

CO-CREATE & INNOVATE

Report on key factors in innovation and productivity in Australian manufacturing small and medium enterprises.

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“THEY ALWAYS SAY TIME CHANGES THINGS, BUT YOU ACTUALLY HAVE TO CHANGE THEM YOURSELF”

– ANDY WARHOL

We illustrated the various pages in this report with photographs of Sydney’s Cockatoo Island, a place that has continually been in transition. Best known as a once vibrant hub in Australian marine manufacturing, changing conditions have seen the island adopt other functions. We think this ability to adapt is fitting for the challenges faced by Australian manufacturing today.

EXECUTIVE SUMMARY

The economic context of the manufacturing sector in Australia is under threat. In order to sustain its productivity and to make sure that manufacturing remains a strong pillar of our economy, we have to come up with new solutions, new products, and new services to remain globally competitive.

Small and medium enterprises (SMEs) account for a significant proportion of the manufacturing industry within Australia, and these enterprises face different challenges in comparison to a large enterprise. Therefore, studying the factors that affect innovation in SMEs becomes an important topic to inform the discussion on Australian industry productivity.

This report outlines the core findings and recommendations of a research project conducted at the University of Technology Sydney. This research was supported by the Department of Industry, Innovation and Science and highlights the antecedents to innovation in Australian manufacturing SMEs. It provides an understanding specifically of how technological change (that is, technological development external to an organisation) impacts the firms internally in relation to their product and process innovations.

We found that to transition to new innovative solutions in a high cost economy like Australia, general education of the workforce and the organisational culture of an SME is very important. Ideally the culture is such that new ideas are supported and encouraged by an organisation's upper management. In other words, the culture should encourage innovative activities across various layers of the organisation. In addition, we argue for co-creation with customers as a driver for innovative activities. Co-creation in this report is defined as an iterative, dialogic process of shaping customer requirements and potential solutions to be manufactured and services to be delivered, including any refinements and cycles of feedback inherent to the collaborative process.

Alongside manufacturing, other sectors such as education will also be affected by changes in the manufacturing landscape. For example, the demand for new skills needs to be met to address the employability of its people.

In this report, we shall highlight several industry recommendations:

1. Find opportunities outside traditional markets

Companies that look for new opportunities across different industries were found to be more innovative and profitable. Such opportunities include the applicability of expertise and capabilities to areas previously not considered.

2. Understand customer needs

Identifying customer needs before products are produced helps a company to understand where its customers need solutions and whether the supplier (SME) has the capacity to provide such solutions based on its capabilities.

3. Understanding quality requirements

Quality of a product should be determined through the perception of a customer rather than a supplier. When a customer wishes a particular quality but is not willing to pay the quoted price, the company needs to realign its goals with those of its customers and look for the best solution.

4. Creating a culture to develop new ideas

To explore customer needs and find opportunities the SME needs have a culture to support customer-centric manufacturing. This support is dependent on the owner or the upper management creating an environment where employees can generate new ideas and openly communicate those ideas.

5. Training expenditure and education

To progress and challenge the existing norms both training and education are important for SME managers and employees, so that new thinking to address existing or new problems is welcomed to encourage and support innovative activities.

6. Adapting continuously to external changes in technology.

SMEs need to adapt continuously to changes in technology. Businesses that did so were seen to be both more profitable and innovative than others. Resilience in the face of change stems from an organisational culture supportive of its continuous change and development.

7. Collaborate to exploit new markets and ideas

Embracing collaborative networks may allow a SME to develop globally, implement new ideas, and explore new markets.

8. Different approaches to produce products

An example of a strategy which uses a different approach to manufacturing is to design high-end products in Australia, using Australian resources, then manufacture outside Australia and import the finished product to sell to Australian consumers.

