

Chapter 6

Productivity

6.1 When announcing the limited tender for the new supply ships, the Minister for Defence made a direct link between the decision to restrict the tender to two overseas shipbuilders and the productivity of local shipyards. Indeed, he cited the 'current low productivity of shipbuilders involved in the AWD program and value for money considerations' as two of three reasons for proceeding with the limited tender.¹ He made his meaning clear that 'Australian industry must be internationally competitive and meet international productivity benchmarks'.²

6.2 In this chapter, the committee considers this statement about the need to acquire two new supply ships and Australia's competitiveness to build them. The committee's main focus is on the productivity of Australian shipyards and the cost effectiveness of building the ships in Australia. In this regard, the committee believes that it is important to place the decision to conduct a limited tender for the supply ships in the context of the experiences with the AWDs.

AWDs

6.3 The AWD project is being delivered through an alliance-based contracting arrangement between ASC AWD Shipbuilder Pty Ltd, Raytheon Australia Pty Ltd and the Government, represented by the DMO. This project—to acquire three Hobart Air Warfare Destroyers and their support system—is one of the largest Defence procurement projects in Australia and intended to form a critical element of the ADF's joint air warfare defence capability. It received first pass approval in 2005 and second pass in 2007. The three ships were to be built in Australia.

6.4 In 2010, however, signs of trouble surfaced in this key acquisition program. At this time, difficulties were encountered in relation to the engineering and construction of some of the first AWD hull blocks. To address this problem, block work was reallocated between BAE, Forgacs and Navantia and the Alliance Operational Schedule was amended. On 6 September 2012, following stakeholder review and support for the time-line extension and resource considerations, the then Minister for Defence announced that the AWD schedule would be re-baselined.³

1 'Minister for Defence—Boosting Australia's maritime capabilities', 6 June 2014.

2 'Minister for Defence—Transcript—Naval shipbuilding announcement, CEA Technologies, Canberra', 6 June 2014, p. 6, <http://www.minister.defence.gov.au/2014/06/06/minister-for-defence-transcript-naval-shipbuilding-announcement/> (accessed 4 August 2014).

3 Australian National Audit Office, Report No. 12 2013–14, *2012–13 Major Projects Report*, December 2013, p. 153, http://www.anao.gov.au/~media/Files/Audit%20Reports/2013%202014/Assurance%20Report%2012/AssuranceReport-2013-2014_12.pdf (accessed 6 August 2014).

This measure would extend the period of work for the Alliance and its partners, including the shipyards in Adelaide (ASC) and Newcastle (Forgacs). According to the minister the revised project plan would:

- reduce peak demand on project critical resources and facilities and project risk;
- not increase the cost of the project nor result in the loss of any jobs; and
- very importantly, help retain skills in the naval shipbuilding industry.⁴

6.5 The re-baselined construction schedule was intended to help Navy reduce the demands and risks associated with accepting into service two major capabilities (LHDs and the AWD) at around the same time.⁵ In November 2013, DMO noted that the key challenge for the AWD project was:

...to maintain an efficient, sustainable workforce that is successful in progressing the consolidation and integration of the AWDs, leading into through-life support activities for the destroyers and future initiatives to protect the naval shipbuilding industry capability ahead of the future submarine program.⁶

6.6 Concerns about the project, however, did not abate.⁷ On 18 December 2013, the Minister for Finance announced that, since the Coalition had assumed government, he had received detailed briefings from key stakeholders associated with the AWD program. In his assessment, there were 'clearly issues associated with this important program' and he foreshadowed the establishment of an independent review.⁸ The review was intended to give government an independent perspective on all of the issues with the program and to make some recommendations on the best way

4 'Minister for Defence, Minister for Defence Materiel and Minister for Finance and Deregulation—Joint Media Release—Air Warfare Destroyer update', 6 September 2012, p. 3, <http://www.minister.defence.gov.au/2012/09/06/minister-for-defence-and-minister-for-defence-materiel-joint-media-release-air-warfare-destroyer-update-2/> (accessed 4 August 2014).

5 'Minister for Defence, Minister for Defence Materiel and Minister for Finance and Deregulation—Joint Media Release—Air Warfare Destroyer update', 6 September 2012, p. 3.

6 DMO website, 'Air Warfare Destroyer, SEA 4000 Phase 3 Build' <http://www.defence.gov.au/dmo/awd/sea4000/> (accessed 6 August 2014).

7 See for example, Sarah Martin, *The Australian*, 'Fears of further delays to the nation's biggest defence project', September 18, 2013, <http://www.theaustralian.com.au/national-affairs/policy/fears-of-further-delays-to-the-nations-biggest-defence-project/story-e6frg8yo-1226721296385> (accessed 6 August 2014).

8 'Minister for Finance and Minister for Defence—Coalition committed to the efficient delivery of the Air Warfare Destroyer programme', 18 December 2013, <http://www.minister.defence.gov.au/2013/12/18/minister-for-finance-and-minister-for-defence-coalition-committed-to-the-efficient-delivery-of-the-air-warfare-destroyer-programme/> (accessed 4 August 2014).

to proceed.⁹ On 25 February 2014, the Minister announced the appointment of former United States Secretary of Navy, Professor Don Winter, and former Transfield chief, Dr John White, to conduct jointly the independent review of the AWD program.¹⁰

6.7 While this review was underway, the ANAO released its performance audit report on 6 March 2014 on the AWDs. The report, which was highly critical of the performance of the project, drew widespread media and industry attention.¹¹ In brief, the ANAO audit found:

Despite the contractual arrangements put in place to manage the project, the AWD Program has experienced a range of delivery issues, including significant immaturity in detailed design documentation, major block construction problems and substantially lower than anticipated construction productivity. The design and construction issues have led to extensive, time-consuming and costly rework.¹²

6.8 On 4 June 2014, a brief summary of the findings of the independent review on the AWD project, commonly referred to as the Winter review, were made public.¹³ In the review's assessment there were two direct causes for cost and schedule growth:

- the initial program plan for AWD development and production was unrealistic in its cost and schedule estimates; and

9 'Minister for Finance and Minister for Defence—Joint Press Conference—Review of the Air Warfare Destroyer program', 4 June 2014, p. 1, <http://www.minister.defence.gov.au/2014/06/04/minister-for-defence-and-minister-for-finance-joint-press-conference-review-of-the-air-warfare-destroyer-program/> (accessed 4 August 2014).

