permanent Staff No.	596
Full Time Equivalent (FTE)	1,144
Salaries (\$) 08 / 09	58,082,911
Contractor No (Approx)	50
Gross Replacement Value (\$) 08 / 09 (i.e. land, buildings and infrastructure)	168,118,000
Capital Works (\$) 08 / 09	18,000,000
Defence Housing (\$) 08 / 09	4,183,400
Private Rental Assistance (\$) 08 / 09	4,570,696
Maintenance / FACOPS (\$) 08 / 09	11,113,302
NOD / Operational Costs (\$) 08 / 09	2,525,057

Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2010

2.3.2 Economic Contributions to the Cairns Region

Using key economic information about the Cairns Defence Precinct and a regional input-output model for the Cairns Region, the economic modelling identifies economic interactions between the Cairns Defence Precinct and all industry sectors in the economic catchment region.

The model estimates that the total contribution that Cairns Defence Precinct makes to the Cairns Region economy is the sum of:

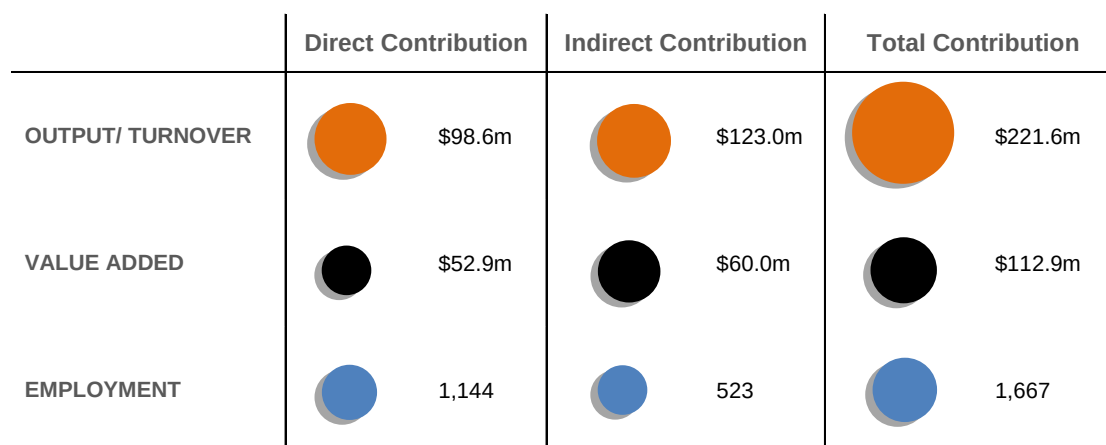
- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the precinct's activities. This is best thought of as all economic activity that has a direct relationship with the precinct (for example, the value of precinct employment, supply contracts, etc); and
- **Indirect contributions⁷** - which result from the additional output, value added and employment generated in the catchment region due to the presence of the precinct. Examples of indirect contributions include housing and retail expenditure in the catchment region that

⁷ It is important to note that indirect contributions may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

occur because of the presence of the precinct (that is, precinct employees spending their wages on home purchases, rentals and shopping).

Figure 7 illustrates the economic contributions made by the Cairns Defence Precinct to the Cairns Region economy.

Figure 7. The Contributions of the Cairns Defence Precinct to the Cairns Region Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Output / Turnover

The output / turnover of the Cairns Defence Precinct is estimated to be \$98.6 million in 2008. The economic multiplier for the Cairns Defence Precinct is 2.25. That is, for every \$1 spent, a further \$1.25 of economic value was created in the Cairns Region economy. As a result of the \$98.6 million of direct output created by the Defence Precinct (the direct contribution), other industries in the catchment region produce an additional \$123.0 million worth of output (the indirect contribution). The total contribution of the Cairns Defence Precinct to the Cairns Region economy is therefore approximately \$221.6 million. This is the largest contribution to a regional economy included in this study.

Value Added

Value added is a measure of 'net output' and is a better indicator of the economic value generated by a Defence precinct. Whereas output relates to the overall size of the precinct's annual expenditure, value added removes the double counting associated with the output measure. Another way to look at it is that value added is equivalent to a project or company's profits and wages (i.e. output minus expenditure on all inputs except wages and profits).

The modelling estimates that in 2008, the direct contribution to the value added component of the Cairns Region economy was approximately \$52.9 million. This is about 54 per cent of the Precinct's direct output. The indirect contribution to value added is estimated to be \$60 million. Together, these two contributions account for \$112.9 million of the total value added component of the Cairns Region economy.

Employment

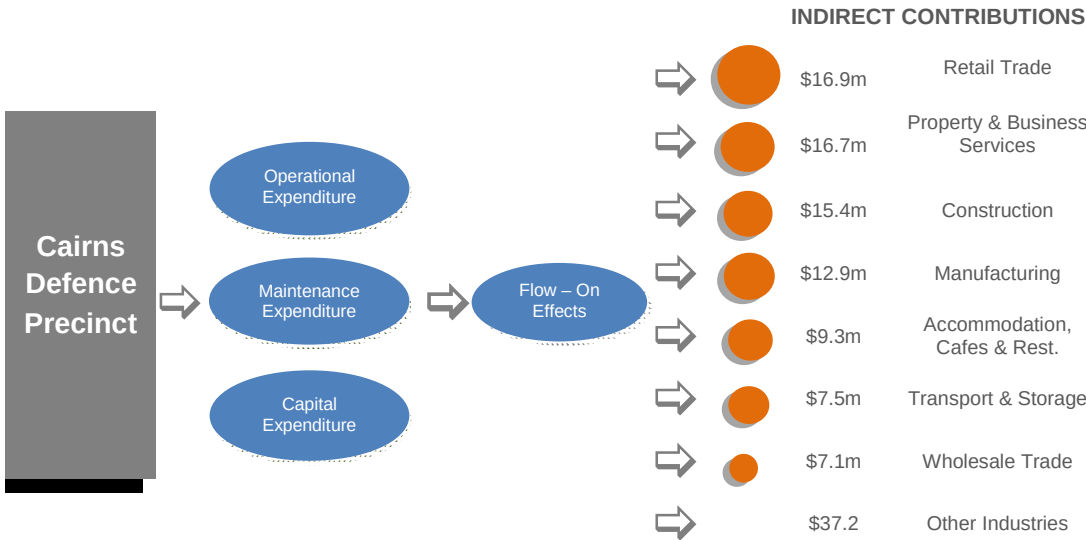
The modelling also estimates the direct and indirect contributions made to employment in the Cairns Region. The direct contribution to employment is simply the number of Full Time Equivalent (FTE) employees (permanent and non-permanent, excluding contractors) of the Cairns Defence Precinct. The indirect contribution is an estimate of the additional jobs that are created in the catchment region as a result of the presence Defence in the region. One reason these indirect jobs are created because the Defence precinct and its employees spend income buying goods and services from within the regional economy.

In 2008, the Cairns Defence Precinct directly employed 1,144 FTE staff, and as a result an additional 523 FTE jobs were created in the Cairns Region. The total employment created by the Cairns Defence Precinct was therefore 1,667 FTE jobs. Therefore, for every Defence FTE job in the Region, another 0.45 of an FTE job is created elsewhere in Cairns region economy.

2.3.3 The Distribution of the Indirect Contributions to the Cairns Region

The indirect contribution of the Cairns Defence Precinct is more or less counted as the additional value created as a result of the presence of the Precinct in the Cairns Region. As summarised in Figure 8, this indirect contribution is distributed across other industries within the region, with which the Defence Precinct has key supply chain linkages⁸.

Figure 8. The Cairns Defence Precinct – The Distribution by Industry Sector of Indirect Contributions to the Cairns Region Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

⁸ Due to rounding, the sum of the indirect contributions by industry sector may not equal the total indirect contributions reported in the previous section.

The most significant indirect contribution made by the Cairns Defence Precinct is to the retail trade sector (\$16.9 million). This indirect linkage between a Defence precinct and the retail trade sector is not uncommon. This is largely because Defence employees spend some of their wages on retail trade, which includes store-based retailing, such as food and fuel retailing, hardware, building and garden supplies, and supermarkets and department stores.

The second most significant indirect contribution is \$16.7 million, which is made to the property and business services sector. This indirect linkage between the Precinct and the property and business services sector occurs on two levels. The first is the indirect flow to the Business Services component of the sector, which occurs because the companies that *directly* service the Precinct's supply requirements later spend some of their revenue on Business Services such as accounting and legal services, technical and computer services and marketing and business management services. The second is the indirect contribution to the Property Services component, which occurs because of payments made by Defence employees to real estate agents for renting or leasing properties and homes.

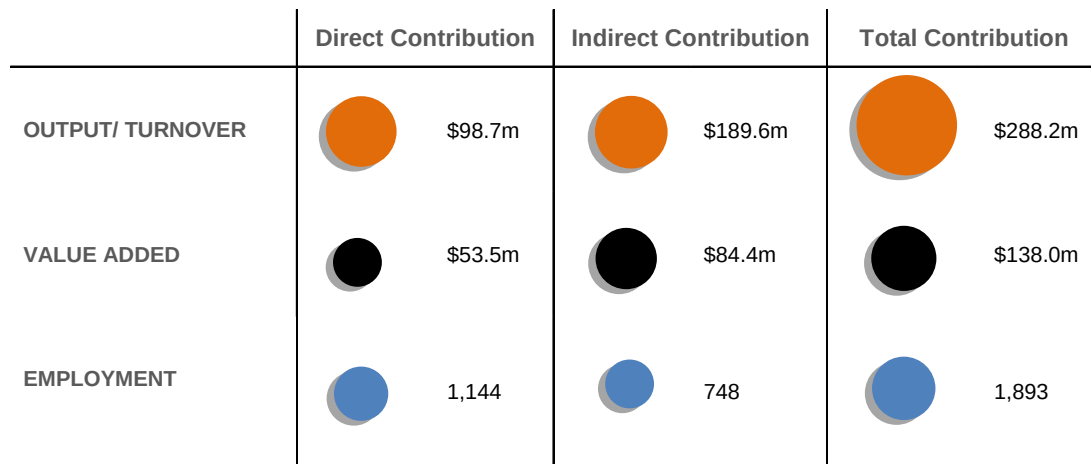
The construction industry received an indirect contribution of \$15.4 million. This indirect relationship occurs mainly as a result of the extra property development, both commercial and residential that is required to support the additional economic activity that is generated in the Cairns Region economy as a result of the presence of the Cairns Defence Precinct.

It is therefore evident that a large proportion of the operating and maintenance expenditure of the Cairns Defence Precinct flows into the region economy.

2.3.4 Economic Contributions to the Queensland State Economy

The modelling was expanded to examine the contribution that the Cairns Defence Precinct made to the Queensland economy as a whole. By widening the economic catchment from the regional to the state level, the scale of imports accounted for in the modelling was reduced. That is, goods and services sourced from outside the Cairns Region, but within the state, were no longer counted as imports, as they would have been in the regional analysis. A Defence precinct may or may not source a large amount of goods and services from its local region, but can be expected to be more highly integrated with its state economy. Therefore, the value of the indirect economic contributions made by the Cairns Defence Precinct increased when its relationship to the Queensland economy was modelled. Figure 9 summarises the economic contributions the Cairns Defence Precinct makes to the greater Queensland economy.

Figure 9. Contributions of the Cairns Defence Precinct to the Queensland State Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Output / Turnover

The effect of broadening the economic catchment of the Precinct to the state level is significant. The indirect contribution of the Cairns Defence Precinct increased to an estimated \$189.6 million, which results in a total economic contribution of \$288.2 million to the Queensland economy. This can also be interpreted as an extra contribution of approximately \$66.6 million which flows beyond the catchment region whilst remaining within the Queensland economy.

Value Added and Employment

In 2008, the Cairns Defence Precinct directly contributed \$53.5 million to the value added component (profits and wages) of the Queensland economy. With an indirect contribution of approximately \$84.4 million, the total contribution to the value added component of the Queensland economy is approximately \$138.0 million.

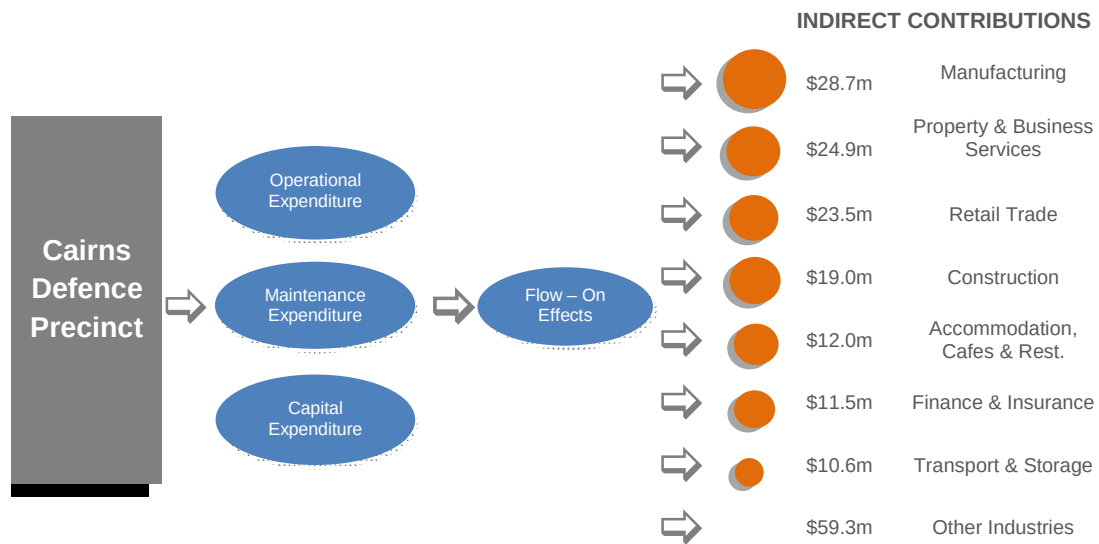
Furthermore, at the state level, a further 748 FTE jobs are indirectly generated, making the overall contribution to Queensland employment approximately 1,893 FTE jobs. Therefore, for every Defence FTE job in the Cairns Region, another 0.65 of an FTE job is created elsewhere in the Queensland economy.

2.3.5 The Distribution of the Indirect Contributions to the Queensland State Economy

As previously stated, the total indirect contribution of the Cairns Defence Precinct to the Queensland economy is \$189.6m, which is distributed across a range of industries within the state. These indirect relationships are illustrated in Figure 10, which highlights the strongest economic relationships between Queensland industries and the Cairns Defence Precinct⁹.

⁹ Due to rounding, the sum of the indirect contributions by industry sector may not equal the total indirect contributions reported in the previous section.

Figure 10. The Cairns Defence Precinct – The Distribution by Industry Sector of Indirect Contributions to the Queensland State Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

The Cairns Defence Precinct's most significant indirect contribution to the Queensland economy is \$28.7 million which was made to the manufacturing sector. This is followed by the property and business services sector with an indirect contribution of \$24.9 million. The retail trade sector receives the third largest indirect contribution of \$23.5 million. Together these three industries receive 40 per cent of all the indirect contributions made by the Precinct to the Queensland economy.

2.4 Summary of the Economic Contributions to the Cairns Region Economy and Queensland State Economy

Figure 11 summarises the contributions made by the Cairns Defence Precinct to the Cairns Region Economy and the Queensland State Economy.

- The first column summarises the direct contribution the Cairns Defence Precinct makes to the Cairns Region Economy in terms of output/turnover, value added and in terms of employment.
- The second column summarises the in-direct contribution the Cairns Defence Precinct makes to the Cairns Region Economy in terms of output/turnover, value added and in terms of employment.
- The third column highlights the in-direct contributions that flow beyond the Cairns Region to the wider Queensland economy in terms of output/turnover, value added and in terms of employment.
- The last column is the total direct and in-direct contribution the Cairns Defence Precinct makes to the Cairns Region and Queensland economies in terms of output/turnover, value added and in terms of employment.

Figure 11 shows that in terms of output/turnover and employment, 35 per cent of the total indirect contributions generated by the presence of the Cairns Defence Precinct are generated beyond the Cairns Region Economy and in the wider Queensland economy. While in terms of value added, approximately 29 per cent of the total indirect contributions flowed beyond the Region and into the wider Queensland economy.

Figure 11. The Cairns Defence Precinct - Summary of the Economic Contributions to the Cairns Region and the Queensland State Economy

	Direct Contribution	Indirect Contribution to the Cairns Region	Indirect Contribution to the Wider QLD Economy	Total Contribution
OUTPUT/ TURNOVER	 \$98.6m	 \$123.0m	 \$66.6m	 \$288.2m
VALUE ADDED	 \$52.9m	 \$60.0m	 \$25.1m	 \$138.0m
EMPLOYMENT	 1,144	 523	 226	 1,893

Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

3 Oakey Defence Precinct

3.1 An Overview of the Oakey Defence Precinct

3.1.1 Location and Operational Background

For the purposes of this study, the Oakey Defence Precinct includes the following:

- Oakey Army Aviation Centre, and
- Borneo Barracks.

Army Aviation Centre, Oakey

The Army Aviation Centre, Oakey (AACO) is an Australian Army operated airfield located approximately two kilometres north-east of the township of Oakey in a predominantly rural area of South-East Queensland. The AACO occupies an area of approximately 850 hectares and is the home of a number of Army training schools which form part of the Army Aviation Training Centre (AAvntC), including the:

- Army Helicopter School
- School of Army Aviation (SAA)
- RAEME Aircraft Maintenance School; and
- Instructor Training Wing (ITW).

Over 50 aircraft are based at the AACO, including the ARH Tiger, the S-70A Black Hawk, Kiowa Bell 206B-1, visiting RAAF fixed wing aircraft and the Republic of Singapore Air Force (RSAF) Super Puma helicopter. The AACO is the second-busiest military airfield in Australia (in terms of flying activity) and personnel trained at the AACO go on to perform a number of valuable flying roles within Army and the wider Australian Defence Force (ADF).

Borneo Barracks

Borneo Barracks is located at Cabarlah, approximately 20 kilometres north of Toowoomba on the New England Highway. Home to the 7th Signal Regiment and the Defence Force School of Signals - Electronic Warfare Wing, the Base consists of an antennae farm and barracks working, administrative and residential accommodation.

3.1.2 The Oakey Defence Precinct Economic Catchment Region

For ease of data collection and economic modelling purposes, the Oakey Defence Precinct economic catchment region (herein referred to as the *Toowoomba Region*) has been defined by 2006 ABS Census local government areas. This makes it easier to match statistical information with the economic catchments used in this study. The selection of areas to include within the Toowoomba Region was based on assumptions regarding the degree of interaction and influence between the Defence precinct and surrounding areas. These assumptions were confirmed by discussions with Defence. The following former local government areas form the Toowoomba Region:

- Cambooya (S) Local Government Area;
- Clifton (S) Local Government Area;
- Crow's Nest (S) Local Government Area;

- Figure 12.** The Oakey Defence Precinct: location and economic catchment region

3.2 Profile of the Toowoomba region

The purpose of profiling the Toowoomba Region is to provide some contextual understanding about the region in which the Defence precinct operates. This profile provides information about the region as a whole, compared to both Queensland and Australia. The source of all data used in the profile is the ABS Census of Population and Housing, 1996, 2001 and 2006.

3.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

For the periods 1996 to 2001 and 2001 to 2006, population growth rates in the Toowoomba Region were roughly in line with the Australian growth rates. However, during the same periods, the population of the region did not grow as fast as the Queensland population.

This can be broadly explained by the fact that coastal areas have generally been more popular and therefore have driven population growth compared to inland regions. While the Toowoomba Region has some attractions and is classed as the gateway to the Darling Downs, its distance from the coastal areas and major (particularly high value) employment locations could be a reason why population in the Region has not grown as fast as Queensland as a whole.

Table 7. Toowoomba Region - 2006 Population

	Population in 2006	% of Australia's Population
Toowoomba Region	137,078	0.7%
Queensland	4,119,800	20.3%
Australia	20,268,010	

Source: ABS Census of Population and Housing, 2006

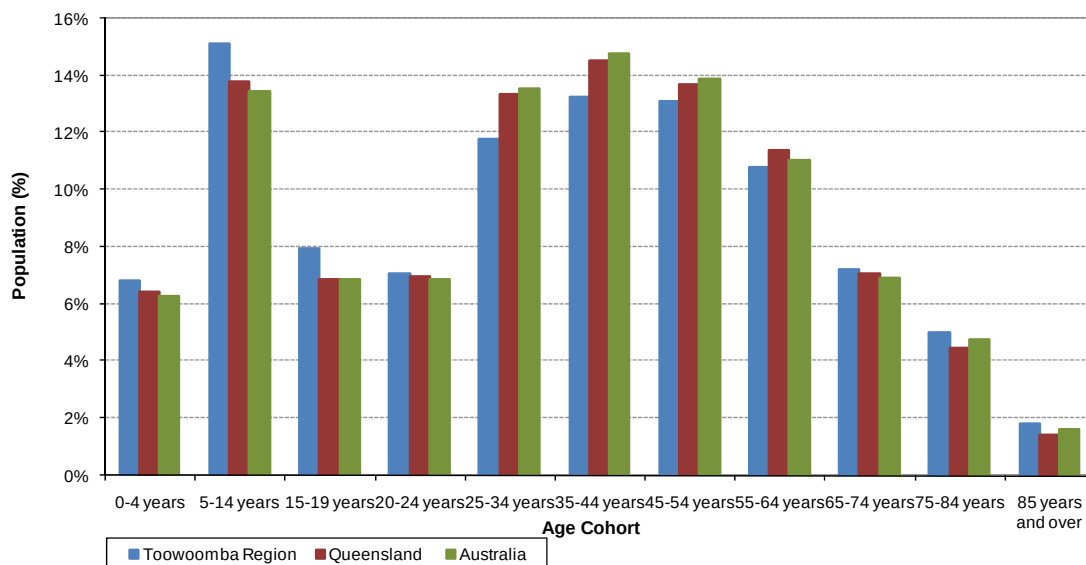
Table 8. Toowoomba Region - Rates of Population Growth, 1996 to 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Toowoomba Region	1.21%	1.26%	1.24%
Queensland	1.73%	2.04%	1.88%
Australia	1.24%	1.11%	1.18%

Source: ABS Census of Population and Housing, 2006

Age Structure

Figure 13 illustrates the relatively older population (above 65 years) in the Toowoomba Region. Although the region had a higher proportion of people aged between 0 and 19 years, they also had relatively fewer people aged between 25 and 64 years, and a greater proportion of people aged over 65 years, compared to both Queensland and Australia.

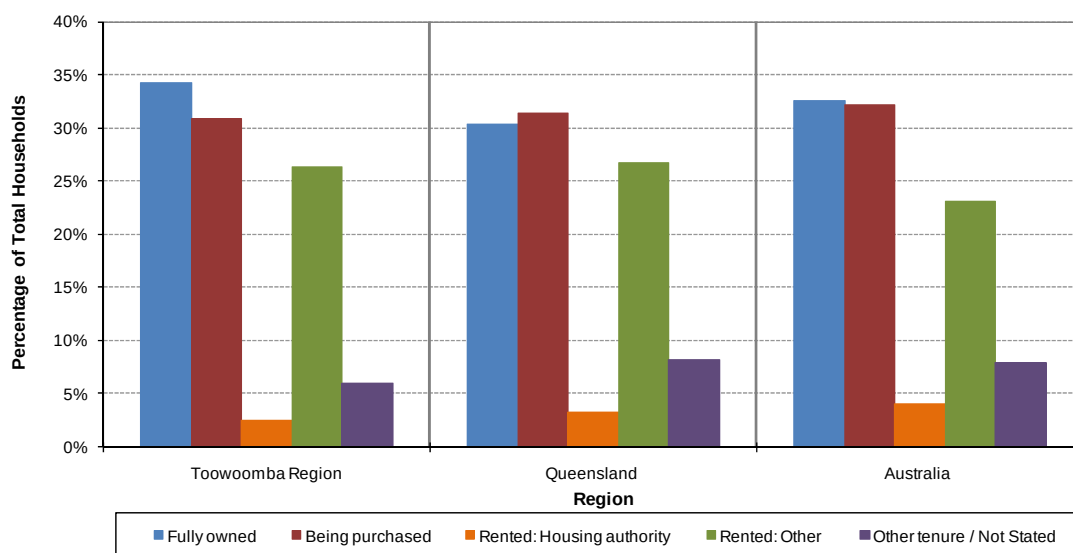
Figure 13. Toowoomba Region - Age of Residents, 2006

Source: ABS Census of Population and Housing, 2006

Household Tenure

Figure 14 shows that a larger proportion of occupied private dwellings in the Toowoomba Region were fully owned compared to Queensland and Australia. Additionally, a smaller proportion of occupied private dwellings were being purchased compared to Queensland and Australia. This reflects the relatively older population in the Toowoomba Region, where it could be assumed that a large proportion of these residents would fully own their own home.

Figure 14. Toowoomba Region - Household Tenure 2006



Source: ABS Census of Population and Housing, 2006

Rental Payments

In 2006, median weekly rental payments in the Toowoomba Region were between \$140 and \$179, while median weekly rental payments for Queensland and Australia were between \$180 and \$224¹⁰. These lower levels of weekly rent in the Toowoomba Region are illustrated in Figure 15. A far greater proportion of households in the Toowoomba Region paid between \$100 and \$224 per week in rent compared to Queensland and Australia. On the other hand, a significantly smaller proportion of households in the Toowoomba Region paid over \$225 per week in rent compared to Queensland and Australia as a whole.

¹⁰ ABS Census of Population and Housing, 2006

Figure 15. Toowoomba Region - Distribution of Rental Payments, 2006

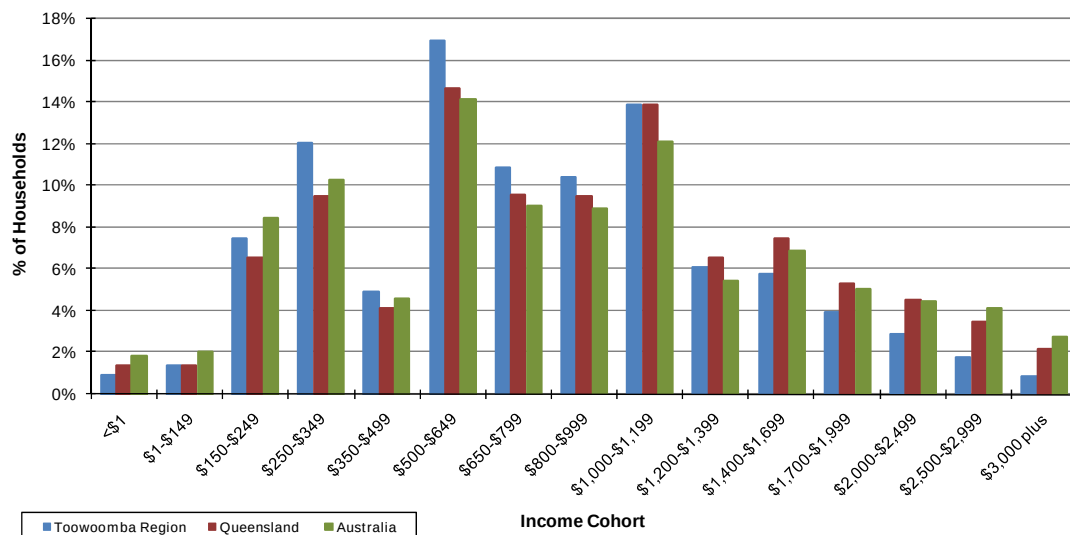


Source: ABS Census of Population and Housing, 2006

Income Profile

The weekly income distributions illustrated in Figure 16 highlights the lower than average weekly incomes in the Toowoomba Region compared to Queensland and Australia. In 2006, a greater proportion of households in the Toowoomba Region earned between \$150 and \$999 per week, while a smaller proportion of households earned \$1,400 or over per week, compared to Queensland and Australia as a whole.

Figure 16. Toowoomba Region - Distribution of Income, 2006



Source: ABS Census of Population and Housing, 2006

3.2.2 Employment and Occupation

Labour Force Participation and Unemployment

In 2006, labour force participation rates in the Toowoomba Region were closely aligned to both Queensland and Australia as a whole.

Table 9. Toowoomba Region - Labour Force Participation, 2006

	Toowoomba Region		Queensland		Australia	
	No.	% of pop	No.	% of pop	No.	% of pop
Total labour force	64,753	60.6%	1,915,947	61.8%	9,607,987	60.4%
Not in the labour force	36,596	34.3%	971,828	31.4%	5,271,120	33.1%
Not Stated	5,461	5.1%	210,220	6.8%	1,038,973	6.5%
Total	106,810		3,097,995		15,918,080	

Source: ABS Census of Population and Housing, 2006

Table 10 illustrates that the unemployment rate was slightly lower in the Toowoomba Region compared Queensland and Australia. This unemployment rate (4.5 per cent) is relatively low in recent historical terms.

Table 10. Toowoomba Region – Unemployment, 2006

	Toowoomba Region		Queensland		Australia	
	No.	% of total labour force	No.	% of total labour force	No.	% of total labour force
Total Employed	61,845	95.5%	1,824,997	95.3%	9,104,185	94.8%
Total Unemployed	2,908	4.5%	90,950	4.7%	503,802	5.2%

Source: ABS Census of Population and Housing, 2006

Occupations

The occupational profile of the Toowoomba Region was similar to Queensland and Australia as a whole. However, a much larger proportion of the workforce in the Toowoomba Region were employed as managers, while a smaller proportion of the workforce were employed as professionals, compared to both Queensland and Australia.

Table 11. Toowoomba Region - Occupational Profile, 2006

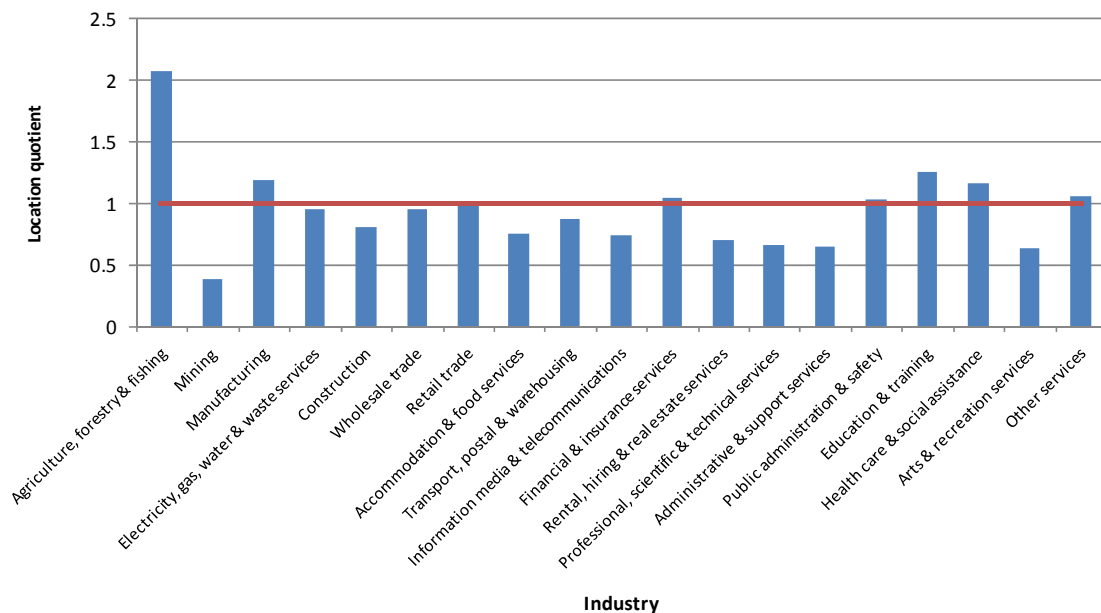
	Toowoomba Region		Queensland		Australia	
	No.	% of total employment	No.	% of total employment	No.	% of total employment
Managers	4,763	19%	225,693	12%	1,202,261	13%
Professionals	3,238	13%	312,865	17%	1,806,012	20%
Technicians & trades workers	3,815	15%	280,342	15%	1,309,255	14%
Community & personal service workers	1,864	8%	166,400	9%	801,914	9%
Clerical & administrative workers	3,032	12%	269,198	15%	1,365,810	15%
Sales workers	1,958	8%	189,038	10%	896,201	10%
Machinery operators & drivers	1,968	8%	132,114	7%	604,616	7%
Labourers	3,693	15%	217,251	12%	952,517	10%
Inadequately described/Not stated	382	2%	32,095	2%	165,598	2%
Total	24,713		1,824,996		9,104,184	

Source: ABS Census of Population and Housing, 2006

3.2.3 Industry Profile

Figure 17 illustrates the 'location quotients' (LQ) for each industry sector in the Toowoomba Region. Put simply, an LQ greater than 1 indicates that employment in an industry is relatively concentrated (and therefore strong) in the region, compared to Queensland averages. Figure 16 therefore highlights which industries in the Toowoomba Region are significant contributors to the greater Queensland economy.