1

INTRODUCTION & OBJECTIVES



1.1 Understanding Productivity

Productivity growth is certainly on the economic policy agenda within Australia, alike most governments in the developed world, and it has been proposed as a major part of strategies to close the growth gap between the world's developed and developing economies (Sachs, McArthur, Schmidt-Traub, Kruk, Bahadur, Faye & McCord 2004). Globalisation has contributed strongly to this trend. The Australian manufacturing sector has been transitioning for various decades, as it has been affected over the years by lower tariffs, changing technology, and outsourcing of tasks to offshore low cost production economies. The share of manufacturing in the GDP as well as employability figures measure the impact of this transition.

Within the last twenty years, the manufacturing sector has shifted from comprising 14% of gross value added (GVA) ¹ in dollar terms across the economy in 1992 to under 7% at the end of 2014. The manufacturing sector was the biggest contributor to employment in 1990, its contribution was around 14.6 per cent. However, this contribution saw a downward trend but less dramatic in comparison to GVA within the 25-year period (1990-2014). Its current (December 2014) contribution was 7.9 per cent of the total employment. The total manufacturing employment is still higher than other sectors such as education, mining, electricity, waste water, information media and telecommunications, agriculture, and financial services. Although the mining sector was one of the sectors that contributed the most towards the GDP, it employed only about 2 per cent of the total Australian population. In the 1990s, mining contributed 1.2% to employment. Similarly, the percentage of people employed within the financial and insurance sectors was 3.6% at the end of 2014, falling from a high of 4.8% at the end of the 1990s. The employment share for the mining, and financial and insurance sectors were much lower than their respective contributions to GVA. The

agriculture, forestry, and fishing employment share has also been decreasing over this period, probably due to development of engineering services and the new machinery in this sector. The employment data suggests that manufacturing still has a significant role within our economy, with a hope that if the manufacturing contribution turns around and increases it can benefit the Australian economy.

Both Borland (2011, p. 193) and Gittins (2014) shed light on how a change in the geographic location has affected manufacturing in Australia. For instance, Gittins (2014) provides an account that 70 per cent of manufacturing employment was from New South Wales and Victoria in 1984 and in 2014 it is 58 per cent, where both the states have equal share (29 per cent each). The share of both 'mining states,' Western Australia and Queensland's manufacturing employment share rose to 10 and 21 per cent respectively in 2014, while South Australia's share fell to 8 per cent. This means that the share of the manufacturing employment has evened out over the period, making different states less dependent on the manufacturing sector and more on others. This does not mean that manufacturing is not important: as seen, the output of the goods has not fallen much. This is due to automation: fewer workers produce similar output.

Gittins (2014) argues that the manufacturing decline may not be a new phenomenon for Australia by suggesting "*the end may not be nigh*." To support his argument he emphasises that previous literature often explains the decline of manufacturing by an increase in share of the other sectors of the economy, especially services, rather than a decrease in the production of manufacturing goods. Thus having a closer look at the labour productivity index for the manufacturing sector suggests manufacturing production per worker has not decreased, indicating manufacturing in Australia "*still has a future*". Figure 1 shows the labour productivity performance of the manufacturing sub-sectors over the same 1990-2014 period (setting the index value in 1990 to 100).²

¹ Australian Bureau of Statistics (2014c)

² Australian Bureau of Statistics (2014a, 2014b)

While labour productivity is clearly subject to regular fluctuations in all sub-sectors, Panel D indicates that a consistent upward trend is evident in the metal products sub-sector and the machinery and equipment sub-sector. There is a significant productivity jump in the non-metallic minerals sub-sector after 2002, while the textile, clothing and footwear sub-sector, the printed and recording media sub-sector, the wood and paper products sub-sector and the food beverage and tobacco sub-sectors all indicate periods of labour productivity growth. The worst performing sub-sector was the petroleum, coal, chemical and rubber sub-sector which showed virtually no increase in labour productivity right across the 1990-2014 period (see Panel C). It is interesting to observe that the machinery and equipment sub-sector performed strongly in terms of both its production and labour productivity levels over the 1990-2014 period. These figures suggest that sections of the manufacturing sector have the potential

to perform more strongly than popular perception of the sector as a whole might indicate and that exploring innovation possibilities within the sector might provide an indication of the likely future of Australian manufacturing.

