

Organisational Agility and Firm's Performance:

**The impact of organisational agility in business
excellence models used by Australian SMEs**

By

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Abstract

The Australian business environment, like most advanced economies, has felt the impact of globalisation and events such as the global financial crisis. Businesses are constantly looking to differentiate themselves and become more competitive. High Performance Theories and Business Excellence Models as espoused by popular books such as 'Good to Great' and government quality and productivity agencies, were touted as ways for firms to achieve this by implementing business excellence enablers such as leadership, people, strategy, partnership and resources, process, product and services. Recent events such as the global financial crisis, where firms who were touted as examples of 'great' organisations that have successfully applied high performance theories required government intervention to avoid bankruptcy, have questioned their validity and usefulness.

This dissertation examines business high performance theories and their relationship with business excellence models such as the Malcolm Baldrige National Quality Awards, European Federation of Quality Management (EFQM), organisational improvement initiatives such as Total Quality Management (TQM), Lean, and Just In Time (JIT) manufacturing. Anomalies in Australian industries have led to the suggestion that the current EFQM model should include Agility as an additional enabling factor. Many researchers have examined concepts such as supply chain agility, manufacturing agility, and network agility with respect to organisational performance. This dissertation examined the relationship between Organisational Agility and Performance as defined by

the EFQM. A theoretical construct for agility was developed based on existing literature and Performance from the EFQM assessment questions. This model was tested using Partial Least Squares Structural Equation Modelling. Data was obtained via telephone surveys from COO's and CFO's of 150 small to medium sized (50 to 250 employees) Australian firms. The results demonstrated that Organisational Agility is a second order formative construct comprised of flexibility, responsiveness, competency, speed, competition, market conditions and regulations, and technology. The research also confirmed that organisational agility has a positive impact to a firm's performance as measured by EFQM's financial, customer, process, and supplier results. These results contribute to high performance theories and business excellence models suggesting that firms seeking to become more competitive should include organisational agility capabilities in conjunction with the established EFQM enablers.

Statement of Candidate

This work represents the original contribution of the author, except where specifically referenced or noted in footnotes. The work is submitted in fulfilment of the degree of Doctor of Philosophy in Management. The work was conducted while the author was a student at Macquarie Graduate School of Management, Macquarie University, Sydney, Australia.

Ethics Committee approval for this work was obtained on 12 September 2011, with reference number 5201100622(D).

I hereby certify that the work has not been submitted for a higher degree at any other university or educational institution.

Viken Kortian

2 February 2015

Dedications

The year 2015 marks the 100th anniversary of the Armenian Genocide. As a grandchild of survivors of this tragic event, I would like to dedicate this thesis to my grandparents who not only survived the first genocide of the 20th century, but taught their children and their grandchildren the importance of human values, education and striving to become better human beings.

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List of Abbreviations

ABEF	Australian Business Excellence Framework
ABS	Australian Bureau of Statistics
AM	Agile Manufacturing
ANOVA	Analysis of Variance
ANZ	Australia and New Zealand
ANZSIC Classification	Australian and New Zealand Standard Industrial
APRA	Australian Prudential Regulation Authority
AQC	Australian Quality Council
ASIC	Australian Securities and Investment Commission
AUD	Australian Dollar
AVE	Average Variance Extracted
BCPE	Baldrige Criteria for Performance Excellence
BE	Business Excellence
BEF	Business Excellence Framework
BEI	Business Excellence Index
BPR	Business Process Engineering
BSC	Balanced Score Card
CB SEM	Covariant Based Structural Equation Modelling
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CII	Confederation of Indian Industry
CMB	Common Method Bias
CMV	Common Method Variance

COO	Chief Operating Officer
CVR	Cross Validated Redundancy
DnB	Dunn and Bradstreet
EFQM	European Federation of Quality Management
GDP	Gross Domestic Product
GE	General Electric
GFC	Global Financial Crisis
GLOBE	Global Leadership and Organizational Behavior Effectiveness
HCM	Hierarchical Component Model
IBM	International Business Machines
IDV	Individualism / Collectivism
ISM	Interpretive Structural Modelling
ISO	International Standards Organisation
IT	Information Technology
JAS-ANZ	Joint Accreditation System Australia New Zealand
JIT	Just In Time
JQA	Japan Quality Association
KBEMS	Kanji Business Excellence Measurement System
LP	Logistical Performance
MAS	Masculinity / Femininity
MBNQA	Malcolm Baldrige National Quality Awards
MO	Market Orientation
NA	Network Agility
NAB	National Australia Bank

OP	Operational Performance
PDI	Power and Distance Index
PLS SEM	Partial Least Squares Structural Equation Modelling
QMS	Quality Management System
ROC	Return On Capital
ROE	Return On Equity
ROI	Return On Investment
ROS	Return On Sales
S&P	Standard and Poor's
SAI	Standards Australia International
SCM	Supply Chain Management
SEM	Structural Equation Modelling
SME	Small to Medium Enterprise
SPP	Strategic Productivity Program
SPSS	Statistical Package for Social Sciences
SQA	Singapore Quality Association
TQM	Total Quality Management
UAI	Uncertainty Avoidance Index
UK	United Kingdom
USA	United States of America
WCM	World Class Manufacturing
α	Cronbach's Alpha

Chapter 1: Introduction

1.1 Overview of Chapter 1

This chapter introduces the main ideas, perspectives and arguments that are used to examine Business Excellence theories and how they are modelled. It explains the impact of Agility and, when included in these models, how it has a positive impact on business performance. The three sections that follow contain the key theoretical arguments that will be examined within the thesis. The research questions are then presented. The subsequent sections present the reasons the research questions are of academic and managerial interest. Summaries of the methodology and the high-level answers to the research questions are then presented. The chapter ends with an outline of the structure of the thesis.

1.2 Why study High Performance theories?

In 2008, the business world plunged into a global financial crisis (GFC). Some of the largest US financial institutions were on the verge of collapse. Countries such as Greenland and Greece were taken to the brink of bankruptcy. Only seven years earlier, authors such as Jim Collins had identified companies like Fannie Mae as one of the 'great' organisations that had withstood the challenges of the business environment over many decades (Collins, 2001). Fortunately, the quick response by governments around the world managed to avoid a global depression, and by the end of 2009, countries such as Australia managed to emerge from the GFC, reversing the negative trends.

The GFC prompted many researchers to ask how such an event could occur (Orr, 2010). Some examined High Performance Theories and questioned their validity and usefulness, especially in situations where organisations had no control over the global environment.

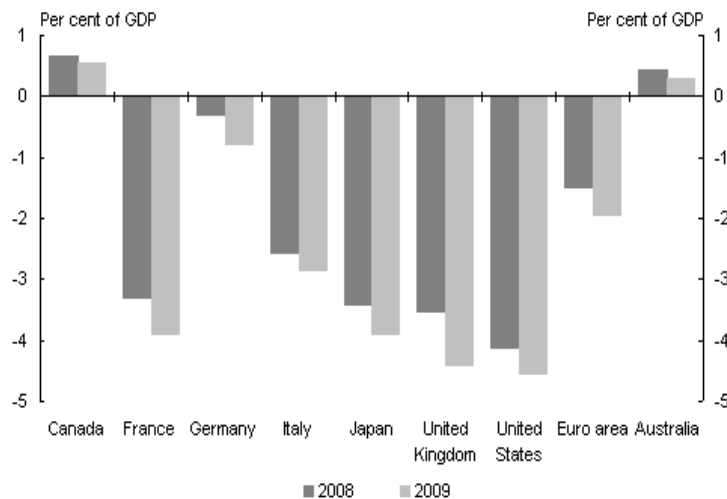
Events such as the GFC remind us of the importance of being vigilant in business, and the necessity to be prepared for unforeseen situations. Australia did relatively well during the GFC. It took dramatic steps to stimulate the economy, including:

1. Budgetary measures, including a AUD55 billion Australian family support package, Building Australia Fund, Education Investment Fund, and Health and Hospitals Fund. (These are listed on www.budget.gov.au/2008-09/)
2. Measures taken to support confidence in Australia's financial markets, such as the following:
 - Guarantee of deposits of authorised deposit-taking institutions,
 - Guarantee of wholesale funding of authorised deposit-taking institutions, and
 - Purchasing AUD8 billion in residential mortgage-backed securities.
3. Economic Security Strategy
 - AUD4.9 billion for an immediate down payment on long-term pension reform,
 - AUD3.9 billion in support payments for low and middle income families,
 - AUD1.5 billion investment to help first home buyers purchase a home,
 - AUD187 million to create 56,000 new training places for the 2008/09 Productivity Places Program, and

- The implementation of the Government's nation building agenda (Building Australia Fund, Education Investment Fund, and Health and Hospitals Fund)

As a result, Australia did significantly better than its major trading partners (see Figure 1.1).

Chart 2.2: Budgetary positions for selected countries in 2008 and 2009



Source: International data are for all levels of the general government sector, sourced from the IMF World Economic Outlook, October 2008. They refer to calendar years. Australian data are for the Australian Government general government sector, sourced from the Australian Government Treasury. They refer to financial years (2008-09, 2009-10). This chart compares selected countries' budgetary positions using their primary budget balance, which may differ from Australia's.

Figure 1.1 – Budgetary position for selected countries 2008 and 2009 (Source website: www.budget.gov.au/2008-09)

1.3 Why Study Business Excellence Practices and Model them?

The vast majority of academic research (see Table 1.1) into Business Excellence Practices and/or the application of TQM (Total Quality Management) supports the idea that for organisations to succeed, implementation of these practices is essential.

Table 1.1 – Summary of Business Excellence Modelling

Author	Research
Kanji (1998)	Measured Business Excellence by introducing a Business Excellence Index (BEI). The BEI is an approach to measuring customer, employer and shareholder satisfaction simultaneously. Kanji constructs a latent variable structural model using 14 quality dimensions or latent variables (4 principles and 8 core concepts). Survey data was gathered from 41 European manufacturing and non-manufacturing organisations to identify the factor weighting of his model.
Kanji & Wong (1999)	Examined whether supply chain management (SCM) could be enhanced with the application of total quality management (TQM) principles. They created a latent variable structure model with 17 variables that focused on supply chain factors and surveyed 139 companies in Hong Kong to validate their model.
Kanji & Wallace (2000)	Condensed Kanji's 14 variables model to 9 factors and linked these to Kanji's BEI. They used the data from their 1998 survey of 61 European manufacturing and non-manufacturing companies and concluded that their model allows any organisation to determine its weaknesses and focus on those areas that will deliver business excellence.
Flynn and Saladin (2001)	Examined the validity of the theoretical model underlying the Baldrige Business Excellence model. The Baldrige Award was introduced in 1988 and the framework was revised in 1992 and 1997. Flynn et al used Path Analysis to test the fit of each of the frameworks (1988, 1992, 1997). A total of 164 manufacturing companies were selected and surveyed from the World Class Manufacturing (WCM) database, Round II. They found that all three frameworks (1988, 1992, and 1997) were a good fit with the Baldrige framework and that the 1992 and 1997 updates were improvements on the 1988 framework.
Kanji (2002)	Kanji introduced his business excellence measurement system (KBEMS) and claimed that this can be used to drive success by focusing the organisation's efforts on the 'real forces of excellence' to make business excellence happen. In essence, he redesigned his original 14-factor structure and divided his model into two parts, including Part A - his 10 factors from his simplified model, and Part B - issues relevant to external stakeholders. This is very similar to the European Foundation of Quality management (EFQM) approach to Business Excellence.

Author	Research
Jacob, Madu, and Tang (2004)	<p>Questioned the value of Business Excellence Awards, specifically the Malcolm Baldrige National Quality Award (MBNQA). Critics cite three key issues: Cost; Award not indicative of exceptional quality; and poor financial performance of past winners.</p> <p>Poor financial performance of some of the past winners (e.g., General Motors Cadillac Division, Motorola, Wallace Company, and Federal Express) suggest that the Award is not an accurate measure of a company's competitiveness and profitability. Their research found these winners performed 11 percent better than similar sized firms on accounting and financial measures and this was not found to be significant. They also found that winning the award did not make the firms more successful.</p>
Bou-Llugar, Escrig-Tena, Roca-Puig, Beltran-Martin (2005)	<p>Conducted an in-depth analysis of the EFQM Excellence Model and examined how the 'enabler' and 'results' criteria were interrelated. They used a canonical correlation analysis to measure these relationships of 446 manufacturing and services companies in Spain. They found that the enabler criteria (Leadership, Policy & Strategy, People, and Process) were strongly related to the results criteria (Customer, People, Society, and Business).</p>
Sila & Ebrahimpour (2005)	<p>Conducted a similar study to those described above (Jacob et al.,(2004)) using SEM to analyse 23 TQM factors and their impact on business results. They surveyed 1,500 manufacturing companies across the USA, of which 220 responded, and found that leadership and information analysis played a significant role in shaping the quality focus of companies.</p>
Bou-Llugar, Escrig-Tena, Roca-Puig, Beltran-Martin (2009)	<p>Examined whether EFQM and MBNQA can be frameworks for TQM implementation, specifically, social and technical issues, holistic interpretation of TQM in the firm, and a causal link between TQM procedures and organisational performance.</p> <p>Based on 446 Spanish companies surveyed (ARDANDatabase), they found:</p> <ul style="list-style-type: none"> • Social <u>and</u> Technical dimensions were embedded • Both dimensions were intercorrelated • Business Excellence 'Enablers' had a strong positive influence on firms 'Results'.

1.4 Business excellence programs in Australia

The application of business excellence programs in Australia within the different industries is difficult to measure. Rahman and Sohal (2002) conducted a detailed review of total quality management research activities within Australia. They found that research in this area has been unbalanced, and in the form of case studies and empirical research.

Since 2001, not much has changed. Research into business excellence practices within Australia is very limited. The most recent research that included Australia was done by Talwar (2011), who conducted a literature review of the Business Excellence activity around the world and examined the relationship of the application of Business Excellence and performance. Mohammad et al. (2011) did a similar study examining the literature, and combined it with semi-structured interviews with 16 quality and Business Excellence experts in New Zealand, Singapore, and Malaysia to propose a model on how improvement initiatives can be adopted towards achieving Business Excellence. These initiatives are arranged according to the common enabling criteria of Business Excellence Models and levels of Business Excellence maturity (Beginning, Progressing, Advanced, Role Model).

Further research into business excellence factors across industry sectors is required, as the adoption of business excellence practices does not seem to result in the expected general outcomes across different industry sectors. The Banking and Chemical industries in Australia are chosen as an example where contradictory results were found. The following sections form a mini-case where these two industries are examined in depth, to highlight the anomaly of implementation of business excellence models and firms' performance, and to show why further research into business excellence factors is required.

In 2011, the four major Australian Banks had a combined profit of over \$23 billion. This profit was a record since the banks were regulated in 1983 and, in the era of the global

financial crisis, represented a spectacular result. During the same period, the Chemical industry reported an estimated \$1.6 billion profit. Today, the banking industry employs approximately 210,000 people. The chemical industry employs approximately 83,000 people. If we were to measure industry success as the amount of profit generated per employee, then the banking industry will have a profit-to-employee ratio of \$110,000 compared with the chemical industry of \$20,000.

1.5 Background of the Australian Banking industry

Four major banks, i.e., the Commonwealth Bank, Westpac, ANZ, and the National Australia Bank, dominate the Australian banking sector. For many years, successive Australian governments have maintained a four-pillar policy that limited the number of mergers and the degree of competition within the banking sector. Apart from the four major banks, there are a number of smaller/regional banks. The latter include Bendigo Bank, Adelaide Bank, Suncorp Metway, the Bank of Queensland, and the ME Bank. Other lending institutions include building societies and credit unions. Over the past few years, the number of Building Societies and Credit Unions has been gradually decreasing.

As a result of the global financial crisis and the failure of large financial institutions overseas, the big four banks in Australia now rate among the top 12 banks in the world in terms of market capitalisation. Foreign banks wanting to do business in Australia (according to the Banking Act) must gain approval from the Australian Prudential Regulation Authority (APRA). They can operate either as wholesale banks or through

subsidiaries. If foreign banks do not wish to get this type of an approval, they can establish representative offices that can act as liaisons and have limited services.

According to the Foreign Investment Review Board, foreign investment in the Australian banking sector needs to be consistent with the Banking Act, the Financial Sector (Shareholdings) Act 1998, and banking policy, including prudential requirements. Any proposed foreign takeover or acquisition of an Australian bank will be considered on a case-by-case basis and judged on its merits. There are a number of foreign subsidiary banks; however, only a few have a retail banking presence. HSBC Bank Australia, Bank of Cyprus Australia Limited, Beirut Hellenic Bank, and Citibank Australia have a small number of branches. Foreign banks have a more significant presence in the Australian merchant banking sector.

The Australian Prudential Regulation Authority (APRA) and Australian Securities and Investment Commission (ASIC), regulate the banking activities. In the Major Australian Bank Review Year End Summary 2012 by KPMG, the report concluded the following:

‘The majors continue to produce strong results despite European uncertainty impacting global markets and consumer confidence, and the considerable volume of regulatory change currently impacting the sector.’

Profit before tax

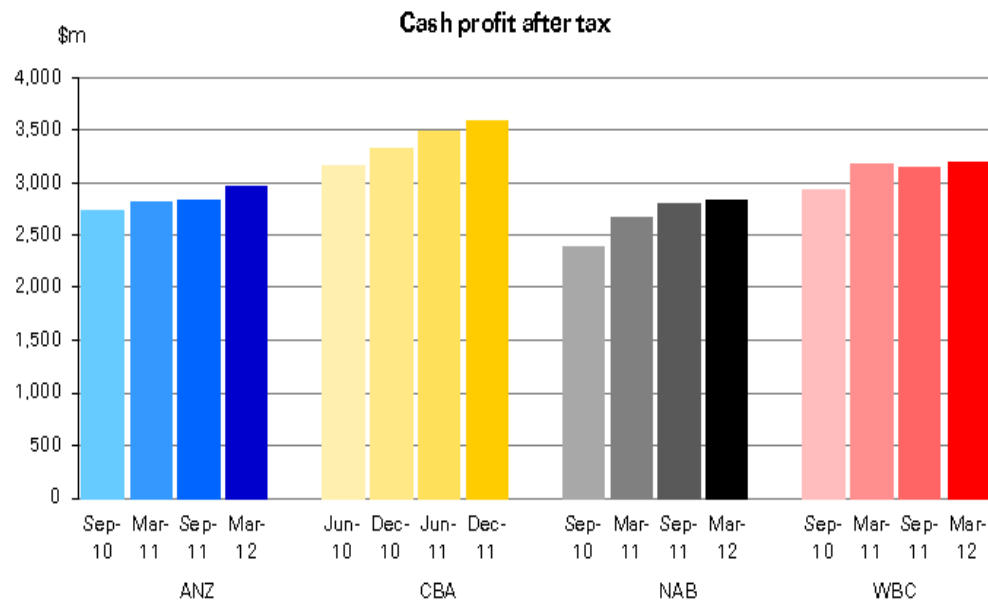
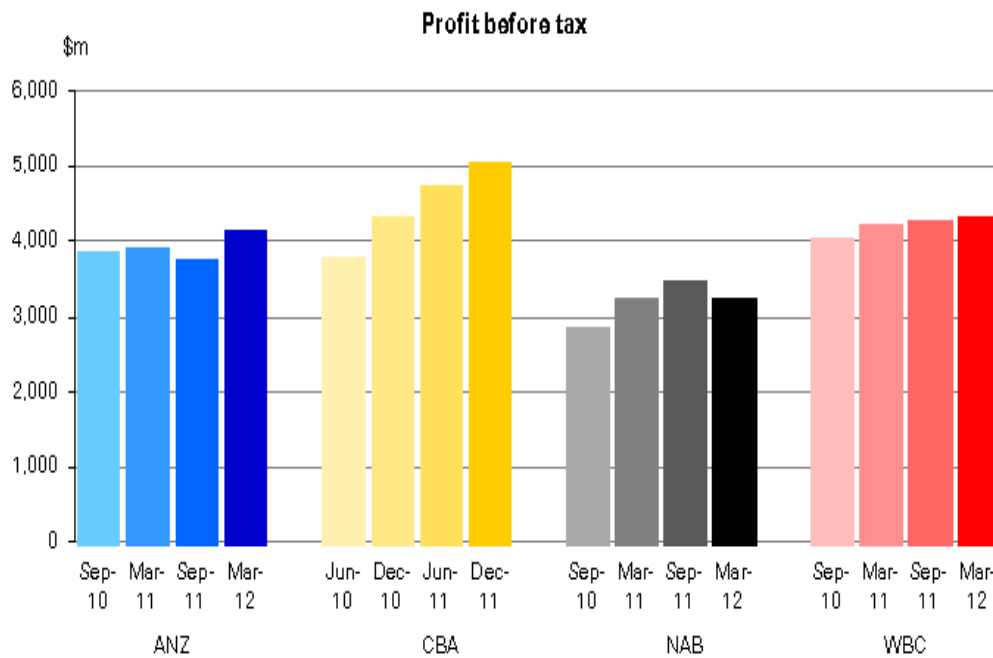


Figure 1.2 – Australian Bank Profits, 2010 to 2012

A key indicator that measures banks' costs is the cost-to-income ratio. Banks around the world use cost-to-income ratio to benchmark their overheads, and it is a major measure of productivity and efficiency. While the four major Australian banks have managed to decrease the cost-to-income ratio from 45.5 percent in 2010 to 44.7 percent in 2012, there is still a great emphasis on further reducing costs in a period where revenue growth is constrained.

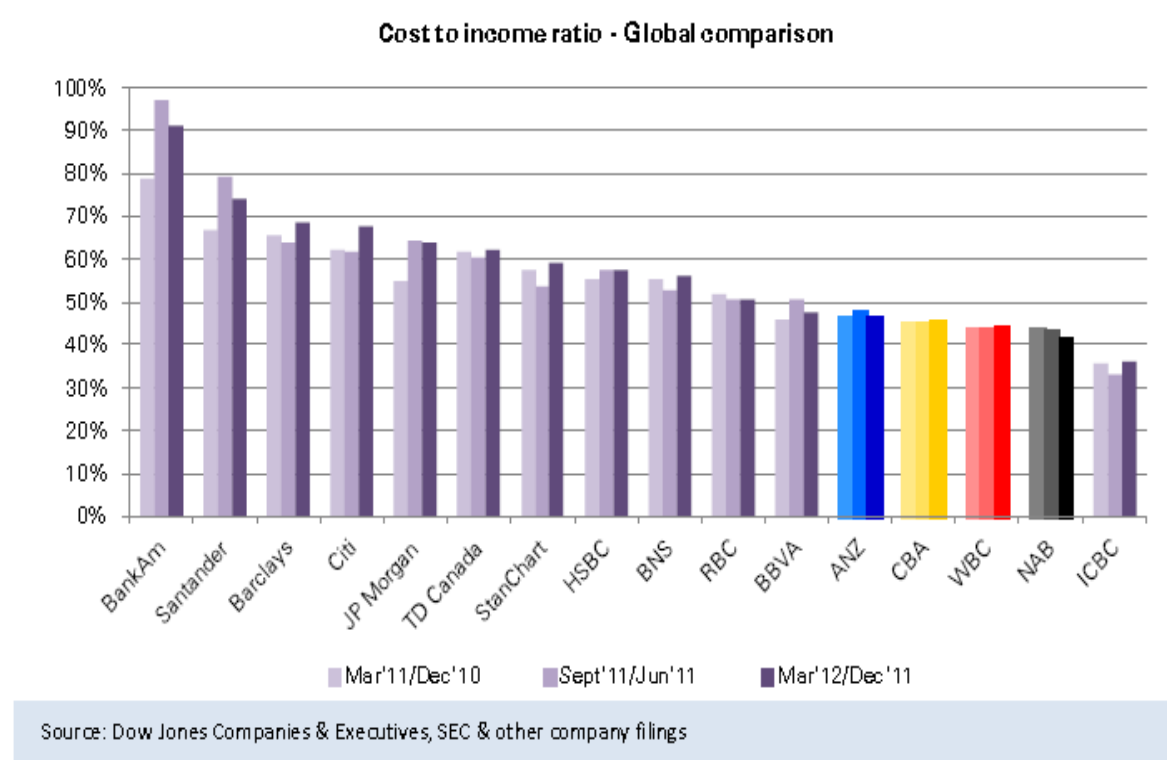


Figure 1.3 – Cost to Income Ratio comparison with global banks

In a yearly global comparison of cost-to-income ratios by KPMG, Australia has performed very well. While the four major banks have had a slight decrease in their cost-to-income ratios they are well ahead compared to their overseas counterparts. Low cost to income ratios does not necessarily result in high profits and caution should be taken when

comparisons are made between international banks. For example, the KPMG benchmark has not included high-performing banks in the US such as Wells Fargo, nevertheless the four major banks continue to work towards reducing their cost-to-income ratio below 40 percent. This trend of continual reduction in cost-to-income ratios has been reported by Tripe (1998), and while a reduction in cost-to-income ratio is sought after, this does not necessarily translate into increased profits.

Tripe also warns of the risks in comparing banks internationally only on cost-to-income ratios. Overseas banks have different operational structures and therefore different operating costs. Some of these banks also calculate their own cost-to-income ratios and this lack of transparency is a cause for concern. Because of the above, caution should be taken when comparisons are made between international banks.

1.5.1 Business Excellence models in the Banking industry

The four major banks were forced into adopting business excellence models as a result of external competition. In 2003, the largest non-banking lender in Australia was GE capital, and it took away significant market share from the four major banks. The banks, in turn, sought the advice of the strategy consulting firms such as McKinsey, the Boston Consulting Group, and Booz Allen. These 'strategy houses' advised their clients that in order to regain their market share, they needed to adopt business excellence programs such as Lean and Six Sigma. The Commonwealth Bank had its first attempt in 2003 with the application of Lean, calling it 'Commway'. In 2004 the National Australia Bank (NAB) started its Lean Six Sigma program in New Zealand before applying it in NAB Australia. In 2003, Westpac commenced its first business excellence program called the Strategic

Productivity Program (SPP). The ANZ Bank started applying Lean Six Sigma in 2005. All these four major banks failed in their first attempts in deploying the total quality management or business excellence programs. There are many reasons as to why these programs failed, but keen to reap the benefits of the Business Excellence Programs, the banks conducted reviews to understand why these programs had failed. In the 2008/2009 timeframe, the banks attempted these programs again. The Commonwealth Bank changed the name of its program from 'Commway' to 'Process Excellence'; the National Australia Bank called its program 'NAB Kaizen'; Westpac named its business excellence program 'Breakthrough'.

All of these programs have had limited success. None has reached the full potential that these programs have delivered in other industries such as the Manufacturing Industries.

1.6 Background of the Australian Chemical industry

Over the past 30 years, the Australian chemical industry has undergone major changes. During the 1980s, the Australian government removed tariffs and barriers for foreign chemical companies to compete with the local Australian chemical industry. As a result, many of the smaller, inefficient chemical companies were taken over or sold; some even shut down, and as a result, the industry shrank as a proportion of Australia's GDP.

The chemical industry today comprises both Australian and foreign companies. It is very difficult to get clear statistics on investments, profit margins, and general success of organisations (many foreign chemical companies have only subsidiaries in Australia with

no domestic part-ownership, and do not report locally on profit and other financial statistics).

Australia's chemical industry 1910 -1998

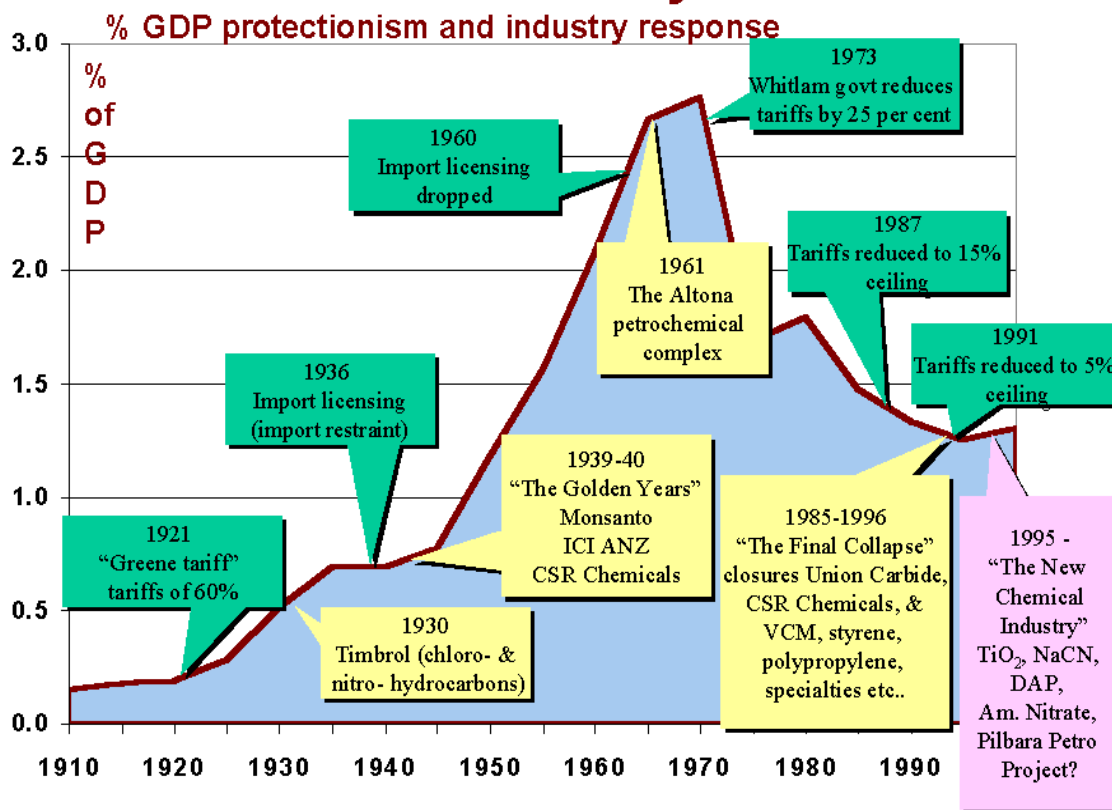


Figure 1.4 – Australian Chemical Industry Summary (Source: Chemical Link website www.chemlink.com.au/chemecon.htm)

The 2011 Annual Report of the peak industry body, Plastics and Chemicals Industry Association (PACIA) stated that the chemical industry was the third-largest manufacturing industry in Australia¹.

Its turnover was approximately \$33.6 billion, employed approximately 83,000 employees, and represented approximately 10 percent of the manufacturing activity in Australia. Key issues facing the chemical industry today are Australia's competitive environment (Australia represents only 0.6 percent of global sales), the image that the chemical industry presents (i.e., that the chemical industry is the cause of pollution and environmental problems), the necessity for Australian chemical industry to produce innovative products to compete with its international counterparts, and the high cost of doing business in Australia.

An indirect method of determining the extent to which the banking and chemical industries have adopted Business Excellence practices is ISO 9000 certification. Only one of the major banks (NAB) has ISO certification, compared with 19 out of the 27 chemical utilities searched on the JAZ-ANZ website (See Appendix 2). Another telling indicator of the state of Business Excellence in Australia is the fact that the last Award was given in 2008 (because this was not a high priority for the administering organisation, SAI Global).

1.6.1 Business Excellence models in the Chemical industry

¹ The manufacturing industry is small compared to the services industry. Services represented 78 percent, manufacturing 12 percent, mining 7 percent, and agriculture 3 percent (Source: 'Structural Change in the Australian Economy' - <http://www.rba.gov.au/publications/bulletin/2010/sep/1.html>)

The chemical industry was one of the early adopters of the business excellence programs. In the mid-1980s the industry had adopted total quality management practices with varying success. By the late 1980s and early 1990s, ISO 9000 (International Standard for Quality Management Systems) had been adopted by the industry as a business standard. Like many other industries, the chemical industry struggled to sustain these programs (most chemical companies continue with ISO 9000 registration) and within 3 to 4 years, these programs had disappeared and re-emerged under a different name. By the mid-1990s, GE started to quote hundreds of millions of dollars of benefits as a result of their Six Sigma program; by 2001, GE was quoting over \$4 billion worth of financial benefits. This was attracting much attention from not only GE's direct competitors but also other industries. By the late 1990s, companies such as Dow Chemicals, 3M, DuPont, Johnson & Johnson, among others, were adopting Lean Six Sigma programs and reporting significant financial benefits. The basic premise of Six Sigma was the creation of business processes, and like chemical processes, these are very similar and so the adoption of these programs was not foreign in terms of the concept. Many of the chemical companies today who have improved their current manufacturing and service processes, have now turned their focus to the application of Six Sigma principles in new products and services (Design for Six Sigma). One other key factor that helped the chemical industry in adopting business excellence models was their early implementation of enterprise resource planning (ERP) tools such as SAP and Oracle.

1.7 Why the anomaly between the Banking and Chemical industries?

The major reason why there is disparity in Business Performance and the application of Business Excellence practices between the two is that the banking industry is regulated and the major banks have the protection of the federal government. This has been described as the 'Four Pillars' policy. Four Pillars began as a Six Pillars policy in 1990, when the Keating (Labour) Government announced that no mergers would be allowed between any of the four major banks and two major life insurance companies – the six pillars of the Australian financial system.

It became Four Pillars when the Liberal government announced its response to the final report of the Financial System Inquiry in 1997. The current policy is that no mergers will be permitted between the four major banks unless there is evidence of increased *competition*².

The chemical industry, as was explained in section 1.6.1 above, due to government deregulation, had all the tariffs removed and the market opened to overseas competition.

In summary, despite the fact that the chemical industry adopted most of the business excellence practices, its financial performance was significantly lower than the banking industry that had adopted significantly less business excellence practices. This anomaly was primarily due to the deregulated chemical industry (increased competition) and the protected (regulated) banking industry.

² The policy is based on the Treasurer's power under s.63 of the Banking Act. This power exists in addition to the ACCC's (Australian Competition & Consumer Commission) power to prevent mergers on competition grounds under the Trade Practices Act.

1.8 Significance of this study

As summarised in Table 1. 1, a number of researchers have examined the relationship of business excellence enablers and performance, and concluded that business excellence enablers have a positive effect on a firm's performance.

If the primary reason for a firm to adopt Business Excellence practices is to become more competitive and increase a firm's performance, then the above example of the banking and chemical industries in Australia demonstrates that there may be a gap in the Business Excellence model. This gap could be identified to be the amount of competition a firm experiences as well as the business environment and the amount of government regulation which were identified as elements of Agility (Sharifi and Zhang, 1999), and are not found in Business Excellence models such as EFQM and MBNQA. While many researchers in high performance theories, TQM, and Business Excellence frameworks, have inferred the importance of an organisation's ability to manage change, they have not included Agility in their models. This research will generate new insights into the causal mechanism of Business Excellence factors (enablers) and a firm's performance as defined by EFQM and MBNQA.

Research into agility and its impact on performance has primarily focused on supply chain agility or manufacturing agility, as well as network or Information Technology (IT) agility, and is summarised in Table 1.2. Most research into the area of agility has used Sharifi and Zhang's (1999) definition of agility. Sharifi and Zhang (1999) defined agility in terms of Agility Drivers (Responsiveness, Speed, Flexibility, and Competency) and Agility

Capabilities (Competition, Market Conditions/Regulation, and Technology). Others who modelled organisational agility (Eshlaghy et al., 2010) have included enabling factors of Business Excellence such as leadership and people. This study contributes to the field of organisational agility by proposing various constructs of agility, and thereby assessing the most suitable through the application of Partial Least Square - Structural Equation Modelling (PLS SEM). This research will also identify those factors in the organisational agility construct that are more significant, thus serving as a guide to becoming an agile organisation.

1.9 Research Question

The research and arguments discussed in the foregoing sections of this chapter lead to a general question of whether Business Excellence Models such as the EFQM or the Malcolm Baldrige National Awards should include Organisational Agility as a key driver of business performance.

Specifically, 'Does Organisational agility have a positive effect on a firm's performance as defined by EFQM?'

Linked to the question above, is the issue of the *definition* of agility and how it is measured. In this study, Sharifi and Zhang's (1999) definition of agility has been used. Sharifi and Zhang proposed that agility is comprised of agility drivers and agility capabilities, the latter two concepts being higher order complex constructs. The specific question this research will address is:

Is organisational agility a higher order complex construct?

The initial area of research was to replicate Bau Ilusar's (2009) research, that is, test EFQM and include the additional latent variable of Agility using Structural Equation Modelling (see Figure 1.5). Most research in the area of agility has used these key definitions and has been modelled as recently as Eshlaghy et al. (2010).

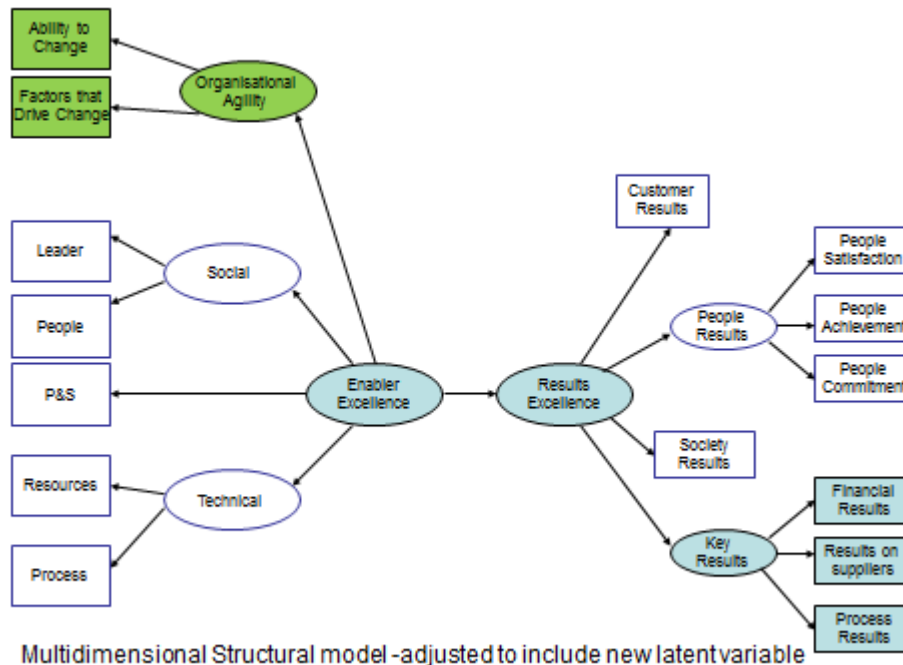
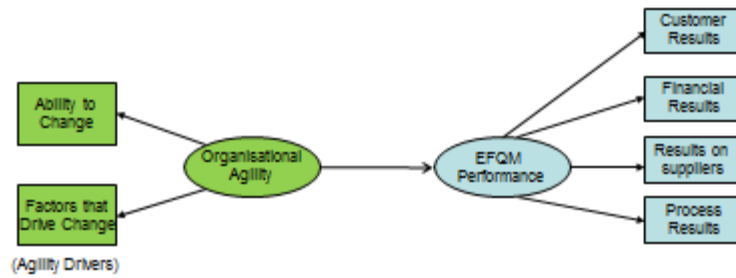


Figure 1.5 – Multidimensional Structural model adjusted to include new latent variable – Organisational Agility

Recent research that was described in Table 1.1 examined the impact of Business Excellence/TQM factors on performance. Research into Organisational Agility and firms performance as defined by EFQM has not been conducted. By removing the variables that have already been researched (in Figure 1.5), i.e., social and technical enabler factors, our construct will examine agility and business performance as depicted by Figure 1.6.



Multidimensional Structural model investigating the relationship of Organisational Agility and EFQM Performance.

Figure 1.6 – Multidimensional Structural model investigating the relationship of Organisational Agility and EFQM Performance.

Using the definitions of Sharifi and Zhang (1999), a second order formative model was constructed, as shown in Figure 1.7 below. This model will be compared to a third order model (figure 1.8) to determine which explains business performance better (as seen in Chapter 4).

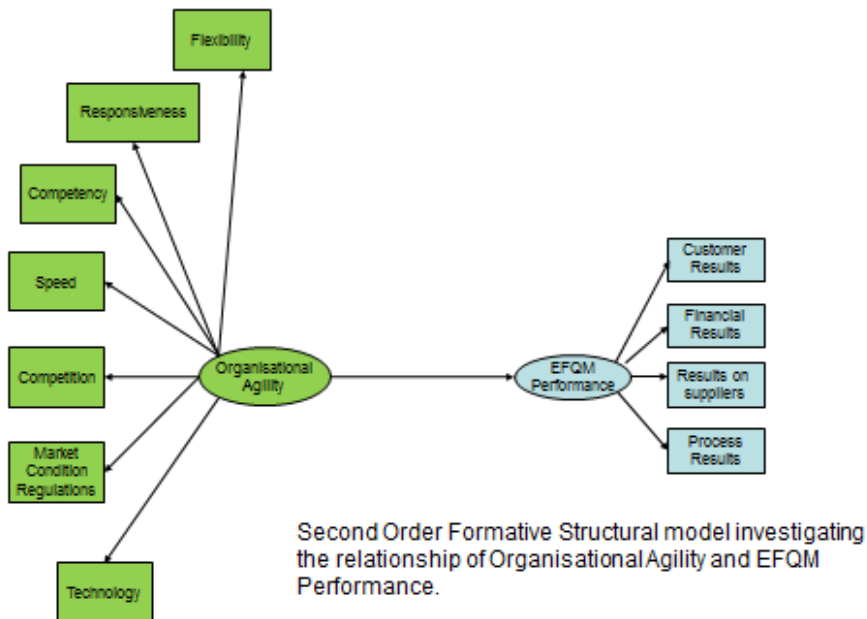


Figure 1.7 – Second Order Formative Structural model investigating the relationship of Organisational Agility and EFQM Performance.

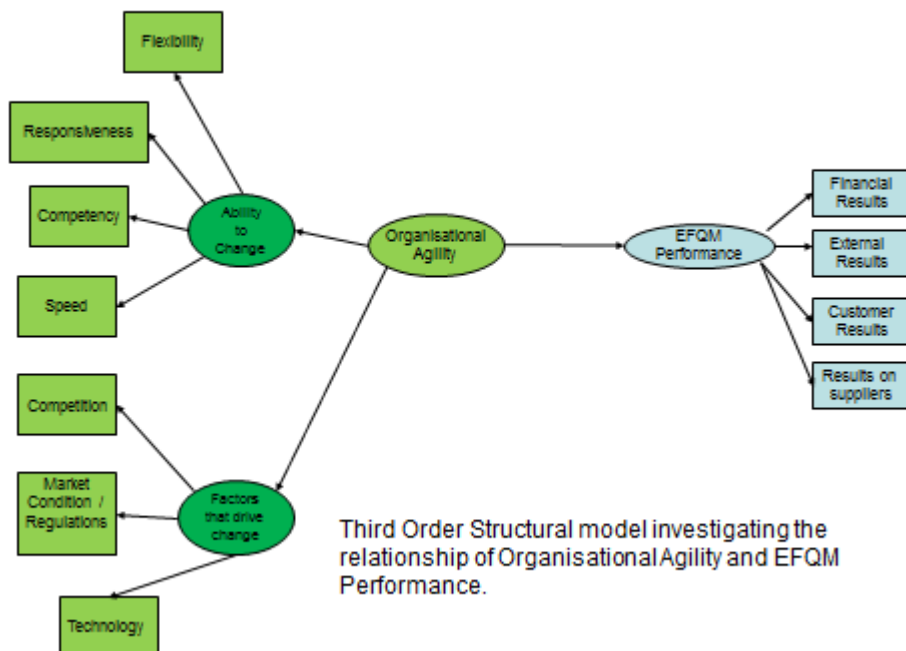


Figure 1.8 – Third Order Structural model investigating the relationship of Organisational Agility and EFQM Performance.

There are five research questions relevant to the foregoing general question that is addressed in the thesis as part of the search for a relationship between Organisational Agility and Performance. These are presented in the list below. The literature that provides specific background to these questions is presented within the literature review, where the questions are re-stated to assist the reader to place them in their proper context. The questions listed below will be examined in this thesis. Specific hypotheses are presented at the end of the literature review and are linked to the research questions.

From the conceptual models discussed above, the following research questions are derived:

1. Is Organisational Agility explained by Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology?
2. Does Organisational Agility have a positive impact on Financial Results, as defined by EFQM?
3. Does Organisational Agility have a positive impact on Customer Results, as defined by EFQM?
4. Does Organisational Agility have a positive impact on Supplier Results, as defined by EFQM?
5. Does Organisational Agility have a positive impact on Process Results, as defined by EFQM?

1.10 Why are the research questions of academic interest?

The EFQM/TQM factors and their relationship with performance are documented in Table

1. 1. There have been a number of studies that have examined various aspects of Agility and Performance and they are summarised in Table 1.2 below.

Table 1.2 – Summary of research conducted with various aspects of agility and performance.

Researched	Topic
Li et al. (2008)	Supply Chain Agility and Performance
Swafford et al. (2008)	IT, Supply Chain Agility and Performance
Chen and Chiang (2011)	IT, Network Agility and Performance
Chen et al. (2014)	IT, Business Process Agility and Performance
Lee and Yang (2014)	Organisational Agility, Network Ties, and Performance
Yang and Liu (2012)	Enterprise Agility, Network and Firm Performance
Zelbst (2010)	JIT, TQM, Agile Manufacturing, and Logistical Performance

However, these studies have not investigated the relationship of Organisational Agility and performance *as it relates to the EFQM definition*. The initial model to be tested is described in Figure 1.7 above. The third-order model described in figure 1.8 will also be tested. This research will address the relationship of Organisational Agility and performance as it relates to the EFQM definition as well as address further research to better understand the impact of business excellence enablers.