Figure 17. Location Quotients for the Toowoomba Region, 2006



Source: ABS Census of Population and Housing, 2006

The above Figure also illustrates that the Toowoomba Region is a significant provider of agriculture, forestry and fishing– both within and beyond the catchment region. This reflects the Region's competitive advantages in farming. The Darling Downs is often described as the one of the major 'food bowls' in Australia. The landscape is dominated by pastures of many different vegetables, legumes and other crops including cotton, wheat, barley and sorghum. There are also farms with beef and dairy cattle, pigs, sheep and lamb stock.

Interestingly, government administration and Defence (public administration and safety) is relatively un-concentrated in the region. However, this does not mean that the Defence precinct's presence is insignificant, but reflects the fact that the economy of the Toowoomba Region is quite large (compared to the size of the Defence precinct) and that the region probably does not provide many other government administration and Defence services.

3.3 The Economic Contributions of the Oakey Defence Precinct

3.3.1 Summary of Key Economic Data

The following table summarises key economic data for Oakey Defence Precinct. The economic modelling for the Precinct uses much of this data as a foundation for further analysis.

Table 12. Summary of Key Data – Oakey Defence Precinct, 2008

Indicator	2008/09 Financial Year
Permanent Staff No.	1,025
Non-Permanent Staff No.	52
Full Time Equivalent (FTE)	1,047
Salaries (\$) 08/09	58,478,083
Contractor No (Approx)	42
Gross Replacement Value (\$,000) 08/09 (i.e. land, buildings and infrastructure)	463,977,000
Capital Works (\$) 08/09	8,900,000
Defence Housing (\$) 08/09	11,180
Private Rental Assistance (\$) 08/09	89,180
Maintenance/FACOPS (\$) 08/09	16,620,630
NOD/Operational Costs (\$) 08/09	22,013,954

Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2010

3.3.2 Economic Contributions to the Toowoomba Region

Using key economic information about the Oakey Defence Precinct and a regional input-output model for the Toowoomba Region, the economic modelling identifies interactions between the Oakey Defence Precinct and all industry sectors in the economic catchment region.

The model estimates that the total contribution that the Oakey Defence Precinct makes to the Toowoomba Region economy is the sum of:

- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the precinct's activities. This is best thought of as all economic activity that has a direct relationship with the precinct (for example, the value of precinct employment, supply contracts, etc); and
- **Indirect contributions¹¹** - which result from the additional output, value added and employment generated in the catchment region due to the presence of the precinct. Examples of indirect contributions include housing and retail expenditure in the catchment region that occur because of the presence of the precinct (that is, precinct employees spending their wages on home purchases, rentals and shopping).

¹¹ It is important to note that the flow-on contribution may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

Figure 18 summarises the economic contributions made by the Oakey Defence Precinct to the broader Toowoomba Region economy.

Figure 18. The Contributions of the Oakey Defence Precinct to the Toowoomba Region to Economy, 2008

	Direct Contribution	Indirect Contribution	Total Contribution
OUTPUT/ TURNOVER	 \$106.1m	 \$111.0m	 \$217.1m
VALUE ADDED	 \$47.1m	 \$51.4m	 \$98.4m
EMPLOYMENT	 1,047	 469	 1,516

Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Output / Turnover

The output / turnover of the Oakey Defence precinct is estimated to be \$106.1 million in 2008. The modelling calculates that the multiplier for the economic relationship between the Defence Precinct and the Toowoomba Region is 2.05. That is, for every \$1 spent, a further \$1.05 of economic value was created in the regional economy. As a result, the direct contribution of \$106.1 million made by the precinct, leads to an indirect contribution of an additional \$111.0 million worth of output in the Toowoomba Region. Therefore, the total contribution of output / turnover is approximately \$217.1 million.

Value Added

Value added is a measure of 'net output' and is a better indicator of the economic value generated by a Defence precinct. Whereas output relates to the overall size of the precinct's annual expenditure, value added removes the double counting associated with the output measure. Another way to look at it is that value added is equivalent to a project or company's profits and wages (i.e. output minus expenditure on all inputs except wages and profits).

The modelling estimates that in 2008, the direct contribution made to the value added component of the Toowoomba Region economy was \$47.1 million, or 22 per cent of direct output. The indirect contribution to the value added component of the Toowoomba Region economy is estimated to be \$51.4 million. Together, these two contributions account for \$112.9 million of the total value added component of the Toowoomba Region economy.

Employment

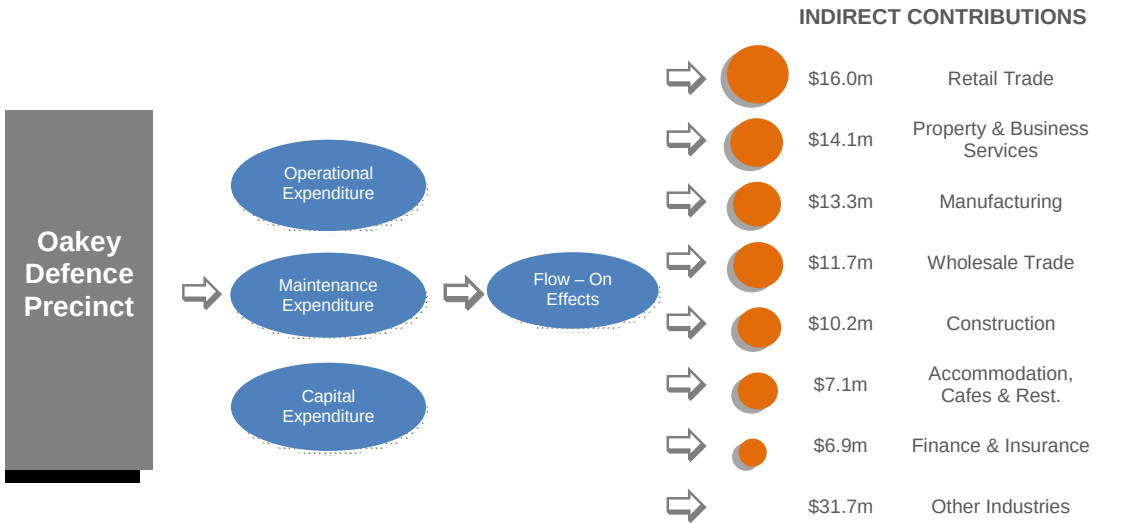
As previously stated, the direct contribution to employment is simply the number of FTE staff the Defence precinct employs (permanent and non-permanent, excluding contractors). In 2008, the Oakey Defence Precinct directly employed 1,047 FTE staff. The modelling estimates that there are

an additional 469 indirect jobs that are created as a result of the presence of the Precinct in the Toowoomba Region. The total employment created by the Oakey Defence Precinct is therefore 1,516 FTE jobs. Therefore, for every Defence FTE job in the Region, another 0.45 of an FTE job is created elsewhere in Cairns region economy.

3.3.3 The Distribution of the Indirect Contributions to the Toowoomba Region

The indirect contribution of the Oakey Defence Precinct is more or less counted as the additional value created by the presence of the Precinct in the Toowoomba Region. This indirect contribution is distributed across other industries within the Defence Precinct's supply chain in the region. Figure 19 summarises the distribution of the Oakey Defence Precinct's indirect contributions across various industries in the catchment region.¹²

Figure 19. The Oakey Defence Precinct – The Distribution by Industry Sector of Indirect Contributions to the Toowoomba Region Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

The most significant indirect contribution made by the Oakey Defence Precinct to industries in the Toowoomba Region was \$16.0 million to the retail trade sector. As previously stated, this indirect linkage between a Defence precinct and the retail trade sector is not uncommon, largely because Defence employees spend some of their wages on retail trade, which includes store-based retailing such as, food and fuel retailing, hardware, building and garden supplies, and supermarkets and department stores.

Another significant indirect contribution was made to the property and business services sector (\$14.1 million). Again as previously stated, this indirect linkage between the Precinct and the property and business services sector occurs on two levels. The first is the indirect flow to the

¹² Due to rounding, the sum of the indirect contributions by industry sector may not equal the total indirect contributions reported in the previous section.

Business Services component of the sector, which occurs because the companies that *directly* service the Precinct's supply requirements later spend some of their revenue on Business Services such as accounting and legal services, technical and computer services and marketing and business management services. The second is the indirect contribution to the Property Services component, which occurs because of payments made by Defence employees to real estate agents for renting or leasing properties and homes.

The manufacturing industry also received a large indirect contribution of \$13.3 million. This indirect relationship occurs mainly as a result of the extra manufacturing (both agricultural related and non-agricultural related) that is required in the Cairns Region economy to support the extra economic activity generated by the Cairns Defence Precinct.

3.3.4 Economic Contributions to the Queensland State Economy

The modelling was expanded to examine the contribution that the Oakey Defence Precinct made to the Queensland economy as a whole. By widening the Precinct's economic catchment from the regional to the state level, the scale of imports accounted for in the modelling was reduced. That is, goods and services sourced from outside the Toowoomba Region but within the state were no longer counted as imports, as they would have been in the regional analysis. A Defence precinct may or may not source a large amount of goods and services from its local region, but can be expected to be more highly integrated with its state economy. Therefore, the value of the indirect economic contributions made by the Oakey Defence Precinct increased when its relationship to the Queensland economy was modelled. Figure 20 summarises the economic contributions the Oakey Defence Precinct makes to the greater Queensland economy.

Figure 20. Contributions of the Oakey Defence Precinct to the Queensland State Economy, 2008

	Direct Contribution	Indirect Contribution	Total Contribution
OUTPUT/ TURNOVER	 \$106.1m	 \$205.7m	 \$311.8m
VALUE ADDED	 \$53.5m	 \$92.3m	 \$145.8m
EMPLOYMENT	 1,047	 812	 1,859

Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Output / Turnover

The effect of broadening the economic catchment of the precinct to the state level is significant. This results in a substantial increase in the indirect contributions created by the presence of the

Oakey Defence Precinct (\$205.7 million) and suggests that approximately \$94.6 million flowed beyond the Toowoomba Region and into the broader Queensland economy.

Value Added and Employment

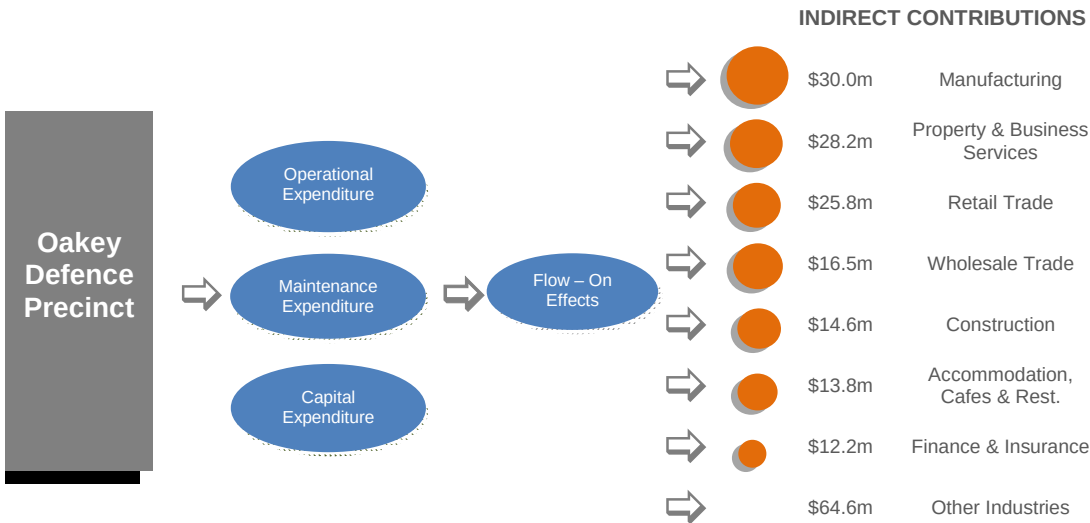
The Oakey Defence Precinct directly contributes \$53.5 million, or 50 per cent of its direct output, to the value added component (profits and wages) of the Queensland economy. Together, with the indirect contribution of \$92.3 million generated by the presence of the Precinct, contribution of \$145.8 million is made to the value added component of the Queensland economy.

The Oakey Defence Precinct directly contributes 1,047 FTE jobs. As a result, the indirect employment generated at the state level is 812 FTE jobs. Therefore, for every Defence FTE job in the Cairns Region, another 0.78 of an FTE job is created elsewhere in the Queensland economy.

3.3.5 The Distribution of the Indirect Contributions to the Queensland State Economy

The indirect contribution to the Queensland economy generated by the presence of the Oakey Defence Precinct is estimated to be \$205.7 million. This is distributed across a range of industries within the state. These indirect relationships are illustrated in Figure 21, which highlights the strongest economic relationships between Queensland industries and the Oakey Defence Precinct¹³.

Figure 21. The Oakey Defence Precinct – The Distribution by Industry Sector of Indirect Contributions to the Queensland State Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

In 2008, the largest indirect contribution from the Oakey Defence Precinct to Queensland industry sectors is \$30.0 million, which is made to the manufacturing sector. This is followed by \$28.2 million to the property and business services sector. The retail trade sector receives the third

¹³ Due to rounding, the sum of the indirect contributions by industry sector may not equal the total indirect contributions reported in the previous section.

highest indirect contribution of \$23.5 million. Together these three industries receive 41 per cent of all indirect contributions made by the Precinct to the Queensland economy.

3.4 Summary of the Economic Contributions to the Toowoomba Region Economy and Queensland State Economy

The following table summarises the contributions made by the Oakey Defence Precinct to the Toowoomba Region Economy and the Queensland State Economy.

- The first column summarises the direct contribution the Oakey Defence Precinct makes to the Toowoomba Region Economy in terms of output/turnover, value added and in terms of employment.
- The second column summarises the in-direct contribution the Oakey Defence Precinct makes to the Cairns Region Economy in terms of output/turnover, value added and in terms of employment.
- The third column highlights the indirect contributions that flow beyond the Toowoomba Region to the wider Queensland economy in terms of output/turnover, value added and in terms of employment.
- The last column is the total direct and in-direct contribution the Oakey Defence Precinct makes to the Toowoomba Region and Queensland economies in terms of output/turnover, value added and in terms of employment.

Figure 22 shows that in terms of output/turnover, value added and employment, approximately 46 per cent of the total indirect contributions generated by the presence of the Oakey Defence Precinct flow beyond the Toowoomba Region into the wider Queensland economy.

Figure 22. The Oakey Defence Precinct - Summary of the Economic Contributions to the Toowoomba Region and Queensland State Economy

	Direct Contribution	Indirect Contribution to the Toowoomba Region	Indirect Contribution to the Wider QLD Economy	Total Contribution
OUTPUT/ TURNOVER	 \$106.1m	 \$111.0m	 \$94.7m	 \$311.8m
VALUE ADDED	 \$47.1m	 \$51.4m	 \$47.3m	 \$145.8m
EMPLOYMENT	 1,047	 469	 343	 1,859

Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

4 Canungra Defence Precinct

4.1 An Overview of the Canungra Defence Precinct

4.1.1 Location and Operational Background

Canungra Military Area

The Canungra Military Area (CMA) is located within the Gold Coast hinterland approximately 90km south of Brisbane. Covering a total area of approximately 6,000 hectares, the CMA dates back to World War II when the base was established to train soldiers in jungle warfare and comprises the Kokoda Barracks and the Canungra Training Area.

Kokoda Barracks is sited across three ridges and includes the main training, administrative and accommodation facilities. Kokoda Barracks was the subject of a major redevelopment between 2005-2008 with over \$87 million being spent to improve working and residential accommodation.

The Canungra Training Area consists primarily of field-training areas and field-firing ranges located within a steep, heavily timbered coastal range. The training area covers an area of approximately 6,000 hectares and supports a diverse array of flora and fauna species.

With over 8,000 personnel passing through it is estimated that every soldier from Corporal above will pass through the CMA at least once during their career. Defence functions at the CMA include:

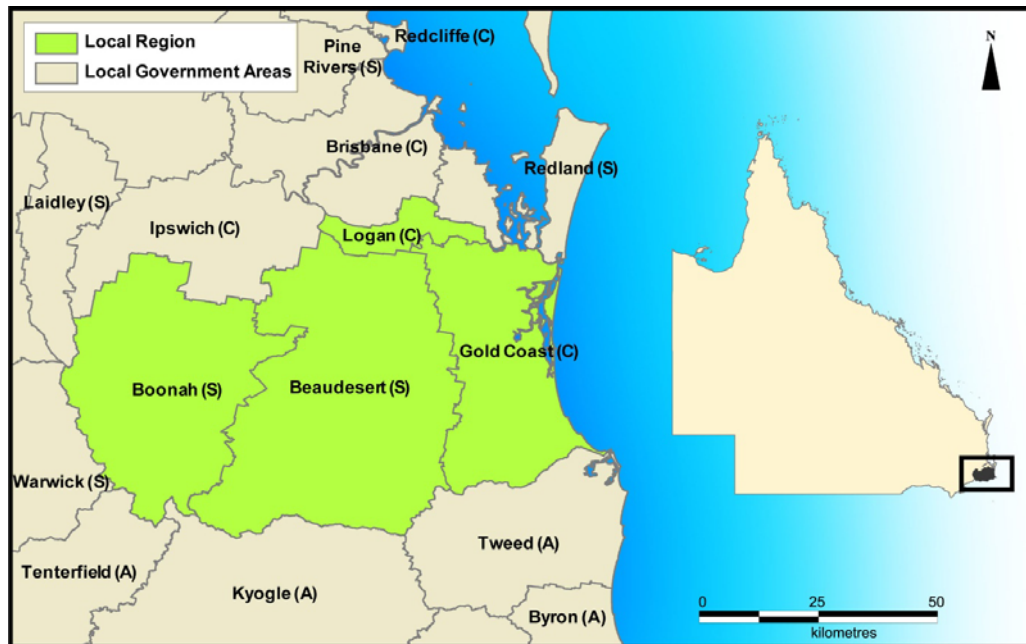
- HQ Land Warfare Centre (LWC);
- Officer Training Wing, LWC;
- WO and NCO Academy; and
- Defence Intelligence Training Centre.

4.1.2 The Canungra Defence Precinct Economic Catchment Region

For ease of data collection and economic modelling purposes, the Canungra Defence Precinct economic catchment region (herein referred to as the *Canungra Region*) has been defined by 2006 ABS Census local government areas. This makes it easier to match statistical information with the economic catchments used in this study. The selection of areas to include within the Canungra Region was based on assumptions on the degree of interaction and influence between the Defence precinct and surrounding areas. These assumptions were confirmed by discussions with Defence. The following former local government areas form the Canungra Region:

- Beaudesert (S) Local Government Area;
- Boonah (S) Local Government Area;
- Gold Coast (C) Local Government Area; and
- Logan (C) Local Government Area.

Figure 23. The Canungra Defence Precinct: location and economic catchment region



4.2 Profile of the Canungra region

The purpose of profiling the Canungra Region is to provide some contextual understanding about the region in which the Defence precinct operates. This profile provides information about the region as a whole, compared to both Queensland and Australia. The source of all data used in the profile is the ABS Census of Population and Housing, 1996, 2001 and 2006.

4.2.1 Population & Housing Characteristics and Trends

Overall Population Trends

The population of the Canungra Region increased substantially from 1996-2006, exceeding both the Queensland and Australian growth rates. The Canungra Region also has a significantly larger population than the other regions included in this study.

In 2006, the Region also made up approximately 20 per cent of the total population of Queensland, and was therefore a major driver to the overall rates of population growth for Queensland as whole. The higher than average rates of population growth for the Canungra Region could be due to a number of factors including, net migration from southern states such as New South Wales and Victoria, the coastal attractiveness of the Region and high value employment compared to other parts of Queensland.

Table 13. Canungra Region - 2006 Population

	Population in 2006	% of Australia's Population
Canungra	704,940	3.5%
Queensland	4,119,800	20.3%
Australia	20,268,010	

Source: ABS Census of Population and Housing, 2006

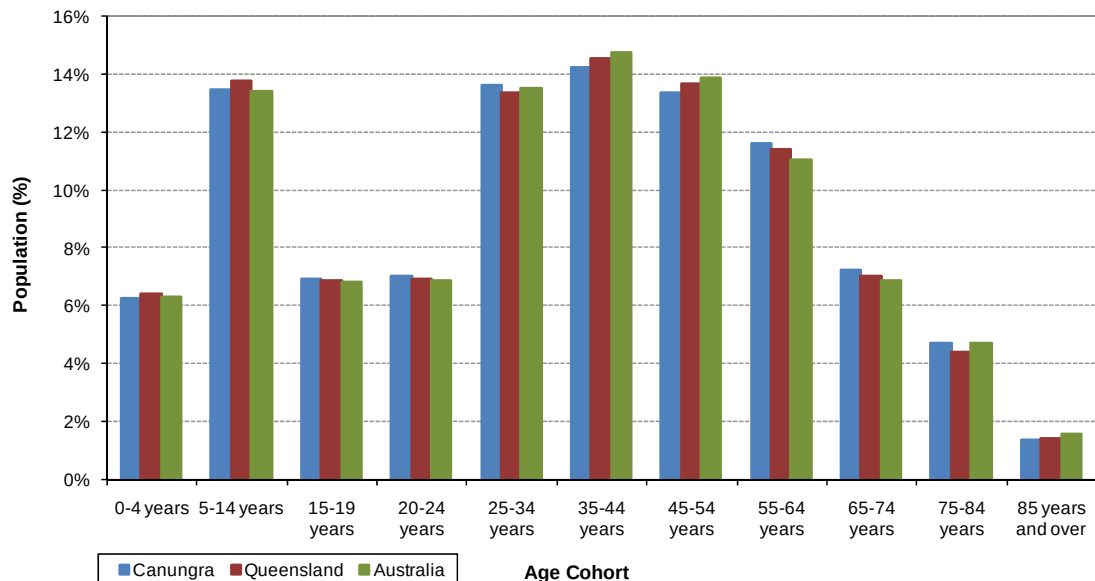
Table 14. Canungra Region - Rates of Population Growth, 1996 to 2006

	1996 to 2001	2001 to 2006	1996 to 2006
Canungra	2.56%	2.25%	2.41%
Queensland	1.73%	2.04%	1.88%
Australia	1.24%	1.11%	1.18%

Source: ABS Census of Population and Housing, 2006

Age Structure

Figure 24 shows that the age distribution of residents in the Canungra Region closely matches that of Queensland and Australia as a whole.

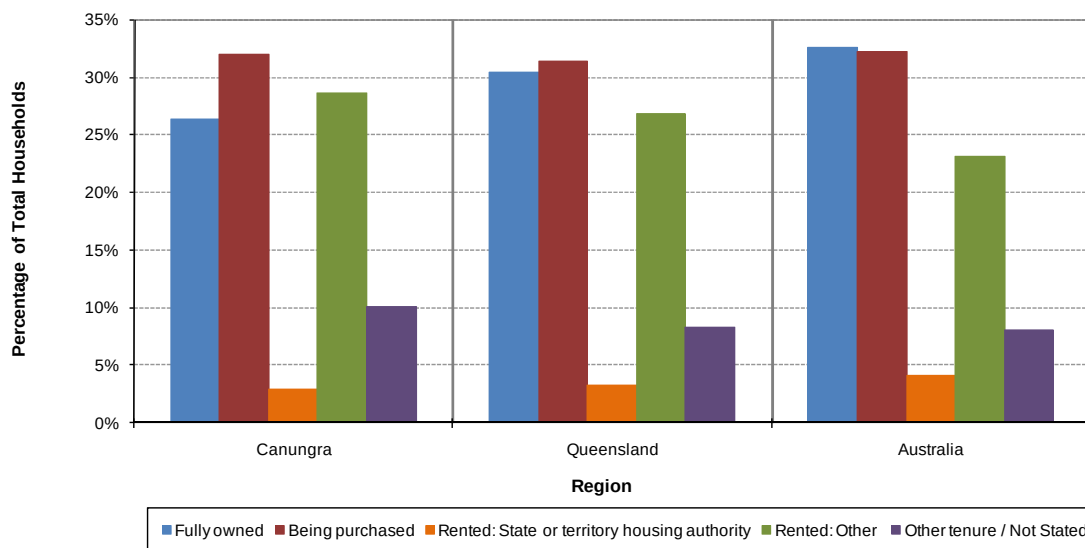
Figure 24. Canungra Region - Age of Residents, 2006

Source: ABS Census of Population and Housing, 2006

Household Tenure

A larger proportion of occupied private dwellings in the Canungra Region were either being rented or being purchased or compared to Queensland and Australia. On the other hand, a smaller proportion of homes were fully owned compared to Queensland and Australia.

Figure 25. Canungra Region - Household Tenure 2006



Source: ABS Census of Population and Housing, 2006

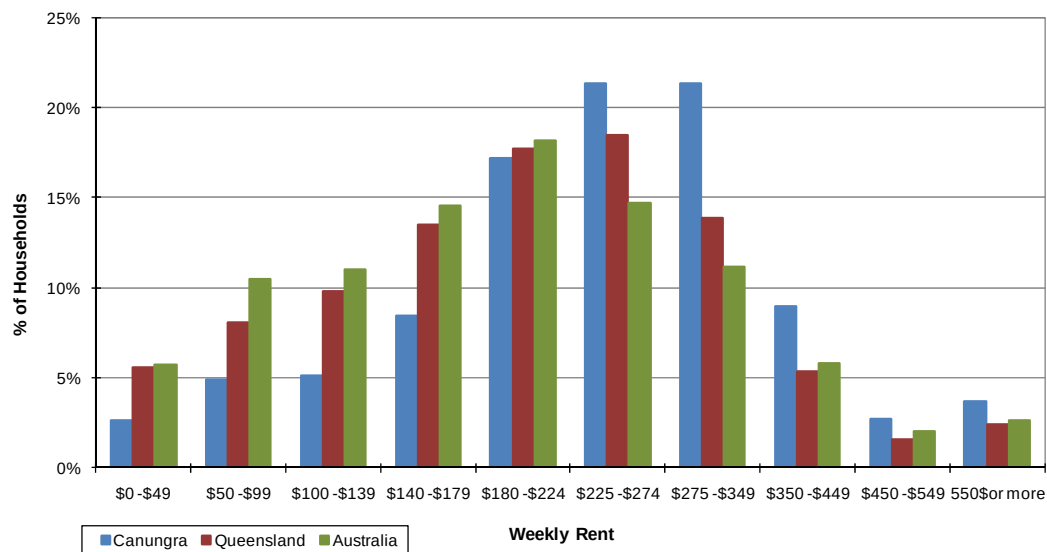
Rental Payments

In 2006, households from the Canungra Region paid higher levels of weekly rent compared to Queensland and Australia as a whole. Median weekly rental payments in the Canungra Region were between \$225 and \$274, while median weekly rental payments for Queensland and Australia were between \$180 and \$224¹⁴.

Figure 26 shows that a far greater proportion of households in the Canungra Region paid over \$225 weekly rent and that a far smaller proportion paid less than \$244 weekly rent compared to both Queensland and Australia.

¹⁴ ABS Census of Population and Housing, 2006

Figure 26. Canungra Region - Distribution of Rental Payments, 2006

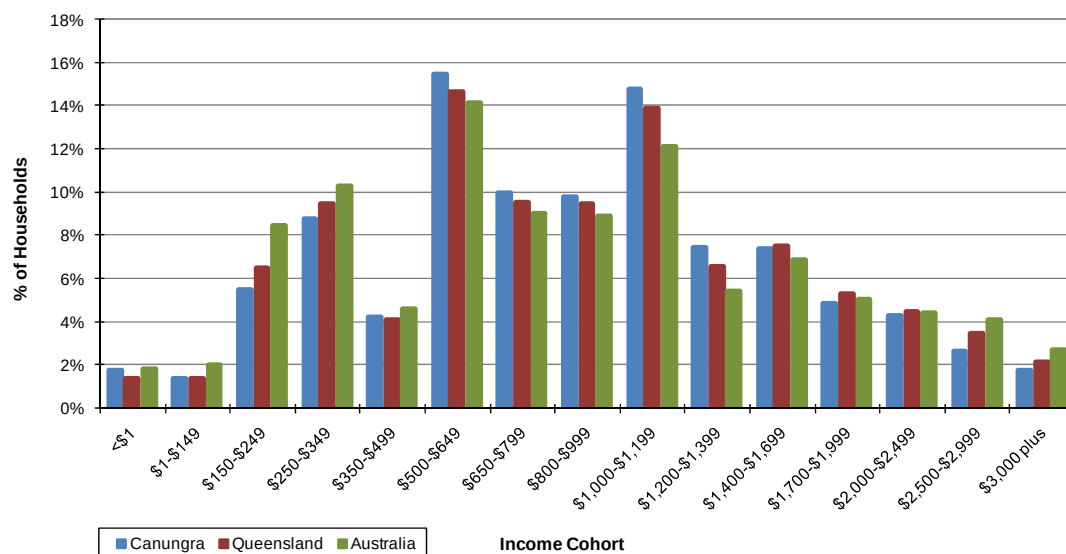


Source: ABS Census of Population and Housing, 2006

Income Profile

The distribution of household income in the Canungra Region closely matches that of Queensland and Australia as a whole. Figure 27 shows that a slightly greater proportion of households from the Canungra Region earned between \$350 and \$1,399 per week, and a slightly smaller proportion earned less than \$349 per week, compared to both Queensland and Australia.

Figure 27. Canungra Region - Distribution of Income, 2006



Source: ABS Census of Population and Housing, 2006

4.2.2 Employment and Occupation

Labour Force Participation and Unemployment

Table 15 shows that in 2006, labour force participation rates in the Canungra Region were similar to both Queensland and Australia as a whole.

Table 15. Canungra Region - Labour Force Participation, 2006

	Canungra		Queensland		Australia	
	No.	% of pop	No.	% of pop	No.	% of pop
Total labour force	319,817	61.2%	1,915,947	61.8%	9,607,987	60.4%
Not in the labour force	161,111	30.8%	971,828	31.4%	5,271,120	33.1%
Not stated	41,852	8.0%	210,220	6.8%	1,038,973	6.5%
Total	522,780		3,097,995		15,918,080	

Source: ABS Census of Population and Housing, 2006

Unemployment was slightly higher in the Canungra Region compared to Queensland and Australia. However, this rate is still relatively low in recent historical terms.

Table 16. Canungra Region – Unemployment, 2006

	Canungra		Queensland		Australia	
	No.	% of total labour force	No.	% of total labour force	No.	% of total labour force
Total Employed	302,503	94.6%	1,824,997	95.3%	9,104,185	94.8%
Total Unemployed	17,314	5.4%	90,950	4.7%	503,802	5.2%

Source: ABS Census of Population and Housing, 2006

Occupations

The occupational profile of the Canungra Region was similar to Queensland and Australia as a whole. A slightly larger proportion of the workforce in the Canungra Region were employed as labours and technicians and trades workers, while a smaller proportion of the workforce were employed as professionals, compared to both Queensland and Australia. This suggests that knowledge intensive industries are less concentrated in the Region.