10 Senator The Hon. Mathias Cormann, Minister for Finance and Senator The Hon. David Johnston, Minister for Defence, 'Review of the Air Warfare Destroyer Program', MC 6/14, 25 February 2014, http://www.financeminister.gov.au/media/2014/mr_2014-06.html (accessed 4 August 2014).

11 See for example, Professional Engineers Australia, 'Minister must boost engineering capacity on the AWD and SEA1000 projects to stop cost blowouts', <http://www.professionalsaustralia.org.au/groups/engineers/advocacy/?id=3060> and Engineers Australia, 'Audit critical of Air Warfare Destroyer project', 6 March 2014, <http://www.engineersaustralia.org.au/news/audit-critical-air-warfare-destroyer-project> and HIS Jane's Weekly, 'Australian government auditor slams AWD programme management', 5 March 2014, <http://www.janes.com/article/34998/australian-government-auditor-slams-awd-programme-management> and *Financial Review*, 'Audit Slams \$8bn warship project', 6 March 2014, http://www.afr.com/p/national/audits_slams_bn_warship_project_KBbPO0n4lw02A79hEUQW-DN (accessed 6 August 2014).

12 Australian National Audit Office, Audit Report No. 22 2013–14 Performance Audit, *Air Warfare Destroyer Program*, tabled 6 March 2014, paragraph 21.

13 'Report of the Independent Review into the performance of the Hobart Class Air Warfare Destroyer Program conducted by Professor Donald C. Winter and Dr John White', 4 June 2014, <http://www.financeminister.gov.au/media/2014/docs/air-warfare-destroyer-program-review-0.pdf> (accessed 8 August 2014).

- the Alliance, as structured, composed and staffed, has been unable to effectively manage the AWD Program.

6.9 It also identified the following contributing causes:

- systems engineering on the AWD Program has been of limited effect;
- the AWD Alliance and ASC were unable to effectively manage the AWD block subcontractors; and
- the oversight provided by the Commonwealth of Australia has been of limited effect.

6.10 Importantly, and relevant to this committee's inquiry, the review also considered systemic issues that could affect any other naval shipbuilding programs in Australia, and identified the following:

- the limited base of shipbuilding activity in Australia materially impacted the AWD Program; and
- the Commonwealth of Australia has not developed a long term shipbuilding plan that can cost-effectively support the needs of the RAN, while sustaining the Australian industrial shipbuilding base.¹⁴

6.11 In the joint media release accompanying the publication of the summary of the Winter review, the Minister for Finance referred to the Auditor General's finding of a \$300 million cost overrun with the AWD project. He stated clearly that:

...the position that we inherited was a deteriorating position. The overall project is 21 months behind schedule. The remedial action we are announcing today and that we are proposing to implement over the next couple of months is designed to make up as much time as possible. But I don't believe we will be able to make up all of the time. The first ship was due for delivery in December 2014. Manifestly we're not going to be able to reach that deadline.¹⁵

6.12 In this same media release, the Minister for Defence spoke of the need for the project to improve and further that the government was 'not going to tolerate the sort of outputs that have been put on the table from a productivity perspective particularly'. He indicated that the government would 'demand commercial discipline in the project

14 'Report of the Independent Review into the performance of the Hobart Class Air Warfare Destroyer Program conducted by Professor Donald C. Winter and Dr John White', 4 June 2014, <http://www.financeminister.gov.au/media/2014/docs/air-warfare-destroyer-program-review-0.pdf> (accessed 8 August 2014).

15 'Minister for Finance and Minister for Defence—Joint Press Conference—Review of the Air Warfare Destroyer program', 4 June 2014, <http://www.minister.defence.gov.au/2014/06/04/minister-for-defence-and-minister-for-finance-joint-press-conference-review-of-the-air-warfare-destroyer-program/> (accessed 4 August 2014).

and we're going to have it'.¹⁶ The Minister for Defence sent an unmistakable message to industry:

...if we can't get this right, if we can't get this to an acceptable benchmark standard, it doesn't say a lot about our future capacity. Now we've got potentially another 8 future frigates that we would like to build in Australia, but I am sending a very clear message out today. If we can't fix this, that is something that will certainly be in jeopardy, because I don't believe the Government will support an enterprise that cannot deliver productively.¹⁷

Announcement of tender for new supply ships

6.13 Two days after the release of a summary of the findings of the Winter report, the Minister for Defence announced what he termed 'the first set of key initiatives in the Abbott Government's long-term strategic naval plan'. They included three major decisions:

- first pass approval for Defence to conduct a limited tender process between Navantia of Spain and Daewoo Shipbuilding and Marine Engineering (DSME) of South Korea for the construction of two replacement replenishment vessels based on existing designs;
- bringing forward preliminary design work to ensure Australia maintains the necessary capabilities to retain the option of building the future frigate in Australia; and
- bringing forward an open competition with Australian industry to construct more than 20 replacement Pacific Patrol Boats.¹⁸

6.14 In his statement, the Minister, referring directly to the government's first pass approval to conduct a limited competitive tender process for the supply ships, attributed the decision to, among other things:

- the current low productivity of shipbuilders involved in the AWD program; and
- value for money considerations.¹⁹

6.15 During his announcement, the Minister, when referring to the viability of Australia's shipbuilding industry, placed a heavy emphasis on the need for productivity improvements and cost-effectiveness.²⁰

16 'Minister for Finance and Minister for Defence—Joint Press Conference—Review of the Air Warfare Destroyer program', 4 June 2014, p. 6.

17 'Minister for Finance and Minister for Defence—Joint Press Conference—Review of the Air Warfare Destroyer program', 4 June 2014, p. 8.

