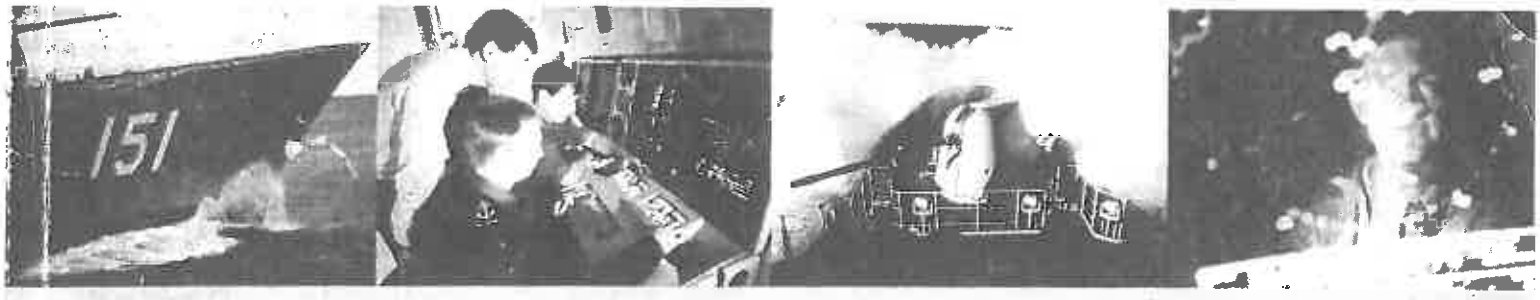

TASMAN
ASIA
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Economic Management & Policy Consultants
CANBERRA

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:

Victoria
Department of State and Regional Development

ipi

Tenix

ISONET

Australian Industry Group
DC
DEFENCE COUNCIL

Mark Thomson

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ASIA
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IMPACT OF MAJOR DEFENCE PROJECTS: A CASE STUDY OF THE ANZAC SHIP PROJECT

Final report

by Denise Ironfield

Prepared for

Australian Industry Group

DC

DEFENCE COUNCIL

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

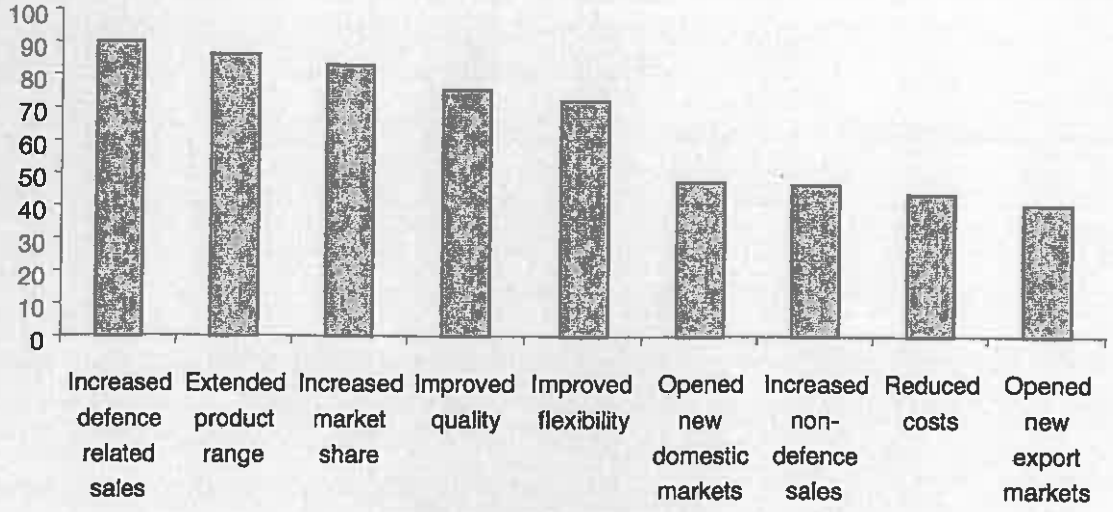
The growth in economic activity resulting from the ASP arises from a range of factors which have increased ASP businesses productivity and competitiveness. Through their participation in the project, companies have:

- 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)



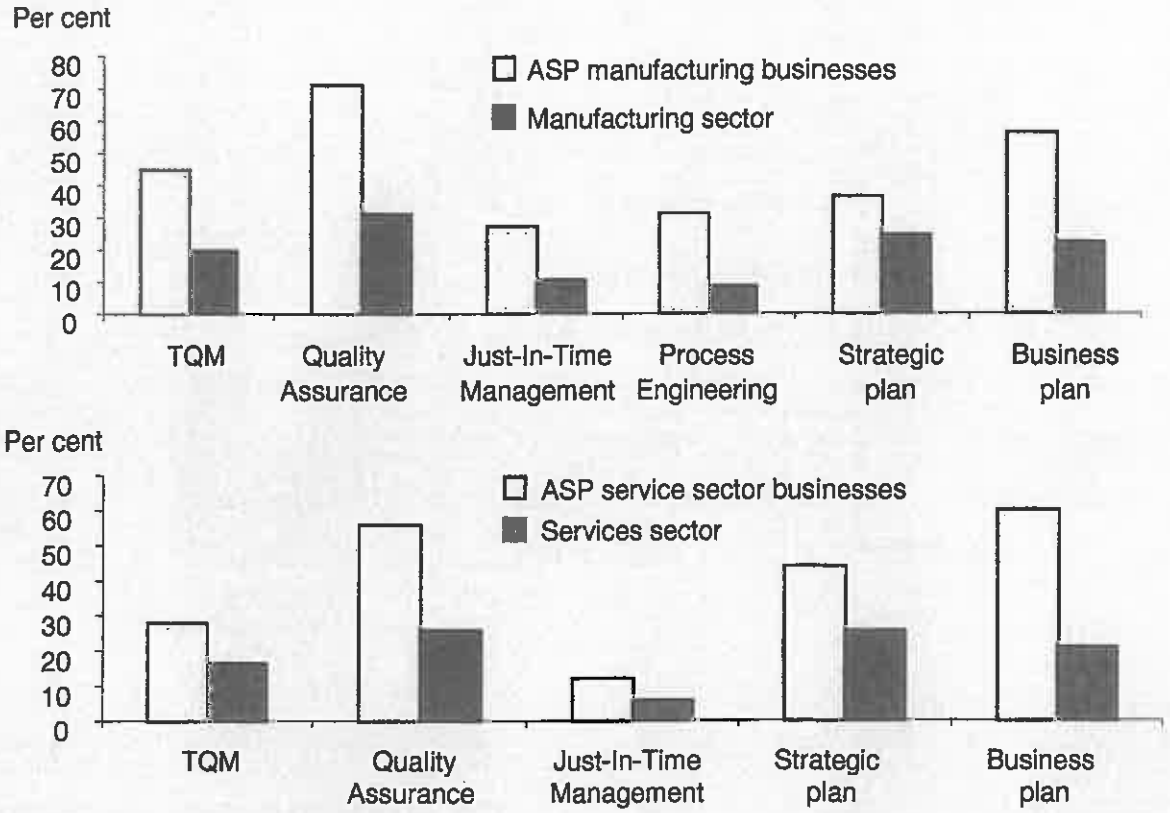
Many of these firms obtained their new technology through original research and development. Notably, the study found that a higher proportion of ASP manufacturers conduct original R&D than companies in the broader manufacturing sector.

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.

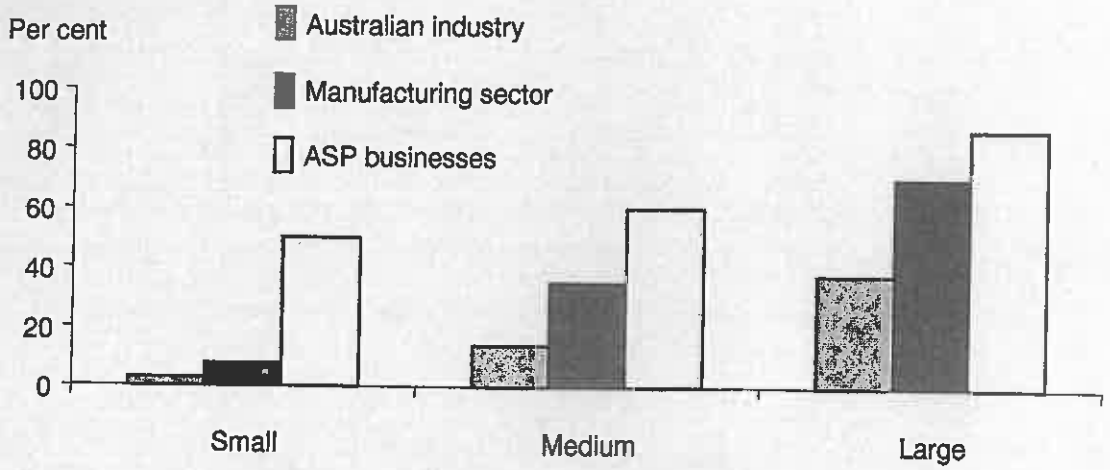
As new companies become involved in the through-life support of the ANZACs, this process of defence related productivity growth will continue and produce ongoing benefits to the economy.

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 on 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 summaries 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

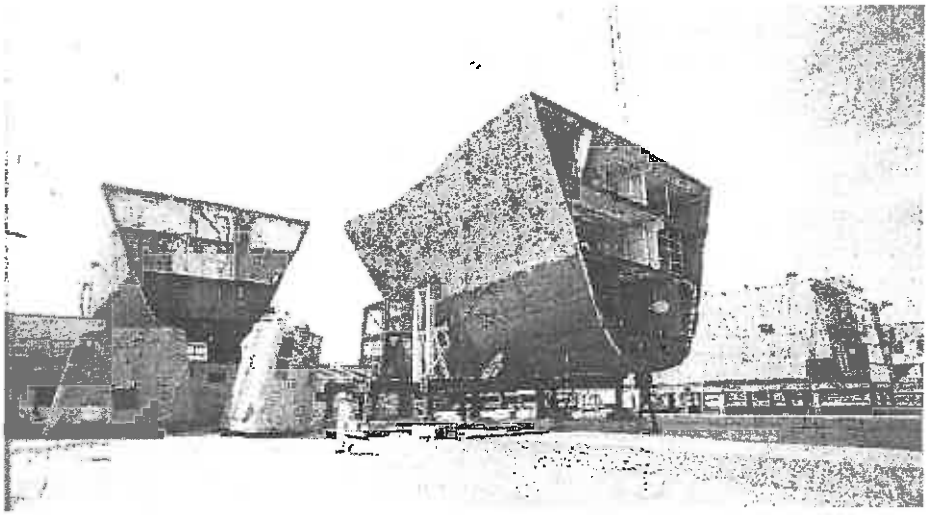
The ANZAC frigates have been developed using an existing MEKO Class hull designed by a German firm Blohm+Voss. However, major elements of the ships' detailed design required a considerable level of indigenous Australian input and intellectual property. For example, the physical design of the hull, electrical 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.