1.11 Why are the research questions of managerial interest?

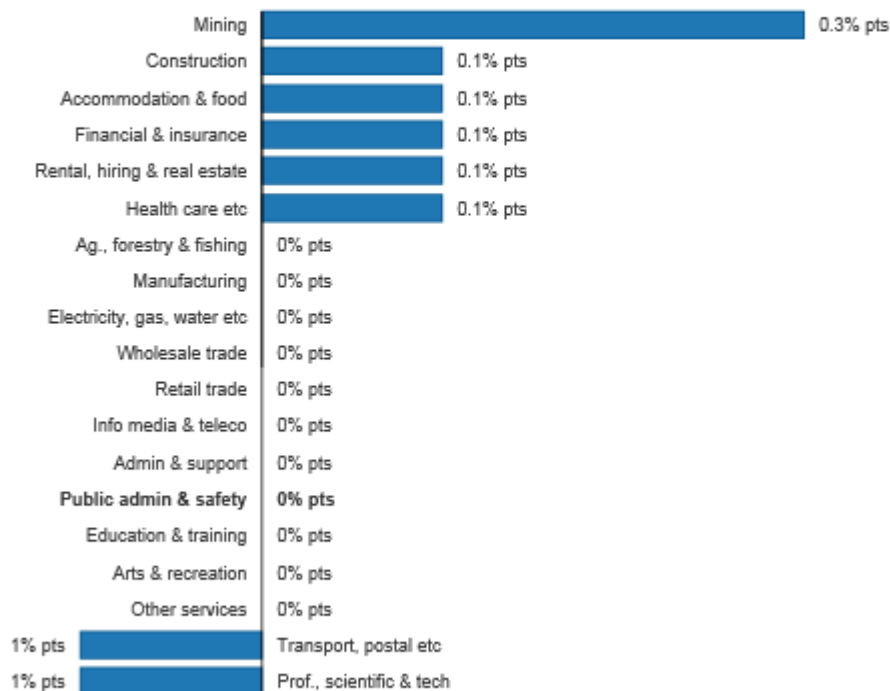
As the world's economies reduce tariffs and trade barriers, Australian businesses will face increased competition. Australia's wealth has primarily come from its natural resources; GDP in 2014 was \$1560.6 billion, and mining was the major contributor. In November 2014, China and India signed Free Trade Agreements with Australia (Source: <http://dfat.gov.au/fta/chafta/>)

Industry contributions to growth

Trend

Quarterly

Annual



Created with [Datawrapper](#)

Source: [ABS 5206.0, Table 6](#). [Get the data](#)

Figure 1.9 – Australia's Industry Contribution to growth by Industry Sector: Source: ABS 5205.6, Table 6 (<http://www.industry.gov.au/industry/Office-of-the-Chief-Economist/Publications/Documents/Australian-Industry-Report.pdf>)

The primary driver for organisations to adopt business excellence models is to become more competitive and, in the current increased competitive environment, business excellence models should attempt to include all variables that can improve performance. If our hypotheses are confirmed, this will allow us to proceed to further research that can suggest a better Business Excellence model, one that includes Agility as a key enabler.

Another reason for managerial interest is that this research will identify how organisational agility is measured and what capabilities firms need to develop in order to become more agile.

1.12 Summary of research methodology used

The organisational unit of interest in the current study was small to medium enterprises (SME's) within Australia. This includes both manufacturing and service-based organisations. The study was based on the use of a survey for which participants who were selected randomly from the Dunn and Bradstreet database were asked questions about the constructs of Agility and Performance. Australian firms chosen had between 50 and 250 employees.

The survey instrument used statements that were adapted from the extant literature. This approach was used because the interest of the present study was the relationship between established factors and the development of new constructs. A quantitative approach was used to study the relationships of interest. Relationships were examined using Partial Least Squares, Structural Equation Modelling (PLS-SEM), reflecting

perspectives of multiple theoretical models for which direct, indirect and total effects were estimated.

1.13 Summary of the findings

This research confirmed that organisational agility has a positive effect on a firm's performance as defined by EFQM. The high level answers to the research question are shown in Table 1.3. More detail is provided in analyses and tables in the chapter 4 Results section and chapter 5, the Discussion section of the thesis

Table 1.3 – High level answers to research questions

Research Question	High level response (as presented in Chapters 4 and 5)
1	Organisational agility is a second order formative construct composed of Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology.
2	The research found a direct, positive relationship between Organisational Agility and organisational financial results, as defined by EFQM.
3	The research found a direct, positive relationship between Organisational Agility and organisational customer results, as defined by EFQM.
4	The research found a direct, positive relationship between Organisational Agility and organisational supplier results as, defined by EFQM.
5	The research found a direct, positive relationship between Organisational Agility and organisational process results, as defined by EFQM.

1.14 Structure of this thesis

This thesis has six chapters following a traditional approach, as described by Perry (1998).

Chapter 1 is the introduction. This is the current chapter and is meant to provide a high level overview of the study.

Chapter 2 presents the theoretical and research literature relevant to the topics covered in the thesis via a broad literature review. The research questions are restated and the hypotheses are listed at the end of this chapter. A graphical representation of the relationships linking the hypotheses is presented within this chapter.

Chapter 3 describes the research methodology and population of interest, the sample, and the data collection procedures. A brief background is provided on the choice of statistical analysis (PLS-SEM), and the approach used to model the relevant relationships. The contents of the survey instrument are examined in detail.

Chapter 4 examines the survey results and statistical analysis. The results related to tests of each hypothesis are presented.

Chapter 5 is the discussion of the statistical results as they relate to each hypothesis.

Chapter 6 provides a summary of the study and a brief answer to the high level research questions. This chapter also presents the key contributions to knowledge and management practice that the research has made. The key limitations of the study are listed, and recommendations for future studies are presented at the end of this chapter.

Chapter 2: Literature Review

2.1 Overview of Chapter 2

This chapter presents the literature that supports key arguments within the thesis. The review is summarised by a mind map (Figure 2.1) that explores the rationale and context for the study. The area of research that is at the heart of the literature review is High Performance Theories (box 1) and the factors that improve business performance. The literature review examined both the popular business publications as well as academic research conducted in this field (bubble 2). The literature review then examined the relevance of studying high performance theories in the Australian context (bubble 3 and 4) given any similarities between Australian and US as well as European cultural differences. The review then examines business excellence and business excellence modelling (bubble 6) focusing on research that attempted to validate the cause and effect relationship of factors that drive business performance. Finally the literature review examines the central topic of the dissertation: Agility, its definition and its impact to organizational performance (bubbles 7,8,and 9). The research hypotheses are presented in the final section of the chapter, with links to the research questions and proposed models to be investigated.

2.2 The Definition of High Performance

High Performance Theories have been included in this literature review to understand the factors of business excellence or performance that have been suggested by both popular authors of business literature as well as academics in the field. As the Mind Map on Figure

2.1 suggests, Business Excellence Models such as EFQM and MBNQA will be examined in the later section of this review.

Kirby (2005) summarised the works of ten scholars who defined high performance. By far the most cited author in this field has been Jim Collins (Collins, 2001, 2005). Table 2.2 gives the summaries of theories of high performance.

Mind Map Literature Review: High Performing Theories, Business Excellence, Agility and How they are Modelled

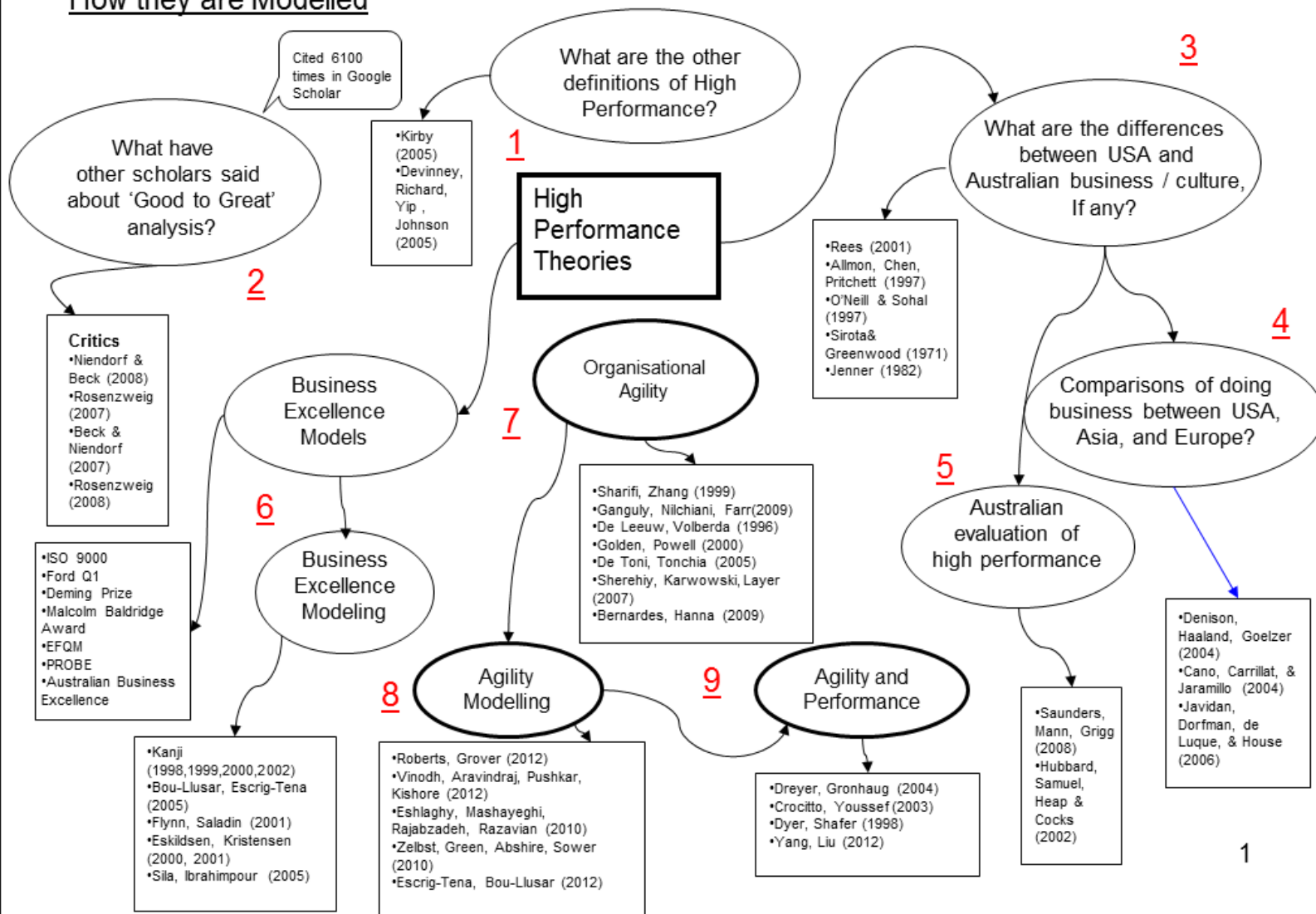


Figure 2.1 – Mind Map of Literature Review: High Performing Theories, Business Excellence, Agility, and how they are modelled
Table 2.1 – Summary of High Performance Theories literature and books.

Author	Book	Companies Examined	High Performance Criteria	Keys to High Performance
Peters & Waterman	In Search of Excellence: Lessons from America's Best Run Companies, 1982	43 companies including 3M, Atari, Boeing, DEC, Delta, Hewlett-Packard, McDonalds, Wang, etc.	Consistently beating competitors over 20-year period based on asset growth, equity growth, ratio of market to book value, ROC, ROE and ROS	Bias for action Close to the customer Autonomy and Entrepreneurship Productivity through people Hands on / Value Driven Stick to the knitting Simple form / Lean staff. Simultaneous loose-tight properties
Kotter and Haskett	Corporate Culture and Performance, 1992	American Express Travel, Bankers Trust, British Airways, ConAgra, First Chicago, General Electric, ICI, Nissan, SAS, and Xerox	Top performers over 11-year period (207 companies in 22 industries, based on annual growth in net income, ROI, stock price	Establishing a culture that emphasises attention to all constituents (customers, stockholders, and employees) Leadership from managers at all levels
Collins and Porras	Built to Last: Successful Habits of Visionary Companies, 1994	3M, American Express, Boeing, Citicorp, Ford, GE, Hewlett-Packard, IBM, Johnson & Johnson, Marriott, Merck, Motorola, Nordstrom, Philip Morris, Procter & Gamble, Sony, Wal-Mart, and Walt Disney	Rose to iconic stature and maintained their stellar performance for 5, 10, 15 years	Dispelled 12 myths of high performance Become clock builders and not time tellers. Choosing A and B rather than A or B Preserving the core and stimulating progress Seeking consistent alignment

Author	Book	Companies Examined	High Performance Criteria	Keys to High Performance
Foster and Kaplan	Creative Destruction: Why Companies That Are Built to Last Underperform the Market – and How to Successfully Transform Them, 2001	Corning, Enron, GE, Johnson & Johnson, Kleiner Perkins Caufield & Byers, Kohlberg Kravis Roberts, and L’Oreal	Sustained market beating performance for more than 15 years	Transformation rather than incremental improvement through: Creating new business Selling or eliminating slow growth business Abandoning outdated structures and rules Adopting new decision-making process, control systems, and mental models
Collins	Good to Great – Why some companies make the leap and others don’t	Abbott Laboratories, Circuit City, Fannie Mae, Gillette, Kimberly-Clark, Kroger, Nucor, Philip Morris, Pitney Bowes, Walgreens, Wells Fargo	Examined 1,435 companies and identified 11 that made the leap to business greatness: outperformed stock market by greater than 3 times consistently for 15 years after inflection point. Comparison made within their industry to companies that didn’t make great criteria	Level 5 Leadership First who then what Confront the brutal facts Hedgehog concept Culture of discipline – disciplined people, discipline thoughts, disciplined actions Technology accelerators
Hubbard, Samuel, Heap, & Cocks	The First XI – Winning Organisations in Australia	11 Australian organisations selected: Brambles, Harvey Norman, Lend Lease, Macquarie Bank, NAB, Qantas, Rio Tinto, Salvation Army, Telstra, Westfield, Woolworths.	Built to Last approach - Surveyed CEO’s of 1000 of Australia’s largest organisations, 199 were nominated using ‘Balanced Score Card approach’. 11 companies selected	9 key factors – Effective Execution, Perfect Alignment, Adapt Rapidly, Clear Fuzzy Strategy, Leadership Not Leaders, Looking Out Looking In, Right People, Manage the Downside, Balance Everything

Author	Book	Companies Examined	High Performance Criteria	Keys to High Performance
Joyce, Nohria, Roberson	What Really Works: The 4+2 Formula for Sustained Business Success, 2003	160 companies across 40 industries, Dollar General, Flowers Industries, Home Depot, Nucor, Schering-Plough, Target, Wal-Mart	Top performers over a 10-year period in their 'quads' – researchers created sets of 4 competitors within an industry. In each there was a winner that outperformed their rivals, a loser that underperformed, a climber that improved over time, and a tumbler that deteriorated over time. Assessment was based on total shareholder returns	4+2 formula: Simultaneous superior performance in four primary areas (strategy, execution, culture, and structure) and in any two of four secondary areas (talent, leadership, innovation, and mergers and partnerships)
Collins and Hansen	Great by Choice (2011)	7 companies over 30-year period (1965 to 2002). Amgen, Biomet, Intel, Microsoft, Progressive Insurance, Southwest Airlines, Stryker	Outperformed the market by at least a factor of 10 during turbulent business environments. Enterprise began its rise to greatness from a position of vulnerability. Being young or small at the start	Fanatical Discipline – extreme consistency of action Empirical Creativity – when faced with uncertainty decisions are made based on sound empirical base (experimentation, observation, and data) Productive Paranoia – maintaining hypervigilance, staying highly attuned to threats and changing environments Leadership that demonstrates passion and ambition for a cause or the company that is larger than them

Kirby (2005) critically discusses four key points in defining high performance

1. Who gets called a winner?
2. What constitutes a pattern?
3. Are the answers universal?
4. Is high performance timely or timeless?

For the first question, Kirby argues that defining a winner is difficult. For example, is the best athlete the one with the best career, the best season, or the onetime performance that sets a world record? With regards to what constitutes a pattern, researchers have to deal with the issue of correlation and causation. In answering the question, 'Are the answers universal?' Kirby argues that one needs to consider the issue of national culture (see bubble 1, Figure 2.1 below). She discusses different views on the question regarding high performance being timely or timeless. Some believe that different things may work at different times, while others believe that if the theory works for companies that are successful today then it will work for the foreseeable future. She concluded that since the publication of one of the first books on high performance (Peters et al., 1982), research on this topic has developed immensely, but a number of questions remain. However, Kirby found that it was encouraging that researchers are building on this area and that they are getting closer to a clearer definition.

Devinney et al. (2005) examined the theoretical and empirical nature of organisational performance. They tested seven propositions as follows:

1. *Measurement of performance requires accounting for the relevance of those measures to focal stakeholders.*
2. *Measurement of performance must take into account each firm's own strategic positioning in relation to its competitive environment.*
3. *Measurement of performance requires an understanding of the time series properties relating organisational activity to measured performance at any point in time.*
4. *Performance is a multidimensional construct.*
5. *Performance measures should not be made specific to the research question but sufficiently robust to cover the domain of organisational performance.*
6. *Measurement of performance requires an understanding of the relationship between measures.*
7. *Performance measures should cover not just a broad domain, but that domain should span multiple time periods.*

Devinney et al. concluded that organisational performance is a multidimensional, time-dependent concept that must be measured using alternative approaches: financial, non-financial and accounting, market based, and by objective and/or subjective measurement methodologies. Each approach has limitations and benefits, with none being obviously superior overall. Their objective was not to define 'what is organisational performance' but rather stimulate our thinking as to what we accept as appropriate organisational performance measures and how these may be constructed.

2.3 The 'Good to Great' analysis

Over the past nine years, J Collins was the most cited author in this area, coining the phrase, '*Good to Great*' (Collins, 2001). He cited three distinct phases of research. In the first phase, 1,435 companies were examined over a 150-year period and 11 firms were identified that made the 'leap to business greatness'. He selected those companies that showed a pattern of 'good' performance punctuated by a transition point, after which they shift to 'great' performance. His definition of 'good' performance is cumulative total stock return no better than 1.25 times the general stock market for the fifteen years prior to the transition point. He defined 'great' performance as cumulative stock return of at least 3 times the general market for the period from the point of transition through the following fifteen years.

In the second phase, comparison companies were selected within the same industry, and the 'good' were compared to the 'great' to see what differentiated them. His third phase of research involved reviewing 50 years of published articles about these companies, attempting to find some common elements that made them 'great'.

His conclusion can be summarised by the following six key concepts:

1. Level 5 leadership – leaders that build enduring greatness through a paradoxical blend of personal humility and professional will.
2. First who, then what – have the right people on your team.
3. Confront the brutal facts – use of data to make good decisions.
4. Hedgehog concept – choose something that you know you can be world class in.
5. Culture of discipline – discipline people, disciplined thoughts, disciplined actions.

6. Technology Accelerators – technology becomes an accelerator of momentum, not a creator of it.

Collins acknowledged that this research was US-focused and encouraged other researchers to replicate this study in other geographical areas.

According to Google Scholar, 6,100 citations were made. Most of the citations were references to his 'keys to high performance'. A vast majority were around his views on leadership, and he defined a continuum, or levels of leadership which was very popular. 'Great' companies had CEOs that demonstrated Level 5 (the highest) leadership; 517 citations for this level were found compared with the 'hedgehog concept' and 'technology accelerators', having 197 and 26, respectively.

On the other hand, only 4 articles were found in this search that criticised Collins' approach to his research. Niendorf and Beck (2008) contend that the use of data mining was flawed and that correlation does not mean causation³. The issue of correlation (or as Niendorf and Beck termed, 'association') and causation is a common one. They commented that Collins showed an association with 11 firms and the 5 principles of 'great' firms. However, he did not show causation; that is, he did not prove that if one applied these principles, one would also have a great company. They conducted a paired t-test and found that only 1 of the 11 companies from the 'Good to Great' list performed better than the S&P average since the analysis was done. The conclusion from the paired t-test analysis was that these companies were no

³ Data mining is a research method where data is collected and patterns are identified. These patterns are then used to explain cause and effect relationships. These patterns are dependent on the specific time period and the data set gathered.

longer performing well but there could be a number of reasons for this that Niendorf and Beck did not explore. For example, could the difference in performance be due to changes in the business environment, introduction of legislation such as Sarbanes Oxley⁴, and changes in a company's leadership?

Another critic was Rosenzweig (2007a, 2007b) who stated that companies cannot achieve superior and lasting business performance simply by following a specific set of steps. He brought up the concept of the 'halo effect' (Thorndike, 1920). This is where scholars make specific inferences on the basis of a general impression. For example, when a company is doing well financially, the inference is made that this is a result of good leadership, strategy, culture, etc. When it is not performing financially, then the inference is that this is due to poor leadership, strategy, culture, etc. However, in reality, not much may have changed during the period from good performance to weak. In particular, Rosenzweig was critical of Collins' research method. Much of Collins' conclusions have come from magazine and newspaper articles. While the interviews conducted were retrospective (managers were asked to look back and describe what contributed to their organisation's 'greatness'), these were often biased with the knowledge of their performance, and again contributed to the 'halo effect'. Rosenzweig was critical of a formula to success or 'greatness'. He stated:

'The business world is not a place of clear causal relationships, where a given set of actions leads to predictable results, but one that is more tenuous and uncertain. The task facing

⁴ The Sarbanes-Oxley Act came into force in July 2002 and introduced major changes to the regulation of corporate governance and financial practice. It is named after Senator Paul Sarbanes and Representative Michael Oxley, who were its main architects, and it set a number of non-negotiable deadlines for compliance.

executives is to gather appropriate information, evaluate it thoughtfully, and make choices that provide the best chance for the company to succeed, all the while recognizing the fundamental nature of uncertainty in the business world.'

Rosenzweig later (2007) reiterated the danger of simplifying organisation success and high-performance theory, and summarised these with his nine 'delusions' (see Table 2.2). In summary, he again discredited the notion that organisational success can be attributed to a few factors. However, he tried to answer the question, 'What leads to high-performance?' (Rosenzweig 2007, Chapter 9). In essence, he contradicts his main thesis, that is, that high performance is complex; but he suggests that organisational success may be the result of two factors—strategy and execution—as espoused by Porter (1996), that is, simplifying success to just two factors (Delusion 3 and Delusion 6).

Some of Rosenzweig's delusions are not applicable currently, for example, the delusion of organisational physics. Also, fifty years ago, it was difficult to assess personality differences. Psychology was more about qualitative than quantitative research, but with the advent of personality profiling and modern medical analysis equipment such as magnetic resonance imaging (MRI), we can now accurately and scientifically describe different personalities.

Similarly, organisational excellence and high performance theory is at a stage where science and the analysis can be applied.

Table 2.2 – Summary of Rosenzweig’s Delusions (2007)

Delusions Number	Description
Delusion one: The Halo Effect	The tendency to look at a company’s overall performance and make attributions about its culture, leadership, values and more.
Delusion two: The delusion of correlation and causality	Two things may be correlated but we may not know which one causes which. He discusses the issues with correlation and drawing conclusions without validating from different angles.
Delusion three: The delusion of single explanations	Many studies show that a particular factor, for example, strong company culture or customer focus or great leadership, leads to improved performance, but since many of these factors are highly correlated, the effect of each one is usually less than suggested.
Delusion four: The delusion of connecting the winning dots	If we take a number of successful companies and search for what they have in common, we will never isolate the reasons for the success because we have no way of comparing them with less successful companies.
Delusion five: The delusion of rigorous research	If the data are not of good quality, it does not matter how much we have gathered or how sophisticated our research methods appear to be. The old adage applies, i.e., ‘garbage in, garbage out’.
Delusion six: The delusion of lasting success.	Almost all high performing companies regress over time. The promise of a blueprint of lasting success is attractive but not realistic.
Delusion seven: The delusion of absolute performance.	Company performance is relative, not absolute. A company can improve and fall further behind its rivals at the same time.
Delusion eight: The delusion of the wrong end of the stick.	It may be true that successful companies often issued a highly focused strategy but that does not mean highly focused strategies often lead to success.
Delusion nine: The delusion of organisational physics.	Company performance does not obey immutable laws of nature and can not be predicted with the accuracy of science, despite a desire for certainty and order.

In 2008 and 2009, the global financial crisis created a number of casualties. The most notable was Fannie Mae⁵. Academics and business commentators questioned why a company such as Fannie Mae, which was held up as an example of a ‘Great’ company, could fail. In fact, most of the great companies that Collins immortalised in his book *‘Good to Great’* (2001) have since

⁵ On September 6th 2008, the US Treasury took over the government-sponsored mortgage brokers, Fannie Mae and Freddie Mac. It was part of a number of government interventions as the result of the subprime mortgage crisis.

had ordinary financial performances. Later, Collins adapted his initial thinking to the proposition that 'Great' companies can stumble, and recover (2009). He then asked the question, 'Can decline be detected and avoided?' He proposed five step-wise stages of decline:

Stage I: hubris born of success

Stage II: undisciplined pursuit of more

Stage III: denial of risk and peril

Stage IV: grasping for salvation, and

Stage V: capitulation to irrelevance or death.

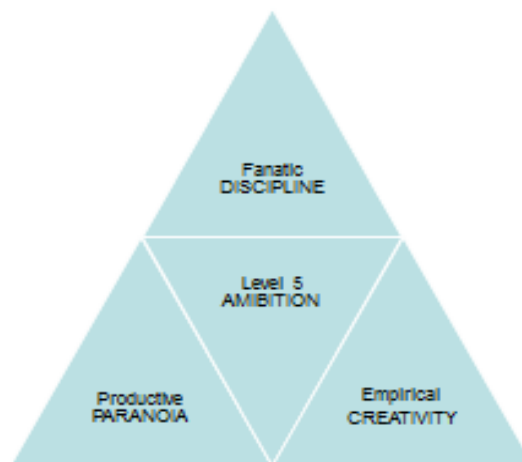
Collins used a number of organisations as examples of how they go through these five stages of decline, among which were Zenith, Motorola, Circuit City, Bank of America, and Scott Paper. However, he does not address the Fannie Mae decline. (In his appendix he does refer to the fact that this research commenced in 2005 and that the Fannie Mae incident, being recent at the time, was not included in that publication.)

Collins and Hansen (2011) conducted further research on successful companies. They examined US firms in a 30-year period and selected those that achieved at least 10 times the market performance ('10 Xers') during turbulent business environments. They found 7 firms that met these criteria and, like 'Good to Great', they asked if there were any similarities.

They found that 10Xers displayed three types of behaviours that, in combination, enabled them to be more successful than their competition. These were:

- Fanatical Discipline – extreme consistency of action.
- Empirical Creativity – when faced with uncertainty decisions are made based on sound empirical base (experimentation, observation, and data)
- Productive Paranoia – maintaining hypervigilance, staying highly attuned to threats and changing environments.

Bringing these three behaviours together is the leadership that demonstrates passion and ambition for a cause or the company that is larger than them.



Collins and Hansen: Great by Choice (2011)

Figure 2.2 – Collins and Hansen model to become ‘Great by Choice’ (2011)

One can see the similarities of the ‘keys to success’ with ‘Good to Great’ (Collins, 2001) and ‘Great by Choice’ (Collins and Hansen, 2011) and these are summarised in Table 2.3 below. Collins and Hansen (2011) introduce the important concept of monitoring the dynamic business environment, and adjusting business strategies based on competitive and environmental threats, a concept that was not addressed in Collins’ previous books (2001, 2009).

Table 2.3 – Comparisons of ‘Good To Great’ (Collins, 2001) and ‘Great by Choice’ (Collins and Hansen, 2011)

Good to Great	Great by Choice
Level 5 leadership – leaders that build enduring greatness through a paradoxical blend of personal humility and professional will.	Bringing these three behaviours together is the leadership that demonstrates passion and ambition for a cause or the company that is larger than them.
First who, then what – have the right people on your team.	
Confront the brutal facts – use of data to make good decisions.	Empirical Creativity – when faced with uncertainty decisions are made based on sound empirical base (experimentation, observation, and data).
Hedgehog concept – choose something that you know you can be world class in.	
Culture of discipline – discipline people, disciplined thoughts, disciplined actions. Technology Accelerators – technology becomes an accelerator of momentum, not a creator of it.	Fanatical Discipline – extreme consistency of action.

2.4 The difference between Australian and US firms regarding high performance determinants

A research question is whether there are any differences in the way Australia and the US excel in business (Bubbles 3 & 4, Figure 2.1). That is, are there the same ‘keys to high performance’ in both US and Australian high performing companies? In Rees’ (2001)

examination of country-related business cultures, he uses Hofstede's (1984) 4 dimensions (Power Distance, Individualism/Collectivism, Uncertainty Avoidance, and Masculinity/Femininity), and adds Psychic Distance from Fletcher et al. (1998). Psychic Distance has been defined as perceived differences between a home country and a "foreign" country regardless of physical time and space factors which differs across diverse cultures. Rees found that Australia is close to the US with respect to Psychic Distance, but when compared to Hofstede's dimensions, there were significant differences, as listed below.

With the *Power Distance (PDI)* dimension, Rees claimed that Australians are more egalitarian than the US, stating that Australians have distaste for ambition and superiority, and that they challenge authority. In the *Masculinity/Femininity (MAS)* dimension, Australians are purported to be more 'macho' and to place less value on intellectual achievement than they would on work or play. Loyalty to family and friends, especially when males are involved, is important but the expression of feelings is difficult and uncommon. With the *Uncertainty Avoidance (UAI)* dimension, Australians had a slightly higher value than the US. The Australian work ethic, according to Rees, is one of value to mates, mistrust of authority and personal independence. In the final dimension, *Individualism/Collectivism (IDV)*, Australians were thought to be more assertive and confident than Americans. Rees stated that Australians had a higher regard for collective value.

Allmon et al. (1997) surveyed 558 students from Australia, USA and Taiwan on 16 *ethical behaviour* questions. It was found that the responses of Australian and US students differed in only 3 of the 16 questions. However, this was a limited study with only students surveyed. A

better approach would have been to survey business leaders. O'Neill et al. (1998) compared their findings from 100 Australian companies to studies conducted in the US and UK. They found that Australian companies were relatively slow in adopting Business Process Reengineering (BPR), suggesting that Australian businesses are cautious of radical change.

Rather than comparing cultural differences, Sirota et al. (1971) examined the *motivations* of employees of 25 different nationalities within a multinational company (IBM), looking at 14 factors, e.g., challenge, autonomy, earnings, advancement, recognition, and security. They found that Australia and US fell within the same cluster grouping of these motivations. Jenner (1982) compared US and Australian managers' values, attitudes, beliefs and opinions on a wide range of topics and found that there were significant differences between managers of the two regions for 10 out of the 21 questions. . However, the conclusions from this study are a bit limited because it was somewhat dated, only males were surveyed, and managers were from different industry sectors in the two regions examined.

On the whole, not many published papers were found in the literature search for specific US and Australian differences, even going back almost 40 years. The search was broadened to see if there were any studies done comparing business differences between US, Europe and Asia.

2.5 Difference in business practices between USA, European, and Asian companies

Javidan et al. (2006) used the findings from the Global Leadership and Organizational Behavior Effectiveness (GLOBE) Research Program to provide the basis for conceptualising

worldwide leadership differences. Over 170 researchers worked together for 10 years collecting and analysing data on cultural values, practices, and leadership attributes from over 17,000 managers in 62 societal cultures in the food, telecommunications, and banking industries. Using Analysis of Variance (ANOVA) to determine differences in the 10 cultural *dimensions* between 10 cultural *clusters*, they found a significant difference between the US and the other 4 clusters among the 10 cultural dimensions, confirming the value in researching the cultural dimension. This article was more about providing guidance and recommendations for US managers when managing people in these countries. However, Australia was placed in the “Anglo” cluster, and no analysis was done within this cluster. Consequently, we can only conclude that there may be some cultural differences between the regions.

Denison et al. (2004) examined *organisational culture and organisational effectiveness* in the three geographic regions, US, Asia, and Europe, observing countries within these regions. They used four cultural traits of mission, consistency, adaptability and involvement, and found that the link between company culture and effectiveness appeared to be strong and consistent across regions, with differences across countries, although it could not be ascertained whether the findings were tested for statistical significance. Cano et al. (2004) examined *market orientation* as a predictor for business performance and whether this was consistent across the world. They conducted a Meta Analysis⁶ on 53 empirical studies (12,043 respondents) from 23 countries across 5 continents to test this relationship, testing 6

⁶ Meta Analysis refers to the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings.

hypotheses. One of the hypotheses was whether a relationship between market orientation and business performance existed, and whether it was stronger in collectivistic rather than individualistic cultures. They found no significant relationship, and if we were to extrapolate this to Australian and US cultures (Australian being more collective and the US more individualistic, as per Rees [2001]), then we could imply that business performance is not impacted by cultural difference.

Jayamaha et al. (2009) studied the validity of three Business Excellence (BE) models, the Australian Business Excellence Framework (ABEF), the Baldrige Criteria for Performance Excellence (BCPE), and the Singapore Quality Award Criteria. They pooled consensus scores of the three regions over a number of years (110 observations between 1999 – 2006 for Australia, 118 observations between 2003 – 2006 from New Zealand, and 113 observations between 2004 – 2005 in Singapore) to obtain sufficient data. They found that all three BE models passed measurement and convergent validity, but they found concerns around discriminant validity. All three models showed strong evidence of predictive validity which is important from a practitioner point of view. They did acknowledge that the precision of the measurement items of the BE models needs to be improved to improve the discriminant validity. The conclusion in this literature search is that more examination in high performance theories and business excellence is valid in the Australian context.

2.6 Studies on Australian High Performing Companies (2001 – 2014)

The next area for the literature review was to examine any studies conducted on Australian high performing companies (Bubble 5, Figure 2.1). Saunders et al. (2008) examined the

adoption of Business Excellence models in Australia. They conducted a literature review and three surveys, a series of focus groups and key informant interviews. The study involved input from 16 countries and was part of a larger study of how Business Excellence Frameworks were designed, reviewed, promoted, and deployed within and across nations. They found that Australian companies' adoption of Business Excellence Frameworks was significantly low, at 1.3 percent. On the other hand, US company adoption was 30 percent, demonstrating significant differences between the companies in these two countries and supporting O'Neill et al (1998) on Business Process Reengineering adoption. One concern expressed by Saunders et al. was the source of the survey data. Part of the information of Australian Business Excellence usage was provided by custodian organisations such as the Australian Quality Council (AQC), but when compared with telephone surveys made by the Saunders et al., there was a significant discrepancy. For example, the Australian telephone surveys showed that Business Excellence usage was 4 times lower than the AQC's estimates, thus suggesting the data sources from the AQC were extremely optimistic.

Hubbard et al. (2001) applied Collin and Porras' *'The Built to Last'* approach and tried to identify why 11 Australian companies (named 'The First XI') were so successful. The criteria used to select these companies were as follows:

- Premier institution in its industry
- Widely admired by knowledgeable business people
- Made an indelible imprint on the world in which we live
- Had multiple generations of chief executives

- Been through multiple product or service lifecycles
- Founded before 1950

Hubbard et al. initially surveyed 1,000 CEOs of the largest organisations in Australia, asking, “Who are the winning organisations?” They then surveyed executives on public senior management courses at the Mount Eliza Business School during 1999-2000, defining ‘winning’ as being extremely successful over a long period of time. ‘Success’ was defined in terms of performance in the Balanced Scorecard model variables (financial, market, internal efficiency, and long term growth and innovation). Out of around 200 organisations nominated, 14 were identified as successful, and then from the financial performance of these companies, 11 were finally listed as ‘successful’.

The ‘Winning’ Australian organisations selected were as follows:

* Brambles	* Macquarie Bank	* Salvation Army
* Harvey Norman	* National Australia Bank	* Telstra
* Lend Lease	* Qantas Airways	* Westfield
* Rio Tinto	* Woolworths	

The illustration given was that: A dollar invested in the ‘Winning’ Australian organisations over a 20-year period would have yielded \$955 in 2001, compared generally to a dollar invested in the Australian Stock exchange over the same period yielding \$415 in 2001. That is, the ‘winning’ companies performed at twice the stock market average. The researchers then interviewed senior people at these organisations as well as examining business case studies

and media articles. They proposed a nine-factor model for Australian organisational success.

Those factors are:

- Effective execution
- Perfect alignment
- Adapt rapidly
- Clear fuzzy strategy
- Leadership, not leaders
- Looking out, looking in
- Right people, committed and proud
- Manage the downside
- Balance everything

The researchers also introduced a concept called '*The Strategic Cycle of Growing Organisations*'. This model suggests that over a period of time, as 'Winning' Australian organisation grew and became more successful, reaching their limit domestically, they looked for growth opportunities overseas. A number of these organisations were at different stages of this model but all had at least shown dominance in the domestic market and had progressed into the 'Domestic – International' arena.

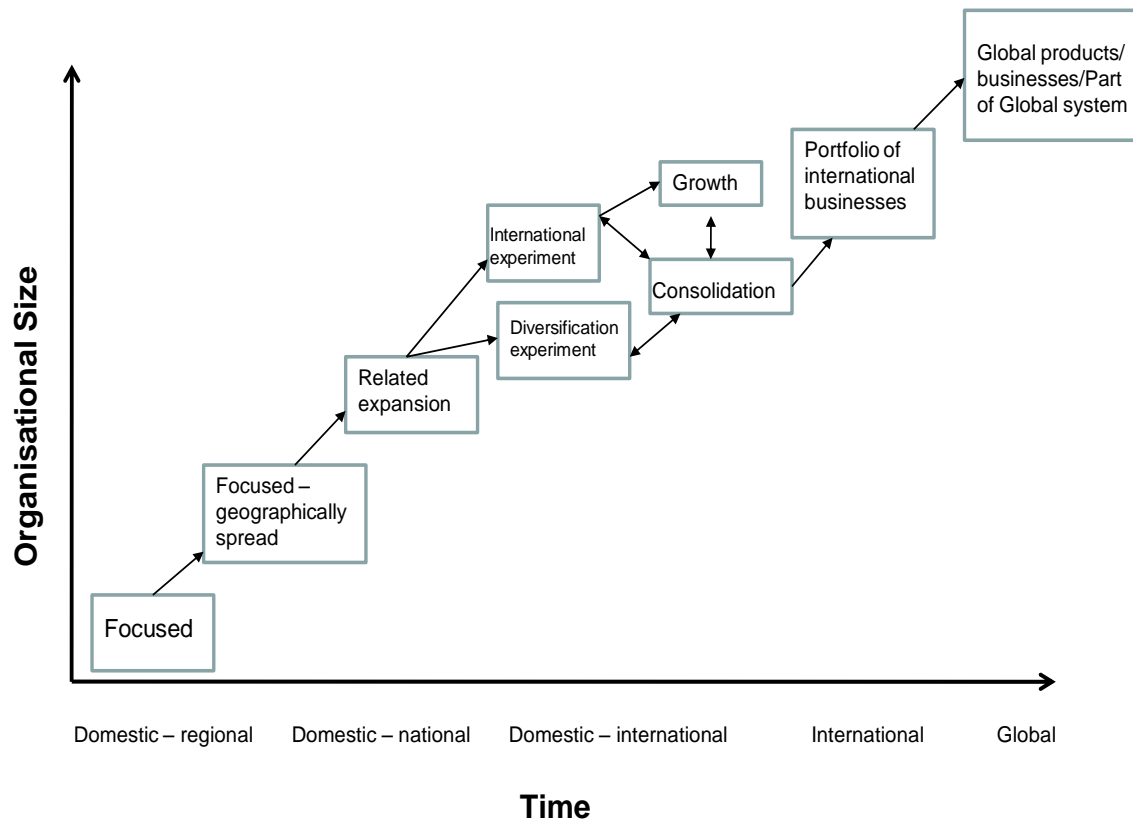


Figure 2.3 – Strategic Cycle of Growing Organisations. Hubbard, Samuels, Heap, & Cocks (2001)

Hubbard et al. (2002, Chapter 11) addressed the question “How does Australia make it different? Is good business practice global, or is there something unique about business practice and context in Australia that makes succeeding here different?”

They suggested seven key differences, viz.:

- specific comparative advantages that Australia has
- immaturity of organisations exposed to local and international competition
- different motivations of Australians for working in organisations

- consequent different leadership styles that are unnecessary for leading successful organisations in Australia
- small market size of Australia
- use of ideas from overseas, and
- growing influence of government in developing organisations in the business environment.

‘The specific comparative advantages of Australia’ refers to the type of business that has been developed as a result of all our obvious capabilities. For example, Australia’s large resources and agricultural base provided a natural foundation for the development of major Australian industries and organisations in farming and mining. The research only identified Rio Tinto as a winning organisation, yet failed to identify BHP: it is important to point out that the study was done in 1999, and since then, BHP merged with Billiton to become the largest mining company in the world.

‘The immature Australian business environment’ looked at the major changes that the Australian government introduced before and after 1980 that had a significant impact on the way Australian companies did business locally and overseas. Examples of these could be the reduction of tariffs and opening up of local markets to international competition.

‘Different motivations’ compared the difference between Australian and US workers and why they chose their companies to work for. Hubbard et al. (2002) suggest that Australians needed to identify a ‘cause’ in working for their organisations, whereas the US workers were looking for “big hairy audacious goals” (BHAGs).

‘Different leadership styles’ again looked at the differences between Australian and US leaders. Australians looked for captain/coach type leaders whereas the US workers were comfortable with leadership/decisions coming from the top, and little was questioned in terms of top-down direction. The researchers referred to the Karpin Report (1995) which describes captain/coach leadership as, ‘to have a go’ attitude, challenge or change the rules, “can-do Aussie battler” attitude, pioneering for Australia, determined or tenacious, and team oriented.

‘Australia’s small market size and spread’ is fairly straightforward and addresses the small population that Australia has, as well the difficulty in managing a commercial operations on a land mass the size equivalent to the continental US and/or China.

‘Big overseas influences on Australian organisational development’ refers to the impact of large multinational organisations and how that has moulded the Australian thinking. An issue that is not discussed is the failure of international change programs and a lack of buy-in from Australian organisations (Karpin Report, 1995).

‘The role of government in developing winning organisations’ discusses how large government departments have transformed into successful business ventures. The researchers referred to Qantas, the Commonwealth Bank and Telstra as good examples of this transformation. Hubbard et al. fail to discuss how governments, through legislation, can influence Australian organisations to adopt good management and business practices.

Apart from the Karpin Report, no other data supported Hubbard et al. suggestions, although some of the reasons given are quite obvious, for example, Australia’s market size.

Hubbard et al. finally compare their research with similar research on high-performance theories. Specifically, they compare their First XI with Peters & Waterman's '*In Search of Excellence*' (1982), Collin & Porras' '*Built to Last*' (1994), and Collins' '*Good to Great*' (2001). Their conclusions are that these factors or elements that are found across the three studies have a large degree of consistency and that this is not surprising. They state that organisations fail to apply these practices, hence raising an interesting question about the success of transformational initiatives. However, they used the same retrospective approach to their research and the same criticism was made regarding '*Good to Great*' about the *Halo Effect*, stating that it is equally applicable to their *First XI*'.

2.6.1 TQM, ISO 9000, and Business Excellence research in Australia.

The literature review was expanded to include Business Excellence, Total Quality Management (TQM) and ISO activities in the Australian context. The number of papers published was limited in these areas for Australia.

One of the earlier studies on Australian quality management practices was conducted by Beaumont et al. (1997). It examined the differences between the service and manufacturing industries. They found that manufacturing organisations applied quality management principles more than service industries; manufacturers were more likely to have single-sourced suppliers whereas serviced industries were more likely to use multiple sourcing; and the service sector was more inclined to use consultants for quality management training. Their research confirmed there was no difference between the service and manufacturing industries in the following areas:

- a) Neither sector showed any correlation between profit growth and quality management practices.
- b) The period of use of quality management practices did not differ.
- c) There was no significant difference in patterns of training, either in quality practices or in factors affecting the adoption of quality management practices.

Rahman and Bullock (2005) studied the relationship of soft and hard TQM factors on performance. They defined soft TQM factors as: workforce commitment, shared vision, customer focus, use of teams, personnel training, and cooperative supplier relations. Hard TQM dimensions were defined as: computer-based technologies, JIT principles, technology utilisation, and continuous improvement enablers. The results of their study (261 Australian manufacturing companies) showed significant positive relationships between soft TQM and hard TQM elements. In addition to direct affects, soft TQM also had indirect effects on performance through its effect on hard TQM.

Similar to Rahman and Bullcok (2005), Gadenne and Sharma (2009) investigated the 'soft' and 'hard' quality management factors (Powell, 1995) and their impact on organisational performance for Australian Small to Medium Enterprises (SMEs). They surveyed 119 Australian SMEs and found that organisational performance appears to be favourably influenced by a combination of 'hard' TQM factors such as benchmarking and quality measurement, continuous improvement, and efficiency improvement, as well as 'soft' factors such as top management philosophy and supplier support, employee training and increased interaction with employees and customers.

Feng et al. (2007) studied the relationship of ISO 9000 implementation and business performance of 613 manufacturing and service organisations in Australia and New Zealand. They found a positive and significant relationship between certification practices (implementation, organisational commitment and planning) with operational performance. However, the relationship between these practices and business performance was found to be positive but not significant for the variables that were studied; organisational commitment to certification was found to be most strongly related to operational and business performance.

Grigg and Mann (2008) conducted a survey on behalf of SAI Global, the current custodian of the Australian Business Excellence Framework (ABEF), focusing on how Business Excellence frameworks are designed, reviewed, promoted and deployed within and across nations. SAI Global's objectives of the study were to understand how they could enhance the ABEF and increase the use of the framework within Australia. A key finding of the research was that of the 276 organisations surveyed, 90.5 percent had not heard of the ABEF. This was a telling statistic regarding BE understanding and implementation. However, indications are that this level of awareness did not differ considerably from many other nations with over 50 percent of other BEF custodians indicating a similar level of awareness. Some countries like Brazil and Canada have, over recent years, increased awareness levels substantially. Brazil cites this increase due to the introduction of a number of regional and sectoral programs/awards aligned to Business Excellence, and the teaching of Business Excellence at universities. Canada cites its increase as due to the introduction of programs that complement Business Excellence, such as the Healthy Workplace program.