Although Australia has traditionally been home to a number of large manufacturing firms, small to medium enterprises (SMEs) collectively make up a significant proportion of Australia's manufacturing capability. Any policy designed to increase productivity in Australia's manufacturing sector, would thus benefit substantially from attention to manufacturing SMEs. Enhancing productivity in this sector depends crucially on understanding how it functions, what drives productivity improvements at the SME level, and whether the factors that drive productivity in manufacturing SMEs are the same as in other sectors of the economy, or whether there are particular factors that are unique in this respect.

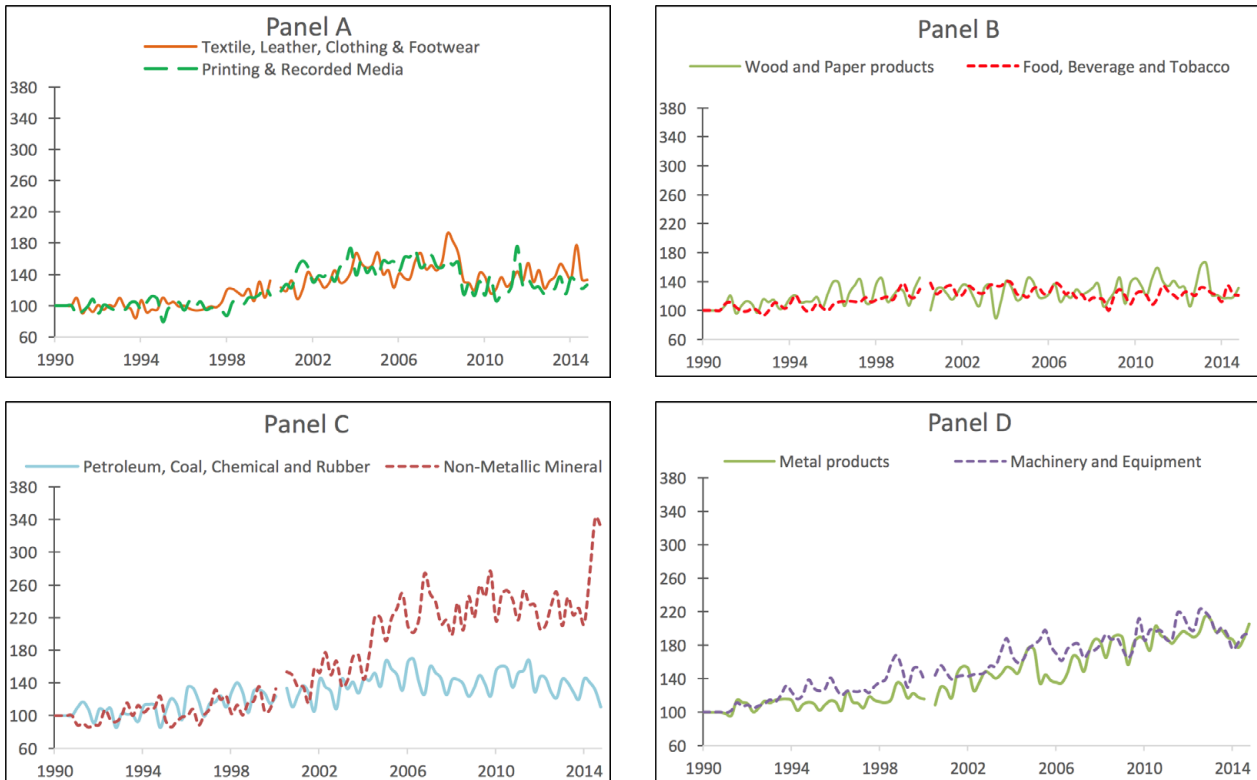


Figure 1. Labour Productivity Indices for Manufacturing sub-sectors – 1990-2014.