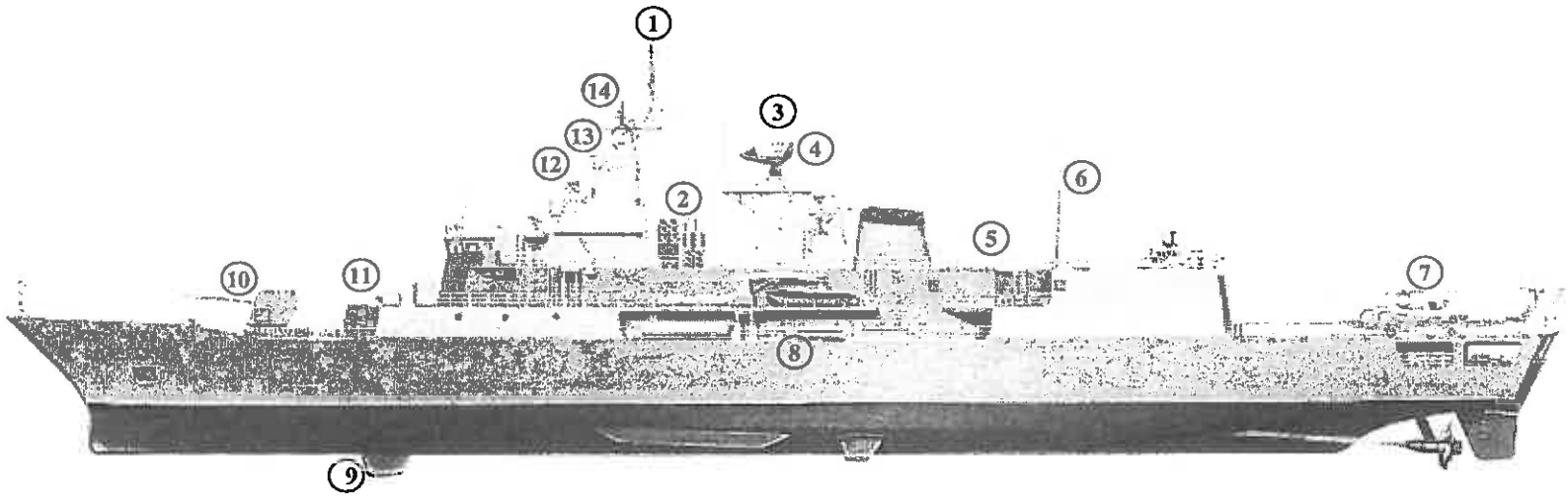
The ships are constructed using a unique level of modular construction which permits rapid installation of equipment and dramatically reduces the time and costs associated with through-life maintenance and upgrade costs (Figure 2.2). Modules are constructed in Australia and New Zealand. Prior to this 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 manufacturer 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**

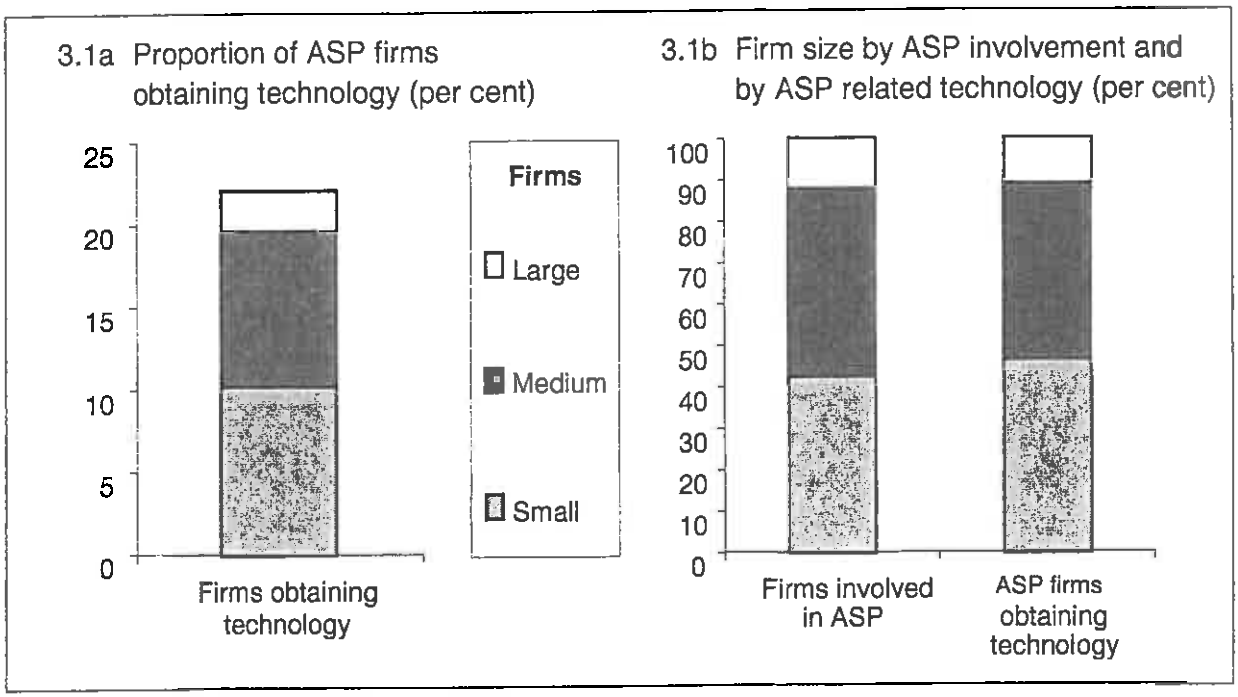
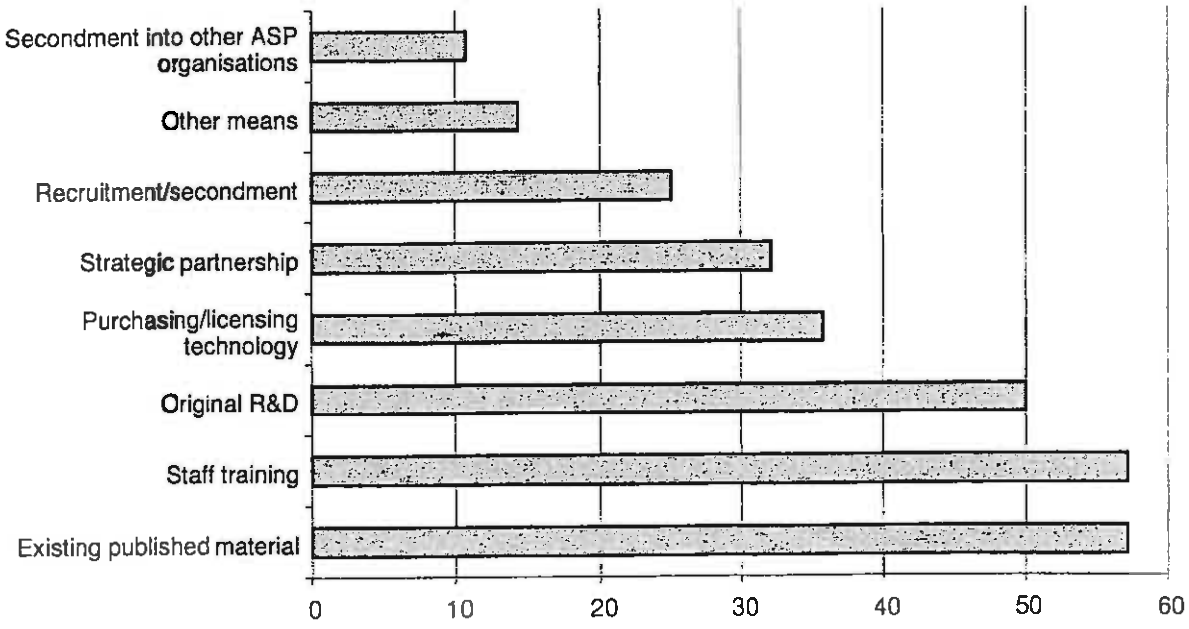


Figure 3.2: **Source of new technology** (per cent of firms obtaining new technology)



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 bar 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:

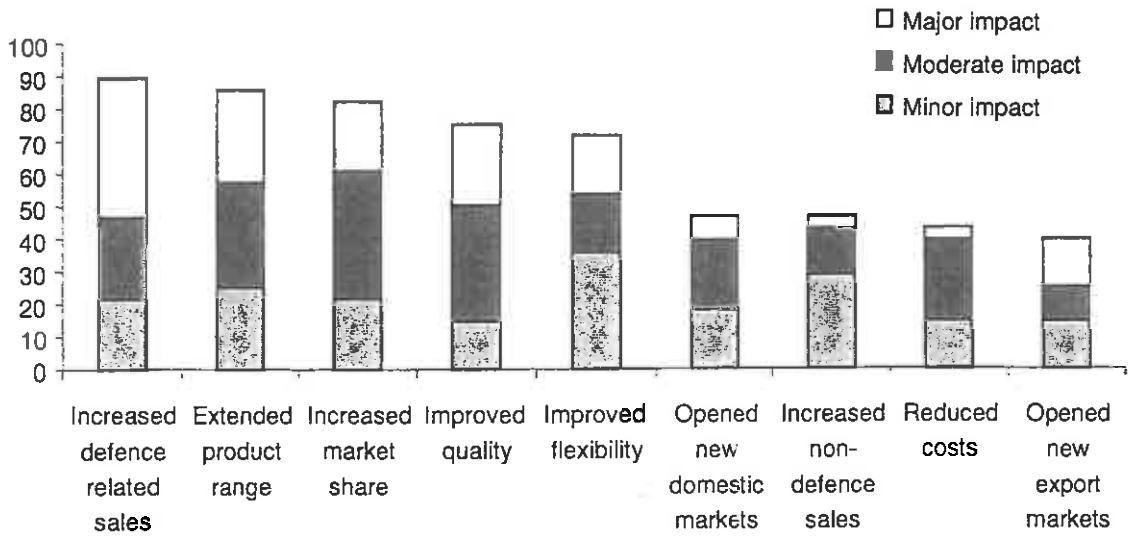
- increased defence-related sales (89 per cent)
- extended product range (86 per cent);
- increased market share (82 per cent);
- improved quality (75 per cent); and
- improved flexibility (71 per cent).