Feng et al. (2006) compared the TQM practices of Australian and Singaporean companies to see how these practices impacted their performances. They surveyed 194 Australian and 58 Singaporean firms and found that impact levels of the TQM practices on organisation performances were the same between the two countries. This may be because both Australia and Singapore are similar in terms of their economic development and the evolution of TQM.

2.7 Business Excellence Models

The literature review examined various business excellence models that exist in countries globally (Figure 2.1, Bubble 6). Table 2.4 summarises eight various business excellence models. The models seem to be very similar. All eight models assess dimensions of leadership, people, strategy and planning, customer and market focus, success or results, process management and improvement, and the basis for assessing organisational excellence. There are a few other factors such as innovation information and knowledge, learning, and measurement, that are included in some of these models, but the essence of each is very similar.

Some of these models have been applied for more than 20 years, and the adoption of these models has been varied. The Baldrige Awards in US and the European Foundation for Quality

Table 2.4 – Summary of Business Excellence Models/Awards

Attributes	Business Excellence Award Australia	EFQM Europe	CII India	IEM Latin America	JQA Japan	SQA Singapore	Baldrige Award USA	PROBE
Leadership	X	X	X	X	X	X	X	X
People	X	X	X	X	X	X	X	X
Strategy & Planning	X	X	X	X	X	X	X	X
Customer & Market Focus	X	X	X	X	X	X	X	X
Success (Results)	X	X	X	X	X	X	X	X
Sustainability	X	X	X	X				
Process Management	X	X	X	X	X	X	X	
Improvement	X	X	X	X				X
Innovation	X					X		X
Information & Knowledge	X				X	X	X	
Learning						X		X
Measurement					X		X	X
Partnership		X	X					
Productivity								X

Source: <http://www.saiglobal.com/professionalservices/Awards/>

<http://www.efqm.org/>

<http://www.cii.in/Awards.aspx?enc=5Qj31akllo6Y7nuU38ndAvRTb9+LMcrWZ1AnlukE3DbrbL2eeJ9usRq0KAp+No1M>

<https://www.iqac.com/en/index.asp>

<http://www.sqcentre.com/our-programs/corporate-excellence-programs/business-excellence-niche-standards-and-sqa/meeting-the-standards-of-the-singapore-quality-award-sqa-7-hrs/>

<http://asq.org/learn-about-quality/malcolm-baldrige-award/overview/overview.html>

Management (EFQM) in Europe create significant interest in the business community. Understanding the factors that impact business excellence and the ability for an organisation to implement the changes necessary to drive business excellence are two very different issues, and one could argue that ‘execution capability’ should be a factor to include in the business excellence model.

The value of applying for awards such as Malcolm Baldrige has been questioned by Jacob et al. (2004). Critics of this award cite three major problems. The first is the cost of applying for the award. Organisations such as Xerox and Corning have reported spending over USD800,000 and 14,000 man-hours in 1989 for their applications. Second, the award may not be indicative of exceptional quality. Third, the poor financial performances of some of the past winners (for example, General Motors Cadillac Division, Motorola, Wallace Company, and Federal Express) suggest that the Award is not an accurate measure of a company's competitiveness and profitability. Jacob et al. (2004) focused their research on how the Baldrige Award winners perform with respect to several accounting, profitability and market metrics. They found that the award winners perform significantly better (financial performance was 11 percent higher) when compared with a group of similar-sized firms and industry benchmarks in terms of accounting and financial performance measures. They also examined whether the award adds value to its winners or whether the winners are the more successful firms to begin with. Their results suggested that firms that win the award are more successful firms in their respective industries both before and after the award, thus implying that winning the Baldrige Award per se does not cause changes in the firms' value for award winners.

Another aspect that is worthy of study are the incentives for organisations to adopt these principles. Is there a role for government to drive these practices or should organisations rely on company boards to sponsor these initiatives? An interesting analogy could be that of the banking sector and the Global Financial Crisis. In 2009, many business analysts were calling

for greater government regulation, especially as the governments, with their tax payer bailouts, had a vested interest in supporting these financial institutions.

Many academics have modelled Business Excellence, and of these, most have used structural equation modelling (SEM). SEM encompasses a number of new and conventional statistical techniques such as multiple regression, factor analysis, and uni- and multi-variate analysis of variance. SEM was developed from the combination of path and factor analysis. Path analysis models examine the relationships between observed variables of interest. Factor analysis models the relationship between item responses, or observed indicators, and underlying theoretical constructs as latent variables that are not directly measured (Kline, 2005).

The most frequent name that appeared in the area of Business Excellence modelling over the past 15 years has been that of Gopal Kanji. Kanji (1998) set out to measure Business Excellence by introducing a Business Excellence Index (BEI). The BEI is an approach to measuring customer, employer and shareholder satisfaction, simultaneously. Kanji constructs a latent variable structural model⁷ using 14 quality dimensions or latent variables (4 principles and 8 core concepts as shown in Figure 2.4).

⁷ Latent variable structural models allow researchers to represent causal relationships and test the strengths of these relationships statistically.

They include the following:

- Leadership
- Delight the customer
- Customer satisfaction
- Internal customers are real
- Management by fact
- All work is process
- Measurement
- People based management
- Teamwork
- People make quality
- Continuous improvement cycle
- Prevention Business Excellence.

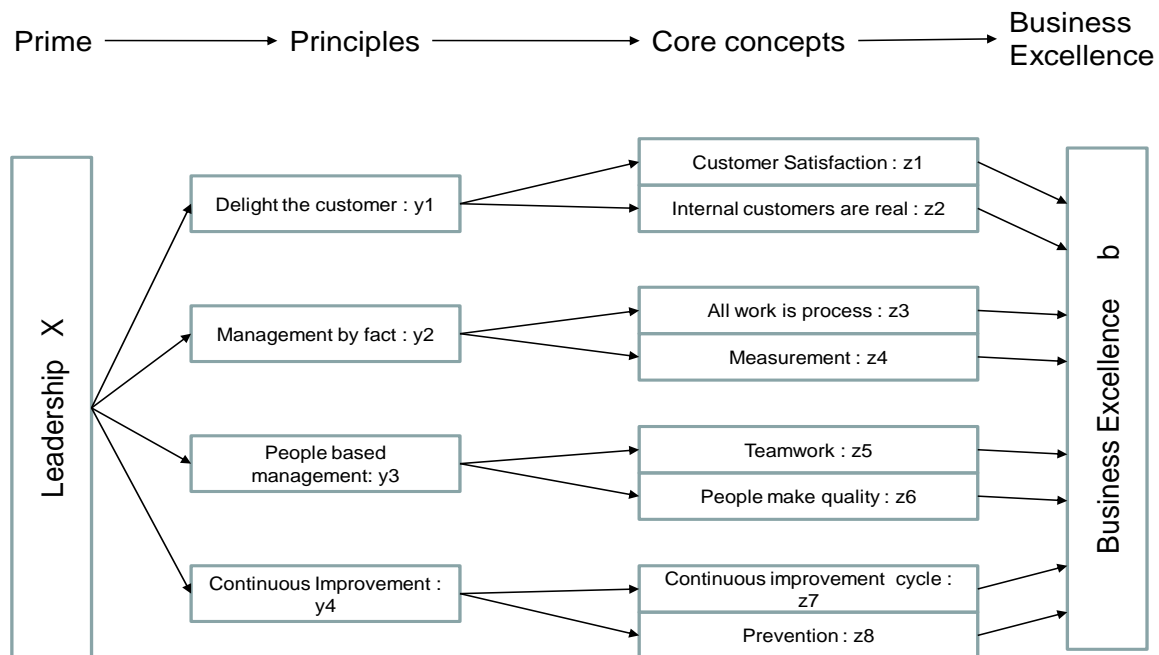


Figure 2.4 – Business Excellence Model proposed by Kanji (1998)

Survey data was gathered from 41 European manufacturing and nonmanufacturing organisations to identify the factor weight of his model. The purpose of Kanji's BEI was to identify those areas that an organisation needed to focus on to make it more competitive/successful. It also aimed to assist companies to determine whether they were ready to apply for Business Excellence awards such as the Baldrige Award.

Kanji and Wong examined whether supply chain management (SCM) could be enhanced with the application of total quality management (TQM) principles (1999). They created a latent variable structure model with 17 variables that focused on supply chain factors and surveyed 139 companies in Hong Kong to validate their model. The variables used were as follows:

- | | |
|---|---------------------------|
| • Cooperative culture | • Seamless operation |
| • Commitment to relationship | • Integrated structure |
| • Commitment to quality | • Performance measurement |
| • Commitment to supply partner satisfaction | • Information exchange |
| • Commitment to customer satisfaction | • Planning and prevention |
| • Supplier dynamics | • Customer satisfaction |
| • Cooperative goals | • Business Results |
| • Cooperative controversy | • Supplier contribution |
| | • Supplier satisfaction |
| | • Process Improvement |

Results of the research support the theory that companies focusing on creating cooperative culture with suppliers, and commitment to supplier relationship and quality, commit themselves to supplier satisfaction and develop cooperative relationship with supply partners, thus enhancing business excellence. In their conclusions, Kanji and Wong acknowledge the use of Deutsch's (1973) theory of cooperation and competition in their SCM Business Excellence Model. Deutsch proposed that the way in which people believe their goals are related is an important variable affecting the dynamics and outcomes of their interaction. The three alternatives in which people interpret goal interdependence are: cooperation, competition, and independence. Although competition is not a variable analysed or included in Business Excellence Models, this is the only source found that has addressed this factor.

Kanji and Wallace (2000) condensed Kanji's 14 variables model to 9 factors and linked these to Kanji's BEI. They used the data from their 1998 survey of 61 European manufacturing and non-manufacturing companies and concluded that their model allows any organisation to determine its weakness and focus on those areas that will deliver business excellence. The 10 factors were as follows:

- Leadership
- Delight the customer
- Customer Focus
- Management by fact
- Process performance
- People based management
- People performance
- Continuous improvement
- Improvement Culture
- Business Excellence

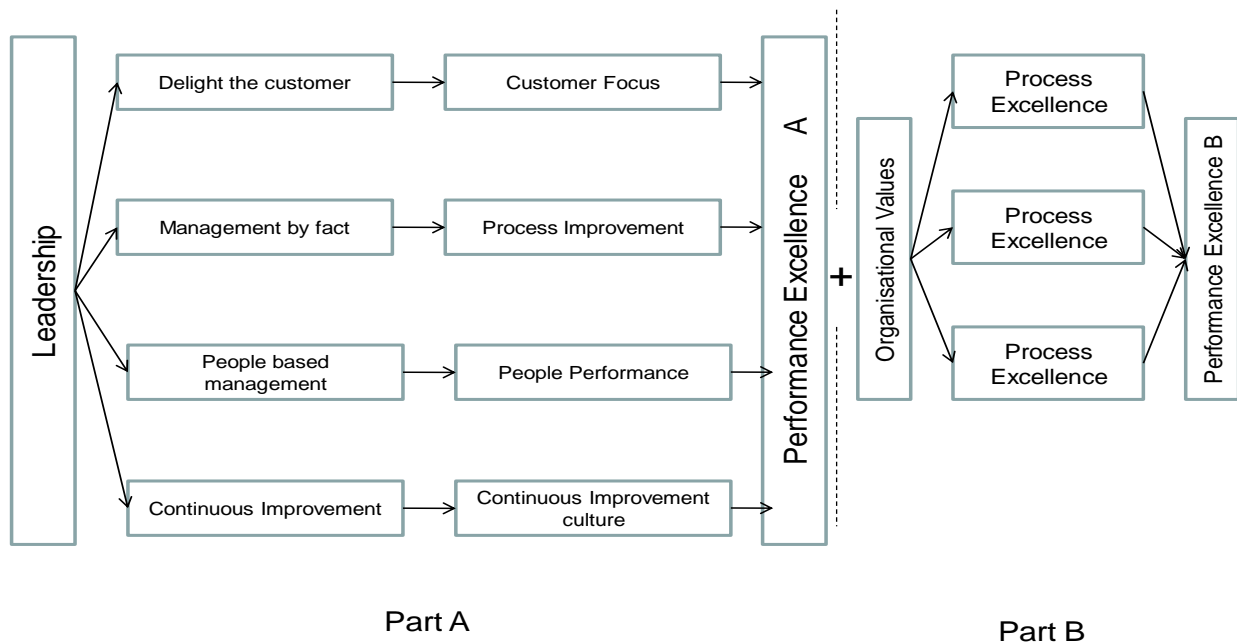


Figure 2.5a – Kanji Business Excellence Measurement System (2002)

However, this study failed to draw any conclusions as to why the simpler model (10 factors) worked just as well as the original 14 factors. Further, the authors do not describe how they measure Business Excellence. Again, although they acknowledge that they do not take into account shareholder value, they suggest that one can estimate the 'economic consequence of quality initiatives' acknowledging the difficulty in measuring business excellence.

As a by-product of his latent variable analysis work, Kanji (2002) introduced his business excellence measurement system (KBEMS), and claimed that this can be used to drive success by focusing the organisation's efforts on the 'real forces of excellence' to make business excellence happen. In essence, he redesigned his original 14 factor structure and divided his

model into two parts, including Part A - his 10 factors from his simplified model, and Part B - issues relevant to external stakeholders (Figure 2.5a). This is very similar to the EFQM approach to Business Excellence (Figure 2.5b).

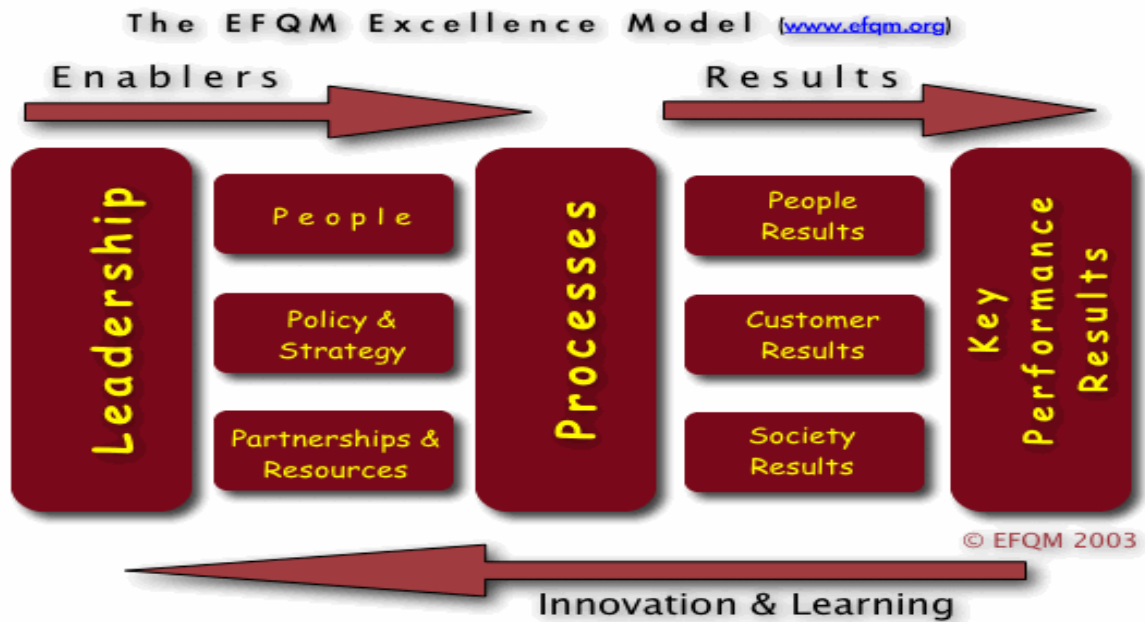


Figure 2.5b – EFQM Excellence Model

In concluding, Kanji acknowledges that the 'lack of integration among performance measures and, more noticeably, the difficulty in analysing the interactions between different performance dimensions remain important shortcomings.'

Curkovic et al (2000) compared the dimensions of TQM to the Malcolm Baldrige National Quality Award (MBNQA) and examined the extent of fit between the factors of MBNQA and its measures, using confirmatory factor analysis and SEM. They surveyed 526 plant managers in the US automotive industry and found that the empirical evidence strongly supports the relationship between the MBNQA and TQM in terms of four major constructs examined: (1)

TQM Strategic Systems, (2) TQM Operations Systems, (3) TQM Information Systems, and (4) TQM Results.

Bou-Llusar et al. (2005) conducted an in-depth analysis of the EFQM Excellence Model and examined how the 'enabler' and 'results' criteria were interrelated. They used a canonical correlation analysis to measure these relationships in 446 manufacturing and services companies in Spain. They found that the enabler criteria (Leadership, Policy & Strategy, People, and Process) were strongly related to the results criteria (Customer, People, Society, and Business).

Flynn and Saladin (2001) examined the validity of the theoretical model underlying the Baldrige Business Excellence model. The Baldrige Award was introduced in 1988 and the framework was revised in 1992 and 1997. Flynn et al. used Path Analysis⁸ to test the fit of each of the frameworks (1988, 1992, 1997). A total of 164 manufacturing companies were selected and surveyed from the World Class Manufacturing (WCM) database, Round II⁹. They found that all three frameworks (1988, 1992, 1997) were a good fit with the Baldrige framework and that the 1992 and 1997 were improvements on the 1988 framework.

For 'The criterion weights of the EFQM excellence model' , Eskildsen et al. (2000) examined the causal structure of the EFQM Excellence Model by developing a latent variable model based on the EFQM criteria and then testing the model by surveying 750 Danish companies.

⁸ Path Analysis is a technique based on regression to understand causal relationships between factors. It is an SEM technique.

⁹ WCM Round II had been expanded to include manufacturing plants in the US, Germany, Japan, England, and Italy.

They found that the theoretical framework fitted the data reasonably well. They then extended their initial research by establishing the criterion weights of the EFQM excellence model (2001). Their approach was again to use the Latent Variable method (SEM) to determine the weights and compare regression coefficients. In Denmark, 756 CEOs were surveyed and it was found that resultant weights were different between the EFQM enablers, suggesting that Danish companies viewed Business Excellence differently from those of other countries in the European Union.

Sila and Ebrahimpour (2005) conducted a very similar study to the ones described above using SEM and examined 23 TQM factors and their impact to business results. They surveyed 1,500 manufacturing companies across the USA, of which 220 responded. These then became the basis of their analysis. They examined the relationships between pairs of factors as listed below. The 23 factors were:

- Leadership to Strategic Planning
- Leadership to Information and analysis
- Leadership to Human resource management
- Leadership Process management
- Leadership to business results
- Strategic Planning to Customer focus
- Strategic planning to Human resource management
- Strategic Planning to Business results
- Information and Analysis to Strategic planning
- Information and Analysis to Customer focus
- Information and Analysis to Human resources management
- Information and Analysis to Process Management
- Human Resource management to customer focus

- | | |
|--|---|
| <ul style="list-style-type: none"> • Information and Analysis to Supplier management • Information and Analysis to Business Results • Process management to Business Results • Human Resource management to process management | <ul style="list-style-type: none"> • Human Resource management to supplier management • Human Resource management to Business Results • Supplier management to process management • Supplier management to business results |
|--|---|

They also found that of the 23 pairs of factors, 13 were significant in their proposed model. They also found that leadership, information and analysis played a significant role in shaping the quality focus of companies. Further, they concluded that the TQM factors are holistic and that synergies must be created among them to achieve favourable business results.

Fotopoulos and Psomas (2010) conducted a similar analysis. They examined the relationship between TQM and organisational performance using SEM. Some 370 Greek companies were surveyed and they found that the key TQM factors, those that impact customers, market share, and the natural and social environment, were: top management, employee involvement in the quality management system, customer focus, process and data quality management, and quality tools and techniques.

De Cerio (2003) also looked at the relationship between Quality Management and performance. He surveyed approximately 1,000 Spanish companies each employing more than 50 people and tested Flynn et al.'s (1995) conceptual model of quality – five dimensions or sets of practices relating to product design, the transformation process, links with

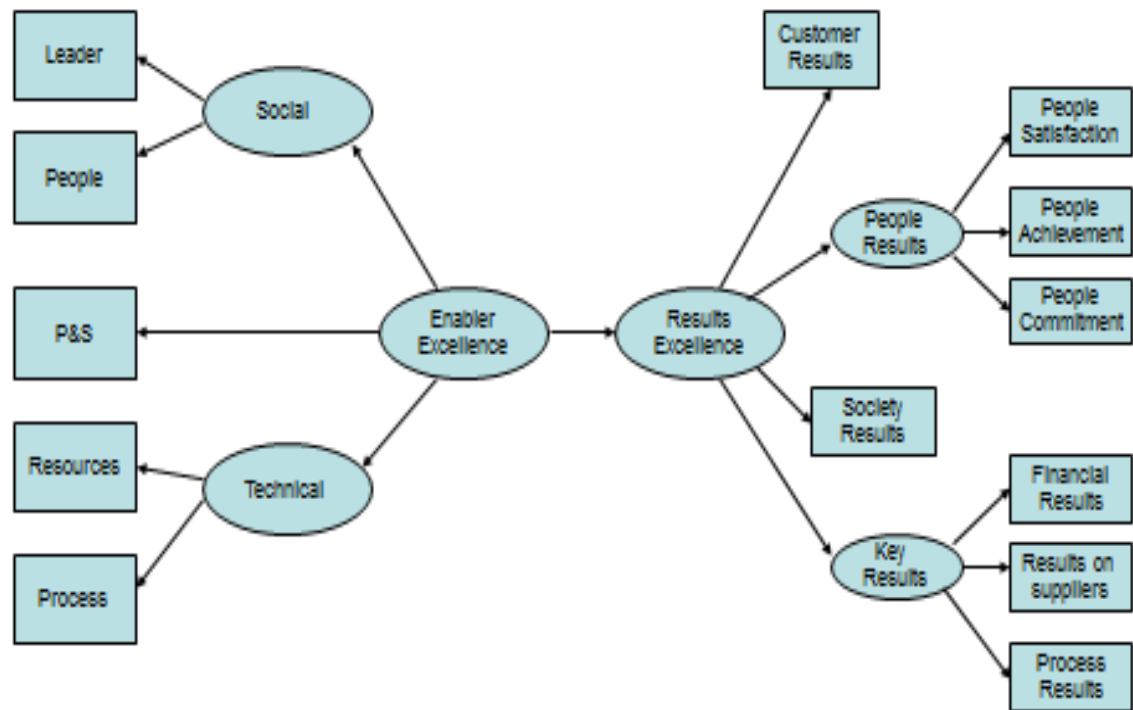
suppliers, links with customers and human resource management. He concluded that Quality Management was significantly related to the improvement in performance.

Lam et al. (2012) began to look beyond the association of TQM practices and performance by incorporating a mediating variable. They examined the impact of TQM practices and market orientation to service quality. Jaworski and Kohli (1993) define Market Orientation (MO) as the company's ability to gather, disseminate and respond to market intelligence. They surveyed 150 service firms in Malaysia and found that TQM practices do have a positive effect on both market orientations. They also found that MO is significantly related to service quality.

Bou-Llugar et al. (2009) examined whether the European Foundation for Quality Management (EFQM) and the Malcolm Baldrige National Quality Award could be a framework for TQM implementation specifically around the technical and social issues, the holistic interpretation of TQM within the firms, and the causal association between TQM procedures and the firm's performance. They proposed a multidimensional model (Figure 2.6), surveyed 446 Spanish companies, and through empirical validation (SEM) concluded:

- a) The EFQM enablers captured both the Technical and Social dimensions of TQM.
- b) Both the Technical and Social dimensions were interrelated, suggesting that an overall approach to TQM exists represented by the 'Enabler Excellence' construct in the Multidimensional Structural model.
- c) There is a 'Result Excellence' construct that underlines the level of deployment obtained by each criterion.

d) 'Enabler Excellence' has a strong positive influence on 'Results Excellence'.



Multidimensional Structural model finally analysed.
Bou-Llusar, Escrig-Tena, Roca-Pulgar, Beltran-Martin. Journal of Operations Management, 2009

Figure 2.6 – Multidimensional Structural model, Bou-Llusar et al. (2009)

In essence, the EFQM Excellence Model did reproduce the TQM framework and organisations could achieve TQM implementation by adopting the EFQM model.

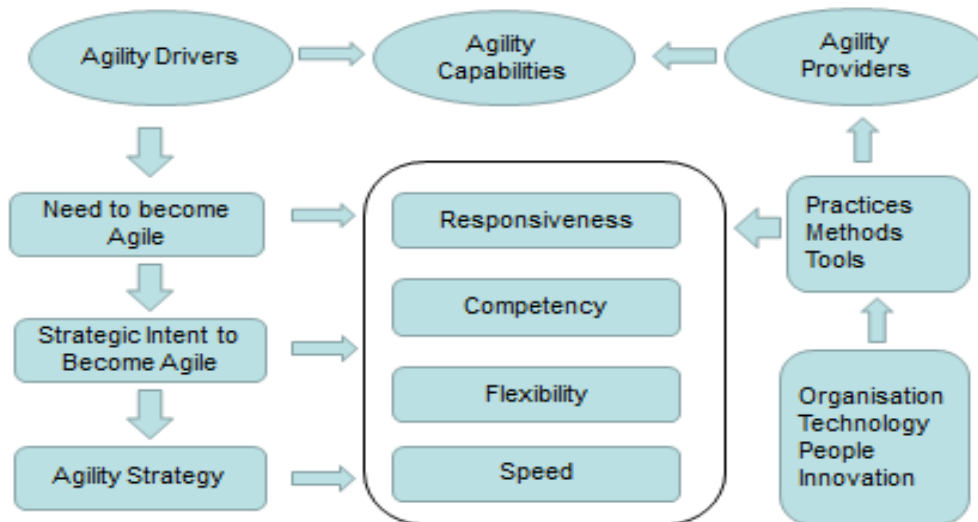
2.8 Organisational Agility

One of the earliest definitions of organisational agility was suggested by Sharifi and Zhang (1999). Their definitions were based on the Iacocca Institute in the US and the Agility Forum

in Bethlehem, Pennsylvania (Lehigh University). They defined Agility or Agile Manufacturing as:

‘The ability to cope with unexpected changes, to survive unprecedented threats of business environment, and to take advantage of changes as opportunities.’

They suggested that agility had two major factors: (1) Responding to change (anticipated or unexpected) in the appropriate way and time, and (2) Exploiting changes and taking advantage of them as opportunities. They developed a conceptual model which defined agility capabilities as responsiveness, competency, flexibility, and speed. Agility drivers were defined as business environment (need to become agile), and agility providers as the tools, methods, people, and technology. (See Figure 2.7).



Agility Conceptual Model: Sharifi & Zhang (1999)

Figure 2.7 – Agility Conceptual Model – Sharifi and Zhang (1999)

They tested this model by surveying 85 companies in the US and confirmed their definitions and the importance of being agile in a turbulent business environment.

Ganguly et al. (2009) set out to define a measure for *Agility* and conducted a detailed literature review on various definitions of Agility. They found that most definitions included:

- Speed / time
- Cost
- Responsiveness
- Quality, and
- Customer needs.

They also discussed the differences between Lean, Flexible, and Agile manufacturing as the transitioning structures of organisations towards agility. Their research suggested three metrics that might aid an enterprise to assess its agile characteristics in its market. These three measures were:

- Market Share
- Responsiveness
- Cost Effectiveness

They then applied these measures to Apple's digital media sector (iPod, iTunes, iPhone etc.) as a case study to determine the applicability of their measures and found that Apple, with an agile score of 7.15 out of 10 (Ganguly et al., 2009), was indeed 'agile' in nature.

In examining the definitions of agility, a similar concept that required further clarification is *Flexibility*.

De Leeuw and Volberda (1996) used the system theory of control to define flexibility. They suggested that flexibility can be viewed as relationship between an organisation and its environment, and that flexibility is concerned with management's ability to utilise its resources to meet the changes of its environment.

Golden and Powell (2000) provided us with a much more detailed definition around flexibility. They introduced the concept of organisational and strategic flexibility. They focused their research on organisational flexibility and concluded that flexibility had four dimensions: Temporal, Range, Intention, and Focus. Temporal is described as the length of time that it takes an organisation to respond to environmental changes. Range is the degree to which an organisation can adapt to foreseeable and unforeseeable changes. Intention is the degree to which an organisation takes an offensive or defensive stance towards flexibility. Focus relates to the two types of strategic flexibility: internal and external. They then suggest four measures for flexibility, as follows:

- Efficiency
- Responsiveness
- Versatility
- Robustness

De Toni and Tonchia (2005) attempt to define and seek to understand the linkages of operational and strategic flexibility. They defined operational or manufacturing flexibility as

the ability of a manufacturing system to adapt to changes in the environmental conditions.

They suggested that strategic flexibility could be viewed in four ways:

1. The speed at which the competitive priorities can be varied within a business. It is directly related to operational flexibility, understood as the capacity for variation of the practices in the time dimension – the strategic level of reference is at the business unit level.
2. Amplitude and positioning of the strategic options at a certain instance within a business. The amplitude is an index of the numerousness of the possible options, while the positioning is an index of their place in the multi-dimensional space of the strategic choice.
3. Rapidity of movement from one business to another. It is directly related to the operational flexibility, understood as the capacity for variation of the competences in the time dimension - the strategic level of reference is the corporate one.
4. Amplitude of the potential business that can be reached at a certain instance, a function of the available competences.

A summary of the link between operational and strategic flexibility is found in Table 2.5 below.

Table 2.5 – Link between strategic and operational flexibility, De Toni and Tonchia (2005)

Characteristic of the variation		Object of variation			
		Operational Level		Strategic Level	
		Quantity of output	Composition of output	Competitive priorities	Businesses
State conditions		Productive capacity	Product range	Scope of strategic options	Variety of Businesses
Transition	Reversible	Volume flexibility	Mix flexibility	Speed of variation of the competitive priorities	Rapidity of movement between businesses
	Irreversible	Expansion flexibility	Product flexibility		

Sherehly et al. (2007) conducted a detailed literature review and characterised an agility enterprise in terms of ‘global strategies’ and ‘organisation and workforce’. A summary of these characteristics is found in Tables 2.6 and 2.7 below.

Table 2.6 – Definition of agility in terms of global strategies – Sherehly et al (2007)

Customer	<ul style="list-style-type: none"> • Enriching the customer • Customer-driven innovation • Customer satisfaction
Cooperation	<ul style="list-style-type: none"> • Cooperating to enhance competitiveness • Internal and external co-operation • Strategic relationship with customers • Close relationship with suppliers
Organisational learning and knowledge development	<ul style="list-style-type: none"> • Leveraging the impact of people, knowledge, information and creativity • Continuous training and development of people • Core competence management • Continuous extraction of tacit knowledge related to customers’ references, service/production processes and work organisation
Culture of Change	<ul style="list-style-type: none"> • Continuous monitoring of internal and external environment to identify changes and opportunities • Continuous updating and revision of business strategies • Continuous improvement, experimentation and improvisation • Product-related change capabilities • Change competency within operations • Capability for re-configuration

Table 2.7 – Definition of agility in terms of organisation and workforce – Sherehly et al (2007)

Organisation	
Authority	<ul style="list-style-type: none"> • Decentralised knowledge and control • Fewer power differentials (fewer titles, levels, status dimensions, etc.) • Less adherence to authority and control • Loyalty and commitment to project or group • Authority tied to tasks • Authority change when tasks change • Wide span of control
Rules and procedures	<ul style="list-style-type: none"> • Few rules and procedures • Low level of formal regulation (in respect to job description, work schedules) • Fluid role definitions • Informally organised
Coordination	<ul style="list-style-type: none"> • Informal and personal coordination • Delegation of tasks and decision-making • Network communication • Goal-directed
Structure	<ul style="list-style-type: none"> • Flat, horizontal, matrix, networked or virtual structure • Teamwork, cross-functional linkages • Loose boundaries among function and units
Human Resources Management Practices and Structure	<ul style="list-style-type: none"> • Employee empowerment • Employee involvement • Job rotation • Job enrichment • Autonomy in decision-making • Information and knowledge access • Teamwork • Multifunctional teams • Multiple skills trainings • Workforce development and training • Differentiation and diversity development
Agile Workforce	
Proactivity	<ul style="list-style-type: none"> • Anticipation of problems related to change • Solution of change-related problems • Personal initiative
Adaptivity	<ul style="list-style-type: none"> • Interpersonal and cultural adaptability • Spontaneous collaboration • Learning new tasks and responsibilities • Professional flexibility
Resiliency	<ul style="list-style-type: none"> • Positive attitude to changes, to new ideas, technology • Tolerance to uncertain and unexpected situation • Coping with stress

Arteta and Giachetti (2004) confirmed what seems to be an obvious statement, that if agility is the ability of a system to respond to change, then less complex processes are easier to change and are thus less agile. They tested their theory within a telecommunication company and confirmed their hypothesis.

Dreyer and Gronhaug (2004) examined the relationship of flexibility and performance. They conducted a longitudinal study and found that flexibility had four 'dimensions': Volume, Labour, Product, and Financial, and that when studying the management of flexibility these dimensions may conflict with one another. They also suggested that not all dimensions are equally important and that these four dimensions are dependent on the competitive environment. They concluded that flexibility is a valuable skill that has a major impact on competitive positioning.

Meredith and Francis (2000) defined organisational strength as a firm's ability to be proactive, adaptable, flexible, fast, a culture of learning, and to be able to effectively manage change. They defined agility as having four key components or quadrants:

a) Agile Strategy

- a. Wide Deep Scanning
- b. Strategic Commitment
- c. Full Deployment
- d. Agile Scoreboard

b) Agile Processes

- a. Flexible Assets and Systems
- b. Fast New Product Acquisitions
- c. Rapid Problem Solving
- d. Rich Information Systems

c) Agile Linkages

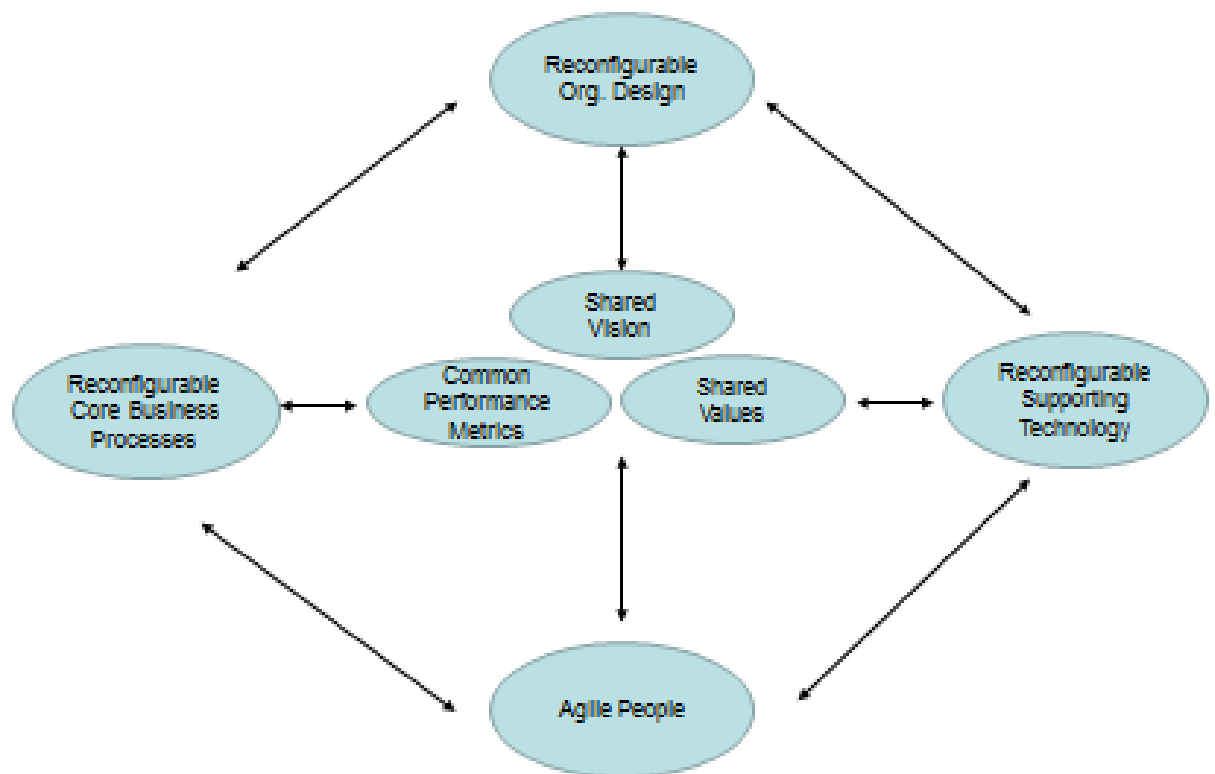
- a. Agility Benchmarking
- b. Deep Customer Insights
- c. Aligned Suppliers
- d. Performing Partnerships

d) Agile People

- a. Adaptable Structures
- b. Multi-Skilled / Flexible People
- c. Rapid, able decision-making
- d. Continuous learning

Crocitto and Youssef (2003) conducted a literature review and reaffirmed the concept that agility is vitally important to an organisation's competitiveness and success. They also suggest that the integration of the human aspects, that is, the role of people, with the technical sphere are important in their model of agility and that therefore, leadership, organisational culture and employee reward systems are key in building a relationship between people and technology.

Dyer and Shafer (1998) conducted a literature review and examined the human aspect of organisational agility, specifically strategic resource management and its relationship to organisational effectiveness. They suggest that agile organisational capability plays an important role in organisational effectiveness. Their model for Agile Organisational Capability, Figure 2.8, shows that a key component is 'agile people'.



Agile Organisational Capability

Figure 2.8 – Model of Agile Organisational Capability – Dyer and Shafer (1998)

They summarised personal competencies of agile people. They suggest that initiative, rapid redeployment, spontaneous collaboration, innovation, and learning are enhanced by the extent to which people throughout an organisation are business driven, focused, generative, adaptive, and values driven.

Bernardes and Hanna (2009) conducted a detailed literature review to examine the overlapping use of the terms flexibility, agility and responsiveness in operations management literature, and to clarify their differences. They concluded that flexibility is

associated with the inherent property of systems which allows them to change within pre-established parameters. They defined agility as an approach to organising that provides for rapid system reconfiguration in a dynamic business environment, and finally defined responsiveness as a system behaviour involving timely purposeful changes in the presence of changing external situations. A summary of their definitions is found in Table 2.8 below.

Table 2.8 – Summary of proposed conceptualisation of flexibility, agility, and responsiveness: Bernardes and Hanna (2009).

Organisational perspective	Flexibility	Agility	Responsiveness
Scope	Operating characteristic	Business level organising paradigm	Business level performance capability
	Inherent system property	Approach to organising the system	System behaviour or outcome
Definition	Ability of a system to change status within an existing configuration (of pre-established parameters)	Ability of the system to rapidly reconfigure (with a new parameter set)	Propensity for purposeful and timely behaviour change in the presence of modulating stimuli

2.8.1 Supply Chain Agility

As a subset of Organisational Agility, a Supply Chain Agility review was conducted. Ismail and Sharifi (2006) proposed a model for an Agile Supply Chain based on an extensive literature search. They acknowledged the importance of supply chain agility as a “winning strategy for growth if not a basic one for survival in certain business environments”. They suggested that an Agile Supply Chain has the following characteristics:

- Market sensitive – Closely connected to end-user trends
- Virtual – Relies on shared information across all supply chains partners
- Network-based – Gains flexibility by using the strengths of specialist players, and

- Process aligned – It has a high degree of process interconnectivity between the network members.

They proposed a Design for Supply Chain model shown in Figure 2.9 below, and suggested that it needs to be integrated with their Supply Chain Model shown in Figure 2.10.

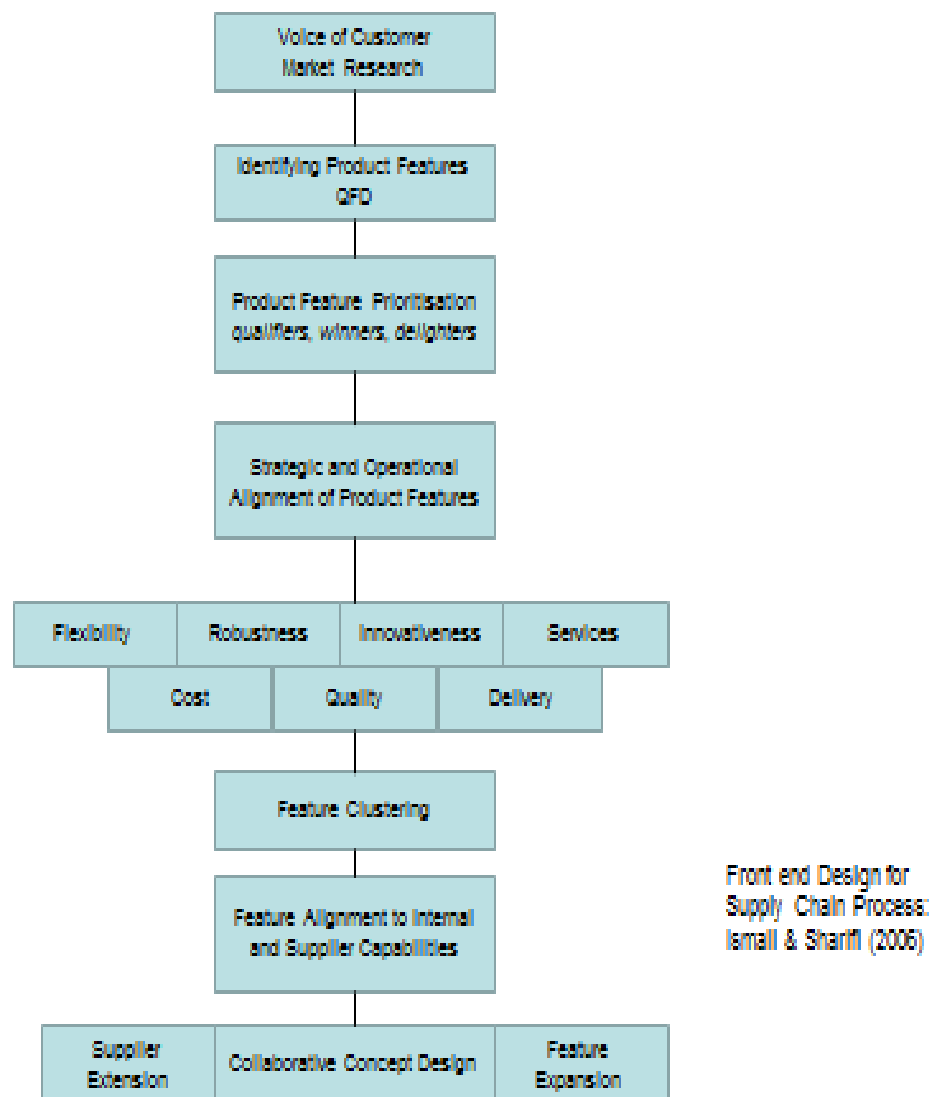


Figure 2.9 – Front end of Design for Supply Chain – Ismail & Sharifi (2006)

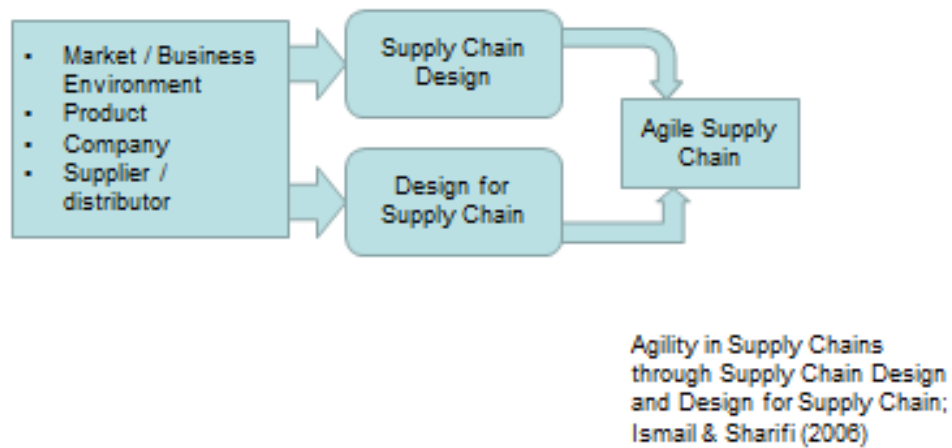


Figure 2.10 – Agility in Supply Chains through Supply Chain Design and Design for Supply Chain: Ismail & Sharifi (2006)

Ismail and Sharifi have incorporated aspects of Design for Six Sigma in their model, and acknowledge that supply chains need to reflect business, market environments and technology, and that a holistic approach is needed to build an Agile Supply Chain.

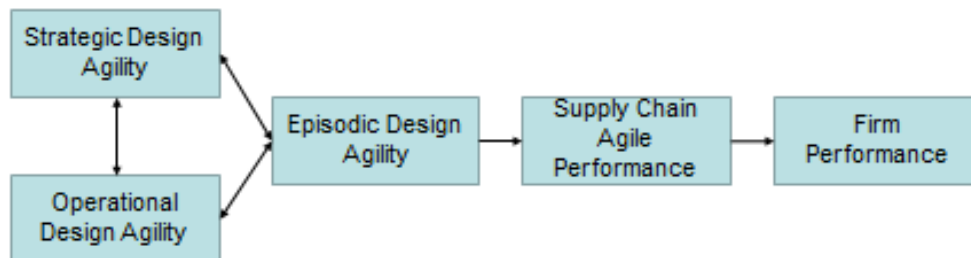
Li et al. (2008) suggest their approach to supply chain agility and investigate the linkages between supply chain agility and a firm's competitiveness. They define Supply Chain Agility as:

‘The result of integrating the supply chain’s alertness to changes (opportunities/challenges) – both internal and environmental – with the supply chain’s capability to use resources in responding (proactively/reactively) to such changes, all in a timely and flexible manner.’