18 'Minister for Defence—Boosting Australia's maritime capabilities', 6 June 2014, <http://www.minister.defence.gov.au/2014/06/06/minister-for-defence-boosting-australias-maritime-capabilities/> (accessed 4 August 2014).

19 'Minister for Defence—Boosting Australia's maritime capabilities', 6 June 2014.

Productivity—compensated growth tonnage

6.16 As an indicator of the performance of Australian shipyards, the Minister for Defence cited the following figures for the AWD project—the international benchmark 'is 60 man-hours per tonne, we set the benchmark for that program at 80 man-hours per tonne, currently it is running at 150 man-hours per tonne...' To his mind, getting back on track was 'essential to the future of naval shipbuilding'.²¹

6.17 Mr King explained the usefulness of using this compensated growth tonnage measure as a way of comparing how many man-hours it takes to build a tonne of ship. He noted that building a tonne of a supertanker was easier than building a tonne of a submarine, so First Marine International (FMI), an independent, internationally renowned organisation, had developed a series of co-efficiencies that would allow this comparison. He confirmed the accuracy of the statistics on productivity quoted by the Minister that: 60 man-hours was the world benchmark for compensated growth tonnage—the best in the world; Defence set 80 man-hours per tonne as a target for the AWD; and the first ship came in at 150 man-hours per tonne.

6.18 According to Mr King, the first ship always takes more man-hours per tonne and that the DMO expected the AWD project could achieve the 80 man-hours. He informed the committee that in 2010, when the shipyards were getting into the production phase, the DMO engaged the FMI to evaluate every shipyard. The FMI produced a report for the years 2011, 2012 and 2013 and Mr King provided information based on the reports to each shipyard so they could be fully aware of their productivity against compensated growth tonnage.²² Furthermore, based on comparisons of yards all around the world, the FMI provided training and advice to the Australian yards on the most efficient way to improve their business. Mr King explained that the FMI stated in its last report that basically: BAE had made substantial improvement; ASC had shown no demonstrable or noticeable improvement despite its efforts; and Forgacs had deteriorated.

AWD experience and acquiring new supply ships

6.19 Mr King drew on his extensive experience with the AWDs to highlight some of the difficulties experienced with an Australian build. While he did not agree fully with the findings of the Winter report he, in the main, concurred with the overall summary presented by the Minister for Finance, which identified problems with:

- the initial program plan;

20 'Minister for Defence—Transcript—Naval shipbuilding announcement, CEA Technologies, Canberra', 6 June 2014, p. 5, <http://www.minister.defence.gov.au/2014/06/06/minister-for-defence-transcript-naval-shipbuilding-announcement/> (accessed 4 August 2014).

21 'Minister for Defence—Transcript—Naval shipbuilding announcement, CEA Technologies, Canberra', 6 June 2014, p. 11.

22 Foreign Affairs, Defence and Trade Legislation Committee, Estimates, *Committee Hansard*, 3 June 2014, p. 50.

- inadequate government oversight;
- the alliance structure which seemed incapable to manage issues if and as they arose; and
- the performance and capabilities of ASC and major subcontractors.²³

6.20 According to Mr King, when Defence embarked on the AWD program, the South Australian government and Defence SA made a compelling offer.²⁴ He explained:

We thought of everything that we could think about to start up that air warfare destroyer project. We looked at the drawing packs. We looked at the time. We developed a schedule. We created a longer schedule than has ever been developed for any comparable ship in the world in order to give Australian industry an opportunity to get on top of it and get it right. And guess what? Despite all those best efforts, despite being what I thought was as practical as I could be, despite industry doing as much work as we thought we could to understand that problem, and we spent \$255 million between first and second pass looking at every practical thing we could ...but despite all that, and even when we came to build an existing design, we are still having budget problems and we are still having schedule slip.²⁵

6.21 One of the lessons to be learnt from the problems with the AWD project, as Mr King observed, was 'you have got to temper marketing and ambition with experience and the reality of what we face'.²⁶ He then proceeded to apply the AWD experience to future projects explaining that with the AWD there was a design that had been built 4½ times. He again stressed that, at the time, he thought that the DMO had given the AWDs all the consideration that could reasonably be given in order to embark on the project. With the AWD problems in mind, he referred to the prospect of building the supply ships in Australia:

...suddenly, magically, this time we can transfer all that design work or even some of that design work to Australia and there will not be a problem. There will be a serious problem.²⁷

6.22 Mr King stated that exactly the same problems would emerge if Defence were to build the AOR in Australia.²⁸

23 'Minister for Finance and Minister for Defence—Joint Press Conference—Review of the Air Warfare Destroyer program', 4 June 2014, p. 2, <http://www.minister.defence.gov.au/2014/06/04/minister-for-defence-and-minister-for-finance-joint-press-conference-review-of-the-air-warfare-destroyer-program/> (accessed 4 August 2014).

24 *Committee Hansard*, 21 July 2014, p. 26.

25 *Committee Hansard*, 21 July 2014, p. 21.

26 *Committee Hansard*, 21 July 2014, p. 21.

27 *Committee Hansard*, 21 July 2014, p. 22.

28 *Committee Hansard*, 21 July 2014, p. 22.

Defence industries response

6.23 Representatives from Defence industries took note of the connection between the observations made about the productivity of Australian shipyards in the context of the AWD with the decision to tender for the replacement replenishment vessels. Indeed, Mr Christopher Burns, Defence Teaming Centre, noted the negative comment made about the productivity of Australia's naval shipbuilding industry based on statistics contained in the Winter report.²⁹ To his mind:

Industry was advised that, due to their poor productivity, evidenced by the unreleased Winter review, Australian industry would not be afforded the opportunity to tender for the Navy's replacement replenishment ships. With no mention of the unsolicited hybrid build proposals offered 18 months earlier by ASC and BAE, the government announced that it would offer their partners in South Korea and Spain limited competitive tenders for Australia's replacement replenishment ships, effectively cutting ASC, BAE and Australian industry out of the opportunity.³⁰

6.24 The Defence Teaming Centre questioned the basis for these assertions about poor productivity and posed a series of questions, especially about comparing the productivity achieved on the first ship as yet uncompleted with that of a mature shipyard producing ships at an advanced stage of a continuous run.