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.

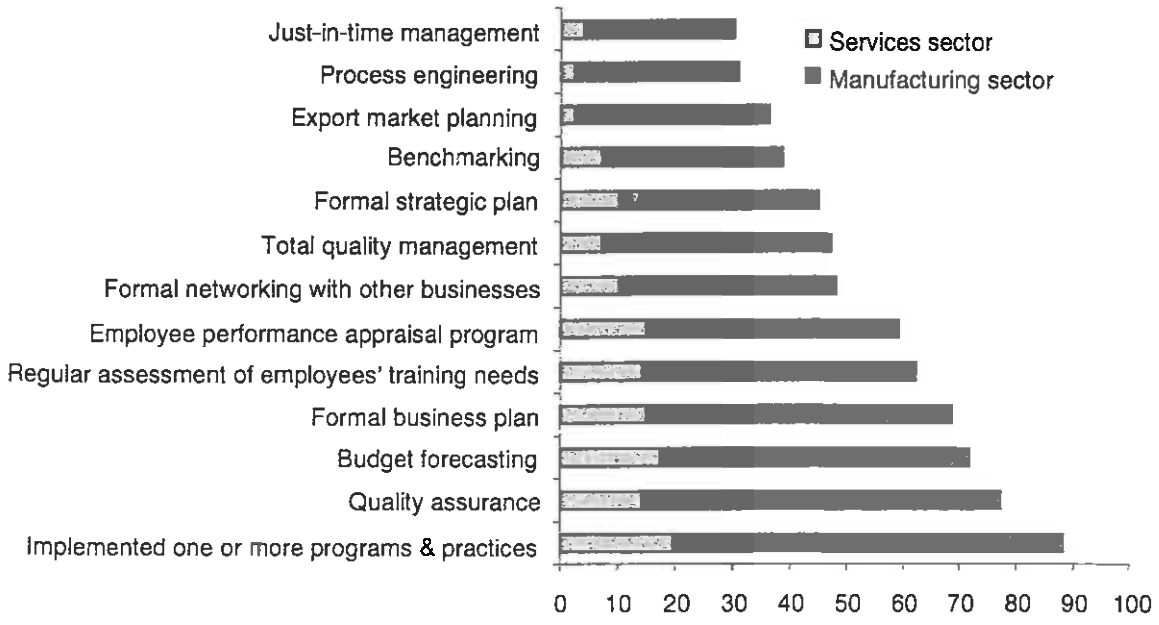
Sweetman Fasteners (previously Delta Fasteners) won the contract to supply thousands of different sized fasteners for the ANZAC frigates (see Box 2.1). Subsequently, the Melbourne based company took on a partnering role with the prime contractor and took over the management of the total stock of fasteners 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).

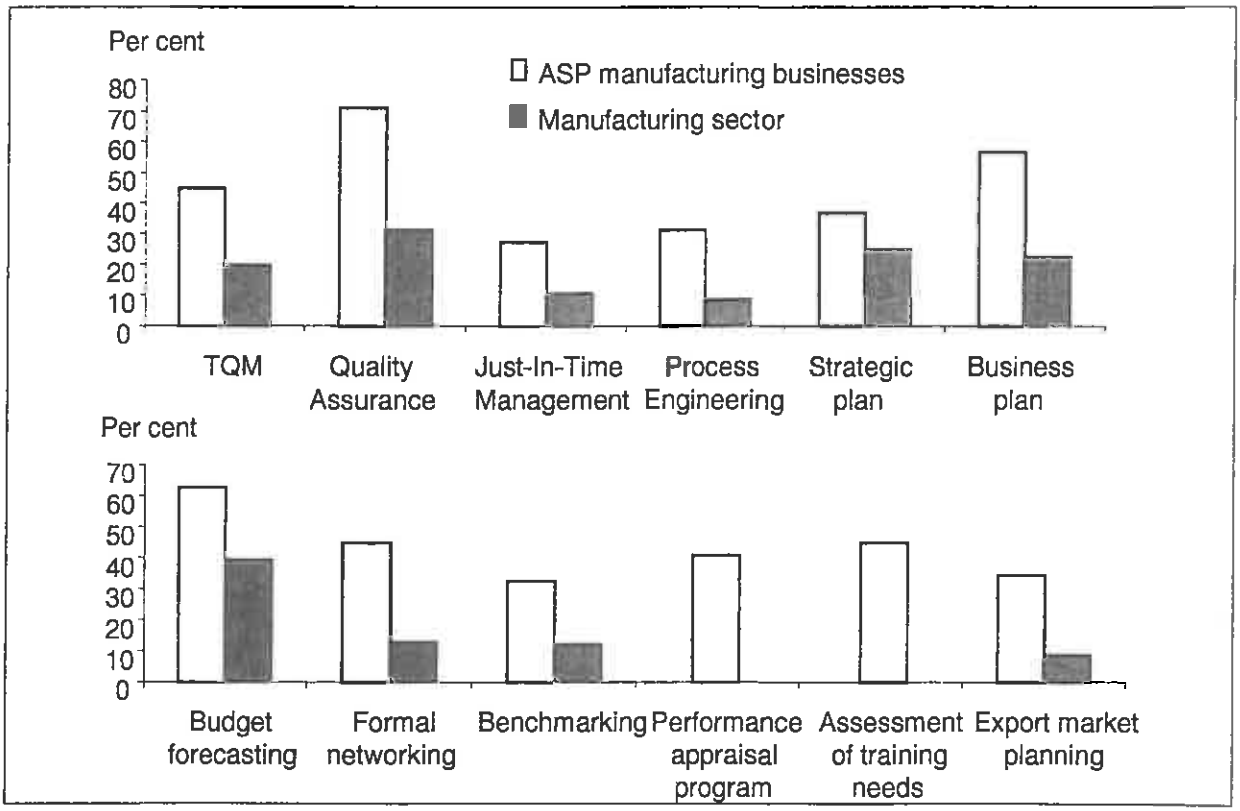
The high quality standards required by the Australian Department of Defence from its prime contractors supplying major defence projects often affects lower tier suppliers, as these standards flow down the supply chain. With this in mind the ASP survey questionnaire asked businesses involved in the project 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.

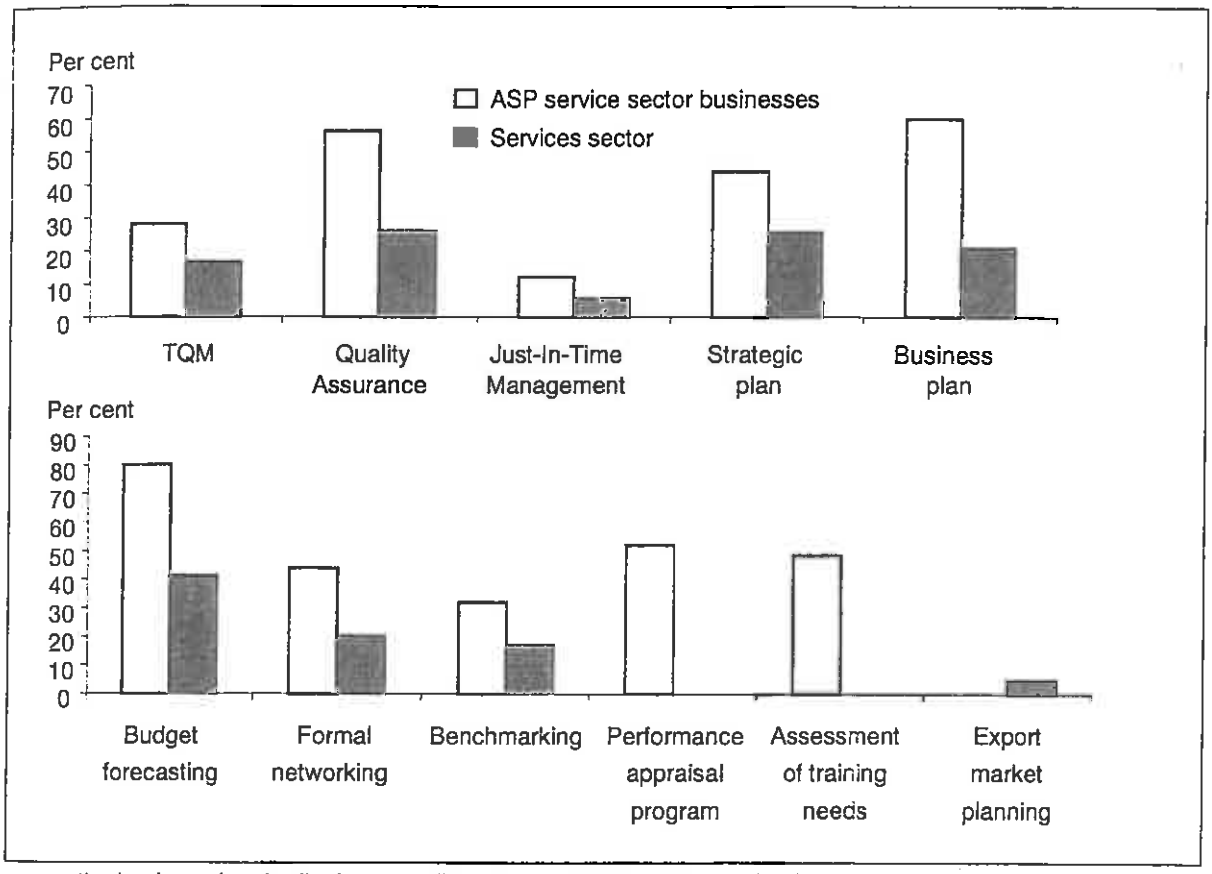
Source: ASP survey and DEWR&SB (1998).