They proposed a Work Design model of supply chain agility that has three levels:

- Strategic Design Agility
- Operational Design Agility
- Episodic Design Agility

After reviewing 583 papers, they suggested the following model that describes the linkage between Supply Chain Agility and competitiveness.



Linking Supply Chain Agility to Performance – Li et al (2008)

Figure 2.11 – Supply Chain Agility and Performance linkage – Li et al. (2008)

Li et al. (2009) suggest a different approach in measuring Supply Chain Agility.

Their two key aspects of this definition are: a) alertness to changes within the supply chain itself, as well as within its surrounding environment – as agility requires a timely awareness of change, and b) response capability. They proposed a model shown in Figure 2.12 as a method of measuring supply chain agility.

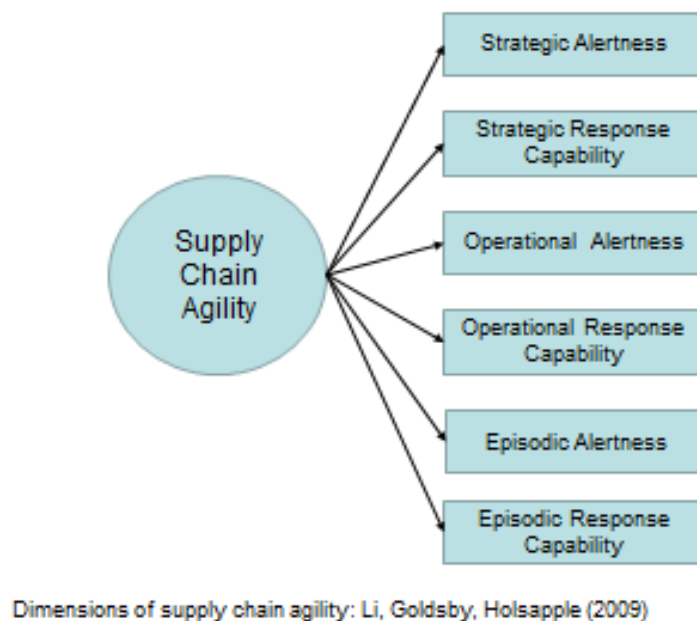


Figure 2.12 – Model proposed by Li et al. (2009) to measure supply chain agility.

The first four items in their model are self-explanatory. Episodic Alertness is defined as the supply chain's alertness, in a timely and flexible manner, to changes (due to changing internal or environmental conditions) for a timely and flexible task adjustment. Episodic

Response Capability is defined as the supply chain's ability to use existing or acquired resources to execute episodic tasks in a timely and flexible manner.

Through these definitions and via an experience survey and the use of expert judges, they developed a 12-item instrument that measures supply chain agility with a high degree of confidence in the scale's validity and reliability.

Lin et al. (2004) developed a supply chain agility index based on fuzzy logic - Fuzzy Agility Index (FAI). Based on an extensive literature review, they developed a framework for evaluating supply chain agility – Figure 2.13. Lin et al. used Sharifi and Zhang's (1999) concepts to evaluate supply chain agility. The model uses the agility drivers and agility capabilities to determine the required level of agility for a supply chain and equip the organisation to respond to this change.

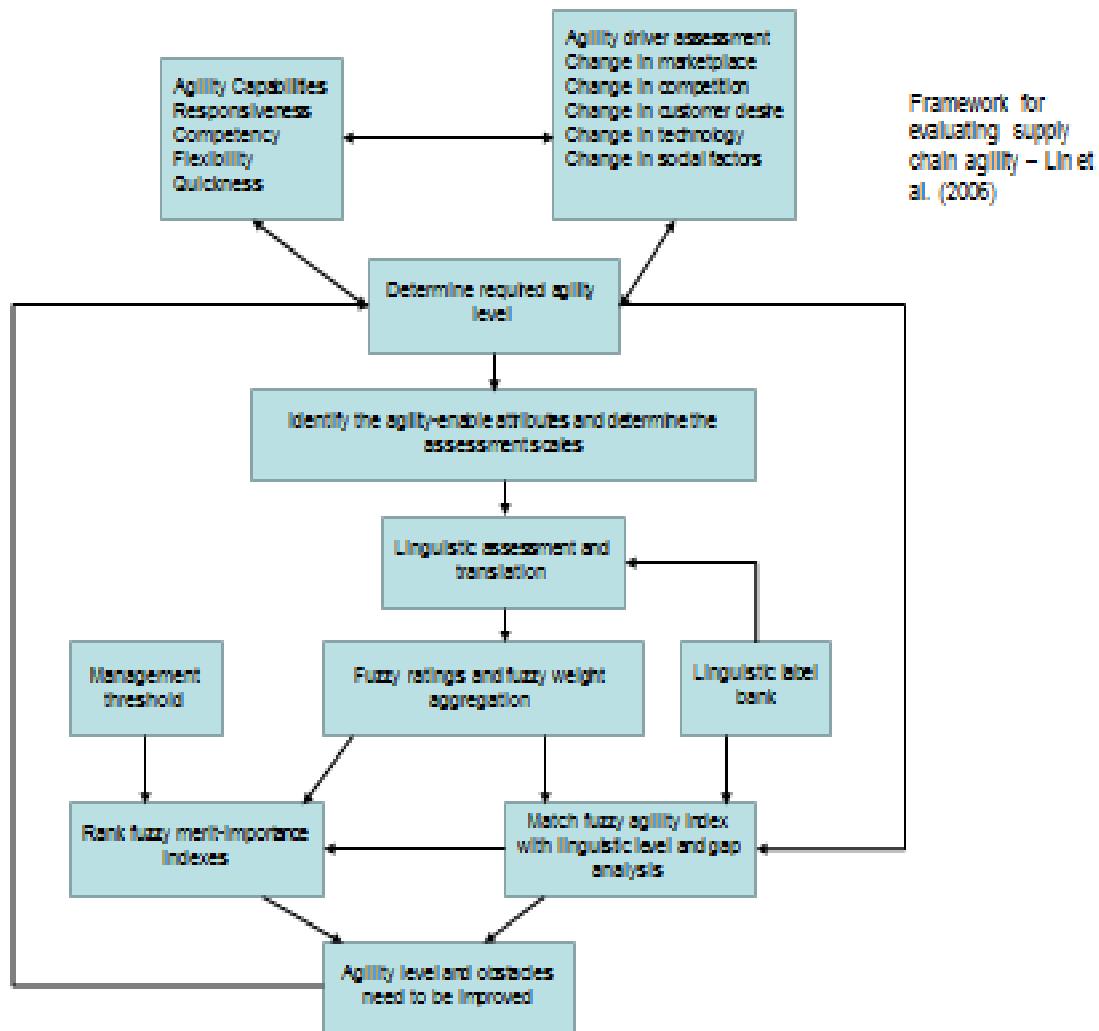


Figure 2.13 – Framework for evaluating supply chain agility – Lin et al. (2006)

They tested this framework on a Taiwan-based international IT products company and found that the measures developed did help the organisation to measure its supply chain agility, as well as to highlight areas on which the firm's leadership could focus.

Agarwal et al. (2007) used interpretive structural modelling to identify the key variables that impact supply chain agility. Interpretive structural modelling (ISM) is an interactive learning process in which a set of different and directly related elements is structured into a

systematic model. ISM helps identify the inter-relationships among variables. They used the model described in Figure 2.14 to apply the ISM approach.

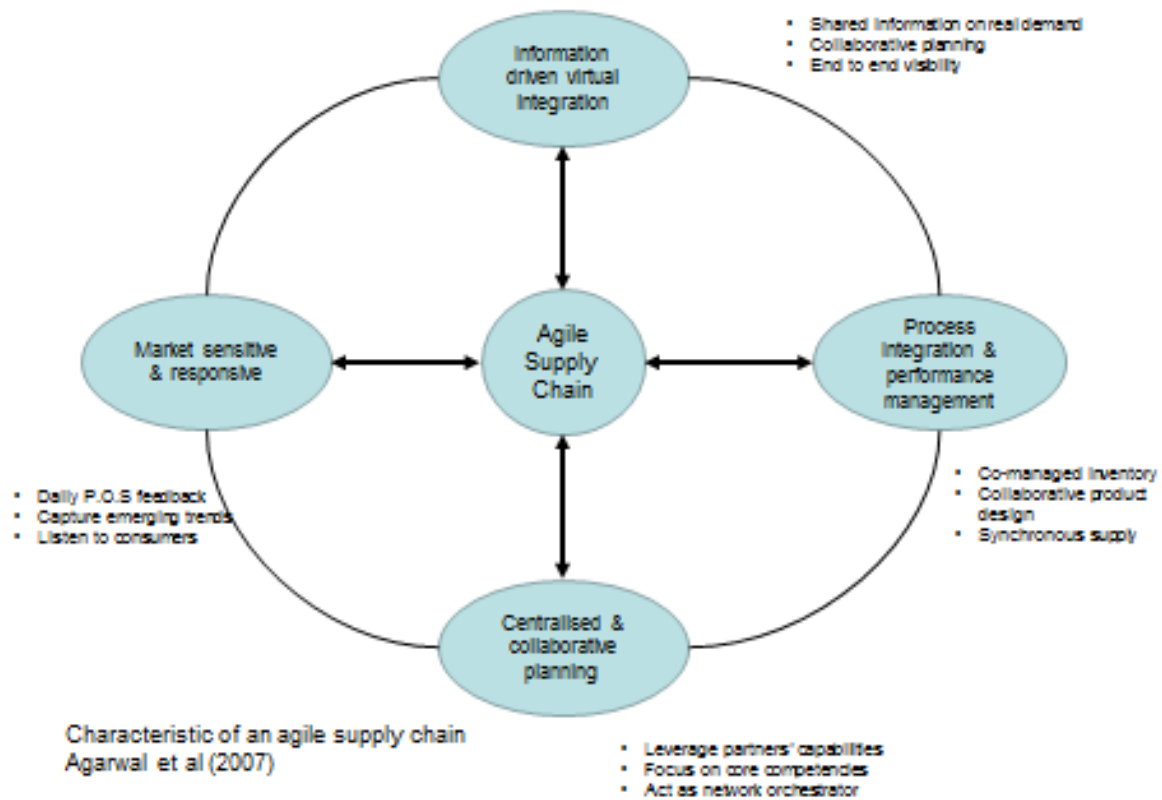


Figure 2.14 – Characteristic of an agile supply chain – Agarwal et al. (2007)

Figure 2.14 depicts that an agile supply chain is one in which is capable of sensing market changes and responding by making the supply chain changes to meet this demand. The outcome of the research of Agarwal et al (2007) found that supply chain agility depends on customer satisfaction, quality improvement, cost minimisation, delivery speed, new product introduction, service level improvement, and leadtime reduction. These factors above are identified as part of agility by Ismail and Sharifi (2006), Li et al. (2008; 2009), and Lin et al. (2004), and thus revalidate their conclusions.

Gligor (2014) conducted a literature review on the role of demand management in achieving supply chain agility. He found that having flexible manufacturing, distribution, and procurement systems is not enough to achieve supply chain agility. Flexibility in managing demand is also needed.

2.8.2 Network Agility

Research into Network Agility has increased in recent years. Lewis et al. (2008) set out to understand the role of IT and the complementary capabilities that create business network agility in a global context. They proposed the model shown in Figure 2.15 as their theoretical framework.

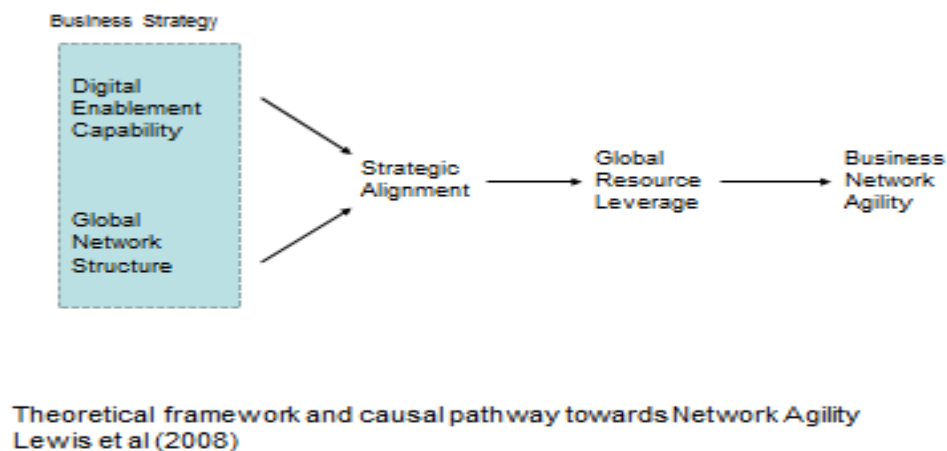


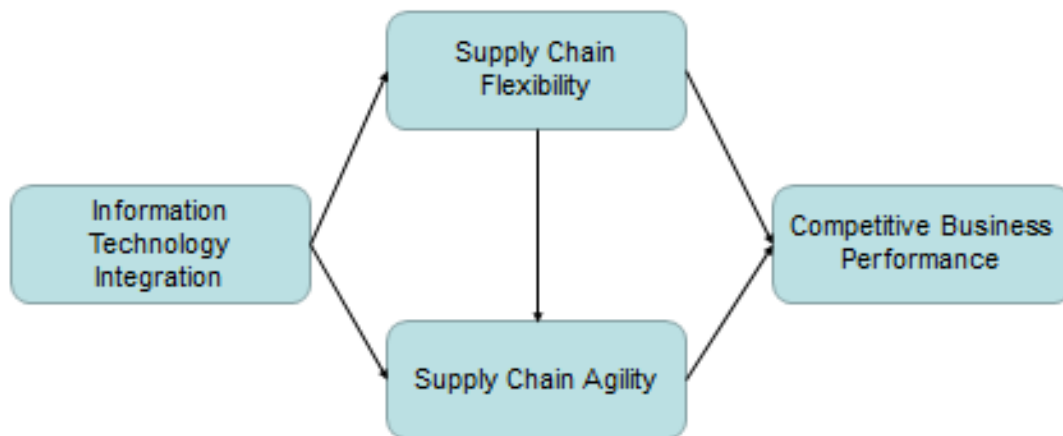
Figure 2.15 – Theoretical framework and causal pathway towards Network Agility- Lewis et al (2008)

Table 2.9 – Definition of Key Constructs for Business Network Agility

Construct	Definition
Digital Enablement Capability	The ability to deploy digital technologies to support business processes across global business networks
Business Network Structure	The arrangement of inter-unit linkages that gives firms access to critical competencies and contributes to the success of the overall business network
Strategic Alignment	The matching of digital enablement capabilities with global network structure to achieve optimum results
Global Resource Leverage	Assets under the control of the organisation that can be used to achieve its goals, including knowledge, information, and processes
Business Network Agility	The ability to respond and perform well in rapidly-changing business environments

They conducted two case studies in the apparel industry and found that despite the importance of developing an IT platform that can support network level capabilities, the role of technology may differ depending on a firm's business strategy and its position within its global network. Developing network-level capabilities is critical for firms operating in global environments that are characterised by dynamic demand, high uncertainty, and short product life cycles. Supply chain integration and agility are critical to the fulfilment of orders and the management of inventories, and ultimately for a firm's performance.

Swafford et al. (2008) also examined the impact of IT integration on supply chain agility and the firm's performance. They proposed that for an organisation to be agile, so too must its supply chain. However, to achieve supply chain agility, an organisation must have supply chain flexibility and IT integration. Their conceptual model is shown in Figure 2.16.

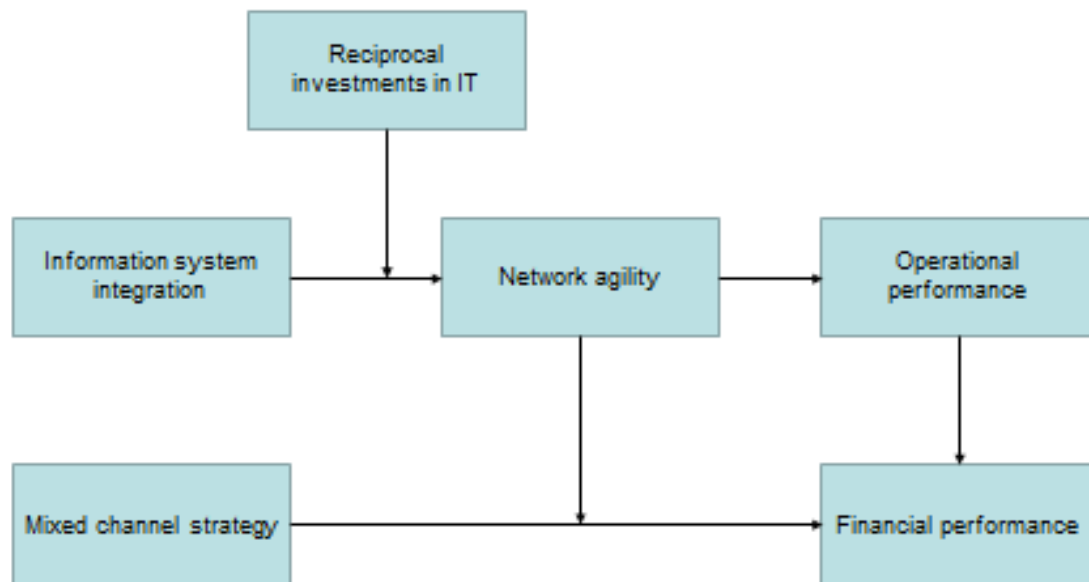


Conceptual framework of supply chain agility – Swafford et al (2008)

Figure 2.16 – Conceptual model for supply chain agility – Swafford et al (2008)

Swafford et al. clearly differentiate flexibility and agility. Based on their literature review they define agility as a measure of reaction time, and flexibility as a measure of a firm's capabilities. They conducted Confirmatory Factor Analysis to assess the validity and reliability of their measurement models of each of the constructs in their framework, based on 131 survey respondents. They found that IT integration enables a firm to tap into its supply chain flexibility, which in turn results in higher supply chain agility and ultimately higher competitive business performance.

Chen and Chiang (2011) conducted a case study involving a supply chain network in the optical storage media industry in Taiwan, and used it to develop a conceptual model to explain how a mixed channel strategy and superior network agility enhance a firm's performance. Their conceptual model is shown in Figure 2.17 below.



Conceptual model for enhancing network agility and implementing the mixed channel strategy: Chen and Chiang (2011)

Figure 2.17 – Conceptual model for enhancing network agility and implementing the mixed channel strategy: Chen and Chiang (2011)

They defined agility as having three interrelated capabilities: customer agility, partnering agility, and operational agility. Customer agility is defined as the ability to co-opt customers in exploring and exploiting opportunities for competitive actions. Partnering agility is defined as the ability to leverage assets, knowledge, and competencies of suppliers,

distributors, contract manufacturers and logistic providers in the exploration and exploitation of opportunities for competitive actions. Operational agility is defined as the ability to accomplish speed, accuracy, and cost in the exploitation of opportunities for competitive actions.

Network agility was defined as a firm's ability to sense the change and respond rapidly in supply chain networks in an intense competitive environment.

Chen and Chiang (2011) chose the CMC group of Taiwan, one of the largest optical storage manufacturing firms in the world, as its focal firm for the case study. They concluded that information systems integration influences a firm's performance through network agility, and that the mixed channel strategy boosts financial performance.

A significant number of papers were published in 2014 that investigated the relationship between Agility and IT/System Networks. While the topic of IT and Network Agility is not directly related to this research, it is a subset of organisational agility and therefore included in the literature review.

Chen et al. (2014) investigated the impact of IT on performance. They surveyed 214 IT and business executives in China and concluded that Business Process Agility mediated (interacts with) IT capability to improve a firm's performance.

Mathrani (2014) conducted a case study examining the positive impact of the deployment of Enterprise Systems to increase agility in three manufacturing organisations in New Zealand, and found that a significant impact was observed through concurrent engineering,

value chain integration, and the creation of virtual enterprise (the latter which proactively aligns work streams and increases responsiveness and flexibility).

Chung et al. (2014), using Partial Least Squares Structural Equation Modelling, found that organisational agility is positively associated with Mobile Enterprise Systems - the ability for employees to access their internal IT systems - so as to increase their efficiency and improve their competitiveness.

Lee and Yang (2014) found that a firm can enhance organisational performance in the flat glass industry in Taiwan, through organisational agility and strong network ties,.

Malekifar et al. (2014) conducted a literature review to examine the relationship between IT competencies, organisational culture, and supply chain agility for small-to-medium enterprises (SMEs). They suggest that IT competence has a positive effect on supply chain agility in SMEs.

They also proposed that organisational culture has a direct relationship with IT competence and supply chain agility in SMEs.

Monauni and Foschiani (2014) conducted a case study to examine the agility enablers in three German manufacturing companies. They found three agility enablers:

- Network Pooling: Mutual usage of similar resources owned by multiple network partners enabling greater scale.
- Network Aligning: Combination of distinct resources to form synergies and acquire unique features.
- Network Slack: Designated excess of resources above functional demand.

2.8.3 Dynamic Capabilities

A field of research that is closely linked to Agility is Dynamic Capabilities. Roberts and Grover (2011) state that agility is emerging as 'an important dynamic capability in contemporary business environments.' Barreto (2010) defines Dynamic Capabilities as a firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market oriented decisions, and to change its resource base. Barreto based his definition on the seminal article by Teece, Pisano, and Shuen (1997) and reviewed the research conducted since the 1997 paper. If we take Barreto's definition we see the similarities to Shariffi and Zhang's (1999) definition of agility, specifically agility drivers (sensing change) and agility capabilities (speed, responsiveness, competency, and flexibility). Barreto (2010) provides a thorough summary of the research conducted in the area of Dynamic Capabilities. Research conducted between 1997 and 2004 has been around characteristics of Dynamic Capabilities, while more recent research has focused on Dynamic Capabilities and performance outcomes. For example, Anand et al. (2009) reviewed 5 companies that had implemented a continuous improvement program and found a number of factors that determined business performance success and these included organisations that had a culture of constant change.

2.9 Agility Modelling

Robertsa and Groverb (2012) provide their definition of a firm's 'customer agility'. They suggest two dimensions or perspectives for customer agility. A static perspective that investigates how an organisation's structure and flexibility influences its ability to adapt to its environment, and a dynamic perspective that explains how a firm builds, leverages and reconfigures capabilities that allows them to adapt to environmental change. Through confirmatory factor analysis, they tested the theory that agility alignment is positively related to a firm's performance. Their results suggested that managers of organisations should align their firm's sensing and responding capabilities. They found that firms that have high sensing and responding capabilities can not only acquire and process information on product or market gaps, but also leverage this arbitrage by organising themselves and configuring the resources to capitalise on it.

Vinodh et al. (2012) also propose a model on agile manufacturing (AM) that described agility in terms of drivers and outcomes. Their model is shown in Figure 2.18 below. Many of the agility drivers are similar to business excellence enablers, e.g., organisational structure, people and design and innovation. They describe agility outcomes as cost, quality, flexibility, innovativeness, customer responsiveness, delivery, market competitiveness, proactivity, and reconfigurability.

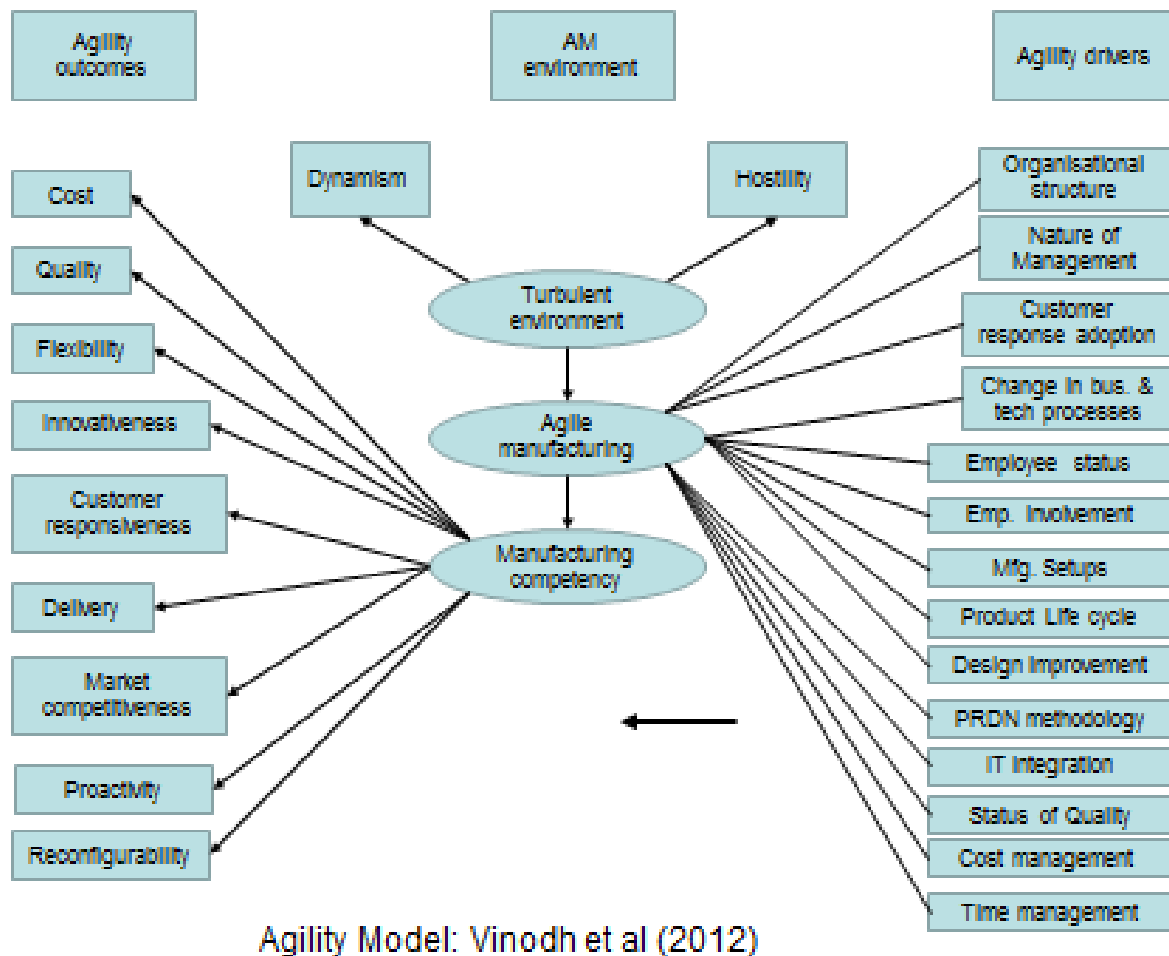
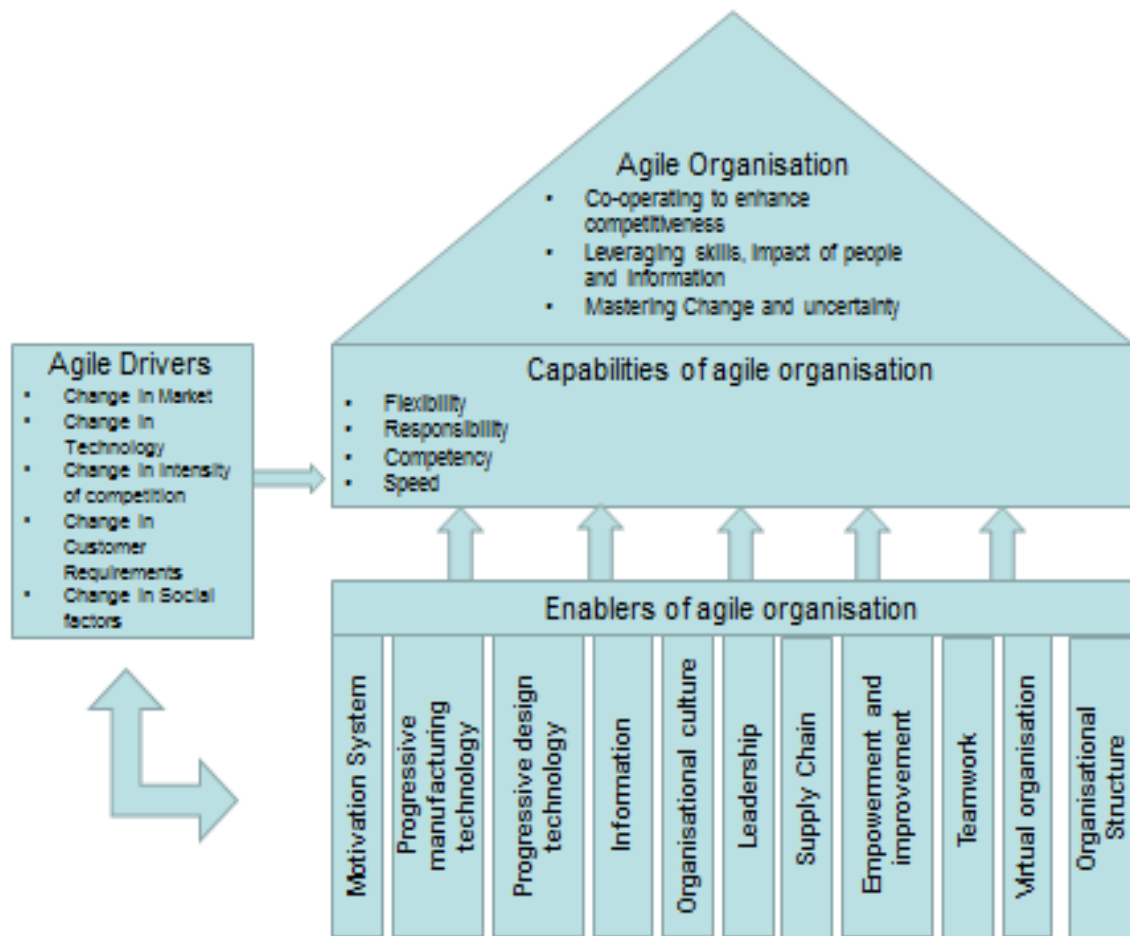


Figure 2.18 – Agility Model as described by Vinodh et al. (2012)

They use SEM to validate their model surveying 30 automotive organisations in India. While their findings confirmed the reliability and validity of their proposed agility construct, they also acknowledge the small sample size and the limited scope of surveying only the automotive industry.

Eshlaghy et al. (2010) draw upon their literature research and propose the following model (Figure 2.19) to describe organisational agility. They have a different view of agility drivers and capabilities. Eshlaghy et al. (2010) have based their definition of agility on Sharifi and

Zhang's (1999) model of agility drivers and agility capabilities. They have then added enablers of agile organisations which comprise of motivation systems, progressive manufacturing and design technology, information, organisational culture, leadership, supply chain, empowerment and improvement, teamwork, virtual organisation, and organisational structure.



Conceptual Model: Eshlaghy et al (2010)

Figure 2.19 – Conceptual Model of Organisational Agility – Eshlaghy et al. (2010)

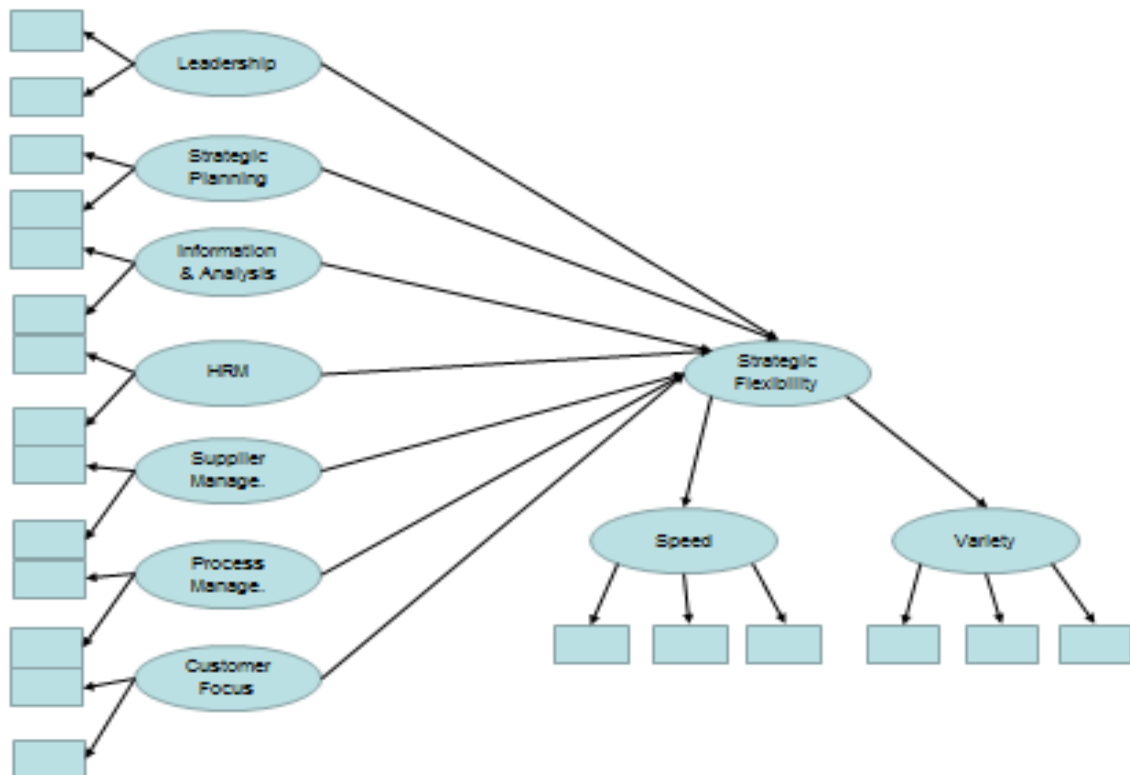
They surveyed 28 Iranian organisations, developed a Structural Equation Model and found that the importance and priority of the analysed model factors that describe organisational agility are:

- Leadership
- Organisation commitment system
- Job satisfaction
- Empowerment and improvement
- Planning and evaluating performance
- Organisational structure-certainty
- Team working
- Organisational culture
- Progressive design and manufacturing technology
- Information technology
- Virtual organisation
- Organisational structure - formality and complexity

Eshlaghy et al. (2010) have included a number of Business Excellence enablers - Leadership, People, Resources, in their analysis of organisational agility. To summarise, their definition of agility is complex and in their analysis, they examined those variables that had a direct and indirect effect on organisational agility. Through their survey analysis, they found that the variables listed above had a positive and direct impact on agility.

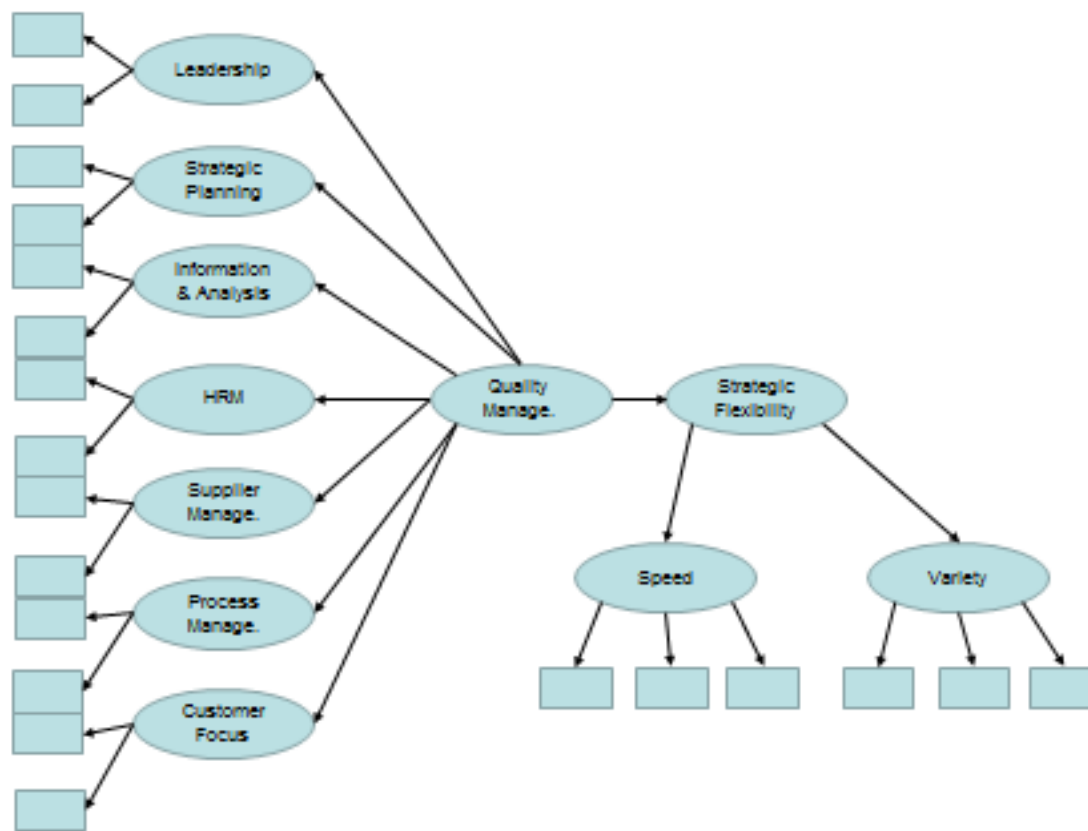
Escrig-Tena et al. (2012) defined strategic flexibility as an organisation's ability to respond quickly and in a varied way to the changes coming from the environment, thereby developing and/or maintaining competitive advantage. They proposed that Quality Management practices, which are consistent with Business Excellence enablers, drive

strategic flexibility. They proposed a multivariate and multidimensional model for Quality Management elements (see Figures 2.20 and 2.21 below). Figure 2.20 shows the elements of *quality management* (leadership, strategic planning, information and analysis, human resource management, supplier management, process management, and customer focus) and how they impact strategic flexibility, which in turn is defined as 'speed' and 'variety'. Variety refers to an organisation's ability to do things differently, whether they are products or services. Figure 2.21 is a higher order model that shows quality management formed by quality management elements (leadership, strategic planning etc.). The thesis expands the above study by including *agility* as a n enabler of a firm's performance.



Multivariate model for Quality Management: Escrig-Tena et al (2012)

Figure 2.20– Multivariate model for Quality Management and its impact strategic flexibility – Escrig-Tena et al. (2012)



Multidimensional model for Quality Management: Escrig-Tena et al (2012)

Figure 2.21 – Multidimensional model for Quality Management and strategic flexibility– Escrig-Tena et al. (2012)

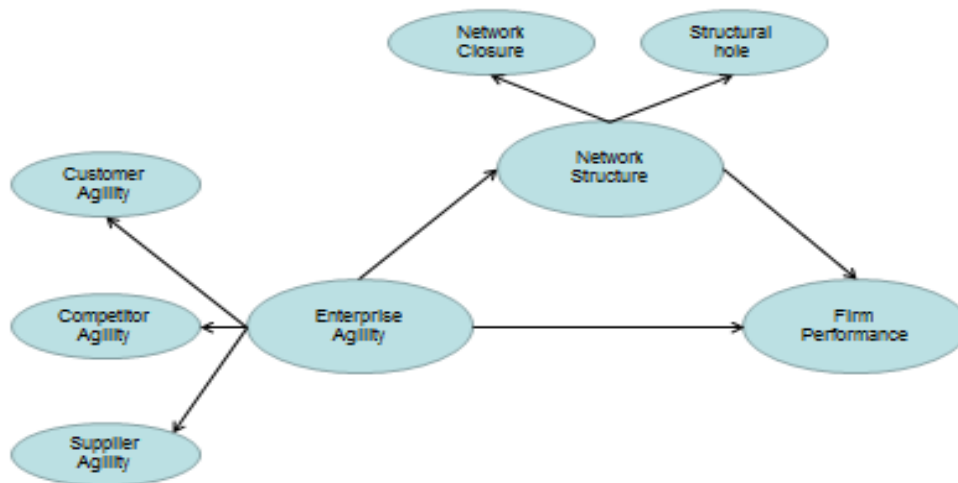
Using the Spanish ‘ARDAN’ database, they surveyed 453 firms from a wide range of industry sectors (service and manufacturing), as well as a wide range of organisational sizes (less than 50 to greater than 250 people).

Using Structural Equation Modelling, they concluded that for the multivariate model (Figure 2.20), only four of the seven examined Quality Management elements contributed positively to strategic flexibility. These comprised strategic leadership, information and analysis, supplier management, and process management. In regards to the multidimensional model, their results confirm other studies (such as Gomez and Verdu,

2005) that there exists a positive relationship between the introduction of Quality Management and flexibility. They acknowledge that the area of Quality Management and flexibility has not received a great deal of research attention because much of the literature focused on analysing the final influence of Quality Management on results.

2.10 Agility and Performance

Yang and Liu (2012) examined the concept that network structure had a positive effect on a firm's performance and that, in turn, a better network structure enhances a firm's agility and thus its performance. They proposed the model in Figure 2.22 below and surveyed 250 companies in Taiwan's glass industry.

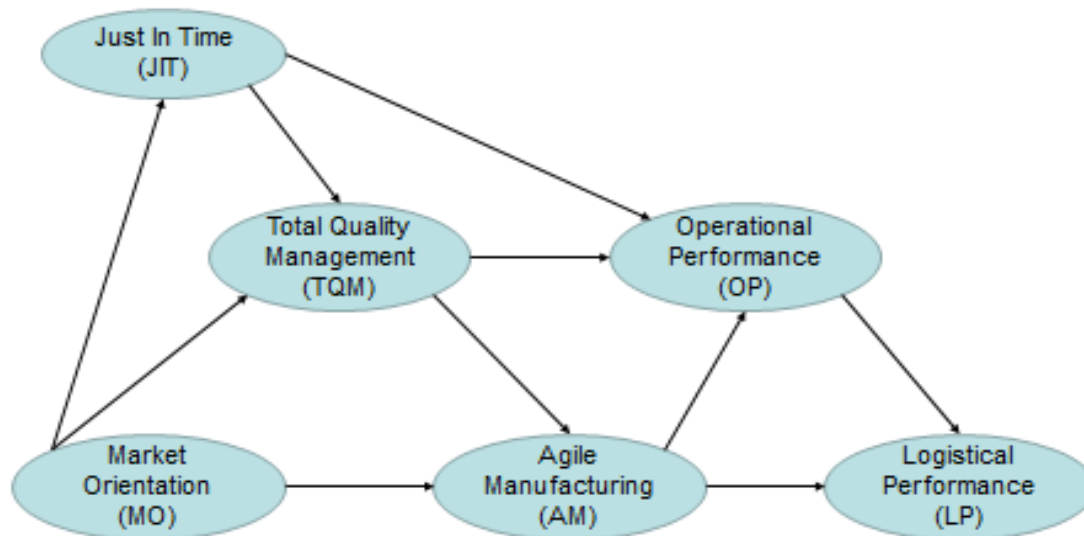


Proposed conceptual model: Yang and Liu (2012)

Figure 2.22 – Conceptual model of Enterprise Agility and Performance – Yang and Liu (2012)

They confirmed, through SEM, that agility capability and network structure had a significant impact on a firm's performance and that the network structure partially mediates the impact of enterprise agility on a firm's performance. Like most similar studies, this research was based on a single industry and the authors acknowledge these limitations.

Zelbst et al. (2010) examined the relationships between Market Orientation (MO), Just in Time manufacturing (JIT), Total Quality Management (TQM) and Agility. From a systems perspective, the research was focused on MO and its direct relationship with JIT, TQM, and Agile Manufacturing (AM), and the subsequent impact on operational and logistical performance. Their conceptual model is shown in Figure 2.23.



Conceptual model Zelbst et al (2010)

Figure 2.23 – Conceptual model of JIT, TQM, Agility and Performance – Zelbst et al. (2010)

Using path analysis they surveyed 104 US manufacturing companies and found that market orientation directly and positively impacts JIT, TQM, and Agile Manufacturing. They also found that JIT positively and directly impacts TQM, which in turn positively impacts Agile Manufacturing. Finally they confirmed that Agile Manufacturing positively and directly impacts both operational and logistical performance. With a sample size of 104, SEM could not have been applied and the model as a whole could not be assessed. That said, their findings confirm the relationship between TQM, JIT, MO, AM, and Performance.

Gomez-Gras and Verdu-Jover studied the relationship between TQM, Structural and Strategic Flexibility, and Performance. They surveyed 417 Western European Chemical, Telecommunication, and Automobile companies and using t-tests, they concluded that companies with TQM programs are associated with greater levels of flexibility and fit, 'but this situation has no repercussions on higher performance'. They did suggest more research into the relationship between TQM, flexibility and performance.

While there has been research into agility and performance, the literature review did not find research in the area of Business Excellence that included agility and performance as defined by EFQM.

2.11 Rationale for Research question

2.11.1 Business Excellence and Performance

In Chapter 1 the anomalies with Business Excellence and performance were discussed at length based on the Australian Banking and Chemical industries. Jacob et al. (2002) also discussed issues with Business Excellence Awards such as Malcolm Baldrige Awards and

whether firms that have won these awards have indeed continued on the 'path of excellence'. Many papers have examined the various factors of Business Excellence and their link to performance. Seminal works by Flynn and Saladin (2001), Kanji (2002), Sila and Ebrahimpour (2005), and Bou-Llusar (2005, 2009) were examined in detail in section 2.7 of this chapter, but they do not explain the anomalies within the Australian industries. On the other hand, as discussed in Chapter 1, the key difference between the Australian Banking and Chemical industries was found to be the amount of regulation and competition among the industry participants.

2.11.2 Agility Definitions

A key factor for Australian chemical companies to be successful (or for any company in a competitive environment) was their ability to change their organisations as the external market and competitive environments changed (Sigglekow, 2001; Kaynak, 2003; Ireland et al. 2004). The focus of the literature was now on the definitions around Organisational Agility.