Table 17. Canungra Region - Occupational Profile, 2006

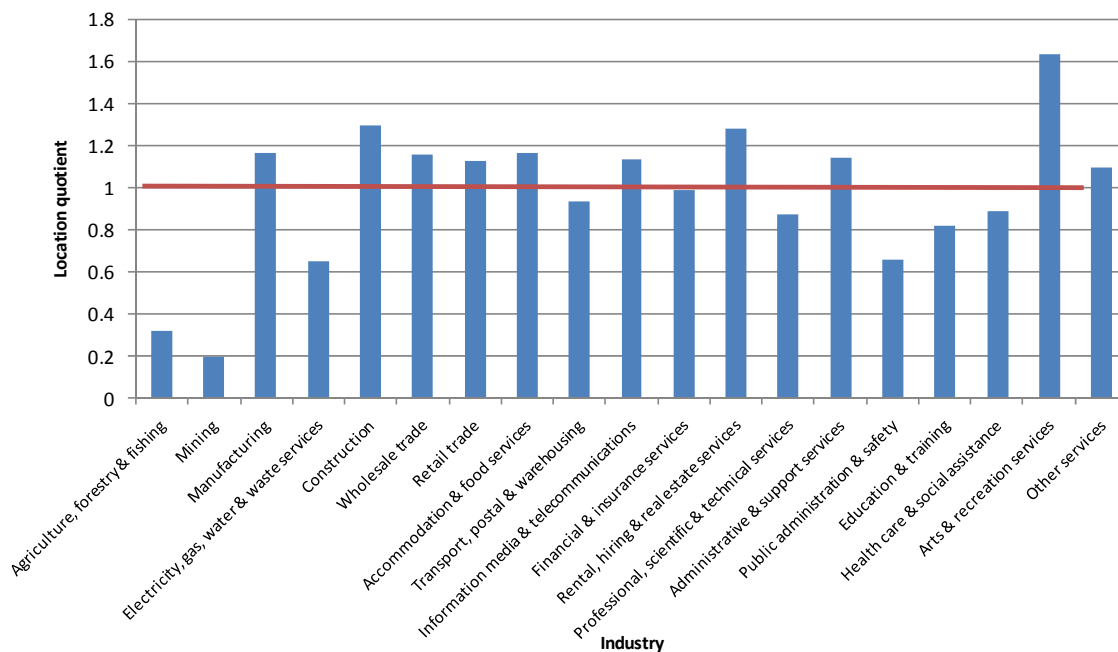
	Canungra		Queensland		Australia	
	No.	% of total employment	No.	% of total employment	No.	% of total employment
Managers	38,321	12%	225,693	12%	1,202,261	13%
Professionals	45,402	14%	312,865	17%	1,806,012	20%
Technicians & trades workers	56,548	17%	280,342	15%	1,309,255	14%
Community & personal service workers	31,004	9%	166,400	9%	801,914	9%
Clerical & administrative workers	50,034	15%	269,198	15%	1,365,810	15%
Sales workers	40,657	12%	189,038	10%	896,201	10%
Machinery operators & drivers	23,867	7%	132,114	7%	604,616	7%
Labourers	39,944	12%	217,251	12%	952,517	10%
Inadequately described/Not stated	6,220	2%	32,095	2%	165,598	2%
Total	331,997		1,824,996		9,104,184	

Source: ABS Census of Population and Housing, 2006

4.2.3 Industry Profile

Figure 28 illustrates the 'location quotients' (LQ) for each industry sector in the Canungra Region. Put simply, an LQ greater than 1 indicates that employment in an industry is relatively concentrated (and therefore strong) in the region, compared to Queensland averages. Figure 28 therefore highlights which industries in the Canungra Region are significant contributors to the greater Queensland economy.

Figure 28. Location Quotients for the Canungra Region, 2006



Source: ABS Census of Population and Housing, 2006

The analysis identifies that the Canungra Region was a significant provider of arts and recreation services— both within and beyond the catchment region. This reflects the extent that the tourism industry contributes to employment on the Gold Coast, the Canungra Region and Queensland as a whole.

Construction and rental, hiring and real estate services industries are also concentrated in the Region compared to Queensland as a whole.

Due to the level of urbanisation in the Canungra Region, employment in the mining and agriculture, forestry and fishing industries were below Queensland averages.

4.3 The Economic Contributions of the Canungra Defence Precinct

4.3.1 Summary of Key Economic Data

The following table summarises key economic data for the Canungra Defence Precinct. The economic modelling for the Precinct uses much of this data as a foundation for further analysis.

Table 18. Summary of Key Data – Canungra Defence Precinct, 2008

Indicator	2008 / 09 Financial Year
Permanent Staff No.	280
Non-Permanent Staff No.	51
Full Time Equivalent (FTE)	297
Salaries (\$) 08 / 09	14,786,543
Contractor No (Approx)	42
Gross Replacement Value (\$) 08 / 09 (i.e. land, buildings and infrastructure)	396,077,000
Capital Works (\$) 08 / 09	nil
Defence Housing (\$) 08 / 09	nil
Private Rental Assistance (\$) 08 / 09	nil
Maintenance / FACOPS (\$) 08 / 09	11,226,162
NOD / Operational Costs (\$) 08 / 09	4,856,241

Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2010

4.3.2 Economic Contributions to the Canungra Region

Using the key economic information about the Canungra Defence Precinct and a regional input-output model for the Canungra Region, the economic modelling identifies interactions between the Canungra Defence Precinct and all industry sectors in the economic catchment region.

The model estimates that the total contribution that the Canungra Defence Precinct makes to the Canungra Region economy is the sum of:

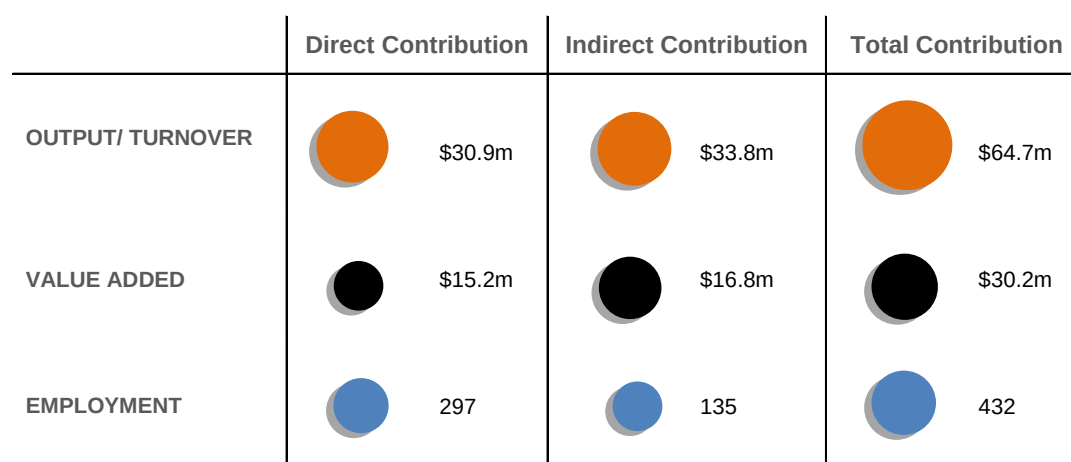
- **Direct contributions** - in terms of the output, value added and employment that arises directly because of the precinct's activities. This is best thought of as all economic activity that has a direct relationship with the precinct (for example, the value of on-base employment, supply contracts, etc); and
- **Indirect contributions¹⁵** - which result from the additional output, value added and employment generated in the catchment region due to the presence of the precinct. Examples of indirect contributions include housing and retail expenditure in the catchment region that

¹⁵ It is important to note that the flow-on contribution may not be realised immediately and refers to the generation of output, value added or employment in years to come. However, it is expected that it would primarily be realised in the earlier years and diminish after that.

occur because of the presence of the precinct (that is, base employees spending their wages on home purchases, rentals and shopping).

Figure 29 illustrates the economic contribution made by the Canungra Defence Precinct to the Canungra Region economy.

Figure 29. The Contributions of the Canungra Defence Precinct to the Canungra Region to Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Output / Turnover

The direct output / turnover of the Canungra Defence Precinct is approximately \$30.9 million. The modelling estimates that the multiplier for the economic relationship between the Defence Precinct and the Canungra Region is 2.09 (i.e. for every \$1 spent a further \$1.09 of economic value was created in the regional economy). This economic activity leads to an indirect contribution of \$33.8 million of output across all industries within the region. The total of the direct and indirect contributions to the Canungra Region economy is approximately \$64.7 million.

Value Added

Value added is a measure of 'net output' and is a better indicator of the economic value generated by a Defence precinct. Whereas output relates to the overall size of the precinct's annual expenditure, value added removes the double counting associated with the output measure. Another way to look at it is that value added is equivalent to a project or company's profits and wages (i.e. output minus expenditure on all inputs except wages and profits).

The modelling estimates that the direct contribution to the value added component of the Canungra Region economy is approximately \$15.2 million, or 49 per cent of the Precinct's total direct output. The indirect contribution to the value added component in the catchment region is \$16.8 million. Together these two components (direct and indirect) account for \$30.2 million of the total value added component in the Canungra Region economy.

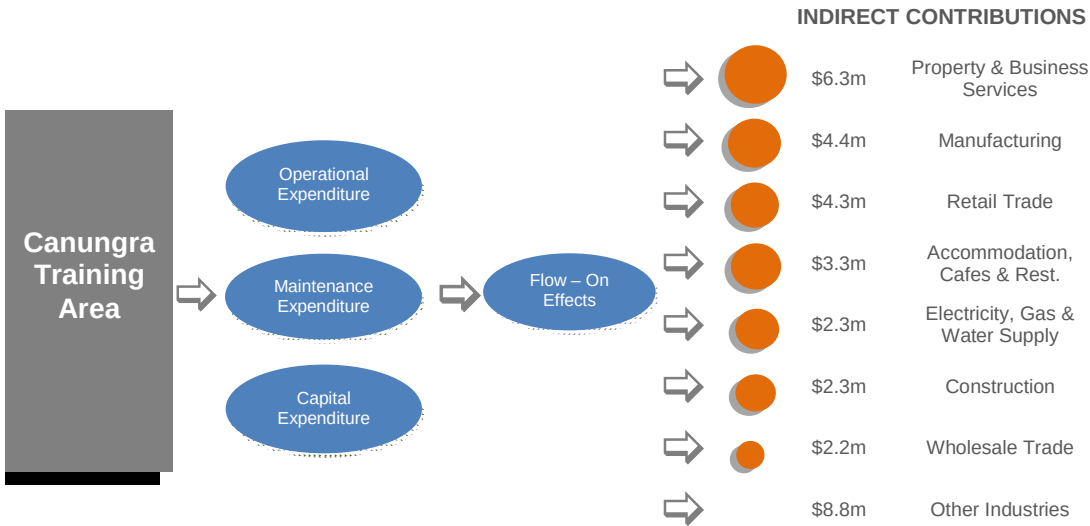
Employment

The modelling estimates the direct and indirect contributions made by the Canungra Defence Precinct to employment in the Canungra Region. In 2008, the Canungra Defence Precinct directly employed 297 FTE staff. Indirectly, there are an additional 135 jobs created because of the presence of the Precinct. Therefore, the total employment created in the Canungra Region by the presence of the Defence Precinct is approximately 432 FTE jobs. This means that for every Defence FTE job in the Region, another 0.45 of an FTE job is created elsewhere in Region.

4.3.3 The Distribution of the Indirect Contributions to the Canungra Region

The indirect contribution of the Canungra Defence Precinct is more or less counted as the additional value created as a result of the presence of the Precinct in the Canungra Region. This indirect contribution is also distributed across other industries within the region. Therefore, Figure 30 highlights the industries with key economic relationships to the Canungra Defence Precinct¹⁶.

Figure 30. The Canungra Defence Precinct – Distribution by Industry Sector of Indirect Contributions to the Canungra Region Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

The most significant indirect contribution made by the Canungra Defence Precinct to the Canungra Region economy was \$6.3 million to the property and business services sector. As previously stated, this linkage is not uncommon for Defence precincts. This indirect linkage occurs on two levels. The first is the indirect flow to the Business Services component of the sector, which occurs because the companies that *directly* service the Precinct's supply requirements later spend some of their revenue on Business Services such as accounting and legal services, technical and computer services and marketing and business management services. The second is the indirect contribution

¹⁶ Due to rounding, the sum of the indirect contributions by industry sector may not equal the total indirect contributions reported in the previous section.

to the Property Services component, which occurs because of payments made by Defence employees to real estate agents for renting or leasing properties and homes.

Indirect contributions of \$4.4 million and \$4.3 million were also made to the manufacturing and retail trade sectors respectively. Together these three sectors received for 44 per cent of all the indirect contributions made by the Canungra Defence Precinct.

4.3.4 Contributions to the Queensland State Economy

The modelling was expanded to examine the contribution that the Canungra Defence Precinct made to the Queensland economy as a whole. By widening the economic catchment from the regional to the state level, the scale of imports accounted for in the modelling was reduced. That is, goods and services sourced from outside the Canungra Region, but within the state, were no longer counted as imports, as they were in the regional analysis. A Defence precinct may or may not source a large amount of goods and services from its local region, but can be expected to be more highly integrated with its state economy. Therefore, the value of the indirect economic contributions made by the Canungra Defence Precinct increase when its relationship to the Queensland economy is modelled. Figure 31 summarises the economic contributions made by the Canungra Defence Precinct to the greater Queensland economy.

Figure 31. Contribution of the Canungra Defence Precinct to the Queensland State Economy, 2008

	Direct Contribution	Indirect Contribution	Total Contribution
OUTPUT/ TURNOVER	 \$30.9m	 \$60.0m	 \$90.9m
VALUE ADDED	 \$14.5m	 \$27.2m	 \$41.8
EMPLOYMENT	 297	 237	 534

Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Output / Turnover

The effect of broadening the economic catchment of the precinct to the state level is significant. The indirect contribution that the Canungra Defence Precinct makes to the greater Queensland economy is estimated to be \$60.0 million. This results in an estimated total economic contribution of \$90.9 million to the Queensland economy. Therefore, an extra contribution of approximately \$26.2 million flows beyond the catchment region to the wider Queensland economy.

Value Added and Employment

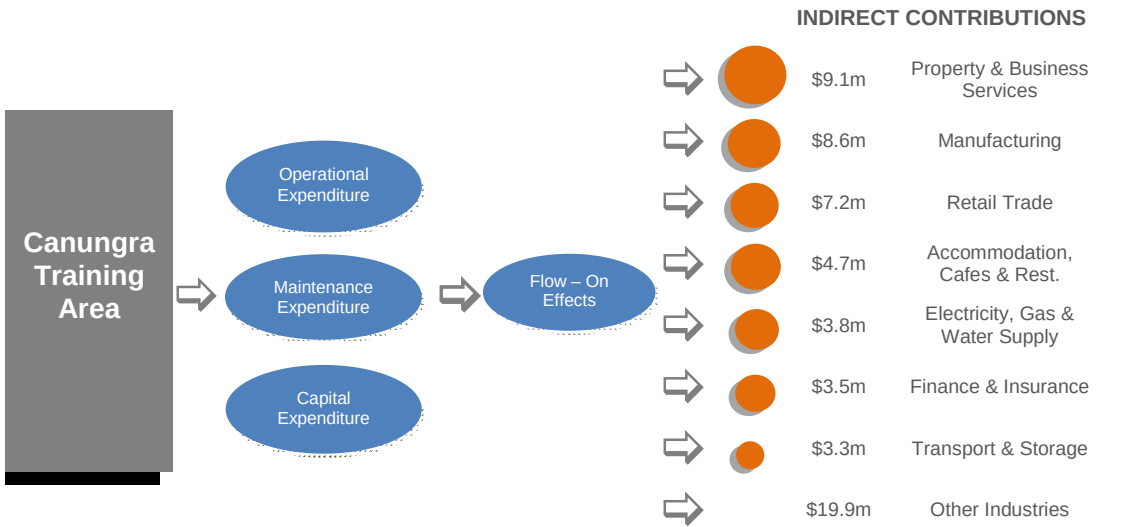
In 2008, the Canungra Defence Precinct directly contributed \$14.5 million to the value added component (profits and wages) of the Queensland economy. The additional indirect contribution of approximately \$27.2 million meant that the total contribution to the value added component of the Queensland economy was \$41.8 million.

We know that in 2008, the Canungra Defence Precinct directly employed 297 FTE staff. When the economic catchment is extended to the state level, the indirect employment created as a result of the presence of the Precinct is increased to 237 FTE jobs. This means that for every Defence FTE job in the Canungra Region, another 0.80 of an FTE job is created elsewhere in the Queensland economy.

4.3.5 The Distribution of the Indirect Contributions to the Queensland State Economy

The indirect contribution of the Canungra Defence Precinct to the Queensland economy is \$60.0 million, which is distributed across a range of industries within the state. This indirect relationship is illustrated in Figure 32, which highlights the strongest economic relationships between Queensland industries and the Canungra Defence Precinct¹⁷.

Figure 32. The Canungra Defence Precinct – The Distribution by Industry Sector of Indirect Contributions to the Queensland State Economy, 2008



Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

Figure 32 also highlights the strong economic linkages between the Precinct and the services industry sectors including, property and business services, retail trade, accommodation cafes and restaurants and finance and insurance.

¹⁷ Due to rounding, the sum of the indirect contributions by industry sector may not equal the total indirect contributions reported in the previous section.

The Canungra Defence Precinct's most significant indirect contributions to the Queensland economy are \$9.1 million, \$8.6 million and \$7.2 million. These contributions are made to the property and business services, manufacturing and retail trade sectors respectively. Together these three industries receive 42 per cent of all the indirect contributions made to the Queensland economy by the Canungra Defence Precinct.

4.4 Summary of the Economic Contributions to the Canungra Region Economy and Queensland State Economy

Figure 33 summarises the contributions made by the Canungra Defence Precinct to the Canungra Region Economy and the State Economy.

- The first column summarises the direct contribution the Canungra Defence Precinct makes to the Canungra Region Economy in terms of output/turnover, value added and in terms of employment.
- The second column summarises the in-direct contribution the Canungra Defence Precinct makes to the Canungra Region Economy in terms of output/turnover, value added and in terms of employment.
- The third column highlights the indirect contributions that flow beyond the Canungra Region to the wider Queensland economy in terms of output/turnover, value added and in terms of employment.
- The last column is the total direct and in-direct contributions the Canungra Defence Precinct makes to the Canungra Region and Queensland economy in terms of output/turnover, value added and in terms of employment.

Figure 33 also shows that in terms of output/turnover and employment, 43 per cent of the total indirect contributions generated by the presence of the Canungra Defence Precinct are generated beyond the Cairns Region Economy and in the wider Queensland economy. While in terms of value added, approximately 38 per cent of the total indirect contributions flowed beyond the Region and into the wider Queensland economy.

Figure 33. The Canungra Defence Precinct - Summary of the Economic Contributions to the Canungra Region and Queensland State Economy

	Direct Contribution	Indirect Contribution to the Canungra Region	Indirect Contribution to the Wider QLD Economy	Total Contribution
OUTPUT/ TURNOVER	 \$30.9m	 \$33.8m	 \$26.2m	 \$90.9m
VALUE ADDED	 \$14.5m	 \$16.8m	 \$10.5m	 \$41.8m
EMPLOYMENT	 297	 135	 102	 534

Source: Department of Defence and ABS Australian National Accounts - Input Output Tables with calculations and interpretations by SGS Economics and Planning, 2010

5 Conclusions

5.1 Summary of Contributions

Summary of Contributions to Economic Catchment Regions

Table 19 summarises the economic contributions of each Defence precinct to their respective economic catchment regions.

Table 19. Summary of Defence Precinct Contributions to their Economic Catchment Regions, 2008

Area	Indicator	Direct	Indirect	Total
Cairns Defence Precinct	<i>Output</i>	\$98.6m	\$123.0m	\$221.6m
	<i>Value Added</i>	\$52.9m	\$60.0m	\$112.9m
	<i>Employment</i>	1,144 jobs	523 jobs	1,667 jobs
Oakey Defence Precinct	<i>Output</i>	\$106.1m	\$111.0m	\$217.1m
	<i>Value Added</i>	\$47.1m	\$51.4m	\$98.4m
	<i>Employment</i>	1,047 jobs	469 jobs	1,516 jobs
Canungra Defence Precinct	<i>Output</i>	\$30.9m	\$33.8m	\$64.7m
	<i>Value Added</i>	\$15.2m	\$16.8m	\$32.0m
	<i>Employment</i>	297 jobs	135 jobs	432 jobs

Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2010

The size of both the direct and indirect contributions made by each Defence precinct to their respective economic catchment regions varies significantly between the precincts. This reflects both the relative size of the Defence precincts, and the scale and intensity of the regional economies in which they are located.

It is clear that increases or decreases in the activities of Defence precincts could have a significant impact on the regional economy in which the precinct is located. Furthermore, for regional economies, the size of residential and/or working populations are directly and indirectly linked to increases or decreases in the scale of Defence activities within the region.

Summary of Contributions at the State Level

Table 20 summarises the economic contributions of each Defence precinct to the Queensland State economy.

Table 20. Summary of Defence Precinct Contributions to the Queensland State Economy, 2008

Area	Indicator	Direct	Indirect	Total
Cairns Defence Precinct	<i>Output</i>	\$98.6m	189.6m	288.2m
	<i>Value Added</i>	53.5m	84.4m	138.0m
	<i>Employment</i>	1,144 jobs	748 jobs	1,893 jobs
Oakey Defence Precinct	<i>Output</i>	\$106.1m	205.7m	311.8m
	<i>Value Added</i>	53.5m	92.3m	145.8m
	<i>Employment</i>	1,047 jobs	812 jobs	1,859 jobs
Canungra Defence Precinct	<i>Output</i>	\$30.9m	\$60.0m	\$90.9m
	<i>Value Added</i>	\$14.5m	\$27.2m	\$41.8m
	<i>Employment</i>	297 jobs	237 jobs	534 jobs

Source: Department of Defence with calculations and interpretations by SGS Economics and Planning, 2010

Table 20 shows that in terms of the size of the direct and indirect contributions to the Queensland State economy, there are significant variations across the Defence precincts. As explained in the previous section, this reflects both the relative size of the Defence precincts, and the scale and intensity of the regional economies in which the precincts are located.

In 2008, compared to the other Defence precincts, the Canungra Defence Precinct made the smallest contributions at the state level. This is not a function of the scale or intensity of the linkages between the Precinct and the broader economy, but more a function of the size of the Precinct's 2008 budget compared to the same budgets for the other Precincts. In other words, at the State level, the multipliers were similar between all three Defence precincts, however, it is the size of the direct contributions that varies significantly.

On the other hand, the Cairns Defence Precinct and the Oakey Defence Precinct are the biggest drivers of State economic activity in terms of both value and employment.

Again it follows that increases or decreases in a precinct's activities could impact on the State economy. As always, the scale of the impact would depend on the nature of the increase or decrease in the type of Defence activities within a particular Defence precinct.

5.2 Recommended Further Steps to Enhance the Estimates of Regional and State Economic Contributions

Earlier in the report, a number of limitations to the study's exploration of economic contributions were discussed. The supportability of the study's assessments of contribution would be enhanced if these limitations were to be further addressed. It is recommended that the following steps be taken in future when assessing or reassessing the contributions of Defence precincts to regional and State economies:

- Develop an exhaustive list of precinct expenditures that supplies sufficient detail to enable the determination of how and where each expense flows from the base and into the economy. This would enable the development of input-output models that are tailored more accurately.
- Improve the understanding of the geography of precinct expenditure patterns by accurately tracking where a precinct's suppliers are located (e.g. local, regional, state, national) and the nature of the supplier (e.g. major national contractors, small local contractors).
- More accurately classify precinct expenditure to industry sectors by accurately nominating the main industry sector to which an expense should be allocated. This would avoid large general classifications of expenses and provide a more fine-grained analysis of value flows and thus contributions.
- Improve understanding of Defence precinct's employee and resident expenditure patterns by undertaking expenditure surveys for Defence precincts. This would enable a more accurate assessment of the flows of contributions at the catchment region level associated with the acquisition of goods and services (such as housing and retail).
- Addressing the above points would enable meaningful sensitivity testing through the recalculation and analysis of multipliers. This would then engender a more comprehensive understanding of the relationships between particular base activities and the economy. The effect of changes in the scale of particular Defence precinct activities on a precinct's economic contributions could then be studied.

Reviews of the economic contributions of Defence precincts should be carried out frequently. At a minimum, this would be every five years to make use of the ABS Census on Population and Housing. However, a review could also be justified whenever a major investment, such as major capital works programs for a Defence precinct has been planned or completed, or whenever large scale changes in precincts activities have occurred.

Appendix – Key Sources of Data

Apart from the data supplied by the Department of Defence, the key sources of data used within this study include the following:

Australian Bureau of Statistics (2009), *Australian National Accounts*, Canberra

Australian Bureau of Statistics (2008), *Input-Output Tables 2004-05*, Canberra

Australian Bureau of Statistics (2006), *Census of Population and Housing*, Canberra

Australian Bureau of Statistics (2006), *Journey to Work Data*, Unpublished, Canberra

Australian Bureau of Statistics (2001), *Census of Population and Housing*, Canberra

Australian Bureau of Statistics (2001), *Journey to Work Data*, Unpublished, Canberra

Australian Bureau of Statistics (1996), *Census of Population and Housing*, Canberra

Department of Defence (2010), *Defence Census 2007*

Department of Defence (2010), *2008/09 Expenditure and Demographic Data*

Economic Report into the Major Defence Bases in the Northern Territory

13 September 2010

ADVISORY

Inherent Limitations

The services provided in connection with this engagement comprise an advisory engagement which is not subject to assurance or other standards issued by the Australian Auditing and Assurance Standards Board and, consequently no opinions or conclusions intended to convey assurance have been expressed.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by, the Department of Defence as part of the process.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

Any estimates or projections of future economic performance are impacted by numerous factors that may influence the various components of the estimates or projections, and are inherently indeterminable whether considered in isolation or in conflux. Although KPMG exercises reasonable care when making forecasts or predictions, factors in the process, such as market behaviour, are inherently uncertain. As such, future events may not unfold as expected and actual results achieved for the forecast periods covered will vary from the information presented. Any estimates or projections will only take into account information available to KPMG up to the date of the deliverable and so findings may be affected by new information. Accordingly, we do not warrant or guarantee that any outcome presented in this report will be achieved. Further, events may have occurred since we prepared this report which may impact on it and its findings.

KPMG is under no obligation in any circumstance to update this report, in either oral or written form, for events occurring after the report has been issued in final form.

The findings in this report have been formed on the above basis.

Third Party Reliance

This report is solely for the purpose set out in the Introduction section and for the Department of Defence's information and is not to be used for any other purpose or distributed to any other party without KPMG's prior written consent..

This report has been prepared at the request of the Department of Defence in accordance with the terms of KPMG's engagement contract dated 6 February 2009. Other than our responsibility to the Department of Defence, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

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Glossary of Terms

Value Added - the value added of a business refers to the total value of goods and services provided by the business, less the goods and services that the business purchases as intermediate inputs. Thus value added is equivalent to wages and salaries plus profit.

Turnover - The turnover/revenue of a business refers to the total value of goods and services provided by the business. This will be equal to the goods and services that the business purchases as intermediate inputs, plus wages and salaries, plus profit.

Consumption – Total expenditure on goods and services that are privately consumed by households.

Living Standards – living standards derive from consumption, not value added, consumption (in principle) is a more appropriate measure of changes in living standards. As such, KPMG Econtech uses consumption as a measure of living standards.

Traded Goods - goods and services that can be sold in the larger State or national market as such, prices of these goods and services are determined in the larger market.

Non-Traded Goods - goods and services that can not be sold in the larger State or national market, i.e. these goods are only sold in the local market and therefore prices for these goods are determined in the local market.

Direct impacts - Direct impacts on employment, industry value added and industry turnover are the result of the Defence facilities operating within Northern Territory. For example, the direct contribution of the facilities to employment in Northern Territory include staff who are employed to work at the facilities e.g. Australian Defence Force (ADF) personnel, Australian Public Servant (APS) and contractors.

Indirect impacts - Indirect or flow on impacts are the result of two factors. The first is the impact of consumer spending in Northern Territory by people who are employed directly by the Defence facilities. The second is the impact of additional spending by upstream businesses that supply goods and services to the facilities.

Computable General Equilibrium (CGE) model - A CGE model combines economic data with economic theory to generate a model of an economy. This model can then be used to estimate how an economy may adjust to external shocks such as a policy change.

MMR - is a CGE model that estimates the effects of policies that are State or region specific. It divides Australia into 33 regions and 8 States and Territories, and contains 18 industries which correspond to the Australian and New Zealand Standard Industry Classifications used by the Australian Bureau of Statistics.

Key Findings

The Department of Defence (Defence) sought to identify the economic contribution major Defence bases in the Northern Territory provide to regional and state economies. KPMG Econtech estimated these impacts by identifying the direct economic impacts and estimating the indirect economic impacts using economic modelling. Hence, the full economic impacts of the Defence facilities are modelled using KPMG Econtech's MMR model, a computable general equilibrium (CGE) model.

Regional Results

Chart A shows the direct and indirect employment impacts of each base on the region in which they are located. Chart B shows the consumption impacts of each base on the region in which they are located.

Chart A: Employment Impacts (Jobs)

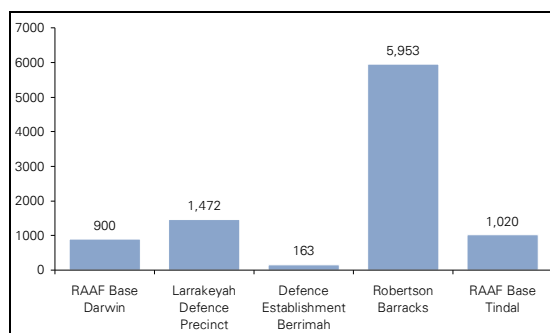
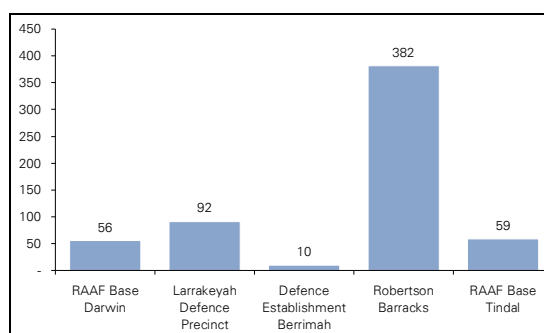


Chart B: Consumption Impacts (\$m)



The results are to be interpreted as the average annual impact of the facility on the region compared to a scenario where the base no longer operates in the same region. For example, the modelling estimates that RAAF Base Darwin directly and indirectly supports 900 jobs in the Darwin regional economy, and contributes \$56 million (\$2008/09) annually to consumption in the Darwin regional economy.

Northern Territory Results

The state results estimate that Defence facilities currently contribute

- 11,116 jobs in the Northern Territory economy,
- contributes \$674 million (2008/09 prices) annually to consumption in the Northern Territory,

than would otherwise be the case if the facilities no longer operated within the territory.

Executive Summary

Introduction

The Department of Defence (Defence) is seeking to identify the economic contribution major Defence bases in the Northern Territory provide to regional and state economies. Defence is particularly concerned about two key issues, namely:

- the impact of urban encroachment and incompatible urban land uses on the sustainability and viability of Defence's operations; and
- understanding the economic contribution of Defence's operations in the Northern Territory to the regional economy.

Defence has engaged KPMG Econtech to undertake an analysis of the economic contribution that specific Defence facilities currently make to the Northern Territory economy. In this study KPMG Econtech has estimated the economic impact of each facility on their regional economy and the economic impact of key Defence facilities on the Northern Territory economy using a consistent and robust methodology. The results in this report are expressed¹ in 2008/09 dollars based on reported activity in 2007/08.

Modelling Methodology

The economic impacts of the Defence facilities on the Northern Territory and regional economies were estimated by identifying the direct economic impacts and estimating the indirect economic impacts.