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]



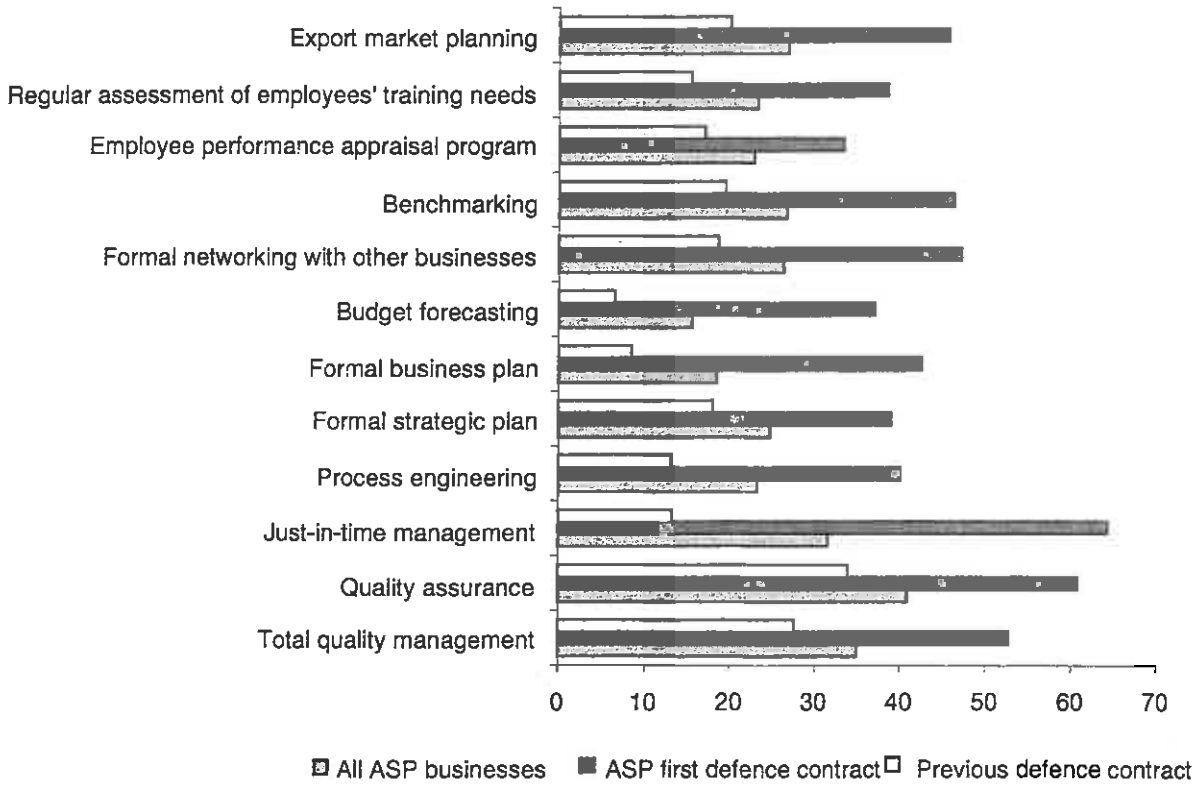
a the business longitudinal survey did not request information on businesses implementation of performance appraisal programs or regular assessment of employees training needs.
Source: ASP survey and DEWR&SB (1998).

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

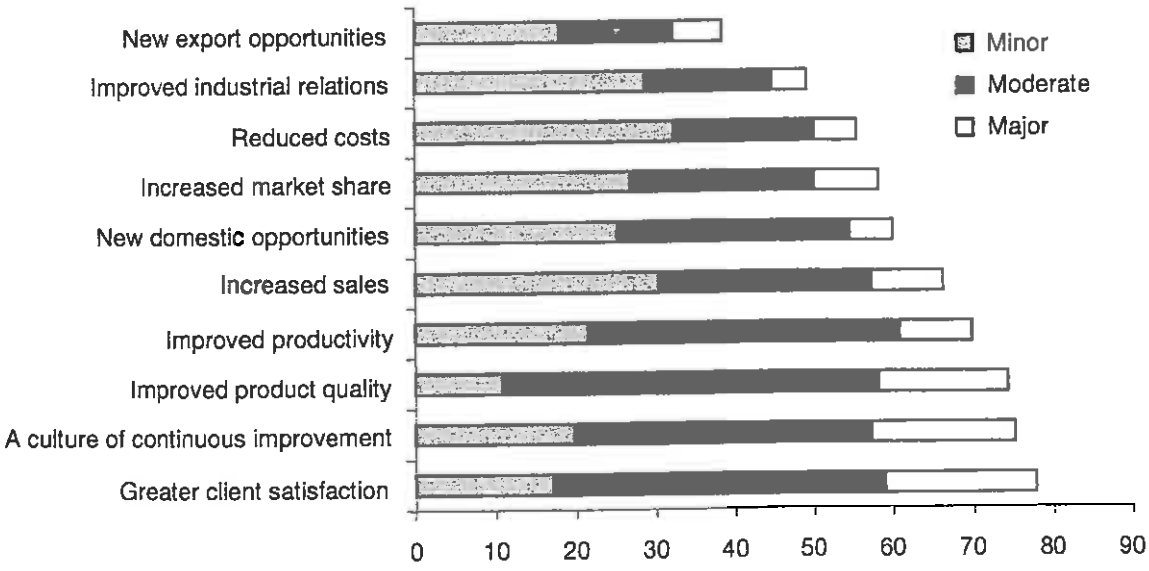
of gaining accreditation. Another respondent, with a number of other defence contracts, indicated that its defence work, including the ASP, was important in its decision to implement process engineering. The company's management said that process engineering had helped the company to achieve the high 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

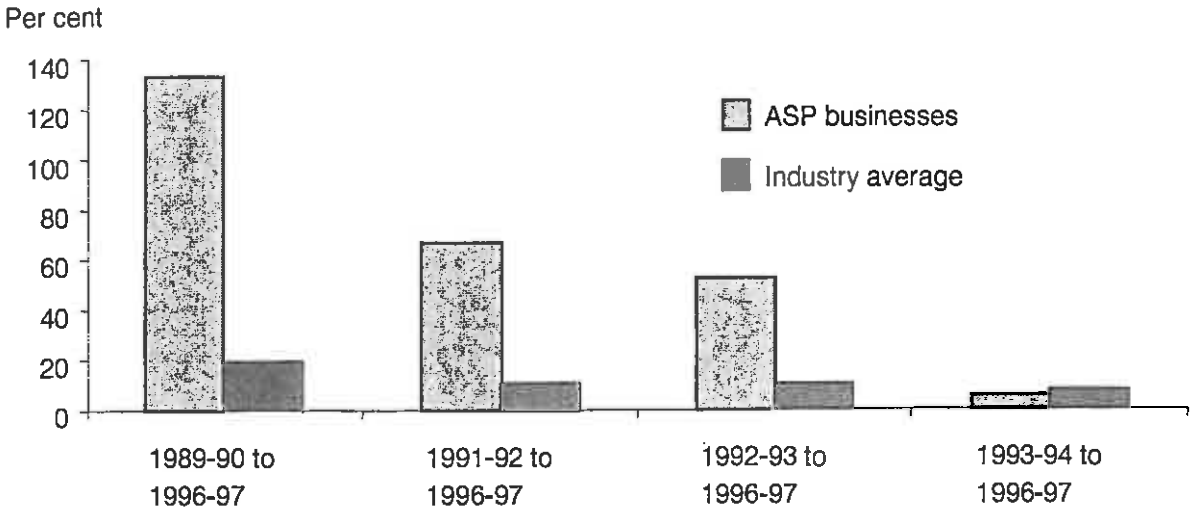
The implementation of these programs and practices also had positive impacts on many ASP businesses operations and outputs. Between 70 and 75 per cent of businesses believed that implementing one or more of the programs and practices had helped create a culture of continuous improvement with improvements 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)

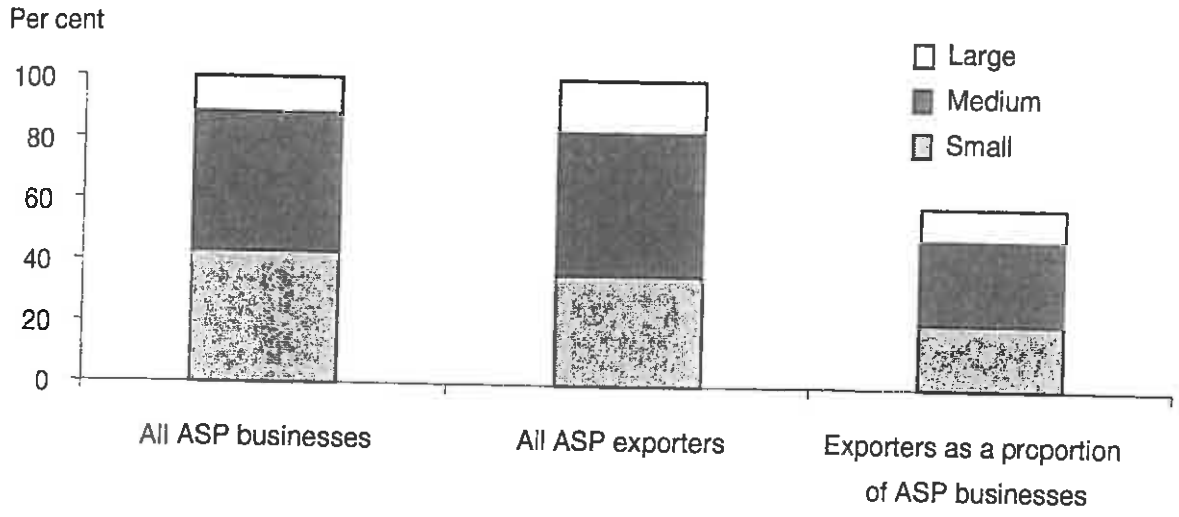


While the relatively limited number of responses means that care should be taken in their interpretation, this labour productivity analysis supports the perceptions of improved performance and the culture of continuous improvement reported by the majority of ASP businesses. It can be expected that as 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**