The most cited paper (412 times) on the definition of Organisational Agility was by Sharifi and Zhang (1999). Much of the literature on agility was in the area of Supply Chain Agility and its impact on a firm's performance (Ismail & Sharifi, 2006; Lin et al. 2009; Agarwal et al. 2007). More recently, the impact of Network Agility and its impact on performance have gained much interest (Li et al. 2009; Chen & Chang, 2011; Lewis et al. 2008; Swafford et al. 2008; Yang & Liu 2012). Many of the definitions have Sharifi and Zhang's (1999) model as a basis. A summary of the definitions of agility is found in Table 2.10 below. This research also used the Sharifi -Zhang definition and combined this with the Bou-Llusar EFQM model as

the initial area of research, that is, that agility was comprised of Agility capability and Agility drivers (see Figure 2.24 below).

Table 2.10 – Summary of Definitions of Agility

Reference	Definition	Flexibility	Responsiveness	Competency	Speed	Competition	Customer / market condition	Technology	Quality
Iococca / Lehigh (1991)	A system that shifts quickly among product models/lines, ideally in real time in order to respond to customer needs	X	X	X	X		X		
Goldman et al. (1995)	Capability of an organisation to operate profitably in a competitive environment comprised of continually changing customer habits	X	X			X	X		
Kumar & Motwani (1995)	Ability to accelerate the activities on critical path and time-based competitiveness		X		X	X	X		
Cho et al. (1996)	Capability to survive and prosper in a competitive environment or continuous and unpredictable changing market, designed by customer products and services		X		X	X	X		
Sharifi & Zhang (1999)	The ability to cope with unexpected changes, to survive unprecedented threats from the business environment, and take advantage of changes as opportunities	X	X	X	X	X	X	X	X
Yusuf et al. (1999)	A successful exploration of competitive bases (speed, flexibility, innovation proactivity, quality, and profitability) through the integration of reconfigurable resources and knowledge management to provide customer-driven products and services in a fast changing market environment	X	X	X	X	X	X	X	X

Reference	Definition	Flexibility	Responsiveness	Competency	Speed	Competition	Customer / market condition	Technology	Quality
Dove (1999)	Ability of an organisation to respond efficiently and effectively to both proactive and reactive needs and opportunities in the face of unpredictable and uncertain environments	X	X	X	X	X	X		X
Sambamurthy et al. (2003)	Ability of a firm to redesign its existing processes rapidly and create new processes in a timely fashion in order to be able to take advantage and thrive in the unpredictable and highly dynamic market conditions	X	X	X	X		X		
Ashrafi et al. (2005)	An organisation's ability to sense environmental changes and respond effectively and efficiently to that change	X	X		X		X		
Mathiyakalan et al. (2005)	Ability of an organisation to detect changes (which can be opportunities or threats or a combination of both) in its business environment and hence provide focused and rapid responses to its customers and stakeholders by reconfiguring its resources, processes and strategies		X	X	X		X		
Swafford et al. (2008)	Supply chain agility refers to the supply chain's capability to adapt or respond in a speedy manner to a changing marketplace environment			X	X		X		
Li et al. (2009)	Agility has two components: 1. Alertness to changes (opportunities/challenges) within the supply chain, as well as within its surrounding environment – as agility requires a timely awareness of change. 2. Response capability	X	X	X	X	X	X	X	

Reference	Definition	Flexibility	Responsiveness	Competency	Speed	Competition	Customer / market condition	Technology	Quality
Eshlaghy et al. (2010)	Agile organisations can be considered as a model that integrates technology, human resources through information and communication infrastructure. It provides flexibility, speed, quality, service efficiency and enables firms to react deliberately, effectively and change the environment in a coordinated manner	X	X	X	X	X	X	X	X
Li et al. (2011)	Agility is the result of integrating an alertness to changes (opportunities/ challenges) – both internal and environmental – with a capability to use resources in responding (proactively/ reactively) to such changes, all in a timely and flexible manner	X	X	X	X	X	X	X	
Yang & Liu (2012)	To have agility a firm must first identify the critical dimensions and next reconfigure or integrate extant resources and capabilities embedded in different activities to achieve such dimensions, ultimately leading to enhancement of its competitive position	X	X	X	X	X	X		

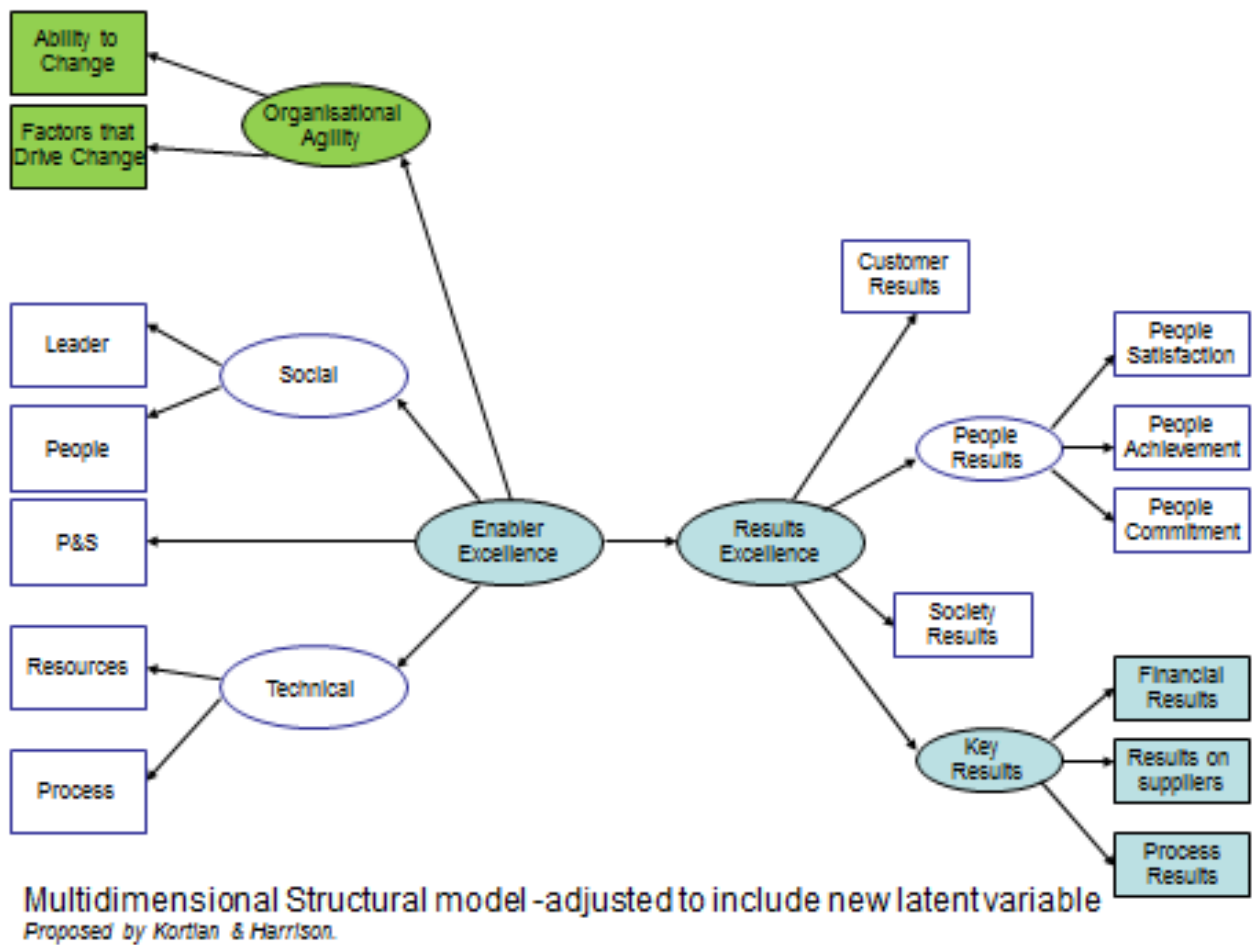
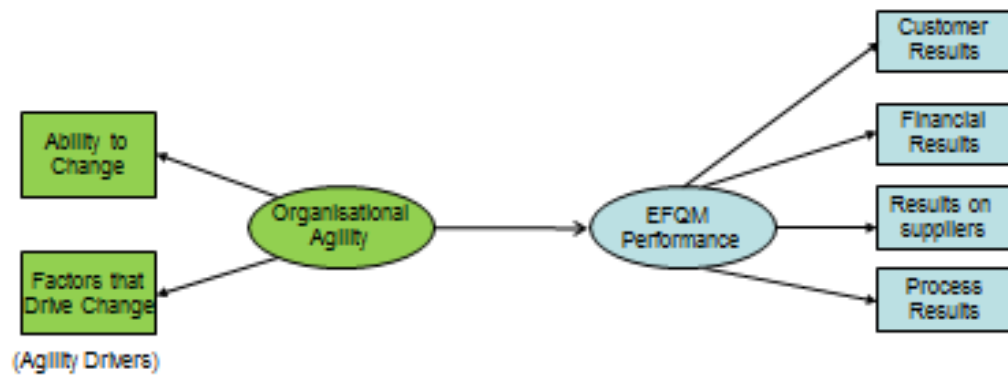


Figure 2.24 – Multidimensional structural model combining Organisational Agility with EFQM model.

Since there has been a number of papers that have investigated the Business Excellence/TQM factors and their impact on performance, and that this study is exploratory in nature to assess the impact of agility on a firm's performance as defined by EFQM, the following model as decided as the focus of this research.



Multidimensional Structural model investigating the relationship of Organisational Agility and EFQM Performance.
Proposed by Kortlan & Harrison.

Figure 2.25 – Multidimensional Structural model investigating the relationship of Organisational Agility and EFQM Performance.

Sharif and Zhang’s definition of Ability capability and Agility drivers were used as measured variables and are summarised in the table blow.

Table 2.11 – Agility Definitions by Sharif & Zhang, 1999.

Agility Capabilities	Agility Drivers
<ul style="list-style-type: none"> • Flexibility • Responsibility • Competency • Speed 	<ul style="list-style-type: none"> • Change in Market • Change in Technology • Change in intensity of competition • Change in Customer Requirements • Change in Social factors

The model to be examined with the measured variables is shown in Figure 2.26.

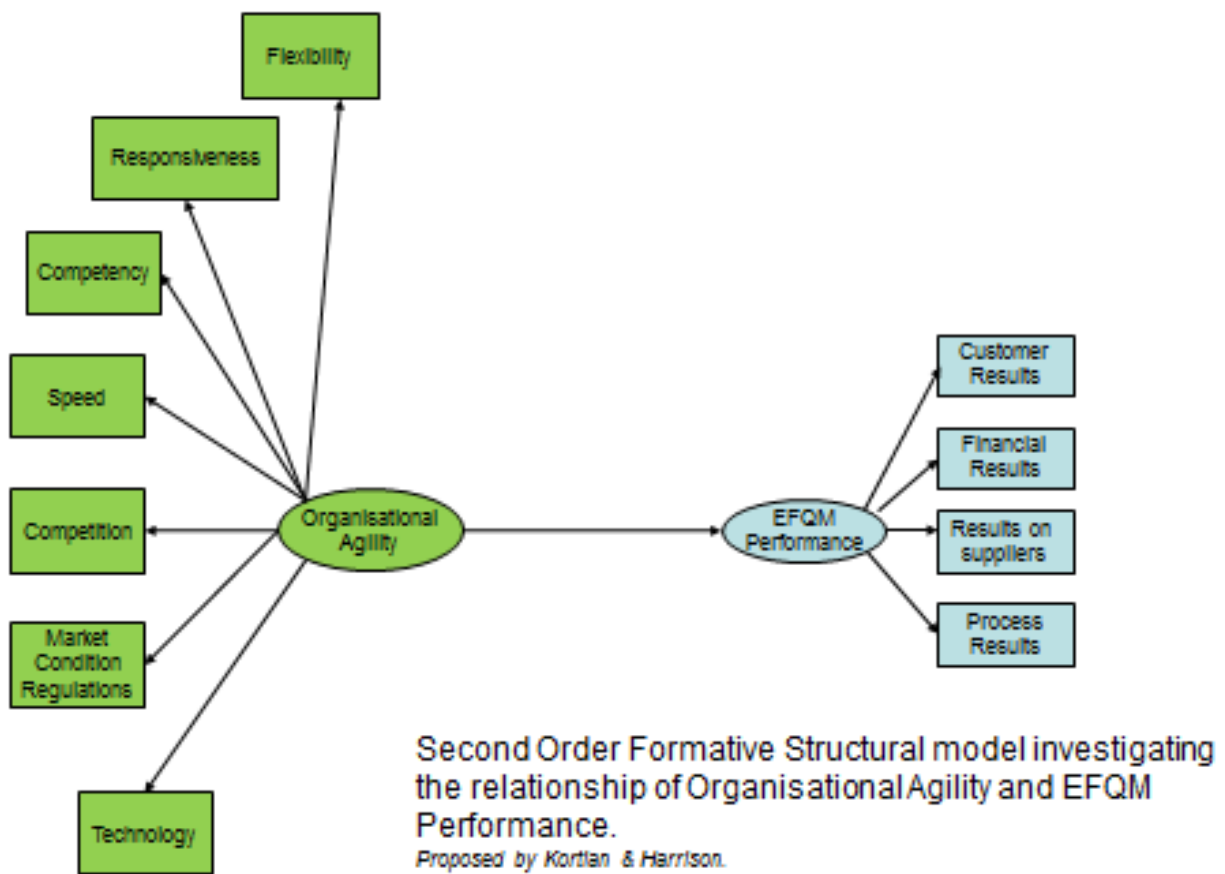


Figure 2.26 – Second Order Formative Structural model investigating the relationship of Organisational Agility and EFQM Performance.

A third construct will also be examined to assess the outputs of the SEM model. The model is shown in Figure 2.27 below.

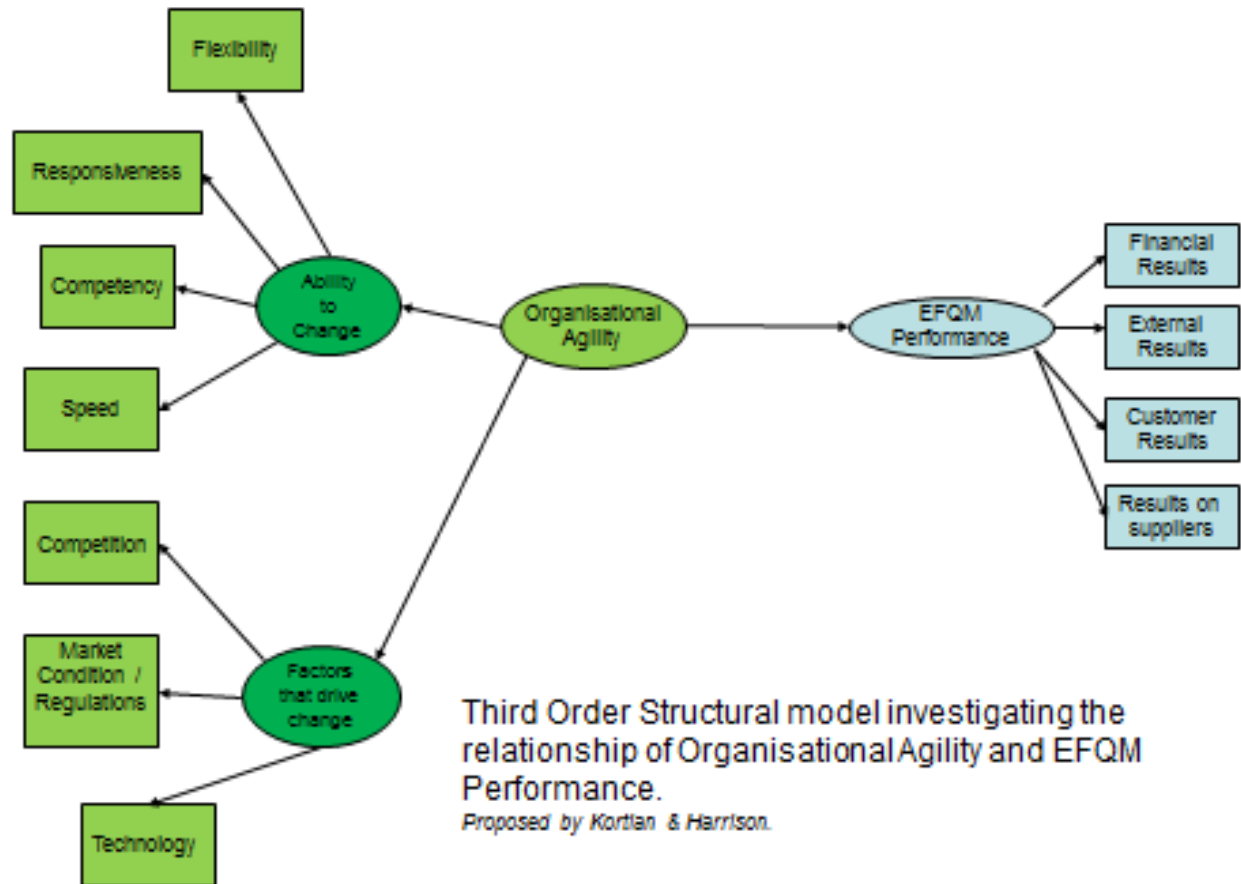


Figure 2.27 – Third Order Structural model investigating the relationship of Organisational Agility and EFQM Performance.

2.12 Research Hypotheses

The following hypothesis is proposed, given the definitions of organisational agility in Table 2.11. The most comprehensive definition of organisational agility was that of Sharif and Zhang (1999) and this has been most recently used by Eshlaghy et al. (2010).

H1: Organisational agility is a 2nd-order formative construct composed of Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology.

Figure 2.1 – Mind Map of Literature Review: High Performing Theories, Business Excellence, Agility, and how they are modelled

The review that is summarized in the figure 2.1 as a mind map, included a detailed examination of high performance theories and their various components in business literature and business excellence models. It then examined whether conducting research in the Australian context is of value, and whether there was significant difference between Australian Business culture and the rest of the world. Discussion was made of research that has been conducted in business excellence models, such as TQM, EFQM and MBNQA. The review then investigated Agility and how agility is defined and modelled. Finally, research into the relationship between agility and performance was examined.

Five research questions were presented with five related hypotheses formulated on the basis of these research questions.

Chapter 3: Research Hypotheses and Methodology

3.1 Introduction to the chapter

This chapter comprises two sections. Section 1 briefly develops and explains five hypotheses. It is followed by the research methodology that explains the sampling method and decisions used.

This chapter develops the conceptual framework and the hypotheses of the study. The first section incorporates agility capabilities and agility drivers, with firm performance as defined by EFQM, into a conceptual model. The second section then develops and presents the research hypotheses based on the proposed conceptual framework. The hypotheses were tested using mixed method designs which will be explained later in this chapter. To begin the analysis, the main research question proposed in Chapter 1 is:

‘Does Organisational Agility have an effect on EFQM dimensions of firm’s performance?’

Drawing on this question and the review of the literature in chapter 2, a conceptual framework is developed with five hypotheses to capture and examine the nature of the associations.

3.2 Conceptual Model

The theoretical model that is shown in Figure 3.1 below was developed by synthesising insights from two theoretical domains, namely organisational agility and EFQM. The nature of this research can be viewed as constructionist and the proposed models tested will attempted to validate the cause and effect relationship.

It is not a new proposition that organisations have to be agile to be successful. Many papers found in the literature review have made this point (Sharifi & Zhang, 1999: Dreyer & Grønhaug, 2004: Gómez-Gras & Verdú-Jover, 2005: Ganguly et al., 2009: Eshlaghy et al., 2010: Zelbst et al., 2010: Vinodh et al., 2012: Escrig-Tena et al., 2012: Yang & Liu, 2012: Roberts & Grover, 2012). However, Agility has not been included explicitly as a business excellence enabler, and this theoretical model will address this question.

Many researchers in the area of Agility have based their definitions on the seminal work by Sharifi and Zhang (1999). They proposed that there were two components to Agility: Agility Capabilities and Agility Drivers. Agility capabilities comprised flexibility, responsiveness, competency, and speed. Agility drivers comprised competition, market conditions and regulations, and technology. The greatest area of research has been in Supply Chain agility, and the literature examined many aspects of Supply Chain Agility and performance. Eshlaghy et al. (2010) expanded on Sharifi and Zhang's definition and modelled Organisational Agility. Their definitions included many aspects of Business Excellence/TQM. They defined these as enablers of agile organisations, and offered complex models.

The definition of firm performance by EFQM was used, i.e., financial results, external results, customer results, and supplier results, in this proposed conceptual model which attempts to answer the research question.

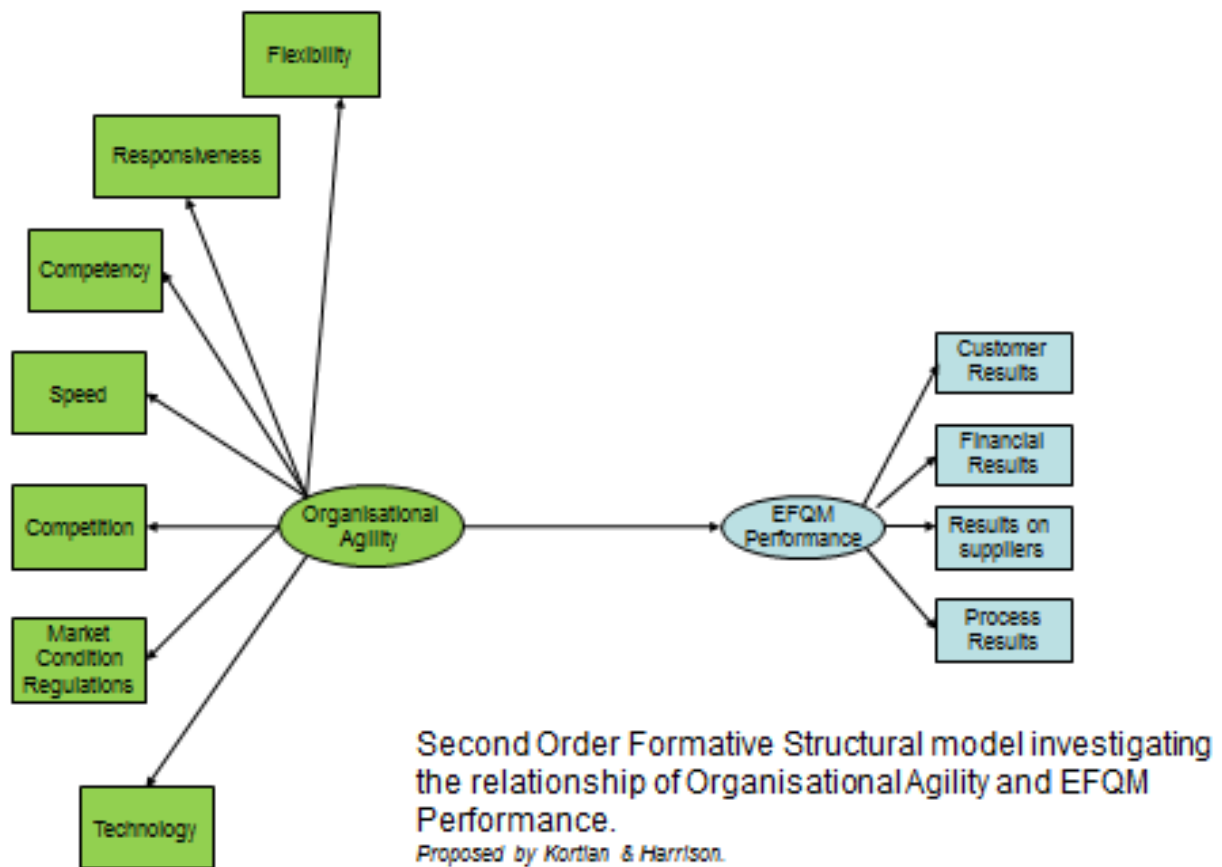


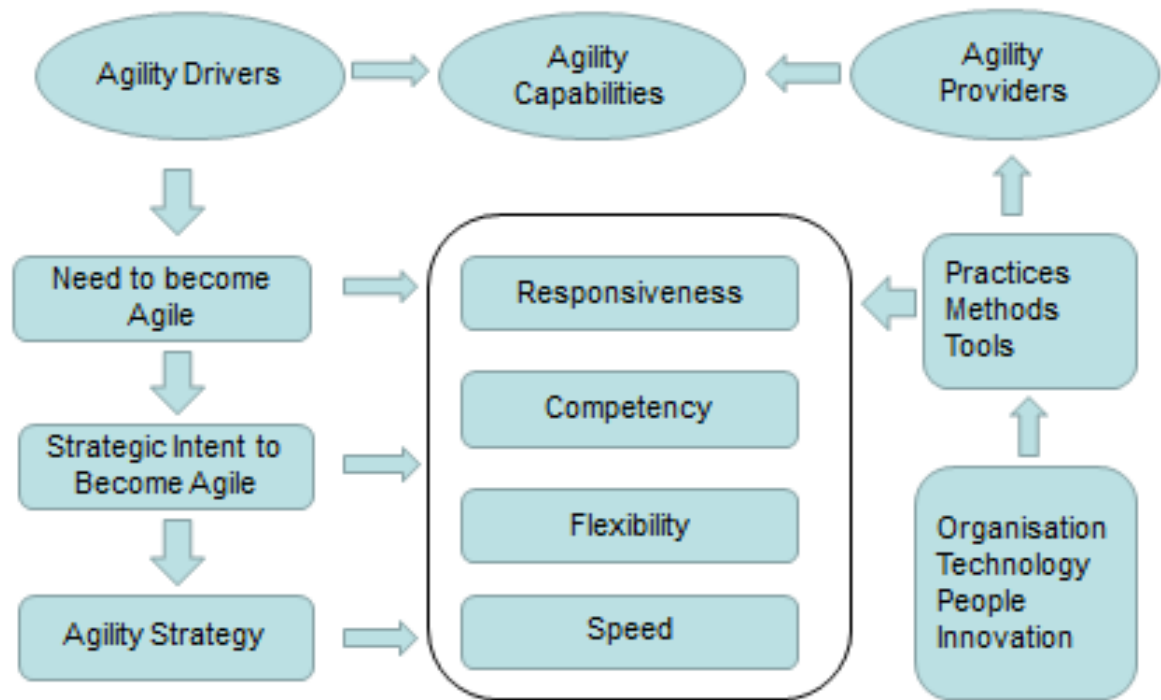
Figure 3.1 – Second Order Formative structural model investigating the relationship of organisational agility and EFQM performance.

3.3 Hypotheses

3.3.1 Hypothesis 1

In the literature review, the potential definitions of Agility were examined. Table 2.10 summarised the various elements of the definition of agility used by researchers. The vast majority of these researchers (Goldman et al., 1995: Dove et al., 1996: 2001, Yusuf et al., 1999: Ganguly et al., 2009: Yang & Liu, 2012) have suggested that Organisational Agility (as

well as Supply Chain Agility and Network Agility) are second-order constructs. Sharifi and Zhang (1999) suggested that Agility comprises three key dimensions: Agility Drivers, Agility Providers, and Agility capabilities. Agility providers have not been included in the conceptual model as they were already included in the business excellence enablers.



Agility Conceptual Model: Sharifi & Zhang (1999)

Figure 3.2 – Agility Conceptual Model (Sharifi and Zhang (1999))

Two options were available to examine the Agility construct. The first was to consider agility as a second-order construct, as shown in Figure 3. 1 The second was to consider agility as a

third-order construct (Figure 3.3) that encompasses the agility drivers and capabilities dimensions. These two hypotheses will be tested.

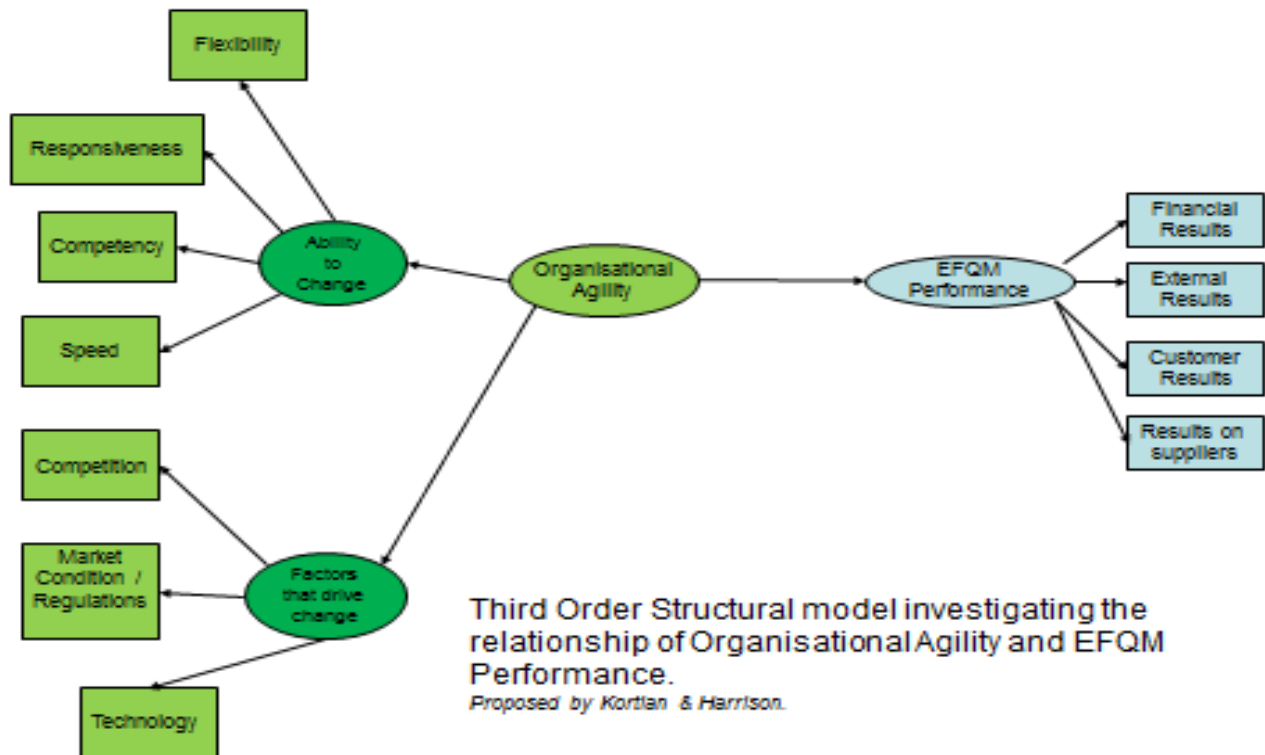


Figure 3.3 – Third Order Structural model investigating the relationship of Organisational Agility and EFQM Performance.

The definitions of each of the measured variables from Sharifi and Zhang (1999) are summarised below:

Table 3.1 – Agility definitions, Sharifi and Zhang (1999)

Agility Measure	Definition
Flexibility	<p>Ability to process different products and achieve different objectives with the same facilities. It consists of items such as:</p> <ul style="list-style-type: none"> • Product volume flexibility • Product model / configuration flexibility • Organisation and organisational issues flexibility • People flexibility
Responsiveness	<p>Ability to identify changes and respond fast to them, reactively or proactively, and recover from them. Actions include:</p> <ul style="list-style-type: none"> • Sensing, perceiving and anticipating changes • Immediate reaction to change by effecting them unto system • Recovery from change
Competency	<p>The extensive set of abilities that provide productivity, efficiency, and effectiveness of activities towards the aims and goals of the company. The following items form the capability structure:</p> <ul style="list-style-type: none"> • Strategic vision • Appropriate technology (hard and soft), or sufficient technological ability • High rate of new product introduction • Product / services quality • Cost effectiveness • Change Management • Operations efficiency and effectiveness • Cooperation (internal and external) • Knowledgeable, competent, and empowered people • Integration
Speed (Quickness)	<p>The ability to carry out tasks and operations in the shortest possible time. These include:</p> <p>Quick new products time to market</p> <p>Products and services delivery quickness and timeliness</p> <p>Introduction of more efficient, faster, and economic production facilities</p>
Competition	<p>Criteria for changes in competition include:</p> <p>New entrants to the market place</p> <p>Increasing pressure of global market competition</p> <p>Market share of the company for one or more specific products</p> <p>Responsiveness of competitors to change</p> <p>Increasing pressure on cost</p> <p>Increasing rate of innovation</p>

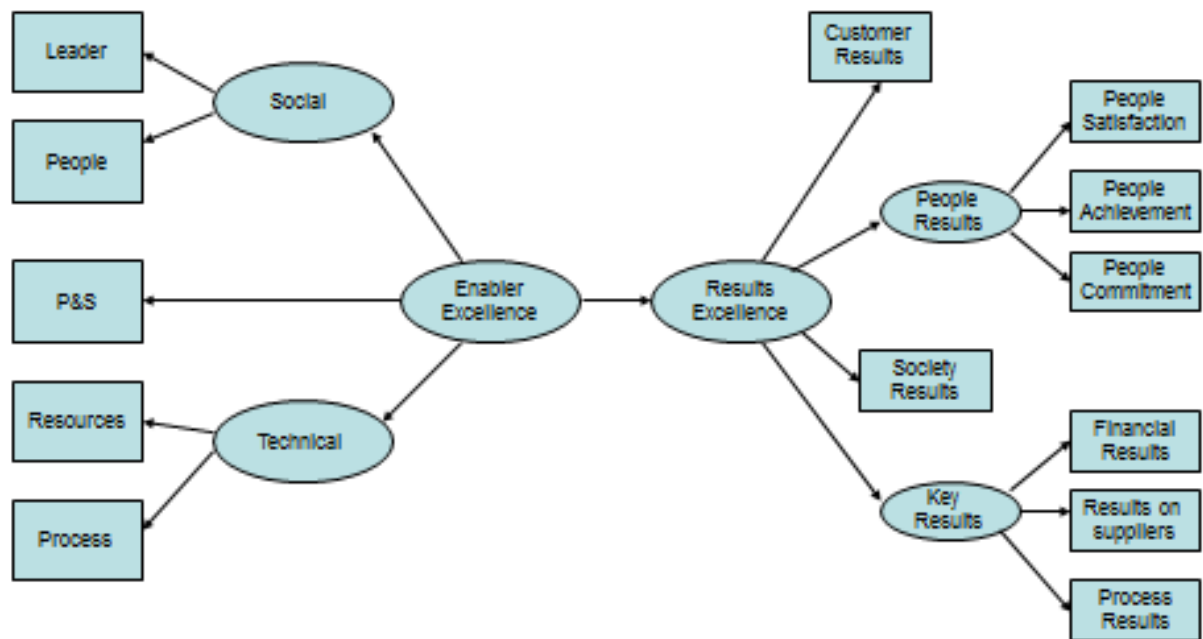
Agility Measure	Definition
Market Conditions / Regulations*	Criteria for changes in market conditions and regulations include: Environmental pressures Quality / safety expectations are increasing Workforce / workplace expectations Legal / political pressures National and international political changes Increased rate of change in product models Demand for individualised products and services
Technology	Criteria for changes in technology include: Introductions of new soft technologies (software and methods) Introduction of more efficient, faster, and economic production facilities Inclusion of information technology in new hard technologies

*Note: Sharifi and Zhang did not use the terms Market Conditions/Regulations. These measures were under the 'Changes in Social Factors' category for agility. Other researchers such as Sherehiy et al. (2007) have used this term that is more encompassing than just social factors.

Therefore, Hypothesis 1 is as follows:

Organisational agility is a second-order formative construct composed of flexibility, responsiveness, competency, speed, competition, market conditions and regulations, and technology.

The remaining 4 hypotheses are from the EFQM definition of performance. The multidimensional framework of the EFQM that Bou-Llusar (2009) modelled, is summarised in Figure 3.4 below.



Multidimensional Structural model finally analysed.

Bou-llusar, Escrig-Tena, Roca-Pulg, Beltran-Martin. Journal of Operations Management, 2009

Figure 3.4 – Multidimensional Structural model, Bou-llusar et al. (2009)

From this path diagram it can be seen that the latent variable, Results, comprises Customer Results, People Results, Society Results, and Key Results. For this research, it was decided to exclude the People Results and Society Results variables, as the research question is aimed at determining the impact of agility on a firm's performance and not societal and people impacts. Also, the relationship between People Results and performance has been well researched by Crook et al. (2011) who had conducted a meta-analysis of research in this field. It is important to note that early models of Malcolm Baldrige National Quality Awards included only customer and financial results (Wilson & Collier, 2000).

Therefore, the remaining definitions of a firm's performance have been taken from the EFQM model, and the following hypotheses form the remaining areas of research in this study.

Hypothesis 2: Agility has a positive impact on financial results.

Hypothesis 3: Agility has a positive impact on customer results.

Hypothesis 4: Agility has a positive impact on supplier results.

Hypothesis 5: Agility has a positive impact on process results.

3.4 Sampling and Data

3.4.1 Population

Manufacturing, non-manufacturing, private and public small-and-medium sized organisations were included in our population. The total number of firms as reported by the Australian Bureau of Statistics (ABS) is approximately 90,000 for medium-to -large size firms in Australia. The size of small-to-medium size firms in this study ranged from 50 to 250 employees. This is slightly larger than the ABS definition of a Small-to-Medium Enterprise (SME) which is less than 200. (<http://www.abs.gov.au/ausstats/abs@.nsf/mf/1321.0>)

3.4.2 Unit of analysis

The unit of analysis is the firm. This was the same approach used in other Business Excellence research (Kanji, 1998; Flynn & Saladin, 2001; Silia & Ebrahimpour, 2005; Bau-Llusar et al., 2009).

The sample data was collected from senior business executives by telephone interviews, based on a questionnaire. The title or roles of the senior executives included in this sample were Chief Operating Officers or their direct reports, Chief Financial Officers or their direct reports, or key decision-makers who were one level removed to the Managing Director or Chief Executive Officer. The rationale for selecting these senior positions was that they would be able to respond to the survey questions more appropriately, have a more reliable access to data, and assumed to have a good understanding of the overall activities of the firm.

3.4.3 Sampling

A random sampling approach was used. As mentioned in section 3.4.1, firms with employee size of between 50 and 250 were chosen.

Contact information of the firms surveyed was obtained from Dun & Bradstreet (DnB) listings. DnB provides an extensive list of Australian business based on the Australian and New Zealand Standard Industrial Classification (ANZSIC) consistent with the ABS (2010: 2011). The DnB database provides information about the age, size, postal address, revenue, contact information, and the name of the key informant (CEO) of the firm, as well as the industrial classification of the firm according to ANZSIC.

3.4.4 Sample Size

In all statistical methods, sample size is a key factor. In this study, the second-order formative structure of agility and the multivariate nature of the theoretical model require a statistically significant sample. As will be discussed, the Partial Least Squares Structural

Equation Modelling (PLS-SEM) technique will be used to examine the model. Hair et al (2013) discusses the minimum sample size requirements. Many researchers have cited the ability to use PLS-SEM over Covariant Based Structural Equation Modelling (CB-SEM) because of the smaller sample size requirements. The sample size, as recommended by Hair et al (2013) – or their “10 times rule” – should be equal to the larger of:

1. 10 times the largest number of formative indicators used to measure one construct,
or
2. 10 times the largest number of structural paths directed at a particular construct in the structural model.

Another way of interpreting this rule is that the minimum sample size should be at least 10 times the maximum number of arrowheads pointing to a latent variable anywhere in the PLS path model. Hair et al. (2013) caution researchers, stating that any statistical technique requires consideration of sample size against the background of the model and data characteristics. In essence, the sample size required should be determined by means of power analysis based on the part of the model with the largest number of predictors. Table 3.2 shows the minimum sample size requirements necessary to detect minimum R^2 values of 0.1, 0.25, 0.50, and 0.75 in any of the endogenous constructs in the structural model for significance levels of 1 percent, 5 percent, and 10 percent, assuming the commonly used level of statistical power of 80 percent and a specific level of complexity of the PLS model.

Table 3.2 – Sample Size Recommendation in PLS-SEM for a Statistical Power of 80%

Max no. of arrows pointing at a construct	Significance Level											
	1%				5%				10%			
	Minimum R ²				Minimum R ²				Minimum R ²			
	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75
2	158	75	47	38	110	52	33	26	88	41	26	21
3	176	84	53	42	124	59	38	30	100	48	30	25
4	191	91	58	46	137	65	42	33	111	53	34	27
5	205	98	62	50	147	70	45	36	120	58	37	30
6	217	103	66	53	157	75	48	39	128	62	40	32
7	228	109	69	56	166	80	51	41	136	66	42	35
8	238	114	73	59	174	84	54	44	143	69	45	37
9	247	119	76	62	181	88	57	46	150	73	47	39
10	256	123	79	64	189	91	59	48	156	76	49	41

Source: Cohen, J.A. Power Primer. *Psychological Bulletin*, 112, pp. 155-519

Our model has 10 arrows in the construct and 150 responses were collected. This is significantly more than the recommended sample size of 100. G*Power software was used to determine the statistical power and validation of the conclusions.

3.4.5 Data collection

An external market research firm (iView) was engaged to collect the data. They used the DnB database to contact firms to solicit their participation via a telephone interview based on a structured questionnaire. A brief overview and background of the survey objective, promise of confidentiality, anonymity, and feedback on findings were read to the

participants, and if they agreed to participate, went on to answer the survey questions. The survey commenced in May 2014 and was completed in October 2014.

A total of 596 firms were approached, of which 150 responded. The average duration of each survey was 11 min, 30 sec (Appendix 3.1).

3.5 Instrument – design of the questionnaire

3.5.1 Format of the survey instrument

Attitudinal statements on a Likert-scale were used to collect the data to be used in the PLS-SEM. The Likert scales were standardised with a range of 1 to 7 as described in Table 3.3a below. The order of the scales is shown in Table 3.3b, and as this was a telephone survey, the scales were not available to the survey participants.

Some level of bias is likely to be present in analyses because of the type of data used in the study. Likert data is ordinal (Olsson, 1979), causing correlations to be significantly attenuated when six or less categories are used (Aguinis et al., 2009, Figure 1), though there will be a degree of bias at fifteen categories (Aguinis et al., 2009, Table 2). Aguinis et al. (2009. P. 643) argue that bias is present in almost all of the published works that have used these types of scales. Seven categories were used in the present study to minimise the bias.

Table 3.3a – Scaling used for all statements.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree	Do Not Know
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Table 3.3b – Order for scales used to convert responses for modelling purposes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(0)
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‘Don’t Know’s’ were originally numbered ‘99’. These were later renumbered as ‘0’ to avoid distortions in calculations of means and variances.

3.5.2 Pilot tested

After the design of the interview questionnaire, a pre-test judgement test and a pilot test were carried out (Gillham, 2005) in order to: 1) refine the questions and increase the validity and reliability of the interview; 2) assess challenges; and 3) anticipate difficulties and problems which may occur during the main data collection phase (Yin, 2009).

According to Seidman (2006), piloting an interview enables the researcher to assess the design and structure of the interview and its ability to collect usable data. Gillham (2005, p. 25) also suggests that once the questions have been streamlined and the structure of the survey is formed, the interview must be piloted in two or three times, with no more than three times recommended. Therefore, following Gillham (2005) and Seidman (2006), the key objectives of the pilot survey were to ensure the following: 1) the structure, transparency, and wording of the questions were appropriate; 2) questions targeted what they were designed for; and 3) be aware of latent problems and challenges during the conduct of the interview that might not otherwise be anticipated by the researcher.

As mentioned above, the interview protocols of this research were piloted by the market research company, iView. They randomly chose 5 firms from the DnB database and tested

the survey. Based on their feedback, some minor modifications were made to the survey to improve the flow and thus, reduce interview duration.

3.5.3 Expert Judgment Testing

The interview protocol was reviewed by the researcher as well as iView, the market research firm that was engaged to carry out the data collection. iView is accredited to ISO 26362 (the International Quality Standard for Online Access Panels) by Best Practice Certification (Source: <http://www.iview.com.au/accreditations.aspx>) . As an organisation with many years of experience, and having the Best Practice Certification, they provided comments regarding the wording, phrasing, and overall design of the interview protocol. The results suggested that the protocol was acceptable and its design satisfactory.

3.5.4 Key constructs

The theoretical model shown in Figure 3.1 is a combination of two key sources of research, i.e., the definition of Agility from Sharifi and Zhang (1999), and the EFQM definition of performance from Bou-Llusar et al (2009).

Sharifi and Zhang (2009) introduced the concept of Agility Drivers and Agility Capabilities. Each of the survey instrument questions has been referenced by these two papers.