Source: Australian Bureau of Statistics, Cat. No. 5206.0, Australian National Accounts: National Income, Expenditure and Product, Table 41 - Indexes of Industrial Production, s.a. Cat. No. 6291.055.003 Labour Force, Australia, Detailed, Quarterly, Table 04 - Employed persons by Industry, s.a.

1.2 Why focus on innovation?

A vital connection between productivity growth and innovation has been articulated in various studies. Innovation can be defined as ‘the creative application of knowledge to increase the set of techniques and products commercially available in the economy’ (Courvisanos 2007). Innovation means the introduction of a novel product or process into a market, which affects other products and the market share of competitors. In the Schumpeterian view this was described as creative destruction of innovations through the formation of new combinations and destruction of old concepts. Creative destruction means that any unexpected change in the internal or external factors in an economic system, described as a structural change, affects innovative activities. The two main components of structural change focused on by the Schumpeterian view were technical progress (or technological change) and competition that belonged to the supply side. Later, Pasinetti (1981) argued that both supply and demand are important for innovative activities undertaken in an economic system and hence consumer demand was also considered to be a part of structural change. While the importance of customers has since been widely recognised, Rogers (2003) reaffirmed that innovation within an organisation is dependent on how knowledge gained externally diffuses within the firm.

Jones (1998) points out that high rates of economic growth are a recent historical phenomenon essentially inaugurated by the industrial revolution with innovations such as the Spinning Jenny, the steam engine, and the power loom which significantly increased labour productivity and thus economic growth. This suggests that fostering innovation is an important precondition for lifting productivity performance. Thus, when an important objective of Australian economic policy is to lift productivity growth, enhancing innovation should be an important dimension of the policy framework.

1.3 Objectives of the report

Our research was undertaken to understand why and how Australian manufacturing small and medium businesses (SMEs) innovate. We focused on interactions between external and internal factors on innovative outcomes and built on earlier research efforts that studied those factors in isolation. Our insights informed the recommendations in this report.

1.4 Our approach

The evidence collected to inform the findings of this report comes from ABS data (i.e., 2014a, 2014b, 2014c), and primary research with Australian manufacturing SMEs. ABS data was used to assess the trends and current situation of the manufacturing sector in relation to GDP and national productivity. This data was also used to calculate a measure of external technological change to understand its direct on innovation as well as its indirect impact on innovation via interactions with factors internal to businesses. A questionnaire-based survey was conducted Australia-wide among SMEs culminating in 74 usable responses. The survey was based on previous studies covering antecedents to innovation, and was further strengthened with four case studies chosen from the respondents. The four cases from metal and machinery manufacturing industries were chosen based on the innovation performance accounted through the survey, and number of employees such that a wide variety of factors can be gathered that affect innovation in Australian metal and machinery sectors. While there are a number of factors that contribute to innovation, this report specially focuses on measures that would lead to improvement between maintaining a balanced culture, importance of employees’ and managers’ general education, and co-creating with customers at a firm level. We suggest policy measures that could provide much needed support to the Australian manufacturing sector.

Recommendations have been developed based on the data collected through survey responses, interviews, and documents collected from the four case studies, and are based on the perceived impact on the four businesses studied. We have consciously avoided assessing impact and potential costs and benefits of the recommendations in quantitative terms. This report offers steps forward for all parties that must be fully considered before being acted upon.

2

FINDINGS

Through this study, it became clearer that competing with offshore companies that are able to produce high volume products at low prices is difficult for Australian manufacturing SMEs.

To survive in a competitive market different strategies are needed where the focus is not limited to creating customer value. This focus should include looking for different opportunities across various sectors and adopting new technology.