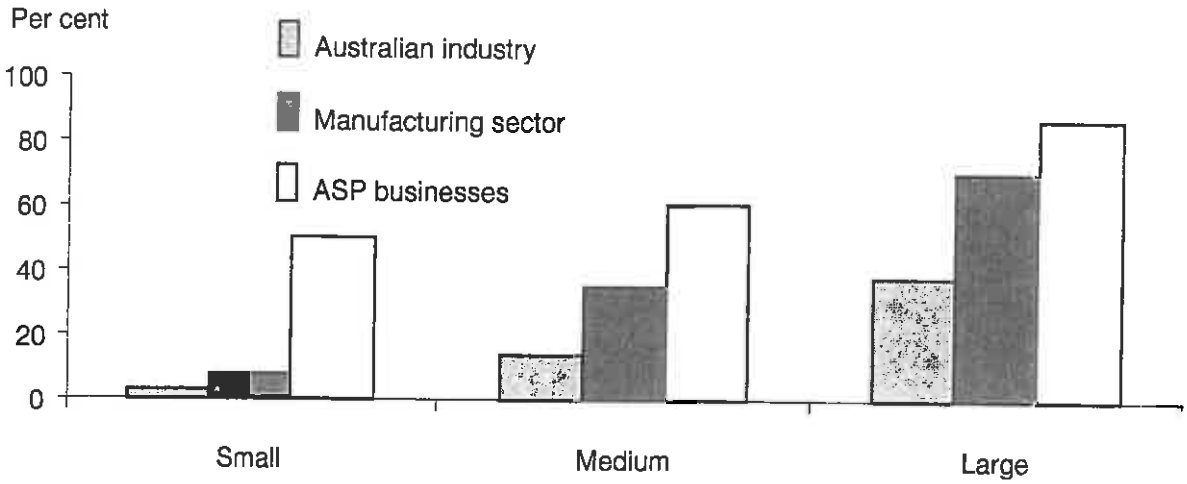
In all three size groupings, a higher proportion of ASP business were likely to export than might be expected by observing the same size groupings in the Australian business population.[3] For example, Figure 5.2 shows that half of the ASP's small businesses export, this contrasts with only three per 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.

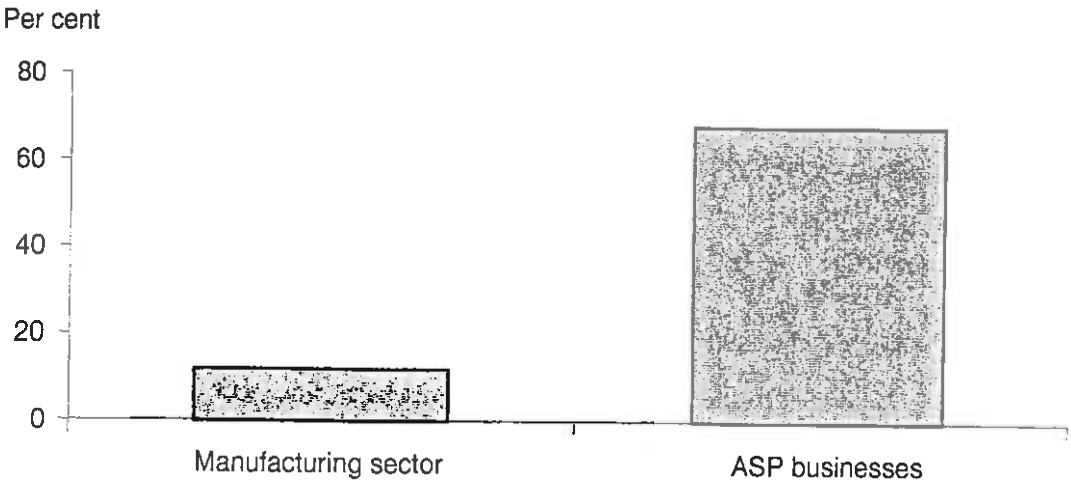
Figure 5.2: **Export propensity by size** (per cent of exporting businesses in size grouping)



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**

Figure 5.4a: ASP and other contributors

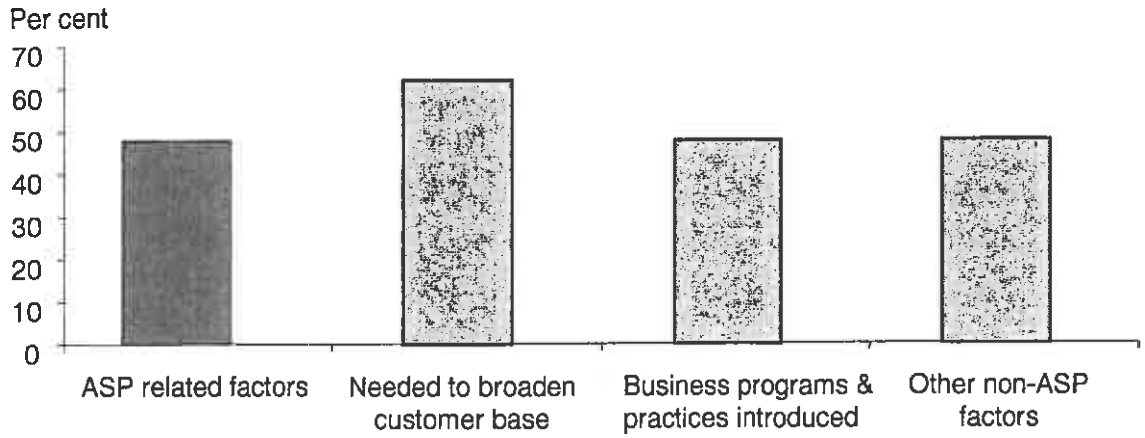
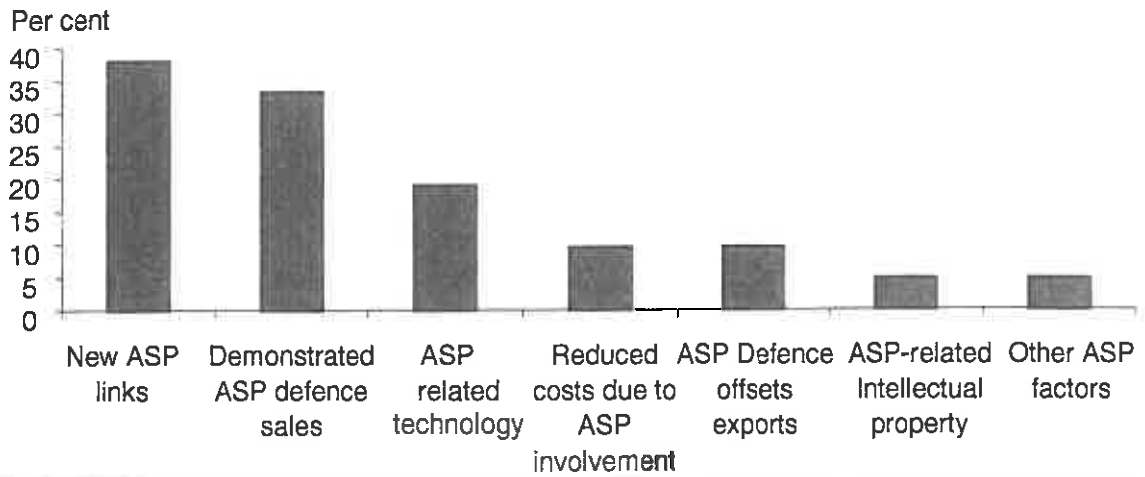


Figure 5.4b: Nature of the ASP contribution



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 manufacturers and supplies virtually all the ANZAC's marine values. 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 manufacturer 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 lead 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 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

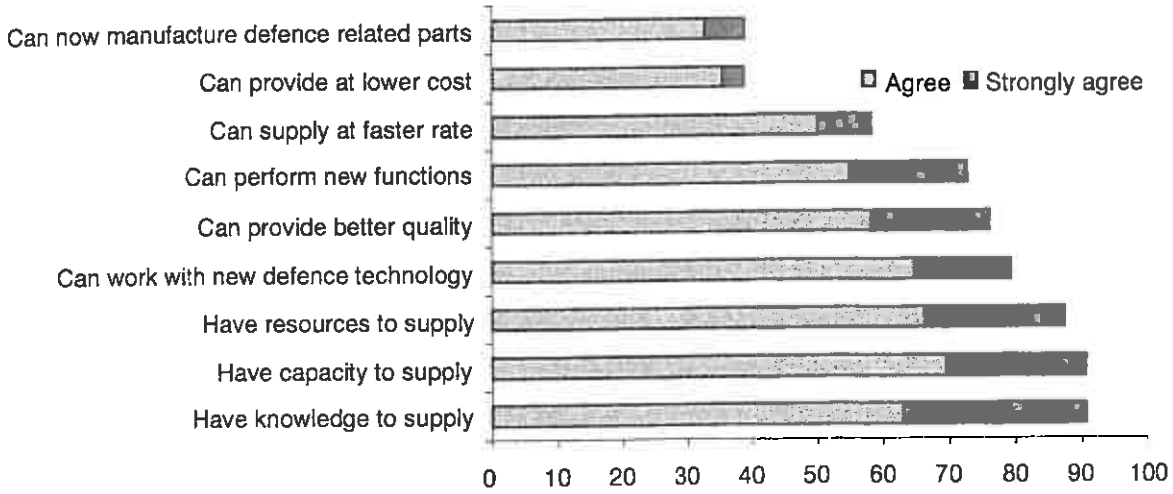
Stallman Pty Ltd is a small company, based in Matraville New South Wales. Stallman supplied pipe and fittings to the ASP. The ASP was the company's first defence contract and its involvement with the project commenced in 1994. While the company's management fought hard to win the contract, in terms of 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

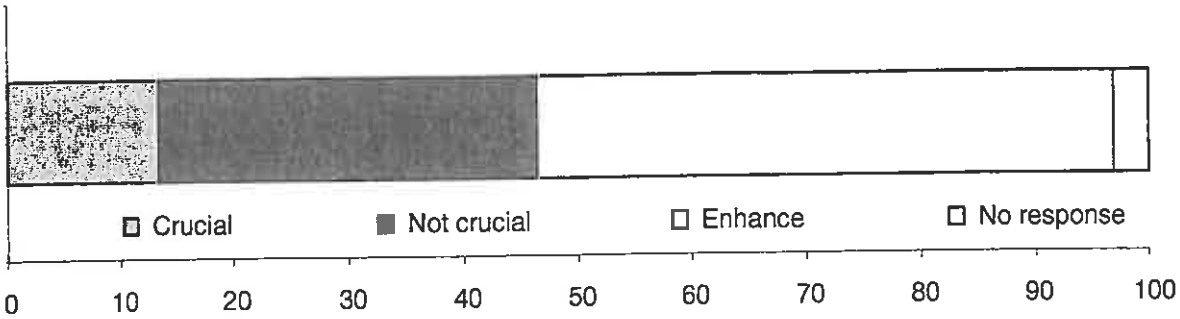
As the quote at the beginning of this section explains Defence is concerned that its in-country defence industry is sustainable over the longer term. The, then, Minister for Defence Industry, Science and Personnel Bronwyn Bishop in the Foreword to the Government's Defence and Industry Strategic Policy 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.