Table 3.4 – Comparison of survey questions and references

Construct	Survey Question	Source – Sharifi & Zhang (1999)
Flexibility $\alpha = 0.61$ AVE = 0.56 Composite Reliability = 0.79	<p>Our organisation can adjust product or service volume as customer demands vary.</p> <p>Our organisation can change its processes and structure with changing business conditions.</p> <p>Our people have the skills to work in different departments or processes as the needs arise due to changing business conditions.</p>	<ul style="list-style-type: none"> • Product volume flexibility • Product model/configuration flexibility • Organisation and organisational issues flexibility • People flexibility <p>Page 18</p>
Responsiveness $\alpha = 0.78$ AVE = 0.69 Composite Reliability = 0.87	<p>Our organisation can perceive or anticipate changes in business or market conditions.</p> <p>Our organisation can respond by making the necessary organisational / process changes as a result of the changed business or market conditions.</p> <p>In those situations where the organisation did not anticipate business or market changes it responded to these changes quickly.</p>	<p>Sensing, perceiving and anticipating changes</p> <p>Immediate reaction to change by effecting them unto system</p> <p>Recovery from change</p> <p>Page 17</p>
Competencies $\alpha = 0.79$ AVE = 0.49 Composite Reliability = 0.85	<p>Our organisation has the appropriate Information technology to deal with the changing market and business conditions.</p> <p>Our organisation has the appropriate industry technology to deal with the changing market and business conditions.</p> <p>Our organisation introduces new products and services more frequently than our competitors.</p> <p>Our new products / services are of a higher quality than our competitors.</p> <p>Our new products / services are produced more efficiently than our competitors.</p> <p>Our people accept and show little resistance to the organisational / process changes.</p> <p>When organisational / process changes are made very few incidences / errors occur.</p>	<p>Appropriate technology (hard and soft), or sufficient technological ability</p> <p>High rate of new product introduction</p> <p>Product / services quality</p> <p>Cost effectiveness</p> <p>Change Management</p> <p>Operations efficiency and effectiveness</p> <p>Cooperation (internal and external)</p> <p>Pages 17 & 18</p>

Construct	Survey Question	Source – Sharifi & Zhang (1999)
Speed $\alpha = 0.67$ AVE = 0.61 Composite Reliability = 0.82	Our organisation introduces new products and services quicker than our competitors. Our organisation can make organisational structural / processes changes quickly. Our organisation is one of the early adopters of new technology in our industry / markets.	Quick new products time to market Products and services delivery quickness and timeliness Introduction of more efficient, faster, and economic production facilities Page 18
Competition $\alpha = 0.52$ AVE = 0.38 Composite Reliability = 0.72	The number of competitors in our industry / markets has increased. Our competitors are predominantly local. The difference in market share among the main competitors is small. Barriers to entry in our markets are high. Price is a key differentiator among our competitors.	New entrants to the market place Increasing pressure of global market competition Market share of the company for one or more specific products Responsiveness of competitors to change Increasing pressure on cost Page 16
Market Conditions / Regulatory $\alpha = 0.68$ AVE = 0.38 Composite Reliability = 0.78	The Industry we compete in is highly regulated. The regulations are effective in protecting the consumer. The regulations are not restrictive to business growth. New regulations are introduced to reflect the changing business environment. New products / services are introduced into the markets frequently. New products / services are introduced as a result of customer driven requirements.	Environmental pressures Quality / safety expectations are increasing Workforce / workplace expectations Legal / political pressures National and international political changes Increase rate of change in product models Demand for individualised products and services Page 16

Construct	Survey Question	Source – Sharifi & Zhang (1999)
Technology $\alpha = 0.73$ AVE = 0.65 Composite Reliability = 0.85	Our organisation must adopt new IT systems in order to remain competitive in our market / industry. Our organisation must adopt new product / production/ service technologies in order to remain competitive in our markets. Our markets and industries rely on new external technology / technologies for their development of new products / services.	Introduction of new soft technologies (software and methods) Introduction of more efficient, faster, and economic production facilities Inclusion of information technology in new hard technologies Page 16
		From this row onward the reference is to Bou-Llusar et al. (2009); not Sharifi & Zhang (1999), as was the case from row 1.
Customer Results $\alpha = 0.76$ AVE = 0.59 Composite Reliability = 0.85	Customer satisfaction has improved Customer consolidation has improved Communication with customers has improved Customer complaints have decreased	Customer satisfaction has improved Customer consolidation has improved Communication with customers has improved Customer complaints have decreased Page 19
Financial Results $\alpha = 0.86$ AVE = 0.69 Composite Reliability = 0.91	Market share has improved Sales per employee have improved Profit levels have improved There has been a noticeable improvement in financial results	Market share has improved Sales per employee have improved Profit levels have improved There has been a noticeable improvement in financial results Page 20
Process Results $\alpha = 0.80$ AVE = 0.72 Composite Reliability = 0.88	Process efficiency has improved Knowledge about efficient operation management has improved. The quality of our products / services has improved	Process efficiency has improved Knowledge about efficient operation management has improved. The quality of our products / services has improved Page 20
Supplier Results $\alpha = 0.75$ AVE = 0.57 Composite Reliability = 0.84	The number of suppliers has decreased Quality of raw materials / service providers has improved Relationships with suppliers have improved Supplier management has improved	The number of suppliers has decreased Quality of raw materials / service providers has improved Relationships with suppliers have improved Supplier management has improved Page 20

3.6 Analytical Methods

3.6.1 SEM: what is it and how has it been used?

Structural Equation Modelling (SEM) is a class of Multivariate Statistical analysis. It is the application of statistical methods that simultaneously analyse path structures and factorial composition of latent variables. Table 3.5 below, from Hair et al. (2013) displays some of the major types of statistical methods associated with multivariate data analysis.

Table 3.5 – Organisation of multivariate methods

	Primarily Exploratory	Primarily Confirmatory
First-generation techniques	Cluster Analysis Exploratory factor analysis Multidimensional scaling	Analysis of Variance Logistical Regression Multiple Regression
Second-generation techniques	PLS-SEM	CB-SEM including Confirmatory factor analysis

There are two types of SEM. Covariance-Based SEM (CB-SEM) is primary used to maximise variance explained in order to confirm fitness of path models (i.e., a set of systematic relationships between multiple variables that can be tested empirically). It does this by determining how well a proposed theoretical model can estimate the covariance matrix for a sample data set.

On the other hand, PLS- SEM does not seek to examine model fit; rather, it is primarily used to maximise variance explained in order to examine paths in an exploratory fashion (Hair et al., 2013). Since this research is about developing a new theory of business excellence, namely the inclusion of a new enabling variable, Agility, in the EFQM model, PLS-SEM was used.

3.6.2 PLS path analysis

Hair et al (2013) list the rules of thumb for choosing between PLS-SEM and CB-SEM.

PLS-SEM is used when:

- The goal is predicting key target constructs or identifying key 'driver' constructs.
- Formatively measured constructs are part of the structural model. Note that formative measures can also be used with CB-SEM, but doing so requires construct specification modifications (e.g., the construct must include both formative and reflective indicators to meet identification requirements).
- The structural model is complex (many constructs and many indicators).
- The sample size is small and/or the data are non-normally distributed.
- The plan is to use latent variable scores in subsequent analyses.

CB-SEM is used when:

- The goal is theory testing, theory confirming, or the comparison of alternative theories.
- Error terms require additional specification, such as the covariation.
- The structural model has non-recursive relationships.
- The research requires a global goodness-of-fit criterion.

Also, since PLS-SEM is an Ordinary Least Squares (OLS) regression-based estimation technique that determines its statistical properties, the method focuses on the prediction of a specific set of hypothesised relationships that maximises the explained variance in the

dependent variables. Therefore, the focus of PLS-SEM is more on prediction than explanation, which makes PLS-SEM particularly useful for studies on the sources of competitive advantage and success driver studies (Hair et al. 2013), and this is particularly applicable to this research objective.

Hair et al. (2013) suggest the following systematic procedure for applying PLS-SEM.

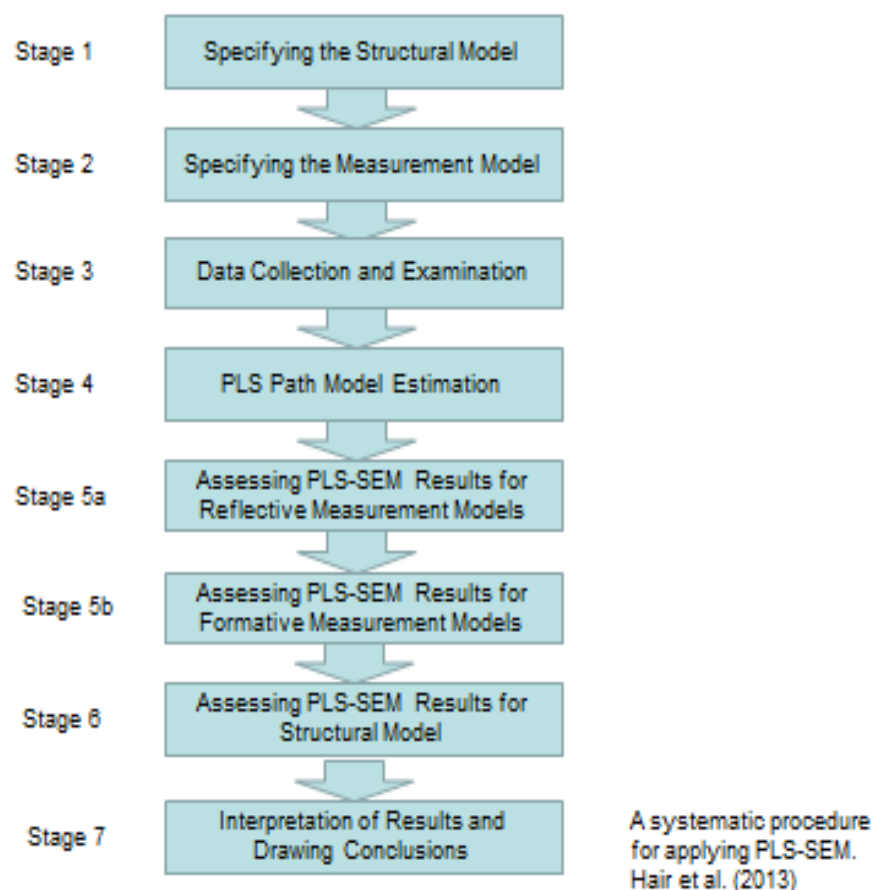


Figure 3.5 – A systematic procedure for applying PLS-SEM. Hair et al. (2013)

Stage 1 involves the preparation of a diagram that illustrates the research hypothesis and displays the variable relationships that will be examined. This diagram is often referred to as

a path model. The path model is a diagram that connects variables/constructs based on theory and logic to visually display the hypotheses that will be tested. The relationship between constructs and their measures in the form of reflective versus formative is a key issue in the execution of structural equation modelling (Hair et al. 2013). A detailed explanation of Formative and Reflective constructs is found in Appendix 3.2.

Having considered these notes, and based on the literature review on the definitions of Agility, all measures were specified as formative (second-order) and for Performance all measures were reflective.

Stage 2 is the Measurement model specification. The measurement model represents the relationships between constructs and their corresponding indicator variables, generally called the outer models. The basis for determining these relationships is measurement theory. A sound measurement theory is a necessary condition to obtain useful results from PLS-SEM. Hypothesis tests involving the structural relationships among constructs will only be as reliable or valid as are the measurement models explaining how these constructs are measured.

In all types of research, data collection is extremely important and SEM is no different. With first-generation statistical methods, the general assumption is that data are error-free. With second-generation statistical methods, the measurement model stage attempts to identify the error component of the data and remove it from the analysis. As a result, the research design phase must be carefully planned and executed so the answers to the questions are as valid and reliable as possible.

Stage 4 of the PLS-SEM procedure is Model Estimation. The Smart PLS software uses the PLS-SEM algorithm to estimate all the unknown elements in the PLS path model. All partial regression models are estimated by the PLS-SEM algorithm's iterative procedures, which include two stages. In the first stage, the construct scores are estimated, then in the second stage, the final estimates of the outer weights and loadings are calculated, as well as the structural model's path coefficients and resulting R^2 values of the endogenous latent variables.

Stage 5 of the PLS-SEM procedure involves the evaluation of the measurement model. Model estimation provides empirical measures of the relationships between the indicators and the constructs (measurement models), as well as between the constructs (structural model). The empirical measures enable us to compare the theoretically established measurement and structural models with reality, as represented by the sample data. That is, it allows us to assess how well the theory fits the data. Stage 5a involves assessing the reflective measurement models' results. These include composite reliability to evaluate internal consistency, individual indicator reliability, and average variance extracted (AVE) to evaluate convergent validity. Stage 5b involves assessing the formative measurement models' results, which is different to the reflective measurement model assessment. The formative measurement models' assessment has a three-step process:

Step 1 – Assess convergent validity of the formative measurement models

Step 2 – Assess formative measurement models for collinearity issues

Step 3 – Assess the significance and relevance of the formative indicators.

Convergent validity is the extent to which a measure correlates positively with other measures (indicators) of the same construct. When evaluating formative measurement models, we have to test whether the formative measured construct is highly correlated with a reflective measure of the same construct. This also known as redundancy analysis. Unlike reflective indicators, which are essentially interchangeable, high correlations are not expected between items in formative measurement models. Collinearity, which is correlation between two formative indicators, can be problematic from a methodological and interpretation point of view. Finally, the assessment of the significance and relevance of the formative indicators is determined by its outer weights. The outer weight is the result of a multiple regression with the latent variable score as the dependent variable and the formative indicators as the independent variables. PLS-SEM relies on nonparametric bootstrap procedure to test coefficients for their significance.

Stage 6 addresses the issue of assessing the PLS-SEM structural model results. This also involves a number of steps. These are:

Step 1 – Assess structural model for collinearity issues

Step 2- Assess the significance and relevance of the structural model relationship

Step 3- Asses the level of R^2

Step 4 – Assess the effect sizes f^2

Step 5 – Assess the predictive relevance Q^2 and the q^2 effect sizes

To assess collinearity we apply the same measures as the evaluation of formative measurement models, that is, tolerance and VIF values.

Structural Model path coefficients are obtained by running the PLS-SEM algorithm. The path coefficients have standardised values between -1 and +1. Estimated path coefficients of close to +1 represent strong positive relationships. Likewise, path coefficients with -1 have a strong negative relationship. Path coefficients close to zero are weak or non-significant.

Evaluation of the structural model is done through the calculation of R^2 , the coefficient of determination. This coefficient is a measure of the model's predictive accuracy and is calculated as the squared correlation between a specific endogenous construct's actual and predictive values. The R^2 value ranges from 0 to 1 with higher levels indicating higher levels of predictive accuracy.

The change in the R^2 value when a specified exogenous construct is omitted from the model can be used to determine whether the omitted construct has a substantive impact on the endogenous constructs. This calculation is referred to as f^2 effect size.

Finally, we calculate the predictive relevance Q^2 . When PLS-SEM models have predictive relevance, they accurately predict the data points of indicators in reflective measurement models of endogenous constructs and endogenous single-item constructs. In the structural model, Q^2 values larger than zero for a certain reflective endogenous latent variables indicate the path models predictive relevance for this particular construct.

3.6.2.1 Internal and external Validity of Design

Internal validity is the extent to which you are able to say that no other variables except the ones you are studying have a cause and effect relationship. Threats to internal validity are selection (people who you have selected for the survey and that they are a representative sample) and maturation (the impact of time in conducting the survey).

External validity is the extent to which results of a study can be generalized to and across individuals, organisations, settings, and times. Threats to external validity are interacting effects of testing and selection bias.

According to Bergh et al. (2004), history and selection are the most common issues in determining the internal validity of the research. In addition, Balnaves and Caputi, (2001) state that sampling is the main concern in evaluating the external validity of a research design. Accordingly, the next sections address these issues respectively.

3.6.2.2 Internal Validity: History and Selection

History is a threat to internal validity when events occur between measurements periods (Bergh, et al. 2004). Therefore, since this study does not intend to measure constructs with a time-lag, and dependent, and independent variables are all measured at a single point in time through a unified instrument (Bergh et al. 2004), the phenomena under investigation are not sensitive to the time period of the research, and history argues it may not apply to this research.

Put differently, the model and research questions aim to investigate the relationship between agility and a firm's performance as defined by EFQM at a single point in time, and hence argued to be not within a period of observation or not becoming emergent phenomena during the data collection (Cook & Campbell, 1976, cited in Bergh, et al., 2004, p. 349). In summary, history appears to be implausible or plausible, but did not occur when collecting data (Bergh, et al., 2004, p. 349) in this research.

So, focussing on dealing with an historical threat to the internal validity is not included in this study.

3.6.2.3 External Validity: Sampling

Inappropriate sampling is the key threat to the external validity of a quantitative research measuring causal relationships (Russ-Eft & Hoover, 2005). Therefore, to achieve a desired level of external validity the suggestions of Slater and Atuahene-Gima (2004) were followed. This study also adopted a random sampling from a carefully selected population (Australian medium-to-large firms). Further, during pilot and expert tests (iView panel of experts who have many years of survey experience) it was ensured that non-obtrusive measures would be adopted (Dillman, 2007).

As previously mentioned, the survey was also pilot-tested and an expert panel test was undertaken to assess whether measures seem obtrusive. These techniques increase the likelihood of achieving a high degree of external validity (Slater & Atuahene-Gima, 2004; Russ-Eft). This is consistent with the study of Kriauciunas, Parmigiani, and Rivera-Santos, (2011) in which authors argue that a survey based on an established-measures approach

and careful sampling and detailed administration (e.g. Dillman, 2007) will result in satisfactory external validity and meaningful generalisable results.

3.7 Ethics Approval

The research project was subject to approval by the Macquarie University Ethics Review Committee (Human Research). This approval was received 12th of September 2011. A copy of the letter of approval is found in Appendix 3.

Chapter 4: Results

4.1 Overview of the chapter

Chapter 4 presents the results of the research project. The chapter opens with a description of the data preparation techniques. Descriptive statistics and extensive descriptions of results associated with the two-step process of PLS-SEM factor analysis are presented in separate sections of this chapter. The two step process comprises 1) assessing a measurement model, and then 2) estimating the statistical significance of estimates through a structural modelling path using a bootstrapping algorithm (Chin, 1998). Alternative models are examined and presented to determine model suitability. A summary of the results relating to each hypothesis is presented at the end of the chapter.

4.2 Data Preparation

4.2.1 Data screening

As mentioned in Chapter 3, after designing the questionnaire, the researcher directed a third-party market research firm to collect data via telephone interviews. The data was recorded and processed through an SPSS file. No data cleansing or search for missing data was required as the interviewers had probed respondents carefully for in each of the questions asked.

4.2.2 Outliers

An outlier is an extreme response to a particular question, or extreme responses to all questions (Hair et al., 2013, p. 53). By definition, an outlier is 1.5 times the interquartile range from either the first or third quartiles. The data that was collected in an SPSS file was

first tested for outliers by generating box plots and determining if outliers existed. No outliers were found.

4.3 Descriptive statistics

4.3.1 Response Rate

The intention was to collect 150 valid responses. A total of 596 firms were contacted, providing a response rate of 25 percent. A summary of the sample disposition is found in Table 4. 1 below.

Table 4. 1: Sample Disposition

Live Sample	
"Virgins/Fresh" numbers	3088
Engaged/Busy	11
No Answer	107
Answering Machine	222
"Soft" Appointment	348
"Hard" Appointment	2
Total Live Sample	3778
Terminal Sample	
Complete	150
Refused	446
Wrong Number	37
Fax	13
Number attempted 5 times	157
Disconnected	76

Sub-Total Inaccurate	283
Non Qualifier - Respondent not available duration of research	214
Respondent Incoherent	0
NQ1 - Not a Key Decision Maker for organisation @ Screener S1	4
NQ2 - Less than 50 Employees @ Screener S2	27
NQ3 - (Spare)	0
NQ4 - (Spare)	0
NQ5 - (Spare)	0
Sub-Total Non Qualifiers	245
Language	3
Quota full	0
Sub-Total Unable to complete	248
Total Terminal Sample	1127
Sample Statistics	
Overall Sample Qualifying Incidence (completes/(completes+relevant NQ's))	83%
Overall Sample Response Incidence (completes/(completes+unable to complete))	38%
Overall Sample Accuracy (accurate sample/(accurate + inaccurate sample))	81%
Response Rate (completes/(refusals + completes))	25%

The 'Live Sample' section in Table 4.1 describes the sample size that was available from the DnB database. The 'Terminal Sample' is the summary of the firms that were approached, who refused and those who responded. It gives the response rate: $150/(150+446)$ or 25 percent. The second section of terminal sample is a summary of the non-qualifiers. Finally, the 'Sample Statistic' section provides the summaries of the response rates. 'Virgin/Fresh' refers to the random sample from the Dunn and Bradstreet database. 'Soft appointments'

are those where the respondents were asked to call back within a specified time, e.g., 30 min or an hour. 'Hard appointments' was the situation where the respondents asked to return the call at a specified time, e.g., at 4pm or during their lunch break.

4.3.2 Demographics

Table 4.2 summarises the distribution of firms randomly selected from each of the Australian States. The bulk of the respondents were from New South Wales, followed by Victoria and Queensland. Table 4.3 summarises the types of organisations taking part in the survey. Of these, 84 percent were individual companies while the remainder were part of a company division. Table 4.4 describes the role the respondents have. This is a key piece of information as it demonstrates that the people who took part in the survey were senior executives or their direct reports who could answer the Business Excellence questions asked of them. Table 4.5 summarises the organisation annual revenue, illustrating a wide range of organisations and that the sample of firms was within the medium-to-large organisations category. Table 4.6 summarises the employee numbers. The sample selected was based on the criteria of organisations that had between 50 and 250 employees.

Table 4.2 – Summary of responses by State.

Sample Item - State	Frequency	Percent	Valid Percent	Cumulative Percent
Australian Capital Territory	3	2.0	2.0	2.0
New South Wales	61	40.7	40.7	42.7
Northern Territory	1	0.7	0.7	43.3
Queensland	24	16.0	16.0	59.3
South Australia	14	9.3	9.3	68.7
Tasmania	4	2.7	2.7	71.3
Victoria	37	24.7	24.7	96.0
Western Australia	6	4.0	4.0	100.0
Total	150	100.0	100.0	

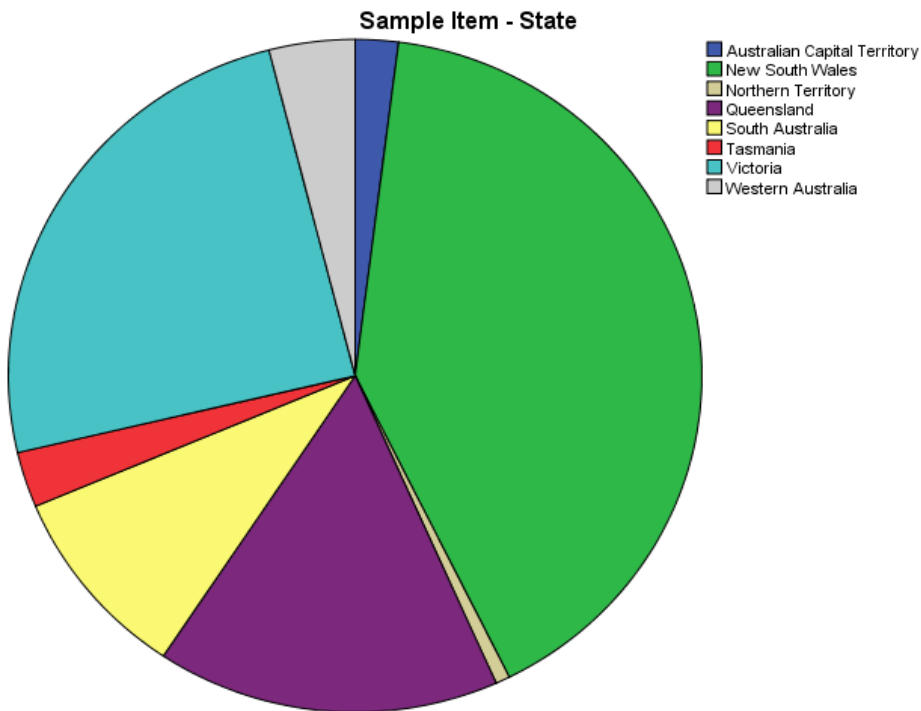


Figure 4.1 – Pie Chart of states participating in the survey.

Table 4.3 – Type of organisation taking part in the survey.

Q2. And which of these would best describe the business unit for which you are responding to this survey?

	Frequency	Percent	Valid Percent	Cumulative Percent
Company	126	84.0	84.0	84.0
Division	16	10.7	10.7	94.7
Plant or Site	8	5.3	5.3	100.0
Total	150	100.0	100.0	

Q2. And which of these would best describe the business unit for which you are responding to this survey?

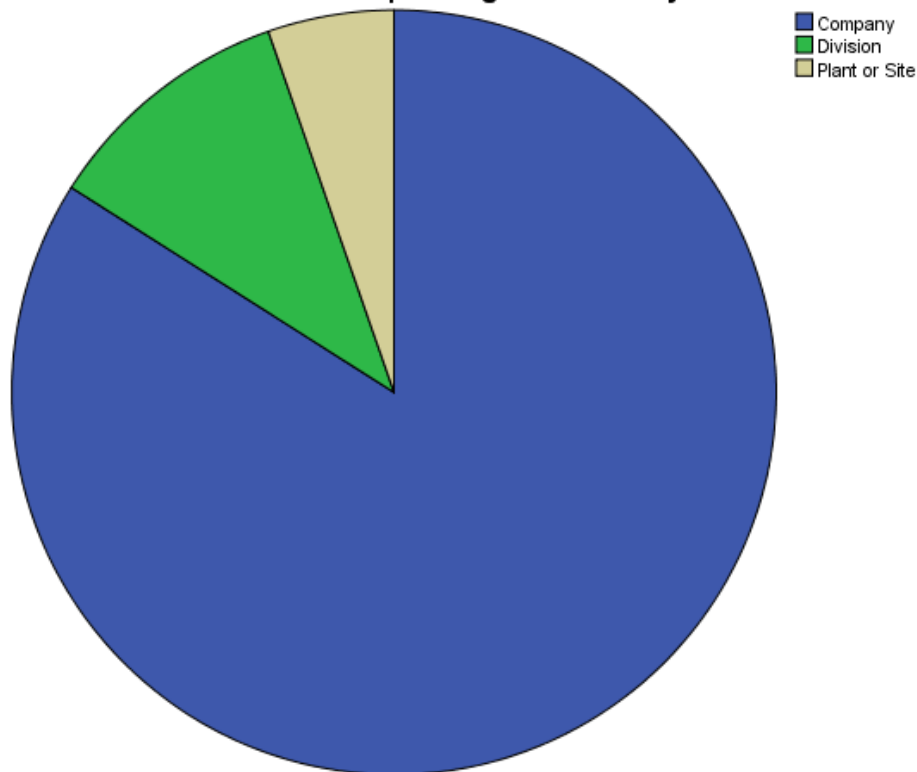


Figure 4.2 – Pie Chart of organisation taking part in the survey.

Table 4.4 – Respondent’s role within the organisation.

S1. Which of the following would best describe your role?

	Frequency	Percent	Valid Percent	Cumulative Percent
Decision-maker or Manager familiar with <u>all</u> aspects of managing the organisation.	80	53.3	53.3	53.3
Decision-maker or Manager familiar with <u>most</u> aspects of managing the organisation.	70	46.7	46.7	100.0
Total	150	100.0	100.0	

Table 4.5 – Mean, Standard Deviations, Minimum and Maximum values of Organisation’s annual revenue (Australian Dollars)

Statistics	
HQ8.Annual revenue AUD	
Mean	42,855,034
Std. Deviation	58,708,064
Minimum	101,472
Maximum	417,659,000

Table 4.6 – Mean, Standard Deviations, Minimum and Maximum values of Organisation’s employee numbers.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
HQ9. Employee size	150	51	250	111.21	51.383
Valid N (listwise)	150				

The summaries of the data are as follows:

- * From table 4.2 we see that 82 percent of the respondents were from New South Wales, Victoria, and Queensland (41 percent, 25 percent, and 16 percent respectively) while South Australian, Western Australia, Tasmania, Australian Capital Territory, and Northern Territory made up the remaining 19 percent.

- * A very large proportion of respondents were from companies (84 percent), while the remaining 16 percent were from divisions or company sites or plants.

- * Table 4.4 shows that there is an even split between respondents who were key decision makers (53 percent) and those who were familiar with most aspects of managing the organisation (47 percent).

- * Table 4.5 shows that the mean and standard deviation of the firms revenue to be \$AUD42.8 million and \$AUD58.7 million respectively demonstrating that there is a wide range of firms who took part in the survey.

- * Firm size in terms of employee numbers is summarised in table 4.6 with a range between 51 and 250 employees and an average of 111.

From the summaries above we can conclude that the sample firms come from various industries, suggesting that the sample is heterogeneous and can represent various industries within Australia. It is also confirmed that the respondents held the roles intended for the survey, and the size of the firms are within the boundaries set for this study.

4.3.3 Factor analysis of the measurement model

4.3.3.1. Agility as a Second-Order Formative

To summarise, the outputs of the data analysis below show that Agility is a second order formative and factorial structure and is consistent with conceptualisation of the model.

The sequence of the data analysis and results are as follows: The survey results were uploaded onto the SmartPLS software program and the path diagram was generated (see Figure 4.3). Table 4.7 is the output of the standardised path coefficients. Column 1 refers to the questions on the survey which are found in Appendix 4. Hair et al. (2013, p. 86) suggest that standardised values of greater than 0.20 are usually significant, and those with values below 0.10 are usually not.

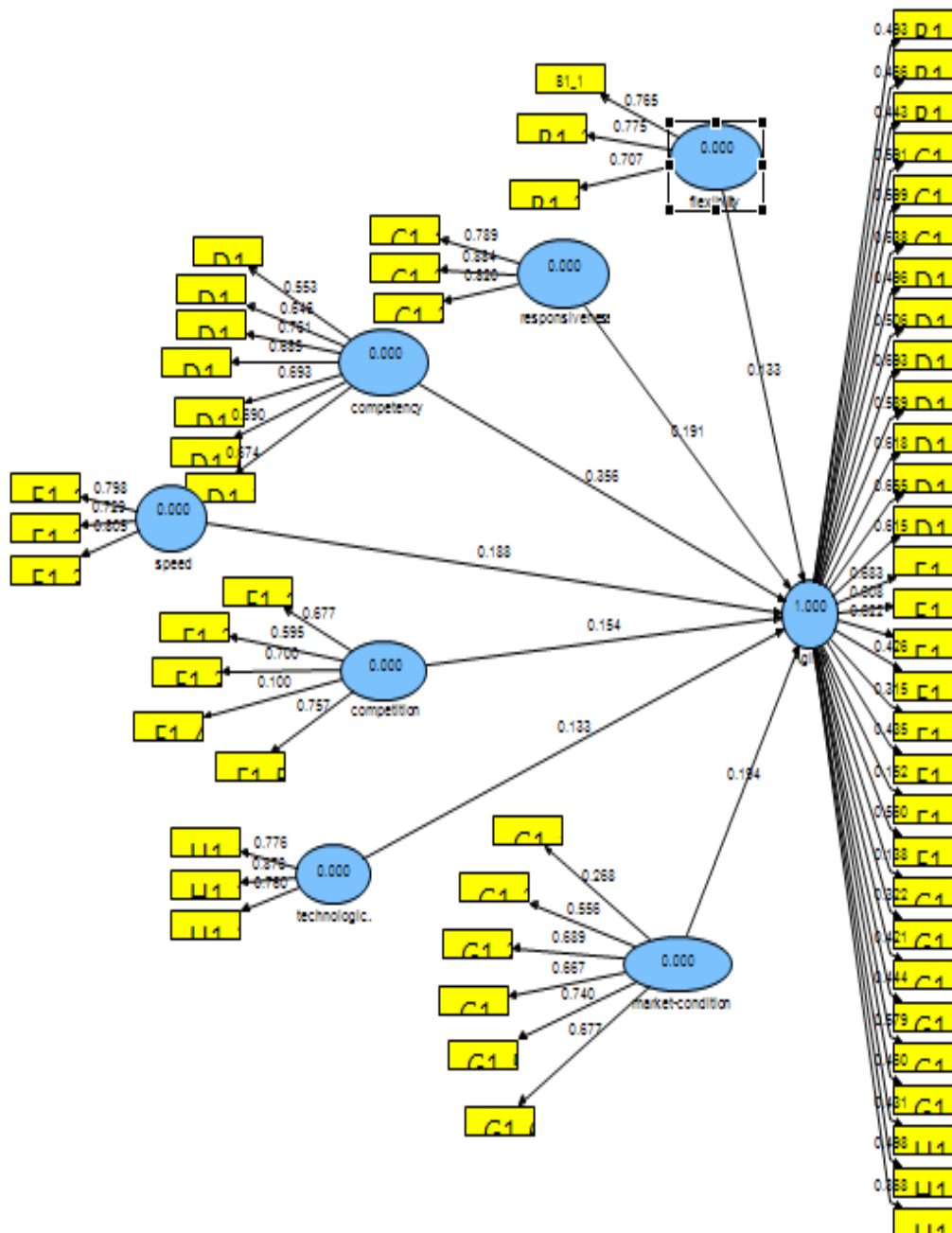


Figure 4.3 – Path diagram for Second-Order Formative Model of Agility

Table 4.7 – Cross-Loading Factor loadings - Factor loadings above 0.5 are significant as long as they are aligned on their intended construct. Because agility is the 2nd order formative construct, all factors are also loading on agility.

	Agility	Competency	Competition	Flexibility	Market condition	Responsiveness	Speed	Technological condition
B1_1	0.49	0.32	0.37	0.76	0.23	0.45	0.32	0.23
B1_1	0.49	0.32	0.37	0.76	0.23	0.45	0.32	0.23
B1_2	0.47	0.30	0.19	0.78	0.19	0.58	0.36	0.09
B1_2	0.47	0.30	0.19	0.78	0.19	0.58	0.36	0.09
B1_3	0.44	0.40	0.22	0.71	0.11	0.43	0.33	0.05
B1_3	0.44	0.40	0.22	0.71	0.11	0.43	0.33	0.05
C1_1	0.59	0.48	0.28	0.43	0.27	0.79	0.47	0.20
C1_1	0.59	0.48	0.28	0.43	0.27	0.79	0.47	0.20
C1_2	0.60	0.46	0.22	0.58	0.21	0.88	0.50	0.15
C1_2	0.60	0.46	0.22	0.58	0.21	0.88	0.50	0.15
C1_3	0.64	0.46	0.34	0.61	0.25	0.82	0.56	0.23
C1_3	0.64	0.46	0.34	0.61	0.25	0.82	0.56	0.23
D1_1	0.50	0.55	0.20	0.26	0.33	0.35	0.38	0.23
D1_1	0.50	0.55	0.20	0.26	0.33	0.35	0.38	0.23
D1_2	0.51	0.65	0.21	0.15	0.30	0.34	0.39	0.21
D1_2	0.51	0.65	0.21	0.15	0.30	0.34	0.39	0.21

	Agility	Competency	Competition	Flexibility	Market condition	Responsiveness	Speed	Technological condition
D1_3	0.69	0.76	0.44	0.30	0.45	0.35	0.61	0.35
D1_3	0.69	0.76	0.44	0.30	0.45	0.35	0.61	0.35
D1_4	0.59	0.69	0.45	0.28	0.41	0.22	0.41	0.31
D1_4	0.59	0.69	0.45	0.28	0.41	0.22	0.41	0.31
D1_5	0.62	0.69	0.36	0.26	0.40	0.32	0.52	0.32
D1_5	0.62	0.69	0.36	0.26	0.40	0.32	0.52	0.32
D1_6	0.66	0.69	0.32	0.39	0.33	0.53	0.56	0.27
D1_6	0.66	0.69	0.32	0.39	0.33	0.53	0.56	0.27
D1_7	0.61	0.67	0.25	0.44	0.30	0.52	0.52	0.17
D1_7	0.61	0.67	0.25	0.44	0.30	0.52	0.52	0.17
E1_1	0.68	0.65	0.46	0.34	0.36	0.35	0.80	0.35
E1_1	0.68	0.65	0.46	0.34	0.36	0.35	0.80	0.35
E1_2	0.61	0.46	0.21	0.51	0.31	0.67	0.73	0.15
E1_2	0.61	0.46	0.21	0.51	0.31	0.67	0.73	0.15
E1_3	0.62	0.58	0.32	0.21	0.27	0.44	0.80	0.37
E1_3	0.62	0.58	0.32	0.21	0.27	0.44	0.80	0.37
F1_1	0.43	0.34	0.68	0.19	0.36	0.19	0.20	0.26

	Agility	Competency	Competition	Flexibility	Market condition	Responsiveness	Speed	Technological condition
F1_1	0.43	0.34	0.68	0.19	0.36	0.19	0.20	0.26
F1_2	0.31	0.17	0.59	0.09	0.34	0.12	0.20	0.20
F1_2	0.31	0.17	0.59	0.09	0.34	0.12	0.20	0.20
F1_3	0.43	0.35	0.70	0.21	0.35	0.16	0.23	0.23
F1_3	0.43	0.35	0.70	0.21	0.35	0.16	0.23	0.23
F1_4	0.15	0.15	0.10	-0.11	0.21	0.08	0.14	0.11
F1_4	0.15	0.15	0.10	-0.11	0.21	0.08	0.14	0.11
F1_5	0.56	0.38	0.76	0.45	0.29	0.38	0.46	0.25
F1_5	0.56	0.38	0.76	0.45	0.29	0.38	0.46	0.25
G1_1	0.14	0.06	0.02	0.05	0.27	0.12	0.11	0.09
G1_1	0.14	0.06	0.02	0.05	0.27	0.12	0.11	0.09
G1_2	0.32	0.21	0.21	0.14	0.56	0.18	0.15	0.21
G1_2	0.32	0.21	0.21	0.14	0.56	0.18	0.15	0.21
G1_3	0.42	0.31	0.41	0.16	0.69	0.17	0.23	0.14
G1_3	0.42	0.31	0.41	0.16	0.69	0.17	0.23	0.14
G1_4	0.44	0.34	0.37	0.08	0.67	0.23	0.24	0.29
G1_4	0.44	0.34	0.37	0.08	0.67	0.23	0.24	0.29

	Agility	Competency	Competition	Flexibility	Market condition	Responsiveness	Speed	Technological condition
G1_5	0.58	0.52	0.44	0.22	0.74	0.18	0.37	0.37
G1_5	0.58	0.52	0.44	0.22	0.74	0.18	0.37	0.37
G1_6	0.46	0.38	0.24	0.19	0.68	0.22	0.32	0.23
G1_6	0.46	0.38	0.24	0.19	0.68	0.22	0.32	0.23
H1_1	0.43	0.26	0.26	0.23	0.34	0.26	0.26	0.78
H1_1	0.43	0.26	0.26	0.23	0.34	0.26	0.26	0.78
H1_2	0.50	0.40	0.37	0.17	0.27	0.20	0.37	0.88
H1_2	0.50	0.40	0.37	0.17	0.27	0.20	0.37	0.88
H1_3	0.37	0.30	0.21	-0.03	0.32	0.10	0.28	0.76
H1_3	0.37	0.30	0.21	-0.03	0.32	0.10	0.28	0.76

Note: As shown in Appendix 3, questions labelled as B1_1-B1_3 are related to Flexibility; C1_1 – C1_3 related to Responsiveness, D1_1 – D1_7 related to competency, E1_1 – E1_3 related to Speed, F1_1 – F1_5 related to competition, G1_1 – G1_6 related to market condition, and H1_1 – H1_3 related to technology

From column 2 (Agility) in Table 4.7, we see that all the path coefficients are greater than 0.5 except for item F1_4 (path coefficient of 0.10), and item G1_1 (path coefficient 0.27). These two questions were ‘trimmed’ from the model as suggested by Hair et al. (2013, p.104) and the model was rerun with the outputs shown in Figure 4.4a and Table 4.7a below.

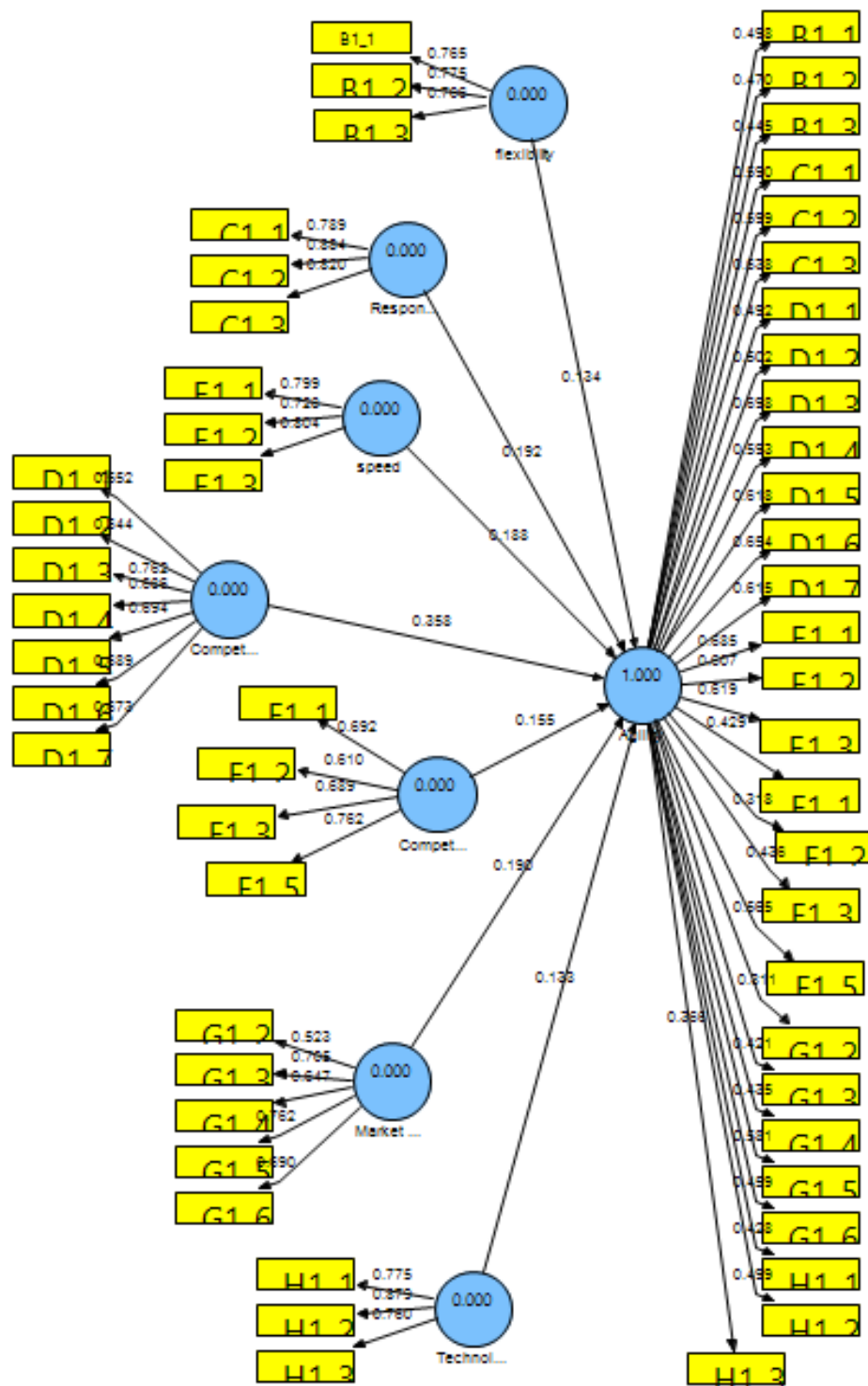


Figure 4.4 – Path diagram for 'Trimmed' Second Order Formative Model of Agility

Table 4.7a – Factor loadings for ‘Trimmed’ model - Factor loadings above 0.5 are significance as long as they are aligns on their intended construct. Because agility is the 2nd order formative construct all factors are also loading on agility.

	Agility	Competency	Competition	Market regulation	Responsive ness	Tech nology	Flexibility	Speed
B1_1	0.50	0.32	0.38	0.24	0.45	0.23	0.77	0.32
B1_1	0.50	0.32	0.38	0.24	0.45	0.23	0.77	0.32
B1_2	0.47	0.30	0.21	0.18	0.58	0.09	0.78	0.36
B1_2	0.47	0.30	0.21	0.18	0.58	0.09	0.78	0.36
B1_3	0.45	0.40	0.23	0.11	0.43	0.05	0.71	0.33
B1_3	0.45	0.40	0.23	0.11	0.43	0.05	0.71	0.33
C1_1	0.59	0.48	0.28	0.26	0.79	0.20	0.43	0.47
C1_1	0.59	0.48	0.28	0.26	0.79	0.20	0.43	0.47
C1_2	0.60	0.46	0.22	0.20	0.88	0.15	0.58	0.50
C1_2	0.60	0.46	0.22	0.20	0.88	0.15	0.58	0.50
C1_3	0.64	0.46	0.33	0.25	0.82	0.23	0.61	0.56
C1_3	0.64	0.46	0.33	0.25	0.82	0.23	0.61	0.56
D1_1	0.49	0.55	0.18	0.33	0.35	0.23	0.26	0.38
D1_1	0.49	0.55	0.18	0.33	0.35	0.23	0.26	0.38

	Agility	Competency	Competition	Market regulation	Responsive ness	Tech nology	Flexibility	Speed
D1_2	0.50	0.64	0.18	0.30	0.34	0.21	0.15	0.39
D1_2	0.50	0.64	0.18	0.30	0.34	0.21	0.15	0.39
D1_3	0.70	0.76	0.43	0.47	0.35	0.35	0.30	0.61
D1_3	0.70	0.76	0.43	0.47	0.35	0.35	0.30	0.61
D1_4	0.59	0.69	0.44	0.43	0.22	0.31	0.28	0.41
D1_4	0.59	0.69	0.44	0.43	0.22	0.31	0.28	0.41
D1_5	0.62	0.69	0.34	0.41	0.32	0.33	0.26	0.52
D1_5	0.62	0.69	0.34	0.41	0.32	0.33	0.26	0.52
D1_6	0.65	0.69	0.31	0.32	0.53	0.27	0.39	0.56
D1_6	0.65	0.69	0.31	0.32	0.53	0.27	0.39	0.56
D1_7	0.62	0.67	0.24	0.30	0.52	0.17	0.44	0.52
D1_7	0.62	0.67	0.24	0.30	0.52	0.17	0.44	0.52
E1_1	0.69	0.65	0.45	0.37	0.35	0.35	0.34	0.80
E1_1	0.69	0.65	0.45	0.37	0.35	0.35	0.34	0.80
E1_2	0.61	0.46	0.20	0.30	0.67	0.15	0.51	0.73
	Agility	Competency	Competition	Market	Responsive	Tech	Flexibility	Speed

				regulation	ness	nology		
E1_2	0.61	0.46	0.20	0.30	0.67	0.15	0.51	0.73
E1_3	0.62	0.58	0.30	0.27	0.44	0.37	0.21	0.80
E1_3	0.62	0.58	0.30	0.27	0.44	0.37	0.21	0.80
F1_1	0.43	0.34	0.69	0.36	0.19	0.26	0.19	0.20
F1_1	0.43	0.34	0.69	0.36	0.19	0.26	0.19	0.20
F1_2	0.32	0.17	0.61	0.34	0.12	0.20	0.09	0.20
F1_2	0.32	0.17	0.61	0.34	0.12	0.20	0.09	0.20
F1_3	0.44	0.35	0.69	0.37	0.16	0.24	0.21	0.23
F1_3	0.44	0.35	0.69	0.37	0.16	0.24	0.21	0.23
F1_5	0.57	0.38	0.76	0.31	0.38	0.25	0.45	0.46
F1_5	0.57	0.38	0.76	0.31	0.38	0.25	0.45	0.46
G1_2	0.31	0.21	0.20	0.52	0.18	0.21	0.14	0.15
G1_2	0.31	0.21	0.20	0.52	0.18	0.21	0.14	0.15
G1_3	0.42	0.31	0.40	0.71	0.17	0.14	0.16	0.23
G1_3	0.42	0.31	0.40	0.71	0.17	0.14	0.16	0.23
	Agility	Competency	Competition	Market regulation	Responsive ness	Tech nology	Flexibility	Speed

G1_4	0.43	0.34	0.34	0.65	0.23	0.29	0.08	0.24
G1_4	0.43	0.34	0.34	0.65	0.23	0.29	0.08	0.24
G1_5	0.58	0.52	0.43	0.76	0.18	0.37	0.22	0.37
G1_5	0.58	0.52	0.43	0.76	0.18	0.37	0.22	0.37
G1_6	0.46	0.38	0.22	0.69	0.22	0.23	0.19	0.32
G1_6	0.46	0.38	0.22	0.69	0.22	0.23	0.19	0.32
H1_1	0.43	0.26	0.25	0.34	0.26	0.78	0.23	0.26
H1_1	0.43	0.26	0.25	0.34	0.26	0.78	0.23	0.26
H1_2	0.50	0.40	0.37	0.27	0.20	0.88	0.17	0.37
H1_2	0.50	0.40	0.37	0.27	0.20	0.88	0.17	0.37
H1_3	0.37	0.30	0.20	0.32	0.10	0.76	-0.03	0.28
H1_3	0.37	0.30	0.20	0.32	0.10	0.76	-0.03	0.28

From Table 4.7a we can see that with the ‘trimmed’ model, all factor loadings are above 0.5 and have very little impact to the other loadings, and therefore the trimmed model is an improved iteration.