6.25 Mr Thompson, AMWU, informed the committee that the union accepted that the performance and construction of the three destroyers was a problem which had caused schedule and cost overruns. The union stressed, however, that the problems were not the result of the production workforce and poor performance—a finding supported by the ANAO.³¹ According to the union, the ANAO audit did not have anything to say in relation to the productive performance.³² Indeed, the AMWU suggested that the workforce engaged in building the AWDs was a productive workforce. It understood that the production workforce and its members have an important role in building industry's capacity and improving productivity.³³

6.26 The South Australian Minister for Defence Industries, the Hon Mr Hamilton-Smith, also referred to the criticisms levelled at the AWD project and argued that partly they were being used to justify the decision about the two supply ships. By way of reference, he noted, however, that if one talks to the gas and energy industry about projects of this size, a 21-month delay and a \$300 million overspend on a project of this magnitude would not be a surprise. He was of view that it was wrong to exaggerate any issues with the AWD's first of type as some form of justification

29 *Committee Hansard*, 21 July 2014, p. 40.

30 *Committee Hansard*, 21 July 2014, p. 40. See also *Submission 10*, p. 3.

31 *Committee Hansard*, 21 July 2014, p. 33.

32 *Committee Hansard*, 21 July 2014, p. 35.

33 Mr Glenn Thompson, *Committee Hansard*, 21 July 2014, p. 33.

against building the supply ships here.³⁴ Mr Hamilton-Smith noted that cost overruns, when you have projects of up to \$8 billion or more, are a part of the business. He explained:

These are complex projects and one ought not over-egg these overruns...I think DMO and the federal government generally can be a little sensitive when a project runs overboard and run off looking for scapegoats or people to lay the blame before. Rather, we need to focus on how we get the deal flow right, how we get the continuity of work right, estimating projects accurately in the first instance at the outset of the project and realising that the true benefit of the project probably lies in the savings made in ship No. 3 or No. 4 in the cycle or the run.³⁵

6.27 It should be remembered that BAE systems informed the committee that it had submitted an unsolicited proposal to government in September 2012 setting out a hybrid build program.³⁶ It informed the committee that it has achieved significant improvements in productivity through its work on the LHD project and building blocks for the AWD program, noting that the Williamstown shipyard was currently at 76 man-hours per Compensated Gross Tonne.³⁷ While, the FMI report quoted earlier supported this claim of improved productivity at BAE, it also found that ASC and Forgacs had shown no such improvement.

6.28 In this regard, it is important to note that Defence acknowledged the work done by BAE to lift productivity. It informed the committee that BAE addressed problems by bringing in shipbuilding experts from the US and the UK. It also referred to the FMI benchmarking data showing that BAE had improved in terms of block productivity since the initial production issues in 2010. Defence stated that it had 'no concerns about BAE's current level of block productivity and, as a commercial shipbuilding company, BAE undoubtedly is looking to improve its performance'.³⁸ In its view, past events show that BAE has 'the means, ability and willingness to react to any decrease in productivity'.³⁹

6.29 When Mr King referred to productivity, he was not speaking about the construction workers. He informed the committee that productivity drives up the cost of producing a ship, which does not necessarily depend on 'the ability of a welder to weld a metre of weld'. In this regard, he noted that Australia is probably as good at

34 *Committee Hansard*, 21 July 2014, p. 47.

35 *Committee Hansard*, 21 July 2014, p. 51.

36 *Submission 9*, p. 1.

37 *Submission 9*, p. 2.

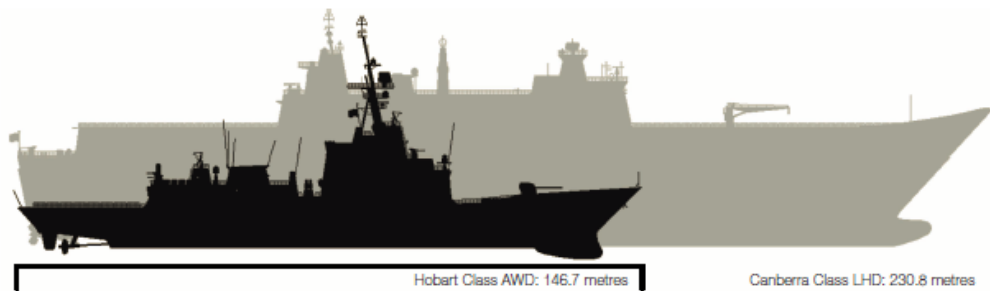
38 Department of Defence, answer to question on notice No. 13.

39 Department of Defence, answer to question on notice No. 13.

welding as 'anybody in the world', but that it was the organisations and structures around the ship build that count and not the individual.⁴⁰

Figure 6.1: Illustrates ship dimensions and block quantities.

LHD and AWD Comparison



AWD

Length overall: 146.7m

Beam overall: 18.6m

Displacement: 7,000t

Number of modules: 31

LHD

Length overall: 230.8m

Moulded beam: 32.0m

Displacement: 27,000t

Number of modules: 104

FMI use Compensated Gross Tonnage (CGT) as an indicator of the effort required to build a ship, as it takes account of the size, complexity and the customer oversight required in building vessels of different types. While the Air Warfare Destroyer (AWD) is about one quarter of the displacement of the Landing Helicopter Dock (LHD), the AWD is a much more complex vessel, given the levels of equipment installed on the ship. The CGT values for both ships, however, are similar.⁴¹

⁴⁰ *Committee Hansard*, 21 July 2014, pp. 13–14.

⁴¹ Department of Defence, answer to question on notice No. 30.