- *Direct impacts* on employment, industry value added and industry turnover are the result of the Defence facilities operating within Northern Territory. For example, the direct contribution to employment in Northern Territory include staff who are employed to work at the facilities e.g. Australian Defence Force (ADF) personnel, Australian Public Servant (APS) and contractors. The direct contribution of the facilities to turnover is the sum of payments made by Defence facilities to wages and salaries, expenditure on goods and services made by Defence such as utilities based in Northern Territory.
- *Indirect impacts* are the result of two factors. The first is the impact of consumer spending in Northern Territory by people who are employed directly by the Defence facilities. The second is the impact of additional spending by upstream businesses that supply goods and services to the facilities.

The direct impacts of the facilities can be estimated in a relatively straightforward manner using available data on Defence expenditure and employment numbers. Measuring the indirect impacts on the other hand requires the use of economic modelling. Hence, the full economic impacts of the Defence facilities are modelled using KPMG Econtech's MMR model.

MMR is a computable general equilibrium (CGE) model. A CGE model combines economic data with economic theory to generate a model of an economy. This model can then be used to

¹ Results including expenditure categories outlined in Chapter 5 have been scaled from the 2007/08 financial year to 2008/09 financial year.

estimate how an economy adjusts to external shocks such as a policy change. KPMG Econtech's MMR model estimates the effects of policies that are State or region specific. It divides Australia into 33 regions and 8 States and Territories, and contains 18 industries which correspond to the Australian and New Zealand Standard Industry Classifications used by the Australian Bureau of Statistics (ABS). Each of the regions are modelled individually, but following a consistent approach.

Defence Facilities

The specific Defence facilities separately analysed in this report are: RAAF Base Darwin, Larrakeyah Defence Precinct, Defence Establishment Berrimah; Robertson Barracks; and RAAF Base Tindal. An overview of the function of each base can be found below.

RAAF Base Darwin

RAAF Base Darwin's primary function is to enable the concentration and mounting of Australian Defence Force operations from Australia's north. While RAAF Base Darwin has no permanent aviation squadrons, it is a key staging base for maritime surveillance, patrol aircraft for border protection operations and multinational training exercises (such as Pitch Black 2010) and is expected to remain an alternative base for Army aviation activities conducted near Robertson Barracks. Units based at RAAF Base Darwin include:

- No. 396 Expeditionary Combat Support Wing;
- No. 92 Wing Detachment Darwin - Surveillance and response;
- No. 44 Wing Detachment Darwin - Air traffic control;
- No. 13 (City of Darwin) Squadron; and
- No. 144 Mobile Control and Reporting Unit Darwin - Radar operations.

Larrakeyah Defence Precinct

Larrakeyah Barracks is the Darwin headquarters of Northern Command (NORCOM) and provides HQ facilities, working and training accommodation in support of NORFORCE, Australia's regional surveillance capability in the NT and northern WA. HMAS Coonawarra at Larrakeyah Cove provides administrative, personnel, logistics and maintenance support to Australia's 12 Darwin-based vessels and personnel. HMAS Coonawarra also hosts visiting warships from time to time.

Units and functions based at Larrakeyah Defence Precinct include:

- HQ NORCOM;
- NORFORCE;
- 36 Water Transport Troop;
- HMAS Coonawarra; and
- Fleet Support Unit - Darwin.

Defence Establishment Berrimah

Defence Establishment Berrimah (DEB) is located on the Stuart Highway south of RAAF Base Darwin in the suburb of Winnellie. It has an area of approximately 166 hectares and operates primarily as an administrative and support facility with APS staff from the Defence Support Group being the major tenants.

In addition to providing administrative services to the wider Defence organisation and community DEB contains residences for ADF personnel and their families, as well as for single ADF members.

Robertson Barracks

Robertson Barracks is designated as a Forward Mounting Base for units accessing ranges and training areas in the region. Robertson Barracks also provides a significant number of living, working and training facilities and is the home of Australia's 1st Brigade (1 BDE) which operates Australia's mechanised force (including the M1A1 Abrams). The 1st Aviation Regiment, which operates the Tiger Armed Reconnaissance Helicopter (ARH), is co-located at Robertson Barracks in purpose-built facilities constructed in 2006.

Units and functions supported by Robertson Barracks include:

- 1st Brigade;
- 1st Aviation Regiment; and
- 1 Troop A Squadron Incident Response Regiment.

RAAF Base Tindal

Formerly a World War II airfield, RAAF Base Tindal is part of a chain of airfields that stretch across Australia from Townsville in Queensland to Learmonth in Western Australia. Once a "bare base" the current RAAF Base Tindal was opened in 1988 and is the home base for the flying operations of F/A-18 Hornets from 75 Squadron. Located approximately 18 kilometres south of Katherine, RAAF Base Tindal occupies an area of over 2,000 square kilometres and allows for the concentration of ADF operations and exercises in the north of Australia.

Units and functions based at RAAF Base Tindal include:

- 75 Squadron (75 SQN);
- 322 Expeditionary Combat Support Squadron (322 CESS);
- 44 Wing Detachment - Tindal;
- Northern Regions Operation Centre (NORTHROC);
- Delamere Range Facility; and
- Katherine Troop NORFORCE.

Modelling Inputs

Estimates of the direct employment impacts were used as the main modelling inputs into the MMR. The estimates of the direct impact of each facility is based on activity in each facility during the 2007/08 financial year. The direct employment impacts for each facility are presented in Table 1 below.

Table 1 Modelling Inputs - Direct Employment Impacts	
Facility	Direct Employment (jobs)
RAAF Base Darwin	641
Larrakeyah Defence Precinct	1046
Defence Establishment Berrimah	117
Robertson Barracks	4128
RAAF Base Tindal	678
Total Northern Territory Defence Facilities	6611

Source: Department of Defence

We note that the direct employment impacts for each of the facilities differ in terms of the distributional impacts across industries (details of the distribution are provided within the body of the report). It is important to note that it is assumed that the facilities and operations associated with the facilities are removed from the Northern Territory and are not re-established elsewhere in the Territory. However, the facilities may be re-established somewhere else in Australia, but outside of the Northern Territory. The direct employment impacts are distributed across the Government Administration and Defence industry and the Property and Business Services industry, this distribution affects the size and distribution of the indirect impacts, as is illustrated in the modelling results.

Economic Impacts

The key results of the economic modelling at both the state and regional level are presented in Table 2. It is important to note that these are estimates of both the direct and indirect impacts and as such employment impacts are not identical to the direct employment impacts in Table 1.

Table 2 Economic Impacts Summary				
Defence Facility	Employment (jobs)	Value Added (\$m)	Turnover (\$m)	Consumption (\$m)
Regional Impacts				
Darwin Region				
RAAF Base Darwin	900	63.9	116.3	55.7
Larrakeyah Defence Precinct	1,472	105.4	189.4	91.6
Defence Establishment Berrimah	163	11.7	20.9	10.0
Robertson Barracks	5,953	427.9	768.0	381.7
Katherine Region				
RAAF Base Tindal	1,020	73.4	132.3	59.0
State Impacts				
Total	11,116	805.4	1,460.9	673.8

Source: KPMG Econtech MMR

Economic impact of Major Defence Facilities in Regional economies

Economic impact modelling was carried out at the regional economy level for five pivotal Defence facilities. The estimates of employment, value added and consumption impacts presented above represent the average annual economic impacts attributable to the facilities, based on reported activity in 2007/08.

As is the case with each of the Bases, the results show that a sizable proportion of the overall employment impact occurs in the Government Administration and Defence industry, as each of the bases directly employs a large number of APS and ADF staff within that industry. These direct employment impacts produce positive indirect employment impacts in industries that supply goods and services to the Bases and sell consumer goods to the Bases employees. Industries that benefit from demand created by Bases in the economy include: Retail Trade; Finance and Insurance; Education; and Health and Community Services. At the same time, expenditure by each base on goods and services within the regional economy contributes to price pressures within some industries. As such, some negative employment impacts are felt in industries that experience a loss of competitiveness through higher input prices. For example, it is estimated that RAAF Base Darwin has negative indirect employment impacts on industries including: Manufacturing; Construction; Transport and Storage; and Property and Business

Services. Importantly, the overall impact of the Defence base on employment in the Darwin region is positive.

These findings are consistent with the findings of previous modelling undertaken by KPMG Econtech for Defence, to measure the economic contribution of the RAAF Base, Richmond, to the Sydney economy. The pattern of direct and indirect impacts are consistent with previous findings Defence bases create positive indirect impacts in consumer focused industries that sell goods to Defence employees, while negative indirect impacts are generally seen in trade-exposed industries. Negative indirect impacts stem from the fact that traded goods prices are determined in the national market. As such, industries producing traded goods are not able to raise the price of their output in response to changes in input prices. However, as discussed above, some of these trade-exposed industries use similar inputs to Defence and thus would be facing price pressures as a result of Defence's presence. Accordingly, those tradable industries that use a similar set of inputs to Defence and does not sell a large proportion of their goods to the Defence bases or to Defence employees are worse off as a result of Defence's presence.

To take a specific example, the Bases increases the demand for goods and services produced by industries such as Finance and Insurance. This industry produces non-tradeable goods and services, and therefore they focus on selling in the Darwin region only. As such, industry production levels and prices for these services are determined by local demand. The Bases increases local demand and therefore leads to an increase in the prices charged by the Finance and Insurance industries. These higher prices would have a slight negative impact on industries that use these goods and services. Hence, production and employment in some industries, such as Property and Business Services, will be slightly lower, as businesses in these industries pay higher prices for business inputs. Importantly, Defence bases contribute positively to employment, value added and consumption in the region in which they are situated.

Key Economic Impacts for the Northern Territory

The Defence facilities that have been included in the Northern Territory analysis are: RAAF Base Darwin; Defence Establishment Berrimah; Larrakeyah Defence Precinct; Robertson Barracks; RAAF Base Tindal; and the Northern Territory Training Areas (Mount Bundy Training Area and the Bradshaw Training Area) and other smaller defence facilities in the Northern Territory. Additionally, the modelling also captures the increased expenditure from Naval ship visits to the region.

The modelling estimates that these Defence facilities and Naval ship visits currently support 11,116 jobs in the Northern Territory economy. The majority of these jobs are in the Government Administration and Defence industry, as most of the direct employment impacts are within that industry. At the same time, the facilities create additional employment in businesses that sell consumer goods to employees of Defence, and in industries that sell goods and services to Defence.

For example, by purchasing construction services, the Defence facilities and their contractors indirectly support employment in the construction industry. Expenditure by the employees of the Defence facilities and their contractors also supports employment in consumer focused industries including: Retail Trade; Education; and Health and Community Services.

The Defence facilities are also estimated to have negative employment impacts on some industries. By contributing to demand in the state economy, the Defence facilities place upward pressure on the prices of goods and services that are not traded between states. As such, some



negative employment impacts are felt in industries which use the non-traded goods and services as they experience a loss of competitiveness through higher input prices. Importantly, Defence bases contribute positively to employment in the Northern Territory.

The modelling estimates that Defence facilities currently contribute \$805 million (2008/09 prices) annually to value added in NT. This is equivalent to the Defence facilities' contribution to Northern Territory GSP. Similarly to the employment impacts, the Defence facilities produce both positive and negative indirect impacts in industries within Northern Territory. Beneficiaries of Defence activity include: Retail Trade; Finance and Insurance; Education; and Health and Community Services. All of these industries receive a positive contribution to value added through sales to Defence facilities, contractors and their employees. Industries that experience negative value added impacts include: Construction; Transport and Storage; and Property and Business Services.

The overall impact of the Defence facilities on Gross State Product (value added) is positive. By supporting production (value added) in the state economy, the Defence facilities contribute to living standards in NT. The Defence facilities are estimated to contribute \$673 million (2008/09 prices) annually to consumption in the Northern Territory.

1 Introduction

1.1 Overview and Objective

While it is generally acknowledged that Defence makes a significant contribution to the Northern Territory's economy, there is scope to understand the nature and extent of this contribution in greater detail. This understanding will help preserve Defence's ability to maintain and grow its Northern Territory presence.

Defence is particularly concerned about two key issues:

- the impact of urban encroachment and incompatible urban land uses on the sustainability and viability of Defence's operations; and
- understanding the economic contribution of Defence's operations in the Northern Territory to the regional economy.

As such, Defence is seeking to understand the contribution, impacts and linkages of its activities in the Northern Territory in greater detail, and in particular the direct and indirect impacts of this activity:

- the **direct effect** stems from the level of employment and expenditure by Defence in the areas where it has bases; and
- the **indirect effect** is the combination of the spending by Defence employees and visitors in the community, and the spending by businesses that supply goods and services to Defence.

Broadly, the analysis seeks to:

- describe the economic profile of major Defence bases in the Northern Territory;
- identify the value (direct and indirect) of the Defence presence and operations to the Northern Territory's state and regional economies;
- summarise the value-added component of combined Defence output to the Territory's economy.

This analysis can be used to:

- build an understanding by local stakeholders with competing priorities as to the significance of Defence's activities in the Northern Territory; and
- ensure that the Defence presence and interests are taken into account by local communities, the Territory and local governments, developers, utilities and other planning authorities.

1.2 Report Structure

The report is structured as follows.

- Section 2 outlines the modelling approach that has been used to estimate the economic contribution of Defence facilities.
- Section 3 provides an overview of major Defence facilities in Northern Territory, detailing the history, location, principal functions and workforce estimate for each facility.
- Section 4 provides details on the regional economies in which the Defence facilities are located. This section provides information on the industry composition, population profile, social and economic indicators, and housing and income statistics for each region.
- Section 5 contains estimates of the direct economic impacts of the facilities.
- Section 6 presents the modelling results that estimate the contribution of Defence facilities to the Northern Territory economy.
- Section 7 presents the modelling results that estimate the regional contribution of the individual Defence facilities.
- Section 8 provides a brief conclusion of the analysis and results.

2 Modelling Approach

This section provides details of the modelling approach used to estimate the economic impacts of major Defence facilities in Northern Territory. We note that the methodology used for this engagement is consistent with that used to model the economic contribution of Defence facilities in South Australia, and the methodology used to model the economic contribution of the RAAF Base, Richmond, to the Northern Sydney² regional economy.

The section is structured as follows.

- Section 2.1 outlines the methodology used to estimate the economic impacts of Defence facilities on the Northern Territory economy including the assumptions and limitations of the report.
- Section 2.2 describes the scenarios that are used to estimate the economic impacts of the Defence facilities.

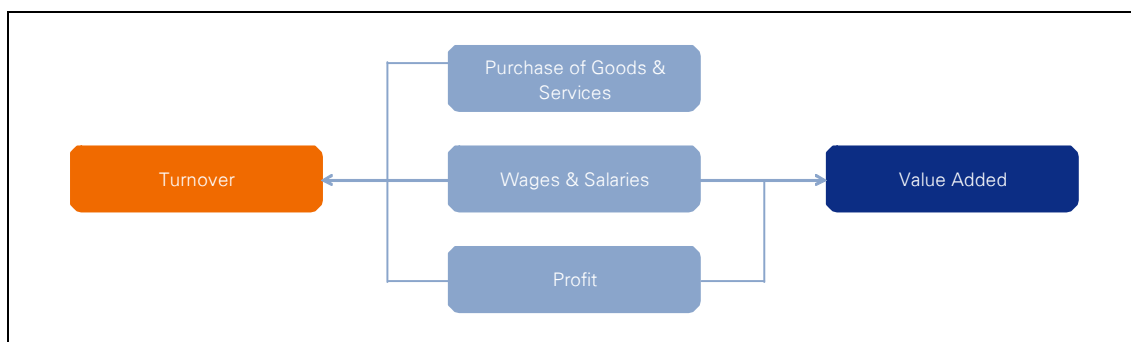
2.1 Methodology

The impacts of Defence facilities on the Northern Territory and regional economies can be assessed using a number of different economic metrics;

- employment;
- value-added (or GDP);
- turnover (or revenue or sales); and
- living standards.

Chart 2.1.1 shows how these measures relate to one another.

Chart 2.1 Value Added vs. Turnover



² As defined by the ABS Statistical Regions

The previous chart shows the difference between turnover and value added.

- The turnover/revenue of a business refers to the total value of the goods and services provided by the business. This will be equal to the goods and services that the business purchases as intermediate inputs, plus wages and salaries, plus profit.
- In contrast, the value added of a business refers to the total value of goods and services provided by the business, less the goods and services that the business purchases as intermediate inputs. Thus, value added is equivalent to wages and salaries plus profit.

Value added is a measure that is often used to estimate the impact on living standards. However, value added is a measure of output rather than a measure of well-being. Because living standards derive from consumption, not value added, consumption (in principle) is a more appropriate measure of changes in living standards. As such, for this analysis, KPMG Econtech uses consumption as the measure of living standards rather than value added.

When measuring the impacts of the Defence facilities on the Northern Territory and regional economies, it is important to make a distinction between the direct and indirect economic impacts of the facilities.

- *Direct impacts* on employment, industry value added and industry turnover are the result of the Defence facilities operating within Northern Territory. For example, the direct contribution to employment in Northern Territory include staff who are employed to work at the facilities e.g. ADF personnel, APS and contractors. The direct contribution of the facilities to turnover is the sum of payments made by the Defence facilities and contractors to wages and salaries, expenditure on intermediate goods and any profits made by Defence contractors based in Northern Territory.
- *Indirect impacts* are the result of two factors. The first is the impact of consumer spending in Northern Territory by people who are employed directly by the Defence facilities. The second is the impact of additional spending by upstream businesses that supply goods and services to the facilities.

The direct impacts of the facilities can be estimated in a relatively straightforward manner using available data on Defence expenditure and employment numbers. Measuring the indirect impacts on the other hand requires the use of economic modelling. Hence, the full economic impacts of the Defence facilities are modelled using KPMG Econtech's MMR model.

2.1.1 MMR

KPMG Econtech's Murphy Model Regional (MMR) is a CGE model that estimates the effects of policies that are State or region specific. It divides Australia into 33 regions and 8 States and Territories, and contains 18 industries which correspond to the Australian and New Zealand Standard Industry Classifications used by the Australian Bureau of Statistics. Each of the regions are modelled individually, but following a consistent approach.

For this project, MMR has been further developed so that the Northern Territory is now broken into three separate sub-regions within the model: the Darwin region; the Katherine region; and the balance of the Northern Territory. These divisions are based on major statistical sub-divisions for Northern Territory that are used by the ABS. The regions disaggregated in the

model (Darwin and Katherine) correspond to the regional economies described in Section 4. The disaggregation of the Northern Territory into three regions was achieved by combining census data with the underlying labour force data which is used in MMR. Detailed census data on employment by industry was used to construct an industry profile of the Katherine region in 2006. As such, it was possible to split the underlying labour force data to develop a data set of employment by industry for the Katherine region, that is consistent with the labour force data used for all other regions in the model.

More detailed information about MMR is presented in Appendix B.

2.2 Scenarios

KPMG Econtech analysed a number of scenarios to estimate the current economic contributions of each of the facilities to the Northern Territory and regional economies.

For each of the facilities included in the analysis, KPMG Econtech modelled a scenario to measure the economic impact of the facility on the surrounding regional economy. KPMG Econtech also modelled an aggregate scenario which shows the economic impact of the combined Defence facilities on the Northern Territory economy. These scenarios were then compared with baseline ‘snapshots’ of the regional and state economies, to determine the current economic contribution of the facilities at a State and regional level.

It is important to note that it is assumed that the facilities and operations associated with the facilities are removed from the Northern Territory and are not re-established elsewhere in the Territory. However, the facilities may be re-established somewhere else in Australia, but outside of the Northern Territory.

2.2.1 Darwin Major Statistical Region Scenarios

The Defence precinct in Darwin includes the RAAF Base Darwin, Defence Establishment Berrimah, Larrakeyah Defence Precinct, Robertson Barracks. To estimate the economic contribution of the facilities to the Darwin regional economy, the following scenarios were modelled using MMR.

- Darwin Baseline Scenario – a scenario that models the current Darwin economy, including the contribution made by Defence facilities located within this region i.e. a ‘snapshot’ of the current Darwin economy.
- RAAF Base Darwin Scenario – a scenario that models the economic impacts of removing RAAF Base Darwin from the Darwin economy.
- Larrakeyah Defence Precinct Scenario – a scenario that models the economic impacts of removing the Larrakeyah Defence Precinct³ from the Darwin economy.
- Defence Establishment Berrimah Scenario – a scenario that models the economic impacts of removing the Defence Establishment Berrimah from the Darwin economy.

³ Larrakeyah Defence Precinct incorporates Larrakeyah Barracks, Coonawarra, Fleet Base North and Naval Fuel Installation

- Robertson Barracks Scenario – a scenario that models the economic impacts of removing Robertson Barracks from the Darwin economy.

The difference between each of the other Defence facility Scenarios and the Darwin Baseline Scenario provides an estimate of current contribution of each of the other Defence facility to the Darwin regional economy. The contribution of the base is calculated as the difference between the scenario where the RAAF Base Darwin is removed and Baseline Scenario. This provides an estimate of the current annual economic contribution of RAAF Base Darwin to the Darwin regional economy. These include the contribution of RAAF Base Darwin to industry value-added, industry turnover, industry employment and overall living standards in Darwin.

2.2.2 Katherine Major Statistical Region Scenarios

RAAF Base Tindal is the main Defence facility in the Katherine region. To estimate the economic impact of this facility on the Katherine regional economy, the following scenarios have been modelled.

To estimate the economic contribution of RAAF Base Tindal and the Bradshaw Training Area to the Katherine regional economy, the following scenarios were modelled using MMR.

- Katherine region Baseline Scenario – a scenario that models the current Katherine region economy, including the contribution made by RAAF Base Tindal and the Bradshaw Training Area i.e. a ‘snapshot’ of the current Katherine region economy.
- RAAF Base Tindal Scenario – a scenario that models the economic impacts of removing RAAF Base Tindal from the Katherine region economy.

The difference between the RAAF Base Tindal Scenario and the Katherine region Baseline Scenario provides an estimate of the current annual economic contribution of RAAF Base Tindal to the Katherine region regional economy. These include the contribution of RAAF Base Tindal to industry value-added, industry turnover, industry employment and overall living standards in the Katherine region.

2.2.3 Northern Territory Scenarios

To estimate the economic contribution of all Defence facilities to the Northern Territory economy, the following scenarios were modelled using MMR. This analysis includes the facilities that have been modelled at the regional level (RAAF Base Darwin; Defence Establishment Berrimah; Larrakeyah Defence Precinct; Robertson Barracks; and RAAF Base Tindal). As well as these, it also includes the Shoal Bay Receiving Station and the Northern Territory Training Areas (Mount Bunday and Bradshaw Training Area) and other smaller facilities. The modelling also captures the increased expenditure from Naval ship visits to the region.

- Northern Territory Baseline Scenario – a scenario that models the current Northern Territory economy, including the contribution made by Defence facilities i.e. a ‘snapshot’ of the current Northern Territory economy.
- Defence Facilities Scenario – a scenario that models the economic impacts of removing these Defence facilities and additional expenditure from Naval ship visits from the Northern Territory economy.



The difference between the Defence Facilities Scenario and the Northern Territory Baseline Scenario provides an estimate of the current annual economic contribution of Defence's facilities and operations to the Northern Territory economy.

3 Overview of Major Defence Facilities in the Northern Territory

The purpose of this section is to provide an overview of major Defence facilities in Northern Territory. Each subsection provides a brief history, followed by the location, principal functions and workforce estimates of each facility. Defence has provided the information contained in the following section.

3.1 RAAF Base Darwin

Established during World War II, RAAF Base Darwin is one of Australia's main forward operating bases and is a joint military-civilian airfield located near the heart of Darwin. RAAF Base Darwin provides a manned forward operational deployment base that allows for the rapid building of Defence forces across Australia when required.

RAAF Base Darwin's primary function is to enable the concentration and mounting of Australian Defence Force operations from Australia's north. While RAAF Base Darwin has no permanent aviation squadrons, it is a key staging base for maritime surveillance, patrol aircraft for border protection operations and multinational training exercises (such as Pitch Black 2010) and is expected to remain an alternative base for Army aviation activities conducted near Robertson Barracks. Units based at RAAF Base Darwin include:

- No. 396 Expeditionary Combat Support Wing;
- No. 92 Wing Detachment Darwin - Surveillance and response;
- No. 44 Wing Detachment Darwin - Air traffic control;
- No. 13 (City of Darwin) Squadron; and
- No. 144 Mobile Control and Reporting Unit Darwin - Radar operations.

Defence is currently investing around \$50 million in RAAF Base Darwin as part of its Stage 2 redevelopment. This project will construct new facilities and upgrade existing buildings. Works include a fuel farm, workshops and a new logistics headquarters.

3.2 Larrakeyah Defence Precinct (including Naval Fuels Installations)

Covering 80 hectares and located just 2 kilometres from the Darwin CBD on a prominent headland, the Larrakeyah Defence Precinct (LDP) comprises two important military bases: Larrakeyah Barracks and HMAS Coonawarra (formerly Darwin Naval Base).

Larrakeyah Barracks is the Darwin headquarters of Northern Command (NORCOM) and provides HQ facilities, working and training accommodation in support of NORFORCE, Australia's regional surveillance capability in the NT and northern WA. HMAS Coonawarra at Larrakeyah Cove provides administrative, personnel, logistics and maintenance support to Australia's 12 Darwin-based vessels and personnel. HMAS Coonawarra also hosts visiting warships from time to time.

Units and functions based at Larrakeyah Defence Precinct include:

- HQ NORCOM;
- NORFORCE;
- 36 Water Transport Troop;
- HMAS Coonawarra; and
- Fleet Support Unit - Darwin.

3.3 Defence Establishment Berrimah

Defence Establishment Berrimah (DEB) is located on the Stuart Highway south of RAAF Base Darwin in the suburb of Winnellie. It has an area of approximately 166 hectares and operates primarily as an administrative and support facility with APS staff from the Defence Support Group being the major tenants.

In addition to providing administrative services to the wider Defence organisation and community DEB contains residences for ADF personnel and their families, as well as for single ADF members.

3.4 Robertson Barracks

Robertson Barracks is located 6km north of Palmerston on the Stuart Highway and covers approximately 964 hectares. Constructed in the early 1990s and named in memory of Lieutenant General Sir Horace Robertson, Robertson Barracks is a purpose-built facility that supports Army's mechanised and army aviation operations and is the largest single military base in the Darwin region.

Robertson Barracks is designated as a Forward Mounting Base for units accessing ranges and training areas in the region. Robertson Barracks also provides a significant number of living, working and training facilities and is the home of Australia's 1st Brigade (1 BDE) which operates Australia's mechanised force (including the M1A1 Abrams). The 1st Aviation Regiment, which operates the Tiger Armed Reconnaissance Helicopter (ARH), is co-located at Robertson Barracks in purpose-built facilities constructed in 2006.

Units and functions supported by Robertson Barracks include:

- 1st Brigade;
- 1st Aviation Regiment; and
- 1 Troop A Squadron Incident Response Regiment.

A \$72 million redevelopment project commenced in 2009 to upgrade the existing facilities and infrastructure at Robertson Barracks. Improvements include new and upgraded training and working facilities, living-in accommodation, as well as new facilities and support services for 1 BDE.

3.5 RAAF Base Tindal

Formerly a World War II airfield, RAAF Base Tindal is part of a chain of airfields that stretch across Australia from Townsville in Queensland to Learmonth in Western Australia. Once a "bare base" the current RAAF Base Tindal was opened in 1988 and is the home base for the flying operations of F/A-18 Hornets from 75 Squadron. Located approximately 18 kilometres

south of Katherine, RAAF Base Tindal occupies an area of over 2,000 square kilometres and allows for the concentration of ADF operations and exercises in the north of Australia.

Units and functions based at RAAF Base Tindal include:

- 75 Squadron (75 SQN);
- 322 Expeditionary Combat Support Squadron (322 CESS);
- 44 Wing Detachment - Tindal;
- Northern Regions Operation Centre (NORTHROC);
- Delamere Range Facility; and
- Katherine Troop NORFORCE.

RAAF Base Tindal is currently receiving over \$120 million of investment to construct and upgrade working accommodation and infrastructure. This investment includes new facilities to support the introduction of Australia's new Airborne Early Warning and Control aircraft, including new taxiways and operational facilities.

3.6 Northern Territory Training Areas

The Northern Territory Training Areas included in this study are the Mount Bunday Military Training Area and Bradshaw Training Area. These areas are important facilities for training Defence personnel in the Northern Territory. The Areas also host defence employees from across the country for various land combat training exercises. These exercises include Kakadu IV and Pitch Black.

Mount Bunday Military Training Area (MBTA) is located in the Pine-Creek Arnhem bio-geographic region of Northern Australia. The area is located 75km south-east of Humpty Doo, and comprises of 117,300ha. The base is bound on three sides by national parks, Kakadu National Park to east and south and the McKinlay Conservation Reserve to the west. The Bradshaw Training Area encompasses approximately 870,000ha and is located 0.5km north of Timber Creek.

The primary function of the facilities is to host training exercises for Defence personnel. The location of the sites makes them suitable for hosting land-based combat operations. These operations include Exercise Kakadu, which seeks to improve maritime interoperability and is a vital maritime exercise that strengthens ties with Australia's international counterparts.

In 2007/08 the Northern Territory Training areas is estimated to have directly employed a total of 9 ADF personnel on-site personnel, however, many hundreds exercise or transit these bases throughout each year.

The Bradshaw Field Training Area has plans for new infrastructure to provide engineering services to allow the use of Bradshaw as a field training area for the 1st Brigade. This project includes roads, training force maintenance area, base camp, range control and caretaker facilities.

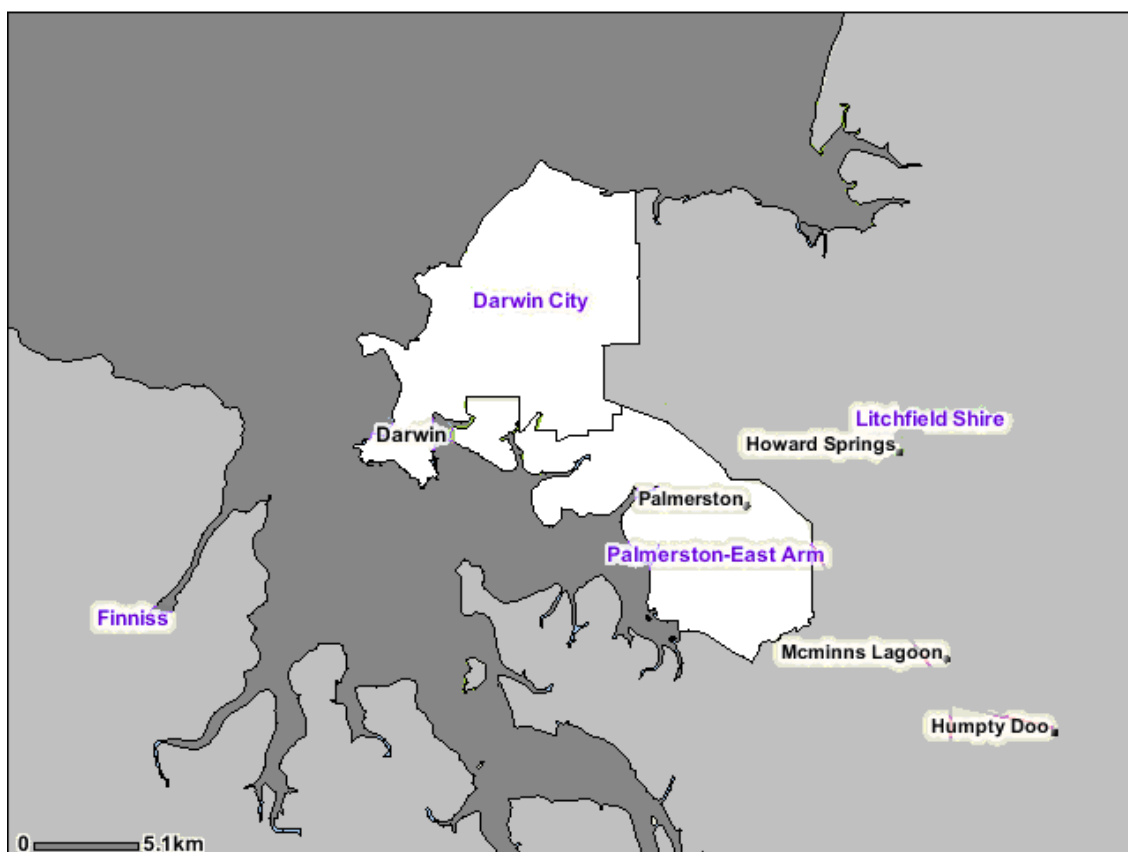
4 Snapshot of the Local Economy

The regional profiles are designed to provide contextual understanding about the region in which the Defence bases are operating. The profile provides information about the region as a whole compared to the Northern Territory and Australia. The source of the data used in the profile is the ABS Census 2006. The objective of this section is to provide an overview of the local economy in which the Defence facilities operate.