PLS-SEM does not assume that the data are normally distributed, which implies that parametric significance tests used in regression analysis cannot be applied to test whether

path coefficients are significant. PLS-SEM applies a non-parametric bootstrap procedure to test for significant (Hair et al., 2013, p. 130). If the resulting empirical t value is above 1.96, we can assume that the path coefficient is significantly different from zero at a 5 percent significance level ($\alpha=0.05$; two tailed test) (Hair et al., 2013, p. 134). From both Figure 4.5 and Table 4.8 we can see all the model t values are above 1.96 except for two measured variables, Agility to Competition (Question 4) and Agility to Market Regulations (Question 1). The overall constructs are significant. These were the same questions with less than 0.5 path coefficients. The bootstrap analysis was rerun with the trimmed model and the results are summarised in table 4.9. The outputs show that the trimmed model has no values below 1.96 therefore we can conclude that based on our path coefficients and significance tests that Agility is a second order formative and factorial structure and is consistent with conceptualisation.

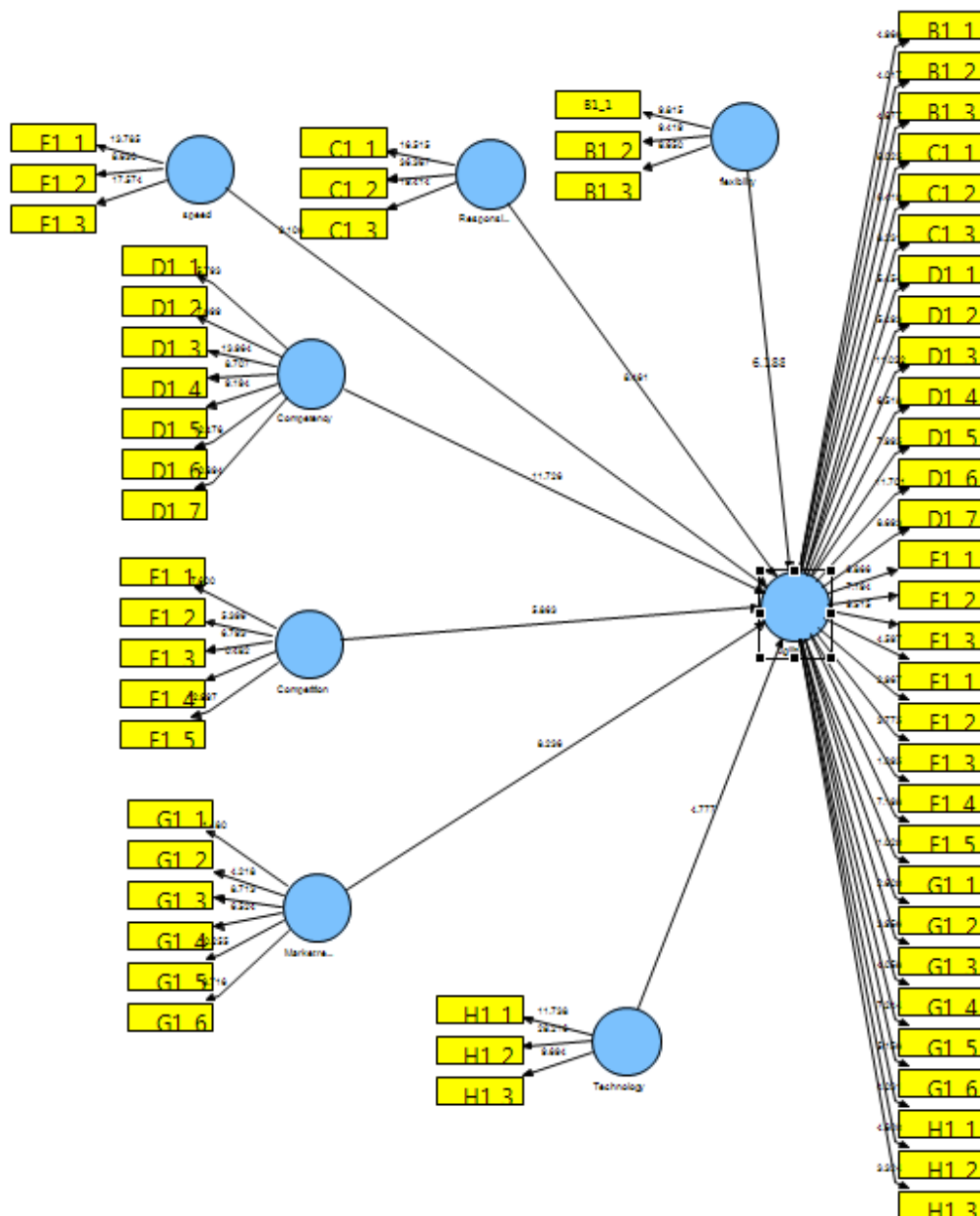


Figure 4.5 – Bootstrapped values on Second-Order Formative model of Agility.

Table 4.8 – Empirical t values for Second Order Formative Agility model.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
B1_1 <- flexibility	0.7647	0.7632	0.0779	0.0779	9.8145
B1_1 <- Agility	0.4932	0.4889	0.0993	0.0993	4.9663
B1_2 <- flexibility	0.7751	0.7653	0.0823	0.0823	9.4195
B1_2 <- Agility	0.4657	0.4579	0.1159	0.1159	4.0175
B1_3 <- flexibility	0.7069	0.7072	0.0817	0.0817	8.6504
B1_3 <- Agility	0.4431	0.4396	0.0947	0.0947	4.6772
C1_1 <- Responsiveness	0.7891	0.7899	0.0478	0.0478	16.5154
C1_1 <- Agility	0.591	0.5885	0.0736	0.0736	8.0251
C1_2 <- Responsiveness	0.8843	0.8838	0.0243	0.0243	36.3675
C1_2 <- Agility	0.5989	0.5986	0.0933	0.0933	6.4192
C1_3 <- Responsiveness	0.8197	0.8201	0.0422	0.0422	19.4138
C1_3 <- Agility	0.6376	0.6334	0.0775	0.0775	8.2311
D1_1 <- Competency	0.5534	0.5522	0.0955	0.0955	5.7934
D1_1 <- Agility	0.4961	0.4949	0.091	0.091	5.454
D1_2 <- Competency	0.6456	0.642	0.0839	0.0839	7.699
D1_2 <- Agility	0.5055	0.5088	0.092	0.092	5.493
D1_3 <- Competency	0.7611	0.7598	0.0545	0.0545	13.9635
D1_3 <- Agility	0.6929	0.692	0.0629	0.0629	11.0218
D1_4 <- Competency	0.6851	0.6801	0.0787	0.0787	8.7072

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
D1_4 <- Agility	0.5895	0.5861	0.0904	0.0904	6.5181
D1_5 <- Competency	0.6931	0.6895	0.0754	0.0754	9.1945
D1_5 <- Agility	0.6179	0.6166	0.0773	0.0773	7.9949
D1_6 <- Competency	0.6896	0.6909	0.0553	0.0553	12.4764
D1_6 <- Agility	0.6554	0.6562	0.056	0.056	11.701
D1_7 <- Competency	0.6737	0.6741	0.0618	0.0618	10.8944
D1_7 <- Agility	0.6146	0.6137	0.0707	0.0707	8.6932
E1_1 <- speed	0.7979	0.7971	0.0579	0.0579	13.7854
E1_1 <- Agility	0.6826	0.6825	0.0692	0.0692	9.8659
E1_2 <- speed	0.729	0.7242	0.0845	0.0845	8.63
E1_2 <- Agility	0.6083	0.6065	0.0846	0.0846	7.1935
E1_3 <- speed	0.8049	0.8082	0.0458	0.0458	17.5743
E1_3 <- Agility	0.6215	0.6266	0.0653	0.0653	9.5153
F1_1 <- Competition	0.6767	0.6634	0.089	0.089	7.6001
F1_1 <- Agility	0.4263	0.4204	0.0927	0.0927	4.5969
F1_2 <- Competition	0.5947	0.5733	0.1102	0.1102	5.3961
F1_2 <- Agility	0.3147	0.3091	0.1061	0.1061	2.9665
F1_3 <- Competition	0.7003	0.6828	0.1031	0.1031	6.793
F1_3 <- Agility	0.4349	0.4306	0.1152	0.1152	3.775
F1_4 <- Competition	0.1004	0.0898	0.2084	0.2084	0.4819

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
F1_4 <- Agility	0.1522	0.1565	0.139	0.139	1.0947
F1_5 <- Competition	0.7567	0.7508	0.0582	0.0582	12.9969
F1_5 <- Agility	0.5602	0.5542	0.0778	0.0778	7.1981
G1_1 <- Market regulation	0.2678	0.2501	0.1809	0.1809	1.4802
G1_1 <- Agility	0.1384	0.1358	0.1345	0.1345	1.0292
G1_2 <- Market regulation	0.5556	0.544	0.1317	0.1317	4.2181
G1_2 <- Agility	0.3217	0.3234	0.1233	0.1233	2.6088
G1_3 <- Market regulation	0.6891	0.6771	0.0791	0.0791	8.713
G1_3 <- Agility	0.4211	0.4159	0.1065	0.1065	3.9556
G1_4 <- Market regulation	0.6667	0.6506	0.1022	0.1022	6.5237
G1_4 <- Agility	0.4439	0.4405	0.1094	0.1094	4.0582
G1_5 <- Market regulation	0.7402	0.744	0.0722	0.0722	10.2552
G1_5 <- Agility	0.579	0.5734	0.0799	0.0799	7.2438
G1_6 <- Market regulation	0.6773	0.6759	0.0777	0.0777	8.7161
G1_6 <- Agility	0.46	0.4567	0.0892	0.0892	5.1557
H1_1 <- Technology	0.7764	0.7772	0.0661	0.0661	11.7381
H1_1 <- Agility	0.4313	0.4206	0.107	0.107	4.0315
H1_2 <- Technology	0.8779	0.8765	0.0311	0.0311	28.2157
H1_2 <- Agility	0.4983	0.4903	0.1083	0.1083	4.5999

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
H1_3 <- Technology	0.76	0.7513	0.0784	0.0784	9.6941
H1_3 <- Agility	0.3681	0.3616	0.1107	0.1107	3.3243

Table 4.9 – Empirical t values for ‘Trimmed’ Second Order Formative Agility model.

	Loading	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
B1_1 <- flexibility	0.4646	0.0704	0.0704	6.6749
B1_1 <- Agility	0.0612	0.0111	0.0111	5.7073
B1_2 <- flexibility	0.4392	0.0741	0.0741	5.9857
B1_2 <- Agility	0.0586	0.0144	0.0144	4.124
B1_3 <- flexibility	0.4217	0.0719	0.0719	5.8427
B1_3 <- Agility	0.0558	0.012	0.012	4.6939
C1_1 <- Responsiveness	0.3897	0.0345	0.0345	11.2834
C1_1 <- Agility	0.0738	0.0092	0.0092	8.1517
C1_2 <- Responsiveness	0.3927	0.0302	0.0302	13.0445
C1_2 <- Agility	0.0748	0.0117	0.0117	6.4681
C1_3 <- Responsiveness	0.4201	0.0343	0.0343	12.264
C1_3 <- Agility	0.0797	0.011	0.011	7.3785
D1_1 <- Competency	0.1722	0.0265	0.0265	6.5671
D1_1 <- Agility	0.0611	0.0104	0.0104	6.0036
D1_2 <- Competency	0.1774	0.0259	0.0259	6.8498
D1_2 <- Agility	0.0632	0.0118	0.0118	5.3645
D1_3 <- Competency	0.2472	0.0241	0.0241	10.2221
D1_3 <- Agility	0.0877	0.0103	0.0103	8.6042
D1_4 <- Competency	0.2077	0.0277	0.0277	7.5557
D1_4 <- Agility	0.0739	0.0122	0.0122	6.1733
D1_5 <- Competency	0.2169	0.0245	0.0245	8.9137
D1_5 <- Agility	0.0771	0.011	0.011	7.1404
D1_6 <- Competency	0.2305	0.0292	0.0292	7.9207

	Loading	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
D1_6 <- Agility	0.0816	0.0103	0.0103	8.0447
D1_7 <- Competency	0.2174	0.0304	0.0304	7.162
D1_7 <- Agility	0.077	0.0111	0.0111	7.01
E1_1 <- speed	0.461	0.0486	0.0486	9.4664
E1_1 <- Agility	0.0861	0.0124	0.0124	6.9872
E1_2 <- speed	0.4048	0.0464	0.0464	8.8026
E1_2 <- Agility	0.0756	0.0116	0.0116	6.6325
E1_3 <- speed	0.4176	0.0379	0.0379	10.9968
E1_3 <- Agility	0.078	0.0107	0.0107	7.3377
F1_1 <- Competition	0.3493	0.0674	0.0674	5.2115
F1_1 <- Agility	0.0534	0.0123	0.0123	4.4247
F1_2 <- Competition	0.2514	0.0772	0.0772	3.3686
F1_2 <- Agility	0.0388	0.0133	0.0133	3.0321
F1_3 <- Competition	0.3488	0.0755	0.0755	4.7231
F1_3 <- Agility	0.0536	0.0141	0.0141	3.9061
F1_5 <- Competition	0.4673	0.0707	0.0707	6.5465
F1_5 <- Agility	0.0706	0.0099	0.0099	7.2055
G1_2 <- Market regulation	0.1969	0.0764	0.0764	2.7188
G1_2 <- Agility	0.0372	0.0149	0.0149	2.639
G1_3 <- Market regulation	0.2716	0.0554	0.0554	5.0671
G1_3 <- Agility	0.0508	0.0123	0.0123	4.331
G1_4 <- Market regulation	0.2836	0.061	0.061	4.7504
G1_4 <- Agility	0.0528	0.0127	0.0127	4.3263

	Loading	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
G1_5 <- Market regulation	0.3915	0.055	0.055	7.046
G1_5 <- Agility	0.0722	0.0091	0.0091	8.0503
G1_6 <- Market regulation	0.3076	0.0559	0.0559	5.4744
G1_6 <- Agility	0.057	0.0109	0.0109	5.3479
H1_1 <- Technology	0.4054	0.0735	0.0735	5.5533
H1_1 <- Agility	0.0521	0.012	0.012	4.5013
H1_2 <- Technology	0.4781	0.0509	0.0509	9.3533
H1_2 <- Agility	0.0617	0.0135	0.0135	4.6703
H1_3 <- Technology	0.3469	0.0709	0.0709	4.9241
H1_3 <- Agility	0.0451	0.0131	0.0131	3.5348

4.3.4 EFQM performance dimensions as reflective constructs

Using the same rationale as explained in section 4.4.1.1 as well as replicating the work done by Bou-Llusar et al. (2009) the formative model presented in Figure 4.6 was tested.

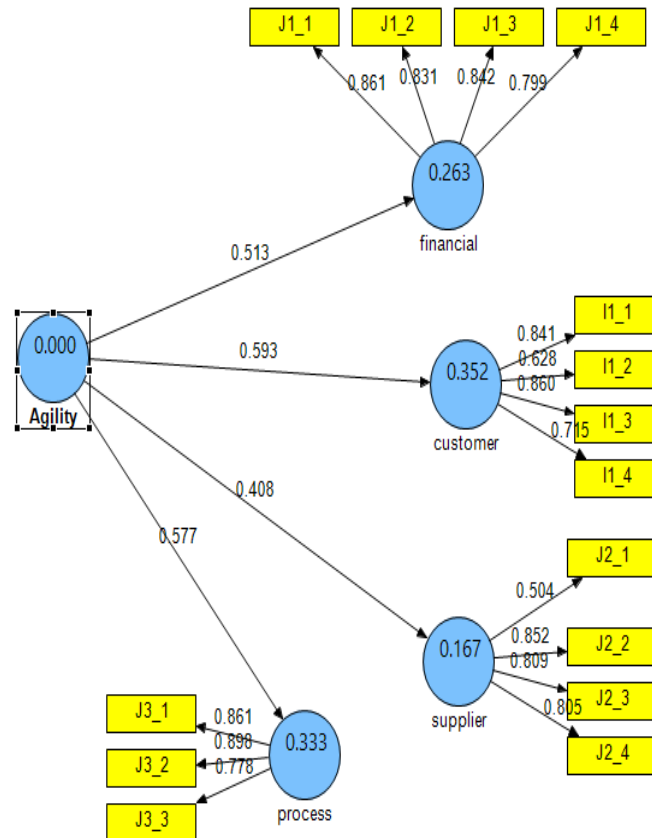


Figure 4.6 – Graphical representation of the final structural model

Table 4.10 – Outer Loading of the final structural model

	Agility	Customer	Financial	Process	Supplier
I1_1		0.84			
I1_2		0.63			
I1_3		0.86			
I1_4		0.72			
J1_1			0.86		
J1_2			0.83		
J1_3			0.84		
J1_4			0.80		
J2_1					0.50
J2_2					0.85
J2_3					0.81
J2_4					0.80
J3_1				0.86	
J3_2				0.90	
J3_3				0.78	

The value of Agility as a 2nd-order latent construct was calculated by PLS algorithm and added to the data file, then a structural model was created in which agility is formed by a single item. This model was used to test the hypothesis. (H1) is a 2nd factorial structure of agility, and from the results we can conclude that this hypothesis is supported, i.e., agility has a positive effect on a firm's performance.

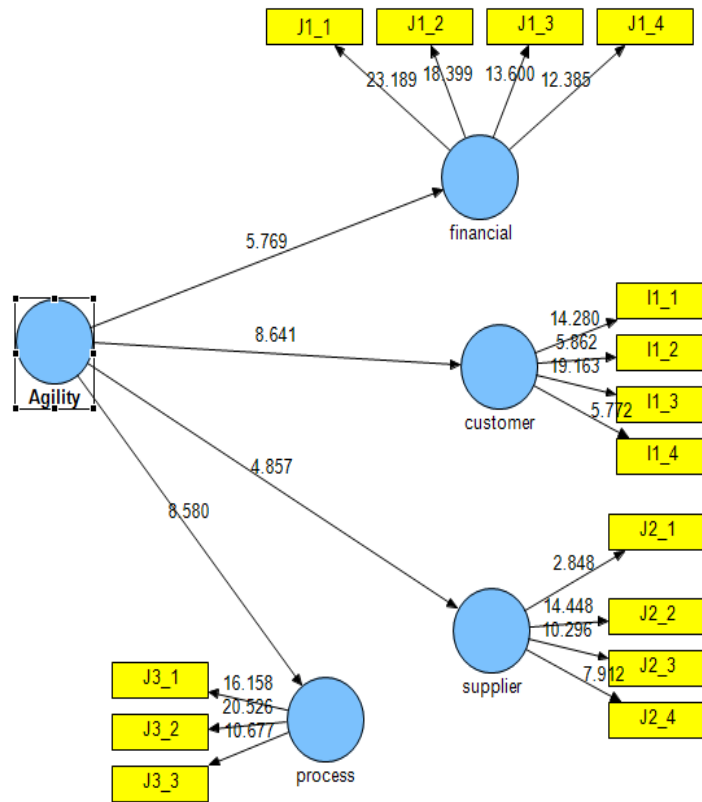


Figure 4.7 – Results of Bootstrapping the Structural Model.

Table 4.11: T statistics of the loadings of the final structural model

	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
I1_1 <- customer	0.35	0.05	0.05	6.48
I1_2 <- customer	0.26	0.07	0.07	3.87
I1_3 <- customer	0.41	0.06	0.06	6.69
I1_4 <- customer	0.27	0.06	0.06	4.39
J1_1 <- financial	0.38	0.04	0.04	8.93
J1_2 <- financial	0.34	0.04	0.04	8.24
J1_3 <- financial	0.25	0.05	0.05	5.10
J1_4 <- financial	0.22	0.04	0.04	5.13
J2_2 <- supplier	0.47	0.09	0.09	5.02
J2_3 <- supplier	0.37	0.12	0.12	3.04
J2_4 <- supplier	0.26	0.10	0.10	2.83
J3_1 <- process	0.34	0.04	0.04	8.03
J3_2 <- process	0.38	0.03	0.03	12.37
J3_3 <- process	0.46	0.07	0.07	6.14
agility <- Agility	1.00	0.00	0.00	0.00

Table 4.12: Contribution of first-order sub-constructs to the second-order, and second-order to the dependent variable

	Path coefficient	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
Agility -> Customer	0.6024	0.071	0.071	8.4814
Agility -> Financial	0.5218	0.0935	0.0935	5.5821
Agility -> Process	0.5873	0.0604	0.0604	9.7235
Agility -> Supplier	0.4145	0.081	0.081	5.115
Competency -> Agility	0.3588	0.0289	0.0289	12.4251
Competition -> Agility	0.1373	0.0288	0.0288	4.765
Market regulation -> Agility	0.2171	0.0281	0.0281	7.74
Responsiveness -> Agility	0.1977	0.0284	0.0284	6.9494
Technology -> Agility	0.1221	0.0279	0.0279	4.3767
flexibility -> Agility	0.1283	0.0233	0.0233	5.5126
speed -> Agility	0.1833	0.0217	0.0217	8.4293

4.4 Reliability and validity

When assessing reflective measurement models, composite reliability is needed to evaluate internal consistency, individual indicator reliability, and average variance extracted (AVE) to evaluate convergent validity (Hair et al., 2013). For internal consistency, Cronbach's alpha has traditionally been used. Due to a number of reasons explained by Hair et al. (2013, p. 101), composite reliability is suggested. Composite reliability values range between 0 and 1, with a higher value indicating higher levels of reliability. Values between 0.60 and 0.70 are acceptable in exploratory research, while in more advanced stages of research values between 0.70 and 0.90 can be regarded as satisfactory (Hair et al., 2013, p. 103).

Convergent validity is measured by the average variance extracted (AVE). This is defined as the grand mean value of the squared loadings of the indicators associated with the construct, i.e., the sum of the squared loading divided by the number of indicators, the same as communality. An AVE value of 0.50 or higher indicates that, on average, the construct explains more than half of the variance of its indicators. Conversely, an AVE of less than 0.50 indicates that, on average, more errors remain in the items than the variance explained by the construct.

Table 4.13 – Summary of Reliability and Validity

	AVE	Composite Reliability	R Square	Cronbach's Alpha	Communality	Redundancy
Agility	1	1	0	1	1	0
Customer	0.5882	0.8491	0.3519	0.7615	0.5882	0.2049
Financial	0.6951	0.9011	0.2633	0.8582	0.6951	0.1709
Process	0.7173	0.8835	0.3326	0.8028	0.7173	0.2271
Supplier	0.5705	0.8369	0.1665	0.7472	0.5705	0.0868

Table 4.14 – Correlation matrix

	Agility	Customer	Financial	ZProcess
Agility	1.00			
Customer	0.59***	1.00		
Financial	0.51***	0.47***	1.00	
Process	0.58***	0.57***	0.39***	1.00
Supplier	0.41***	0.37***	0.30***	0.45***

Note: *** indicates 2-tailed significance at 0.0001

The table shows that no inter-construct correlation is above 0.85 (Hair et al., 2009) suggesting that multicollinearity is not present. Furthermore, since all constructs are strongly correlated ($r > 0.1$), the model shows initial evidence of nomological network validity (Cronbach & Meehl, 1955). As a result, path coefficient can be used to examine hypotheses.

4.5 Examining predictive relevance of the model for endogenous constructs

When evaluating structural models, Fernandes (2012) states that this should be done based on the predictive relevance of the latent variables, that is, their nomological validity. This is determined by analysing multiple R^2 and Stone-Geisser's Q^2 coefficients. There are three multiple R^2 thresholds to take into account:

- if R^2 is greater than 0.1, the model is significant
- if it is between 0.05 and 0.1, the model is tangent
- if it is below 0.05, the model is not significant.

R^2 can be used to indicate the contribution each explanatory variable makes to predictions of the dependent variable; hence, R^2 values are examined for dependent constructs. Because changes in R^2 can be explored to determine whether or not an independent latent variable has a substantial impact (Chin, 1998, pp. 316-317), it is important to report R^2 values for each of the model's dependent constructs.

From table 4.15 we can see that for all the dimensions (customer, financial, process, and supplier results), AVE/Communality range between 0.57 to 0.72, Composite Reliability range between above 0.84 and 0.90, R^2 between 0.17 and 0.35, and Chronbach's Alpha 0.75 and 0.86, concluding that our model is valid and reliable.

The quality of each structural equation can be evaluated using Stone- Geisser's Q^2 coefficient, also known as the cross-validated redundancy index (Tenenhaus, et al., 2005).

This is a cross-validated test of R^2 between the manifest variables of a dependent latent variable and all the manifest variables associated with the latent variables. It uses the estimated structural model to explain the dependent latent variable. Q^2 is calculated using redundancy and commonality.

In the structural model, Q^2 values larger than zero for a certain reflective endogenous latent variable indicate the path model's predictive relevance.

Table 4.15 – Predictive Relevance Q^2

Predictive relevance of the model with original data			
Total	SSO	SSE	1-SSE/SSO
Customer	600	484.3767	0.1927
Financial	600	499.187	0.168
Process	450	348.4438	0.2257
Supplier	600	550.8375	0.0819
Case 1	SSO	SSE	1-SSE/SSO
Customer	70.625	55.4452	0.2149
Financial	64.8381	48.0197	0.2594
Process	47.0811	31.6849	0.327
Supplier	90.2039	80.1188	0.1118
Case 2	SSO	SSE	1-SSE/SSO
Customer	66.7629	54.2339	0.1877
Financial	76.3899	61.5639	0.1941
Process	92.969	72.2949	0.2224
Supplier	65.4079	63.4287	0.0303
Case 3	SSO	SSE	1-SSE/SSO
Customer	95.9599	82.5527	0.1397
Financial	89.7839	82.1458	0.0851
Process	44.8564	33.2278	0.2592
Supplier	91.9783	85.9763	0.0653

Predictive relevance of the model with original data			
Case 4	SSO	SSE	1-SSE/SSO
Customer	86.5159	74.4385	0.1396
Financial	72.1783	57.6476	0.2013
Process	57.9606	39.0694	0.3259
Supplier	82.3515	71.5678	0.1309
Case 5	SSO	SSE	1-SSE/SSO
Customer	101.0735	86.9315	0.1399
Financial	81.8336	67.1667	0.1792
Process	99.4494	87.0515	0.1247
Supplier	78.0653	69.1958	0.1136
Case 6	SSO	SSE	1-SSE/SSO
Customer	80.4233	56.1747	0.3015
Financial	103.6324	85.8384	0.1717
Process	50.1565	40.3113	0.1963
Supplier	97.0756	90.2752	0.0701
Case 7	SSO	SSE	1-SSE/SSO
Customer	98.6395	74.6003	0.2437
Financial	111.3439	96.8049	0.1306
Process	57.5271	44.8041	0.2212
Supplier	94.9175	90.275	0.0489

According to Esposito (2010, pp. 655-690), cross-validated redundancy is preferred over cross-validated communality for calculating Q^2 . For this reason, the table above reports CVR and corresponding computed Q^2 . It is to be noted that five cases were chosen for

blindfolding, as the recommended value for omission distance in the blindfolding procedure (Hair et al., 2013). As exhibited in Table 4.15, all values of Q^2 are positive indicating the predicted constructs are relevant and the model has overall predictive relevance (Hair et al., 2013, p. 178).

4.5 PLS path analysis of the structural model

The second part to the PLS analysis was to examine Agility's impact on a firms performance as defined by EFQM. Figure 4.8 summarises the outer weights and R2

4.5.1 Hypothesis testing

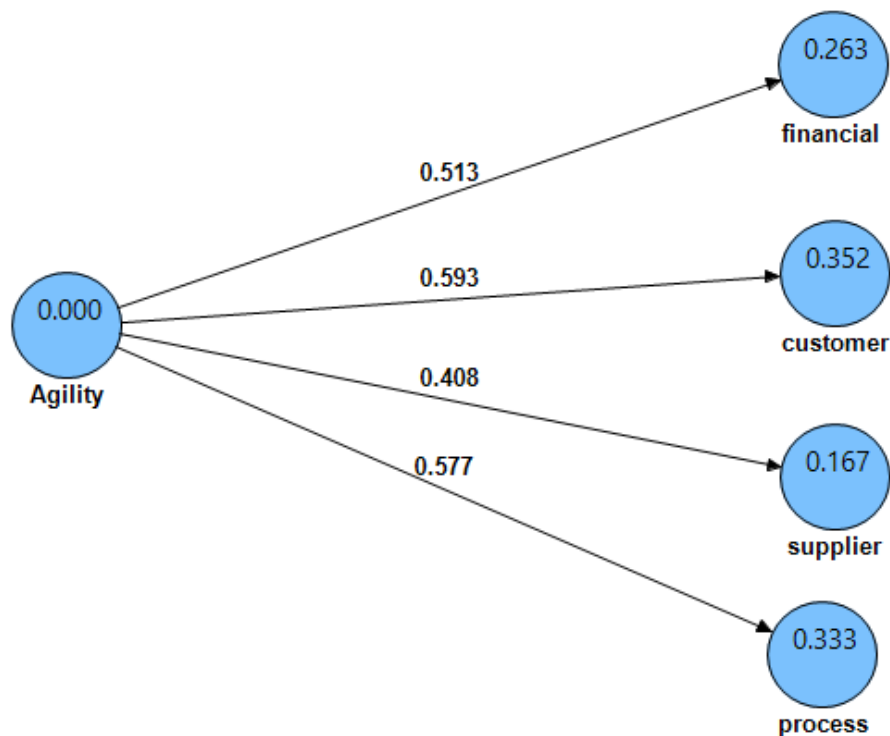


Figure 4.1 – Results of PLS path analysis

Our first hypothesis was supported in the previous section (4.5.1). The path analysis addresses hypothesis 2 to 5.

Table 4.16 – Results of PLS path analysis

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
Agility -> customer	0.5932	0.6057	0.0691	0.0691	8.5888
Agility -> financial	0.5132	0.5208	0.0922	0.0922	5.5628
Agility -> process	0.5767	0.5819	0.0662	0.0662	8.7158
Agility -> supplier	0.4081	0.4363	0.0814	0.0814	5.0124

4.5.1.1 Hypothesis 2: Agility has a positive effect on customer results

Hypothesis 2 suggested that there is a positive association between agility and customer results. As shown in Table 4.16, the standardised path coefficient is $B = 0.593$ which is significant ($t = 8.59 > 1.96$). Therefore, hypothesis 2 is supported. This indicates that agility has a strong positive impact on organisational customer outcomes. That is, an increase in agility will result in an increase in customer outcomes as predicted by our hypothesis.

4.5.1.2. Hypothesis 3: Agility has a positive effect on financial results

Hypothesis 3 suggested that there is a positive association between agility and financial results. As shown in Table 4.16, the standardised path coefficient is $B = 0.513$ which is significant ($t = 5.56 > 1.96$). Therefore, hypothesis 3 is supported. This indicates that agility has a strong positive impact on organisational financial outcomes. That is, an increase in agility will result in an increase in financial outcomes as predicted by our hypothesis.

4.5.1.3 Hypothesis 4: Agility has a positive effect on process results

Hypothesis 4 suggested that there is a positive association between agility and process results. As shown in Table 4.16, the standardised path coefficient is $B = 0.577$ which is significant ($t = 8.72 > 1.96$). Therefore, hypothesis 4 is supported. This indicates that agility has a strong positive impact on organisational process outcomes. That is, an increase in agility will result in an increase in process outcomes as predicted by our hypothesis.

4.5.1.4 Hypothesis 5: Agility has a positive effect on supplier results

Hypothesis 5 suggested that there is a positive association between agility and supplier results. As shown in Table 4.16, the standardised path coefficient is $B = 0.408$ which is significant ($t = 5.01 > 1.96$). Therefore, hypothesis 5 is supported. This indicates that agility has a strong positive impact on organisational supplier outcomes. That is, an increase in agility will result in an increase in supplier outcomes as predicted by our hypothesis.

As a further step towards a more complete understanding of the proposed associations, several additional tests of robustness were carried out. Common Method Variance, a post hoc power analysis, and an Analysis of Variance (ANOVA - to test if there were any significant differences in the responses between the Australian States) were conducted and detailed in the following section.

4.6 Additional Tests of Robustness

4.6.1 Ad hoc Common Method Variance

Common Method Variance (CMV) or Bias (CMB) refers to the amount of spurious covariance shared among variables because of the common method used in collecting data (Buckley et al., 1990). To minimise the impact of this bias the recommendations of Podsakoff et al. (2003) were followed, that is, using a 7-point Likert scale. To assess the impact of CMV, the Harman's single factor analysis was performed.

An exploratory factor analysis was conducted using principal component estimation, with varimax rotation, and resulted in a single factor explaining 19.35 percent of the total variance. Since it is less than 50 percent, there is evidence to suggest that CMV is not threatening the validity of the results.

Table 4.17: Common Method Variance

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.708	19.351	19.351	8.708	19.351	19.351
2	4.373	9.719	29.069			
3	3.450	7.666	36.736			
4	3.161	7.024	43.760			
5	2.936	6.524	50.284			
6	2.173	4.830	55.113			
7	1.866	4.148	59.261			
8	1.714	3.810	63.071			
9	1.438	3.195	66.266			
10	1.415	3.144	69.411			
11	1.349	2.998	72.409			
12	1.238	2.752	75.161			
13	1.167	2.593	77.753			

Extraction Method: Principal Component Analysis.

4.6.2 Post hoc power analysis

The minimum sample size for applying the PLS algorithm on the proposed model was identified by multiplying by 10 the number of paths leading to the endogenous construct with the most paths (Chin, 1998). Firm performance has 4 paths, suggesting that a sample size of 40 would be sufficient. Having determined this, a sample size of 150 will be more than sufficient to effectively identify and confirm our hypothesised relationships.

Then, to further examine the predictive power the proposed model, a post-hoc assessment of power was carried out using the G*Power software (as described earlier in Section 3.4.4) (Faul et al., 2009).

A post hoc power analysis for the predictive power of the model using the following criteria:

- 1) EFQM performance as the dependent and agility as the only predictor
- 2) Sample size 150
- 3) $DF=n-2=148$
- 4) Error =0.95
- 5) Estimation: linear multiple regression fixed model

Table 4.18 is a summary of the statistical power calculated using the G*Power software program.

Table 4.18: Post hoc Power test

	Number of predictors	R^2	Effect size (f)	Sample size	Non-centrality parameter(δ)	Critical t	Df	Achieved power
EFQM finance	1	0.26	0.35	150	7.25	1.97	148	99%
EFQM customer	1	0.35	0.54	150	8.98	1.97	148	99%
EFQM supplier	1	0.16	0.19	150	5.34	1.97	148	99%
EFQM process	1	0.33	0.49	150	8.59	1.97	148	99%

From table 4.18 it can be seen that for the model - finance, customer, supplier and process – there is a power of 99 percent; that is, there is a 99 percent chance of detecting a significant relationship.

4.6.3. Additional analysis for cross-state financial performance (ANOVA)

In order to be confident that our sampling did not have any bias, an ANOVA analysis was performed to test if there were any significant differences in the responses between the States of Australia. The Null Hypothesis shows the mean of the responses of each State the same:

$$H_0: \mu_{NSW} = \mu_{Vic} = \mu_{QLD} = \mu_{TAS} = \mu_{SA} = \mu_{WA} = \mu_{NT} = \mu_{ACT}$$

The Alternative Hypothesis shows at least one State's mean was different:

$$H_a: \text{At least } \mu_{NSW} \neq \mu_{Vic}, \mu_{QLD}, \mu_{TAS}, \mu_{SA}, \mu_{WA}, \mu_{NT}, \mu_{ACT}$$

Table 4.19: Summary of Descriptive Statistics for State Comparison

Descriptive

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	61	4.5454	1.02093	0.13072	4.2839	4.8068	2.07	6.93
2	37	4.5892	1.04024	0.17101	4.2424	4.9360	1.33	6.13
3	14	4.8571	0.76766	0.20517	4.4139	5.3004	2.93	6.13
4	24	4.6222	0.61374	0.12528	4.3631	4.8814	3.53	5.73
5	4	4.7500	1.08781	0.54391	3.0190	6.4810	3.47	5.87
6	6	4.2222	0.84292	0.34412	3.3376	5.1068	3.40	5.47
7	1	4.4000	4.40	4.40
8	3	3.9333	0.30551	0.17638	3.1744	4.6922	3.67	4.27
Total	150	4.5769	0.92856	0.07582	4.4271	4.7267	1.33	6.93

Table 4.20 – Test for Equal variances

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
1.236 ^a	6	142	0.291

a. Groups with only one case are ignored in computing the test of homogeneity of variance for financial.

Table 4.21 – P values from ANOVA analysis

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.364	7	0.481	0.545	0.799
Within Groups	125.107	142	0.881		
Total	128.471	149			

From table 4.20 we can see that our p value (Sig column) for the Levene Test is above 0.05, which means that the variances between States are equal. From ANOVA analysis in Table 4.21 our p value is again above 0.05, therefore we can conclude that there were no differences between the States, and that no ‘State’ bias was present in the responses.

4.7 Alternative models

In order to ensure thoroughness in our analysis, a number of alternative models were tested and compared to our Hypotheses to determine whether the best model was selected.

The first alternative model examined was treating EFQM performance as a reflective construct. When conducting exploratory analysis, loadings need to be above 0.5 and when conducting confirmatory analysis, loadings need to be above 0.7. When comparing loadings with Figure 4.6, it was observed that the model in Figure 4.9 has a single path coefficient

(J2_1 at 0.21); this is below 0.5, thus showing an improvement in the tested model in Figure 4.5.2.1.

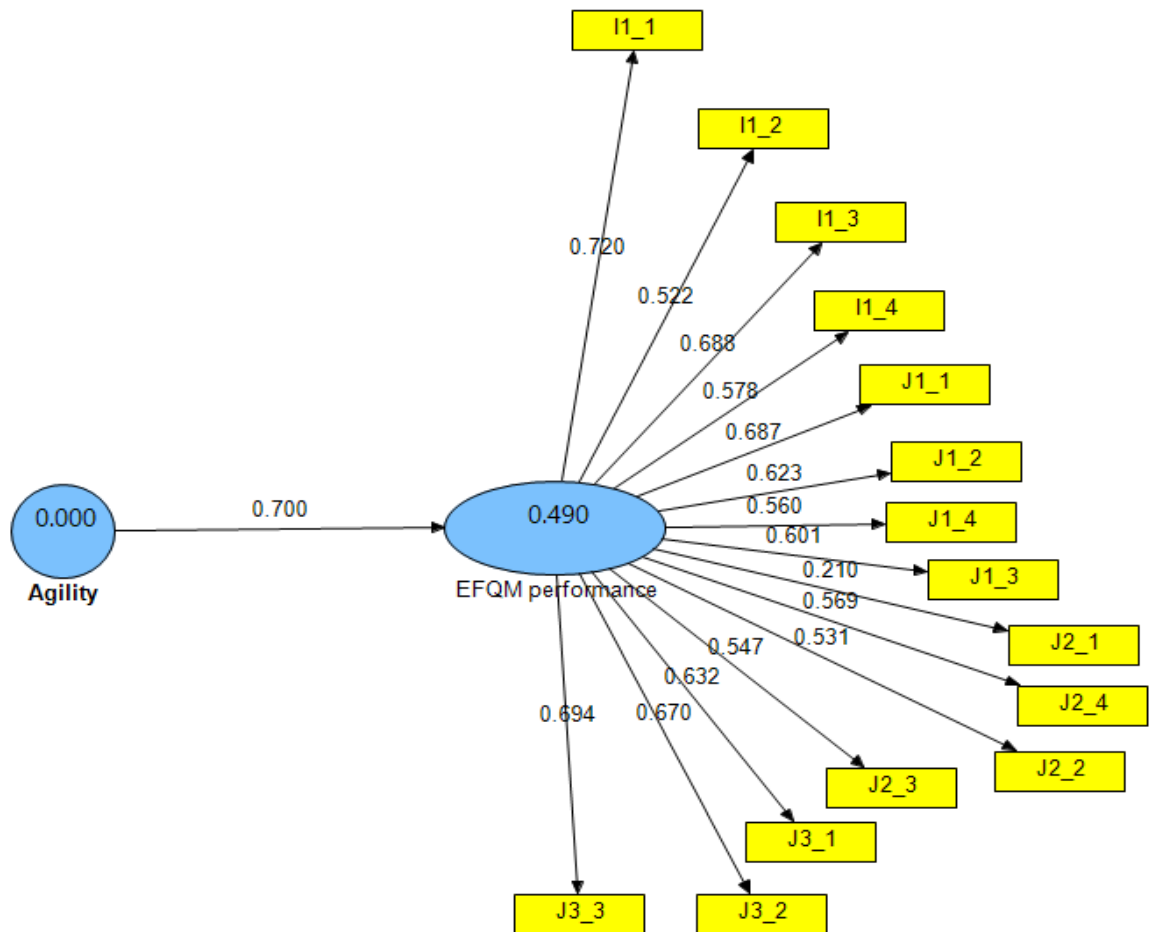


Figure 4.9 – EFQM as a reflective construct.

The next alternative model tested was treating agility as a third-order construct with 'Ability to change' and 'Agility drivers' and having a single dimension of performance.

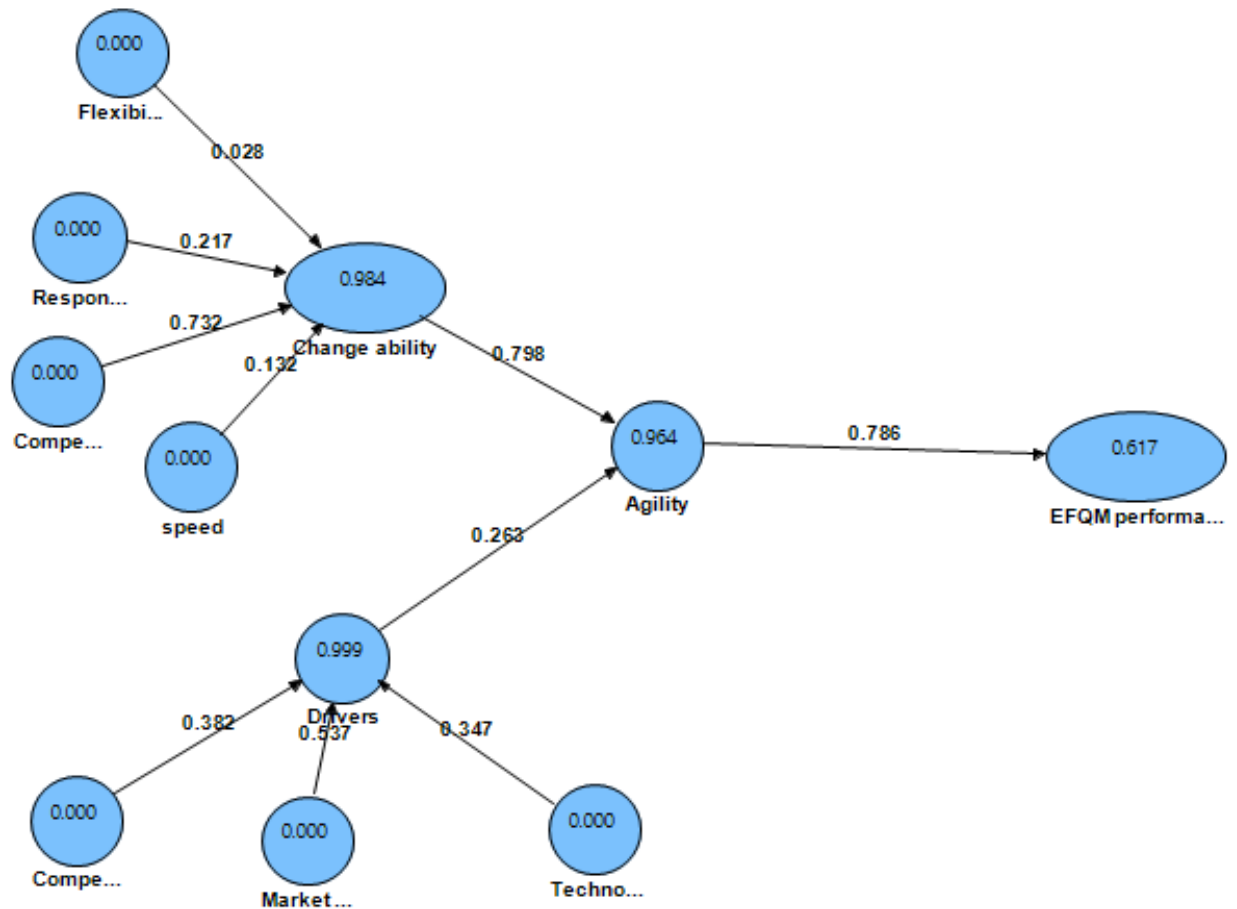


Figure 4.10 – Treating Agility as a Third-Order construct with ‘Ability to Change’ and ‘Agility Drivers’ introduced with a single dimension of performance.