6.30 According to Mr King, productivity efficiency was necessary for a shipbuilding industry to be effective and efficient and that productivity efficiency was achieved through three main areas—module building and outfitting, design and economies of scale.⁴² He explained that one important way to achieve efficiency is with module building and pre-outfitting—a practice all around the world. In his words:

What you try to do is you take a slice of the ship, called a module, and you pre-outfit it with as much equipment as you can. This gives you access to both sides of the module, so you can fit it out. The world benchmark you are looking for is about 85 per cent pre fit-out or better. Clearly then the module size is set by the beam of the ship, pretty much. You could slip it again, but by having a module size the bigger the ship gets then the bigger the module gets. The second thing you want to do is you want to be able to turn the modules, invert them. The last thing you want to do is have welders or electricians doing a lot of fitting out work over the top of the head or overhead. What we do is we build the modules and then we turn them over so that the workers can work 'downhand', not overhead.⁴³

6.31 He contrasted the AWD, which is in the order of an 18.3-metre beam, with the LHD at 32 metres and the AORs, which are likely to be 23 metres.⁴⁴

Economies of scale

6.32 Mr King also argued that 'one-offs and two-offs do not make for anywhere near efficient shipbuilding'. As an example, he cited the ANZAC Ship Project, which was built out of Williamstown in Victoria. In his view, this project was 'probably the benchmark of economic performance in shipbuilding in Australia'. He referred to the learning curve effect for the ANZAC build, which was not achieved for the first few ships. But, according to Mr King, by the end of that program, 'we were building those ships in Australia cheaper than we could have bought them offshore'. In his view, the main thing was that the labour rate was not such a big factor and that there was no structural reason preventing Australia from being an efficient shipbuilder. He concluded, however, that Australia could not even 'be close to being an efficient shipbuilder' unless there was 'a genuine strategic approach' to building ships and which ships you are going to build. He stated:

Simply doing one-off or two-off ships, particularly if they are very large and require a very high investment in infrastructure, which is unlikely to ever be used again—our demand for another big ship is probably 30 years away—would be highly questionable.⁴⁵

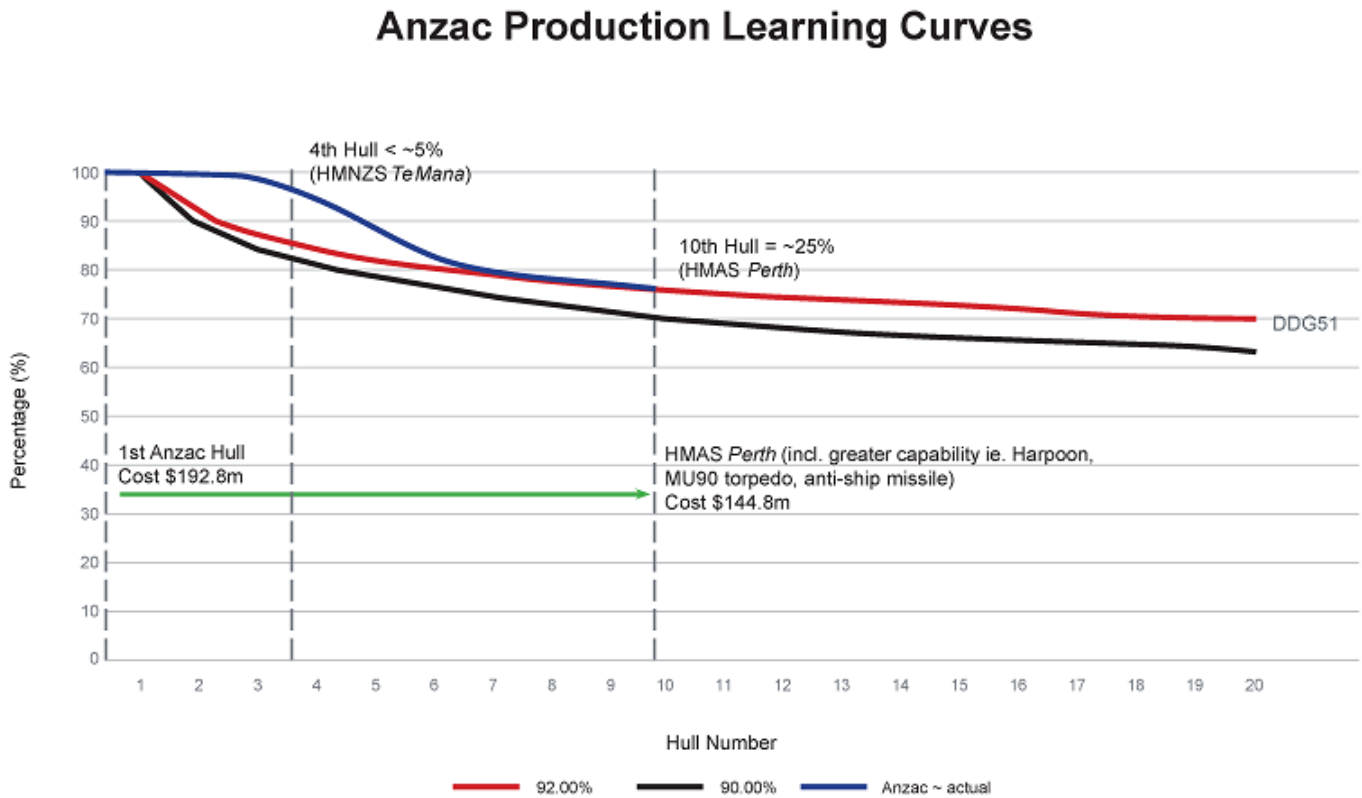
42 *Committee Hansard*, 21 July 2014, p. 14.

43 *Committee Hansard*, 21 July 2014, p. 14.

44 *Committee Hansard*, 21 July 2014, p. 14.

45 *Committee Hansard*, 21 July 2014, p. 14.

