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Supporting Industry Promotion Policies in APEC – Case Study on Australia

APEC Policy Support Unit
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Acronym List

Acronym	Full term
ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industrial Classification
APEC	Asia-Pacific Economic Cooperation
BETA	Bimodal Electric Tissue Ablation
CRC	Co-operative Research Centres
DSD	Department of State Development
EMDG	Export Market Development Grants
GDP	Gross Domestic Product
GSP	Gross State Product
GVA	Gross Value Added
ICN	Industry Capability Network
NSW	New South Wales
OECD	Organisation for Economic Cooperation and Development
OEMs	Original equipment manufacturers
PIRSA	Department of Primary Industries and Research South Australia
R&D	Research and Development
SA	South Australia
SARDI	South Australian Research and Development Institute
SBIR	Small Business Innovation Research Program
SES	State Emergency Services
SIP	Supplier Improvement Plan
SVA	Specialist Vehicles Alliance
SME	Small and Medium Enterprise

EXECUTIVE SUMMARY

This case study examines government policies to support the four largest manufacturing supply chains sectors in the State of South Australia – those related to food and beverage production, transport equipment production, machinery and equipment production, and manufacture of fabricated metal products. South Australia is one of six Australian States and is ranked fifth in terms of population. Most of its industry is located in its capital city, Adelaide, and immediate surrounding regions.

The case study is presented as an example of policies for supporting industries in the developed economy of Australia. It was compiled through secondary desk research and interviews with government, industry and research and development (R&D) institutions in December 2016.

In this study, supporting industries are defined as those parts of the supply chain which enable manufacturers to produce their final goods. The study follows the typology described by Nguyen (2007) and covers transformed physical inputs (parts, components, tools and machinery) and input services (as addressed by policy initiatives to support manufacturing), but excludes raw materials (e.g. agricultural products and ores).

Supply chains

The food and beverage (including wine) manufacturing supply chain relies on inputs, as measured by value, from agricultural products (46% - materials), intermediate goods (~24% - including other food/ingredients manufacturers and packaging), capital goods (~10%) and services (~20% - significantly, transport and warehousing). The industry sells to customers in agriculture, retail trade, hospitality, accommodation and other services.

The transport equipment manufacturing supply chain relies on inputs from production services (~41% - significantly, technical services), intermediate goods which include fabricated metal products (~26%), capital equipment and machinery (~18%) and materials (~15%). Final goods assemblers in Australia are either car manufacturers, which are closing or have closed their assembly plants, or shipbuilders. Finished product is sold mainly to operators of transport services. Most companies in this supply chain can be classified as "supporting industries" and many may no longer have their major customer within the Australian economy.

General policy approaches

Australian national and State governments take a broad supply-side approach to industry support, focussing on encouraging access by small to medium enterprises (SMEs) to R&D providers and business advisers. These support programs are largely firm-specific and offer part-funding (less than or equal to 50% of total project costs) to companies for specific projects which align with program objectives. As a result of the departure of automotive assemblers from Australia, a number of automotive-sector programs aim to help automotive suppliers take up advanced manufacturing technologies or diversify into other sectors.

National programs offer support for linkages anywhere in Australia and assist export marketing. Most South Australian programs, on the other hand, stress linking companies to customers within the State, largely because of fears of leakage of benefits of State funding into other Australian jurisdictions.

Demand-side programs are limited, with both national and South Australian governments only recently commencing procurement initiatives. Neither use regulation and the regulation-based national Green Car initiative of 2014 was halted before its planned end-point. The joint State-Commonwealth Industry Capability Network is a hybrid program which aims to promote suppliers to large construction, engineering and other manufacturing projects. There are important demand-side initiatives linking automotive supply chain participants with defence and ship-building.

Cluster programs are non-existent at the national level but are being pursued within South Australia to stimulate demand in the automotive supply chain from other types of customers, such as those from mining and defence.

The findings of the analysis of these programs are as follows:

- There are programs with similar targets at both national and State level. South Australia generally provides more support to smaller companies than equivalent programs nationally, is less concerned about ownership of intellectual property and is less likely to support equipment purchases (although both do support this for automotive diversification programs).
- State programs were developed in response to local and State consultations with industry and an international analysis of manufacturing policies. National and State programs generally follow best practice (as summarised by the OECD) for SME-support policies. National level programs are more transparent than SA programs.
- With the exception of the automotive adjustment schemes, national programs have been relatively stable over time, with amendments following evaluations of program impacts and/or changes in government or program administration. On the other hand, South Australia made major changes to its 2012 Manufacturing Works after only two years and now prioritises regional clustering. Administrative arrangements have also had major changes. While the national government has made several new policy announcements in the same period, the impact of changes at State level is of more concern to those involved with these programs in South Australia.
- State programs are mostly focussed on linking organisations within the State. While this builds a local network, it may limit access by companies to essential technologies in other locations. There are significant clusters of skills in advanced technologies in South Australian R&D institutions, yet are not highly ranked internationally. The same approach also fails to support company access to global value chains, unless the international player is also operating in South Australia.
- It is difficult to get SMEs to engage with programs. While the 2014 review of the State's Manufacturing Workings programs was positive, only 242 of South Australia's ~6,300 manufacturing companies had engaged with them.
- This same review found that 28% of the 232 businesses in the program could attribute some business outcome to their participation, with net benefit estimated at AU$88m, and increased State Value Add at $AU26m, for AU$11.75m expenditure at the time of the survey (2.21:1 benefit ratio). An additional 290 jobs had also been created. Net benefit over the next 10 years was estimated at AU$229m of incremental revenue, AU$68m of incremental value add and 847 incremental jobs.

Focus of government programs on supporting industries

In the food and beverage manufacturing sectors, State policy does not distinguish between final food producers and ingredients suppliers but the overall emphasis is on value-adding to raw ingredients. There is a heavy emphasis on product development and hence support is also provided for production services (e.g. through links to R&D institutions and professional services) and intermediate goods providers including packaging materials.

Support programs for transport equipment manufacturing supply chain implicitly focus on supporting industries. Grants focus on re-equipping companies with advanced manufacturing technologies, robotics or equipment to manufacture for non-automotive sectors. Within this supply chain there is support for production services but only when R&D institutions within the State supply these services.

The absence of support programs for other production services including transport and warehousing can be explained by the fact that these companies are often large national chains and hence do not attract policy support, which is normally focussed on SMEs.

Conclusions

The major national and State programs have been supply-side focussed and emphasise either accessing R&D or building firm capacity through training, technical advice or equipment. Supporting industries

which supply intermediate or capital goods benefit significantly from these support programs, despite not necessarily being explicitly identified as targets in the programs. However relatively few companies are accessing these programs because of structural issues within industries and changes to programs. More stability in the programs and a greater focus on demand-side policies would support a larger number of companies in accessing national and international supply chains.

SA relies on the stable business environment provided by a suite of legislation which is implemented and administered nationally. SA has aligned its policies and practices with those operating nationally in the following areas:

1. Programs focus on SMEs because these have the least internal capacity for performing R&D and finding new customers
2. Programs appear to follow best practice for SME policy formulation
3. Programs are evaluated regularly
4. Program administration is transparent in that grant objectives are clear and guidelines for applications are provided
5. Support programs cover the cost of new equipment and services (R&D and other) and require applicants to part-fund these to ensure commitment
6. R&D support focuses on building linkages with R&D providers for short term impact
7. Clustering programs are relevant and focussed
8. Programs include both supply side and demand side components.

Areas for potential improvement for SA are as follows:

1. Recipients of grants should be announced and non-commercial details made available and access so potential applicants can better understand the likelihood of funding
2. SA companies need to be made more aware of national programs which could extend their reach to R&D providers and customers nationally and internationally, as relevant
3. Support programs need to run unchanged for a longer period in order for SMEs to become aware of and engage with them
4. Impact of policies on other industries could be assessed and where relevant those industries included in networking, partnering and other initiatives
5. While grant programs to supply chain components dominated by large companies (e.g. transport and warehousing) may not be appropriate, government policy needs to understand their role in supporting the target industry and address other non-support issues (e.g. regulatory barriers)
6. Where access to new technologies is a key focus, support programs need to enable companies to get access to the best advice, whether or not it is located inside State boundaries.

1. INTRODUCTION

This case study examines policies to support specific manufacturing industries in the State of South Australia (SA). SA is one of six States in Australia, which is a developed, higher income economy. SA is 984,000km2 but has a population of only 1.7 million (fifth of 6 Australian States). Two-thirds of its population and most of its industry is in Adelaide, South Australia's capital city, and immediately surrounding regions. This case study examines government policies to support the four largest manufacturing sub-sectors in the State, namely: food and beverage manufacturing, transport equipment manufacturing, machinery and equipment manufacturing and fabricated metal products manufacturing.

Manufacturing accounts for 7.9% of the total workforce and is the fifth largest employing industry in Australia behind healthcare/social assistance, retail trade, construction and professional/scientific services.[1,2] Nationally, the largest employing sub-sectors are the same as those in SA, with the addition of primary metal and metal product manufacturing, which is less significant in SA.[3] While SA ranks third (behind New South Wales (NSW) and Victoria) in manufacturing employment, SA relies more on manufacturing to employ its workforce than the larger States, with 8.7% of its employees in this sector.[4]

The case study examines the national and State policies supporting two major supply chains which are integral to the four largest manufacturing sub-sectors: the food and beverage supply chain and the transport equipment supply chain. The case study focuses on direct support through grants and other assistance, primarily to SMEs.

The case study analyses policies which affect the supply chains for these sub-sectors. As will be seen, the supply chain for food manufacture is relatively linear and the policies there are straightforward and contained within the food sector. In transport equipment manufacturing, recent policy initiatives are a response to the decision by the major automotive manufacturers to cease car assembly in Australia. These policies have directly affected supporting industries in this supply chain and will have flow-on effects to other sectors supplied by similar companies. The lessons from the State's programs are relevant to APEC because of their focus on capacity building and customer linkages for manufacturing SMEs.

This case study is divided into six main sections. Section 2 outlines the methodology. Section 3 defines manufacturing and "supporting industries" and provides an overview of the four largest manufacturing sub-sectors in SA. Section 4 describes and then compares the policy frameworks operating nationally in Australia, and at State level in SA, for manufacturing. The national discussion focuses on those programs most relevant to SA manufacturing, and the SA analysis is limited to the four target sub-sectors. This section also comments on the impact of these policies on supporting industries. Section 6 discusses lessons from the case study. Annexes provide more details on method, government programs and grant recipients.

[1] Australian Government, Department of Employment (2015): *Manufacturing Industry Outlook*, June 2015, ISSN 2201-3660. Manufacturing has always been significant to the Australian economy, peaking at 25% of gross domestic product (GDP) in the mid-1960s. See Productivity Commission (2004): *trends in Australian Manufacturing* for more background
[2] Australian Government Department of Employment (2015): *op cit*
[3] Australian Bureau of Statistics (2015): Labour Force, Australia, Cat 6291.0.55.003
[4] Australian Government Department of Employment (2015), *op cit*, page 5

2. METHODOLOGY

The case study was developed from a combination of secondary and primary data sources.

Secondary sources included academic studies of innovation and manufacturing industry, and publicly available statistics and government announcements. Statistics were drawn from national input-output tables provided by the Australian Bureau of Statistics.[5] Analysis of inputs to industries at the six-digit level enabled us to develop a picture of the likely supply chain to major manufacturing sub-sectors. For the purposes of this case study, we have assumed that trends at the national level also apply at State level as State-level data of this type is not available.[6]

The literature review raised several questions which were examined during primary data collection with key players in SA. We used semi-structured interviews as a qualitative research tool that, while focused on a particular topic, allowed participants to bring in new information and enable the interviewer to follow issues that emerge during discussion. Interviews sought additional details on the nature of regulatory reform in SA and the impact of Federal policies, where relevant. Annex 1 presents the broad question guide developed for these interviews.

Field work was conducted in December 2016. This included 13 face-to-face interviews conducted over three days in Adelaide. These were followed by a small number of interviews via Skype with key individuals either not based in Adelaide or not available on the dates of travel. Table 1 outlines the main organisations targeted for interview and the reasons for their inclusion. Annex 2 lists those who were interviewed from these organisations.

Table 1: Types of interviewee organisations

Organisation type	Examples	Reason for inclusion
Government agencies	Department of State Development (DSD) Primary Industries and Research South Australia (PIRSA)	Responsible for administration of support programs
Industry advisory organisations	Advanced Manufacturing Council	Provides expert industry advice to SA government
Industry Associations	Australian Information Industries Association Australian Industry Group Food South Australia Simulation Australasia	Consulted during development of the program; involved in implementation as advisors, or for specific program delivery (under contract to SA government)
R&D institutions	Data to Decisions Co-operative Research Centre South Australian Research and Development Institute (SARDI) Flinders University (Flinders) University of South Australia (UniSA)	Supply of technology and advice to SMEs in supporting industries, either on own initiative or under contract to SA government

[5] Input–Output (I–O) tables are part of the Australian national accounts, complementing the quarterly and annual series of national income, expenditure and product aggregates. They provide detailed information about the supply and use of products in the Australian economy, and the structure of and inter–relationships between Australian industries.

[6] Direct inputs to production (Table 5), from ABS Cat 5209.0.55.001 *Australian National Accounts: Input-Output Tables - 2013-14* – released in November 2016

3. DEFINING MANUFACTURING AND SUPPORTING INDUSTRIES

Defining and measuring manufacturing

Manufacturing refers to the process by which units, usually factories or mills with powered machinery, transform materials, substances or components by using either physical or chemical methods, so that they become new products.[7]

In international statistical frameworks, manufacturing includes the physical or chemical transformation of the products of agriculture, forestry, fishing, mining or other manufactured products, but excludes the production of agricultural crops and the construction of buildings and civil engineering works.[8] Manufacturing also includes the assembly of a set of component parts into a final manufactured product.[9]

In Australia, the Australian and New Zealand Standard Industrial Classification (ANZSIC), provides the statistical framework for understanding manufacturing.[10] Within the Manufacturing Division there are 15 sub-sectors or subdivisions (the term "sub-sector" is used throughout this report). These align with those used internationally and are as follows:[11]

- Food Product Manufacturing
- Beverage and Tobacco Product Manufacturing

Referred to as "food and beverage manufacturing" in this report

- Textile, Leather, Clothing and Footwear Manufacturing
- Wood Product Manufacturing
- Pulp, Paper and Converted Paper Product Manufacturing
- Printing (including the Reproduction of Recorded Media)
- Petroleum and Coal Product Manufacturing
- Basic Chemical and Chemical Product Manufacturing
- Polymer Product and Rubber Product Manufacturing
- Non-Metallic Mineral Product Manufacturing
- Primary Metal and Metal Product Manufacturing – includes basic ferrous metals and non-metals product manufacture
- Fabricated Metal Product Manufacturing – includes forging of iron and steel, structural metal product manufacture, metal container manufacture, and sheet metal manufacture
- Transport Equipment Manufacturing – includes manufacture of automotive vehicles, railway rolling stock, ships and aircraft
- Machinery and Equipment Manufacturing – includes manufacture of professional and scientific equipment, computer and electronics, electrical equipment, domestic appliances, pumps and ventilators,
- Furniture and Other Manufacturing

References to manufacturing and its sub-sectors in this report are based on this classification scheme. It should be noted that manufacturing is activity-based. Establishments that undertake some manufacturing but obtain most of their income through delivery of services will be classified in national collections by their service activities. These could include, for example, repair services which manufacture components as part of the repair process.

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[7] Australian Bureau of Statistics, 2016, *Australian New Zealand Standard Industrial Classification*, [http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/AF04F89CEE4E54D6CA25711F00146D76?opendocument], Commonwealth of Australia.

[8] 1292.0 Australian and New Zealand Standard Industrial Classification 2006 Revision 1.0, Division C – Manufacturing - definitions

[9] *Ibid.*

[10] Australian Bureau of Statistics, 2014, *Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006*, [http://www.abs.gov.au/ausstats/abs@.nsf/0/A0FED0532C1C9C9ECA25711F00146E4F?opendocument], Commonwealth of Australia.

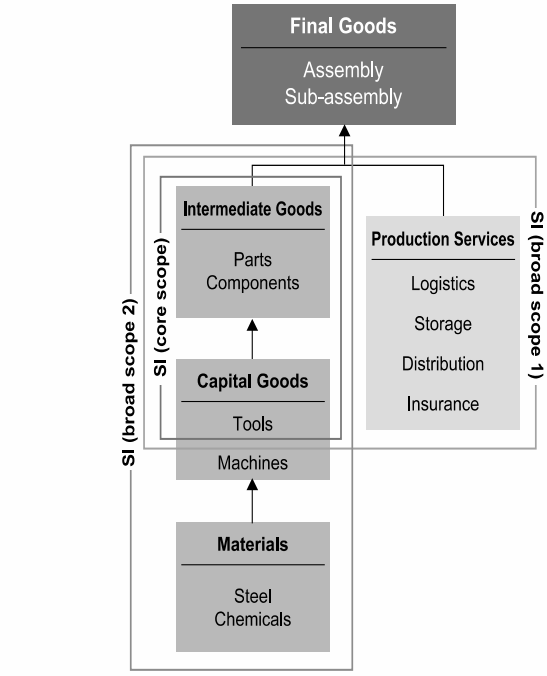
[11] Some details of additional sub-categories are provided where particularly important in South Australia

Supply chains and supporting industries

Manufacturers, as noted above, transform input materials (e.g. agricultural products, ores) and components into new products. To obtain these materials or components, manufacturers rely on the input of 'supporting' industries (or supporting sub-sectors) that provide parts, tools, machinery, information services, design and other elements necessary to produce their final goods.

While there is no single universal definition of supporting industries, the focus of analysis is generally the 'upstream' part of the supply chain that enabled manufacturers to convert raw materials or components into final products.[12,13] The 'downstream' steps after manufacturing include the marketing and distribution of products to consumers or final customers.

Figure 1: Model of manufacturing and supporting industries



Source: Nguyen, Chapter 2 in Ohno (2007)

Nguyen's typology is outlined in Figure 1.[14] It shows the basic model of supporting industries used to frame the case studies.[15] Core Supporting Industries are those that supply parts, components and tools to produce parts and components. There are also two broad scope supporting industries: Broad Scope 1 Supporting Industries (covered by this case study) are those that supply parts, components, tools to produce parts and components, and production services such as insurance, storage and distribution services and include technical and professional services which are a major focus of policy support in Australia. Broad Scope 2 Supporting Industries supply all physical inputs including parts, components, tools, machines and materials, but exclude services.[16]

The Nguyen model does not distinguish between the size, ownership, location or structure of the firms involved in supporting industries. This means supporting industries may be clustered around or near their customers as part of a region, or far from their customer as a player in a globally distributed supply chain. The model also may not be applicable to all manufacturing sub-sectors. However, it provides a useful starting point for analysis of the key manufacturing sub-sectors and their supporting industries in SA and has been adopted for use in this case study.

[12] For example, US Department of Energy (2005): *Decreasing Energy Intensity in Manufacturing - Assessing the Strategies and Future Directions of the Industrial Technologies Program*. This report defined supporting industries to include heat treating, forging, welding, powder metallurgy, and particulate materials. Each of the seven supporting industries (six specific and one crosscutting) developed a roadmap and/or vision document between 1996 and 2001. These roadmaps outline specific research needs and prioritize them according to the potential impact on industrial competitiveness, and the strategies needed to achieve these goals.

[13] Nguyen, Thuy, (2007): *Supporting Industries: Review of Concepts and Development* in Ohno (ed.) *Building Supporting Industries in Vietnam Vol. 1.*, Vietnam Development Forum.

[14] Source: Thuy, NTX (2007): Supporting Industries, A Review of Concepts and Developments, *in Ohno, K: "Building Supporting Industries in Vietnam Volume One", Vietnam Development Forum*

[15] *Ibid*, p. 37.

[16] *Ibid.*

Manufacturing in South Australia

The State of SA has a population of 1.7 million people, or about 7% of the Australian population. Its Gross State Product (GSP) is AU$98.5 billion. It has the second lowest GSP per capita of any Australian State – AU$58,250 – and was one of two States (the other being Tasmania) where the actual number of firms fell between 2007 and 2012.[17]

Historically, the main manufacturing sub-sectors in SA (by employment) have been food and beverage production, transport equipment production (automotive equipment and ship building), machinery and equipment production and manufacture of fabricated metal products.[18] These four sectors are also four of the five largest manufacturing employment sub-sectors nationally.[19]

Overarching factors

Nationally, the vast majority of companies in Australia are small to medium enterprises (SMEs). This is no less true in South Australia and is also relevant to the major manufacturing sectors in the State. Many SMEs are small family owned businesses which may have limited skills in basic business as well as a general lack of awareness of innovation. This has affected the style of State government support programs and will be discussed later in this report.