2.1 Benefits of customer co-creation to improve innovation within SMEs

Customer co-creation was the best alternative available to these enterprises to survive in the market. Given that competition between SMEs within Australia was found to be price competitive, SMEs ought to look at their capabilities to help them innovate. In our cases, embracing co-creation came with a change in one's business model, which in turn became an essential component of innovation for these companies. Co-creation was seen as important strategic part to gain customers. What differentiated some cases from others was the manner in which co-creation was embraced within an enterprise. We identified several common characteristics in these SMEs that can be applied to a wider range of enterprises.

Creating customer value: Adding value to products and services; this means value as recognised by customers and for which they, the customers, are willing to pay a premium price. Customer-oriented value is something that manufacturing SMEs have to think about, as opposed to value from their own perspective. As customers are identified as an important link in the supply chain, identifying their problems and designing products based on their needs is much needed and can lead to innovative outcomes.

Building on ones capabilities: It was found that customer value could be created if an SME built on its capabilities. Clearly knowing one's organisations' capabilities and how these differ from competitors helped the interviewed companies to not only have a clear strategy but also helped these SMEs to look for opportunities across different sectors based on their strengths. That is, their strengths can transcend current limits in the business model and operations.

Overstated quality requirements: It was found that

the quality of a product should be determined through the perception of a customer rather than a supplier. During interviews we started to uncover that the quality demanded by a customer meant meeting the customer's required product or service standards at a particular price. Quality measurement as found by many companies was seen as reduction in error rate etc. This measure is effective, however if a customer wishes a particular quality but is not willing to pay the quoted price, the company needs to realign its goals with those of its customers. In those instances they should look for the best solution and try to realign its definition of quality, before letting customers go to competitors. Although practically this might present many challenges, a hands-on approach, and trying to decrease production costs whilst maintaining quality and creating value, should be the preferred approach of an SME.

Change of the business model: Close examination of the metal and manufacturing SMEs suggests that exploring customers' needs helped these SMEs to create innovative products and services and more importantly innovate their business models. A unique strategy adopted by one of the case studies was that they acted as importers to secure domestic work. They designed their high-end products in Australia, used Australian resources, exported the source components to another country, manufactured them according to Australian standards, and then import the finished products to Australia to sell to Australian consumers. They believed that it was still an Australian made product, because it was designed using Australian components and labour, and documented and used in Australia for an Australian project. Such an approach can work as a mechanism for high end manufacturing businesses. Moreover, customers seemed to place more trust in imported products and often did not value Australian skills and capabilities.

2.2 Finding opportunities across different sectors and industries

Finding opportunities across various industries could be done with the assistance of online information to start investigating opportunities. Most importantly, looking for global opportunities and travelling to meet people situated at various parts of the world, to gain work and maintain customer relationship was considered to have a positive influence on both profitability and survival of the business. Finding opportunities across different sectors was contributed to by customer feedback, and collaboration with other enterprises with the assistance of online technology.

Customer feedback: This is probably the most important step, which relates to both customer co-creation and finding opportunities and relates to building of relationships with customers. For example, this can be done by regularly meeting them in person or calling via Skype or phone to gain valuable customer feedback on an SME's products and services. Such feedback also provides valuable references when exploring other opportunities and help to gain an understanding of the needs of its customer. Although stated numerous times within businesses, it was found that some SMEs still thought their ideas and understanding of customer needs were better than the customer itself.

Collaborate to exploit new markets and ideas: One feature lacking in most of the manufacturing companies was collaboration. The isolation which these companies perceive, where they feel "every man is for himself" while fighting the global competition, means that a change

in collaborative practices is much needed. Embracing collaborative networks to develop globally, implement new ideas, and explore new markets can be given a new look. While exploring outside a company's traditional market is considered a challenge, such a challenge may be overcome through global collaboration with other companies such that different markets abroad can be exploited. Indeed, some Australian SMEs have initiated collaboration with overseas companies, capitalising on online communication tools to establish contacts as found in the example below. They were found to be successful not only in innovating but also in increasing their profitability.