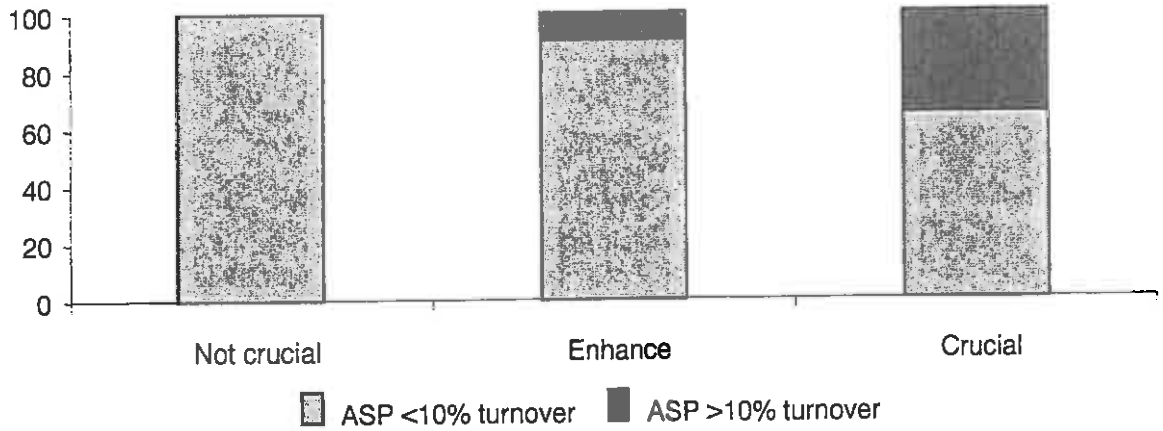
There were some notable differences in the characteristics of the respondents reporting that their defence related contracts were crucial to their viability. For example, the responses to the sustainability question varied slightly between small/medium and large businesses. Only six per cent of businesses 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 lead 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 where 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 contact 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 than 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 snap shot 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:

- GDP[4] — 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.

TASMAN ASIA PACIFIC

THE IMPACT OF THE ANZAC FRIGATES PROJECT ON PARTICIPATING FIRMS

Australian Industry Group

DC

DEFENCE COUNCIL

↓ 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.

Tenix

BUSINESS VICTORIA

DEPARTMENT OF STATE DEVELOPMENT

ISONET

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@aigact.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 <u>any</u> 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.....	☐	☐	☐

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

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:	Exclude:
• 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.	• 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:	**Exclude:**
• 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.	• Sales of fixed tangible assets; • Export freight charges; • Interest income; • Royalties from mineral leases; • Income from finance leases; • Payments received under hire purchase arrangements.

Financial year ending	June 1997	June 1995	June prior to ASP involvement 19__ __ (please show year)
Income.....	$A ,000	$A ,000	$A ,000

22. Please provide details of the wages and salaries paid by this business.

Include:	**Exclude:**
• 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.	• 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

26. 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 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.

TASMAN ASIA PACIFIC

THE IMPACT OF THE ANZAC FRIGATES PROJECT ON PARTICIPATING FIRMS

Australian Industry Group
DC
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?

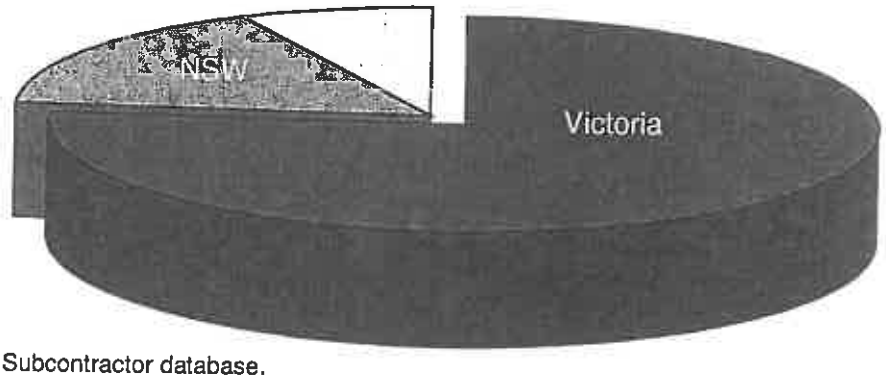
Yes ..... ☐
No..... ☐

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**

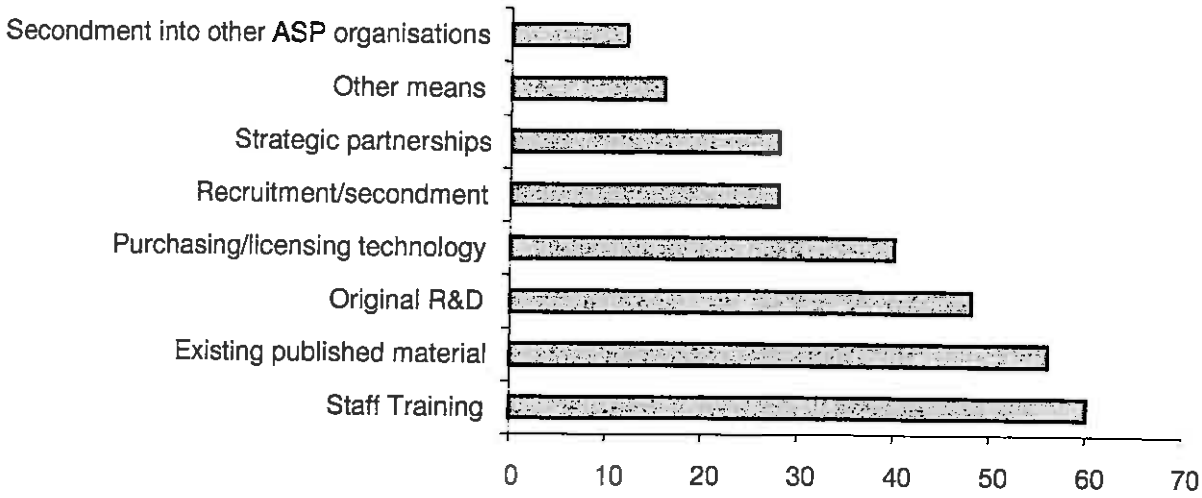
	Victorian businesses (103 responses)	*Other Australian businesses (24 responses)*	*Is there a significant difference in proportions? (a)*
	(per cent)	(per cent)	
First Defence contract	36.0	33.0	No
Obtained new technology	24.0	12.5	No
Business programs and practices	88.3	87.5	No
Improved export potential	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

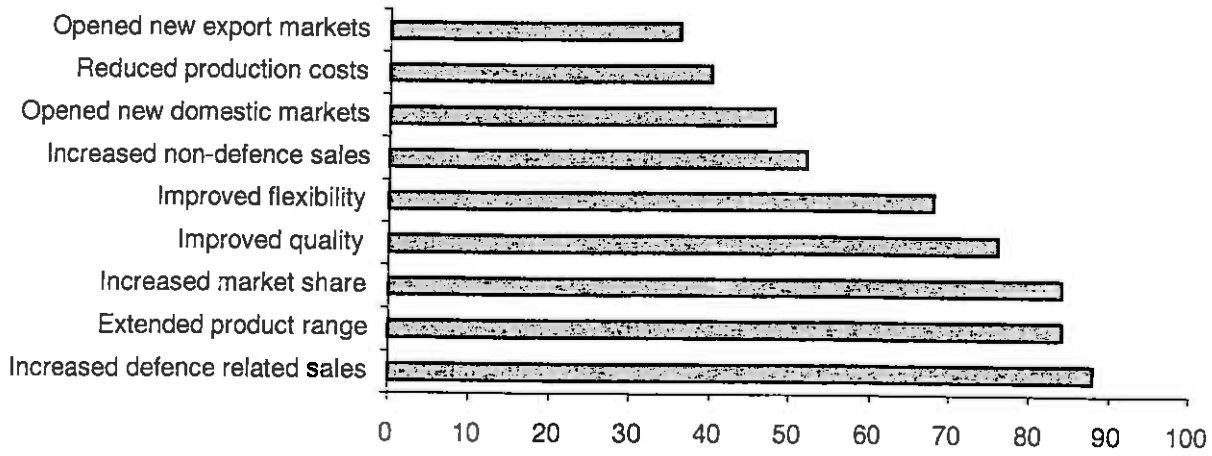
Just under a quarter of Victorian respondents indicated they obtained new technology as a result of their business's involvement with the ASP (Table A2.1). Staff training, existing published material and original research and development were the most commonly reported methods used by Victorian businesses 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).