A second overarching factor applies to the transport equipment supply chain, which has at its head the major automotive assemblers such as Mitsubishi and Toyota. These have moved their Australian operations to other economies, leaving the supply chain without a local major customer. As will be shown in Section 5, the government has responded to this threat with additional programs to support the supply chain in this industry.

Food and beverages manufacturing

SA food and beverage manufacturing establishments manufacture wine, dairy, seafood, processed horticultural goods and manufactured food products including chocolate, cheese and processed meat and grain.[20] Food and wine manufacturing generated AU$18.2 billion in revenue in South Australia is 2014-15, of which $8.2 billion was for finished products including ingredients.[21] At a national level, SA's wine sector is significant and accounted for 45.1% of Australia's total wine production in 2012-13[22] while also contributing to 40% of SA's total merchandise exports.[23]

There were 948 food and beverage manufacturers in SA at the end of 2014-15.[24] Food manufacturers employed 16,397 people in 2014-15,[25] giving an average firm size of 17.3 employees. In a similar vein, there were 681 beverage companies (including wine makers) employing 7,195 people giving an average firm size of 10.5 employees.

Employment in food production has been relatively stable nationally over the last five years; however, employment in this sub-sector and in beverage manufacturing has fallen in South Australia.[26]

Figure 2 shows the main supporting industry input to food and beverage manufacture at a national level. In this, and subsequent figures, only the most significant inputs are shown and hence totals do not add

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[17] Swanepoel and Harrison (2105): *op cit*, Fig. 2.2

[18] Australian Bureau of Statistics (2012): Manufacturing Industry Economic Contribution, in *Yearbook Australia*, www.abs.gov.au/ accessed December 2016

[19] Department of Employment (2015): *Industry Outlook – Manufacturing*, ISSN 2201-3660, Australian Government, May 2015, Figure 2 – Primary Metals and Metal Products is ranked 4th nationally, but is not as significant in South Australia

[20] Primary Industries and Regions South Australia, 2016, *Agriculture, Food and Wine in South Australia*, Government of South Australia.

[21] South Australian Government (2016): *Premium food and wine exported, Economic Priorities*, www.economic.priorities.sa.gov.au accessed December 2016

[22] Australian Bureau of Statistics (2013): *Australian Wine and Grape Industry, 2012-13*, Commonwealth of Australia.

[23] South Australian Government (2016): *Seven Strategic Priorities*, Government of South Australia.

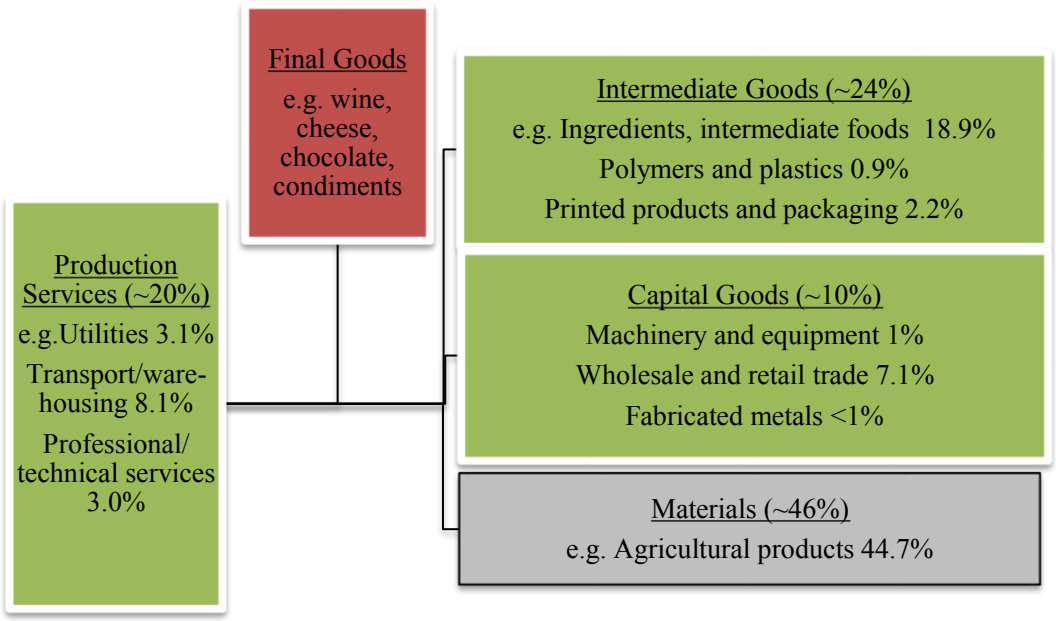
[24] Australian Bureau of Statistics (2016): ABS Cat 8165.0 Counts of Australian Businesses including Entries and Exits June 2011 to Jun 2015

[25] ABS (2015): *Cat. 8155.0 Australian Industry, 2014-15*, Table 2 Manufacturing Industry by State and ANZSIC Subdivision

[26] *ibid*

to 100%. Many suppliers of capital goods (machinery and equipment) for both food and wine manufacture come from overseas and, as they are sold by distributors rather than the manufacturers themselves, are classed in national statistics in wholesale or retail trade (this is true for all sectors examined). Over one fifth of inputs are intermediate goods with most of these coming from other companies in the same sector (ingredients and processed food inputs, for example).

Figure 2: Significant supporting industries for food and wine production



Source: Author's analysis using Nguyen (2007) model and Australian Bureau of Statistics Cat. 5209.0.55.001 Australian National Accounts: Input-Output Tables - 2013-14, Tables 5 (by industry). Figures provide only the major industrial inputs to the value chain, as a percentage of total inputs, and do not total to 100%.

According to interviewees, suppliers of raw materials (agricultural products) and intermediate goods are more likely to be based within SA. The value of input from fabricated metals manufacturers is low, being specialised towards meat processing and beverage manufacturing. According to interviewees, much of the packaging is provided by local companies who supply polymers and plastics but this is still a low proportion of input costs for the sector.

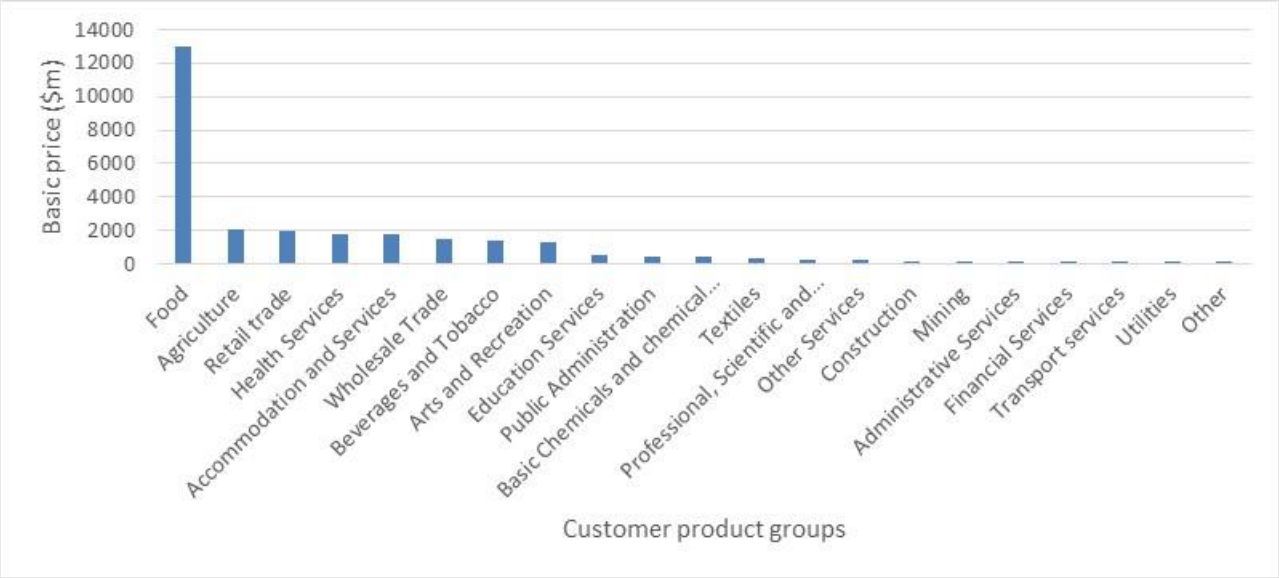
Transport and warehousing are significant inputs because of the important role of food exports. Export consolidation services which combine small quantities of goods into a container load for a specific destination are available in NSW and Victoria, close to the major export ports.

Emerging technical trends in food and beverage manufacturing include high pressure processing; use of nanotechnology to change tastes and textures; changing processes to reduce water and energy use during processing; new packaging which increases shelf life or inform consumers if food is still fresh/edible; and encapsulation and related technologies to support development of functional foods.[27] As will be shown in Section 5, these are being addressed through government supply-side programs linking food companies with suppliers of R&D (mainly universities).

Apart from other food manufactures, major customers for finished food products are diverse and include agriculture (e.g. animal feeds), retail trade and health services (e.g. hospitals), accommodation and services (e.g. cafes, restaurants and arts/recreation establishments) and distributors (wholesale trade). Figure 3 shows that these sectors take 40% of the total food sector output.

[27] Johnston, R (2011): *The Potential Role of Enabling Technologies in the Future of the Australian Food Industry 3rd Industry Uptake Foresight Workshop*

Figure 3: Major customer sectors for food products[28]



Source: Author's analysis from ABS 5215.0.55.001 Australian National Accounts: Input-Output Tables (Product Details), 2013-14. It is not possible from national statistics to split out ingredients suppliers form final food product manufacturers

The SA food manufacturing supply chain is fairly self-contained, with over half the inputs costs attributable to agriculture and ingredients and little major input from other significant manufacturing employment sectors. As will be seen in the next section, this, coupled with the role of agricultural products as major inputs, has justified policy management of the food industry under the State government's primary industries portfolio.

Customers for food products are diversified and the main issue for a government is likely to be efficiency and competitiveness of the sector so that local companies can compete against imports. Food innovation is needed to maintain competitiveness and to enable local companies to respond to technical changes. However, the typical small family company will have limited technical skills and will need assistance to identify and adopt new technical skills.

The lack of differentiation in industry statistics between final food manufacturers and ingredients suppliers makes it difficult for governments to measure the industry effectively and therefore also to measure the impact of policies.

Transport equipment manufacturing

The transport equipment manufacturing supply chain is made up of:

- Transport equipment (automotive) manufacturers which make passenger motor vehicles, motorbikes, sports utility vehicles, buses, trucks, specialist vehicles such as quad bikes and racing vehicles, caravans and trailers;[29]
- Machinery and equipment manufacturers, which supply to transport equipment, construction, mining and health services industries; and
- Fabricated metal products manufacturers, which supply to transport equipment manufacturers, construction, energy, electronics and machinery industries.

[28] The full text for truncated *Customer product groups* in the Figure are: 'Basic Chemical and Chemical Product Manufacturing' and 'Professional, Scientific and Technical Services'

[29] The Senate Economics References Committee (2015): *Future of Australia's automotive industry: Driving jobs and investment*, The Commonwealth of Australia

Given each of these sub-sectors is viewed in SA as an industry in its own right, detail on each is provided here. The remainder of the report discusses the supply chain as a whole.

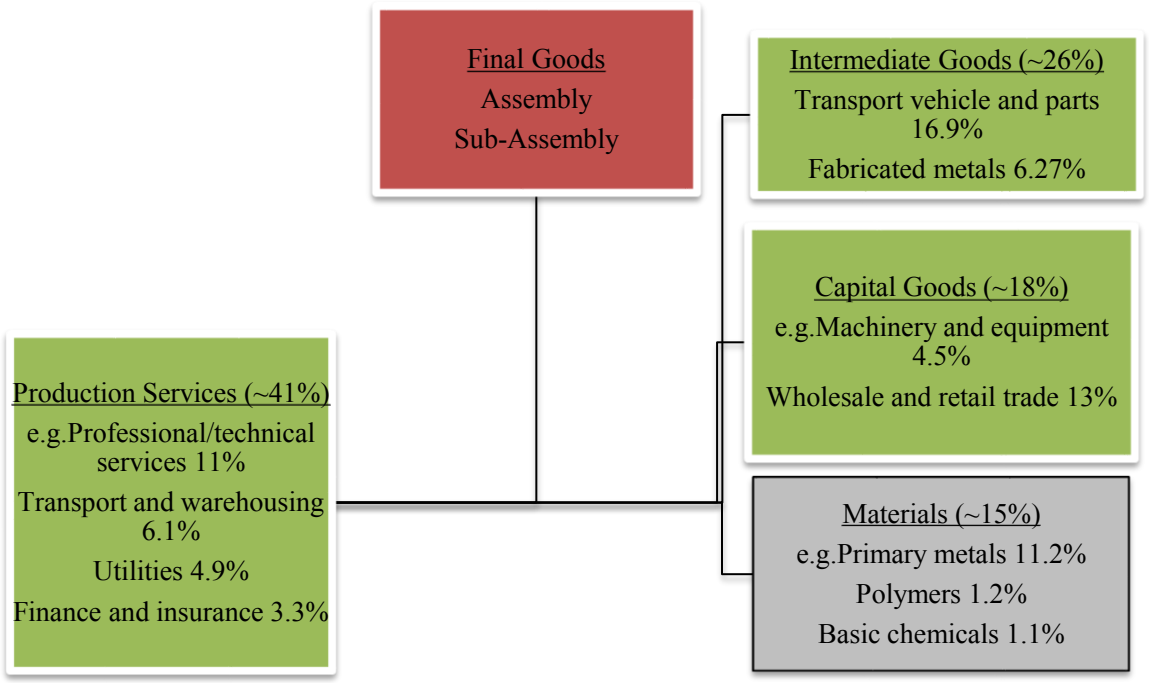
Transport equipment

Transport equipment manufacturers have been important in SA because of the presence of several large, international passenger vehicle original equipment manufacturers (OEMs) that assemble final goods at the end of the manufacturing supply chain. Shipbuilding has also been significant, with Adelaide claiming the location of "the nation's premier naval industry hub" which has built Australia's Collins class submarines and air warfare destroyers on behalf of the federal government.[30]

Employment in 2014-15 totalled 7,300, a fall from 9,719 in 2012-13.[31] There were 409 companies, giving an average size of 17.8 employees.[32]

Figure 4 shows the role of supporting industries in the manufacture of transport equipment. The transport equipment manufacturing sector is dependent on component parts manufacturers, manufacturers of tools and the machinery that assemble vehicles, amongst others. Many of these come from two of the other large manufacturing sectors in SA, machinery and equipment (also supplied through distributors – wholesale and retail trade), and fabricated metal products (mainly structural products).

Figure 4: Significant supporting industries for transport vehicle manufacture

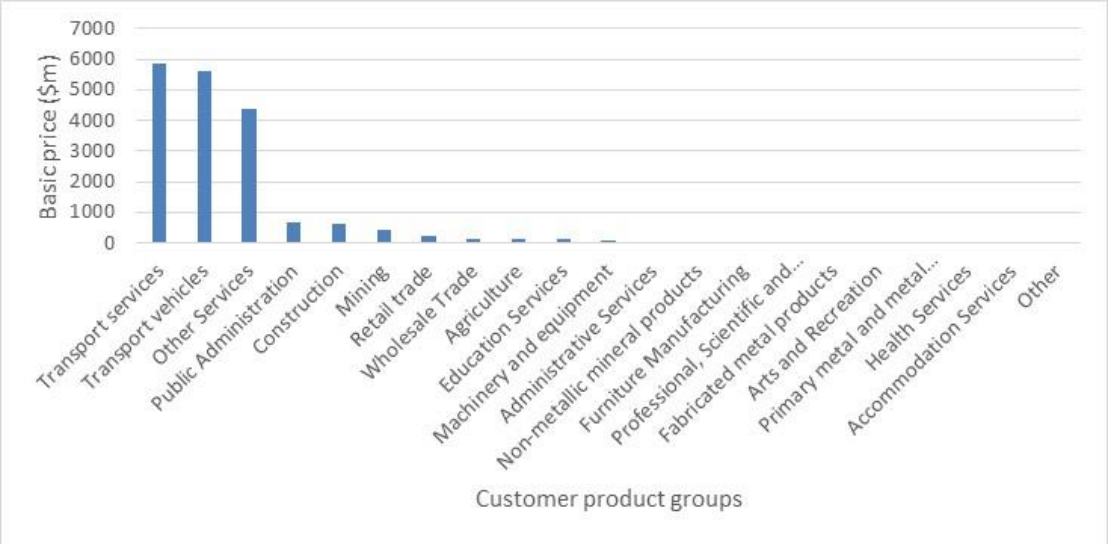


Source: Author's analysis using Nguyen (2007) model as per Figure 2

Major customers for transport equipment include transport services (e.g. rail transport, road transport), transport vehicles (e.g. supply of components to car and ship manufacturers) and other services (mainly repair and maintenance services). Figure 5 reveals that these sectors account for 85% of product output.

[30] Techport Australia, (2016): *About*, http://www.techportaustralia.com/ accessed 12 December 2016
[31] ABS (2015): Cat. 8155.0 *op cit*
[32] ABS (2016): ABS Cat 8165.0 *op cit*

Figure 5: Major customer sectors for transport equipment[33]



Source: Author's analysis from ABS 5215.0.55.001 as per Figure 3

Technology trends in the transport equipment industry worldwide include development of products that will meet demand for the "sharing economy" in motor vehicle transport. This implies use of information and communication technologies to develop autonomous vehicles and software that will enable vehicles to collect and transmit data (for their manufacturers, owners or "mobility providers" such as Uber and Google).[34]

In addition, electrification and battery technologies are replacing fossil fuels, with the standard lead-based battery technology that dominates today to be overtaken by advanced lead-based technology, nickel-metal-hydride and lithium-ion technologies by 2020.[35]

Additive manufacturing techniques will reduce the costs of manufacturing by 30% to 70% through enabling product innovation, reducing the needs for tooling and reducing material.[36,37] Analysts also claim that developments will require greater collaboration between transport equipment manufacturers and their customers, and a greater reliance on software and new designs as inputs, both of which will also demand development of new business models in the sector.

Finally, development of new hardware and software to enhance flexibility of manufacturing machinery and greater automation in the use of programmable equipment will also lead to productivity improvements in this sector.

The link between government policies and these technical trends is discussed in Section 5.

[33] The full text for truncated *Customer product groups* in the Figure are: 'Professional, Scientific and Technical Services' and 'Primary Metal and metal products'

[34] Gao, P *et al* (2016): *Disruptive trends that will transform the auto industry*, McKinsey & Co, January 2016

[35] Association of European Automotive and Industrial Battery Manufacturers (nd): *A Review of Battery Technologies for Automotive Applications*

[36] Giffi, C and Gangula, B (2014): *3D opportunity for the automotive industry*, Deloitte University Press

[37] Technavio (2016): *Global Machine Tools Market 2016-2020*

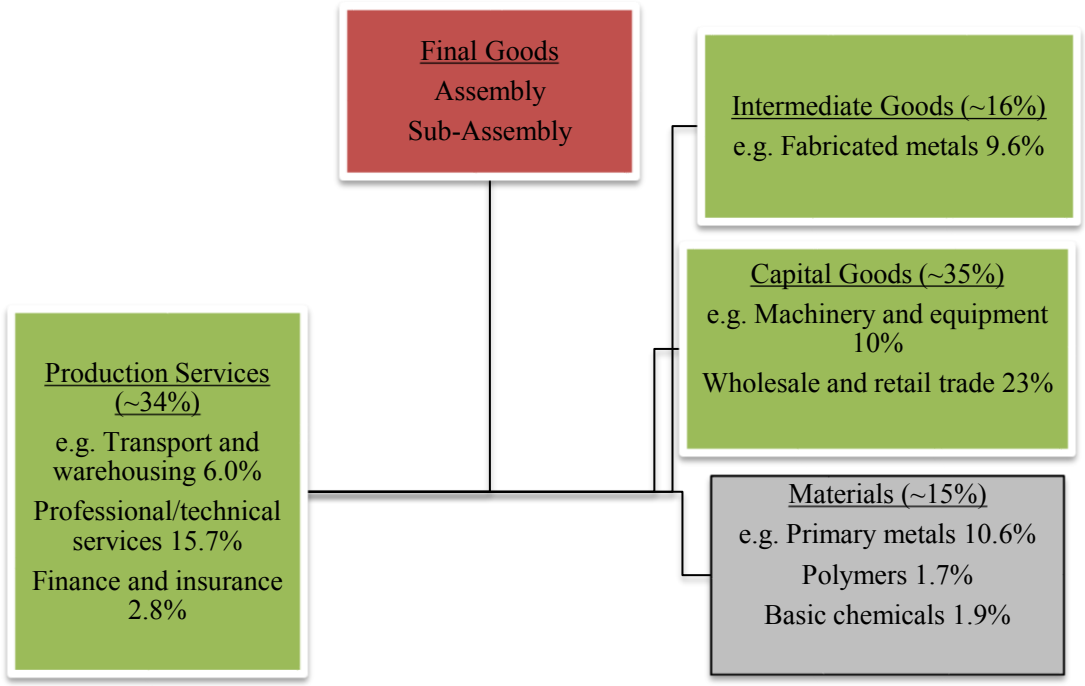
Machinery

Machinery and equipment was once the most significant manufacturing sector in SA,[38] but it has recorded significant reductions in employment in the last decade.[39] It still, however, accounted for 11.4% of GVA to GSP in the fiscal year 2009-2010.[40]

Employment in this manufacturing sub-sector totalled 6,539 in 2014-15, a fall from 7,795 in 2012-13.[41] There were 803 companies as at the end of 2014-15, giving an average company size of 8.1 employees.[42]

Figure 6 shows the supporting industries' input to machinery and equipment manufacture. Capital goods account for one third of inputs, with fabricated metals and primary metals significant suppliers of other inputs. In this sector, fabricated metal products are likely to be "other" metal products rather than containers and hence have been included in intermediate goods. The sector also relies heavily on professional and technical services (likely to be mainly engineering).