4.1 Darwin Region

For data collection purposes and analysis, the Darwin has been defined by the ABS Census statistical subdivision. This makes it easier to match statistical information with the economic catchments used in this study. The Darwin Region is contained by the statistical sub divisions (SSD) Darwin City and Palmerston-East Arm as defined in Chart 3.1.1 below. The Darwin Region is part of the larger Darwin statistical division. These divisions are based on major statistical sub-divisions for Northern Territory that are used by the ABS, and is the region that the economic modelling undertaken in this study is based on.

Chart 4.1.1: Darwin Region



Source: Australian Bureau of Statistics – Census Data

Demographic Profile

The estimated resident population of the Darwin Region in 2006 was around 78,000. Population growth in the region of 1.4 per cent was stronger than both Northern Territory (1.0 per cent) and Australia (1.1 per cent) over the 10-years to 2006.

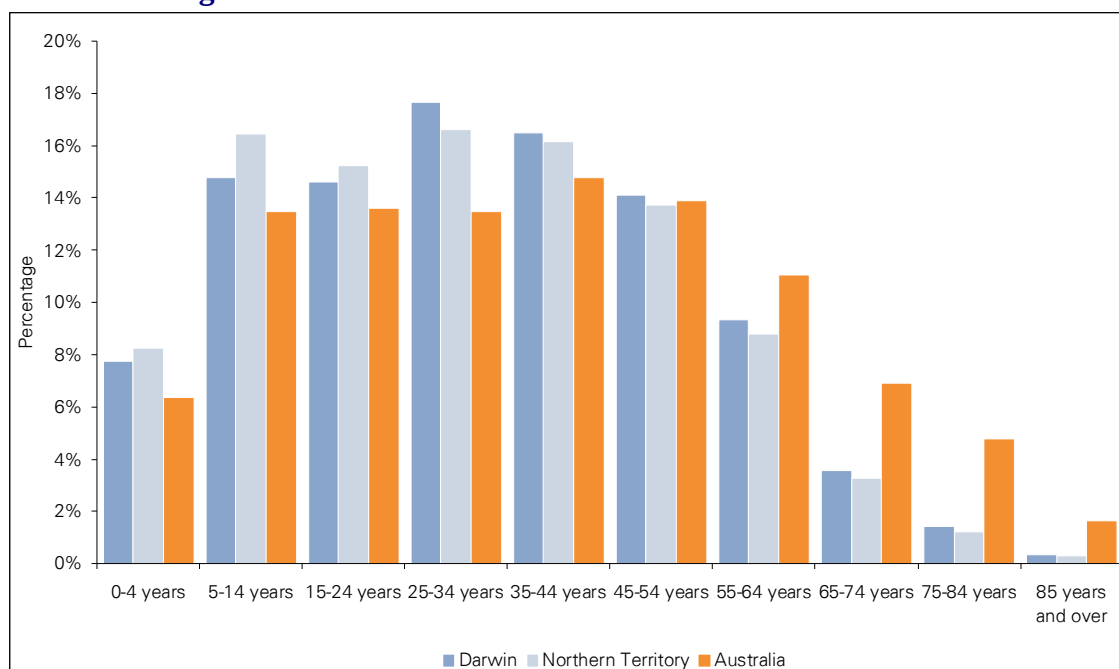
Table 4.1.1 Darwin Region - Rates of Population Growth - 1996 - 2006

	Population			CAGR		
	1996	2001	2006	1996-2001	2001-2006	1996-2006
Darwin Region	78,394	84,725	90,435	1.6%	1.3%	1.4%
Northern Territory	175,342	183,799	192,898	0.9%	1.0%	1.0%
Australia	17,752,829	18,588,308	19,855,288	0.9%	1.3%	1.1%

Source: ABS Census

Note: CAGR = Compounded annual growth rate

Chart 4.1.2: Age Profile - 2006



Source: Australian Bureau of Statistics – Census Data

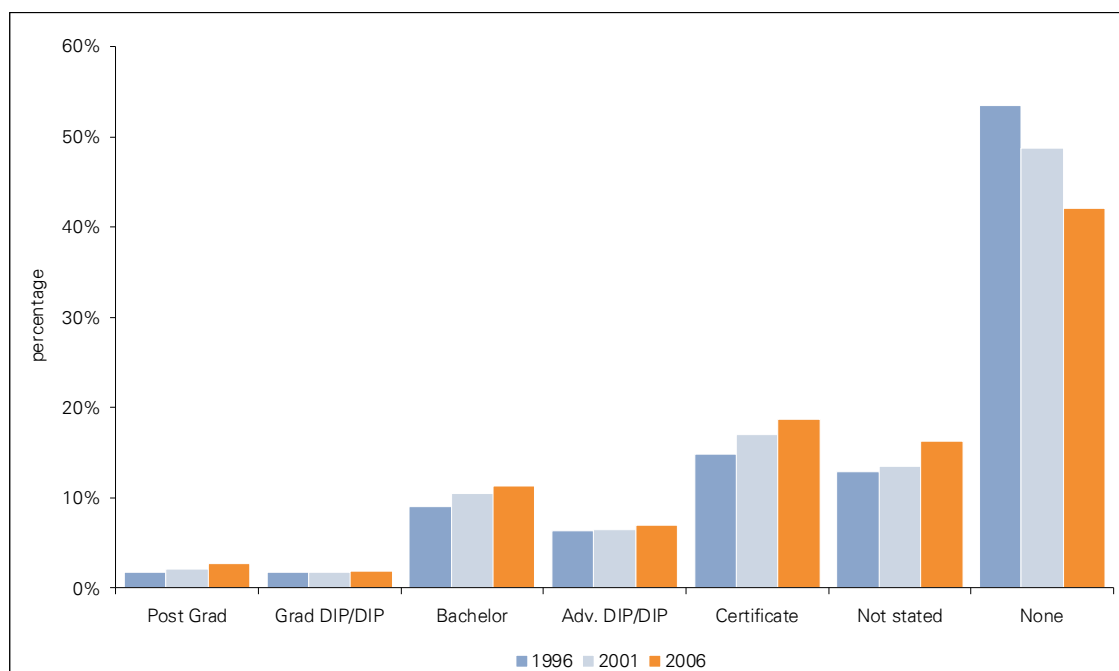
The Darwin Region has a higher proportion of children, young adults and middle aged (35-55 years) than Australia, similar to the Northern Territory as a whole, reflective of a younger population. This may be a result of imported labour from other regions, including people who move to the region for work opportunities, particularly in Defence positions.

Education

In the Darwin Region, 58.0 per cent of the population aged 15 years and over hold a post-school qualification (40,613 persons). The most common level of qualification are certificates (32.4 per cent of residents) and Bachelor Degree (19.5 per cent). The most common qualification by field of study in the Darwin Region was engineering and related technologies (16.0 per cent of all post-school qualifications held by residents), followed by management & commerce (14.0 per cent) and society and culture (9.7 per cent). These qualifications mirror the qualifications attained at the national level.

The following chart shows educational attainment in the Darwin Region across the past three Census collection nights. Over the 10-year period, the number of residents obtaining post school education has increased in all areas of attainment. Across the same period, the total number of residents with a post-school qualification has increased at an average annual rate of 3.9 per cent.

Chart 4.1.3: Darwin Region Educational Attainment – 1996, 2001, 2006



Source: Australian Bureau of Statistics – Census Data

Employment and Occupation

The Darwin Region has a significantly higher labour force participation rate than the Northern Territory and Australian average. This can be further explained by the high level of working aged population in the Darwin region.

Table 4.2.2 Labour Force Participation - 2006

	Darwin Region		Northern Territory		Australia	
	Number	% of total	Number	% of total	Number	% of total
Total labour force	47,970	68.5%	91,186	62.8%	9,607,984	60.4%
Not in the labour force	14,606	20.8%	37,149	25.6%	5,271,114	33.1%
Labour force not stated	7,479	10.7%	16,961	11.7%	1,038,978	6.5%
Total	70,055	100.0%	145,296	100.0%	15,918,076	100.0%

Source: ABS Census

Furthermore, the unemployment rate of 3.6 per cent in Darwin is significantly lower than the Northern Territory and Australian unemployment rates, of 4.4 per cent and 5.2 per cent respectively. This can be partly explained by the Australian Governments Community Development Employment Projects which supports Indigenous Australians to achieve economic independence. The initiative provides Indigenous Australians with community-managed activities to help build skills and improve employability.

Table 4.1.3 Labour Force Participation - 2006

	Darwin Region		Northern Territory		Australia	
	Number	% of total	Number	% of total	Number	% of total
Total Employed	46,250	96.4%	87,179	95.6%	9,104,175	94.8%
Total Unemployed	1,720	3.6%	4,007	4.4%	503,809	5.2%
Total	47,970		91,186		9,607,984	

Source: ABS Census

The most common employment occupation in the Darwin Region is Professionals, as is also the case in the Northern Territory and Australia. Clerical workers and Technicians in the Darwin Region were the next most common.

Table 4.1.4 Occupation Profile - 2006

	Darwin Region		Northern Territory		Australia	
	Number	%	Number	%	Number	%
Managers	5,895	12.7%	10,542	12.1%	1,202,261	13.2%
Professionals	9,194	19.9%	15,841	18.2%	1,806,016	19.8%
Technicians	6,953	15.0%	12,870	14.8%	1,309,256	14.4%
Community	5,525	11.9%	10,910	12.5%	801,902	8.8%
Clerical	7,628	16.5%	12,672	14.5%	1,365,810	15.0%
Sales Workers	3,943	8.5%	6,437	7.4%	896,209	9.8%
Machinery	2,516	5.4%	5,105	5.9%	604,616	6.6%
Labourer	3,797	8.2%	10,364	11.9%	952,519	10.5%
Other	804	1.7%	2,437	2.8%	165,595	1.8%
Total	46,255	100.0%	87,178	100.0%	9,104,184	100.0%

Source: ABS Census

Industry Profile

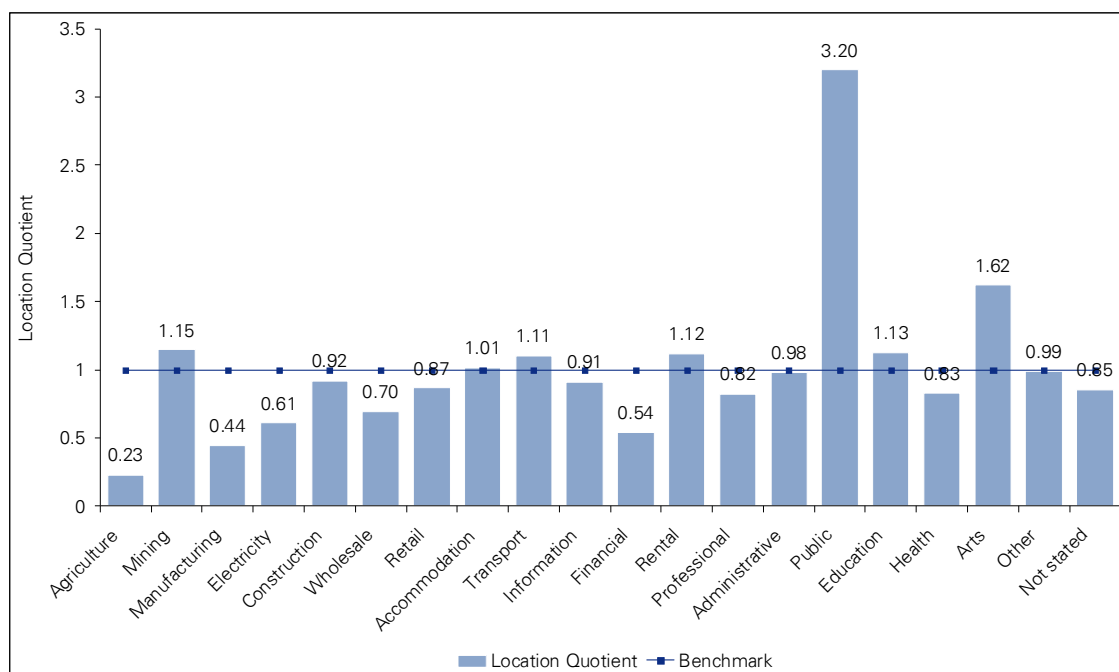
The chart below shows location quotients for Darwin Region for each industry sector. Location quotients give an indication of which industry sectors are significant in the region, and are based

on regional employment by industry⁴. A location quotient greater than 1 indicates that an industry is relatively concentrated in the region, compared to Australia as a whole.

This analysis indicates that the Darwin Region has a high concentration of employment in Public administration and safety industry, compared to the national average. This result is unsurprising given the presence of numerous Defence facilities in the Darwin Region and Defence employment is a component of the Public administration and safety industry.

Other significant industries in the Darwin Region are: Arts and recreation services; Mining; Transport, postal and warehousing; Rental hiring and real estate services; and Education and training.

Chart 4.1.4: Darwin Region - Industry Profile 2006



Source: Australian Bureau of Statistics – Census Data

The following table shows the percentage of persons employed by industry on census nights in 1996, 2001 and 2006. In 2006, the industries employing the largest number of people are Public administration and safety (21.4 per cent), followed by Retail trade (9.8 per cent).

⁴ Location Quotient = ((regional employment in industry_(i) in year_(t)) / total regional employment in year_(t)) / (national employment in industry_(i) in year_(t)) / (total national employment in year_(t))

Table 4.1.5 Employment by industry - Darwin Region

	1996		2001		2006		CAGR
	People	%	People	%	People	%	1996-2006
Agriculture, forestry & fishing	318	0.8%	428	1.0%	325	0.7%	0.2%
Mining	528	1.3%	400	0.9%	623	1.3%	1.7%
Manufacturing	1,645	4.2%	2,021	4.8%	2,144	4.6%	2.7%
Electricity, gas, water & waste services	270	0.7%	490	1.2%	277	0.6%	0.3%
Construction	3,041	7.7%	2,403	5.7%	3,307	7.1%	0.8%
Wholesale trade	1,607	4.1%	1,671	3.9%	1,401	3.0%	-1.4%
Retail trade	3,597	9.1%	4,416	10.4%	4,545	9.8%	2.4%
Accommodation & food services	2,945	7.5%	3,213	7.6%	2,959	6.4%	0.0%
Transport, postal & warehousing	1,774	4.5%	2,217	5.2%	2,403	5.2%	3.1%
Information media & telecommunications	956	2.4%	950	2.2%	816	1.8%	-1.6%
Financial & insurance services	1,030	2.6%	988	2.3%	961	2.1%	-0.7%
Rental, hiring & real estate services	773	2.0%	846	2.0%	877	1.9%	1.3%
Professional, scientific & technical services	2,087	5.3%	2,657	6.3%	2,520	5.4%	1.9%
Administrative & support services	1,136	2.9%	1,531	3.6%	1,430	3.1%	2.3%
Public administration & safety	7,244	18.4%	7,494	17.7%	9,891	21.4%	3.2%
Education & training	3,049	7.7%	3,564	8.4%	3,989	8.6%	2.7%
Health care & social assistance	3,509	8.9%	3,668	8.6%	4,014	8.7%	1.4%
Arts & recreation services	975	2.5%	824	1.9%	1,049	2.3%	0.7%
Other services	1,528	3.9%	1,619	3.8%	1,704	3.7%	1.1%
Inadequately described/Not stated	1,359	3.5%	1,042	2.5%	1,024	2.2%	-2.8%
Total	39,371	100.0%	42,442	100.0%	46,259	100.0%	1.6%

Source: ABS Census

38.82%

12.87%

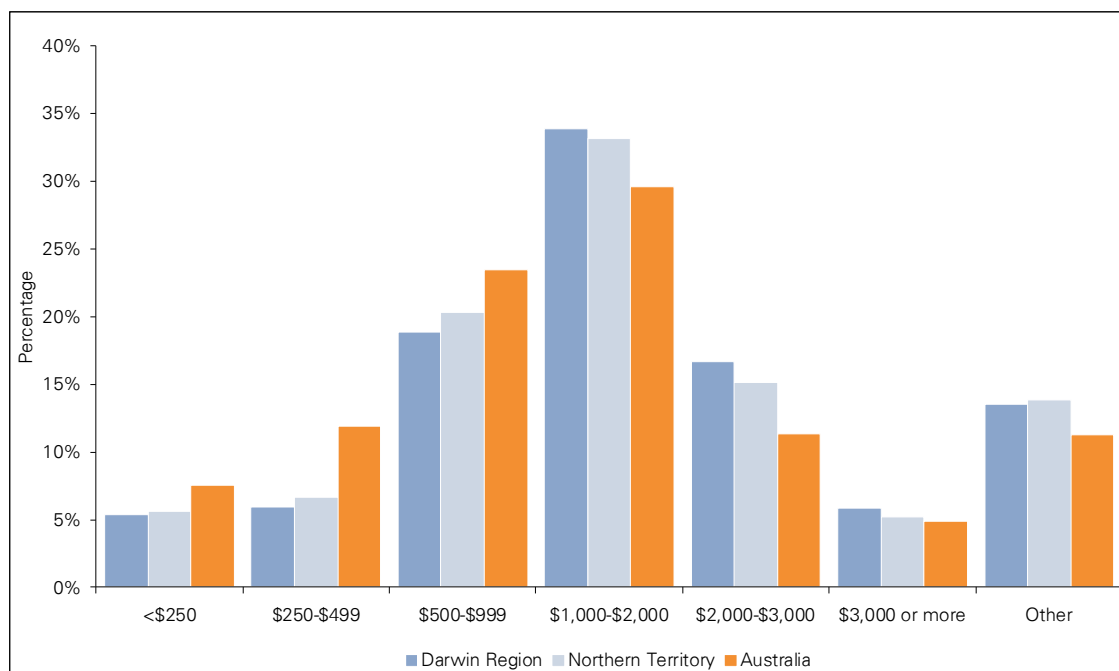
Employment in the Darwin Region increased 17.6 per cent over the ten-year period. Industries that contributed to the growth in the period were Public administration and safety, Retail trade and Education and training. This was partially offset by a decrease in wholesale trade, information media and telecommunications and financial services.

Income Profile

The income of households living in the Darwin Region is an important indicator of their socio-economic status. The 2006 Census data indicates that the Darwin Region residents are relatively wealthy compared to Northern Territory and Australia. Consistent with this, the median weekly household income in the Darwin Region (Darwin \$1,286 Palmerston \$1,255) is significantly higher than in the Northern Territory (\$549) and Australia (\$1,027). The income distribution shows that a larger proportion of employees in the Darwin region are in the mid to high end of the income scale when compared to the state and national averages. The can partly be explained by the high concentration of people employed in the Public Administration and safety industry which includes Defence personnel. This industry has a higher average weekly earnings of \$1348 compared to the average across all industries of \$1291 per week.⁵

⁵ Australian Bureau of Statistics (cat 6302.0) - Average Weekly Earnings, Australia, Feb 2010

Chart 4.1.5: Income Distribution - 2006



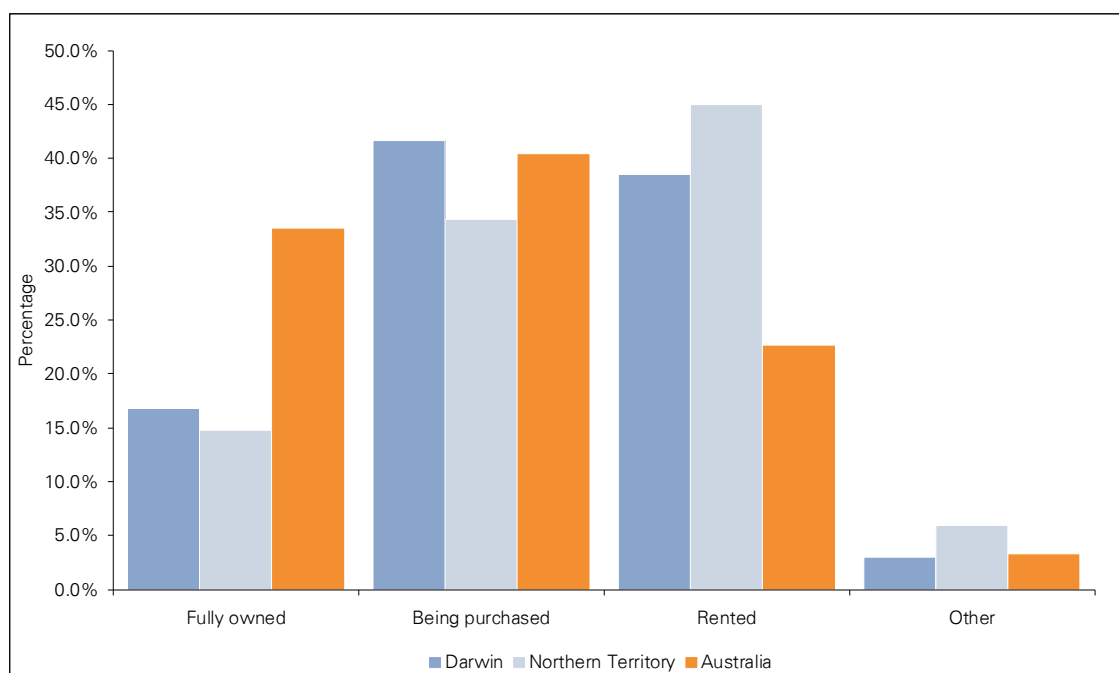
Source: Australian Bureau of Statistics – Census Data

Household Tenure

The following chart shows the house ownership structure in the Darwin region compared to Northern Territory and Australia in 2006. The median weekly rent in Darwin Region (Darwin \$200, Palmerston \$182) is significantly higher than the Northern Territory median (\$140) and higher than the median of the Australian figure (\$190). Despite the higher rent seen in Darwin, the Darwin Region still contain a larger proportion of households that are renting, almost double the proportions renting in Australia as a whole. There is a clear seasonality effect in net-interstate migration,⁶ which can be indicative of a transient city. As such, this may explain the high proportion of people renting as they have only temporarily moved to this state.

⁶ ABS Australian Demographic Statistics, Sep 2008 (cat 3101.0)

Chart 4.1.6: Household Tenure 2006

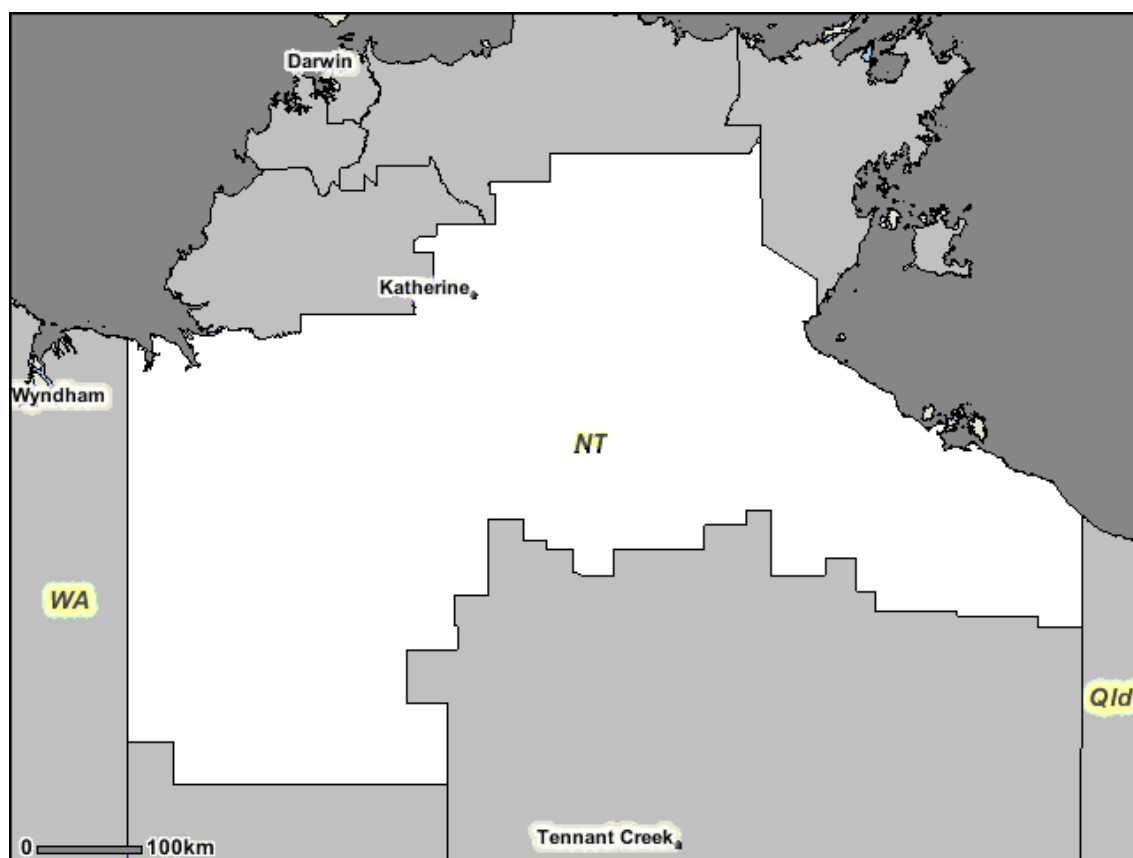


Source: Australian Bureau of Statistics – Census Data

4.2 Katherine Region

For data collection and analysis purposes, the Katherine Region has been defined by the ABS Census statistical areas. This makes it easier to match statistical information with the economic catchments used in this study. The Katherine Region is contained by the statistical subdivision (SSD) Lower Top End NT.

Chart 4.2.1: Katherine Region



Source: Australian Bureau of Statistics – Census Data

Demographic Profile

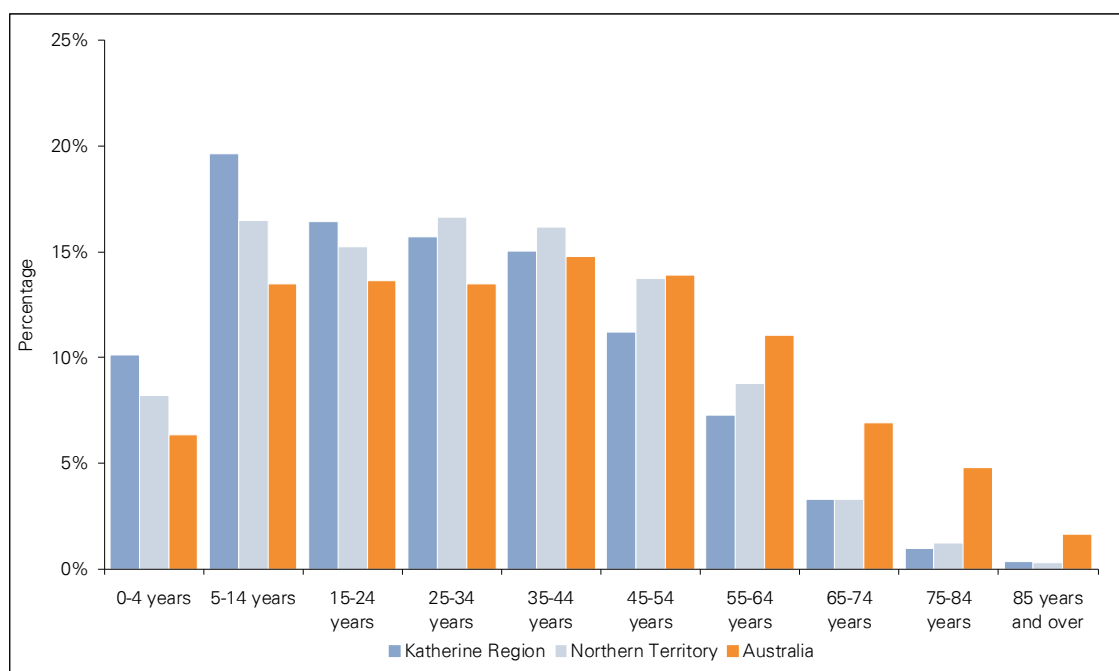
The estimated resident population of the Katherine Region in 2006 was 16,464 persons. The population in the Katherine Region increased by 0.3 per cent on average over the 1996-2006 period, unlike the Northern Territory and Australia, which experienced faster growth over the same period. The Katherine region experienced subdued growth over the 2001-2006 period. This is unsurprising given the region is very sparse and contains no major cities and few population centres.

Table 4.2.1 Katherine Region - Rates of Population Growth - 1996 - 2006+C48

	1996	2001	Population 2006	1996-2001	2001-2006	CAGR 1996-2006
Katherine Region	15,913	16,260	16,464	0.4%	0.2%	0.3%
Northern Territory	175,342	183,799	192,898	0.9%	1.0%	1.0%
Australia	17,752,829	18,588,308	19,855,288	0.9%	1.3%	1.1%

Source: ABS Census

Chart 4.2.2: Age Profile - 2006



Source: Australian Bureau of Statistics – Census Data

Similar to Northern Territory, the Katherine Region has a higher proportion of children and people aged 15 to 35 years than Australia. The Katherine Region also contains a lower proportion of older people, reflective of a younger population, again similar to the Territory as a whole.

Education

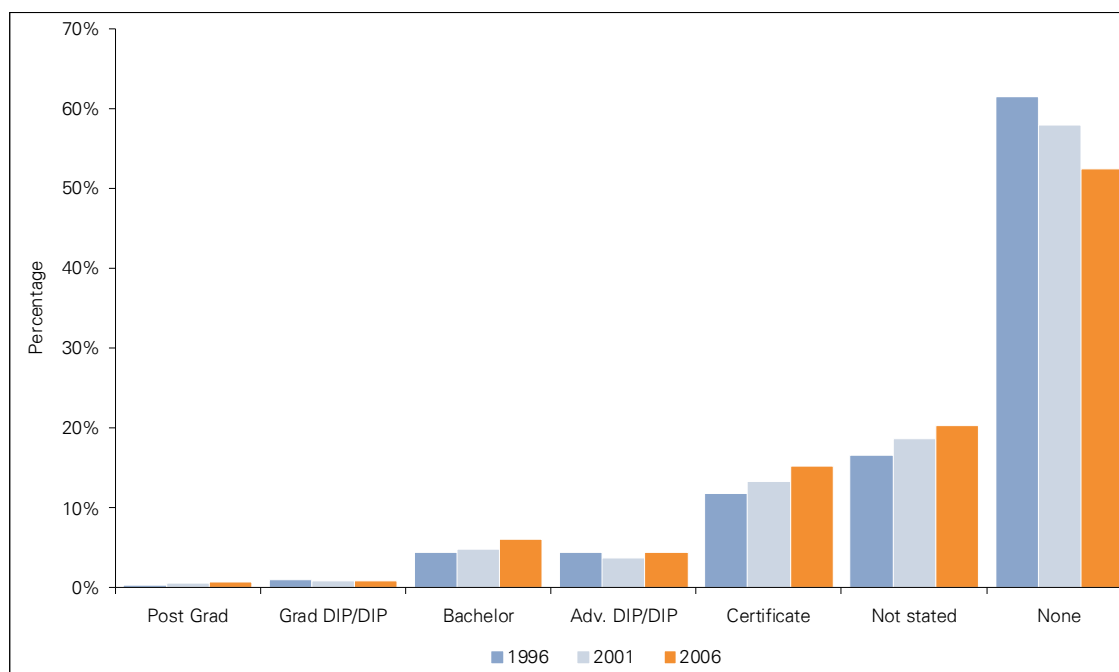
In the Katherine Region, 47.5 per cent of the population 15 years and over hold a post-school qualification (5,494 persons). Of these residents, 31.9 per cent hold a Certificate and 12.8 per cent hold a Bachelor Degree.