FigureA2.3: **Impact of new technology** (per cent of Victorian firms with new technology)

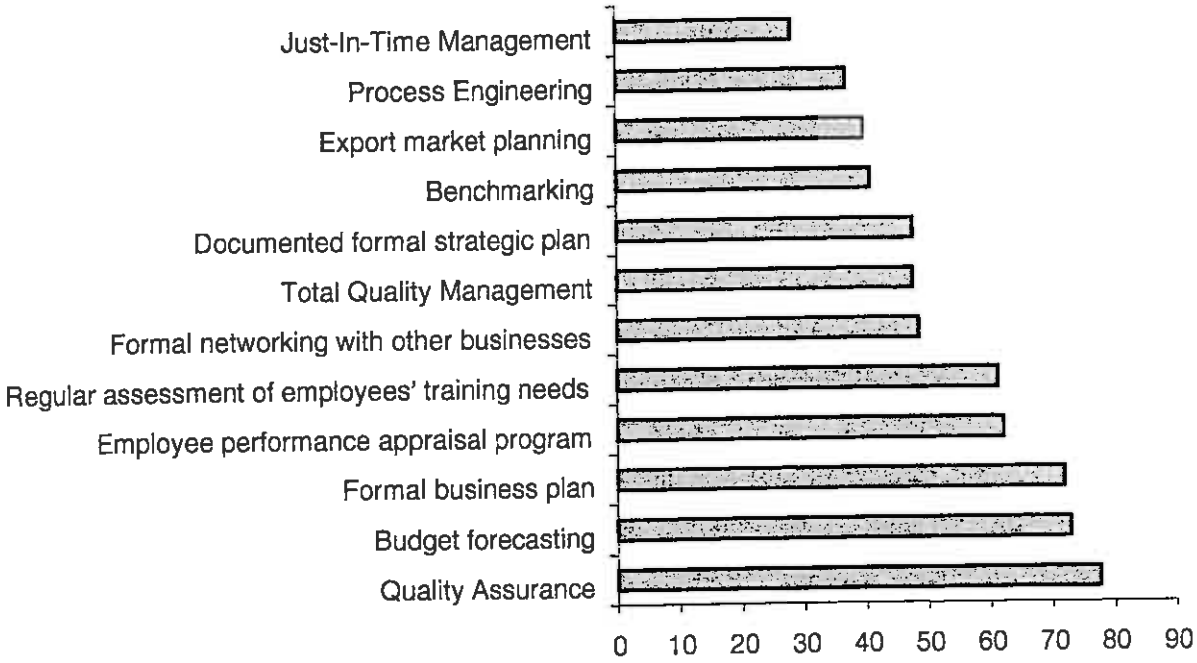


BEST PRACTICE

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).

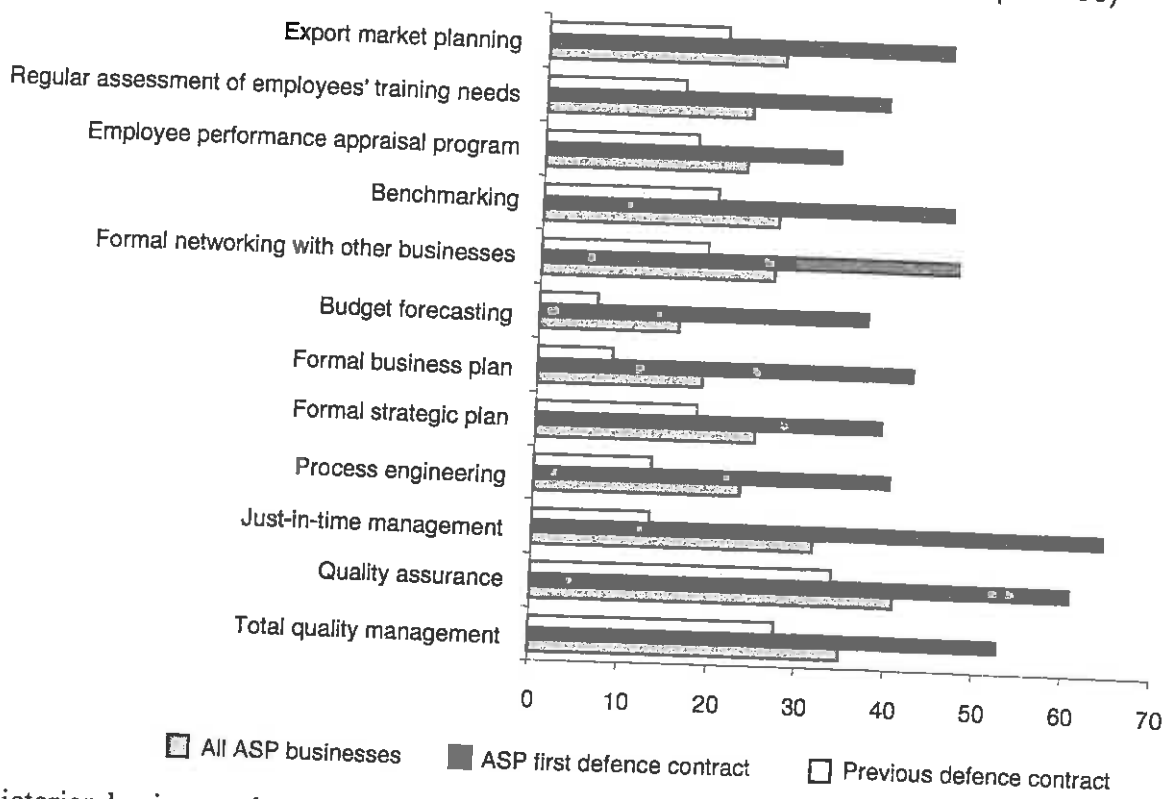
Nearly 80 per cent of Victorian respondents indicated their business has quality assurance techniques in place (Figure A2.4). While over 70 per cent indicated that they undertook budget forecasting and developed formal business plans. Around 60 per cent of Victorian ASP businesses had implemented an 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**



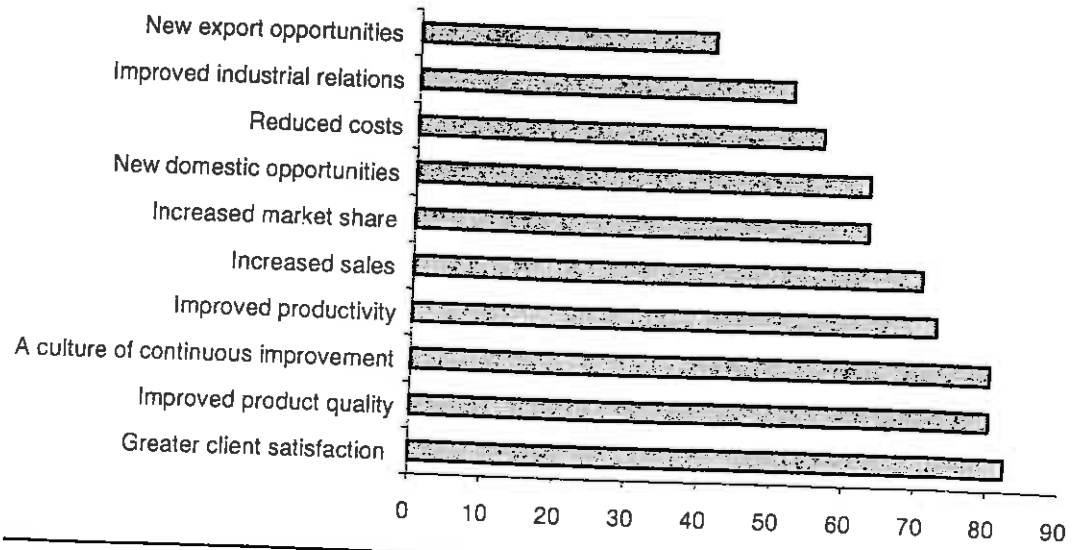
Many businesses considered that their involvement with the ASP was an important factor in the decision to implement these business programs and practices. As outlined in Chapter 4 and reproduced in Figure A2.5, involvement with the ASP was more likely to be associated with a business's decision to implement 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**

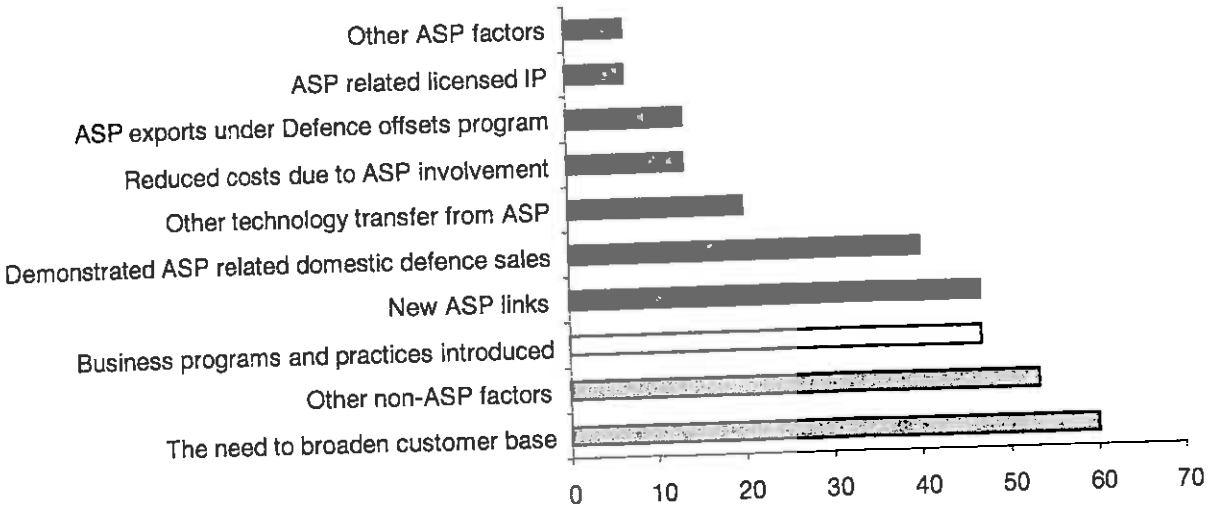


EXPORTS

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 where 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**