Figure 6.2: ANZAC Class Learning Curve productivity levels



The graph illustrates productivity improvement through continuing work on the same design. Experience with the ANZAC Class program shows that a short series of ships, like the two Auxiliary Oiler Replenishment ships, is not long enough to develop improvements in shipyard learning. An experienced naval shipyard with constant throughput of work would normally expect a learning curve of 90–94 per cent between first and second ship. It is important to note that, because of the peaks and troughs associated with naval shipbuilding in Australia, the ANZAC Class program did not achieve a corresponding learning curve effect until the fifth ship.⁴⁶

46 Department of Defence, answer to question on notice No. 30.

6.33 Mr Thompson, AMWU, understood that there were productivity gains from building a number of ships. He noted Mr King's observations regarding the ANZAC frigate project, which by ship No. 6, was producing the vessels at world's best practice. A few of the workers engaged in the project told Mr Thompson that, in the end, they were 'building those ships with their eyes closed because of the continuity'.⁴⁷ The union accepted that, from a value for money perspective, building a new class of ship from an existing design in a new shipyard costs more than later ones.⁴⁸ In Mr Thompson's view, this fact reflected normal results in any manufacturing endeavour and that building the two supply ships in Australia would be no exception.⁴⁹ He argued, however, not to assume that the European shipyards do not face similar start-up costs. He again cited the limited experience with AORs:

It has been a long time since the Spanish built the *Cantabria*, which was commissioned in 2010. The Korean ship is a new design. Steel for the first ship [for] the UK was only cut last month on 27 June.⁵⁰

6.34 Mr Dunk also agreed with the proposition that if the supply ships were to be built in Australia then a two-ship build was not going to achieve economies of scale'.⁵¹ He cited the ANAO report on the AWD, which basically indicated that after completing ship No. 4 then 'you are in the ballpark of competitiveness'. He stated however, that:

I do not necessarily accept that parts of the ship could not have been built here for maybe some additional cost, that is to be seen, and maybe some slippage of the schedule, and that is to be seen as well.⁵²

6.35 Mr Hamilton-Smith similarly appreciated the fact that a build-up of two ships might not produce economies of scale in contrast to producing a run of six such ships where there would be some benefits. Nonetheless, he sought to emphasise the point that Australia presently faces a particular issue, which is 'to cover the valley of death'—to keep the skilled workforce in place and Australian capabilities in position for what is to follow. In his opinion:

The decision to fit these two ships offshore is going to hurt that capability.⁵³

6.36 Mr Burns noted that recently the New Zealand Navy announced it was also going to replace its replenishment ship. In his view, the opportunity existed for

47 *Committee Hansard*, 21 July 2014, p. 35.

48 *Submission 4*, p. [4].

49 *Committee Hansard*, 21 July 2014, p. 34.

50 *Committee Hansard*, 21 July 2014, p. 34.

51 *Committee Hansard*, 21 July 2014, p. 43.

52 *Committee Hansard*, 21 July 2014, p. 43.

53 *Committee Hansard*, 21 July 2014, p. 51.

Australia to enter into a partnership with New Zealand to have a three-ship arrangement.⁵⁴

Reputation of South Korean shipbuilders

6.37 As noted earlier, one of the tenderers is Daewoo Shipbuilding and Marine Engineering (DSME) of South Korea. It should be noted that in 2006 the Foreign Affairs, Defence and Trade Committee acknowledged that the South Korean shipyards were recognised and highly regarded for their efficiency in producing commercial tankers:

Their business model is based on high-rate production and they have forward orders running for many years.⁵⁵

6.38 At that time, Dr Stephen Gumley, then CEO, DMO, told the committee that the production capacity of the South Korean shipyards was 'just phenomenal'. Indeed, Lieutenant General David Hurley recalled a tour of those yards:

...we...asked the Koreans if they would be interested in building a 20,000-tonne LHD, they looked down their noses because they 'don't build tugs'. It was just a size they do not consider...⁵⁶

6.39 The reputation of the South Korean shipyards remains high for their productivity. Mr King referred to South Korea as the specialists in tankers—where in one yard alone, they are 'delivering a ship every nine days'.⁵⁷ He noted that AORs are similar to tankers and that even other countries with their own naval shipbuilding industry look overseas to acquire their large replenishment ships. He gave the following example:

Norway, who is a specialist shipbuilder, a renowned shipbuilder, who produces offshore vessels all the time—probably the world's leading, certainly up there, offshore vessel builder—is buying its AOR from Korea. So there is a country with a well-established, renowned capability in shipbuilding that has chosen to buy its AOR from Korea.⁵⁸

6.40 In respect of DSME, Defence informed the committee that it was one of the world's best and most prolific shipbuilders in the world, having the highest of reputations for tanker construction. It noted that DSME had 148 commercial and naval vessels currently on order worth a combined \$US 44 billion and had built over 1,000 commercial and naval vessels, including more than 330 commercial tankers, to which

54 *Committee Hansard*, 21 July 2014, p. 45.

55 Mr Kim Gillis, Foreign Affairs, Defence and Trade Committee, *Committee Hansard*, 18 August 2006, p. 46.

56 Foreign Affairs, Defence and Trade Committee, *Committee Hansard*, 18 August 2006, p. 46.

57 *Committee Hansard*, 21 July 2014, p. 20.

58 *Committee Hansard*, 21 July 2014, p. 20.

the potential AOR Aegir 18A design is a variant.⁵⁹ Furthermore, as well as the Norwegians, DSME was currently in contract with the United Kingdom Ministry of Defence for the Royal Navy's MARS (Military Afloat Reach and Sustainability) Tanker.⁶⁰

6.41 According to Defence, Navantia was a leading and 'a proven shipbuilder with experience with AOR design and construction, including the *Cantabria* in 2008 and the Navy's two new LHDs. The *Cantabria* deployed to Australia during 2013 and 'operated very successfully' with the RAN.⁶¹ Furthermore, Defence noted that in recent years, Navantia had undertaken the construction of naval vessels for a number of different navies—those of Spain, Australia, Norway, India and Venezuela. It explained further that the *Cantabria* class design was 'a development of the earlier Auxiliary Oiler Replenishment (AOR) *Patino* commissioned in 1995, and was built using the same shipyard processes as the Spanish and Australian Landing Helicopter Dock (LHD) ships'. According to the DMO:

The Spanish shipyards have long established suitable facilities and construction techniques, with shipyard familiarity extending established processes across other recent successful construction projects. The Spanish shipyards would use the same design teams, common building procedures and standards, and build strategy for potential Royal Australian Navy (RAN) AOR ships as undertaken for *Cantabria* and other recent programs.