Figure 6: Significant supporting industries for machinery and equipment manufacture



Source: Author's analysis using Nguyen (2007) model as per Figure 2

Customers for machinery and equipment are diversified and include construction and mining companies, manufacturers of other machinery and equipment, and health services (Figure 7). These sectors purchase 56% of product output. In South Australia, the customers are said to also include agriculture, food and beverage manufacturing and the Australian Defence Force (shipbuilding), although it is not clear whether this analysis has excluded imported product.[43]

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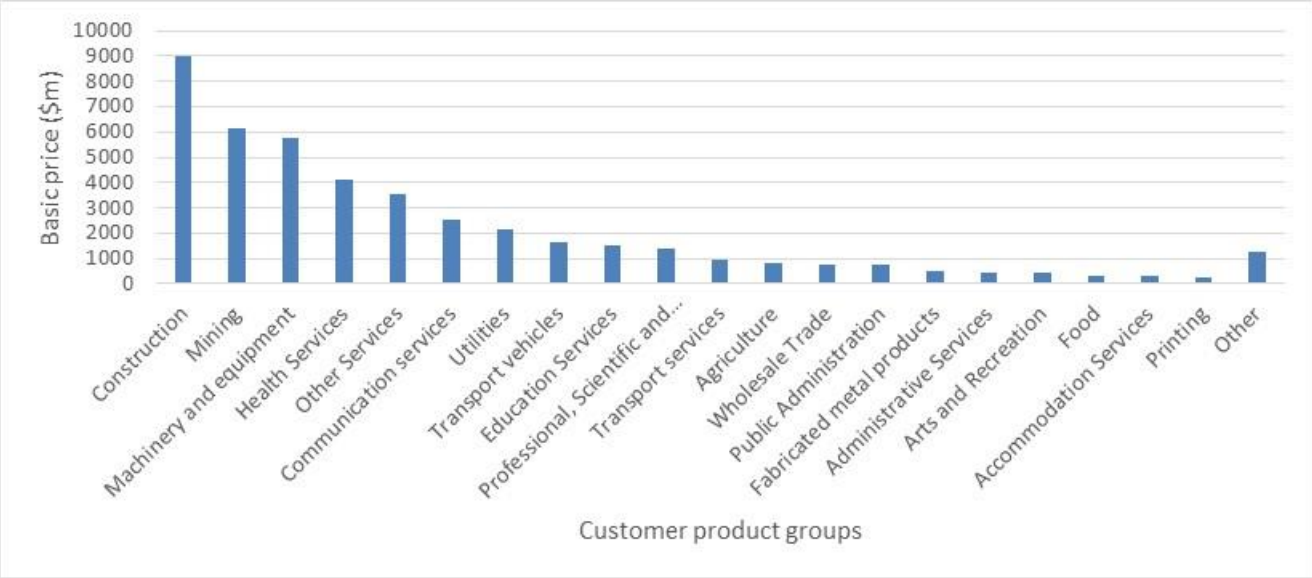
[38] ABS (2001): *Manufacturing Industry South Australia 1999-2000*, [http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Manufacturing%20industry~147], Commonwealth of Australia.
[39] Ibid.
[40] ABS (2010): *South Australia's Changing Industrial Landscape*, [http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1345.4Feature%20Article1Apr%202011], Commonwealth of Australia.
[41] ABS (2015): Cat. 8155.0 *op cit*
[42] ABS (2016): ABS Cat 8165.0 *op cit*
[43] O'Neil, M., Whetton, S., Gobett, D., Findlay, C. (2015): *Where Do We Go From Here? South Australia's Economic Prospects Going Forward and the Role of Government*, South Australian Centre for Economic Studies.

Figure 7: Major customer sectors for machinery and components[44]



Source: Author's analysis from ABS 5215.0.55.001 as per Figure 3

Fabricated metals

The fabricated metal sector includes iron and steel forging, structural metal product manufacturing, metal container manufacturing, sheet metal manufacturing and other fabricated metal manufacturing.[45] Metal fabrication accounted for AU$1.09 billion of state IVA in the financial year 2004-2005.[46] It was the third greatest contribution to state Gross Value Added (GVA) that year, following the food and beverage and machinery and equipment sectors.

State employment in 2014-15 in this sector totalled 7,476, an increase from 7,373 in 2012-13.[47] There were 597 companies in this sub-sector giving an average firm size of 12.5 employees.[48]

South Australian metal fabricators, along with those in other parts of Australia, have been affected by competition from imports over the last five years.[49] Local manufacturers have found it increasingly difficult to compete on price with imports from foreign companies that operate with lower wages and overheads and have greater economies of scale. Over this period, import penetration climbed at a rate greater than domestic demand, with the result that domestic manufactures decreased. However, statements by industry groups suggest that Australian industry has some competitive advantage in relation to an ability to meet short lead times, reduced whole of life costs and a skilled labour-force trained in the latest steel fabrication and welding techniques.[50]

Figure 8 shows the supporting industries' input to fabricated metal products. Manufactured products as a group account for 48% of inputs with over 80% of these being other fabricated metal products, machinery and primary metals. Transport and warehousing accounts for a larger percentage of input costs in this sector, presumably because of the bulky nature of the goods produced.

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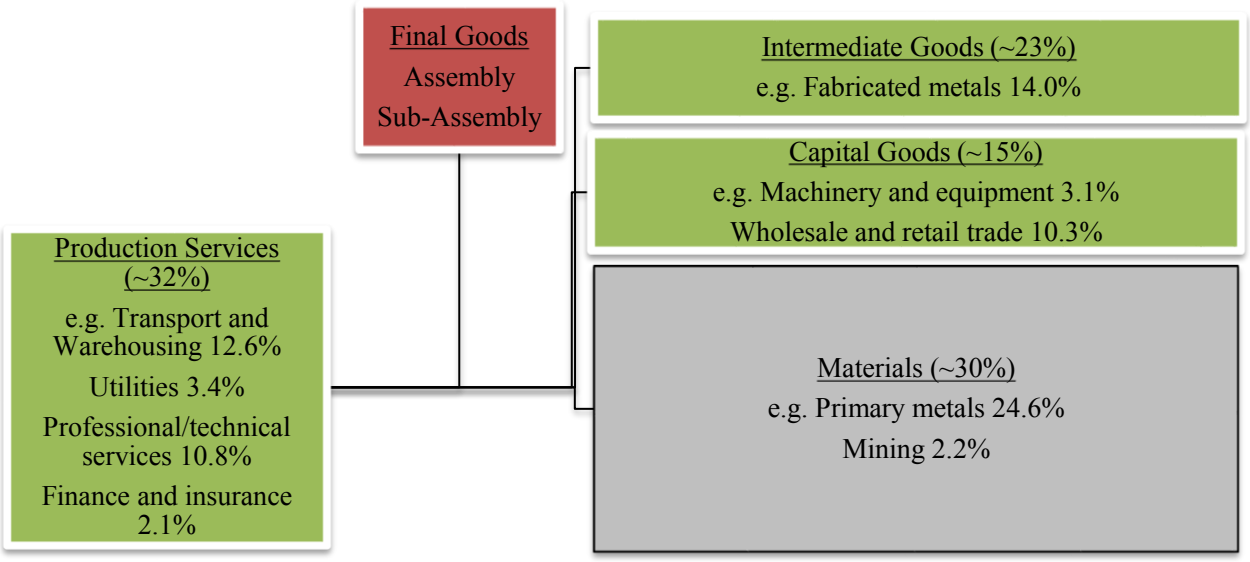
[44] The full text for truncated *Customer product groups* in the Figure is: 'Professional, Scientific and Technical Services'
[45] ABS (2014): *Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006*, [http://www.abs.gov.au/ausstats/abs@.nsf/0/A0FED0532C1C9C9ECA25711F00146E4F?opendocument], Commonwealth of Australia.
[46] Australian Bureau of Statistics (2010): *Year Book Australia 2009-2010*, [http://www.abs.gov.au/ausstats/abs@.nsf/0/3F1ADDE71E707BD1CA25773700169CD0?opendocument], Commonwealth of Australia.
[47] ABS (2015): Cat. 8155.0 *op cit*
[48] Australian Bureau of Statistics (2016): ABS Cat 8165.0 *op cit*
[49] IBISWorld (2016): *Fabricated Metal Product Manufacturing in Australia: Market Research Report*
[50] Australian Industry Group (2016): *Submission to the Senate Inquiry into the Sustainability of the Australian Steel Industry*

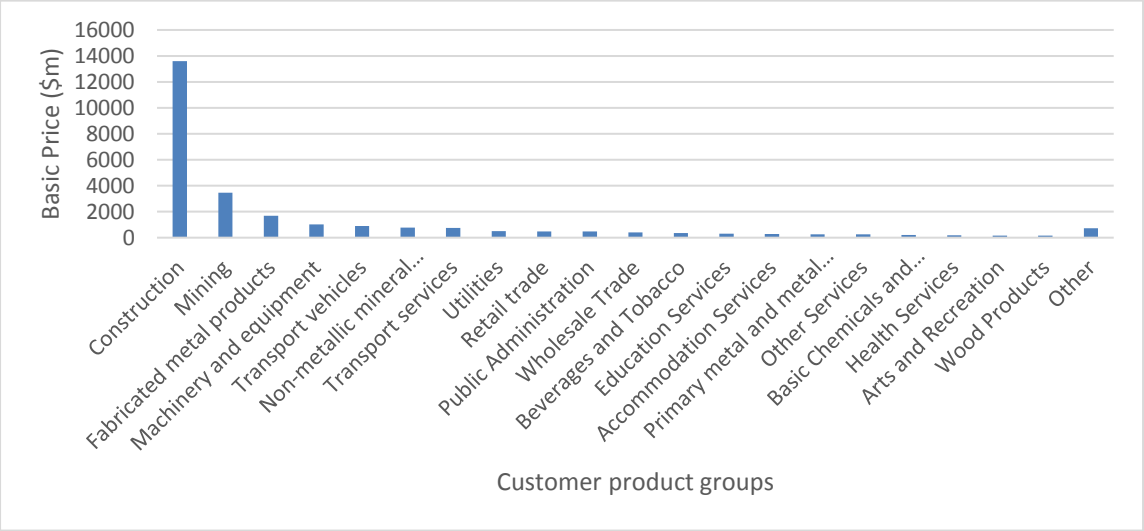
Figure 8: Significant supporting industries for fabricated metal products



Source: Author's analysis using Nguyen (2007) model as per Figure 2

Globally, major customers of metal fabricators are construction, automotive, manufacturing, energy and power, electronics and other industries.[51] In Australia, the main markets for fabricated metal products are construction (35%), manufacturing (22% - fabricated metal products, machinery, transport vehicles) and mining (15%) (Figure 9).

Figure 9: Major customer sectors for fabricated metal products



Source: Author's analysis from ABS 5215.0.55.001 as per Figure 3

Major technical trends in metal fabrication include waterjet cutting (which is also a major technology for automotive manufacturing);[52] coating technologies, computer-aided design (CAD) and technologies that enable reductions in water and energy use during manufacture.[53] The role of policy support for these new technologies is discussed in Section 5.

[51] ReportBuyer (2016): *Metal Fabrication Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2016 - 2024*
[52] Technavio (2015): *Global Waterjet Cutting Machine Market 2016-2020*
[53] Australian Industry Group (2016): *op cit*

The transport equipment supply chain has been historically heavily dependent on the OEMs (in SA these were Mitsubishi and Toyota). The whole SA supply chain is made up of supporting industries which supply intermediate products to one or two major assembler-level customers which are the link to global supply chains. According to interviewees, these customers dictated what and how much these suppliers manufactured, reducing the incentive for innovation up the supply chain. Therefore, the whole SA transport equipment industry is vulnerable to failure of the OEM and as small companies they are likely to have limited capacity to diversify. Both the SA and national governments have responded to the threat of job loss in transport equipment supporting industries by introducing comprehensive support programs.

The machinery and equipment and fabricated metal products sub-sectors are both part of the transport vehicle supply chain but have diversified customers in construction, mining and a range of other sectors. Construction is the fourth largest contributor to GDP[54] and accounts for around 9% of employment nationally, but is also highly fragmented and dominated by SMEs.[55] Mining, while a much smaller employer, is a heavy user of machinery and is dominated by larger, ASX-listed companies. It might still be expected that local companies building machinery and equipment and fabricated metal products suppliers are more resilient overall than firms in transport vehicle sectors because of their greater diversification, but will also be vulnerable to downturns in these customer industries.

From a policy perspective it is important to understand that none of these industries exists in isolation. Manufacturing statistics, being activity based, often do not differentiate between end-point final (assembled) goods and intermediate inputs (particularly for food and transport equipment sectors) and hence do not provide a ready reference for policy agencies to be able to measure the impact of their interventions.

The next section introduces the overall policy framework and support programs operating nationally and in SA. Section 5 then discusses how these are applied to key manufacturing sectors, drawing on the information in this section to comment on government approaches to sector support. Section 6 then draws together the information from Sections 3, 4 and 5 to discuss how these policies affect key supporting industries in South Australia.

[54] ABS (2010): *A Statistical Overview of the Construction Industry*, ABS 1350.0 – Economic Indicators, Feature Article
[55] Vanddenbroek, P (2016): *Employment industry statistics – a quick guide*, Statistics and Mapping Section, Australian Parliamentary Library

4. POLICY FRAMEWORK

National Policy Framework

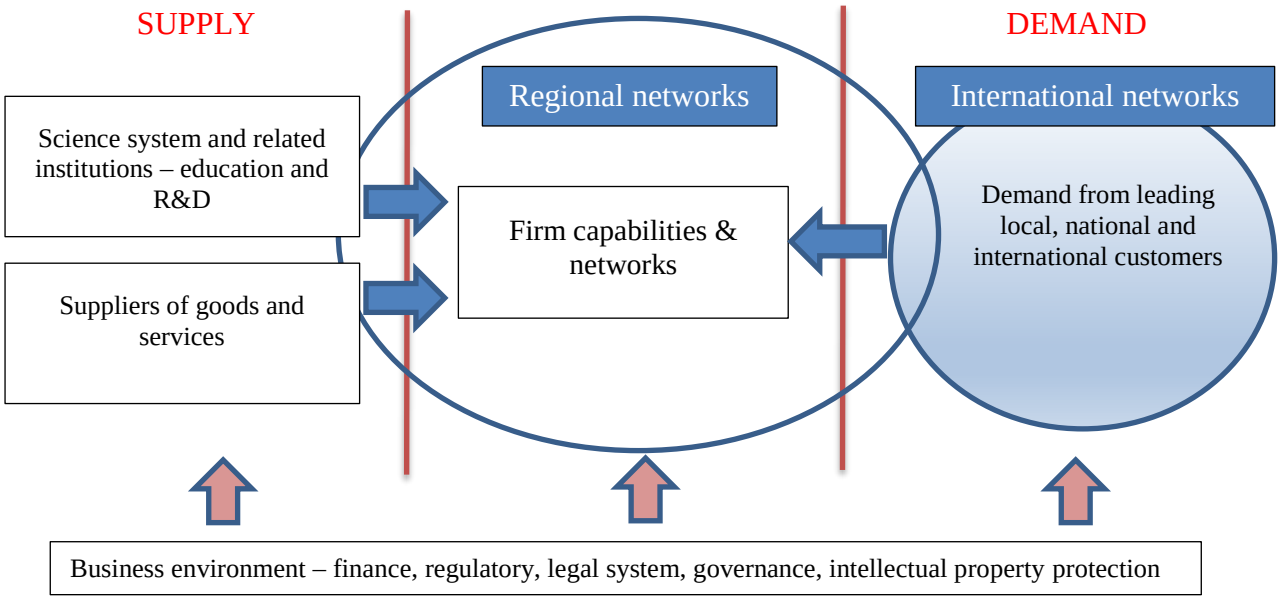
The Commonwealth of Australia is a federation with six States (including SA) and two Territories. The States pre-dated the formation of the Australian federation in 1901, and retained all the powers they had when operating as self-governing British colonies, apart from those ceded specifically to the national government.[56] At Federation, the States granted the Commonwealth of Australia rights over specific matters, including taxation, defence, currency and the banking system, intellectual property, immigration, international treaties and overseas trade including bounties and tariffs.[57]

Both SA and national governments support industry through policy and programs. At the State level, industry support is important but varies between States because of their differing industrial histories and current challenges. At the national level, the Australian government has influenced industry development through control over export policy, tariffs and the financial system.

General policy approach

The broad structure of the Australian economy and its supporting institutions is shown in Figure 10. Companies operate within a general national framework – the system of laws, regulations and financial systems that are broadly referred to as the "business environment". Nationally and regionally, individual R&D institutions, educational institutions and goods/service providers support production. Firms then sell product to customers who may be regionally, nationally or internationally based – the "leading" customers pull the firm to create new products, improve productivity or improve existing products to remain in business and increase returns to the company and its shareholders. Successful companies must have regional or international networks to alert them to coming trends, threats and opportunities, identify new markets and receive input from large leading edge customers.

Figure 10: Model Australian economic system



Source: Author, drawing broadly on literature on national innovation systems

[56] Government of Australia (undated): *How Government Works* http://www.australia.gov.au/about-government/how-government-works accessed January 2016. States remain responsible for schools, roads railways, utilities, mining, agriculture and consumer affairs.
[57] Australian Constitution, Section 51

Examples of legislation that operates nationally to provide a stable business environment are shown in Table 2.

Table 2: Examples of national laws that establish conducive business environment

Type of law	Examples of legislation
Finance	Corporations Act 2001 - Advertising of financial products Taxation Act 1953 – collection of income and other national taxes including A New Tax System (Goods and Services Tax) Act 1999
Legal system	Corporations Act 2001 – laws governing corporations nationally
Intellectual property	Copyright Act 1968 – law covering copyright nationally Patents Act 1990 – law covering patents nationally
Consumer laws	Privacy Act 1998 – national laws covering handling of personal information National Credit Act and National Consumer Credit Protection Act 2009 – consumer protections when dealing with financial organisations Competition and Consumer Act 2010 (formerly Trade Practices Act 1974) – consumer rights in relation to recall of faulty goods
Waste management	National laws limited to nationally owned land and agencies (including universities)

Source: Author's analysis drawing on publicly available information

National policy trends

Since the mid-1990s Australia, along with many developed economies, has relied on macro-economic policies (monetary and fiscal policy) and opening of the overall business environment (taxation, competition policy, and support for entrepreneurship) to promote innovation and economic growth. This policy approach replaced a prolonged period of protectionist policy from the 1930's to mid-1980s, which (as also followed by other developed economies at the time) used tariffs, import quotas and production bounties to promote the establishment of a large Australian manufacturing base.[58,59,60]

From the 1980s to the 1990s Australia tried to restructure its uncompetitive manufacturing industries by reducing tariffs while at the same time boosting productivity and enhancing export performance. This was particularly in transport vehicle manufacturing where major assemblers had been encouraged to set up manufacturing plants in Australia through favourable subsidies.[61,62,63,64] These initiatives were coupled with further tariff reductions[65] and broader competition reforms including harmonisation of tariffs, floating of the Australian dollar, reduced industry regulation and increased regional trade agreements.[66,67]

This intermediate period also introduced grants for innovation in SMEs, which dominated Australian industry, and policies to build links between publicly-funded R&D institutions and companies. Australian industry is dominated by very small SMEs which have an average of fewer than 20

[58] Green, R., Roos, G. (2012): *Australia's Manufacturing Future: Discussion paper prepared for the Prime Minister's Manufacturing Taskforce*, Roy Green and Göran Roos.
[59] Emmery, M. (1999): *Australian Manufacturing: A Brief History of Industry Policy and Trade Liberalisation*, Department of the Parliamentary Library, 19 October 1999
[60] Grabas, C and Nutzenadel, A (2013): *Industrial Policies in Europe in Historical Perspective*, Welfare, Wealth and Work, Work Package 306 MS66, Theme SSH.2011.1.2-1, European Commission
[61] The then Minister of Industry was Senator the Hon. John Button,
[62] Green, R., Roos, G. (2012): *Australia's Manufacturing Future: Discussion paper prepared for the Prime Minister's Manufacturing Taskforce*, Roy Green and Göran Roos.
[63] Emmery, M. (1999a): *Australian Manufacturing: A Brief History of Industry Policy and Trade Liberalisation*, Department of the Parliamentary Library.
[64] Avenell, S (1996): Competition for Corporate Regional Headquarters, Asia Research Centre, Working Paper 67, November 1996
[65] Emmery, M (1999b): Industry Policy in Australia, Research Paper 3 1999-2000, 21 September 1999, Department of the Parliamentary Library
[66] Industry Commission (2014): *From Industry Assistance to Productivity – Thirty Years of "the Commission",* Industry Productivity Commission, Commonwealth of Australia 2003
[67] *Ibid.*

employees per firm[68,69] This is about half the size of the average manufacturing firm in the USA and about 40% of that in Germany, and is due to the small domestic market and distance from major international markets.[70]

High labour costs, small firm size, competition from lower cost economies and distance from major markets all create hurdles for Australian SMEs.[71] The national government has sought to help companies overcome these barriers with a range of policies and support programs. These have generally operated on the supply side – that is, they have aimed to increase SME's access to information and to the skills necessary to enhance capacity. In a policy sense, the Australian government's rhetoric has echoed that of Organisation for Economic Cooperation and Development (OECD) and APEC, and has emphasised innovation and competition as a means of lifting productivity and increasing global competitiveness.[72,73]

Despite the stated policy approach, the Australian government continued to provide tariff assistance totalling AU$7.8bn in 2014-15.[74] The manufacturing sector receives over 90% of assistance, including $7.0bn on output tariffs (i.e. tariffs on imports) and support programs including tax concessions (total AU$15bn to all sectors nationally).