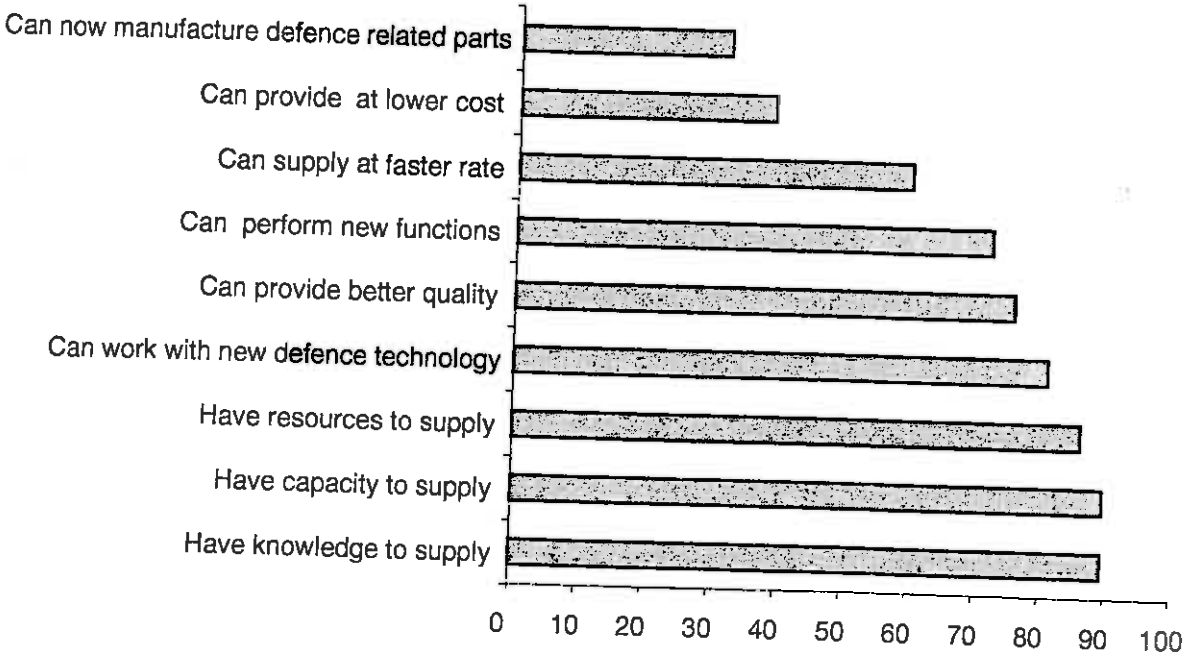
DEFENCE CAPABILITY AND SUSTAINABILITY

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.

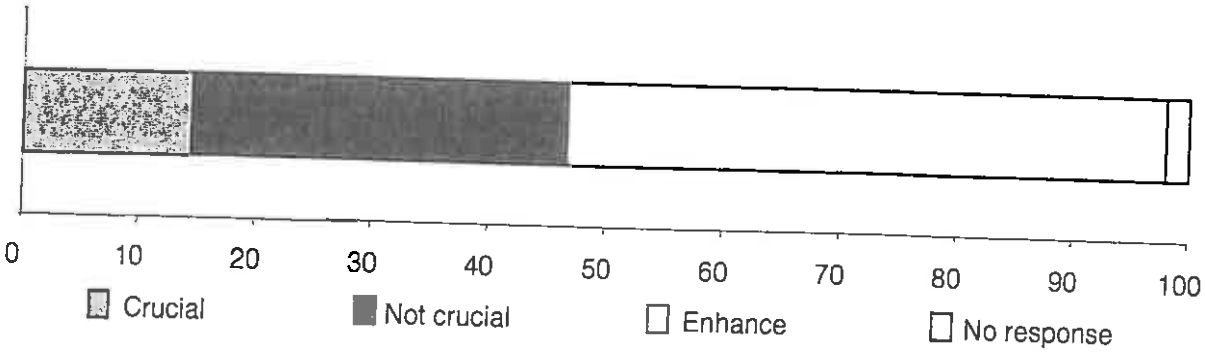
Involvement with the ASP has improved many facets of these Victorian businesses defence capability. As a result of the ASP the majority of these businesses now have the knowledge, capacity and resources to supply the DoD or its contractors (Figure A2.8).

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**

	Non-response bias survey		*Results from mail out Questionnaire survey*			*Statistically significant difference (a)*
	%	*No in sample*	*%*	*Number in sample*	*Z statistic*	
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 that 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 sub-contractors 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

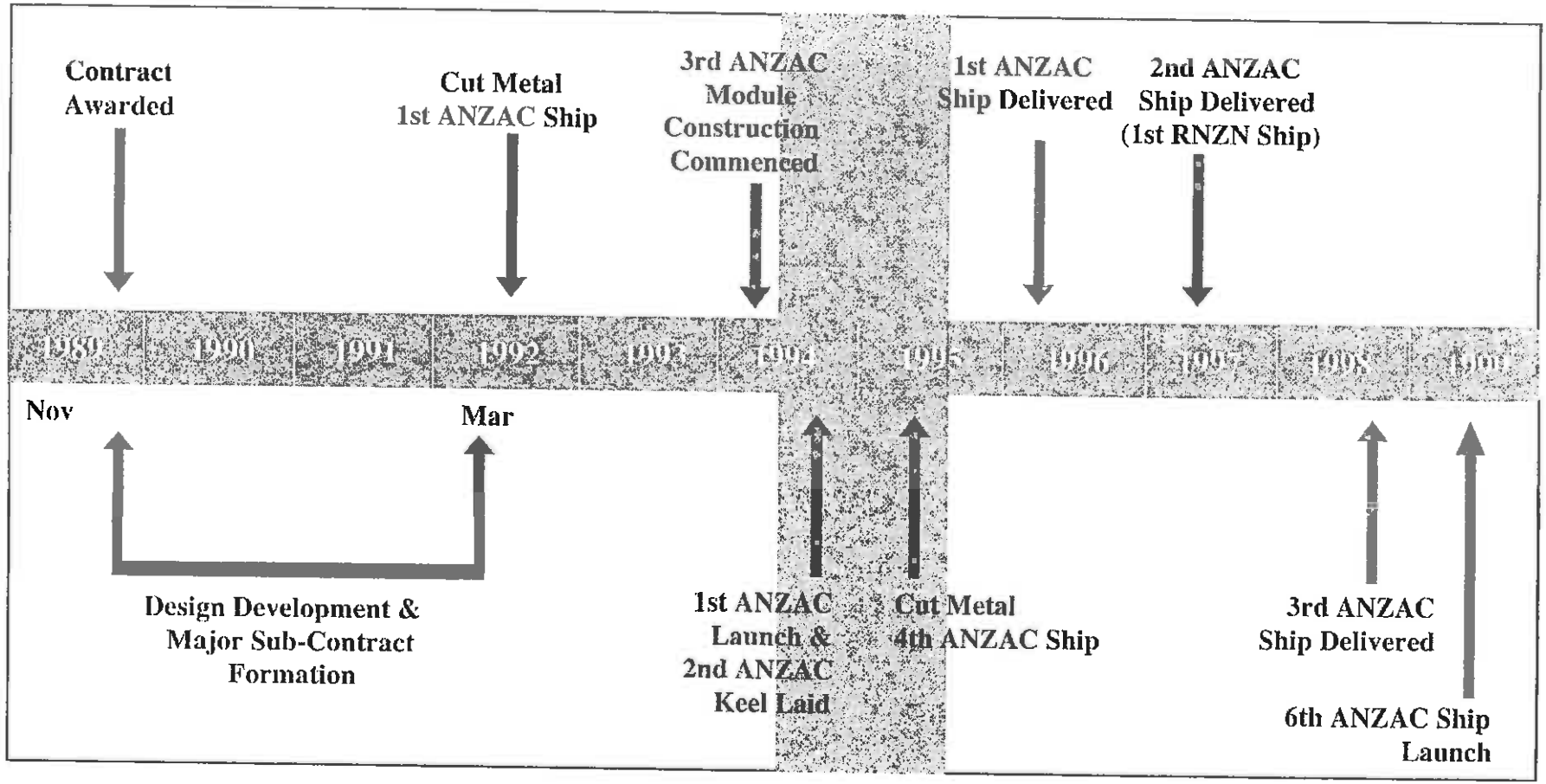
The ASP database has been used to estimate input-output multipliers for the ASP subcontractor industry and the ASP prime contractor industry. Input-output multipliers are summary measures that are used for estimating the total impact on all Australian industries of a change in the output of a single 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**

Industry/sector	*Increase in demand*	*Initial effect*	*First round multiplier*	*Industrial support multiplier*	*Total multiplier*
	$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**

Industry/sector	*Increase in demand*	*Initial effect*	*First round multiplier*	*Industrial support multiplier*	*Total multiplier*
	$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**

Industry/sector	*Increase in demand*	*Initial effect*	*First round multiplier*	*Industrial support multiplier*	*Total multiplier*
	$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.

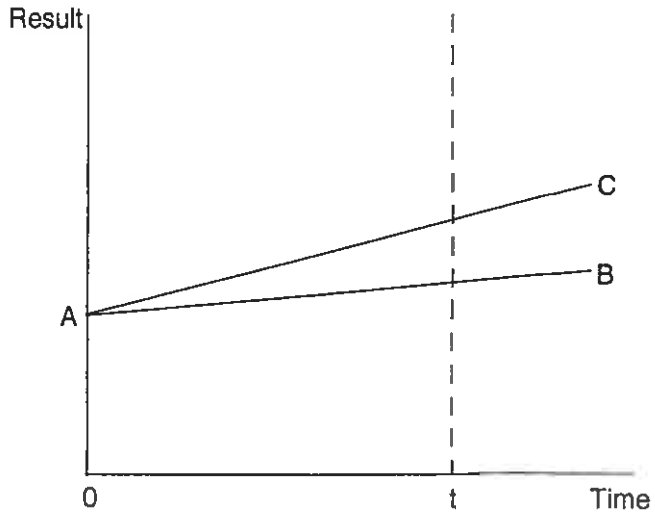
At the industry level, producers are very constrained in the short run as they cannot adjust their capital stock. Any changes in the demand for capital are countered by movements in the rental price of capital and to a lesser extent the creation price of capital. As a result, a simulation that increases 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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