There would be no requirement to re-engineer the block size or other aspects of the design as would be required to undertake construction by local Australian industry (noting it has been independently recognised that such re-engineering effort negates any learning curve and productivity-related benefit).⁶²

6.42 The Navy League of Australia, which strongly supported the notion of Australia maintaining shipbuilding capability, drew a parallel with the UK, which also had a similar need to sustain a naval shipbuilding program. It noted:

As the aircraft carrier project draws to a conclusion the Type 26 frigate program assumes great importance in sustaining industry capability in the UK. Submarine capability is committed long term to the *Astute* class and the SSBN successor program. It is significant that the order for 4 Royal Fleet Auxiliary MARS 37,000 tonne fleet tankers was placed in Korea with Daewoo. They are being built to a British design by BMT Defence Services.⁶³

59 Department of Defence, answer to question on notice No. 31.

60 Department of Defence, answer to question on notice No. 14.

61 Department of Defence, answer to question on notice No. 14.

62 Department of Defence, answer to question on notice No. 31.

63 *Submission 12*, p. [1].

BAC Cantabria blocks built by Navantia in Cadiz, Spain

Figure A: Typical block under construction in Spain (462 tonnes)⁶⁴



Figure B: Aft superstructure block under construction in Spain. Australian construction of this block required it to be constructed and lifted as four separate blocks due to manufacturing and lifting capacity restrictions.⁶⁵

64 Department of Defence, answer to question on notice No. 30.

65 Department of Defence, answer to question on notice No. 30.

6.43 The League also understood that Norway, as Mr King mentioned, was acquiring a similar but smaller ship from the same builder and had considered that their domestic shipyards would benefit more from building smaller, higher value, specialist vessels.⁶⁶ The League was of the view that there were cogent reasons for Australia placing orders for the two support ships overseas. It argued that the government's decision to call for a restricted tender for the construction of the two ships to replace HMAS *Success* and HMAS *Sirius* appeared essentially pragmatic—a decision which faced the reality of shipbuilding in Australia.⁶⁷

6.44 The committee agrees that the productivity of some overseas shipyards such as those in South Korea, is impressive. Even so, submitters pointed to other considerations, such as broader economic benefits, through-life support and national security, that may well override considerations based on purely the cost and schedule of a build. For example, Mr Dunk supported the argument that factors other than the cheapest price need to be taken into account when acquiring a naval vessel. In his view:

These factors can be broadly considered as the mitigation of strategic risk through the development of an industrial base that we need to have, the associated development of skills and expertise for the longevity and sustainment of that industrial base and the economic benefits of doing the work in country through factors such as increased employment, return to the government through taxation, innovation and potentially export.⁶⁸

6.45 In the following section, the committee considers the economic benefits of having an Australian build including consideration of through-life costs.

Contribution to Australian economy

6.46 Naval shipbuilding makes an important contribution to the Australian economy. Mr Simon Kennedy, Adelaide Ship Construction International and Smart Fabrication, wrote of the positive returns on investment should the supply ships be built in Australia:

Every dollar spent on a ship or submarine within Australia goes further than the initial transaction. Australian primes engage Australian manufacturers who engage Australian subcontractors. The training and development required to build the ships and submarines not only contributes to our local economy, but also our local knowledge and skills base.⁶⁹

6.47 He argued that if the Navy's auxiliary supply ships were to be built overseas, the flow-on effects of each dollar spent would not be felt in Australia. He stated:

66 *Submission 12*, pp. [1–2].

67 *Submission 12*, p. [3].

68 *Committee Hansard*, 21 July 2014, p. 41.

69 Mr Simon Kennedy, Adelaide Ship Construction International and Smart Fabrication, *Submission 8*, p. 2.

We would be investing billions of dollars in an overseas economy, in overseas communities, instead of our own. It would be detrimental to Australia's knowledge and skills base and akin to shooting ourselves in the foot.⁷⁰

6.48 An ASC paper on Australia's shipbuilding industry also noted the advantages that flow through to the national economy from investment in the Australian naval industry—an advanced manufacturing, high value-add sector. The paper referred to studies on the economic effects of projects such as the ANZAC Frigate and the Coastal Mine Hunters projects showing that 'basic benefits to the national economy from in-country construction are nearly double the value of the investment'. Taken together with the flow-through effects of in-country construction, it argued that 'the human capital generated by large projects and innovation spill-overs from in-country design and development work, contribute substantially to the national economy'. It also referred to generating innovation and thus creating even greater spill-overs.⁷¹

6.49 According to the Australian Industry & Defence Network Inc, naval shipbuilding directly employs some 6,000 people and indirectly nearly 15,000 people. It stated further:

The industry makes a contribution to the Australian economy of between (conservatively) \$1.5 billion up to around \$2.3 billion (based on total multipliers) per annum.

Around 7,400 full time equivalent (FTE) jobs across Australia can be attributed to the production of naval vessels by the five largest prime contractors in the industry. In addition, up to 7,560 FTE jobs can be attributed to the activities associated with through life support of naval vessels.⁷²

6.50 In the Network's view, more often than not the Defence Department's value for money (VFM) criteria only considers the short term acquisition costs and this drives procurement often to an overseas supplier. Furthermore, that 'a more holistic "Whole of Life" VFM criteria would ensure a more realistic appraisal of competing bids'.⁷³

6.51 The ACIL Allen report to the Australian Industry Group, *Naval Shipbuilding Through Life Support*, produced the set of figures quoted above, including the potential \$2.3 billion contribution from naval shipbuilding and through-life support to the economy. This report also noted other significant economic benefits—technology

70 Mr Simon Kennedy, Adelaide Ship Construction International and Smart Fabrication, *Submission 8*, p. 2.

71 An ASC paper, *A Sustainable Australian Naval Industry*, issue 1.0, pp. 15 and 19, <https://www.asc.com.au/Documents/Speeches/A%20Sustainable%20Australian%20Naval%20Industry.pdf> (accessed 7 August 2014).