Australian State and national Government support policies do not, as a rule, focus on large companies because these have the resources to look after themselves. Policies focus on SMEs, as a group where small size leads to an inability to, for example, scan the market or take up new technology efficiently.

National support programs have been largely sector-neutral, as well as supply-chain-position neutral. Where specific sectors are supported (including those in manufacturing) the incentive has been major industry restructuring. Most support programs are focused on the supply side (Figure 11), that is they subsidise the cost of R&D, exploring new markets or obtaining advice and skills to be able to respond to opportunities and threats.

National programs are regularly reviewed on consultation with industry and others. In addition, the national Productivity Commission and/or national Parliament will conduct reviews of programs and will consider submissions from industry in coming to their conclusions. For example, the Productivity Commission reviewed public support programs for the Australian Automotive Industry in 2013.[75]

[68] Swanepoel, J and Harrison, A (2015): *The business size distribution in Australia*, Department of Industry Innovation and Science Office of the Chief Economist, Research Paper 5/2015

[69] *Smarter Manufacturing for a Smarter Australia* A report of the non-Government members of the Prime Minister's Taskforce on Manufacturing, with support from the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE), 2012

[70] *Ibid* Figure 2.3

[71] Parish, C (2013): *Labour costs in Australian compared to other countries*, BIS Shrapnel, 17 June 2015, www.businessinsider.com.au

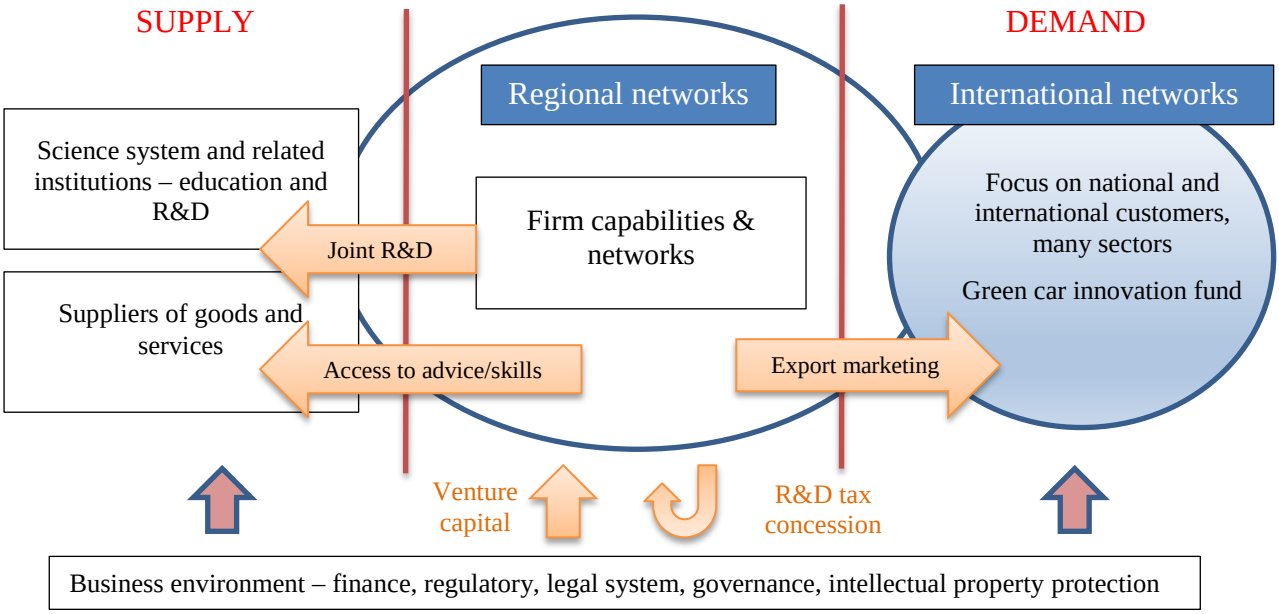
[72] Green, R., Roos, G. (2012): *Australia's Manufacturing Future: Discussion paper prepared for the Prime Minister's Manufacturing Taskforce*, Roy Green and Göran Roos.

[73] Australian Government (2014): *Industry Innovation and Competitiveness Agenda*, Commonwealth of Australia.

[74] Productivity Commission (2016): *Trade and Assistance Review 2014-15*, Productivity Commission Annual Report Series, July 2016

[75] Productivity Commission (2014): *Australia's Automotive Manufacturing Industry*

Figure 11: Targeting of national support programs



Source: Author's analysis

While companies self-select, in that they choose to apply for grants, programs are also naturally skewed towards technology-based firms and those which might be termed potential "high growth" due to requirements for companies to own or have sole (Australian) control over intellectual property and to be able to demonstrate "national benefit" in competing for limited grant funding.

Supply side programs

As has been noted, the national policy framework is based around tariff reduction and opening up of firms to international competition. National policies are almost exclusively supply-side in that they aim to build firm capacity by reducing the costs of investing in innovation – cost reductions may then promote linkages with R&D institutions (suppliers of professional and technical services) or advisers, investment in new equipment and training, acquisition of staff with new skills. Even when policies are aimed at enhancing access to export markets the general approach is to reduce the costs of exploring these markets.

The major national programs are summarised in Table 3.

Table 3: Summary of national innovation support programs

Type of program	Name of program/s	Style of program	Aim
Business environment (supply-side)	Venture Australia	Part-funding of venture capital investment managers	Reduce risk of investing in early stage technology venture
R&D linkage (supply-side)	Co-operative Research Centres R&D Corporations	Part-funding of R&D conducted in priority areas by R&D institutions with industry or other partners	Enhance capacity Enhance industry uptake of R&D outputs
Business capacity – new customers (supply-side)	Automotive Diversification Automotive Transformation Next Generation	Part funding of R&D, re-tooling or product development including investment in new	Technical upskilling, focussing on costs of equipment Diversification of

	Manufacturing Investment Manufacturing Transition	equipment, for current or new customers	customers
Business capacity – skills (supply-side)	Enterprise Connect/Entrepreneurs' program R&D Tax offset Supplier Business Improvement Program	Advice to companies on business performance improvements Rebate for R&D expenses carried out by the company	Enhancing business productivity, business models and reducing costs of change
International market access (supply-side)	Export Market Development Grants Specialist Vehicle Alliance	Part-funding of costs of export marketing Subsidise costs of identifying new customers	Exporting and expansion of customer base
Regulation (demand-side)	Green Car Innovation Fund	Part-funding of new product development	Using regulation to drive change
Government as customer (demand-side)	Nil (pending)		
Other customer-led demand (demand-side)	Industry Capability Network	Introduction services	Reduce costs for SMEs to identify and approach new demanding customers

Source: Author's analysis. More detail in Annex 3

The main emphasis has been on building internal capacity (tax incentives, access to advisory services, training, export marketing) and supply side linkages with service providers and R&D institutions. In addition, there have been some sectoral programs which have aimed to reduce the impact of automotive industry closures.[76]

Grants underwrite the costs (to the company or the providers) of commercial interactions – grant programs require a contribution from the recipient organisation, usually matched by government funding with government contributing no more than 50% of the project costs, less for larger projects. More detail on each of these, including grants to SA companies where available, is provided in Annex 3.

Demand side programs

Demand-side programs using regulation to stimulate change in manufacturing are limited at national level. In 2008, the Australian government launched the Green Car Innovation Fund, which aimed to use regulation to reduce the impact of climate change, through requiring introduction of low emission and fuel efficient vehicles.[77,78] More information on this program is in Annex 4. It was closed in 2013.

Using government purchasing to stimulate innovation has been discussed for some time but only resulted in a first call for proposals in August 2016.[79]

[76] These have often been aimed at the rural sector, for example, deregulation in the dairy industry since the late 1990s discontinued price supports which had maintained high prices for milk inputs. Deregulation resulted in closure of a number of farms as part of industry consolidation and the Australian government provided temporary support through two programs which provided direct assistance to farmers through the Dairy Structural Adjustment Program Dairy Australia – *History of Australian Dairy Industry Deregulation*, http://www.dairyaustralia.com.au/Industry-information/About-the-industry/Deregulation.aspx accessed December 2016.

[77] Priestley, M (2010): *How Green is the Green Car Innovation Fund?* Parliamentary Library, Economics Section, 27 May 2010

[78] Berman, T and Squire, M (2011): *Demand-side Innovation Policies* in Australia, in OECD (2011): Demand-Side Innovation Policies, OECD

[79] Business Research and Innovation Initiative, announced as part of the National Science and Innovation Agenda 21 August 2016

Finally, the Industry Capability Network (ICN – a joint initiative of the national and all State governments) has run for over 30 years and covers Australia and New Zealand. ICN is a hybrid demand-supply-cluster program. The demand-side component enables major purchasers to identify potential suppliers for civil engineering, construction, mining and manufacturing works.[80] Its regional gateway provides local councils (provincial governments) with an online interface to call for tenders from local companies. In SA, ICN typically advertises projects in civil engineering and construction (e.g. solar farms, railways), mining (e.g. copper mine in regional SA), transport equipment manufacture (shipbuilding) and transport services (truck services for mine building).

Clustering programs

Internationally, clustering programs which link firms, people and knowledge operate at a regional level. However, reviews of clustering policies show that regional clusters are most effective if they link firms into global value chains. Work by the OECD note that governments can either take a supply-side approach to clustering policies (i.e. building SME capacity) or on the drivers of regional or national growth (i.e. priority sectors), and may focus on lagging regions.[81]

There has been some move towards identifying priority growth sectors in Australia, in both research[82] and industry.[83] However, national level programs have been largely absent because clusters are inherently regional and hence are more likely to be attractive to State governments or (more rarely) individual organisations. For example, the Commonwealth Scientific and Industries Research Organisation (CSIRO) has recently announced a series of Industry Innovation Precincts to bring together multiple research partners in a shared space.[84] None of these are based in SA.

South Australian Policy Framework

General policy approach

South Australia, in line with the approach operating nationally, has relied mainly on market-opening policies[85] with sectoral programs introduced in response to economic change. Similar to those in the rest of Australia, State policies protected the economy from competition through the 1940s to 1980s. With the opening of markets, interviewees noted that SA manufacturing could not compete in a high cost labour market that had not kept up with technology and innovation due to past protections.

Anticipating the need to be open to new ideas, the SA government invited Professor Göran Roos to participate in its long-standing Thinker in Residence Program[86] in 2011. Prof Roos produced the Manufacturing into the Future report,[87] which stressed the importance of manufacturing to developed economies and in particular the importance of new technologies (e.g. additive manufacturing, biotechnology, nanotechnology) and business model innovation. This report was developed following work by Prof. Roos with a number of SA manufacturing companies, as well as regional organisations and local and State government representatives. The report was developed with a close understanding of the conditions operating in the State, while referencing international trends in manufacturing.

The report noted the barriers facing SA companies due to their small size, and the potential impacts of market failure due to the departure of large firms from within the region, leading either to

[80] Industry Capability Network (2017): *Welcome to ICN*, www.icn.org.au accessed January 2017
[81] OECD (2007): *Competitive Industry Clusters: National Policy Approaches*, Regional Innovation Reviews, OECD
[82] Australian Government priority areas of food, soil/water, transport, cybersecurity, energy, resources, advanced manufacturing, environmental change and health as science and research priorities.
[83] AU$250m over four years for six industry growth centres in the areas of advanced manufacturing, cyber security, food and agribusiness, medical technologies and pharmaceuticals, mining equipment and technologies, and oil/gas/energy resources – funds only started to flow in 2016/17 and no centre is yet operational. Industry Growth Centres Initiative summary, https://www.industry.gov.au/industry/Industry-Growth-Centres/Pages/default.aspx, accessed December 2016
[84] CSIRO (2015): *World leading innovation precincts bring expertise into your back yard*, http://www.csiro.au/en/Do-business/Collaborative-research/Active-opportunities/Precinct-partnerships, accessed January 2017
[85] For a recent example see Seven Strategic Priorities http://www.priorities.sa.gov.au/ accessed 12 December 2016
[86] Thinkers spent three months in the State capital Adelaide, helping the government and community to tackle problems and explore opportunities for the state.
[87] Roos, G (2012): *Manufacturing Into the Future – Summary of Recommendations*, Government of South Australia

stagnation/decline. Diversion of resources to the (then) resources boom which was creating major growth in neighbouring States was also recognised as a major threat.

The report recommended "rebalancing" SA's economy by increasing the value-add and productivity of its manufacturing firms through supply-side programs focusing on investment in education for manufacturers; investment in infrastructure for manufacturers. The report also recommended encouraging innovation through demand-side policy tools including: government procurement as a means to lead the market and with the resulting intellectual property handed to the party which can best commercialise it; and regulation, based around raising awareness of regulators of the impact on innovation of their regulations, as well as using regulation to influence innovation (e.g. green technologies). Finally, the report recommended building industry clusters, based around regions, in specific sectors in which SA already has strengths.

The recommendations were a major departure from the usual policy approach, in that they advocated a heavier focus on demand-side policies coupled with regional clustering, as well as enhancement of business skills. The principles on which the recommendations were based comprised transforming and rejuvenating mature or declining industries as well as growing industries where SA has potential comparative advantages (e.g. food, mining supplies) and building new industries where global demand is rising (e.g. scientific instruments). The report also recommended targeting assistance at the 15% of SMEs which would be expected to be growth-oriented.

State programs

The main State program supporting manufacturing is Manufacturing Works, which was launched in 2012 as the SA Government's response to Manufacturing into the Future.

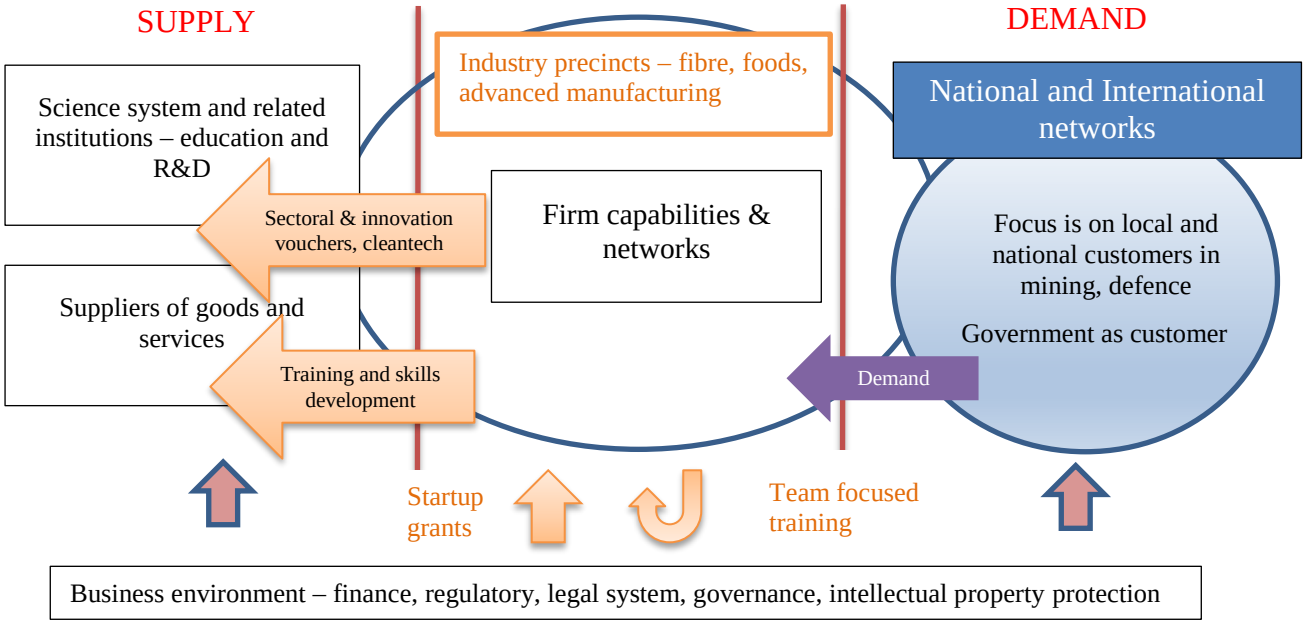
At the time, the government announced an aim to support development of a diversified, high-value and globally connected manufacturing industry in SA through development of a critical mass of manufacturing firms that compete on value rather than cost and create positive social outcomes for the State.[88] It was broadly aimed at any company producing intermediate and final goods. The program is based on four principles, which have been based on those enunciated in Manufacturing into the Future: increasing the ability of manufacturers to innovate; enhancing the skills and leadership of the SA workforce; capturing future markets and opportunities; and addressing infrastructure and policy gaps.

The program does not focus on the top 15% of SMEs (as recommended by Prof. Roos), but rather (and in line with the general approach nationally) makes support available to all SMEs which qualify under program guidelines (which mainly relate to location in SA). According to interviewees, it was recognised that companies were located at different points along a development path (with some already engaged internationally and others struggling to adopt basic IT systems). This meant that in theory the programs were available to all SMEs, rather than those deemed to be "growth oriented" although in practice it is those that are searching for new markets and opportunities that take advantage of the support offered. However, those with more basic capacities could still become more competitive if they addressed some more fundamental issues. Thus, Manufacturing Works contains a range of programs to suit companies with a range of skills.

The program contains a mix of supply-side policies (e.g. creating links to existing R&D institutions) and demand side policies, including government procurement and links with new leading edge or large customers, to provide incentives to target products and services to demanding customers. More details on each of the programs is in Annex 4 and a table summarising how the programs align with the four strategic pillars announced by the State government is in Annex 5.

[88] Government of South Australia (2012): *Manufacturing Works* October 2012

Figure 12: Targeting of South Australian programs



Source: Author's analysis

According to interviewees, the government was aware of the opportunities to dovetail with existing national level programs and actively sought to avoid duplication. Characteristics of the support offered under Manufacturing Works are that:

- Companies self-select to participate in any or all programs, according to their eligibility and needs, in particular recognising that companies had different levels of skill and awareness of new opportunities at the start of the program.
- Most programs have some requirement for providing matching funds or in-kind (similar to national programs).
- SA programs which are similar to those offered at national level are open to smaller companies in SA (e.g. Enterprise Connect is only open to companies with turnover of more than AU$20m whereas the average turnover in SA manufacturing firms is AU$1.5m).[89]
- Access to grants is competitive so all companies which are eligible may not receive funding.
- Many of the programs are delivered by industry associations or research institutions contracted to the government. This is also common practice in Australia at State level and taps into the existing relationships of industry associations with industries in the target market; and the skill sets of R&D institutions.

In addition, interviewees reported that the government recognised that, with these changes, traditional business models would be tested and that companies needed to be helped to meet the challenges while at the same time the state government needed to create large macro-level economic transformations to position the state for the coming changes.

The following paragraphs summarise the approach. Details of all programs and lists of grant recipients can be found in Table 4 as well as Annex 4.