The most common qualification by field of study in the Katherine Region on Census night 2006 was Engineering and related technologies (14.6 per cent of all post-school qualifications held by residents), followed by Management & commerce (9.0 per cent) and Health (7.2 per cent).

The following chart shows the educational attainment in the Katherine Region across the past three Census collection nights. Over the 10-year period, the number of residents obtaining post school education has increased in all areas with the exception of Advanced and Graduate Diplomas, which has remained constant over the period. Across the same period, the total

number of residents without a post-school qualification has decreased at an average annual rate of 1.0 per cent.

Chart 4.2.3: Katherine Region Educational Attainment – 1996, 2001, 2006



Source: Australian Bureau of Statistics – Census Data

The Katherine Region has a significantly lower participation rate than the Northern Territory and Australia.

Table 4.2.2 Labour Force Participation - 2006						
	Katherine Region		Northern Territory		Australia	
	Number	% of total	Number	% of total	Number	% of total
Total labour force	6,610	57.2%	91,186	62.8%	9,607,984	60.4%
Not in the labour force	3,106	26.9%	37,149	25.6%	5,271,114	33.1%
Labour force not stated	1,848	16.0%	16,961	11.7%	1,038,978	6.5%
Total	11,564	100.0%	145,296	100.0%	15,918,076	100.0%

Source: ABS Census

The unemployment rate of 5.7 per cent in the Katherine Region is significantly higher than the Northern Territory rate of 4.4 and the Australian rate of 5.2.

Table 4.2.3 Labour Force Participation - 2006						
	Katherine Region		Northern Territory		Australia	
	Number	% of total	Number	% of total	Number	% of total
Total Employed	6,234	94.3%	87,179	95.6%	9,104,175	94.8%
Total Unemployed	376	5.7%	4,007	4.4%	503,809	5.2%
Total	6,610		91,186		9,607,984	

Source: ABS Census

The low participation rate and high unemployment rate may be explained by the size and remoteness of the Katherine Region and lack of employment opportunities within the region.

Table 4.2.4 Occupation Profile - 2006

	Katherine Region		Northern Territory		Australia	
	Number	%	Number	%	Number	%
Managers	724	11.6%	10,542	12.1%	1,202,261	13.2%
Professionals	845	13.6%	15,841	18.2%	1,806,016	19.8%
Technicians	907	14.5%	12,870	14.8%	1,309,256	14.4%
Community	875	14.0%	10,910	12.5%	801,902	8.8%
Clerical	649	10.4%	12,672	14.5%	1,365,810	15.0%
Sales Workers	349	5.6%	6,437	7.4%	896,209	9.8%
Machinery	278	4.5%	5,105	5.9%	604,616	6.6%
Labourer	1,305	20.9%	10,364	11.9%	952,519	10.5%
Other	302	4.8%	2,437	2.8%	165,595	1.8%
Total	6,234	100.0%	87,178	100.0%	9,104,184	100.0%

Source: ABS Census

The most common employment occupation in the Katherine Region was Labourers followed by Technicians. Residents employed as Professionals and Clerical workers were the next most common.

Industry Profile

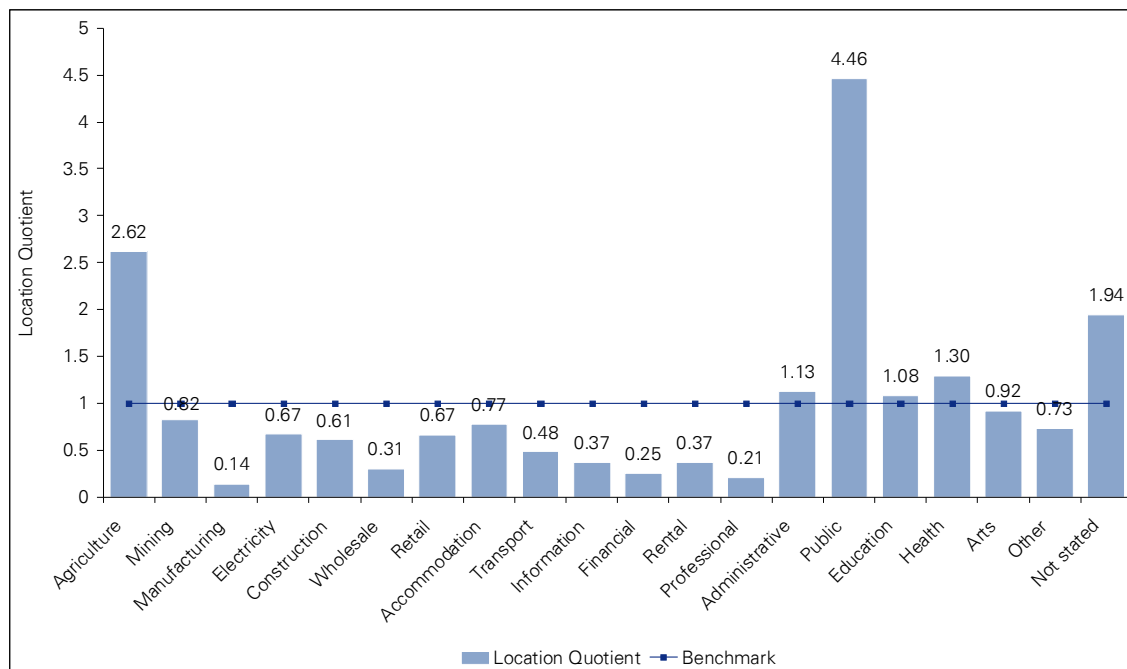
The chart below shows location quotients for the Katherine Region for each industry sector. Location quotients give an indication of which industry sectors are significant in the region, and are based on regional employment by industry⁷. A location quotient greater than 1 indicates that an industry is relatively concentrated in the region, compared to Australia as a whole.

This analysis indicates that the Katherine Region has a high concentration of employment in the Public administration and safety industry. Similar to the Darwin Region, this result is expected given a large defence facility, the RAAF Base Tindal is located in the Katherine Region.

Other significant industries in the Katherine Region in 2006 include: Administrative & support services, Education & training, and Health care & social assistance. Consistent with the limited employment opportunities, other industries are significantly underrepresented, highlighting the importance of RAAF Tindal to the region as a whole.

⁷ Location Quotient = ((regional employment in industry_(i) in year_(t) / total regional employment in year_(t)) / (national employment in industry_(i) in year_(t)) / (total national employment in year_(t)))

Chart 4.2.4: Katherine Region - Industry Profile 2006



Source: Australian Bureau of Statistics – Census Data

The following table shows the percentage of persons employed on census nights in 1996, 2001 and 2006. In 2006, the industries employing the largest number of people were Public administration and safety, Health care and social assistance; and Agriculture forestry and fishing.

Table 4.2.5 Employment by industry - Katherine Region

	People	1996 %	People	2001 %	People	2006 %	CAGR 1996-2006
Agriculture, forestry & fishing	480	7.5%	464	7.3%	505	8.1%	0.5%
Mining	221	3.5%	76	1.2%	60	1.0%	-12.2%
Manufacturing	168	2.6%	91	1.4%	90	1.4%	-6.1%
Electricity, gas, water & waste services	59	0.9%	75	1.2%	41	0.7%	-3.6%
Construction	263	4.1%	308	4.8%	296	4.7%	1.2%
Wholesale trade	132	2.1%	162	2.5%	83	1.3%	-4.5%
Retail trade	430	6.7%	468	7.4%	472	7.6%	0.9%
Accommodation & food services	398	6.2%	402	6.3%	305	4.9%	-2.6%
Transport, postal & warehousing	164	2.6%	159	2.5%	141	2.3%	-1.5%
Information media & telecommunications	37	0.6%	49	0.8%	45	0.7%	2.0%
Financial & insurance services	76	1.2%	60	0.9%	60	1.0%	-2.3%
Rental, hiring & real estate services	32	0.5%	52	0.8%	39	0.6%	2.0%
Professional, scientific & technical services	133	2.1%	149	2.3%	87	1.4%	-4.2%
Administrative & support services	156	2.4%	188	3.0%	221	3.5%	3.5%
Public administration & safety	1,845	28.9%	2,114	33.2%	1,861	29.8%	0.1%
Education & training	465	7.3%	450	7.1%	516	8.3%	1.0%
Health care & social assistance	815	12.7%	582	9.1%	848	13.6%	0.4%
Arts & recreation services	50	0.8%	73	1.1%	80	1.3%	4.8%
Other services	210	3.3%	238	3.7%	170	2.7%	-2.1%
Inadequately described/Not stated	261	4.1%	206	3.2%	315	5.1%	1.9%
Total	6,395	100.0%	6,366	100.0%	6,235	100.0%	-0.3%

Source: ABS Census

32.24% 16.36%

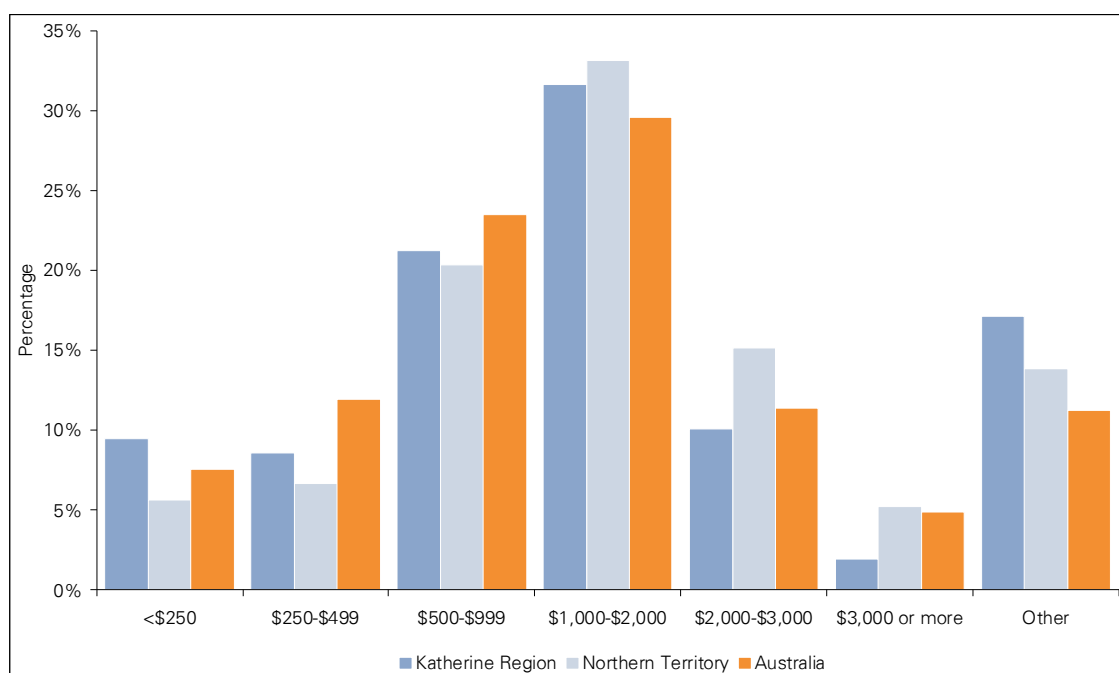
Employment in the Katherine Region decreased 0.3 per cent over the ten-year period from 1996-2006. The decline was driven by falls in the Mining, Manufacturing and Professional,

scientific and technical services industries. This was partially offset by an increase in employment in the Arts and recreation services industry.

Income Profile

The income of households living in the Katherine Region is an important indicator of their socio-economic status. The 2006 Census data indicates that the Katherine Region residents are relatively wealthy compared to Northern Territory. The median weekly household income in the Katherine Region (\$1,040) is significantly higher than the Northern Territory (\$549) and higher than Australia (\$1,027). Similar to the Darwin Region, the income distribution shows that 50 per cent of employees in the Katherine Region are in the mid to high end of the income scale when compared to the state and national averages. This can partly be explained by the high concentration of people employed in the Public Administration and safety industry which includes Defence personnel. This industry has a higher average weekly earnings of \$1348 compared to the average across all industries of \$1291 per week

Chart 4.2.5: Income Distribution 2006

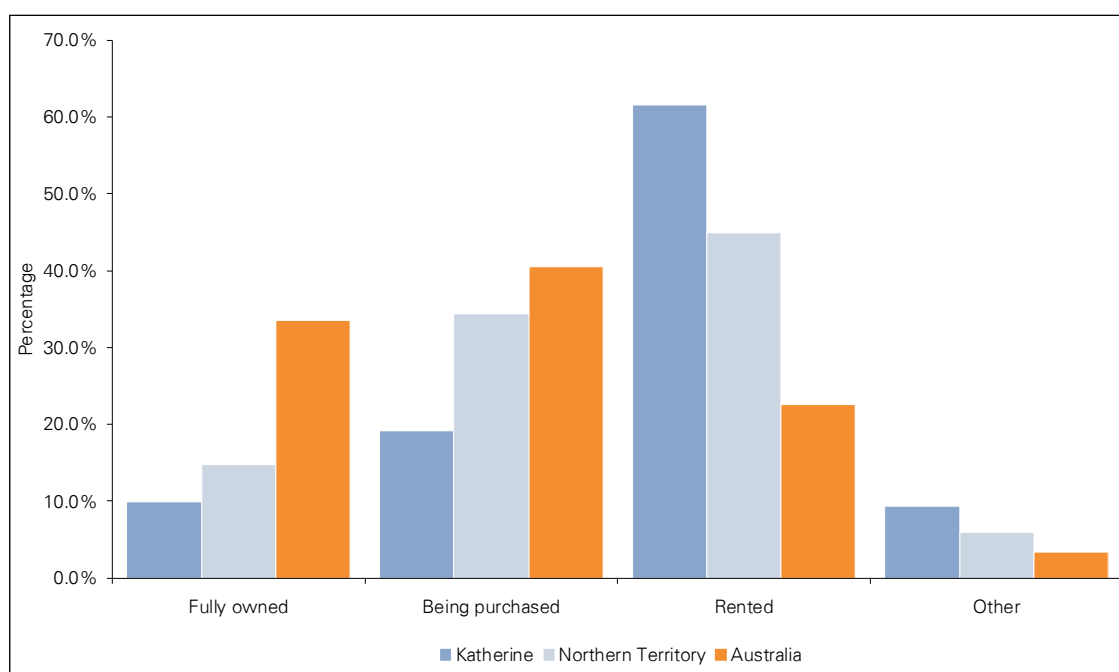


Source: Australian Bureau of Statistics – Census Data

Household Tenure

The following chart shows the house ownership structure in the Katherine Region compared to Northern Territory and Australia in 2006. The Katherine Region also contains a larger proportion of households that are renting, more than double the proportions renting in the Northern Territory and Australia. The median weekly rent in the Katherine Region (\$75) was significantly lower than the Northern Territory median (\$140) and the median for Australian (\$190). The low rental costs combined with the remoteness of the region goes some way to explaining the high incidence of renting.

Chart 4.2.6: Household Tenure



Source: Australian Bureau of Statistics – Census Data

5 Modelling Inputs

As outlined in Section 2.1, the Defence facilities contribute directly to employment and expenditure in the regional economies. Estimates of the direct impacts for each facility have been used as inputs into MMR to determine the indirect or flow-on activity that is supported by the respective facilities. The following section details the main data inputs that are used to model the scenarios that are outlined in section 2.2.

For the purposes of this study, four major direct impacts have been identified and estimated to be used as inputs into MMR. These impacts represent the economic activity that would not occur within the regional economies if the Defence facilities ceased to operate in the region.

- Defence facility employees – each facility directly employs permanent staff, including ADF and APS personnel.
- Contractor employees – the Defence facilities directly employ contractors to provide services such as facilities maintenance, equipment maintenance, and IT and technical support.
- Defence facility expenditure – each Defence facility contributes directly to turnover in the regional economies through expenditure on goods and services, and through capital expenditure on equipment and infrastructure⁸.
- Visitor expenditure – both the Bradshaw Training Area and the Mount Bundey Military Training Area support economic activity by hosting a large number of visitors each year that attend the facilities for training purposes. These visitors purchase on goods and services from the local economy.

Estimates of the direct impacts of each facility were sourced by the Department of Defence and provided to KPMG Econtech. Following consultation with relevant stakeholders, the estimated direct impacts for each facility were converted into an appropriate data set to be used as an input into MMR. All estimates of direct impacts are based on employment and expenditure in the 2007/08 financial year. Employment and expenditure are shock variables within MMR which are used to simulate the economic impact of Defence facilities.

Where estimates of both employment and expenditure were available, employment impacts were used as the favoured shock variable. This was done to avoid double counting the direct impacts of facilities. Employment and expenditure are interlinked within the model, as expenditure on wages and operating costs is related to employment. As such, removing Defence employment from the model impacts on Defence expenditure in the model. Alternatively, reducing Defence expenditure in the model leads to lower Defence employment. Hence, reducing both expenditure and employment for a given facility would double count the direct impact, *unless* the expenditure is not directly associated with employment at the facility.

Estimates of direct employment and direct expenditure were used within MMR, to simulate the impact of removing the facilities. Specifically, estimated employment impacts were entered into MMR as employment shocks broken down by Australia and New Zealand Standard

⁸ Note that capital expenditure only has a direct impact on the regional economy when assets are purchased from local sources. For example, capital expenditure on hardware and equipment that is imported into the region does not have a direct impact on the regional economy.

Industry Classification (ANZSIC) industry. Estimated expenditure impacts were entered into MMR as expenditure shocks broken down by ANZSIC industry.

Defence provided estimates of employment and estimates of expenditure broken down by expense category for each of the bases, as detailed in the following sections.

5.1.1 RAAF Base Darwin Direct Impacts

RAAF Base Darwin contributes directly to the Darwin economy by employing staff and contractors, and by spending money on operations and capital within the regional economy.

In 2007/08, RAAF Base Darwin is estimated to have directly employed a total of 641 FTEs, which are predominantly Defence employees and contractors. These employees are split between two industries, Government Administration and Defence and Property and Business Services.

In 2007/08, RAAF Base Darwin is estimated to have spent \$43 million in Northern Territory on wages, capital and operating expenses. A breakdown of these expenses is presented in the following Table.

Table 5.1: RAAF Base Darwin Expenses (\$2007-08)

RAAF Base Darwin - Expenses	
Expense Category	Expenditure (\$m)
Salaries	22.7
Utilities (elec)	2.8
Utilities (gas, water, sewerage)	1.1
Garrison Support	4.3
Comprehensive Maintenance Services Fees	4.5
General Suppliers	1.1
Facilities Operations (FACOPS)	6.7
Total	43.2

Source: KPMG Econtech estimates based on information provided by the Department of Defence

** Data has been inflated from 2006/07 to 2007/08. It has been adjusted for price inflation only and does not take into account any growth that may have occurred during this period*

Modelling Inputs

Based on the estimates presented above, the direct employment impacts were identified as an appropriate input to model the economic impacts of RAAF Base Darwin. It is important to note that we did not remove the Gross Replacement Value of RAAF Base Darwin from the economy as the modelling captures the impact of the facility no longer being operational, not the impact of closing the base itself.

Table 5.2: RAAF Base Darwin Modelling Inputs

RAAF Base Darwin - Modelling inputs	
Industry	Total FTEs (jobs)
Property and Business Services	168
Government Administration and Defence	473
Total	641

Source: KPMG Econtech estimates based on information provided by the Department of Defence

5.1.2 Larrakeyah Defence Precinct Direct Impacts

The Larrakeyah Defence Precinct⁹ contributes directly to the Darwin economy by employing staff and contractors, and by spending money on operations and capital within the regional economy.

In 2007/08 the Larrakeyah Defence Precinct is estimated to have directly employed a total of 1,046 FTE's.

In 2007/08, the Larrakeyah Defence Precinct is estimated to have spent \$32 million in Northern Territory on wages, capital and operating expenses. A breakdown of these expenses is presented in the following Table.

Table 5.3: Larrakeyah Defence Precinct Expenses (\$2007-08)

Larrakeyah Defence Precinct - Expenses	
Expense Category	Expenditure (\$m)
Salaries	16.8
Utilities (elec)	2.2
Utilities (gas, water, sewerage)	0.6
Garrison Support	2.7
Comprehensive Maintenance Services Fees	3.6
General Suppliers	1.4
Facilities Operations (FACOPS)	4.7
Total	32.0

Source: KPMG Econtech estimates based on information provided by the Department of Defence

** Data has been inflated from 2006/07 to 2007/08. It has been adjusted for price inflation only and does not take into account any growth that may have occurred*

⁹ Larrakeyah Defence Precinct includes the estimates provided for Coonawarra and Fleet Base North

Modelling Inputs

Based on the estimates presented above, the direct employment impacts were identified as an appropriate input to model the economic impacts of Larrakeyah Defence Precinct. It is important to note that we did not remove the GRV of the precinct from the economy as the modelling captures the impact of the facility no longer being operational, not the impact of closing the base itself. As such, the modelling inputs for Larrakeyah Defence Precinct are presented in the following table.

Table 5.4: Larrakeyah Defence Precinct Modelling Inputs

Larrakeyah Defence Precinct - Modelling Inputs	
Industry	Total FTEs (jobs)
Property and Business Services	96
Government Administration and Defence	950
Total	1,046

Source: KPMG Econtech estimates based on information provided by the Department of Defence

5.1.3 Defence Establishment Berrimah Direct Impacts

The Defence Establishment Berrimah contributes directly to the Darwin economy by employing staff and contractors, and by spending money on operations and capital within the regional economy.

In 2007/08, Defence Establishment Berrimah is estimated to have directly employed a total of 117 FTE's.

In 2007/08, Defence Establishment Berrimah is estimated to have spent \$15.6 million in Northern Territory on wages, capital and operating expenses. A breakdown of these expenses is presented in the following Table.

Table 5.5: Defence Establishment Berrimah Expenses (\$2007-08)

Defence Establishment Berrimah - Expenses	
Expense Category	Expenditure (\$m)
Salaries	9.3
Utilities (elec)	1.2
Utilities (gas, water, sewerage)	0.3
Garrison Support	3.0
Comprehensive Maintenance Services Fees	0.7
Facilities Operations (FACOPS)	1.0
Total	15.6

Source: KPMG Econtech estimates based on information provided by the Department of Defence

** Data has been inflated from 2006/07 to 2007/08. It has been adjusted for price inflation only and does not take into account any growth that may have occurred*

Modelling Inputs

Based on the estimates presented above, the direct employment impacts were identified as an appropriate input to model the economic impacts of Defence Establishment Berrimah. It is important to note that we did not remove the GRV of DEB from the regional economy as the modelling captures the impact of the facility no longer being operational, not the impact of closing the base itself. As such, the modelling inputs for Defence Establishment Berrimah are presented in the following table.

Table 5.6: Defence Establishment Berrimah Modelling Inputs

Defence Establishment Berrimah	
Industry	Total FTEs (jobs)
Property and Business Services	0
Government Administration and Defence	117
Total	117

Source: KPMG Econtech estimates based on information provided by the Department of Defence

5.1.4 Robertson Barracks Direct Impacts

The Robertson Barracks contributes directly to the Darwin economy by employing staff and contractors, and by spending money on operations and capital within the regional economy.

In 2007/08 the Robertson Barracks is estimated to have directly employed a total of 3828 FTE's.

In 2007/08, Robertson Barracks is estimated to have spent \$181 million in Northern Territory on wages, capital and operating expenses. A breakdown of these expenses is presented in the following Table.

Table 5.7: Robertson Barracks Expenses (\$2007-08)

Robertson Barracks - Expenses	
Expense Category	Expenditure (\$m)
Salaries	144.9
Utilities (elec)	5.4
Utilities (gas, water, sewerage)	0.7
Garrison Support	8.0
Comprehensive Maintenance Services Fees	10.0
Facilities Operations (FA COPS)	12.4
Total	181.5

Source: KPMG Econtech estimates based on information provided by the Department of Defence

** Data has been inflated from 2006/07 to 2007/08. It has been adjusted for price inflation only and does not take into account any growth that may have occurred*

Modelling Inputs

Based on the estimates presented above, the direct employment impacts were identified as an appropriate input to model the economic impacts of Robertson Barracks. It is important to note that we did not remove the GRV of the Barracks from the economy as the modelling captures

the impact of the facility no longer being operational, not the impact of closing the base itself. As such, the modelling inputs for Robertson Barracks are presented in the following table.

Table 5.8: Robertson Barracks Modelling Inputs

Robertson Barracks - Modelling Inputs	
Industry	Total FTEs (jobs)
Property and Business Services	300
Government Administration and Defence	3,828
Total	4,128

Source: KPMG Econtech estimates based on information provided by the Department of Defence

5.1.5 RAAF Base Tindal Direct Impacts

The RAAF Base Tindal contributes directly to the Katherine economy by employing staff and contractors, and by spending money on operations and capital within the regional economy.

In 2007/08 the RAAF Base Tindal is estimated to have directly employed a total of 598 FTEs.

In 2007/08, the RAAF Base Tindal is estimated to have spent \$535 million in Northern Territory on wages, capital and operating expenses. A breakdown of these expenses is presented in the following Table.

Table 5.9: RAAF Base Tindal Expenses (\$2007-08)

RAAF Base Tindal - Expenses	
Expense Category	Expenditure (\$m)
Salaries	27.9
Utilities (elec)	3.4
Utilities (gas, water, sewerage)	0.5
Garrison Support	4.7
Comprehensive Maintenance Services Fees	8.4
Facilities Operations (FA COPS)	3.5
Total	48.4

Source: KPMG Econtech estimates based on information provided by the Department of Defence

* Data has been inflated from 2006/07 to 2007/08. It has been adjusted for price inflation only and does not take into account any growth that may have occurred

Modelling Inputs

Based on the estimates presented above, the direct employment impacts were identified as an appropriate input to model the economic impacts of RAAF Base Tindal. It is important to note that we did not remove the GRV of RAAF Base Darwin from the economy as the modelling captures the impact of the facility no longer being operational, not the impact of closing the base itself. As such, the modelling inputs for RAAF Base Tindal are presented in the following table.

Table 5.10: RAAF Base Tindal Modelling Inputs

RAAF Base Tindal - Modelling Inputs	
Industry	Total FTEs (jobs)
Property and Business Services	80
Government Administration and Defence	598
Total	678

Source: KPMG Econtech estimates based on information provided by the Department of Defence

5.1.6 Northern Territory Direct Impacts

The direct impacts of all of the Defence facilities on the Northern Territory economy is estimated as the sum of employment and expenditure impacts of each facility. This includes the five facilities discussed above, as well as some additional facilities that have not been modeled individually. The Defence facilities that have been included in this analysis are: RAAF Base Darwin; Defence Establishment Berrimah; Larrakeyah Defence Precinct; Robertson Barracks; Shoal Bay Receiving Station; RAAF Base Tindal; and the Northern Territory Training Areas. To capture the economic impact of the training facilities it is important to take into account the increased visitors and their spending in the region due to the exercises that the training areas play host to. Thus, the modelling also captures the expenditure from Naval ship visits to the region for these exercises.

In 2007/08 the Northern Territory Bases were estimated to have directly employed a total of 6155 FTEs.

In 2007/08, Defence had a total housing stock of 1,827 houses in the Darwin region and 193 houses in the Katherine region. The following table provides details housing and rental expenditure estimates.

Table 5.11: Northern Territory Housing Stock (\$2007-08)

Northern Territory Housing Stock		
	Darwin Region	Katherine Region
Total housing stock	1,827	193
Defence-owned	753	193
Assessed rent per annum	\$22,518,080	\$0
Defence Rental Assistance	\$2,498,028	\$91,000
New constructions	64	0
New direct lease/acquisitions	6	0

Source: KPMG Econtech estimates based on information provided by the Department of Defence

In 2007/08, the Northern Territory bases are estimated to have spent \$337 million in Northern Territory on wages, capital and operating expenses. A breakdown of these expenses is presented in the following Table.

Table 5.12: Northern Territory Expenses (\$2007-08)

Northern Territory - Expenses	
Expense Category	Expenditure (\$m)
Salaries	221.5
Utilities (elec)	16.3
Utilities (gas, water, sewerage)	3.2
Garrison Support	26.3
Comprehensive Maintenance Services Fees	29.1
General Suppliers	2.4
Facilities Operations (FA COPS)	38.2
Total	337.0

Source: KPMG Econtech estimates based on information provided by the Department of Defence

** Data has been inflated from 2006/07 to 2007/08. It has been adjusted for price inflation only and does not take into account any growth that may have occurred*

The Bradshaw Training Area and the Mount Bunday Military Training Area support economic activity by hosting a large number of visitors each year that visit the facilities for training purposes. In the case of these facilities, the Defence purchases items such as rations and fuel from the regional economy in order to facilitate training exercises.

In addition, there is induced spending in the state economy due to higher visitor numbers from Defence exercises (for example the training areas recently hosted two larger exercises, Exercise Pitch Black and Kakadu). Spending by training attendees is induced in the sense that the visitors would not have spent money in the Northern Territory economy had the training exercises not taken place. As such, this expenditure can be categorised as a direct impact of the training areas. This has flow-on impacts as visitors spend on goods and services in the local economy and stimulates the supply chain of businesses that sell consumer goods.

The Department of Business, Economic and Regional Development (BERD) assessed the economic impact of naval ship visits to the Port of Darwin. The study uses a survey on crew spend undertaken in 2007. This data has been used to estimate the approximate economic value of the naval ships visits from 1999 (when a peak number of ships visited the Port of Darwin) to 2007 (where the least number of ship visits occurred).

The survey included crew members from five Royal Australian Navy ships, four major fleet units and one minor war vessel, and one United States Navy major war survey. The survey estimated the average spend per sailor per day to be \$227.90 and the estimated crew spend for 2007 to be \$5.5 million. These figures were used to estimate the value of the sector in 2007 and an average over the years 1999 to 2007. The following table provides an estimate of these figures.

Table 5.13: Estimated value of naval ship visit to the Port of Darwin

Estimated Value of the Sector			
		2007	Avg 1999-2007
Crew Spend	\$	5,534,639	\$ 8,359,400
Husbandry	\$	580,000	\$ 3,570,000
Fuel Tariff	\$	178,994	\$ 202,800
Total	\$	6,293,633	\$ 12,132,200

Source: Department of Business, Economic and Regional Development (BERD)

Based on the survey data, the estimated value of the sector has been allocated across the ANZSIC industries used in MMR to capture the increased activity from the naval ship visits to the region. The survey provided estimates of the spend patterns of the sailors, broken into eight expense categories: Accommodation, Cafes and Restaurants; Electronic Equipment, Entertainment, Internet and Phone, Public Bars and Clubs, Shopping and Transportation. As such, the crew spend has been spread across a number of ANZSIC industries as presented in the following table.

Table 5.15: Estimated value of naval ship visit to the Port of Darwin by ANZSIC Industry

Estimated value of the sector by MMR Industry	
Industry	Expenditure (\$m)
Manufacturing	3.57
Retail Trade	2.16
Accommodation, Cafes and Restaurants	4.84
Transport and Storage	0.91
Cultural and Recreational Services	0.66
Total	12.13

Source: Department of Business, Economic and Regional Development (BERD)

Based on the estimates presented above, both employment and expenditure impacts were identified as an appropriate input to model the economic impacts for the Northern Territory Defence facilities. It is important to note that the modelling captures the economic impacts based on the difference between a baseline scenario (current situation) and a scenario under which the facilities cease operations. This is in contrast to a scenario under which the facilities close down. As such, the GRV of each facility has not been included.

The modelling inputs for the combined Defence facilities and induced activity from naval ship visits to Northern Territory are presented in the following table.

Table 5.15: Northern Territory Modelling Inputs

Total Northern Territory Defence Facilities - Modelling Inputs		
Industry	Total FTEs (jobs)	Expenditure (\$m)
Manufacturing		3.57
Retail Trade	-	2.16
Accommodation, Cafes and Restaurants	-	4.84
Transport and Storage	-	0.91
Property and Business Services	740	-
Government Administration and Defence	7,105	-
Cultural and Recreational Services	-	0.66
Total	7,845	12.13

Source: KPMG Econtech estimates based on information provided by the Department of Defence

6 Economic Impact of Major Defence Facilities in Regional Economies

Economic impact modelling was carried out at the regional economy level for five pivotal Defence facilities. The following section outlines the regional modelling results, presenting estimates of the current contribution of the Defence facilities to the regional economies in which they are located. The following estimates of employment, value added and consumption impacts represent the average annual economic impacts attributable to the facilities, based on reported activity in 2007/08.