2.3 Adapting to technological change

The cases in this study originated from metal and machinery manufacturing. It was seen that with the end of the mining boom in Australia, this sector had to think outside the box in order to get their capabilities adapted to the new situation and newer technology. Thus it was found that changes in technology could have both positive and negative impact for the Australian manufacturing sector, including metal and machinery.

The quantitative survey results suggest that technological changes such as 3D printing started to impact various businesses. Those businesses that diversified and adapted to the new technology, invested in developing the organisation's skills in the same, were starting to regain their confidence and acquire new customers. Technological change in this case was likely to both destroy old skills of the people and create demand for the new ones.

Case study example

A small business incorporated in a backyard shed in New South Wales grew from 2 to 14 employees from 1996 to 2014. This business found opportunities when several changes in the policies around health and safety were introduced in Australia. Currently they are expanding into European markets and investing in gaining European patents for their product. As a result of its online presence, a Danish company has recently approached them with a proposal to collaborate and conquer European markets. The proposed collaboration includes off-shore design (i.e., in Australia) and manufacturing of its products with the Danish company to save on freight costs, a tangible benefit considering the heavy weight of the machines.

Another project by this company involves collaborating with a Hong Kong company, where they import from them, document the product based on Australian standards, and finally supply them to Australian companies.

Both of the above examples have been recent changes as they changed their business model, led by an agenda focusing on understanding customer needs and trying to overcome challenges related to expansion.

The other affect was seen by technology enabled transformation where customers' access to the global markets meant the resultant price competition was affecting Australian business. The disadvantage was that companies started to lose their market share to offshore companies. However, the advantages of easier access to global markets include improved potential to find potential customers and global collaborative partners, as seen in the example to the left.

Most importantly it was found that the effects of external technological change was dependent on choices made by managers rather than the technical factors per se.

2.4 Striking an appropriate balance within organisational culture

Exploration of customer needs, finding opportunities, and adapting to the changes in technology cannot be ensured unless SMEs have a culture to support customer-centric manufacturing. This support is dependent on the owner and/or upper management and their ability to create an environment where employees can generate new ideas and openly communicate those ideas (Boedker et al., 2011; Green et al., 2011). Trusting the judgement of employees helps a firm create an atmosphere to promote and develop new ideas. Such a culture requires flexibility both by the SME owners and their employees in a changing environment. We also concluded that sometimes having a family-like culture can restrict innovative ideas. Thus having a good balance in providing employees with freedom to innovate and challenge existing practices, while providing support and having a community-like culture, could help companies to not only innovate, but also come up with more effective ways of promoting their organisation.

Similarly striking an appropriate balance between formal meetings (e.g., every morning, monthly, or set toolbox meetings) and informal communication (talking with ones colleagues' individually on work issues) was seen as an important mechanism that stimulates the development and generation of new ideas. Hence, organisational culture affects and can contribute towards innovative activities.

2.5 Training expenditure and education

To progress and challenge the existing norms both

training and education is important for SME managers and employees. A culture in which education and training is promoted so that new thinking to address existing or new problems is welcomed is important for encouraging and supporting innovative activities.

Quantitative analysis suggest education is a very important factor driving innovation across both types, product and process, for the firms responding to the survey described in this thesis. This is particularly true of the general education of firm managers which is statistically significant and positive for innovation outcomes across the full range of models reported above. But education positively enters the determination of innovation in number of ways not simply via this one important channel. It seems, however, that business education is not particularly important in this respect. In contrast to this is the finding that for process innovation, employees' management education did appear to mediate the effect of technological change on innovation, which lends credit to the idea that employees' management education can be beneficial. This finding is encouraging for further exploration.

Qualitative results depict that to acquire knowledge, education was found to provide a conceptual understanding to companies' managers, while having a trade background helped their CEOs understand the function of the workshop as well as how products were created. Thus, it seemed that practical knowledge of a company's product development process was beneficial to them, whereas no such value emerged for management-oriented education. It was found that training helped, not only in providing skills to one's employees, but it also boosted the morale of employees who felt their management believed in their capabilities. Because education and training present a major investment for an SME, with the potential for those receiving the benefits to contribute to innovative activities, businesses need to evaluate the outcomes from the investment.