[89] ABS Cat. 8155.0, 2014-15, *op cit*

Table 4: Summary of State innovation support programs

Type of program	Name of program/s	Style of program	Aim
Business environment (supply-side)	Micro-finance fund Venture Catalyst	Part-funding for startup companies	Reduce cost of early stage proofing of technology-based products and services
R&D linkage (supply-side)	Business Innovation Vouchers Manufacturing Transformation Technologies Medical Technologies Cleantech Partnering Advanced Food Manufacturing	Part-funding of SMEs working with R&D institutions on applying known technologies to business problems	Enhance capacity in new technologies Enhance industry uptake of R&D outputs New product development
Business capacity – new customers (supply-side)	Business Transformation Vouchers Automotive Suppliers Diversification	Part funding of R&D, re-tooling or product development including investment in new equipment, for new customers	Technical upskilling, focussing on costs of equipment Diversification of customers
Business capacity – skills (supply-side)	SME Innovation Capacity Customer-led Innovation Manufacturing Through Leadership Network	Part-funding of guided self-analysis and learning from peers	Review business models and learn new approaches to change
International market access (supply-side)	Nil	N/A	N/A
Regulation (demand-side)	Nil	N/A	N/A
Government as customer (demand-side)	Small Business Innovation Research	Government call for proposals for specific solutions	Lead customer to pull product development
Other customer-led demand (demand-side)	Mining Industry Participation Office	Develop collaborations between mining customer and SMEs for new product development	Lead customer to pull product development
Clusters (regional + demand side)	Competitive Foods Initiative Internet-of-Things Resources Cluster	Collaboration between firms for new product development	Lead customer to pull product development+ local networks

Source: Author's analysis. More detail in Annex 4

Business environment

Laws affecting the business environment (taxes, financial controls) are set at national level and hence the SA government plays a minor role in this area. Examples of legislation that operates nationally to provide a stable business environment are shown in Table 5.

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Table 5: Examples of SA laws that establish conducive business environment

Type of law	Examples of legislation
Finance	No specific State laws apart from those transferring State's rights over certain financial matters to the national government (1999)
Legal System	Some business names can be registered at State level
Intellectual property	No specific State laws – rely on national laws
Consumer laws	No specific State laws – rely on national laws
Waste management	Waste management and disposal is administered by the State Environment Protection Authority

Source: Author's analysis drawing on publicly available information. See Table 2 for reference to national laws.

In relation to finance, the main opportunity for intervention lies in incentives for business formation, and SA has two small programs aimed at providing finance for startup companies. One of these, the Micro-Finance Fund, was short-lived and provided AU$50,000 grants to support early stage ventures. The other, the Venture Catalyst program, is administered by the University of Adelaide and only funds companies started up by students from that university. It also provides AU$50,000 grants. Both schemes attract applicants from a wide range of sectors including manufacturers.

Supply side programs

As State governments have no involvement in taxation, there is no equivalent to the R&D tax concession operating at State level. However, SA aims to help SMEs form linkages with R&D providers in order to increase R&D capacity. The main program is the Innovation Voucher program, which helps companies develop products with the assistance of R&D institutions or private companies. This program has provided grants to suppliers of machinery and equipment and fabricated metal products as well as beverage packaging aimed at the wine industry. Several end-product manufacturers have also been funded.

SA also has funded a Manufacturing Technologies program which links SMEs to specific SA research institutions which have skills in photonics, data mining, nanotechnology and additive manufacturing. The research institutions run the programs and companies receive a contribution by the State government for their costs. The research institution must apply existing knowledge to the company's problems rather than conduct new research.

A number of supply-side programs are aimed at specific industry sectors:

- The Medical Technologies Program (MTP) supports early stage development of new medical devices and are focused on providing R&D support. The program is administered by Flinders University, which partners with funded companies.
- The Advanced Food Manufacturing (AFM) Grants Program provides up to $100,000 of matched funding to a food company to work with research organisations or a technical partner to develop innovative food products or production systems. The program is administered by Primary Industries and Regions SA (PIRSA).

A suite of programs supports internal capacity building by subsidising the cost of acquiring new equipment. These include the Next Generation Manufacturing Investment program and the Business Transformation Voucher Program (both aimed at helping companies adopt advanced manufacturing), and the Automotive Suppliers Diversification Program which provides equipment grants for companies to target new non-automotive customers.

A further range of programs aims to build internal company capacity through training and coaching. These include the SME Innovation Capacity Building program, administered by the Australian Industry Group, and training programs offered on at "at-cost" basis.

In food manufacturing, the focus has moved to high value functional and luxury foods, following a study commissioned by PIRSA, which has had responsibility for food manufacturers since 2014.[90]

[90] Primary Industries and Regions South Australia (2016): *Agriculture, Food and Wine in South Australia*, Government of South Australia.

PIRSA has established the SA Food Innovation Centre to support innovation by SMEs by bringing together a range of R&D and service providers across Adelaide.[91]

Demand side programs

According to interviewees, the SA government initially approached the national government on co-development of demand-side programs (e.g. similar to the Small Business Innovation Research program operating in the United States),[92] but in the end started to develop its own initiatives. These have not led to any substantive initiatives based on government procurement.

The Mining Industry Participation Office, however, has been more active. It aims to link manufacturers with customers in the resource sector by providing information on planned resource sector projects, identifying gaps in local capability and (in a supply-side component), working with companies to build capacity. It has successfully brokered at least two projects between local suppliers and international mining companies.

Clustering programs

Since the launch of Manufacturing Works the SA government has also announced seven strategic proprieties for the State's future.[93] The framework remains focused on manufacturing and aligns with the Australian government's current "growth through innovation" approach.[94]

The economic strategy specifically identifies higher-value-added industry activities in food, health and medical, defence projects, ICT and supply chains.[95] This has led to identification of nine industry "clusters": wastewater, aquifers, forestry, premium food and wine, defence specialist vehicles, music, mining and the Internet-of-Things, defence aerospace, and health and medical devices. The aim is to develop regional concentrations of large and small companies and their suppliers plus a critical mass of skills and talent and with interaction between entrepreneurs, researchers, and innovators.[96]

The State also announced establishment of a Manufacturing Technologies Centre in 2016. This has been opened as part of the clustering initiatives and is based in northern Adelaide. The centre will play a role in linking SMEs with providers of technology in big data, photonics and the like, and hence overlays programs already funded under Manufacturing Works to subsidise SME links with SA service providers in these fields.

The Australian Information Industry Association (AIIA) has also administered an Internet-of-Things program for the mining industry on behalf of the State government. This raises awareness among existing SA companies of opportunities to sell into the mining industry and also provides pull-through from mining companies to local suppliers.

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[91] Primary Industries and Regions South Australia (2016): *South Australian Food Innovation Centre Brochure*, http://pir.sa.gov.au/__data/assets/pdf_file/0003/269085/SA_Food_Inno_Centre_A4_4pp_revised.pdf accessed December 2016

[92] SBIR STTR (2016): *The SBIR Program,* https://www.sbir.gov/about/about-sbir - SBIR encourages small businesses to engage in federal R&D that can be commercialised. The program is demand side in that federal agencies, as the customers, decide what they want and then seek proposals from small businesses to provide this. The idea has been under discussion in Australia for some time however, the federal government has moved more slowly than the SA government required and at the time of writing has only just launched its equivalent program, Business Research and Innovation http://www.innovation.gov.au/page/business-research-and-innovation-initiative

[93] Seven Strategic Priorities *op cit*

[94] Government of South Australia (2016): *Economic Priorities – Growth Through Innovation,* http://economic.priorities.sa.gov.au/priorities/growth_through_innovation/progress_against_objectives accessed December 2016

[95] *ibid*

[96] Overview: The New Federal Role in Innovation Clusters, in National Research Council (US) Committee on Competing in the 21st Century: Best Practice in State and Regional Innovation Initiatives. Washington (DC): National Academies Press (US); 2012.Clustering for 21st Century Prosperity: Summary of a Symposium, National Academy of Science, https://www.ncbi.nlm.nih.gov/books/NBK115046/

5. FOCUS OF GOVERNMENT PROGRAMS ON SUPPORTING INDUSTRIES IN FOOD AND TRANSPORT EQUIPMENT

This section discusses the impact of government programs on supporting industries in the largest two manufacturing supply chains in South Australia – food and transport equipment, characteristics of both of which were summarised in Section 3.

Food manufacturing

Support programs for food and beverage manufacturers are aimed at suppliers of intermediate goods and those who manufacture final products (Table 6). This fits with current State policy focus on premium products which may contribute more to State Value Add than raw materials. However, individual companies may produce both premium products and intermediate goods, because of the nature of the industry and generally small markets in Australia. Around 10% of grants go to companies providing input services. There is a heavy emphasis on product development and hence support is also provided for production services (10% of grants) and intermediate goods including packaging (24% of grants). Grants to companies in this sector averaged $177,000 under all programs.[97]

Table 6: Allocation of grants to food and beverage firms, by position in supply chain

Program (focus)	Position in supply chain of recipient					
	Assembled product	Supplier of capital goods	Supplier of intermediate goods	Support of materials	Input services	Total
Advanced Food Manufacturing* (product development)	9	5	3	1	1	19
Business Transformation Vouchers** (business model and internal R&D)	12	1	4	1	3	21
Innovation Vouchers** (access to R&D – advanced technologies)		3	2			5
Micro-finance Fund** (access to finance)		1	2		1	4
Next generation manufacturing investment		3				3
Business model innovation** (business model review)	2		3		1	6
Total	23	13	14	2	6	58

Source: Author's analysis, n=43 (one company received two grants)
** administered by PIRSA* *** accessed by food companies before PIRSA had policy responsibility*

The SA Food Innovation Centre taking an essential supply-side approach by aiming to link companies with R&D providers (in SA). However, local R&D providers claim expertise in shelf life, smart packaging, processing and links to health benefits (e.g. lipids, functional foods), freshness sensors, clean production, sensory characteristics and flavours, and links between diet and health.[98] These match fairly well to the emerging technical trends in food manufacturing noted in Section 3.

[97] Only partial information available for Business Transformation Vouchers
[98] SA Food Innovation Centre Brochure *op cit*

Demand-side programs are largely absent in this sector, perhaps because of the diversified nature of the industry's customers (40% of customers spread over 5 sectors – see Figure 3).

Transport equipment manufacturing

The departure of final automotive product assemblers from both SA and Victoria means that "supporting industry" players dominate the remaining industry. Table 7 summarises grants to companies in these sub-sectors. As automotive assemblers were ineligible under these programs, no grants were provided to end-product manufacturers. All the grants went to companies in supporting industries that supplied capital goods (machinery and equipment) or intermediate goods (components) to automotive (and other) industries. Approximately 43% of grants went to machinery and equipment manufacturers, and 51% went to suppliers of intermediate goods. Grants have been provided to production services, specifically linking companies to public sector R&D institutions, but detail of these was not available for analysis. The average grant was substantially higher than other types of grants award, being $920,000.[99]

Table 7: Allocation of grants to transport manufacturing supply chain supply chain

Program (focus)	Position of recipient in supply chain			
	Supplier of capital goods	Supplier of intermediate goods	Supplier of Materials	Total
Automotive Diversification (non-automotive product development)		13		13
Automotive supplier diversification (non-automotive product development)	5			5
Business transformation voucher (business skills and internal R&D)	6	6	3	15
Green car innovation (reduce climate change impact)	3	3		6
Innovation vouchers (access to R&D – advanced technologies)		2		2
Manufacturing transition (advanced product development)		2		2
Micro-finance fund (finance)	1			1
Next generation manufacturing investment (advanced technologies)	7			7
Total	22	26	3	51

Source: Author's analysis, n=46 (several companies received grants under more than one program). Details of grants for links with R&D institutions not available

Demand-side programs are important and given the absence of automotive integrators the focus has been on linking supporting industries with new customers in mining and defence.

Cluster programs are only just commencing in manufacturing, with the launch of the Advanced Manufacturing Centre (AMC). It is not yet possible to comment on the potential benefits to transport equipment manufacturers, however AMC appears to be playing a role similar to that of the AIIA in the Internet-of-Things project and will help companies take advantage of existing government programs.

Comparing national and State policy approaches

While the national and State governments have different resources available to them, and sometimes different philosophies on industry support, there are some common themes emerging from their support programs for manufacturing sectors. There are also some key differences between current national and

[99] Excludes innovation vouchers and transformation vouchers, for which information was not available

SA programs. The following sections summarise similarities and differences, and then address gaps which have become evident through the development of this case study.

Common themes

Provision of a stable business environment is an important precursor to the operation of specific policies for the manufacturing sector in SA, but most of these regulations are nationally administered. As already noted, most of the key policies are implemented through national legislation, while the SA government has direct responsibility for a more limited set of laws including waste management.

Both the national and SA governments focus their programs on SMEs, because of their limited capacity to do R&D and find new customers (Table 5). The majority of programs are firm-specific and rely on companies applying for grants after a public call for submissions where the selection criteria and their weighting are known at the time of advertisement.

Both national and State programs support access to technical and professional services. This approach recognises the value of skilled service providers (R&D institutions or consultants) in building internal capacity for SMEs. Such an approach helps SMEs identify, understand and apply new knowledge in a way that transforms the company, thus enhancing their "absorptive capacity".[100]

Both national and State programs support projects rather than underwriting whole companies; and also insist that companies provide part of the funding (usually 50%). This ensures that companies have funds "at risk" by either investing profits or finding external investors also willing to underwrite projects – the latter helps reassure government that the project is financially viable.

Both national and State policies appear to follow best practice for SME policy formulation which, according to the OECD, needs to focus on financing (reducing costs of private equity finance), technology (upgrades to innovation capacity), management capabilities (training or access to advisory services) and access to markets (international customers or public procurement).[101] Policies support efforts made by SMEs themselves in that they will only provide part-funding for specific projects (not the whole company).

Both national and SA governments provide for analysis and evaluation of their programs. National programs are somewhat more transparent – it is easy to find information on who has benefited, and a major component of the evaluation process involves calls for public submissions. While SA does announce grant recipients, there is no central public source of this information. Further, the Frost and Sullivan evaluation of Manufacturing Works appeared to be limited to input by the State government and former grant recipients.[102]

State and National Differences

National support for venture capital targets funds managers whereas SA government programs funds a technology supplier. The national approach is longstanding and aims to move the risk of selecting potentially successful startups to the private sector professional fund managers. The SA government program funds the University of SA which then makes the decision on funding the startup company.

State programs generally admit smaller companies than national programs, because companies in SA are smaller than the average nationally. Many SA companies which are not eligible for national grants due to small size will be eligible for similar grants offered through the SA government.

National programs focus more on building internal capacity whereas SA programs focus on adoption of tried and true technologies for immediate use. The national approach is due to the emphasis on demonstration of national benefit and export potential, plus a willingness to fund startup

[100] Cohen, W and Levinthal, D (1990): Absorptive Capacity – a New Perspective on Learning and Innovation, Administrative Science Quarterly, 35(1) March 1990
[101] OECD (1997): *Small Business, Job Creation and Growth – Facts, Obstacles and Best Practices*.
[102] Frost and Sullivan (2014) *op cit*, page 13

companies which may need to develop for some years before becoming significant employers. State level programs, on the other hand, seek shorter term employment gains and hence focus on immediate benefits. In addition, State programs link companies with State-resident R&D institutions, which in SA conduct more applied rather than basic research.[103]

National programs are entirely supply-side focused whereas SA provides both supply-side and demand-side programs. SA's procurement policy, like that of Victoria[104] and the Australian Capital Territory, is based on the US Small Business Innovation Research (SBIR) Program. SA has established programs to link firms with demanding customers, the most significant of these being the Mining Industry Participation Office.

SA's policy framework includes clustering programs, which are absent from the national framework. Clustering programs are more relevant to local and regional governments which are seeking to build vibrant regional hubs. In SA's case, the strong concentration of the State's population in Adelaide and a small number of regional centres provide opportunities to strengthen local supply chains through clustering.

Both national and State programs support R&D, however the national approach is through the R&D tax concession as well as grants for projects with R&D institutions and the State only provides funding for the latter. This is because taxation is administered at national level.

National programs support export marketing whereas State programs focus on finding new customers in South Australia. The national Export Market Development Grants program reimburses companies for part of the cost of export marketing which ties in with the national focus on building export capacity for internationally competitive industries. SA's linkage programs help companies find new customers in existing (food) or new (non-automotive) industries – this also ties in with the State's interest in building local clusters.

State policies have a shorter time frame than national programs. While Manufacturing Works was launched in 2012, it has since been overshadowed by newer initiatives in priority industries and the establishment of the Manufacturing Technologies Centre. Changes to administrative arrangements, where responsibility for food manufacturing moved to PIRSA in 2014, has also interfered with long-term State commitment. National programs, while also undergoing some changes in branding and specifics, have been operating largely since the mid to late 1990s, despite several changes in government over that period.

Gaps

While the analysis thus far of SA programs has focussed on the food supply chain and transport equipment supply chain, it will be recalled from Section 3 that the supporting industries for the latter in particular are major suppliers to other sectors. These sectors include construction and health services (for machinery and equipment), and construction, energy, defence and mining for fabricated metals.

In general, government programs aimed at a specific industry do not consider or measure impacts on other sectors (the so-called spill over effect). Construction, though a large industry, is very fragmented with a high number of independent (sole trader) contractors.[105] It is thus difficult for governments to target with support policies and the major focus at national level is workplace health and safety, insurance, employment and environmental impact. Large companies, on the other hand, dominate mining and defence industries, with existing access to global value chains.

Neither the national nor State government provides policy or programs support for significant services such as transport and warehousing. This can be explained by the fact that these companies

[103] Uni Reiews (2017): *Australian University Rankings 2017*, https://universityreviews.com.au/australian-rankings/ accessed February 2017

[104] Berman, T and Squires, M (2011) *op cit*, page 98 refers to the Victorian SME Market Validation Program, which differs from the SBIR by creating an avenue for voluntary participation by State agencies in procurement initiatives, with funding provided by the industry departments. The Australian Capital Territory government also finalised an SBIR program in 2015.

[105] Government of Australia (2016): *Construction Industry FactSheet*, www.business.gov.au accessed December 2016

are often large national chains and hence do not attract policy support, which is normally focussed on SMEs.

While SA is transparent in terms of its program administration up until the time of grant, it is sometimes difficult to find out which organisations have received grants. Industry would be able to better understand the suitability of grant programs if the grantees for each round were available in a single list, in the same manner as is made available by the national government for its grant recipients.

Responding to technical change

As noted early in this report, the sectors considered here are undergoing considerable technical change. This is often related to R&D, and support for R&D is a significant feature of Australian industry policy at both national and State levels. This section summarises common themes and differences that have emerged in considering the issues in this case study.

Common themes

National and SA programs both support part of the cost of purchasing new equipment. This approach at both levels of government recognises the limited capacity of SME to invest in major capital equipment and

Both SA and national programs encourage SMEs to collaborate with third parties (either in R&D, product development or through consultants) and develop new business models. This addresses in part the emerging requirement, outlined in Section 3 for developing new methods of working. In SA's case, interviewees spoke highly of the Business Transformation Program as a means of enabling companies to review their business models. Interviewees also valued the Internet-of-Things program as a means of creating informal networks that could raise awareness and lay groundwork for multi-company collaborations, leading to new products.

State and National Differences

National programs do not identify target technologies whereas State programs are more likely to do so (this being linked to State R&D capacity). However, both levels of government leave it up to companies to identify desirable technologies and enhancements that are suited to them. It can be seen from Table 8 that technologies funded vary widely within and between programs and that not all the emerging technologies identified in Section 3 appear to be covered by existing grants.

Table 8: Comparison of emerging technologies and government grants supporting them

Sub-sector supply chain	Technical trends	Program support (S = State and N=national)
Food	Nanotechnology Energy use Encapsulation Functional foods	Innovation voucher (S) for new functional food products Manufacturing Transformation Program (S) for big data analytics and nanotechnology Advanced Food Manufacturing grants (S) for functional products and new packaging
Transport equipment	Internet-of-things and big data Battery technologies Additive manufacturing Software and new designs Flexible manufacturing/ CAD Water jet cutting Reduce water and energy user	Automotive Suppliers Diversification (S) grants for injection moulding Green Car (N) for new materials Innovation voucher (S) grants for power controls systems, new low-energy materials and machine visualisation Manufacturing Transformation (S) grants for laser/sensor technologies, big data analytics Manufacturing Transition (N) grants for injection moulding NextGen (N) program grants for additive manufacturing, robotics, precision cutting and new power systems

Source: Summarised from Section 3; author's analysis

Gaps

National R&D support programs enable SA companies to link nationally and internationally, whereas SA programs focus more on intra-State linkages. Under most of the Manufacturing Works program, companies must work only with institutions or firms in SA. There are a limited number of universities in SA, which are also not ranked highly at an international level. This may mean that firms cannot guarantee they have access to the best or most relevant advice to their business operation. While SA firms can work with institutions in other States (or internationally), they cannot get State government funding to support this.