6.1 Overview of Results

As is the case with each of the Bases, the results show that a sizable proportion of the overall employment impact occurs in the Government Administration and Defence industry, as each of the bases directly employs a large number of APS and ADF staff within that industry. As was noted in the region profiles, Defence contributes positively to both the Darwin and Katherine regions. This can be seen in the high concentration of employment in Public administration and safety industry, compared to the national average. Employees in this sector pay higher incomes, as such, the data shows higher median weekly household income in the Regions. These direct employment impacts produce positive indirect employment impacts in industries that supply goods and services to the Bases and sell consumer goods to the Bases' employees. Industries that benefit from demand created by Bases in the economy include: Retail Trade; Finance and Insurance; Education; and Health and Community Services.

At the same time, expenditure by each base on goods and services within the regional economy contributes to price pressures within some industries. As such, some negative employment impacts are felt in industries that experience a loss of competitiveness through higher input prices. For example, it is estimated that RAAF Base Darwin has negative indirect employment impacts on industries including: Manufacturing; Construction; Transport and Storage; and Property and Business Services. Importantly, the overall impact of the Defence base on employment in the Darwin region is positive.

These findings are consistent with the findings of previous modelling undertaken by KPMG Econtech for Defence, to measure the economic contribution of the RAAF Base, Richmond, to the Sydney economy. The pattern of direct and indirect impacts are consistent with previous findings that Defence bases create positive indirect impacts in consumer focused industries that sell goods to Defence employees, while negative indirect impacts are generally seen in trade-exposed industries. Negative indirect impacts stem from the fact that traded goods prices are determined in the national market. As such, industries producing traded goods are not able to raise the price of their output in response to changes in input prices. However, as discussed above, some of these trade-exposed industries use similar inputs to Defence and thus would be facing price pressures as a result of Defence's presence. Accordingly, those tradable industries that use a similar set of inputs to Defence and does not sell a large proportion of their goods to the Defence bases or to Defence employees are worse off as a result of Defence's presence.

To take a specific example, the Base increases the demand for goods and services produced by industries such as Finance and Insurance. This industry produces non-tradeable goods and services, and therefore they focus on selling in the Darwin region only. As such, industry production levels and prices for these services are determined by local demand. The Base

increases local demand and therefore leads to an increase in the prices charged by the Finance and Insurance industries. These higher prices would have a slight negative impact on industries that use these goods and services. Hence, production and employment in some industries, such as Property and Business Services, will be slightly lower, as businesses in these industries pay higher prices for business inputs. Importantly, Defence bases contribute positively to employment, value added and consumption in the region in which they are situated.

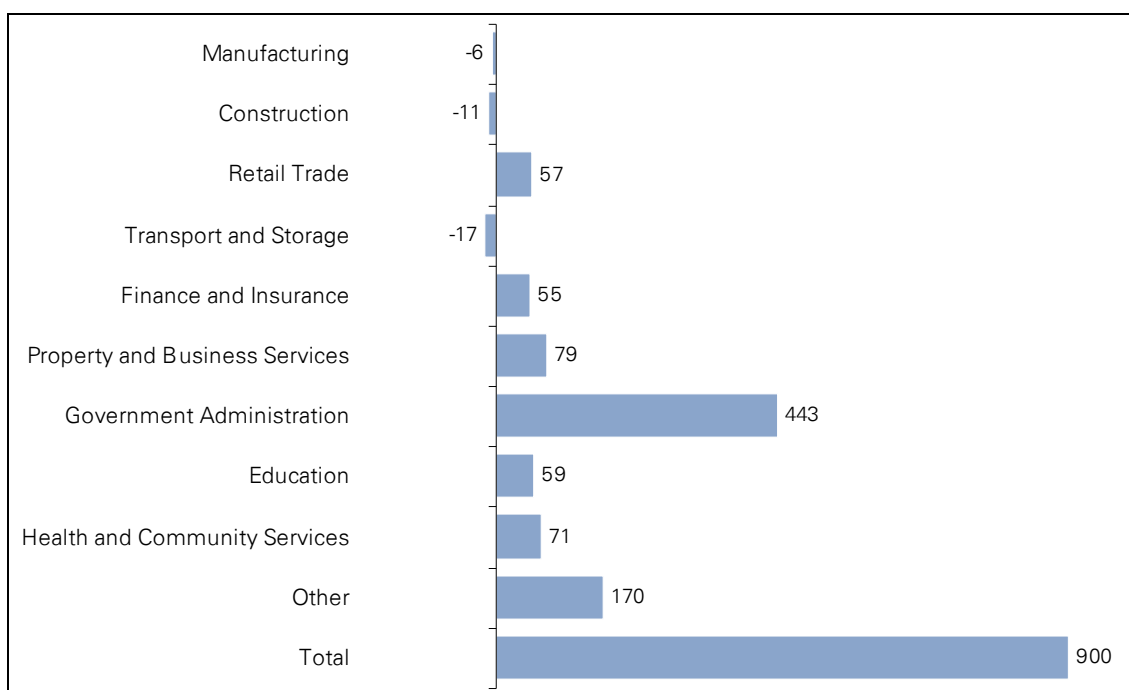
The following sections provide the detailed results for each scenario that was modelled. More detailed results (including estimates of turnover impacts) are provided in Appendix A.

6.1.1 RAAF Base Darwin

Employment

The modelling estimates that RAAF Base Darwin directly and indirectly supports 900 jobs in the Darwin regional economy. These jobs are distributed amongst different industry sectors as indicated in Chart 6.1.

Chart 6.1 RAAF Base Darwin Contribution to Employment in Darwin (jobs)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

A sizable proportion of the overall employment impact occurs in the Government Administration and Defence industry (443 jobs), as RAAF Base Darwin directly employs a large number of APS staff within that industry. These direct employment impacts produce positive indirect employment impacts in industries that supply goods and services to RAAF Base Darwin and sell consumer goods to RAAF Base Darwin employees. Industries that benefit from demand created by RAAF Base Darwin in the Darwin economy include: Retail Trade; Finance and Insurance; Education; and Health and Community Services.

At the same time, expenditure by RAAF Base Darwin on goods and services within the Darwin economy contributes to price pressures within some industries. As such, some negative employment impacts are felt in industries that experience a loss of competitiveness through higher input prices. For example, it is estimated that RAAF Base Darwin has negative indirect employment impacts on industries including: Manufacturing; Construction; Transport and Storage; and Property and Business Services. The Property and Business services industry, in particular, experiences strong negative impacts due to higher input prices, as it uses similar inputs as the Government Defence and Administration industry i.e. competes directly with RAAF Base Darwin for resources. Importantly, the overall impact of the Defence base on employment in the Darwin region is positive.

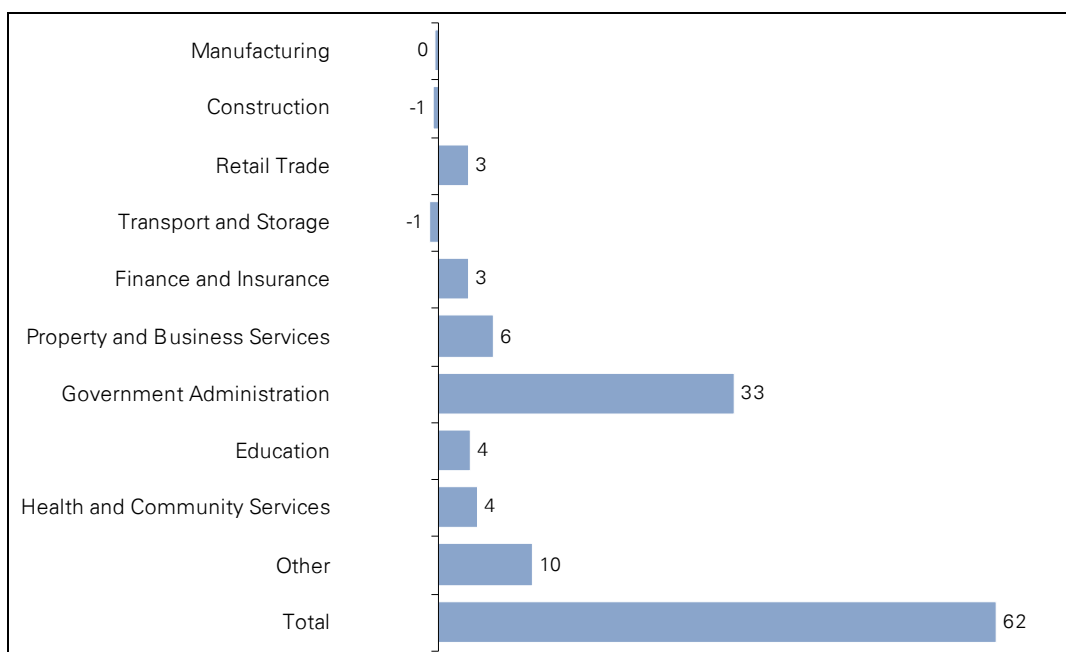
Value Added

The modelling estimates that RAAF Base Darwin directly and indirectly contributes \$64 million (2008/09 prices) annually to value added in the Darwin regional economy. This impact is distributed amongst different industry sectors, as indicated in Chart 6.2.

Similar to the employment impacts, the bulk of the value added contribution occurs in the Government Administration and Defence industry (\$34 million). Impacts in this industry can be primarily attributed to wage payments by RAAF Base Darwin.

The pattern of indirect value added impacts reflect the employment impacts, with positive indirect impacts occurring in industries such as Finance and Insurance and Health and Community Services. Likewise, negative indirect impacts occur in industries that experience a loss of competitiveness due to increased input prices, with a negative impact (\$1 million) occurring in both the Construction and Transport and Storage industries. Overall the RAAF Bases Darwin contributes positively to value added in the region.

Chart 6.2 RAAF Base Darwin Contribution to Value Added in Darwin (\$ 2008/09 m)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

Living Standards

As outlined in Section 3.2, living standards are often measured in terms of gross domestic product (or value-added). However, this is not a good measure of living standards because value-added is a measure of output, rather than a measure of well-being. Capacity to consume goods is highly correlated with leading living standard indicators such as poverty rates, literacy/numeracy levels etc. As living standards derive from consumption, not value added, consumption (in principle) is a more appropriate measure of changes in living standards. As such, in line with the Productivity Commission's practice when measuring living standards, KPMG Econtech uses consumption as the measure of living standards instead of value-added.

By supporting production in the regional economy, RAAF Base Darwin contributes to living standards in Darwin. The modelling estimates that RAAF Base Darwin contributes \$56 million (\$2008/09) annually to consumption in the Darwin regional economy. Notably, the consumption impact is similar in magnitude to the value added impact, as a large proportion of the value added impacts occur in consumer-focused industries.

Summary

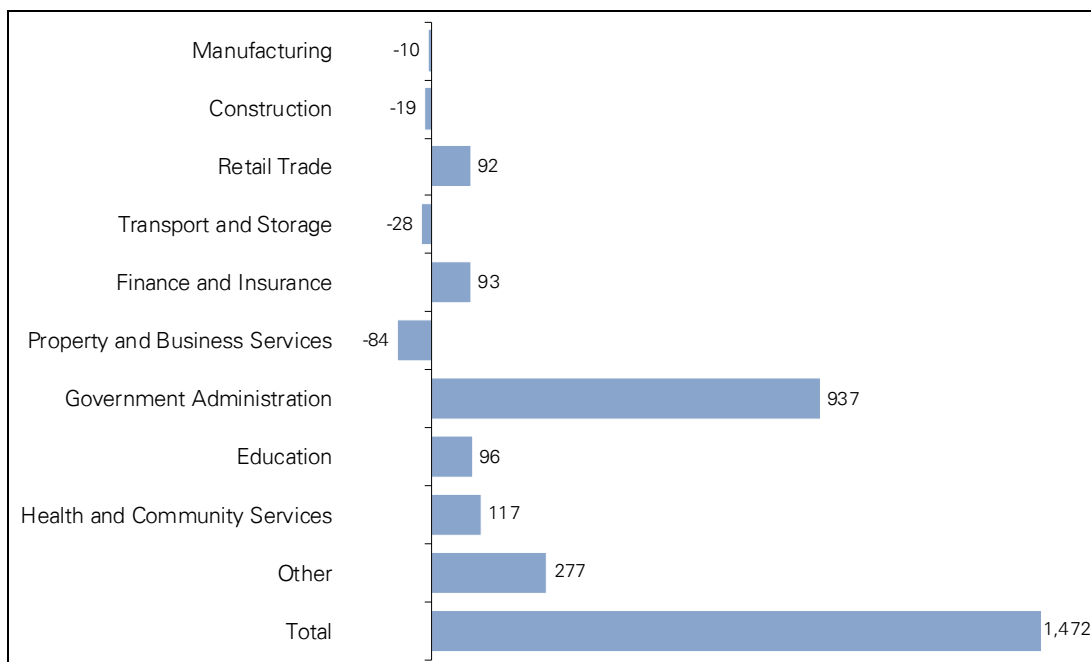
The modelling estimates that RAAF Base Darwin directly and indirectly supports 900 jobs in the Darwin region. That is, total employment in the Darwin region is 1.5 per cent greater than would otherwise be the case if the base did not operate in the region. This includes a 3.6 per cent gain in employment in the Government Administration and Defence industry, a 1.0 per cent lift in employment in the Property and Business Services industry and a 1.3 per cent lift in employment in the Retail Trade industry. In level terms, the operations of RAAF Base Darwin directly and indirectly contributes \$64 million (2008/09 prices) annually to value added, and contributes \$56 million (\$2008/09) annually to consumption in the Darwin regional economy. In percentage terms, the operations of RAAF Base Darwin leads to a 1.0 per cent gain in valued added and a 1.1 per cent gain in consumption in the Darwin region.

6.1.2 Larrakeyah Defence Precinct

Employment

The modelling estimates that the Larrakeyah Defence Precinct directly and indirectly supports 1,471 jobs in the Darwin regional economy. These jobs are distributed amongst different industry sectors, as indicated in Chart 6.3. The largest employment impacts occur in the Government Administration and Defence industry (937 jobs), as the Larrakeyah Defence Precinct directly employs a large number of ADF staff within that industry.

Chart 6.3 Larrakeyah Defence Precinct Contribution to Employment in Darwin (jobs)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

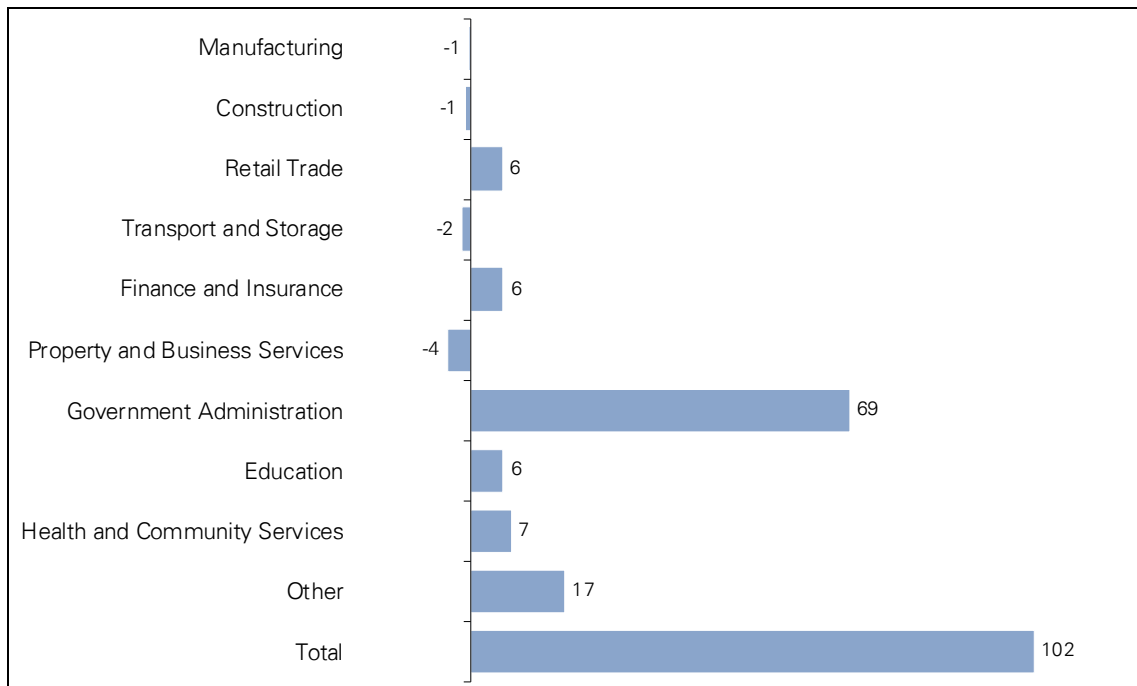
This direct employment stimulates positive indirect employment impacts in industries that supply the Larrakeyah Defence Precinct and its contractors, and industries that sell consumer goods to ADF and contractor employees. The industries that benefit from higher demand include Retail Trade; Finance and Insurance; Education; and Health and Community Services.

At the same time, expenditure by the Larrakeyah Defence Precinct and its contractors contributes to price pressures for some goods and services in the Darwin economy. This causes negative employment impacts in some industries that by pushing up input prices for the industries that benefited from the higher demand. For example, the modelling estimates that the Larrakeyah Defence Precinct has negative indirect employment impacts on industries including: Manufacturing Construction; Transport and Storage; and Property and Business Services. Interestingly, the Property and Business services industry experiences net negative employment impacts despite the fact that the Larrakeyah Defence Precinct directly employs a number of contractors in that industry. In this case, the modelling estimates that the negative indirect impacts on Property and Business Services outweigh the positive direct employment impacts. Overall the Larrakeyah Defence Precinct has a positive impact on employment in the region.

Value Added

The modelling estimates that the Larrakeyah Defence Precinct directly and indirectly contributes \$105 million (2008/09 prices) annually to value added in the Darwin regional economy. This impact is distributed amongst different industry sectors as indicated in Chart 5.4 As with the employment impacts, a large proportion of the value added contribution occurs in the Government Administration and Defence industry (\$71 million). Impacts in this industry can be primarily attributed to wage payments.

**Chart 6.4 Larrakeyah Defence Precinct Contribution to Value Added in Darwin
(\$ 2008/09 m)**



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

Living Standards

By supporting production in the regional economy, the Larrakeyah Defence Precinct contributes to living standards in the Darwin region. The modelling estimates that the Larrakeyah Defence Precinct contributes \$92 million (\$2008/09) annually to consumption in the Darwin regional economy.

Summary

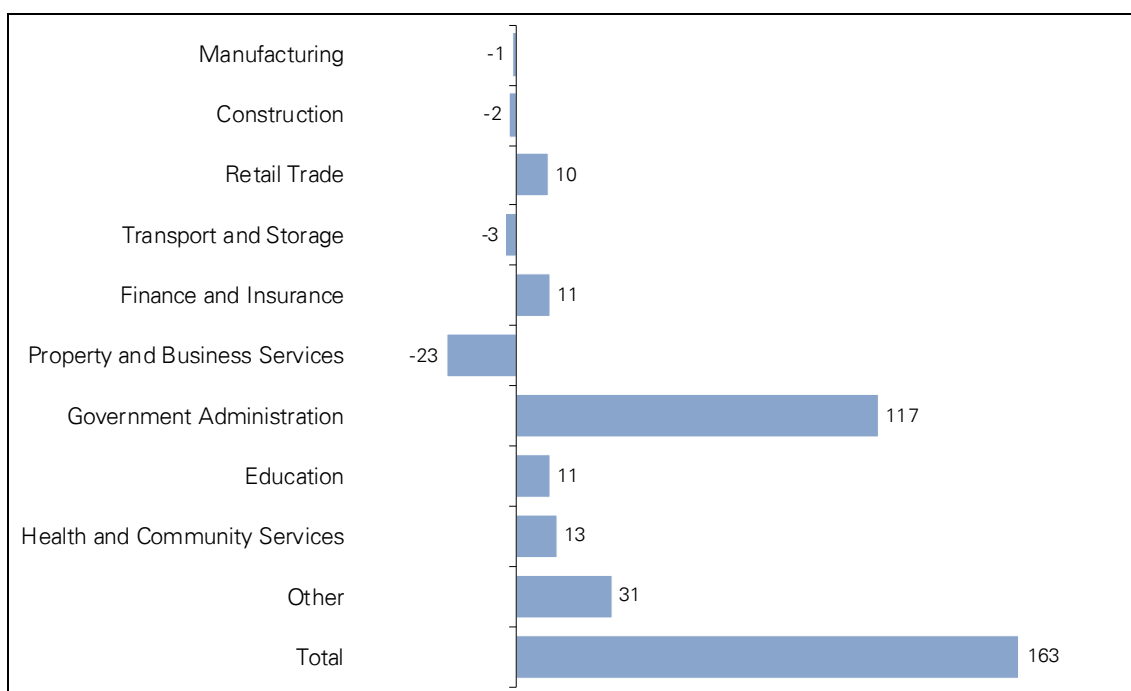
The modelling estimates that Larrakeyah Defence Precinct directly and indirectly supports 1,471 jobs in the Darwin region. That is, total employment in the Darwin region is 2.4 per cent greater than would otherwise be the case if the base did not operate in the region. This includes a gain of 7.6 per cent in employment in the Government Administration and Defence industry, a gain of 3.5 per cent in employment in the Finance and Insurance industry and a gain of 2.1 per cent in employment in the Retail Trade industry. The operations of Larrakeyah Defence Precinct leads to a 1.6 per cent lift in valued added and a 1.8 per cent lift in consumption in the Darwin region. In level terms, the operations of Larrakeyah Defence Precinct also directly and indirectly contributes \$105 million (2008/09 prices) annually to value added, and contributes \$92 million (\$2008/09) annually to consumption in the Darwin regional economy.

6.1.3 Defence Establishment Berrimah

Employment

The modelling estimates that the Defence Establishment Berrimah directly and indirectly supports 163 jobs in the Darwin regional economy. These jobs are distributed amongst different industry sectors as indicated in Chart 6.5.

Chart 6.5 Defence Establishment Berrimah Contribution to Employment in Darwin (jobs)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

The largest employment impact occurs in the Government Administration and Defence industry (117 jobs) as a result of the direct employment impacts of the Base. These direct employment impacts produce positive indirect employment impacts in industries that supply the Base and its contractors, and industries that sell consumer goods to ADF and contractor employees. These industries that benefit from higher demand include Retail Trade; Finance and Insurance; Education; and Health and Community Services.

At the same time, expenditure by the Defence Establishment Berrimah and its contractors contributes to price pressures for some goods and services in the Darwin economy. This causes negative employment impacts in some industries by pushing up input prices. For example, the modelling estimates that the Defence Establishment Berrimah has negative indirect employment impacts on industries including: Manufacturing, Construction; Transport and Storage; and Property and Business Services.

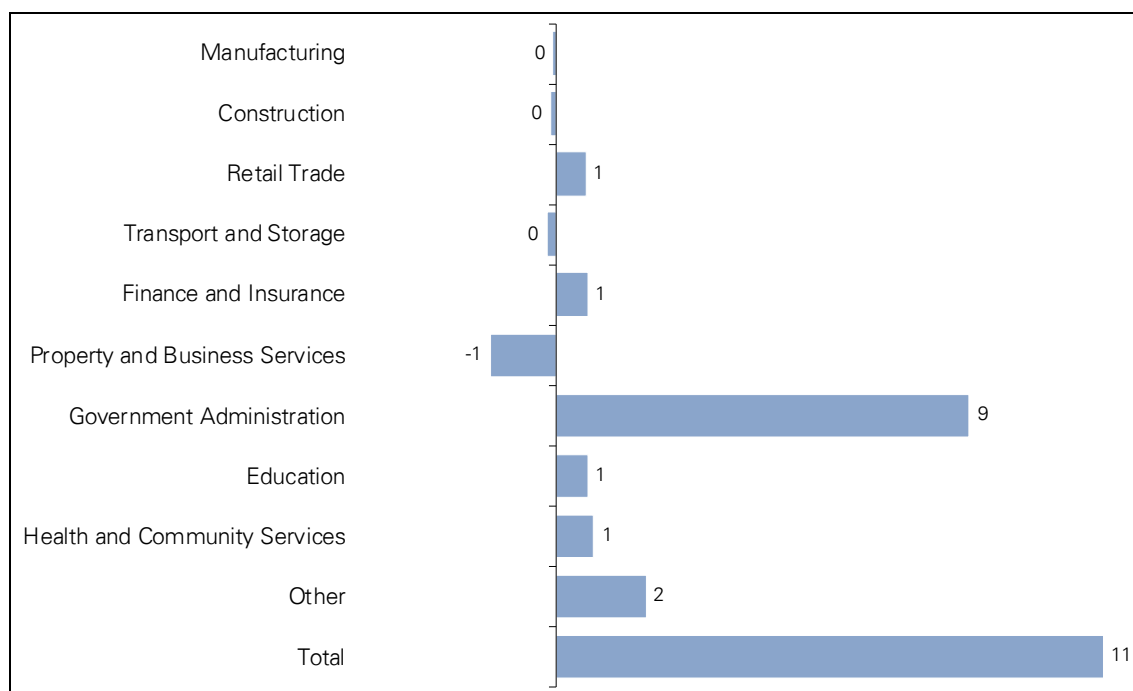
Similar to the Larrakeyah Defence Precinct, the negative indirect impacts on Property and Business Services outweigh the positive direct employment impacts. This results in the Property and Business services industry having net negative employment impacts despite the fact that the Base directly employs a number of contractors in that industry.

Value Added

The modelling estimates that the Defence Establishment Berrimah directly and indirectly contributes \$12 million (2008/09 prices) annually to value added in the Darwin regional economy. This impact is distributed amongst different industry sectors as indicated in Chart 6.6.

Similar to the employment impacts, the bulk of the value added contribution occurs in the Government Administration and Defence industry (\$9 million). Impacts in this industry can be primarily attributed to wage made payments by Defence Establishment Berrimah. The pattern of indirect value added impacts mirror the employment impacts, with positive indirect impacts occurring in industries such as Finance and Insurance and Health and Community Services. Likewise, negative indirect impacts occur in industries that experience a loss of competitiveness due to increased input prices, as can be seen in the Property and Business Services industry. The overall impact of the Defence Establishment Berrimah on value added in the region is positive.

Chart 6.6 Defence Establishment Berrimah Contribution to Value Added in Darwin (\$ 2008/09 m)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

Living Standards

By supporting production in the regional economy, the Defence Establishment Berrimah contributes to living standards in the Darwin region. The modelling estimates that the Defence Establishment Berrimah contributes \$10 million (\$2008/09) annually to consumption in the Darwin regional economy.

Summary

The modelling estimates that Defence Establishment Berrimah directly and indirectly supports 163 jobs in the Darwin region. That is, total employment in the Darwin region is 0.3 per cent greater than would otherwise be the case if the base did not operate in the region. This includes a 0.9 per cent lift in employment in the Government Administration and Defence industry, a 0.4 per cent lift in employment in the Finance and Insurance industry and a 0.2 per cent lift in employment in the Retail Trade industry. Defence Establishment Berrimah also directly and indirectly contributes \$12 million (2008/09 prices) annually to value added, and contributes \$10 million (\$2008/09) annually to consumption in the Darwin regional economy. In percentage terms, the operations of Defence Establishment Berrimah leads to a 0.2 per cent gain in valued added and a 0.2 per cent lift in consumption in the Darwin region.

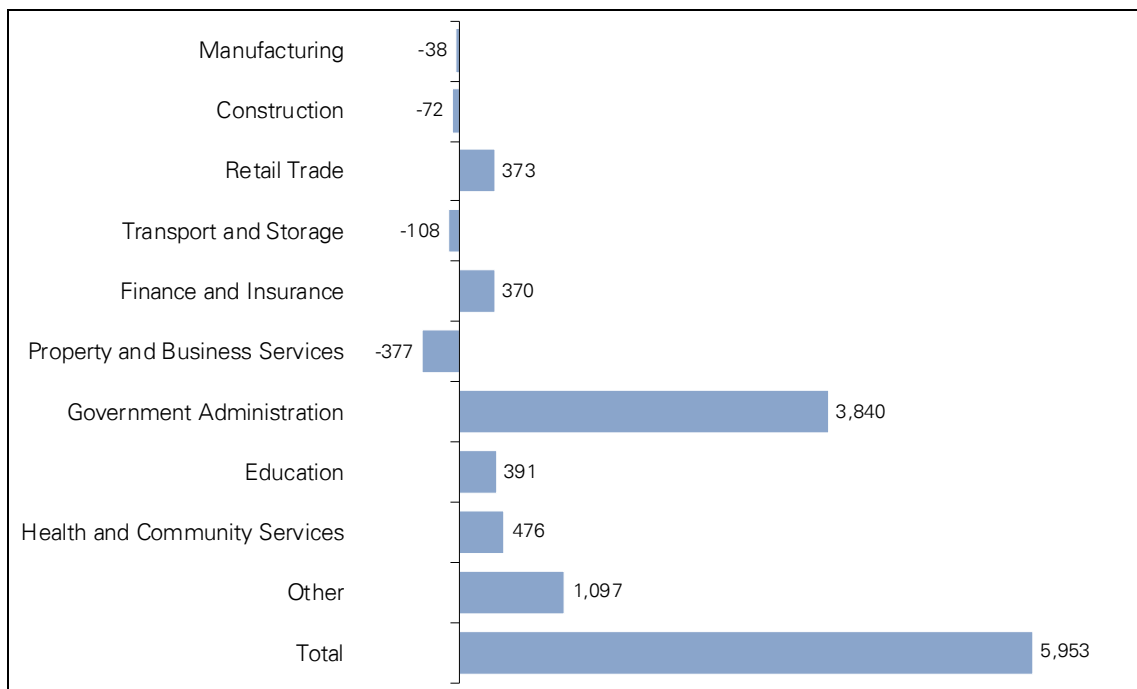
6.1.4 Robertson Barracks

Employment

The modelling estimates that Robertson Barracks directly and indirectly supports 5,953 jobs in the Darwin regional economy. These Barracks employed the largest number of personnel compared to the other Northern Territory bases that were examined. These jobs are distributed amongst different industry sectors as indicated in Chart 6.7.

A sizable proportion of the overall employment impact occurs in the Government Administration and Defence industry (3,840 jobs), as Robertson Barracks directly employs a large number of APS staff within that industry. These direct employment impacts produce positive indirect employment impacts in industries that supply goods and services to Robertson Barracks and sell consumer goods to Robertson Barracks employees. Retail Trade, Finance and Insurance, Education and Health and Community Services industries benefit from demand created by Robertson Barracks in the Darwin economy.

Chart 6.7 Robertson Barracks Contribution to Employment in Darwin (jobs)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

Employment is also indirectly impacted by expenditure by Robertson Barracks on goods and services within the Darwin economy, by contributing to price pressures within some industries. This leads to negative employment impacts in industries that experience a loss of competitiveness through higher input prices. These industries experiencing a negative employment include: Manufacturing; Construction; Transport and Storage; and Property and Business Services.