2.6 Motivation

The motivation to innovate mattered in our findings. CEOs who were more concerned with creativity and the core objectives of their businesses were better able to harness external technological change for innovation than those simply concerned with profit.

3

INDUSTRY RECOMMENDATIONS

To address the barriers to innovation, and to support Australian manufacturing and prosperity of SME productivity, we propose a number of industry wide recommendations.

These recommendations are build on the foundations of this research project. As such, the following advice is strongly influenced by the case studies conducted within the metal and machinery manufacturing sector within Australia.

3.1 Find opportunities outside traditional markets

Australian manufacturing industries could look outside their traditional markets or industries for new opportunities rather than waiting for customers to approach them. This means that SMEs should be able to explore opportunities by analysing their strengths and building on their capabilities. The opportunities across different companies or industries could be investigated, for example through the wealth of online information on potential new customers and markets.

3.2 Understand customer needs

Considering the high cost of Australian labour, traditional manufacturing and its competition on price is challenging, hence a change to more customer-centric manufacturing offers opportunities. Identifying customer needs before products are produced helps a company to understand where its customers need solutions and whether the supplier (SME) has the capacity to provide such solutions based on its capabilities. Necessarily, this change will lead to a change in the original business model, from being a product manufacturer to being a solution provider. This means co-creating with their customers to provide solutions through identifying their needs. Such cases are dependent on skills available within the organisation and the marketing techniques used. Traditional cold-calling or visiting one's (potential) customers could be helpful.

3.3 Understanding quality requirements

Re-emphasising Drucker's (1985) argument, the quality of a product should be determined through the perception of a customer rather than a supplier. Thus the quality demanded by a customer means meeting the customer's required product or service standards at a particular price. Where a customer wishes a particular quality but is not willing to pay the quoted price, the company needs to realign its goals with those of its customers and look for the best solution, before letting its customers go to competitors. Although this might present many challenges on a practical level, a hands-on approach, and trying to decrease production costs whilst maintaining quality and creating value, should be the preferred approach for a SME.

3.4 Creating a culture to develop new ideas

To explore customer needs and find opportunities cannot the SME needs have a culture to support

customer-centric manufacturing. This support is dependent on the owner or the upper management creating an environment where employees can generate new ideas and openly communicate those ideas. Trusting the judgement of its employees helps a firm create an atmosphere to promote and develop new ideas. Culture therefore requires flexibility both by the SME owners and their employees in a changing environment. Changing the business model is dependent on the culture within an SME.

3.5 Training expenditure and education

To progress and challenge the existing norms both training and education are important for SME managers and employees. A culture in which education and training is promoted so that new thinking to address existing or new problems is welcomed is important for encouraging and supporting innovative activities.

3.6 Adapting continuously to changes in technology

SMEs need to adapt continuously to changes in technology, and adapt their company's culture accordingly. Attention for such adaptations is much needed in most of the SMEs. Those firms which adapted to these changes in a continuous manner were seen to be both more profitable as well as more innovative than others. The resistance to change either by upper management or the employees could be disastrous for an SME. To overcome such situations a culture supportive of continuous changes is therefore highly recommended.

3.7 Collaborate to exploit new markets and ideas

One feature often lacking in manufacturing companies is collaboration. Embracing collaborative networks may allow a SME to develop globally, implement new ideas, and explore new markets. Some of the studied Australian SMEs have initiated collaboration with overseas companies, capitalising on online communication tools to establish contacts.

3.8 Different approaches to produce products

An example of a strategy which uses a different approach to manufacturing is to design high-end products in Australia, using Australian resources, then manufacture outside Australia and import the finished product to sell to Australian consumers. Such an approach can work as a mechanism for manufacturing businesses with high-end merchandise.