Overall Impact of SA programs

The SA government commissioned an evaluation of the quantitative and qualitative impacts to date of Manufacturing Works in 2014, and a 10-year forward forecast of potential impacts.[106] The analysis measured the number of participants, jobs created (or kept), cost savings and impact on State Value Add. Their survey found that 28% of the 232 businesses in the program could attribute some business outcome to their participation, and as a result estimated a net benefit of AU$88m, and increased State Value Add of A$U26m, in return for the AU$11.75m expenditure at the time of the survey (2.21:1 benefit ratio). The evaluation found an additional 290 jobs had been created (but no jobs saved). The report estimated that over the next 10 years, assuming all the Manufacturing Works funds were expended, that there would be AU$229m of incremental revenue, AU$68m of incremental value add and 847 incremental jobs.

While these numbers are impressive, only 242 companies accessed assistance through Manufacturing Works in the period covered by the review. This is only 3.8% of the ~6,300 companies in the four sectors analysed in this case study.[107] Around 2.5% of companies are usually classified as innovators, and a further 13.5% as early adopter, so this implies that the innovators and a small proportion of early adopters are accessing these programs. The majority of companies follow slowly, meaning that a new technology is completely adopted after around 15-25 years.

The difficulty in obtaining SME engagement was identified by Frost and Sullivan.[108] Interviewees for this case study highlighted the same issue. This was partly due to the fragmented nature of program management (e.g. each R&D institution offering subsidised services had to build up their own mail lists and do their own marketing), but was also said to be an issue in relation to some of the demand-side programs which must first attract companies to a managed event to build their networks.

Companies can also help themselves and do so, but the small size of the vast majority of companies and the fact that most will be followers rather than innovators means that many will resist change or will be not able to afford the major investment of time and money needed for major change. Even when a company is innovative and looking to introduce new technologies or skills, limited resources (staff, know-how, finance and assets) means that change will be slower than what is really needed to keep up with international trends and remain (or become) globally competitive. Those companies that do succeed will become ineligible for government support and will need to compete on their own.

According to interviewees, the Manufacturing Technologies Program, part of Manufacturing Works, has been outstanding in educating SMEs about disruptive and emerging technologies in a way that enabled them to understand these technologies and how they could affect their business, thus enhancing absorptive capacity. Prior to the program's implementation, an industry survey of 200 SA manufacturing SMEs found that most were aware of the technologies but they hadn't been able to determine their value. According to interviewees, the program was a low risk but an accountable way for companies and R&D institutions to work together to enable the SME to get an answer to its specific question while also proving the value of technology to the company.

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[106] Frost and Sullivan (2015): *Assessment of the Manufacturing Works Program*, May 2015

[107] Frost and Sullivan report notes that the figure could be as high as 7% once firms with no employees are omitted from calculations

[108] Frost and Sullivan (2015): *op cit*

6. CONCLUSIONS

The major programs supporting SA manufacturing have been supply-side focussed and have emphasised accessing R&D (predominantly from public sector institutions) or building firm capacity through training, technical advice or equipment. Supporting industries benefit from funding to acquire or develop intermediate and capital goods, and link manufacturers to those production services from R&D institutions, even though supporting industries may not be identified explicitly as program targets.

From interviewee comments and the analysis in this report, SMEs, which already have limited capacity for environmental scanning, find it difficult to keep track of government programs which change over relatively short time periods (2-4 years), particularly if companies are not already "innovators". Many interviewees commented on how hard it is to engage SMEs, their confusion when programs or administrative arrangements change, and the long time required to effect real change at an industry level. Governments have attempted to overcome access problems by providing program information portals,[109] but more stability for the programs themselves would also help them reach more firms. Government programs, if they are to help more than a small percentage of SMEs in a sector, need to recognise that change is slow and be willing to invest in the long term so that SMEs which are not naturally innovative can also benefit from new technologies and business models.

SA R&D support programs aim to induce R&D institutions to use known technology to solve a specific problem for local SMEs. They help build local networks and develop industry clusters with integral links to local R&D providers; however, programs may reduce access to key technologies in institutions outside the State. It is unlikely that SA programs will change, because of political requirements, so this is not an issue which can be resolved easily. SA institutions can help to expand their own expertise, and usefulness to SA companies, by forging links with institutions outside the State. Other national programs such as the CRC program and R&D Corporations help to leverage such linkages.

Both national and SA governments struggle to develop demand-side policies. National regulation-based programs for manufacturing have been short-lived. Successful demand-side programs are generally a mix of "business matching" programs which introduce SMEs to large customers in a range of sectors (ICN, SVA), and true demand side programs (e.g. Internet-of-Things and SVA) which aim to use demand by larger customers to induce innovation in SME suppliers in mining and defence. These seem to be producing results, but the State government's focus on linking to mining companies nationally may limit SME's capacity to access international supply chains available when automotive assemblers operated in the State. The national SVA program is more likely to be effective internationally.

In conclusion, both national and SA programs have focussed on companies in supporting industries without being explicit about this focus. A mix of programs supporting access to technologies, re-tooling and business transformation has enabled companies to choose the level of support. However relatively few companies are accessing these programs because of structural issues within industries as well as changes to programs themselves. More stability in programs would help more companies gain access. A greater focus on demand-side policies would also help companies access national and international supply chains, rather than remaining State-based.

Where to Next?

This case study has examined the development and delivery of manufacturing support programs in SA for supporting industries in food and transport equipment. The material gathered from secondary sources and from interviewees permits some final analysis of what has worked well in the programs, and what could be improved.

[109] The one in South Australia is called GRANTAssist

Good practice

Good practices in SME program development and administration have been defined by the OECD.[110] National and SA programs follow many of these, and SA also benefits from the stable business environment provided by a suite of legislation which is implemented and administered nationally. SA's policies and practices align with those operating nationally in the following areas:

1. Programs focus on SMEs which have the least capacity for performing R&D and finding new customers.
2. Programs appear to follow best practice for SME policy formulation in that they focus on financing, technical capacity-building, management capabilities and access to markets.
3. Programs are evaluated regularly.
4. Program administration is transparent in that grant objectives are clear and guidelines for applications are provided.
5. Support programs will cover the cost of new equipment and services (R&D and other) and require applicants to part-fund these to ensure commitment.
6. R&D support focuses on building local linkages with R&D providers for short term impact.
7. Clustering programs are relevant and focussed.
8. Programs include both supply side and demand side components.

Areas for potential improvement

In addition to these positive findings, interviewees and desk research revealed some areas for potential improvement:

1. Recipients of grants with some of their non-commercial details should be announced and in a single list so that potential applicants can better understand who has benefited in the past and what the government sees as relevant projects.
2. SA companies need to become aware of national programs which could extend their reach to R&D providers and customers nationally and internationally, as relevant.
3. Support programs need to run unchanged for longer so SMEs can become aware of them and formulate methods to engage.
4. Impact of policies on other industries (e.g. construction) could be assessed and where relevant those industries included in networking, partnering and other initiatives.
5. While grants to larger companies in the supply chain (e.g. transport and warehousing) may not be appropriate, governments need to understand their roles in supporting the target industry and address other barriers (e.g. regulation).
6. Where access to new technologies is important, support programs need to enable companies to reach the best or most technically relevant advice, whether or not it is located inside State boundaries.

[110] OECD (1997) *op cit*

7. ANNEX 1 – INTERVIEW FRAMEWORK

Case Study of South Australian Manufacturing Supporting Industries

Semi-structured interview Questions

(Distributed to interviewees before the meeting)

Scope: Introduction and impact of the SA Manufacturing Works and related policies on supporting "supporting industries" to manufacturing in South Australia

Purpose of interviews:
Understand broader context of regulation, approaches, barriers and implementation issues

a) Confirm our understanding of the various components of Manufacturing Works, in particular its role in supporting industries (i.e. those which provide goods or services to end-product manufacturers)

b) Identify gaps in our understanding, especially industry/government influences which explain main trends

c) Identify policies and events that might alter our interpretation of facts and issues, particularly role of other programs at State and National level

d) Deepen our understanding of the sequence of reforms and how policymakers balanced competing objectives, addressed adjustment issues, and targeted assistance and capacity building to can maximise flow on effects for the economy

Interviewees will be from government, universities and the private sector

a) Government agencies in South Australia

b) Manufacturing and supplier industry representatives, esp. industry associations

c) Regional representatives as relevant

Use of interview material:

Detailed notes will be confidential but will be used for the written case study. Interviewee names and contact details will be provided to APEC as part of reporting but will be listed as names and positions in the final report.

Person conducting interviews:

Dr Lyndal Thorburn
Senior Associate
Sustineo Pty Ltd, 27 Torren St Braddon ACT 2602 Australia

Lyndal.thorburn@sustineo.com.au

Interview content

Note – main focus of discussion (time spent) was on item 3

1. Introduction

The research topic, its purpose, process and stage in the project.

2. The current understanding in the case study

Summarise what we know so far in this case study/industry sector, and seek comment.

3. How this program works in the State and national

As relevant to the interviewee:

a) Background to the development of the policy and its introduction
b) Definitions of supporting industries covered by the policy/initiative
c) Focus on components of the supply chain, especially services, components, machinery
d) What led to the selection on key technologies?
e) Considerations prior to introduction including industry consultation; capacity building in SMEs as an issue and how this was addressed
f) How the local vs. international vs. national value chain issues were considered
g) Competing issues that arose at the time
h) Other policies that affected introduction of the policy and influences including national policies
i) Adjustment issues experienced by policymakers, industry etc.
j) Expected impact of the change vs. actual observed impacts (Frost and Sullivan report)
k) Objective measures of impact: employment growth, labour force productivity, growth or changes in structure of supporting industry and/or telecoms manufacturing industry

4. Gaps

What other events have resulted in the trends that we see in this case study? Focus on national level – this country vs. others

Who else should we speak to?

5. Further references

What other sources documents might be available?

8. ANNEX 2 – INTERVIEWEES

Organisation	Name	Position
Advanced Focus	Mr Mark Fusco	Managing Director
Advanced Manufacturing Industry Council	Professor Göran Roos	Chair
Advanced Manufacturing Council	Ms Rebecca Murrie	(Former) Executive Officer
Australian Industrial Transformation Institute (Flinders University)	Dr Lance Worrall	Director
Australian Industry Group	Mr Stephen Myatt	Head – South Australia
Australian Information Industry Association	Mr Steven Travers	Executive Manager – IoT Cluster for Mining and Energy Resources
Australian Information Industry Association	Mr Philip Catley	Council Chair – South Australia
Data to Decisions Cooperative Research Centre	Mr Sanjay Mazumdar	Chief Executive Officer
Department of State Development - Strategic and Economics and Policy Coordination	Mr Tim Mares	Director
Department of State Development - Strategic and Economics and Policy Coordination	Mr Philip Taylor	Principal Economist
Department of State Development - Industry and Innovation Division	Mr David Rush	Manager – Advanced Manufacturing Industry Development
Department of State Development - Industry and Innovation Division	Mr Adam Reid	Executive Director
Electronics Industry Development Adelaide Inc.	Dr Ronald Grill	Information and Public Officer
Food South Australia	Ms Catherine Sayer	Chief Executive Officer
Office of the Economic Development Board	Ms Catherine Jamieson	Principal Project Manager
Primary Industries and Regions, South Australia	Ms Christina Belperio	Assistant Director – Food Programs
Simulation Australasia	Mr John Stewart	Chief Executive Officer
South Australian Research and Development Institute	Dr Tom Madigan	Research Scientist (Food Safety and Quality)
Defence Teaming Centre	Mr Les Shearn	Alliance Facilitator, Specialist Vehicles Alliance

9. ANNEX 3 –NATIONAL MANUFACTURING PROGRAMS

This summary provides more detail on the overall framework described in Figure 11. Only those most relevant to this case study have been included. The authors have allocated companies to supply chain positions based on publicly available information about their activities. Data in these tables has been compiled from comprehensive lists of grant recipients available from the Australian government.

Business environment

Venture Australia is the latest in a series of programs which has aimed to overcome market failures in supply of investment capital in to Australian startups, particularly those which are technology-based. Previous programs have provided funds to match (in part) funds raised by private investment managers, who then make their own investment decisions in innovative companies, usually over a ten-year time horizon. The most recent initiatives are Early Stage Venture Capital Limited Partnerships (ESVCLPs) and Venture Capital Limited Partnerships (VCLPs).[111] The latter are meant to attract international investors through establishing a regime similar to that available in the United States.[112] They have had limited success, are generally manufacturing-shy, and no investments have been made in firms in South Australia.

Supply side programs

R&D linkage programs

Second, the Co-operative Research Centres (CRC) program was first launched in the early 1990s and was intended to enhance long term development and encourage an increase in business enterprise R&D through formation of partnerships between R&D institutions and the private sector, including SME's. CRCs are funded for 5-7 years, with the Australian government matching, dollar for dollar, the funds contributed by the partners to each CRC as a whole. Over the life of the program, there have been 211 CRCs funded, with each based around a specific theme of interest to the parties and or importance to Australia's international competitiveness.[113] While CRCs are headquartered in one location, most have a number of geographically dispersed "nodes", thus drawing together specific subject expertise from around Australia. Many CRCs have addressed manufacturing issues. The current (17th) round of funded CRCs includes a Data to Decisions CRC (headquartered in SA), an Innovative Manufacturing CRC (headquartered in Victoria) and a Rail Manufacturing CRC (headquartered in Queensland) and CRC for Polymers (headquartered in Victoria). Most CRCs have specific programs to ensure that they engage with SMEs.

A longstanding program has been the R&D Corporations. This agricultural R&D program has provided a mechanism for primary producers and the government to co-invest in research. The program commenced in the 1950s and has allowed for the funding of both statutory corporations and industry-owned R&D companies, with industry contributions coming from a levy on production or processing.[114] While primarily agriculturally based, there are three R&D corporations whose work also involves R&D on manufacturing within their sector – these are the Australian Grape and Wine Authority (wine making), Australian Meat Processor Corporation (abattoirs) and Dairy Australia (milk processors). Their primary aim is to link producers with R&D providers, at a national level.

[111] Australian Department of Industry, Innovation and Science (2017): *Venture Capital* [https://www.business.gov.au/assistance/venture-capital]
[112] Cawson, G and Taylore, J (2003): *Venture Capital Limited Partnerships – will the money flow?* Focus – Private Equity, January 2003
[113] Department of Industry, Innovation and Science (2016): Co-operative Research Centres Programme (CRCs) over time
[114] Rural Research and Development Corporations - http://www.agriculture.gov.au/ag-farm-food/innovation/research_and_development_corporations_and_companies accessed 9 December 2016

Business capacity building – equipment/ new customers

The Automotive Diversification program provides funding for companies to find customers outside the automotive sector. Funds are provided for R&D, re-tooling, early stage commercialisation, and pre-production development in Australia and development of export capability. Thirteen South Australian companies (Table 9) have received grants, which are only open to those companies already selling to Australian automotive OEM.[115] Nationally, 32 companies have received funds. All SA recipients have received funds for new machinery and equipment, which according to interviewees is primarily imported from overseas. Grants to SA companies over the three rounds of funding totalled AU$7.5m for projects worth $17.56m (total grants nationally were AU$17m for projects worth AU$48.8m). According to information available, new markets targeted included mining, construction, furniture, food, consumer goods, aerospace, energy and logistics.

Table 9: SA-based supporting industry recipients of Automotive Diversification grants

Company (position in supply chain)	New market targeted	Grant Amount (AU$)	Total project (AU$)
ZF Lemforder (shock absorbers and clutches– automotive components)	Mining, construction and agriculture	$603,500	$1,898,364
Maxiplas Injection Moulding (plastics - intermediate goods)	Logistics	$1,000,000	$2,504,488
Multislide Industries (wire forming - fabricated metals)	Furniture	$259,100	$518,200
Quality Plastics & Tooling (plastics - intermediate goods)	Food	$230,000	$460,000
Cutler Brands (packaging)	Food, cosmetics	$1,000,000	$2,117,136
Numetric Manufacturing (Axiom) (extruded components - fabricated metals)	Aerospace	$265,577	$751,155
Adelaide Tooling (metal stamping, welding, sheet metal - fabricated metal products)	Construction	$360,000	$851,000
Blown Plastics (packaging)	Consumer goods	$831,250	$1,782,500
Monroe Australia (shock absorbers – automotive components)	Automotive export markets	$125,500	$270,000
Precise Global (prototypes, moulds dies – fabricated metals)	Not stated, but USA targeted	$250,000	$575,000
Precision Components (press metal components – fabricated metals)	Solar thermal power	$1,000,000	$2,780,000
Quality Plastics & Tooling (plastics - intermediate goods)	Food	$600,000	$1,200,000
SMR Automotive (mirrors - automotive components))	Automotive and other industry sectors	$971,474	$1,942,948
		$7,496,401	$17,650,791

Source: Author's analysis, based on government grant announcements

The Automotive Transformation Scheme encourages competitive investment and innovation in the automotive industry. In line with the broad approach taken by the national government, the scheme provides grants for 50% of eligible investment in R&D, and direct grants for motor vehicle manufacturers, manufacturers of motor vehicle components, machine tool and automotive tooling producers, and automotive service providers.[116] This scheme was announced in 2014 and has a sunset date of 2020.

[115] Department of Industry, Innovation and Science (2016): *Fact Sheet – Automotive Diversification Programme*, January 2016.

[116] Australian Department of Industry, Innovation and Science (2016): *Automotive Transformation Scheme*, [https://www.business.gov.au/assistance/automotive-transformation-scheme]

The Next Generation Manufacturing Investment Program helps with the cost of investing in capital projects for businesses establishing or expanding manufacturing operations. The programs will support capital projects of up to three years at a manufacturing site in South Australia or Victoria. Grants range from AU$500,000 to AU$2.5m and support up to one third of project costs, including purchasing (or constructing), installing and commissioning new machinery and equipment, adapting or extending premises to accommodate new machinery and equipment acquired through the project and training to use and maintain new machinery and equipment acquired through the project.[117] Funding to SA firms totals AU$30.8m for 16 projects (15 companies).

In South Australia grant recipients in automotive manufacturing fabricated metals and service sectors (Table 10) have installed advanced robotic, ultra-clean or precision cutting/machining systems, and new packaging facilities, and have expanded capacity. Unlike the Automotive Diversification Program, companies receiving grants under this program can be end-point manufacturers as well as suppliers to such companies, and are installing new equipment to maintain competitive within their existing industry.

Table 10: SA-based supporting industry recipients of Next Generation Manufacturing investment grants

Company (position in supply chain)	Enhanced internal capacity	Grant Amount (AU$)
Pfitzner Performance Gearbox (gear sets – automotive manufacturing)	Multi-function machining centres	$719,273
LaserBond (surface engineering and welding – technical services)	Advanced robotics laser additive manufacturing for mineral extraction tools	$1,072,873
Precise Plastics Tooling (plastics - intermediate goods)	New machinery to provide a precision machining and manufacturing service	$545,000
Redarc (electronics - machinery and equipment)	Expand capacity and capability in electronic power systems and diversity into medical and defence industries	$2,500,000
Scholle (packaging)	Advanced manufacturing in retail packaging and laminating	$1,100,046
Ahrens Group (structural steel – fabricated metals)	Flat bottom silo manufacturing process	$3,083,487
Levett Engineering (precision milling – technical services)	Expand production capacity to meet production volumes required for defence contracts	$1,632,500
SA Structural (structural steel - fabricated metals)	State of the art coping machine for cut steel using high definition plasma, to diversify manufacturing capabilities	$1,261,140
Mayfield Industries (intermediate goods – switchboards)	New CAD/CAM capability and material requirement planning for manufacture of switchboards and portable switch-rooms	$1,414,981
Ennio (intermediate goods – food nettings and casings)	Textile equipment to increase capacity and productivity for expansion into export markets	$2,442,062
Techno-Plas (intermediate goods – bottles)	Install three robotic production cells for injection moulding	$658,873
		$30,880,813

Source: Author's analysis, based on government grant announcements. Note that total project cost was not announced

[117] Australian Department of Industry, Innovation and Science (2016): *Next Generation Manufacturing Investment Programme Factsheet*

The AU$90m Manufacturing Transition Program, launched in 2014, provides grants for capital investment that help businesses move to higher value or niche manufacturing activities. It is designed to assist companies with capital equipment purchases that help move or expand into higher value or niche manufacturing activities, build skills in higher value and knowledge intensive activities in new or growing markets. Grants can range from AU$1m to AU$10m, are competitive and fund 25% of the total costs over two years.[118] Thus, companies must be in a position to fund the other 75% of costs and it is a condition of grant that the project must be at least AU$4m in value. Funds can be used for changing premises, buying building or installing new machinery, training staff on the use of new machinery, and buying technology or intellectual property. As this is a national program it is open to companies around Australia. Only one SA company has benefited, through receipt of $2.4m towards AU$9.6m purchase of injection moulding machines to expand current capacity and increase cost efficiency.[119]

Business capacity – skills

Enterprise Connect (renamed Entrepreneur's Program in 2015) is final National program that is of direct relevance to this case study. Enterprise Connect provided a business adviser to apply a standardized business assessment tool to companies with turnover of more than AU$1.5m but less than AU$100m. The adviser then recommended actions to identify business strengths and weaknesses, and to recommend potential actions to improve growth, typically around quality management, lean manufacturing, resource management, product or service development, and human resource management. Companies could then access up to AU$20,000 in funding to implement the recommendations.