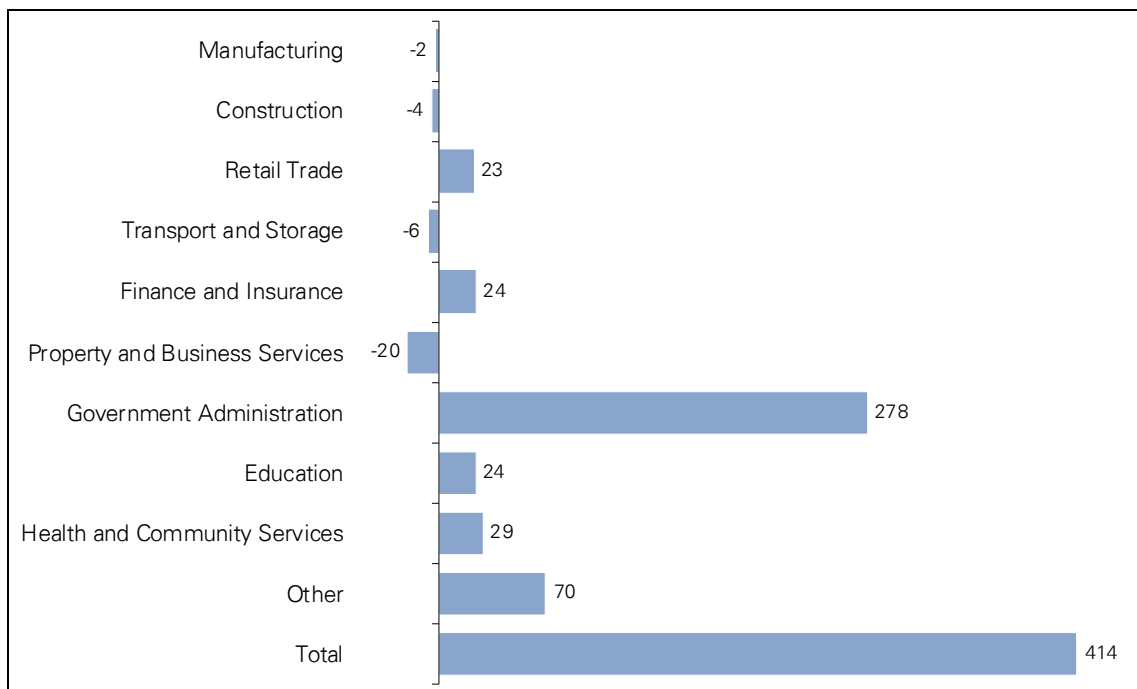
Again the Property and Business services industry experiences strong negative impacts due to higher input prices, as it uses similar inputs as the Government Defence and Administration industry (i.e. competes directly with Robertson Barracks for resources). Importantly, Robertson Barracks contribute positively to employment in the region.

Value Added

The modelling estimates that the Robertson Barracks directly and indirectly contributes \$428 million (2008/09 prices) annually to value added in the Darwin regional economy. This impact is distributed amongst different industry sectors as indicated in Chart 6.8.

Similar to the employment impacts, a large proportion of the value added contribution occurs in the Government Administration and Defence industry (\$278 million). This impact in the industry can be primarily attributed to payments by the Robertson Barracks to wages. The overall impact of the Robertson Barracks on value added in the region is positive.

Chart 6.8 Robertson Barracks Contribution to Value Added in Darwin (\$ 2008/09 m)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

The pattern of indirect value added impacts mirror the employment impacts, with positive indirect impacts occurring in industries such as Retail Trade, Finance and Insurance, Education and Health and Community Services. Likewise, negative indirect impacts occur in industries that experience a loss of competitiveness due to increased input prices, with a sizeable negative impact (\$20 million) occurring in Property and Business Services.

Living Standards

By supporting production in the regional economy, the Robertson Barracks contributes to living standards in the Darwin region. The modelling estimates that the Robertson Barracks contributes \$381 million (\$2008/09) annually to consumption in the Darwin regional economy.

Summary

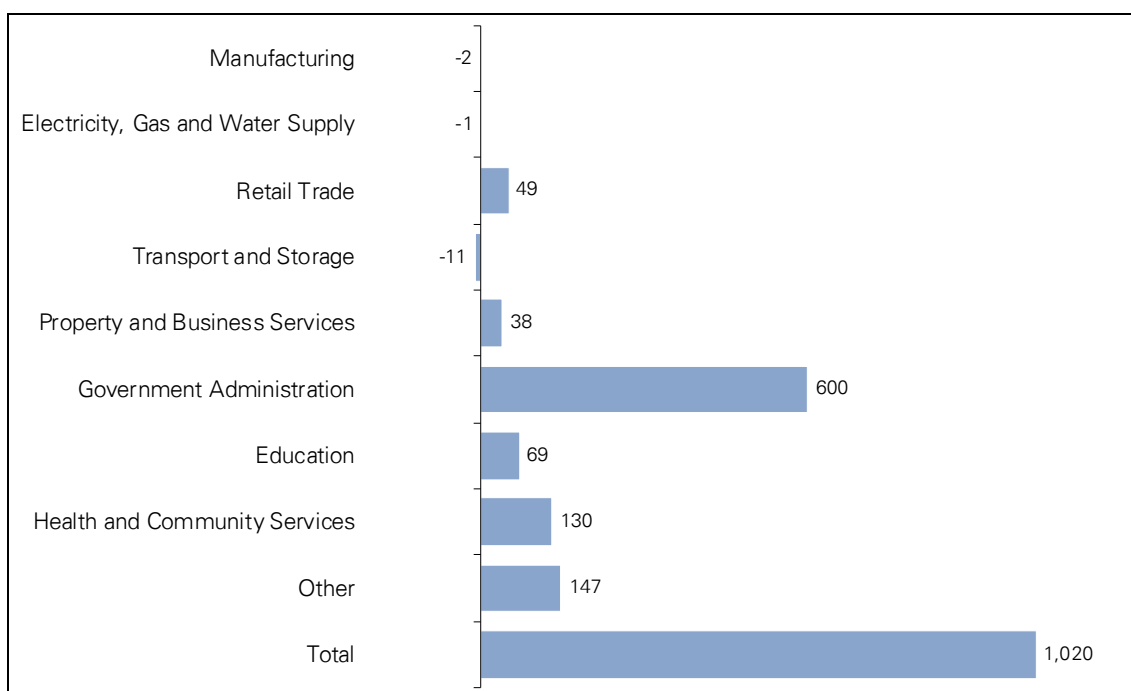
The modelling estimates that Robertson Barracks directly and indirectly supports 5,953 jobs, in the Darwin region, a 9.7 per cent lift in employment than would otherwise be the case if the base did not operate in the region. This includes a 3.1 per cent gain in employment in the Government Administration and Defence industry, a 13.8 per cent gain in employment in the Finance and Insurance industry and a 0.2 per cent gain in employment in the Retail Trade industry. Robertson Barracks also directly and indirectly contributes \$428 million (2008/09 prices) annually to value added, and contributes \$382 million (\$2008/09) annually to consumption in the Darwin regional economy. In percentage terms, the operations of Robertson Barracks leads to a lift of 6.6 per cent in value added and a 7.5 per cent lift in consumption in the Darwin region.

6.1.5 RAAF Base Tindal

Employment

The modelling estimates that the RAAF Base Tindal directly and indirectly supports 1,020 jobs in the Katherine regional economy. These jobs are distributed amongst different industry sectors, as indicated in Chart 6.9. The largest employment impacts occur in the Government Administration and Defence industry (600 jobs), as the RAAF Base directly employs a large number of ADF staff within that industry.

Chart 6.9 RAAF Base Tindal Contribution to Employment in Katherine (jobs)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

These direct employment impacts produce positive indirect employment impacts and industries that sell consumer goods to ADF and contractor employees and in industries that supply the RAAF Base and its contractors. As can be seen in Chart 6.9, industries that benefit from these flow on impacts include: Retail Trade; Finance and Insurance; Education; and Health and Community Services and Property and Business services.

At the same time, expenditure by the RAAF Base and its contractors contributes to price pressures for some goods and services in the Darwin economy. This causes negative employment impacts in some industries by pushing up input prices. For example, the modeling estimates that the RAAF Base has negative indirect employment impacts on industries including: Manufacturing and Transport and Storage. Importantly, RAAF Base Tindal contributes positively to employment in the Katherine region.

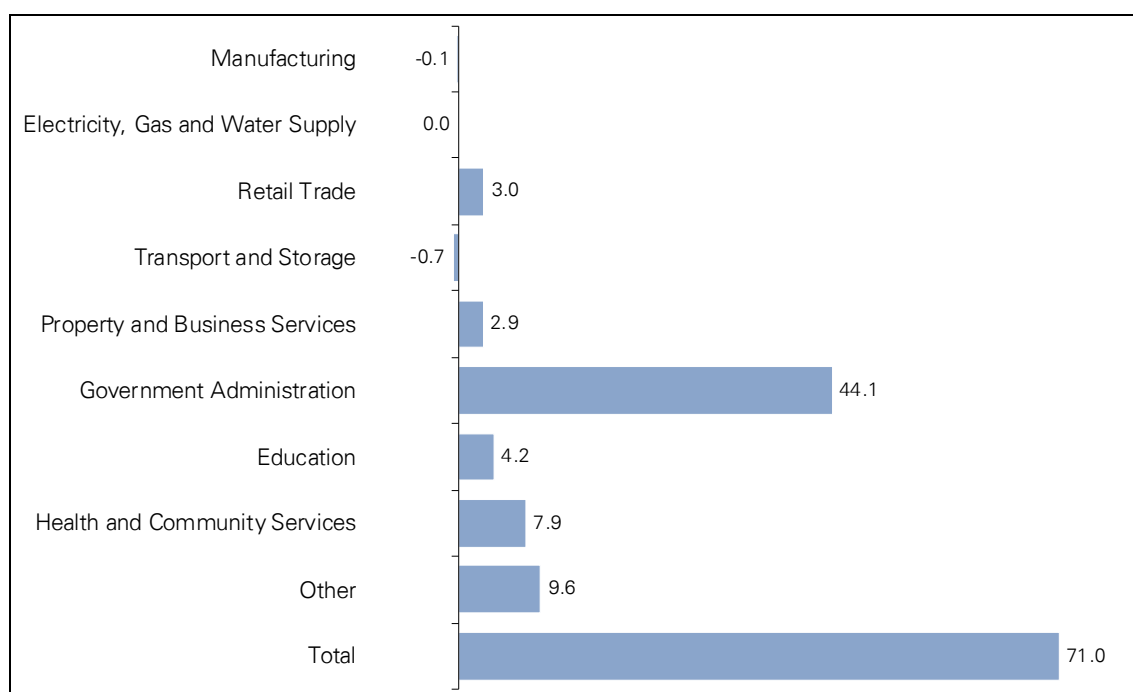
Value Added

The modelling estimates that RAAF Base Tindal directly and indirectly contributes \$73 million (2008/09 prices) annually to value added in the Katherine regional economy. This impact is distributed amongst different industry sectors, as indicated in Chart 6.10.

Similar to the employment impacts, the bulk of the value added contribution occurs in the Government Administration and Defence industry (\$46 million). Impacts in this industry can be primarily attributed to wage payments by RAAF Base Darwin.

The pattern of indirect value added impacts mirror the employment impacts, with positive indirect impacts occurring in industries such as Finance and Insurance and Health and Community Services. Likewise, negative indirect impacts occur in industries that experience a loss of competitiveness due to increased input prices, with a negative impact occurring in both the Manufacturing and Transport and Storage industries. The overall impact of the RAAF Base Tindal on value added in the region is positive.

Chart 6.10 RAAF Base Tindal Contribution to Value Added in Katherine (\$ 2008/09 m)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

Living Standards

By supporting production in the regional economy, the RAAF Base Tindal contributes to living standards in Katherine. The modelling estimates that the RAAF Base contributes \$59 million (\$2008/09) annually to consumption in the Katherine regional economy.



Summary

The modelling estimates that RAAF Tindal directly and indirectly supports 1,020 jobs in the Katherine region. That is, total employment in the Katherine region is 13.8 per cent greater than would otherwise be the case if the base did not operate in the region. This includes a 26.4 per cent lift in employment in the Government Administration and Defence industry, an 18.1 per cent lift in employment in the Property and Business Services industry and an 11.8 per cent lift in employment in the Retail Trade industry than would otherwise be the case. The operations of RAAF Tindal leads to a 9.9 per cent gain in valued added and a 10 per cent gain in consumption in the Katherine region. In level terms, RAAF Tindal directly and indirectly contributes \$73 million (2008/09 prices) annually to value added, and contributes \$59 million (\$2008/09) annually to consumption in the Katherine regional economy

7 Economic Impacts of Major Defence Facilities on the Northern Territory Economy

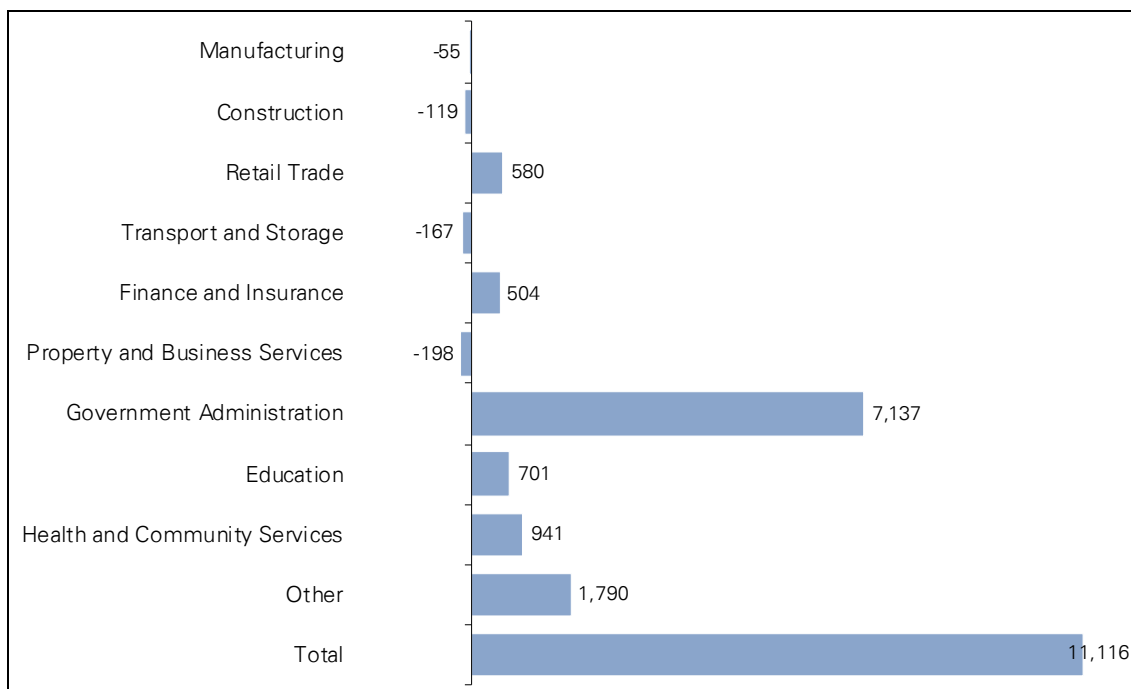
The following section outlines the modelling results for Northern Territory, presenting estimates of the current contribution of the Defence facilities to the Northern Territory economy as a whole. The estimates of employment, value added and consumption impacts represent the average annual economic impacts attributable to the Defence facilities, based on reported activity in 2007/08. The Defence facilities that have been included in this analysis are: RAAF Base Darwin; Defence Establishment Berrimah; Larrakeyah Defence Precinct; Robertson Barracks; RAAF Base Tindal; and the Northern Territory Training Areas (Mount Bundy Training Area and the Bradshaw Training Area) and smaller defence facilities in the Northern Territory. Additionally, the modelling also captures the expenditure from Naval ship visits to the region.

The section is structured as follows. Section 7.1 details the employment impacts broken down by industry sector. Section 7.2 presents the estimated value added impacts broken down by industry sector. Section 7.3 presents the estimated contribution that Defence facilities make to living standards in Northern Territory.

7.1 Employment

The modelling estimates that Defence facilities currently support 11,116 jobs in the Northern Territory economy. These jobs are distributed between different industry sectors as a result of the direct and indirect impacts that the Defence facilities have on economic activity, as discussed in Chapter 5.

Chart 7.1 Defence Facility Contribution to Employment in Northern Territory (jobs)



Source: KPMG Econtech MMR

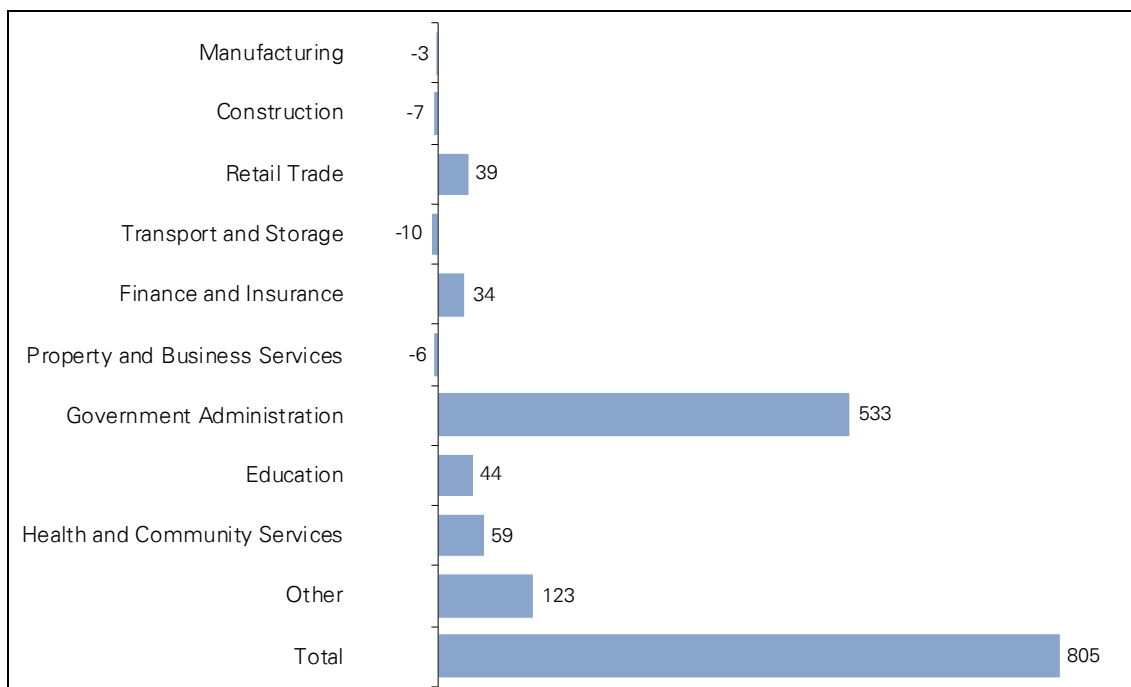
Note: The sum of impacts may not add exactly to total due to rounding.

7.2 Value Added

The modelling estimates that Defence facilities currently contribute \$805 million (2008/09 prices) annually to value added in the Northern Territory. This is equivalent to the Defence facilities' contribution to Northern Territory Gross State Product (GSP).

The pattern of indirect value added impacts mirror the employment impacts, with positive indirect impacts occurring in industries such as Finance and Insurance and Health and Community Services. Likewise, negative indirect impacts occur in industries that experience a loss of competitiveness due to increased input prices, with a negative impact occurring in both the Construction and Transport and Storage industries. The overall impact of the Defence facilities on Gross State Product (value added) is positive.

Chart 7.2 Defence Facility Contribution to Value Added in Northern Territory (\$ 2008/09 m)



Source: KPMG Econtech MMR

Note: The sum of impacts may not add exactly to total due to rounding.

7.3 Living Standards

By supporting production (value added) in the state economy, the Defence facilities contribute to living standards in the Northern Territory. As outlined in Section 2.2, living standards are often measured in terms of gross domestic product (or value-added). However, this is not a good measure of living standards because value-added is a measure of output, rather than a measure of well-being. Because living standards derive from consumption, not value added, consumption (in principle) is a more appropriate measure of changes in living standards. As such, in line with the Productivity Commission's practice when measuring living standards, KPMG Econtech uses consumption as the measure of living standards instead of value-added.

The four Defence facilities are estimated to contribute \$673 million (2008/09 prices) annually to consumption in the Northern Territory.

8 Conclusions

The results of the analysis find that Defence facilities make a significant contribution to employment and output in the Northern Territory economy. It is important to note that it is assumed that the facilities and operations associated with the facilities are removed from the Northern Territory and are not re-established elsewhere in the Territory. However, the facilities may be re-established somewhere else in Australia, but outside of the Northern Territory.

A summary of the results are presented in Table 8.1.

Table 8.1: Summary of Modelling results (\$2008/09m)

Economic Impacts Summary				
Defence Facility	Employment (jobs)	Value Added (\$m)	Turnover (\$m)	Consumption (\$m)
Regional Impacts				
Darwin Region				
RAAF Darwin	900	63.9	116.3	55.7
Larrakeyah Defence Precinct	1,472	105.4	189.4	91.6
Defence Establishment Berrimah	163	11.7	20.9	10.0
Robertson Barracks	5,953	427.9	768.0	381.7
Katherine Region				
RAAF Katherine	1,020	73.4	132.3	59.0
State Impacts				
Total	11,107	804.5	1,458.5	673.2

Source: KPMG Econtech MMR

Overall, the facilities were found to directly and indirectly support approximately 11,116 jobs in the Northern Territory, contributing \$805 million to GSP in 2008/09. Defence currently supports 11,116 jobs in the Northern territory economy, this equates to a sizeable portion of those employed in the Northern Territory.

Appendix A – Detailed Results

Economic Impacts of Defence Facilities in Northern Territory			
Industry	Employment (jobs)	Value Added (\$m)	Turnover (\$m)
Agriculture, Forestry and Fishing	-25	-1.5	-2.9
Mining	-20	-1.2	-2.2
Manufacturing	-55	-3.0	-9.5
Electricity, Gas and Water Supply	-9	-0.5	-1.0
Construction	-119	-7.1	-14.7
Wholesale Trade	136	8.3	20.3
Retail Trade	580	37.6	72.2
Accommodation, Cafes and Restaurants	420	31.5	75.7
Transport and Storage	-167	-9.9	-20.3
Communication Services	474	31.1	52.7
Finance and Insurance	504	32.9	51.4
Property and Business Services	-198	-5.9	-12.3
Government Administration	7137	515.9	992.9
Education	701	42.6	49.8
Health and Community Services	941	57.3	72.7
Cultural and Recreational Services	246	16.5	29.2
Personal and Other Services	568	34.7	59.6
Ownership of Dwellings	0	0.0	0.0
Total	11116	779.2	1413.3

Source: KPMG Econtech MMR

Economic Impacts of RAAF Base Darwin in Darwin			
Industry	Employment (jobs)	Value Added (\$m)	Turnover (\$m)
Agriculture, Forestry and Fishing	-1	0.0	-0.1
Mining	-1	-0.1	-0.1
Manufacturing	-6	-0.4	-1.1
Electricity, Gas and Water Supply	-1	-0.1	-0.1
Construction	-11	-0.7	-1.4
Wholesale Trade	14	0.9	2.1
Retail Trade	57	3.4	6.6
Accommodation, Cafes and Restaurants	37	2.2	5.3
Transport and Storage	-17	-1.0	-2.1
Communication Services	46	2.8	4.7
Finance and Insurance	55	3.4	5.2
Property and Business Services	79	6.1	12.7
Government Administration	443	32.8	63.1
Education	59	3.6	4.2
Health and Community Services	71	4.3	5.5
Cultural and Recreational Services	25	1.5	2.7
Personal and Other Services	50	3.0	5.2
Ownership of Dwellings	0	0.0	0.0
Total	900	61.8	112.5

Source: KPMG Econtech MMR

Economic Impacts of the Larrakeyah Defence Precinct in Darwin			
Industry	Employment (jobs)	Value Added (\$m)	Turnover (\$m)
Agriculture, Forestry and Fishing	-1	-0.1	-0.1
Mining	-2	-0.1	-0.2
Manufacturing	-10	-0.6	-1.9
Electricity, Gas and Water Supply	-1	-0.1	-0.2
Construction	-19	-1.1	-2.3
Wholesale Trade	23	1.4	3.3
Retail Trade	92	5.6	10.7
Accommodation, Cafes and Restaurants	59	3.6	8.7
Transport and Storage	-28	-1.7	-3.5
Communication Services	81	5.0	8.4
Finance and Insurance	93	5.7	9.0
Property and Business Services	-84	-4.3	-9.0
Government Administration	937	68.6	132.0
Education	96	5.8	6.8
Health and Community Services	117	7.1	9.0
Cultural and Recreational Services	38	2.3	4.2
Personal and Other Services	81	4.9	8.4
Ownership of Dwellings	0	0.0	0.0
Total	1472	102.0	183.2

Source: KPMG Econtech MMR

Economic Impacts of the Robertson Barracks in Darwin			
Industry	Employment (jobs)	Value Added (\$m)	Turnover (\$m)
Agriculture, Forestry and Fishing	-4.2	-0.3	-0.5
Mining	-7.9	-0.5	-0.9
Manufacturing	-37.8	-2.3	-7.1
Electricity, Gas and Water Supply	-5.5	-0.3	-0.6
Construction	-72.0	-4.3	-8.9
Wholesale Trade	91.4	5.6	13.6
Retail Trade	372.9	22.8	43.8
Accommodation, Cafes and Restaurants	232.7	14.8	35.6
Transport and Storage	-107.6	-6.4	-13.3
Communication Services	308.6	20.2	34.2
Finance and Insurance	369.7	24.2	37.8
Property and Business Services	-377.1	-20.0	-42.0
Government Administration	3,839.9	277.6	534.3
Education	391.1	23.8	27.8
Health and Community Services	476.4	29.0	36.8
Cultural and Recreational Services	152.8	10.0	17.6
Personal and Other Services	329.3	20.1	34.6
Ownership of Dwellings	0.0	0.0	0.0
Total	5,952.6	414.0	743.0

Source: KPMG Econtech MMR

Economic Impacts of RAAF Base Tindal in Katherine			
Industry	Employment (jobs)	Value Added (\$m)	Turnover (\$m)
Agriculture, Forestry and Fishing	-9	-0.5	-1.0
Mining	-1	-0.1	-0.1
Manufacturing	-2	-0.1	-0.4
Electricity, Gas and Water Supply	-1	0.0	-0.1
Construction	-9	-0.5	-1.1
Wholesale Trade	10	0.6	1.4
Retail Trade	49	3.0	5.8
Accommodation, Cafes and Restaurants	39	2.5	6.1
Transport and Storage	-11	-0.7	-1.4
Communication Services	31	2.1	3.5
Finance and Insurance	30	2.0	3.2
Property and Business Services	38	2.9	6.0
Government Administration	600	44.1	84.9
Education	69	4.2	4.9
Health and Community Services	130	7.9	10.1
Cultural and Recreational Services	14	1.0	1.7
Personal and Other Services	42	2.6	4.5
Ownership of Dwellings	0	0.0	0.0
Total	1020	71.0	128.0

Source: KPMG Econtech MMR

Appendix B – MMR

This attachment outlines the features of MMR, the economic model used to simulate the economic impacts of the various Defence facilities on the SA regional economy.

MMR estimates the effects of policies or events that are state or region specific. It is a Computable General Equilibrium (CGE) model that divides Australia into 34 regions and the 7 states and territories, with 18 industries. MMR uses statistical information from the ABS Input-Output tables and labour force survey. The regions used are based on the ABS statistical regions applied in its labour force survey. The 18 industries correspond to the Australian and New Zealand Industry Classification (ANZSIC) also used by the ABS. Each region is modelled individually but utilising a consistent approach. MMR is calibrated using national and regional data for 2007/08.

In MMR, a distinction is made between industries that produce tradeables and industries that produce non-tradeables. This distinction is based on specific economic assumptions. For example, industries that produce tradeables have a national or international focus, and production levels of these industries are dependent on prices prevailing on national or world markets. In contrast, industries that produce non-tradeables focus on their own region and production levels of these industries depend on local demand. An increase in local demand will lead to an increase in the prices charged by industries that produce non-tradeables.

Each region in MMR is modelled individually but following a consistent approach. Further, medium-term equilibrium is modelled for each region, which would be broadly achieved over a period of about three years.

This medium-term equilibrium is far enough into the future for equilibrium to be obtained in product markets. Also, consumer spending is at a sustainable level so that the trade account for each region, taking into account both international and inter-regional trade, is in balance.

Further, the medium-term equilibrium is not far enough into the future for businesses in each region to adjust their capital stocks. It is also not far enough into the future for labour markets to attain equilibrium so national industry wage rates are taken as given.

Key Assumptions

The results in this report are based on the standard version of the model, which provides medium-term estimates. The medium-term equilibrium in MMR is based on specific economic assumptions.

On the one hand, this medium-term equilibrium of about three years is far enough into the future for equilibrium to be obtained in product markets. Also, consumer spending is at a sustainable level so that the trade account for each region, taking into account both international and inter-regional trade, is in balance.

On the other hand, this medium-term equilibrium is not far enough into the future for labour markets to attain equilibrium; rather industry wage rates are taken as given. Three years is also not far enough into the future for businesses in each region to adjust their capital stocks.

In MMR, the distinction between industries that produce tradeables and industries that produce non-tradeables is also based on specific economic assumptions.

Industries that produce tradeables have a national or international focus, and production levels of these industries are driven by prices prevailing on national or world markets. In contrast, industries that produce non-tradeables focus on their own region and production levels of these industries depend on local demand.

MMR is flexibly configured so that individual industries can be treated as either producing tradeables or non-tradeables, depending on what makes more economic sense in the context of the particular regional policy.

Consulting

MMR has been used successfully in many projects such as the following.

- “Electricity price Modelling Impacts of Feed-in-Tariff”, ACT Government, 2009-10
- “The Economic Impacts of the Manuka Oval and Canberra Stadium”, ACT Government, 2009.
- “Economic Impacts of Regional Development Policies in Victoria”, Regional Development Victoria, 2009.
- “The Contribution of the Star City Casino Complex to the NSW Economy”, URS, 2007.
- “Economic Impact Assessment of the Re-Development of the Centrepont, Imperial Arcade and Skygarden Shopping Centres”, Allens Arthur Robinson, 2006.
- “Modelling the Economic and Social Impacts of Various Scenarios for the RAAF Base Richmond”, the Department of Defence, December 2006.
- “The Impact of the Hunter Economic Zone on the Hunter Region and New South Wales Economies”, the Hunter Economic Zone, June 2004.
- “The Economic Impact of the Establishment of Business Transformation Outsourcing (BTO) Centres in Brisbane and the Gold Coast”, IBM, July 2004.
- “The Impact of Totalcare Industries Limited on the ACT economy”, Totalcare Industries Limited, 2001.

Regional Detail

As discussed above, MMR divides Australia into 32 regions. MMR estimates the effects of policies that are state or region specific in each of the following 32 regions, which match the 32 ABS statistical regions.

1. Sydney	2. Hunter
3. Illawarra	4. South Eastern NSW
5. Richmond-Tweed and Mid-North Coast	6. Northern-Central-Far Western NSW
7. Murray-Murrumbidgee	8. Melbourne
9. Barwon-Western District	10. Central Highlands-Wimmera
11. Loddon-Mallee	12. Goulburn-Ovens-Murray
13. All Gippsland	14. Brisbane
15. South and East Moreton	16. North and West Moreton
17. Wide Bay-Burnett	18. Darling Downs-South West
19. Mackay-Fitzroy-Central Qld	20. Northern-North West
21. Far North	22. Adelaide
23. North and West SA	24. South and East SA
25. Perth	26. Lower Western WA
27. Remainder WA	28. Greater Hobart-Southern
29. Northern Tasmania	30. Mersey-Lyell
31. Northern Territory	32. Australian Capital Territory

Industry Detail

As explained above, each region in MMR contains 18 industries corresponding to the ANZSIC industry divisions used by the ABS. MMR estimates the effects of policies that are state or region specific in each of the following 18 industries.

A. Agriculture, Forestry and Fishing	B. Mining
C. Manufacturing	D. Electricity, Gas & Water
E. Construction	F. Wholesale Trade
G. Retail Trade	H. Accommodation, Cafes & Restaurants
I. Transport	J. Communication Services
K. Finance & Insurance	L. Property & Business Services
M. Government Administration and Defence	N. Education
O. Health & Community Services	P. Cultural & Recreational Services
Q. Personal & Other Services	R. Ownership of Dwellings

MMR Model Outputs

For each region and industry, MMR produces estimates of the effects of regional or state policy changes on:

- employment;
- turnover;
- value added; and
- consumption.