4

IMPLICATIONS FOR FUTURE RESEARCH

4.1 Testing the relationship between different factors

The qualitative cases were limited to metal and manufacturing SMEs, hence the conclusions drawn may be limited to that industry segment. As the case studies were restricted to the metal and machinery manufacturing sector, a wider study encompassing the whole manufacturing sector would be necessary to test the interaction between external technological change factors and internal factors of innovation. Results of future studies can help manufacturing not only within Australia, but also in other developed countries whose economies are stagnant and experiencing competition from low-cost producing countries.

Our developed model of innovation proxies external drivers through structural technological change faced by businesses (changes which may be absorbed or not). The case studies highlighted that innovative activities are also (partially) driven by (potential) customer demand and competition, often from a desire to deliver a worthwhile product and/or service, or from a desire to survive in the marketplace. Prior literature has indeed discussed the relevance of technical change and competition (Schumpeter 1954), and consumer demand (Pasinetti 1981) under the umbrella of structural change. We found that these three external drivers were interrelated and therefore our work provides empirical evidence for the argument to consider these three drivers together in future modelling of innovation in SMEs. This requires attention both quantitatively and qualitatively within different industries apart from metal and machinery for further verification. The results of future studies can help manufacturing not only within Australia but in other developed countries whose economies are stagnant and who are experiencing competition from low-cost producing countries.

4.2 Exploring quality from customer's perception as a factor of innovation

The case studies indicated that the perception of quality

(either from a customer's or supplier's perspective) affects innovation. Taking a more customer-oriented perspective towards quality motivated the studied businesses to consider customer needs, available technological developments, and how their products could be developed and priced along those external standards. Such an orientation towards delivering quality rather than a product per se motivated some of the studied cases to adjust their business to a more service-oriented model.

4.3 Exploring balance within culture as a factor of innovation

To our knowledge, whether a balance within organisational culture contributes to innovation has not been previously studied. We argue this should be investigated further across a broad range of SMEs including those in manufacturing industries. Our study indicates an appropriate alignment between formal and informal communication appears to assist innovation; this hypothesis needs further testing.

Learning from failed innovations was often referred to within the cases, although the impact of failure was not studied in any detail as part of this research. However, when analysing the data it was found that failure could have both positive and negative impact on the innovative culture of an SME. Therefore, we propose failures in innovation could become a fruitful avenue for future research.

4.4 Distinguishing between general and management education

With this study it was found that the management education of the managers or employees did not contribute towards product innovation while a warrant was made for employee management education with regard to process innovation. Therefore maintaining the distinction between general and management education in the modelling of innovation in SMEs could be further tested.

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CONCLUSION

This report concludes that general education of the workforce, CEOs' motivation to creativity rather than profits, and a balanced culture mediate the effect of technological change so that innovations can be generated in Australian manufacturing SMEs. These are promising findings.

Employees should be given opportunities by upper management to innovate and challenge old ways of doing things. Further, as meeting customer demand is not restricted to a particular sector only, SMEs should be able to exploit opportunities across a range of sectors and build on their capabilities. A willingness to change strategy in the face of changing circumstances is needed.

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ABOUT THE AUTHORS

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Megha obtained a Masters of Commerce. She also completed a MBA degree at UTS, which paved the way for her interest in management and the financial sector. Recently, she completed her PhD at the UTS Business School. Her research investigated the interactions of external and internal factors on innovative outcomes in Australian manufacturing SMEs. She has also published on organisational knowledge and learning. Her thesis work forms the basis of the present report.

Dr Christine Burton

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Christine is the Associate Dean Education at UTS Business School. She has particular expertise in the areas of leadership and innovation and has been a consultant in Great Britain reviewing management teams and undertaking change management assessments with a range of businesses primarily in the arts and creative industries. Her PhD research focused on new entrants in the museum sector. Her research focuses on arts and cultural industries in relation to consumer co-creation of value in services.



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