The Research and Development (R&D) Tax Offset (or previously, "Concession") is a major policy which has gone through a series of permutations since it was first introduced in the 1990s.[120] The intention of this program is to encourage industry to conduct R&D that may not otherwise have been conducted, encourage SMEs to undertake R&D and to provide businesses with more predictable, less complex support. The program provided AU$800 million in tax concession to businesses in the financial year 2012-2013.[121] The Supplier Continuous Improvement Program (SCIP) is aimed at improving supply chain performance and assisting businesses to better understand the requirements of their customers.[122] The services around a SIP is delivered by a network of Business Advisers and Business Facilitators who work with the particular business. A successful application to a SIP will: gain access to an advisor over a 12 month period; receive advice and guidance in relation to the needs and requirements of their target customers; develop a tailored action plan with recommendations for improving their business performance; and assistance with implementation the recommendations.[123]

Eligibility for the SIPs requires the applicant to be operating in a relevant Growth Sector. These include: advanced manufacturing; food and agribusiness; medical technologies and pharmaceuticals; mining equipment, technical and services; and oil, case and energy resources. Further to this, the business must provide enabling technologies and services in at least one of the Growth Sectors and have adequate skills, expertise, or intellectual property to undertake future work within one of the Growth Sectors. Applicants are also required to be solvent, have filed Business Activity Statements demonstrating ongoing trade over a three year period, and have an annual turnover of between AU$1.5 million and AU$100 million[124] within one of the last two financial years. The development of a Supplier

[118] Department of Industry and Science (2015): *Manufacturing Transition Programme Fact Sheet*, January 2015.
[119] Department of Industry and Science (2016): *Manufacturing Transition Programme Grant Recipients, Round 1*, 5 August 2016
[120] The Australian Government (2007): *New Elements of the R&D Tax Concession: Evaluation Report*, Commonwealth of Australia. The most recent framework, introduced in July 2011, offers a 43.5% refundable tax offset for eligible entities with an aggregated turnover of less than AU$20 million on their first AU$100 million of eligible R&D expenditure, and a 38.5% non-refundable tax offset of the eligible R&D activities of all other eligible entities.
[121] Karanikolas, E (2016): *Industry Policy in an open economy*, Parliament of Australia.
[122] Australian Department of Industry, Innovation and Science (2017): *Supplier Improvement Plan* [https://www.business.gov.au/assistance/supplier-improvement-plan]
[123] *Ibid.*
[124] Applicants from remote of northern Australia require a turnover of between AU$750,000 and AU$100 million

Improvement Plan may also make the business eligible to apply for matched government funding of up to $20,000 through a Business Growth Grant[125]

International market access

The Export Market Development Grants (EMDG) program[126] is a financial assistance program targeted to business of currently export, or intend to do so in the future. To be eligible, businesses must have an income of less than AU$50 million for the grant year and have incurred a minimum of $15,000 in eligible export expenses in the grant year.[127] Businesses are then eligible to up to half export expenses, providing the expense is above $5,000. The program supports a broad range of sectors and industry products. This includes those which promote: export of goods and services; inbound tourism; export of intellectual property and know-how outside Australia; and conferences and other such events held in Australia.[128] The annual budget for the EMDG is AU$137.9 million and, in the 2015/2016 financial year, 3,059 grants were awarded to exports worth a total AU$131.45 million.[129]

The Specialist Vehicles Alliance (SVA) was established in 2014 with national funding and aims to identify business opportunities for suppliers affected by the decline in the automotive sector within Australia and for other companies which want to diversify into sectors beyond their current markets. It is operated out of the Defence Teaming Centre, which is based in SA.

Fifteen companies are currently members of the alliance and include those from supporting industries particularly plastics, fabricated metals and other electronic and non-electronic components. The alliance claims its members, which are pre-accredited, can provide world leading support in engineering, body/chassis/drive train systems, connected vehicles, interior design, electronics and through-life support.[130]

The aim of the alliance is to set up a range of activities that will increase the export opportunities for specialist vehicles and components developed, modified and built in SA and to increase collaborations between industries involved in the production of specialist vehicles and between those businesses and researchers. The target market sectors for the alliance are military/defence, mining, emergency services and custom built for racing and other applications. The alliance provides a single point of contact to these members companies.

Based on information provided, between 2014 and 2016 the SVA had brokered identified four contracts with a total value of AU$9.3m from Australian customers, with a further 20 deals totalling over AU$100m in the pipeline involving customers in Australia and Asia. The State government estimates that the signed contracts will provide 42 full time jobs and that the deals in the pipeline, if they come to fruition, will provide a further 100 jobs.

Demand side programs

The Green Car Innovation Fund is the main national program that operates on the demand side and is relevant to manufacturing in South Australia. Stream A of the fund comprised AU$900m which was only open to final-product car makers registered with the government (e.g. Toyota, Holden) and provided subsidies for them to invest in new technologies. While this is a supply-side approach, the AU$400m demand-side Stream B was aimed at companies which supply to these manufacturers, to enable them to invest in new products to meet the demands of those companies in Stream A.[131] Stream B recipients can received at least $100,000 but recipients must match this with at least $300,000.[132] The

[125] See: https://www.business.gov.au/Assistance/Business-Growth-Grants
[126] See: http://www.austrade.gov.au/australian/export/export-grants/what-is-emdg
[127] *Ibid.*
[128] Austrade (2017): *Who can apply for EMDG?* [http://www.austrade.gov.au/Australian/Export/Export-Grants/What-is-EMDG/Who-can-apply/Who-can-apply-for-EMDG]
[129] AusTrade (2016): *Export Market Development Grants – At A Glance*, July 2016.
[130] Specialist Vehicles Alliance (undated): *Overview*, https://skipsolabs-specialist-vehicles.s3.amazonaws.com/frontend/challenge/DTC1642%20SVA%20brochure_07FA_719a.pdf accessed January 2017
[131] Priestley, M (2010): *op cit*
[132] Department of Industry, Innovation, Science and Research (2009): *Annual Report 2008-09*, Industry Assistance programs Section 2

Green Car Fund was halted in 2011 and the funds diverted to flood recovery,[133] and then closed in 2013 with a change of government in Australia from Labor to Liberal-National Party.[134] Some limited information about grant recipients for Stream B does is available and appears to show that recipients are often subsidiaries of international companies.

Table 11: South Australian recipients of Green Car Innovation Fund grants

Company	State	Grant	Purpose
Toyoda Gosei Australia (rubber and plastic products) – closed 2015	South Australia	$2.3m	Lighter body sealing and safety products e.g. air bags
Hirotec Australia (stamping and assembly – fabricated metal products)	South Australia	$1.6m	Lighter automotive hoods and deck lids
SMR Automotive	South Australia	$2.4m	Lightweight automotive mirrors

Source: Public statements – details on 9 of the 10 suppliers funded under this program have been available publicly

Finally the Industry Capability Network (ICN – a joint initiative of the national and all State governments) has run for over 30 years and covers Australia and New Zealand. ICN is a hybrid demand-supply-cluster program. Through ICN companies can register to receive information about major infrastructure contracts. For suppliers, ICN helps find opportunities through a network of consultants located in each State and in New Zealand. For buyers, ICN helps major project managers comply with any Australian content requirements, tariff requirements and also to find local suppliers. ICN claims its database contains information on AU$290 billion projects and 70,000 suppliers.[135]

The ICN is also contracted by the Australian Government to administer the Supplier Access to Major Projects (SAMP) program. Established in 1997, SAMP provides funds for ICN to work with project developers to identify supply opportunities for appropriate and has more than $15.1 million for 147 grants.[136] While funding for SAMP has concluded, ICN is responsible for administering the remaining grants through to completion.[137]

ICN also offers a regional gateway which provides local councils with an online interface to call for tenders from local companies. In South Australia, ICN typically advertises projects in civil engineering and construction (e.g. solar farms, railways), mining (e.g. copper mine in regional SA), transport equipment manufacture (shipbuilding) and transport services (truck services for mine building).

Regional networks

No relevant programs.

[133] Australian Government (2011): Final Winners in Green Car Innovation Fund Announced, press release, 30 March 2011
[134] Porter, I (2011): *Dumping Green Car Fund Throttles Industry*, Drive, 3 February 2011
[135] Industry Capability Network (2017): *op cit*
[136] Industry Capability Network (2017): *Government initiatives* [http://www.icn.org.au/content/national/government-initiatives]
[137] *Ibid.*

10. ANNEX 4 – SA MANUFACTURING SUPPORT PROGRAMS

Programs are grouped according to the framework in Figure 12. Data on recipients was collated from Government media releases as the State government does not publish comprehensive lists of recipients. Hence the total number of recipients in these tables do not equal the total number of companies claimed as program recipients by the State government.

Business environment

The South Australian Micro-finance fund (Table 12) provided grants of up to $50,000 to develop ideas, with successful applicants receiving $2 of government funds for every $1 that they raise themselves (Table 12).[138] The program ran for two financial years (2014/15 and 2015/16) and has now been replaced by the South Australian Early Commercialisation Fund.

Table 12: Micro finance fund grants

Company	Purpose	Amount (AU$)
Arkwright Technologies Pty Ltd (optical fibre technologies for telecommunications – machinery and equipment)	To help commercialise fibre optic pressure sensing technology and establish a small-scale manufacturing facility	$50,000
Global Aquatica Pty Ltd (machinery and equipment)	To help test the feasibility of a pilot plant for its BioAqua technique to eradicate pollution caused by Acid Mine Drainage	$50,000
Paracombe Premium Perry (machinery and equipment)	To help install a small-scale fully automated bottling line, and to offer micro businesses in the Adelaide Hills access to small-scale bottling runs	$50,000
Seer Insights Group (technical services)	To help further develop its intelligent software system which assists vineyard staff, growers, and wineries to improve the accuracy of their yield estimates	$30,000
Fleet Space Technologies Pty Ltd (electronic equipment)	Engage technical specialists to complete prototype manufacture for low-cost internet connectivity in remote areas using tiny, low-cost satellites	$50,000
Flints of Coonawarra (beverage packaging)	To help prototype development for its unique, single-serve, dual purpose wine container	$50,000
Group Kinetica Pty Ltd (weeding device for agriculture)	To help further develop a prototype of its safe and environmentally friendly weeding solution	$48,667
INNOVO Healthcare	To help first batch local manufacturing of its U-Stand Frame mobility assistance device	$50,000
Vinnovate Pty Ltd (beverage packaging)	Bottle closure, being tested in collaboration with the Australian Wine Research Institute and wineries	$50,000

Source: Public announcements

The Venture Catalyst program, part of Manufacturing Works, offers grants of up to AU$50,000 to assist university students to start new business, and in doing so creates partnerships between established manufacturers and student entrepreneurs. The scheme only applies to students of the University of South Australia and the founding team must include at least one current student or recent graduate of the university.[139] While many recipients of funding have been developing software for service sectors,

[138] *New Fund to Support Entrepreneurs*, press release 25 March 2015
[139] Innovation & Collaboration Centre (2017): *Venture Catalyst*, http://icc.unisa.edu.au/venturecatalyst/ accessed January 2017

those funded include developers of micro-gas turbines, computer vision (used in food processing, for example), wine container closures, small batch beverage tonics and woollen apparel.

Supply side programs

R&D linkage programs

The Business Innovation Voucher Program is aimed at SMEs. Its primary objective is to reduce economic risks associated with building new relationships with external knowledge providers, viz. relationships between SMEs and public and private research providers to develop solutions to commercially identifiable problems.

Unlike the Manufacturing Technologies Program, it aims to help SMEs develop a full product through providing SME R&D projects with up to $50,000 to partner with R&D institutions or companies that provided research development and design services (e.g. technical research, design development, design validation, prototyping and process development). The SME must have an annual turnover of less than AU$200m and the SME must also provide some matching funds as cash or in-kind, the amount of which is determined by a sliding scale (more contribution for larger companies).

As at 2014, 44 projects had been given total funding of AU$1.45 million. Of these projects, 18 have been completed to date. Full information on grant recipients is not available, however some information has been collated from public announcements and access by supporting industries to these grants is shown in Table 13 (13 out of 17 grant recipients)

Table 13: SA supporting industry recipients of innovation vouchers

Company (position in supply chain)	Enhanced internal capacity	R&D partner	Grant Amount (AU$)
WBC Group (machinery and equipment)	Initial prototype to control typical electrical products such as lighting, and will be imbedded in the infrastructure during construction.	Flinders University	$50,000
WBC Group (electrical equipment – machinery and equipment)	Further develop a faster, simpler and safer wiring installation system	Private company	Not provided
Critical Asset Protection (software – ICT)	Software for specialised monitoring system	Private co.	$50,000
PRB Units Pty Ltd (machinery and equipment)	Vehicle immobilisation device		
Hardcore Diamond Products (fabricated metals)	Experiments with molten alloy infiltration for the production of specialised drill bits.	Uni SA	$20,000
Coiltek Manufacturing (machinery and equipment)	To help commercialise a product that will improve metal detector performance	Private co.	$30,000
Scholle Industries Pty Ltd (beverage packaging)	To develop a purpose built in-line carbonation system for Scholle's bag-in-box packaging technology, to produce a demonstration unit for sparkling wine	Australian Wine Research Institute	Not provided
SPS Aus International (beverage packaging)	To test a screw-top closure suitable for sparkling wine	Australian Wine Research Institute	Not provided
Ferguson Australia (food manufacturer)	Proof of concept samples to demonstrate the potential of high value new food	Flinders University's	20,000

	products, derived from otherwise discarded lobster components, for local and export markets	Centre for Marine Bioproducts Development	
The Common Sense Surf Company (polymers)	Designing a new organic surfboard wax designed to repel shark attacks.	Flinders University	$40,000
Dotti Enterprises (chemical products)	Development of DNA Guardian' crime deterrent system which uses a solution that is sprayed at the site of a crime	Australian Genome Research Facility	Not provided
Lifebelt Pty Ltd (automotive components)	To test a prototype seat and belt system that provides better restraint around the hips	APV Tech Centre	Not provided
Trident Plastics (polymers)	To develop a prototype for a plastic mesh for concrete reinforcement applications to replace existing steel mesh	Martelli Sons Pty Ltd	$40,000
Associated Electronic Services Pty Ltd (machinery and equipment)	Design and build equipment for automated analysis of almonds for quality control and classification	Laragon Pty Ltd	$20,000

Source: Compiled by author from Ministerial press releases

The Manufacturing Transformation Technologies Program provides funding for manufacturers to explore opportunities for adopting new and emerging technologies in additive manufacturing, advanced materials, advanced robotics and automation, photonics, digital technologies and big data analytics. The program acknowledges the role of research institutions in providing contract research services to industry and accelerating and broadening technology diffusion, while recognizing that SMEs have limited capacity to scan the environment for new technologies and then afford R&D institution services.[140] The program also recognises the need for RTO services to SMEs to be delivered as projects, prototypes and links to relevant experts.[141]

The program aims to, among other things, increase industry awareness of current and emerging manufacturing technologies that could deliver cost reduction, efficiency, productivity and innovation benefits leading to increased profits; increase the awareness of SA's research capabilities and equipment for industry and connect research institutions with industry to address industry needs and develop commercial solutions.

The program linked individual SMEs with research institutions to explore a problem specific to the company, by tapping in to specific expertise at a South Australian research institution:

- Photonics Catalyst program (laser and sensor technologies), at the Institute for Photonics and Advanced, Sensing, University of Adelaide[142]
- Big data analytics (Big Data Connect program), at the Data 2 Decisions CRC[143]
- Nanoconnect, delivered through the Flinder's University Centre for Nanoscale Science and Technology.

The research institution provided expertise within the known parameters of the technology, i.e. the projects were not conducting research they were applying existing knowledge in the technology to the

[140] Roos, G, Pike S and Kallioski, P (2012): *The Increasing Importance of Research and Technology Organisations in Global Innovation Systems*, presented at the SMS Special Conference, Globalisation of Innovation Strategies: Novel Moves for a Global Game, 7-9 June, Singapore, 2012

[141] *Ibid*, page 39

[142] https://www.adelaide.edu.au/ipas/pcp/

[143] Under the terms of the agreement with the State government, the CRC was only allowed to contribute the time of its SA-based staff to these projects

company's problem. The State government provided each research institution with funds to underwrite the cost of providing services to the SMEs. To be eligible for funding, the SME must be based in South Australia or form connections in the State, the project must be technically and commercially feasible, it must require the technical skills of the research institution and must actively engage the company, which must also contribute in-kind support.[144] The amount of support to be provided by each SME varied from university to university e.g. in the photonics program was AU$5000 in-kind, whereas at the Data 2 Decisions CRC the company pays for 50% of the cost.

Each research institution conducts its own marketing to companies to raise awareness and generate interest e.g. through briefing or networking sessions.

As at 2014, four projects had been accepted into the Photonics Catalyst Program, and 31 were being assessed, while 7 manufacturers had explored new opportunities in nanotechnologies through the NanoConnect Program. More recently, three companies have worked with the Data 2 Decisions CRC on big data.

The government has addressed potential for companies to work with research institutions in advanced robotics and automation, digital technologies and advanced materials by recently funding, with AU$1.2m, an Advanced Manufacturing Centre with the University of Adelaide.[145] The location of the centre in northern Adelaide is partly intended to provide better access to companies from the automotive sector based in that region, to help them diversify into different industries. Development of flexible machinery is an important input to both tools and machinery/equipment manufacturers and requires both new hardware and software, and greater skills in automation and programming.[146,147] Interviewees, however, noted that companies which were strong suppliers to automotive manufacturers generally lacked marketing and business development skills and were doubtful that a pure technology-access program would have the desired effect.

The Medical Technologies Program provides funds for companies developing medical devices to receive up to 250 hours of research for prototype development, proof of concept, product validation or evaluation plus market assessment. The program is a collaboration between industry, research institutions, end-users and government, and is based at Flinders University.[148] Projects have been focussed on development of machinery and equipment and include:

- Portable Post-Operative lower limb rehabilitation device;
- Ultrasensitive Hand Held Cancer Probe;
- Dental x-ray device integrating for a more targeted and faster x-rays;
- Low level dental laser therapy device to prevent dentin hypersensitivity;
- Qualitative assessment of a new bed frame to assist people in sit-to-stand transfers
- Modernisation of the SimTools - a suite of diagnostic tools that can be used on actors or basic manikins to provide simulated physiological information to healthcare students;
- Design and prototyping of Hydralert to provide real time measurements of urine specific gravity (an indicator of hydration) for the mining and construction sector;
- A new laryngoscope for AMNY Medical that would negate patients' neck extension for a linear airway access;
- Design and prototype of a new surgical instrument for bone graft delivery in spinal fusion;
- Proof-of-concept prototype for single person operation of a bag valve mask emergency ventilator;

[144] In-kind support is a common requirement for grants in Australia – it requires the company being able to provide, through perusal of its accounts, that a staff member has contributed a certain amount of hours at an agreed per-hour rate to a specific project

[145] New Tech Hub Opened in South Australia, 1 December 2016, http://www.manmonthly.com.au/news/new-tech-hub-opened-south-australia/

[146] Technavio (2016): *Global Machine Tools Market 2016-2020*

[147] Australian Industry Group (2016): *op cit*

[148] Department of State Development (2016): *Medical Technologies Program* [http://www.statedevelopment.sa.gov.au/industry/manufacturing/manufacturing-programs-and-initiatives/medical-technologies-program]

- R&D for a new 'rhythm map' tool to guide treatment for atrial fibrillation.