72 *Submission 7*, p. 2.

73 *Submission 7*, p. 3.

transfer, transfer of expertise, and improved practices in areas such as quality assurance, business planning, sub-contracting and dealing with Defence.⁷⁴ It drew attention to the 'hidden but real, financial costs that are likely to arise if a decision is taken to source ships from overseas or between different approaches to Australian design, build and sustainment'. One of the key considerations was the possible additional costs to maintain the vessels throughout their service life.

6.52 It should be noted that in response to a question about the economic benefits that flow through the economy from government spending in Australia on naval acquisitions, Defence offered some qualification on the statistics provided to the committee. It advised that when assessing the economic impact of a project, three issues should be kept in mind. According to Defence, they were not mentioned in evidence and suggested the benefits of building the Navy's auxiliary supply ships in-country may have been overstated. Defence then explained the relevant issues:

- All Defence capital equipment projects must ultimately be paid for by Government by raising taxes or reductions in other areas across the public sector to maintain a balanced budget. Consequently, defence capital equipment can only be purchased at the cost of displacing or 'crowding out' other areas of activity elsewhere in the economy. This applies irrespective of whether the equipment is produced domestically or sourced from overseas.
- Many of the resources already used within Australia for the production of defence capital equipment, or earmarked for potential use, can eventually be deployed in other parts of the economy; possibly in more productive applications. If Australia is required to pay a substantial price premium to ensure that an item of defence capital equipment is produced in-country, it suggests that more productive uses for these resources are available over the longer term. Consequently, a price premium is normally only justified for the domestic build of equipment if the equipment has an especially high military-strategic value to the Australian Defence Force and overseas supply is impractical. The construction of an auxiliary supply ship in Australia does not satisfy either of these criteria. Moreover, any payment of a price premium will erode the purchasing power of the Defence budget and require that Defence reduces its expenditure on other military capabilities. A premium therefore has a direct opportunity cost.
- Although investing in the domestic build of an auxiliary supply ship will generate so-called multiplier or flow-on effects and may create so-called spillovers by contributing to broader workforce skilling, it is not clear whether these effects are any higher than if the investment in the build had been re-directed and used for other purposes. That is, it is not clear that the multipliers

74 ACIL Allen Consulting, *Naval Shipbuilding & Through Life Support, Economic Value to Australia*, ACIL Allen report to Australian Industry Group, December 2013, p. ii.

or spill-overs associated with building the ship are any greater than those associated with other types of economic activity.⁷⁵

Through-life-support

6.53 When considering the costs of an acquisition, industry participants emphasised the need to take account of the through-life expenses which may be many times greater than the initial cost of acquisition. Indeed, the Foreign Affairs Defence and Trade Committee noted that as a rule of thumb applying to large constructions, including a typical warship, most estimates suggest 30 per cent in initial acquisition costs compared to 70 per cent through-life support costs.⁷⁶ Likewise, Mr Fletcher noted the significant through-life support costs as compared to the purchase cost:

...one of the challenges before our nation is for the Defence department to seriously look at whole-of-life-cycle costing when making procurement decisions, because generally whole-of-life-cycle sustainment cost is up to two, three or four times the procurement cost, so you get a very different answer if you model whole-of-life-cycle costing versus the initial procurement.⁷⁷

6.54 Mr Fletcher also stressed the point that the initial penalty for upfront procurement in Australia would be defrayed, if the 'whole-of-life-cycle costs and the information, knowledge and skills base is preserved and maintained for future upgrades and sustainment of those vessel'.⁷⁸ Likewise, Mr Hamilton-Smith argued that the decision to build off-shore 'will cost the Commonwealth government far more through the full life cycle than any possible savings made in the initial procurement'.⁷⁹

6.55 The committee has already noted that investment in infrastructure may have long-term benefits for the costs in maintaining and upgrading vessels: that by constructing vessels in Australia, the economic costs of maintaining, repairing and refitting large naval vessels throughout their operational lives could be reduced. Thus the savings generated by having the infrastructure available for the maintenance and upgrade of the Navy's fleet should be a major consideration.⁸⁰ But the argument about through-life support also extends to the know-how and the skills base needed to sustain and upgrade the fleet. In other words, if Australia is to maintain and modernise its naval vessels, it needs an experienced, knowledgeable and productive

75 Department of Defence, answer to question on notice No. 19.

76 Foreign Affairs, Defence and Trade Committee, *Blue Water Ship: consolidating past achievements*, December 2006, paragraph 10.1.

77 *Committee Hansard*, 21 July 2014, p. 51.

78 *Committee Hansard*, 21 July 2014, p. 52.

79 *Committee Hansard*, 21 July 2014, p. 47.

80 For a more detailed discussion on through-life support of Naval ships see Foreign Affairs, Defence and Trade Committee, *Blue Water Ships: consolidating past achievements*, pp.126–155.

workforce to repair and service these vessels throughout their operational life. Some suggest further that naval ships should be built in Australia so that the country will acquire the knowledge and experience necessary to maintain, repair and upgrade its vessels.

Conclusion

6.56 There is no denying that the AWD project has run into trouble and that productivity is a problem. As the work on the second and third AWD vessels progresses and the skills base and experience continues to develop, the committee understands that further productivity gains could be anticipated. The committee accepts, however, that the benefits that derive from economies of scale cannot be expected with the two-off build of the replenishment ships. Furthermore, the committee is aware that some overseas shipbuilders, notably the South Korean shipyards, have an impressive and proven track record in producing large tanker-like vessels cost-effectively and without delays.

6.57 Even so, the committee notes that cost and schedule are not the only factors that should be taken into account when considering the procurement of a major naval acquisition. The committee has looked at the much broader economic benefits that accrue from a local build or Australian involvement in the production of a naval vessel. They include the development of a highly skilled workforce, employment, the growth that comes through research and development, knowledge transfer and the benefits that innovation bring to the wider economy. The committee also understands the importance of having the skills base, experience and local know-how necessary to support the vessel throughout its operational life. This self-reliance is central to national security and is discussed further in the following chapter.