The Cleantech Partnering Program is focused on the development and application and environmentally sustainable technologies. It provides a total of AU$2.15 million program focused on assisting SMEs in moving clean technology related services, products and processes from either concept of early development through to market.[149] There were two types of grants available under the program: the CleverGreen Innovation Grant for commercial viability testing (up to AU$50,000); and the CleverGreen Commercialisation Grant for matched funding related to commercialisation activities (up to AU$100,000).[150] The successful applicant would be partnered with an expert organisation in the relevant field to assist with delivery of activities under the grant.[151] While applications for Round 6 of funding opened in early 2012, limited information is available on successful applicants to the Program beyond two examples which were not part of either food or automotive sectors and related supply chains. [152]

The Advanced Food Manufacturing grants program is designed to support partnerships and collaborations between SA food and beverage manufacturers (excluding wine) and R&D providers to commercialise research and develop new, or improved, food products or manufacturing.[153] The program provides grants of up to AU$100,000 for co-funded projects, are to be completed within 12 months, and are co-fund at the ratio of $1 for each $2 grant for businesses with turnover of up to AU$5 million and $1 for each $1 grant or businesses with turnover of up to AU$20 million. [154] The activity specifically focuses on projects that seek to develop: innovative and market-leading food products; high value food products for specialist domestic or international markets; use novel food packaging or perseveration technologies; or focus on sustainable food production through reduced waste or the optimisation of raw materials.[155] Preference is given to projects that can demonstrate the delivery of functional or luxury products.[156]

To date, two rounds of the Advanced Food Manufacturing grants program have been completed (Table 14). Round One awarded grants to nine projects, including AU$694,000 from the SA government and AU$542,000 from industry. Round Two awarded 10 grants, including AU$500,000 from government and $695,600 from industry.[157] Round 3 opened in June 2016 with AU$550,000 available from the SA government for co-funding projects, however no details are yet available on the latest round of recipients.[158]

[149] Claire Roberta (2012): *Cleantech Partnering Program – South Australia*, Australian Manufacturing, 1 August 2012 [http://www.australianmanufacturing.com.au/4908/cleantech-partnering-program-south-australia]
[150] *Ibid.*
[151] *Ibid.*
[152] Australia Business Financing Centre (date unknown): *Aldgate, SA Processing Plant Strives for Eco Innovation with $50,000 Federal Govt Grant* [http://www.australiangovernmentgrants.org/articleview.php?id=161&t=aldgate-sa-processing-plant-strives-for-eco-innovation-with-50000-federal-govt-grant]
[153] Primary Industries and Regions South Australia (2017): *Advanced Food Manufacturing Grants Program* [http://www.pir.sa.gov.au/primary_industry/industry_support/food_innovation/advanced_food_manufacturing]
[154] Primary Industries and Regions South Australia (2016): *Advanced Food Manufacturing Grants Program – Guidelines and Assessment Criteria*, Government of South Australia.
[155] *Ibid.*
[156] Primary Industries and Regions South Australia (2017): *Advanced Food Manufacturing Grants Program* [http://www.pir.sa.gov.au/primary_industry/industry_support/food_innovation/advanced_food_manufacturing]
[157] Primary Industries and Regions South Australia (2016): *Advanced Food Manufacturing Grants Program* [http://www.pir.sa.gov.au/primary_industry/industry_support/food_innovation/advanced_food_manufacturing]
[158] Primary Industries and Regions South Australia (2016): *Funding to Boost Food and Agribusiness Innovation* [http://www.pir.sa.gov.au/alerts_news_events/news/premium_food_and_wine/funding_to_boost_food_and_agribusiness_innovation]

Table 14: Grants from the advanced food manufacturing grants program

Company	Purpose	R&D provider	Amount
Round 1			
Solar Eggs (egg farm)	The research will be commercialised to increase the level of Omega 3 in eggs by incorporating selected natural plant oils into the diet of laying hens.	FOODplus (Uni. of Adelaide)	$150,000
Savannah Farm (livestock farm)	To develop a mobile plant that will provide small scale processing for local farms and food systems.	Not provided	$100,000
Natural Fractions (manufacturer of citrus ingredients)	To develop a fractionation system to recover natural components from essential oils for use in food products.	Oenology group (Uni. Of Adelaide)	$100,000
Tuckers Natural (crackers, snacks and fruit pastes)	To develop new and healthy snack products and packaging.	Not provided	$86,000
South Australian Cattle Company (beef production and retail)	To develop new production methods and create more export opportunities for its dry-aged Hereford Beef farmed on the Limestone Coast.	Research agencies in South Australia and Denmark	$75,000
Pangkarra Foods (cereals, legumes, hay)	To develop a range of products made from pulses grown on its farm.	SARDI	$66,500
Carème Pastry (pastry)	To diversify the Barossa Valley-based company and develop its gluten free pastry range.	SARDI	$66,400
Barossa Pizza (wholesale pizza producer)	To conduct testing and trials of a new frozen range of pizzas.	SARDI	$25,000
Robern Menz (fruit processing)	To perfect the recipes for a new range of snack products.	SARDI	$25,000
Round 2			
Fergusaon Australia (seafood processing and retail)	To deliver extracts from underutilised Southern Rock-lobster co-products through developing value-added extract from rock-lobster co-products for food flavouring and pharmaceuticals.	Mitani Products and Austanz Chitin	$30,000
Flinders Ranges Premium Grain (processed wheat)	To increase shelf life of whole grain cereals and pulse flour.	Uni of Adelaide and (TAFE SA)	$70,000
Fruitwise (muesli and fruit straps)	To develop a new range of products for a new range of seafood products in accordance with the Health Start Rating System.	SARDI	$25,000
Kangaroo Island Living Honey (bee products incl. soaps, candles)	To develop nutraceutical products using Kangaroo Island Honey and Propolis.	School of Agriculture, Food & Wine (Uni. of	$25,000

		Adelaide) and SARDI	
Kangaroo Island Shellfish (Oyster farm and processors)	To develop frozen pre-topped premium oysters, to reduce waste and increase oyster supply into regional areas.	SARDI	$20,000
Organic Raw and Trading Company (beverages)	To optimise production and scale of raw and naturally fermented Kombucha.	The Australian Wine Research Institute	$70,000
Potatoes South Australia Inc. (potato processing)	To transform underutilised potatoes into pure, nutritious, premium food products, targeted at the infant, elderly and convenience market segments.	FOODplus (Uni of Adelaide) and SAFCOL Australia	$100,000
South Australian Seafoods (seafood processing)	To develop a range of premium value-added mussel products, with extended shelf lives for domestic and export markets.	SARDI	$30,000
Uni of Adelaide (research school)	Develop novel grazing systems to achieve a supply of premium pasture-finished cattle during autumn and winter, resulting in cattle meeting premium standards and achieving higher value for South Australian Beef.	Teys Australia, Limestone Coast Beef producers, SARDI, Food & Forage, and NAS Agribusiness Naracoorte	$90,000
Willunga Pasta (gluten-free pasta)	To develop effective and efficient small-scale low temperature drying equipment for its unique high-value gluten free pasta.	Envirotec Group and Logifish Consulting	$40,000

Source: public announcements

Business capacity building – equipment/new customers

The Next Generation Manufacturing Investment Program was established to help businesses to invest in capital projects as a way of establishing or expanding high value manufacturing operations. The Program operates under the Growth Fund that was established to assist staff, businesses and the regions influenced by the closure of car manufacturing in Australia. It is focused on manufacturers in South Australia and Victoria. The Program is worth AU$90 million, with the SA government also having contributed AU$12 million to grants.[159] The Program provide grants, worth between AU$500,000 and AU$2.5 million to cover up to a third of an eligible projects costs, to be implemented over a period of up to three years.[160]

To be eligible, projects must be focused on activities including the procurement of new machinery and equipment, expansion of current premises to accommodate the new machinery and equipment, and to training staff in the use of the new machinery and equipment. The project costs must be of at least

[159] Australian Department of Industry, Innovation and Science (2017): *Next Generation Manufacturing Investment Program* [https://www.business.gov.au/assistance/next-generation-manufacturing-investment-programme]
[160] Australian Department of Industry, Innovation and Science (2016): *Next Generation Manufacturing Investment Programme Factsheet*

AU$1.5 million, be located in South Australia or Victoria, and not result in the movement of business away from those States.[161]

The Business Transformation Voucher Program aims to accelerate advanced manufacturing. It provides funding to promote diversification, process improvement and innovation. Vouchers are awarded on a competitive basis to existing firms that have been operating for longer than 12 months. The Business Transformation Voucher program has lifetime budget of AU$4.5 million over four years.[162] As of July 2016, there had been 64 successful applicants to the Business Transformation Voucher Program (Table 15) outlines a publicly-accessible selection of these firms. As a note, in March 2016 the incumbent SA government claimed that an absence of Commonwealth funding has stalled progress in the program.[163]

Table 15: Business transformation voucher program grants

Company	Purpose	Amount (AU$)
Enzo's at Home with Colby Industries (restaurant)	Maximise existing processes and identify alternative energy sources for cooking.	$50,000
Panda Honey with MerchMiner Trading Pty Ltd (food manufacturer)	Identify production any issues and improve efficiencies, and identify new plant and machinery	$50,000
Stair Lock Pty Ltd with Mechvac Engineering (wooden products)	Cost effective solution to consolidating all of the company's operations at one site	$50,000
Bowe Pty Ltd with PM Precision (food products machinery)	Identify the best means of unloading and sort raw materials to minimise waste.	$50,000
IPC Granite Pty Ltd with Sage Automation Pty Ltd (Marble, granite and engineered stone products)	Analyse and review manufacturing and test new-crossing cutting, high-tech equipment	$50,000
Sunfresh Salads with Manufacturing Focus (food manufacture)	Review and analyse a proposed upgrade to facilities.	$35,000
Micromet with Dadongwu (water and wastewater treatment products)	Develop and implement a marketing and brand strategy for Australian and international markets	$26,000
WBC Group Pty Ltd (electrical apparatus and equipment)	Not provided	Not provided
Huntsman Chemical Company Australia Pty Ltd (manufacturer and marketer of chemical products)	Not provided	Not provided
Williams Metal Fabrications Pty Ltd (metal fabrication specialisation in mining, civil and construction industries)	Not provided	Not provided
Precise Advanced Manufacturing Group (vertically integrated manufacturing company)	Not provided	Not provided
Mitolo Group Pty Ltd (potato and onion packing company)	Not provided	Not provided
Techno Plas Pty Ltd (manufacturing through injection moulding)	Not provided	Not provided
Smart Fabrication, Quality Plastics & Tooling Pty Ltd (plastics manufacturing)	Not provided	Not provided

[161] Australian Department of Industry, Innovation and Science (2017): *Next Generation Manufacturing Investment Program* [https://www.business.gov.au/assistance/next-generation-manufacturing-investment-programme]
[162] Kyam Maher (2016): *$150,000 to help local businesses transform*, Press Release, 23 June 2016
[163] Tom Richardson (2016): *Weatherill blames Feds for abandoned policy pledges*, IN Daily, 8 March 2016

Street & Park Furniture Pty Ltd (street furniture production)	Not provided	Not provided
Tucker's Natural (producer of crackers and biscuits)	Not provided	Not provided
Munns Lawn Company (law seed, lawn care and garden care product supplier)	Not provided	Not provided
Riviera Bakery (bakery good producer)	Not provided	Not provided
Prancing Pony Brewery (brewery)	Not provided	Not provided
Haigh's Chocolates (chocolatiers)	Not provided	Not provided
Mitchell & Cheesman Pty Ltd (toolmakers)	Not provided	Not provided
Udder Delights (food producer – cheese)	Not provided	Not provided
Jedmar Pty Ltd (food producer – dried fruit, vegetable and soap products)	Not provided	Not provided
Gelista (food producer – gelato)	Not provided	Not provided
B.-d. farm Paris Creek Pty Ltd (food producer – diary)	Not provided	Not provided
Jurlique International (skin care products)	Not provided	Not provided
Maggie Beer Products (food producer)	Not provided	Not provided
Peats Soil & Garden Supplies (supplier of garden products)	Not provided	Not provided
Sturm's Mechanical Engineering (glass and glazing work contractor)	Not provided	Not provided
Moose Industries (agricultural sector equipment)	Not provided	Not provided
Cronin Fabrication Pty Ltd (wired goods, sheet metal and light fabrication manufacturer)	Not provided	Not provided
Electrolux (home appliance supplier)	Not provided	Not provided
Sentek (soil water and salinity measurement products)	Not provided	Not provided
4 Ways Fresh (fruit and vegetable producers with national dissemination network)	Not provided	Not provided
Moo Premium Foods (food producer – dairy)	Not provided	Not provided
Australian Fashion Labels (clothing manufacture)	Not provided	Not provided
KJM Contractors (accommodation and hire, logistics and maintenance and construction)	Not provided	Not provided
Kennewell CNC Machining (machine sales)	Not provided	Not provided
Krix Loudspeakers (manufacturers of home entertainment and commercial loudspeakers)	Not provided	Not provided

Detmold Holdings (manufacturer of paper and board based packaging products)	Not provided	Not provided
The Green Dispensary (pharmacies)	Not provided	Not provided
Ferguson Australia (food manufacturer)	Not provided	Not provided
Goolwa Pipi Co (food producer - seafood)	Not provided	Not provided

Source: Compiled from public statements[164]

Automotive Suppliers Diversification Program (ASDP) offers funding of up to AU$11.65 million from 2013-14 to 2017-2018 to support eligible automotive supply chain companies to diversify their business in order to secure new and sustainable sources of revenue in domestic and international markets, including from customer segments outside automotive equipment.[165] The Automotive Suppliers and Competitiveness sub-program funds services and mentoring for low cost and low risk projects up to a value of AU$15,000 per firm whereas the Retooling and Diversification sub-program provides direct funding for re-tooling.[166] Funds can also be used to form alliances and strategic partnerships.[167] In April 2016 the State government announced that funding under the scheme would be refocused towards companies aiming to supply to shipbuilding, because of the announcement nationally that the French company DCNS had won an Australian government contract to build 12 submarines in Adelaide.[168]

Table 16: Recipients of Automotive Supplier Diversification Grants

Company	Purpose	Amount	New target
Sonnex (engineering and steel fabrication – fabricated metal products)	Business coaching and mentoring, international quality management certification and new laser cutting and robotic handling equipment	$417,500	Defence
Trident Plastics (SA) (supplier of engineering and industrial plastics)	New tooling for new plastic products	$0.5m	
ZF Lemforder Australias (manufacturing of motor vehicle parts and accessories)	Development of innovative bulk goods transportation solutions, including pneumatically-operated side tipping technology.	$0.5m	
Australalloy (manufacturing of super duplex, duplex, austenitic, martensitic and ferritic stainless steel castings)	Larger copper castings for operational trials at the Olympic Dam mine.	$0.08m	Mining
Blown Plastics (plastic moulding for manufacture of diverse range of plastic good products)	State-of-the-art moulding equipment	$0.5m	Medical

Source: public announcements

[164] Andrew McLachlan (2016): *Business Transformation Voucher Program*, Briefing Room, 27 July 2016 [http://andrewmclachlan.com.au/question/business-transformation-voucher-program-2/]
[165] South Australian Government (2016): *Automotive Supplier Diversification Program*, Government of South Australia, [http://www.statedevelopment.sa.gov.au/industry/automotive/asdp].
[166] Maher, K (2015): *$1 million in grants to help auto supply companies diversify*. Press release 8 September 2015
[167] Department of State Development (2016): *South Australia Automotive Suppliers Diversification Program Guidelines*, January 2016
[168] Starick, P (2016): *$50bn future submarines to be built at Osborne, Adelaide, by French Firm DCNS*, The Advertiser, 26 April 2016

Business capacity building – skills

The SME Innovation Capacity Program (also referred to as Business Model Innovation program) has provided 60 companies with access to targeted training from globally recognised experts in business transformation, including developing customer insight, new business models and new revenue sources from service offerings to increase profitability.

The program is delivered by the Australian Industry Group (AIG), an industry association which has many manufacturers as members. Companies are charged AU$4,000 and receive rebate of $1,000 from the government on completion of the training.[169] They must send their CEO and up to another 3 members of their senior team to a training course where they spend several days analysing their business model, working out the challenges and determining whether it needs to be left "as is", slightly changed or entirely rebuilt – the final stage of the course included the rebuilding as required. According to interviewees, participants have included a number of companies in the tooling, components, cast metals and food sectors. No detailed information is published on grant recipients but AiG has provided a list of recipients for analysis.

The Customer Led Innovation Program aims to train businesses to develop new approaches to transforming their products and services by better understanding their customers' needs. It takes the form of a series of a course offered to senior management representatives of participating firms, and companies pay for their own participation.

The Manufacturing Thought Leadership Network is made up of experienced executives. Its aim is to maximise the number of businesses and managers exposed to learning about higher performance manufacturing. The topics covered in the network are business strategy, innovation, global value chains and high performance workplaces.

Demand side programs

Government as customer – Small Business Innovation Research

This program assists companies to undertake research, develop solutions and products to meet a government agency's needs and ultimately commercialise the solution more broadly and is one of the major demand-side programs of the South Australian government. A total budget of AU$3 million over three years was announced to commence in 2014-15.

In November 2015 the government called for proposals to develop Bimodal Electric Tissue Ablation (BETA) technology for development of a custom-built BETA generator and integrate into existing monitoring probe/probes (electrodes) that will result in safer and more precise removal of tumours.[170] The first phase was to provide up to $100,000 to each of five SMEs for development and proof of concept activities, to be followed by a development phase of more intensive research and development (R&D) and detailed product development. To be eligible companies must either be based in SA or, if outside SA, must undertake 80% of the work under the project in SA.

The South Australian State Emergency Services (SES) announced a call for proposals under this program in September 2014, to develop an electronic responder check-in system with tracking capability. The aim is to develop a tool or tools to track resources, including personnel, preferably in real-time, to provide current information to support the safe and effective management of resources at emergency events. According to the SES, five companies received funding for Phase 1 and two companies were selected for Phase 2 but for various reasons, these projects did not progress.

Other customers

The Mining Industry Participation Office aims to develop the capacity/capability of SA business to become 'resource-sector ready'. No information about the results of its activities is available publicly. The overall objective is to establish South Australia as a mining services hub for the nation, through a

[169] Australian Industry Group (2016): *Business Model Innovation Program 2016 flyer*
[170] Department of State Development (2014): SA Small business innovation Research Pilot Program Guidelines, July 2014

series of initiatives including development of a roadmap for the oil and gas industry, development of a minerals and petroleum service centre of excellence, and development of an advisory council.[171] The State government, through the Mining and Petroleum Services Centre of Excellence, provides small grants that build links between local suppliers and mining customer and hence also has strong regional clustering activities (Table 17).

Table 17: MIPO-brokered projects

SA company	Partner	State government grant (AU$)	Industry contribution (AU$)	Purpose
IMP Technologies (machinery & equipment)	BHP, MSP Hallett, Kelsey Engineering	$136,000	$1,140,000	Development of superfine crusher for global markets
Multiple SA suppliers	BHP Billiton and Mining CRC	$80,000	$690,000	Battery-electric derivative for light vehicle

Source: Goiak, P (2015): op cit

Regional networks

The Competitive Foods Initiative, which was completed in 2015, aimed to help develop smart food clusters (that encourage collaboration between firms) and to encourage the application of new technology and innovation in food and beverage manufacturing. The program was run in partnership between the Department of Primary Industries and Regions SA and Food SA.

The Internet-of-Things Resources Cluster administered by AIIA on behalf of the State government is part of Mining cluster initiative and is serving to link manufacturing and ICT suppliers with demanding customers in the mining industry (see above). The State government has funded a manager within the AIIA to build research and development consortia with the mining industry, and with universities.

According to interviewees, AIIA runs technical events and working groups which are addressing key issues for the mining industry – real-time machine and sensor integration, fleet operations monitoring, real-time alerts, plant dashboards, logistics and quality monitoring, ore-grade sensing and predictive analytics – coming together to discuss potential projects. The projects are strongly demand-driven with the problems put forward by the mining companies. While half the participants in the network are based outside South Australia, the approach aims to push South Australia forward as a place to do business for large international companies. The network currently comprises 900 people with 90 people regularly attending events on behalf of 60 companies. Effectiveness is measured by the value of contracts signed and jobs created or retained but there is no public information on details.

[171] Goiak, P (2015): *Mining Industry Participation Office* – presentation to South Australian Resources and Investment Conference, 14 April 2015

11.ANNEX 5 – ALIGNMENT OF MANUFACTURING WORKS PROGRAMS WITH GOVERNMENT OBJECTIVES

This Annex summarises how the programs in Manufacturing Works align with the main objectives announced by the Government following the program's launch.

Table 18: Summary of SA Government Programs for Manufacturing

Program	Mechanism	Business innovation	Enhance skills	Future markets	Address infrastructure & policy gaps
Manufacturing Business Innovation program	Skills development through training	✓	✓		
Customer led Innovation Program (CLIP)	Skills development through training		✓		
Innovation Voucher program (IVP)	Funding for collaboration between manufacturers and researchers	✓			
Business Transformation Voucher Program (BTV)	Funding for business diversification, process improvement and innovation, esp. for advanced manufacturing	✓		✓	
Small Business Innovation Research Pilot	Help small businesses develop products for use by government			✓	✓
Manufacturing Technologies	Adoption of nanotechnologies and photonics	✓			✓
Cleantech	Development of environmentally sustainable technologies			✓	
High Performance Workplaces	Online self-assessment tool	✓	✓		
Venture Catalyst	Seed funding for new businesses	✓		✓	
Manufacturing Leaders' Network	Practical pathways to higher performance		✓		
GRANTAssist	Web-based grant searching interface				✓
Medical Technologies	Research and market assessment			✓	

	for development of medical devices				
Cellulose Fibre Chain Study	Roadmap for forestry industry			✓	
Mining Industry Participation Office	Develop capacity for manufactures to sell to resource sector in SA (cluster)			✓	
Competitive foods Initiative	Smart food cluster			✓	

Source: Frost and Sullivan, op cit