Again, when we compare the results between Figure 4.10 and Figure 4.5. and Table 4.7a we see that our third-order model has two loadings below 0.2 – flexibility and speed, thus concluding that the original model is better.

The final alternative model that was tested was combining the third-order model with the four dimensions of performance as shown in Figure 4.11. When applying the same criteria with respect to loading we see again that flexibility and speed have loadings of 0.034 and

0.124, which are below 0.2, thus concluding that the original model as described in Figure 4.3 is better than the third-order construct.

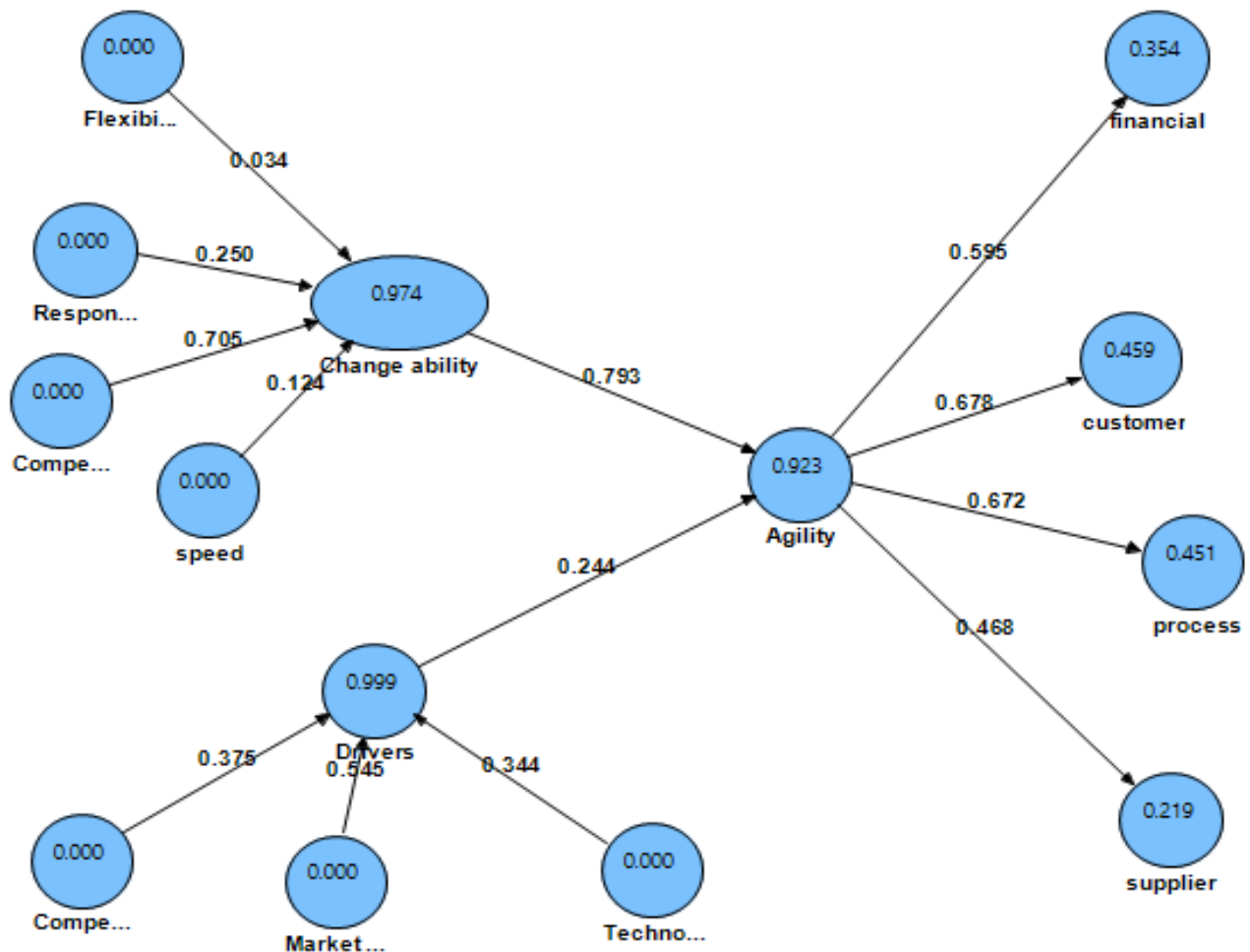


Figure 4.11 – Third order model with the four dimensions of performance

A bootstrap analysis was done to confirm loading significance. Bootstrap values need to be above 2. We see from Figure 4.12 that Flexibility, Responsiveness, and Speed all have values

below 2 thus making their loadings not significant and confirming that our initial model is better than the third-order model with the four dimensions of performance.

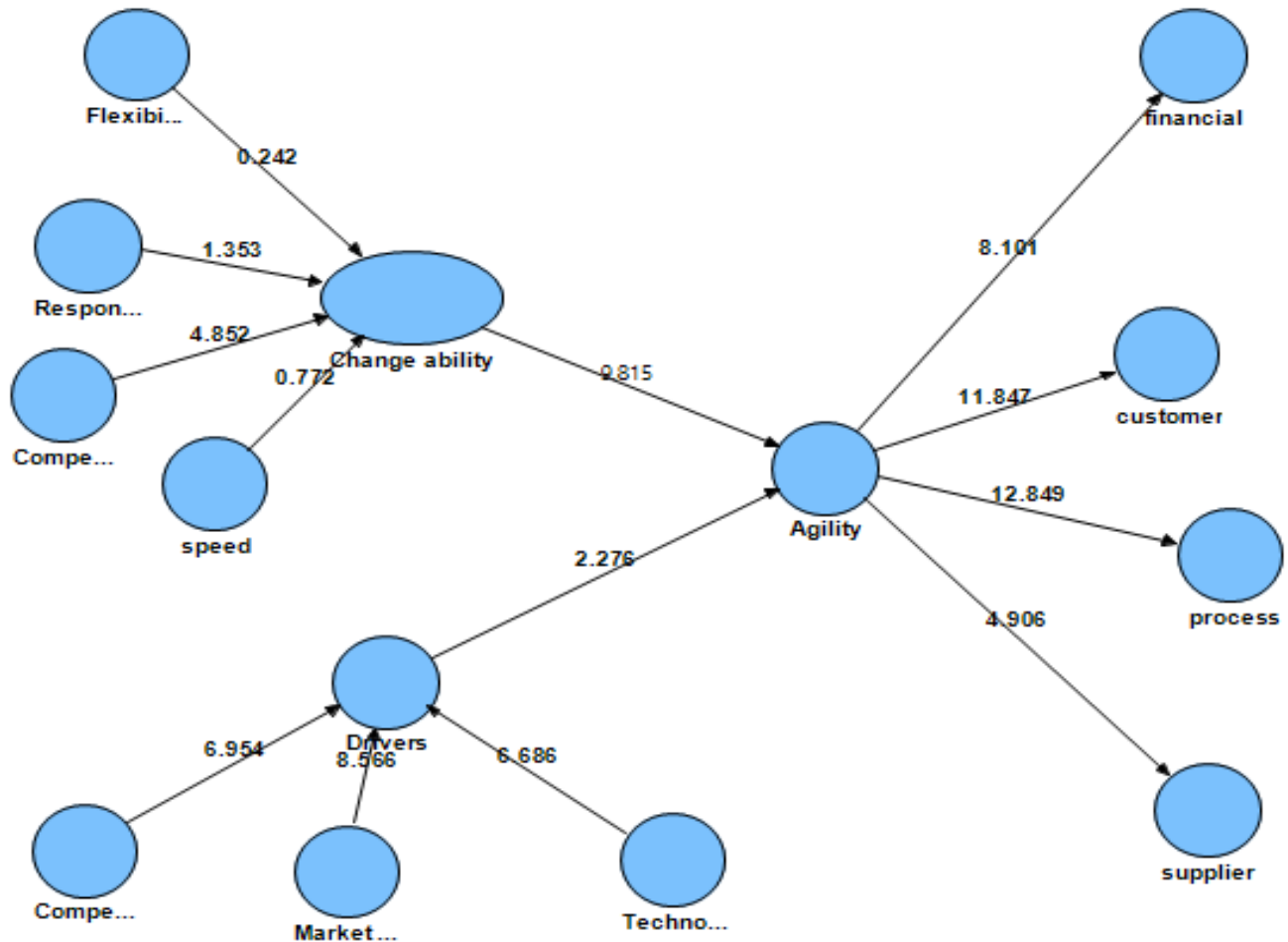


Figure 4.12 – Third-order model with 4 dimensions of performance and bootstrapped values.

4.8 Additional test for examining potential bias of “Don’t Know” responses

It was stated in Chapter 3 that since the surveys were conducted via telephone interviews, no missing data was recorded. There were, however, “Don’t know” responses. A common

approach with “don’t know” responses is to include them as missing data and apply imputation procedures to avoid potential bias (Wang, 1997; Shoemaker et al., 2002; Mondak & Davis, 2001; Kroh, 2006). The Smart PLS software used in the analysis uses one of two approaches, mean value replacement and casewise deletion. Hair et al. (2013, p. 51) suggests that when the amount of missing data on a questionnaire exceeds 15 percent, the observation is typically removed. There were only 9 cases out of the 150 responses where there was greater than 15 percent of “Don’t Know” responses, and in order to confirm validity of the model assessment, the predictive relevance test was conducted again to assess the difference. The results are summarised in Table 4.22.

Table 4.22 – Predictive Relevance after removing “Don’t Know” responses.

Predictive relevance after removing ‘don’t know’ cases			
Total	SSO	SSE	1-SSE/SSO
Customer	560	477.8396	0.1467
Financial	560	497.1847	0.1122
Process	420	315.8381	0.248
Supplier	420	386.3891	0.08
Case 1	SSO	SSE	1-SSE/SSO
Customer	63.4594	46.9743	0.2598
Financial	52.9773	45.0163	0.1503
Process	33.4133	20.733	0.3795
Supplier	63.9134	65.0728	-0.0181
Case 2	SSO	SSE	1-SSE/SSO
Customer	101.8844	79.0252	0.2244
Financial	59.6333	58.9782	0.011
Process	109.0114	77.6935	0.2873
Supplier	56.622	49.3414	0.1286
Case 3	SSO	SSE	1-SSE/SSO
Customer	73.8796	72.4311	0.0196
Financial	86.9551	67.2661	0.2264
Process	67.2648	42.744	0.3645
Supplier	54.4347	44.7629	0.1777

Predictive relevance after removing 'don't know' cases			
Case 4	SSO	SSE	1-SSE/SSO
Customer	108.3955	89.5019	0.1743
Financial	104.6299	96.7022	0.0758
Process	67.1035	56.9567	0.1512
Supplier	95.4455	92.7524	0.0282
Case 5	SSO	SSE	1-SSE/SSO
Customer	82.4303	69.6613	0.1549
Financial	81.1024	69.4677	0.1435
Process	53.2231	44.9983	0.1545
Supplier	43.4491	40.0011	0.0794
Case 6	SSO	SSE	1-SSE/SSO
Customer	67.7245	63.4219	0.0635
Financial	79.6154	85.6439	-0.0757
Process	37.8744	35.6815	0.0579
Supplier	58.2037	45.4962	0.2183
Case 7	SSO	SSE	1-SSE/SSO
Customer	62.2263	56.8237	0.0868
Financial	95.0866	74.1105	0.2206
Process	52.1095	37.0309	0.2894
Supplier	47.9316	48.9622	-0.0215

From Table 4.22 we can see that the Q^2 values are all positive, indicating the predicted constructs are relevant and the model has overall predictive relevance, no different to the original analysis that had included the "Don't Know" responses.

4.9 Summary of Chapter

Chapter 4 provides the details of the analysis of data that was collected from the survey participants. The early part of the chapter outlines how the data was initially examined and presents the descriptive statistics related to the sample. Details of the responses are found in Appendix 4. The chapter presents detailed analysis of the PLS-SEM, examining the formative and reflective constructs. Alternative models were also tested to determine the most suitable construct. Testing of the hypotheses associated with the preferred model was then presented. The chapter closes with a table summarising the support for each hypothesis.

Table 4.23 – Summary of support for Hypotheses tested using PLS SEM

Research Hypothesis	Support for Hypothesis
H1: Organisational agility is a 2 nd -order formative construct composed of Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology	Supported
H2: Agility has a positive impact on Financial Results	Supported
H3: Agility has a positive impact on Customer Results	Supported
H4: Agility has a positive impact on Supplier Results	Supported
H5: Agility has a positive impact on Process Results	Supported

Chapter 5: Discussion of Results

5.1 Overview of Chapter 5

Chapter 5 examines the research results within the context of the relevant research literature and key arguments presented in previous sections of the thesis. The discussion includes an examination of the relevance of the model as well as the relevance of the results of each hypothesis. There is a brief section that provides short answers to the research questions. Contributions to knowledge and to management practice are presented on the chapter that follows, together with a discussion of the study's limitations and recommendations for further research.

5.2 Summary of Results

In Chapter 4, a comprehensive evaluation of the results was conducted. The formative measurement model comprised:

- Flexibility
- Responsiveness
- Competency
- Speed
- Competitive environment
- Market conditions / regulatory
- Technology

The model described Agility as a latent variable. Table 4.7a summarised the Agility construct loadings and weights and it can be concluded that when we align these factor loadings on their intended constructs, all values are above 0.5 (Hair et al., 2013). Significance of the weights are determined by the t values and were summarised in Table 4.8, with all being above 1.96 (Hair et al., 2013), this brings the conclusion that the path coefficients are significant.

The reflective measurement model was the EFQM definition of performance that comprised financial results, customer results, process results, and supplier results. The reflective measurement model indicator loadings were summarised in Table 4.8 and all show that they are above 0.7 (Hair et al., 2013b) and therefore are significant. Internal consistency reliability was measured by calculating Cronbach's alpha and composite reliability. Both measures should be above 0.7 (Hair et al., 2013b). Convergent Validity and AVE should be above 0.5. These were confirmed and summarised in table 4.7.1.

For the structural model, Table 4.13 summarises the key attributes, specifically the R^2 values for Customer Results of 0.352, Financial Results of 0.263, Process Results of 0.333, and Supplier Results of 0.166. Hair et al. (2013) acknowledge that it is difficult to provide rules of thumb for acceptable R^2 values, as this depends on model complexity and research discipline.

Path coefficients are summarised in Table 4.10. To test their significance the standard errors were examined via bootstrapping that allowed the calculation of the empirical t values. For a two-tailed test, t values of greater than 1.96 are required for a 5 percent

significance level. Figure 4.6 shows the t values for the structural model and it is observed that all of the model t values are above 1.96.

Finally, to evaluate the magnitude of the R^2 values as a criterion of predictive accuracy, the Stone-Geisser's Q^2 value of predictive relevance was calculated and summarised in Table 4.15. The Q^2 values should be greater than zero, and from the table it is seen that all values are greater than zero, thus concluding that there is good predictive relevance.

5.2.1 Assessment of “Don’t Know” Responses.

An additional assessment was conducted to determine whether “Don’t Know” responses caused bias in our model assessment. As discussed in section 4.11, a common approach with “don’t know” responses is to include them as missing data and apply imputation procedures to avoid potential bias (Wang, 1997; Shoemaker et al., 2002; Mondak & Davis, 2001; Kroh, 2006). Hair et al. (2013, p. 51) suggests that when the amount of missing data on a questionnaire exceeds 15 percent, the observation is typically removed. There were only 9 cases out of the 150 responses where there was greater than 15 percent of “Don’t Know” responses. These 9 results were removed from the data set and the model recalculated to determine if there were differences between the greater than 15 percent “Don’t Knows”. Table 4.22 is summary of the Predictive Relevance Q^2 , and we can see that all values are above zero, suggesting that the 9 sets of response that had greater than 15 percent “Don’t knows” did not have an impact on the model studied and conclusions regarding the hypotheses.

5.3 Relevance of results: Research questions, hypothesis testing, and related literature

The accepted structural model was presented graphically in Figure 3.1. The figure portrays the supported relationships between the key variables and the related hypotheses. Figures 4.3 and 4.6 show the path coefficients for the formative and reflective constructs, that combined provides the structural model. The relevance of these relationships will be discussed in the following sections.

5.3.1 Agility is a second order formative construct

Hypothesis 1 was accepted with the present research confirming that Agility is a second-order construct comprised of flexibility, responsiveness, competency, speed, competitive environment, market and regulatory conditions, and technology. The results corroborate recently published research relating to Organisational Agility (Eshlaghy et al., 2010; Roberts & Grover, 2012; Vinodh et al., 2012) that had used the definition of agility by Sharifi and Zhang (1999). Sharifi and Zhang's model was based on the Agility Drivers and Agility Enablers.

Hair et al. (2013, p. 121) suggest a three-step process to evaluate formative measurement models:

Step 1: Assess convergent validity of formative measurement models

Step 2: Assess formative measurement models for collinearity issues

Step 3: Assess the significance and relevance of the formative indicators.

Convergent validity was assessed in section 4.13 with all R^2 values greater than 0.1 (Chin, 1998) suggesting that the model is significant.

Collinearity was calculated using a correlation matrix in Table 4.14. The table showed that no inter-construct correlation was above 0.85 (Hair et al., 2009) suggesting that multicollinearity was not present.

In assessing the significance and relevance of the formative indicators, outer weights and t-values were calculated and examined.

When we examine Table 4.7 factor loading for the Agility construct, we see that all the values are above 0.5, and range from 0.55 to 0.88 except for two questions, F1_4 which asked respondents about price being a differentiator (Competitive Environment), and G1_1 which asked respondents if their industry was highly regulated. Since the factor loadings and significance values that were reported in Table 4.8 failed the tests performed, it was decided to remove the questions and rerun the model. Table 4.7a summarises the factor loadings which all show that they are above 0.5 (ranging from 0.55 to 0.88). Table 4.9 shows that the trimmed model has t values all above 1.96. T values ranged from 2.64 to 13.04, suggesting that all factors are significant with responsiveness having a t value of 13.04, with speed with 10.99, and competency with 10.22 being the highest values.

It was this trimmed model that was then used to examine agility and firms' performance as defined by EFQM.

Since Sharifi and Zhang had suggested Agility having two main components of 'Drivers' and 'Enablers', this would have suggested a higher-order model (third-order hierarchical component model - HCM) to be examined. Hair et al. (2013) suggest three main reasons for the inclusion of HCMs. First, by establishing HCMs, one can reduce the number of relationships in the structural model, making the PLS path model more parsimonious and easier to grasp. Second, HCMs prove valuable if the constructs are highly correlated; the estimations of the structural model relationships may be biased as a result of collinearity issues, and discriminant validity may not be established. In situations characterised by collinearity among constructs, a second-order construct can reduce such collinearity issues and may solve discriminant validity problems. Third, establishing HCMs can also prove valuable if the formative indicators exhibit high levels of collinearity. Both Hair et al. (2013) and Wetzels et al. (2009) provide examples of second and third-order formative and reflective constructs.

In order to be thorough in this analysis, it was decided to test the second-order model over the third-order model, and determine which was more suitable. Figure 4.10 shows the third-order model with the associated factor loadings. The factor loadings were the prime determinant in assessing model suitability. There were two factors with loadings less than 0.2, i.e., Flexibility and Speed, which suggested that the original second-order model was better.

An additional alternative model was tested by combining the third-order model with the four dimensions of performance (customer, financial, process, and supplier results) as

shown in Figure 4.11. When applying the same criteria with respect to loading, it was then observed that flexibility and speed had loadings of 0.034 and 0.124 which were below 0.2, thus concluding that the original model as described in Figure 4.3 was improved.

A bootstrap analysis was done to confirm loading significance. Bootstrap values need to be above 2. From Figure 4.12 we see that Flexibility, Responsiveness, and Speed all have values below 2, thus making their loadings not significant and confirming that our initial model is better.

The third-order construct was examined in terms of factor loading and compared to the second-order, and it was determined that the second-order had better factor loadings. An evaluation of the factor loadings was required to compare Agility capabilities versus Agility drivers as per the Sharifi and Zhang (1999) definition.

The factor loadings were registered for the following:

- *Flexibility* ranged from 0.71 to 0.78,
- *Responsiveness* ranged from 0.79 to 0.88,
- *Competency* ranged from 0.55 to 0.76,
- *Speed* ranged from 0.73 to 0.80,
- Competition/Competitive Environment ranged from 0.69 to 0.76
- Market Conditions / Regulatory Environment ranged from 0.52 to 0.76, and
- *Technology* ranged from 0.76 to 0.88.

From the factor loadings, it is observed that that there are no significant differences between Agility Capabilities and Agility Drivers, and that both are just as significant. This is a key finding as it answers the anomalies in the Australian Chemical and Banking industries, viz., that the Banking industry is high regulated and the competitive environment is much more diluted compared to the Australian Chemical industry, which has no barriers to entry and is an open market. This reflects what was discussed in Chapter 1.

The present results provide a positive answer to Research Question 1, which asked whether Organisational Agility is explained by Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology.

5.3.2 Organisational agility has a positive impact on a firm's performance as defined by EFQM

In section 4.5.2.1, the results showed that Agility had a positive effect on the firm's financial, customer, process and supplier results as defined by EFQM.

Factor loadings, t values, R^2 and Q^2 (predictive relevance) values were all significant. To determine model suitability, EFQM performance was examined as a reflective construct. In conducting exploratory analysis, loadings needed to be above 0.5 and confirming analysis loadings needed to be above 0.7. When loadings were compared with Figure 4.6, the model examined in Figure 4.9 showed a single path coefficient (J2_1 at 0.21) below 0.5, improving the model (as in Figure 4.6).

The above supports a number of recent published scholarly papers on the association of Agility and Performance. Section 2.10 of the literature review specifically examined the

current research on the association between agility and a “firm’s performance” (Yang and Liu, 2012; Zelbst et al, 2010; Gomez-Gras and Verdu-Jover, 2005).

Previous cited definitions of performance were limited in scope. Compared to these, the EFQM framework was by far more comprehensive. To enlarge, for example, Yang and Liu (2012) used three questions to assess a firm’s performance. These were:

1. A firm has better responding ability for both known and unpredictable changes.
2. A firm has better ability to provide products and services to satisfy customers’ preferences and needs.
3. A firm has superior competitive advantage and better profitability.

Zelbst et al. (2010) specifically examined the association with Just in Time (JIT), Market Orientation (MO), Total Quality Management (TQM), and Agile Manufacturing (AM) with Operational and Logistical performance. They defined Operational Performance as:

1. Throughput
2. Inventory Expense
3. Operating Expense
4. Lead Time
5. Product Cycle time (throughput time)
6. Due date performance
7. Inventory levels
8. Cash flow.

They defined Logistical Performance as:

1. Customer Satisfaction
2. Delivery speed
3. Delivery dependability
4. Responsiveness
5. Delivery flexibility
6. Order fill capacity

Gomez-Gras and Verdu-Jover (2005) used Powell's (1995) five items related to performance. The questions used were:

1. Over the past 3 years our financial performance has been outstanding
2. Over the past 3 years our financial performance has exceed our competitors
3. Over the past 3 years our revenue (sales) growth has been outstanding
4. Over the past 3 years we have been more profitable than our competitors
5. Over the past 3 years our revenue growth has exceeded our competitors.

However, comparing these to the EFQM definition of performance (see Table 5.1 below) which had 15 questions defining financial, customer, process and supplier results, it can be clearly stated that the EFQM definition is more detailed and encompasses more aspects of a firm's performance. Note that all aspects of the EFQM measures of performance were included in this study. People Results and Societal Results were not included, as the primary focus was on tangible firm measures.

Table 5.1 – EFQM Questions for Performance

Category	Questions
Financial	<ol style="list-style-type: none">1. Market share has improved2. Sales per employee have improved3. Profit levels have improved4. There has been a noticeable improvement in financial results
Customer	<ol style="list-style-type: none">1. Customer satisfaction has improved2. Customer consolidation has improved3. Communication with customers has improved4. Customer complaints have decreased
Process	<ol style="list-style-type: none">1. Process efficiency has improved2. Knowledge about efficient operation management has improved3. The quality of our products / services has improved
Supplier	<ol style="list-style-type: none">1. The number of suppliers has decreased2. Quality of raw materials / service providers has improved3. Relationships with suppliers have improved4. Supplier management has improved

5.3.2.1 Agility has a positive effect on Financial Results

The results section showed that agility had a significant positive effect on a firm's financial results, which led to the acceptance of Hypothesis 2. The issue of defining a firm's performance was addressed above in that most research in the area of agility and performance has not defined performance to the degree of detail as the EFQM model. Hypothesis 2 dealt directly with a firm's financial performance, following Gomez-Gras and Verdu-Jover (2005) who focused on financial performance when measuring a firm's performance.

5.3.2.2 Agility has a positive effect on Customer Results

Agility was shown to have a significant positive effect on a firm's customer results, and this led to the acceptance of Hypothesis 3. This indirectly supports a widely-held view that

customer results, and specifically customer satisfaction, drives business performance. There are many examples of research into the area of customer satisfaction and performance. Johnson et al. (2001), Anderson et al. (2004), Reinartz et al. (2004), Fornell et al. (2006), Williams and Newman (2011), and Morgan (2012) are examples confirming the importance of customer satisfaction and its impact on a firm's performance.

5.3.2.3 Agility has a positive effect on Process Results

Agility was observed to have a significant positive effect on a firm's process results, and this led to the acceptance of Hypothesis 4. In this study, process results encompassed quality and efficiency dimensions of performance. These results confirm the link between agility and quality as suggested by Sharifi and Zhang (1999), Cricotto and Youseff (2003) as well as Argawal et al. (2007), and Zhang (2011). Similarly, a number of researchers have examined the link between Agility and Efficiency (Adler et al. 1999; Helo, 2004; Narasimhan et al. 2006; Sull, 2009). This research confirms their findings.

5.3.2.4 Agility has a positive effect on Supplier Results

The results showed a significant positive effect of agility on a firm's supplier results, which led to the acceptance of Hypothesis 5. The questions in Table 5.1 relating to supplier results addressed issues of number of suppliers, raw material quality, supplier relationship and management. This study confirms similar views on the positive impact that agility has on supplier results conducted by Christopher and Towill (2001), Power et al. (2001), Christopher and Peck (2004), Agrawal et al. (2006), Swafford et al. (2008), and Handfield et al. (2014).

5.3.2.5 Summary of Organisational Agility and Firm's Performance

The main driver for an organisation to adopt a Business Excellence model is to improve performance and to become more competitive. The literature review in Chapter 2 examined in detail the definitions of Agility and research into agility and its impact on a business's performance. The key driver for research in the area of agility was around Agile Manufacturing (AM) and its impact to an organisation's supply chain, and ultimately its performance.

Li et al. (2008) based their research on Sharifi and Zhang's (1999) model of Agility and followed their 2008 work with the development of the supply chain agility index in 2009. They proposed that with this model an organisation can measure its supply chain agility and hence improve performance. No direct link was proposed.

Swafford et al. (2008) examined the link between IT integration, Supply Chain flexibility, Supply Chain Agility and Business performance. They found IT integration impacts supply chain flexibility, which results in higher supply chain agility and ultimately higher competitive business performance. Swafford et al. research supports the widely-held view that Supply Chain Agility improves a firm's performance.

Chen and Chang (2011) confirmed the link with mixed channel strategy, Network Agility and Business Performance, reiterating the importance of factors of agility (responsiveness, speed, flexibility etc.) with IT networks that support business functions and business performance. Measurement of business performance was not defined. Chen et al. (2014) investigated the impact on IT and performance. They surveyed 214 IT and Business

executives in China and concluded that Business Process Agility mediated IT capability in a firm's performance.

Similar research was conducted by Chen et al. (2014), Lee and Yang (2014), and Yang and Liu (2012). Zelbst et al. was one of the earliest papers that examined the link between Market Orientation (MO), Just in Time (JIT) manufacturing, Total Quality Management (TQM) and Agility Manufacturing (AM) with a firm's operational and logistical performance. They concluded that the combined impact of a system that incorporates MO with JIT, TQM and AM, to enhance a firm's performance is more effective than the individual impact of single programs.

In the literature review as well as the summary in Table 1.1, the relationship between TQM/BE and performance is well established. Most recently a number of papers have been published that confirm these initial findings. These include Corredor and Goni (2011), Ahmad et al. (2013), Yunis et al. (2013), Kamath et al. (2013), and Wayhan et al. (2013), showing that TQM and BE frameworks have a positive impact on a firm's performance.

The main focus of this research was to propose reasons for the anomalies in the Australian Banking and Chemical industries. The Australian banking industry has adopted only a few elements of TQM/BE yet has produced financial performance much better than other countries in the Western economies (even growing during the Global Financial Crisis). This can be compared with the Australian Chemical industry that has adopted most of the elements of TQM/BE yet has had modest financial performance. It was observed that BE models such as EFQM and Malcolm Baldrige National Quality Awards did not include Agility

as an enabling factor even though Agility comprised flexibility, responsiveness, competency, speed, competitive environment, market conditions/regulatory environment, and technology variables. Since the relationship between TQM/BE has been well researched, and Organisational Agility (as opposed to Agile Manufacturing, Supply Chain Agility, or Network Agility) and its relationship with Business Performance as defined by the BE Models such as EFQM and Malcolm Baldrige has not been investigated, the results of this study answer the research questions raised through the literature review. These are summarised in Table 5.2 below.

Table 5.2 – Summarised Responses to Research Questions

Research Question	Questions	Summarised Response based on this Study's Findings
1	Is Organisational agility explained by Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology?	Organisational agility is a 2nd-order formative construct composed of Flexibility, Responsiveness, Competency, Speed, Competition, Market Conditions/Regulations, and Technology.
2	Does Organisational agility have a positive impact on Financial Results as defined by EFQM?	A direct, positive relationship between Organisational Agility and organisational financial results as defined by EFQM.
3	Does Organisational agility have a positive impact on Customer Results as defined by EFQM?	A direct, positive relationship between Organisational Agility and organisational customer results as defined by EFQM.
4	Does Organisational agility have a positive impact on Supplier Results as defined by EFQM?	A direct, positive relationship between Organisational Agility and organisational supplier results as defined by EFQM.
5	Does Organisational agility have a positive impact on Process Results as defined by EFQM?	A direct, positive relationship between Organisational Agility and organisational process results as defined by EFQM.

Chapter 6: Summary and Further Research

6.1 Overview of Chapter 6

This chapter is the concluding part of the thesis. It briefly summarises the research conducted, reviews the key findings of the research and discusses how the research questions have been addressed using quantitative analysis. This is then followed by an explanation of the implications to theory and practice, limitations, and suggestions for future research.

In terms of structure, this chapter provides a summary of the overall study in section 6.2, and provides a brief response to the high level research question in section 6.3. The responses to the more detailed hypotheses were made in the previous chapter. Section 6.4 outlines the major contributions to this study, and section 6.5 presents the limitations of the study. Finally, section 6.6 presents proposals for further research.

6.2 Summary of the Study

Recent global events have reminded us of the importance of being vigilant and prepared for the uncertainty in economic and political situations. Businesses in turn have looked toward the directions within high performance theories as ways to ensure they are prepared. Books such as 'Good to Great' by Jim Collins (2001) were extremely popular, yet in 2009, the GFC proved that these theories were flawed and the 'Great' companies such as Fannie Mae did not survive. In Australia, the trend has been the opposite, and Business Excellence models such as the Australian Business Excellence Framework have not been in operation since 2008. The motivation for initiating the present study grew from anomalies identified in the

Australian Banking and Chemical industries. The Australian Banking industry had adopted only a few elements of TQM/BE yet had produced much better financial performance than many of those in the Western economies (e.g., even growing during the Global Financial Crisis), whereas the Australian Chemical industry that had adopted most of the elements of TQM/BE yet has had relatively modest financial performances. The major reason for the disparity between the two seems to be that the banking industry is regulated and the major banks have the protection of the federal government. The chemical industry had all tariffs removed and opened the market to overseas competition. When examining BE models such as EFQM and MBNQA, it was clear that these important variables (i.e., competition and regulation,) were missing from the frameworks.

The literature review first examined the definition of high performance and high performance theories. It then examined popular business publications from Peters and Waterman (1982) through to Jim Collins (2001, 2009, 2011) and his most recent publications trying to explain why companies fail. The literature review then examined the high performance theories in the Australian context and questioned whether there were enough differences in the Australian business environment and culture (from those in the US and Asia) to warrant an Australian-based research program. The conclusion from the literature was that there were valid reasons to look at high performance theories and business excellence in the Australian context. Interestingly, of all the high performance models examined, the Australian-based publication by Hubbard et al. (2002) was the only one that suggested 'adapt rapidly' as a key factor, which is close to the Agility concept.

The literature review then examined research into the area of business excellence and business excellence modelling. It found a number of papers that examined the causal relationship between the applications of BE models such as EFQM, MBNQA, and TQM, and performance. Very few papers examined the impact of Agility and BE on business performance. Zelbst et al. (2010) was the only paper that focused on Market Orientation and its associated impact on Agile Manufacture and in turn, its impact on JIT, TQM, and Operational and Logistical Performance. Gomez-Gras and Verdu-Jover (2005) found that those organisations that implement TQM are more flexible. No evidence at the time was found where BE models had included Agility.

The literature review then examined the definition of Agility. Most definitions of agility revolved around agility in terms of Agile Manufacturing, the source being the Iacocca Institute in US (1991) and the Agility Forum in Bethlehem, Pennsylvania (Lehigh University) (1991). Sharifi and Zhang (1999) wrote the seminal paper on agility that has been cited and used by a number of researchers that were addressed in the literature review. Organisational agility was observed to have a large scope, but the overall concepts were similar and so this definition was used as the basis for the analysis. The literature review then examined research conducted in the areas of Agility Modelling, Supply Chain Agility, Network Agility, and finally, the relationship between Agility and Business performance.

From the observations around the anomalies of the Australian banking and chemical industries, and through the literature review, the high level research question asked:

‘Does Organisational agility have a positive effect on a firm’s performance as defined by EFQM?’

The definitions of organisational agility from Sharifi and Zhang (1999) were used as the basic construct, that is, organisational agility comprises agility capabilities (flexibility, responsiveness, competency, and speed) and agility drivers (competitive environment, market conditions/regulations, and technology). The EFQM definition of business performance was used, i.e., comprising financial, process, customer, and supplier results.

The doctoral candidate worked with a market research firm to contact 596 prospective participants using a telephone interview to gather data to test the hypotheses and research questions. The prospective participants were Australian firms with employees ranging from 50 to 250 people. A total of 150 usable responses were collected. The analysis employed the Partial Least Squares Structural Equation Modelling (PLS SEM) technique to test the Agility construct and the causal relationship between agility and business performance.

6.3 Research to the main research question

Again, the high level research question asked was as follows:

‘Does Organisational agility have a positive effect on a firm’s performance as defined by EFQM?’

The study identified that organisational agility is a *second-order construct* comprising flexibility, responsiveness, competency, and speed, competitive environment, market conditions/regulations, and technology. The *third-order construct* (agility capabilities and

drivers) was tested and found to be inferior to the second-order construct. The second-order agility construct was found to have a positive effect on business performance as defined by EFQM. That is, it had a positive effect on financial, process, customer and supplier results.

The results of the study suggest that, in order for organisations to be competitive and succeed, they need to adopt business excellence models that include organisational agility as a key enabler. Critical to their success was their ability to detect changes in the business and competitive environment and respond quickly to these changes using the most current or leading edge technologies (IT or specific engineering or scientific expertise).

6.4 Major contributions to the Study

6.4.1 Contributions to knowledge

The results of the current research project make multiple contributions to knowledge.

The key contributions include the following:

1. The present study is, to the best of the author's knowledge, the first study to examine Agility as an enabling factor in a business excellence model such as EFQM or MBNQA.

As mentioned in previous sections of this thesis, other studies have examined agile manufacture or supply chain agility and its impact on business performance (e.g. Ismail and Sharifi, 2006; Li et al., 2008, 2009; Swafford et al., 2008; Zelbst et al., 2010; Chen & Chang, 2011; Yang & Liu, 2012; Lee & Yang, 2014). However, this is the first known study that

examines Organisational Agility as a Business Excellence enabler and its impact on a firm's performance as defined by EFQM. This finding is important because it explains anomalies identified in the Australian Banking and Chemical industries. The present results suggest that organisations wanting to become more competitive and successful need to adopt organisation-wide agile management practices.

The idea of introducing Agility as an enabler variable within EFQM was first presented by this researcher at the 2010 Decision Sciences Institute (DSI) Meeting in San Diego, and again at the 2011 DSI Meeting in Boston. In 2012, EFQM (and MBNQA) introduced 'concepts' that were intended to work in conjunction with the EFQM enablers and had included 'Managing with Agility'. Table 6.4.1 summarises the EFQM Concepts and Model criteria. Figure 6.1 is a diagram of the EFQM Concepts. However, at this stage, EFQM has not included this concept of Agility as an enabler in its Model Criteria (as in Figure 6.2). This thesis research is therefore justified in the inclusion of Agility as an enabler of organisational performance.

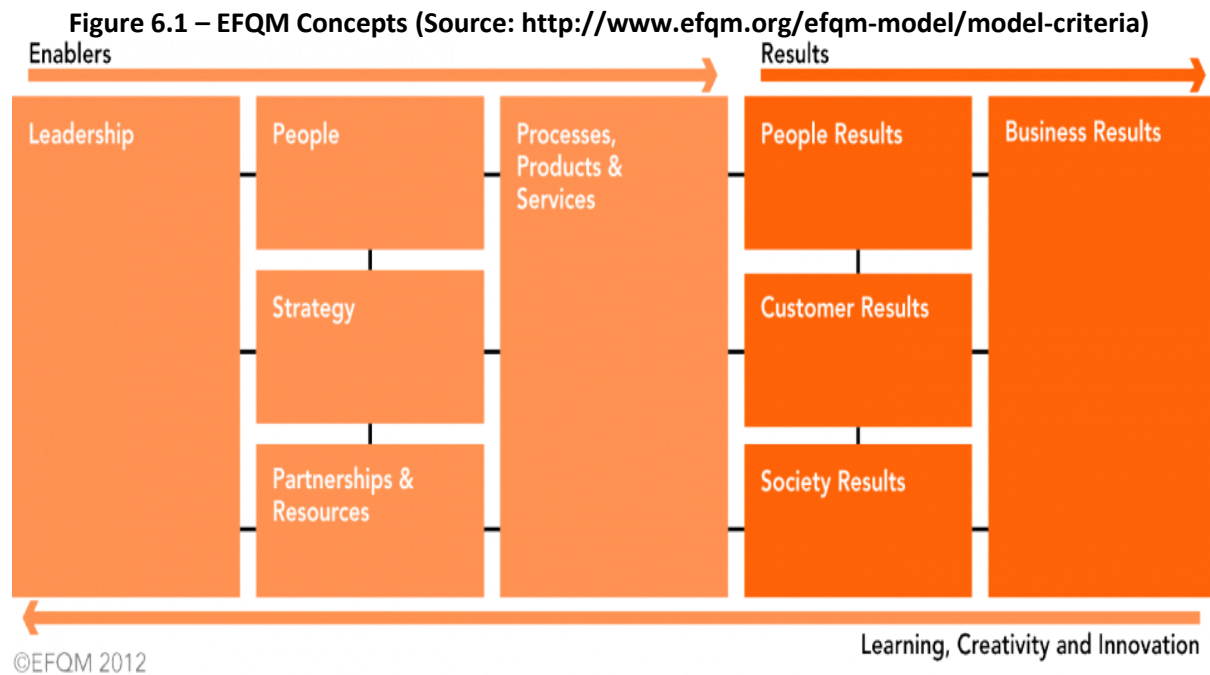
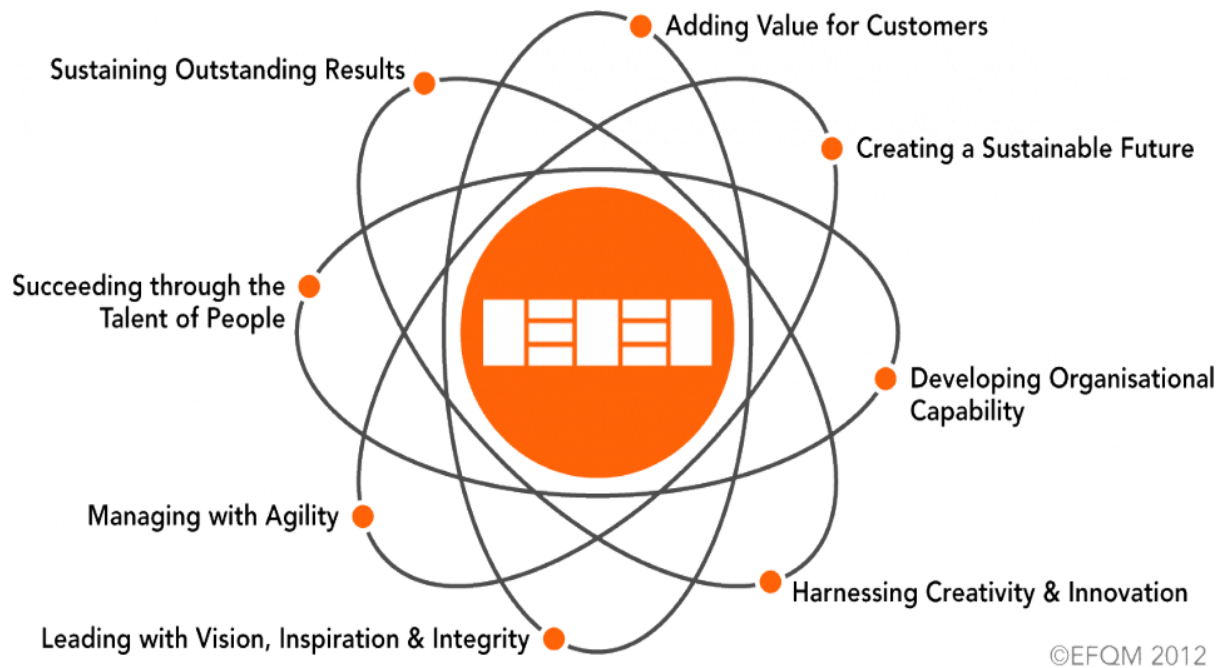


Figure 6.2 – EFQM Model Criteria (Source: <http://www.efqm.org/efqm-model/fundamental-concepts>)

From Table 6.1 it can be seen that the concepts are very similar to the model criteria except for Agility. The question must be asked – ‘Why was Agility not included in the EFQM framework?’ Nowhere in either of the EFQM or MBNQA websites can one find details on how agility is defined or measured, as opposed to the other enablers where one can find detailed questions that define each enabler. One should also note that ‘Strategy, and Partnership & Resources’ that are included in the model criteria are not included in the concepts.

Table 6.1 – EFQM Model Criteria versus Concepts

EFQM Concepts	EFQM Model Criteria
Adding Value for Customers: Excellent organisations consistently add value for customers by understanding, anticipating and fulfilling needs, expectations and opportunities.	Customer Results: Excellent organisations achieve and sustain outstanding results that meet or exceed the needs and expectations of their customers.
Creating a Sustainable Future: Excellent organisations have a positive impact on the world around them by enhancing their performance while simultaneously advancing the economic, environmental and social conditions within the communities they touch.	Society Results: Excellent organisations achieve and sustain outstanding results that meet or exceed the need and expectations of relevant stakeholders within society.
Developing Organisational Capability: Excellent organisations enhance their capabilities by effectively managing change within and beyond the organisational boundaries.	People: Excellent organisations value their people and create a culture that allows the mutually beneficial achievement of organisational and personal goals. They develop the capabilities of their people and promote fairness and equality. They care for, communicate, reward and recognise, in a way that motivates people, builds commitment and enables them to use their skills and knowledge for the benefit of the organisation.
Harnessing Creativity and Innovation: Excellent organisations generate increased value and levels of performance through continual improvement and systematic innovation by harnessing the creativity of their stakeholders.	Processes, Products & Services: Excellent organisations design, manage and improve processes, products and services to generate increasing value for customers and other stakeholders.
Leading with Vision, Inspiration and Integrity: Excellent organisations have leaders who shape the future and make it happen, acting as role models for its values and ethics.	Leadership: Excellent organisations have leaders who shape the future and make it happen, acting as role models for its values and ethics and inspiring trust at all times. They are flexible, enabling the organisation to anticipate and reach goals in a timely manner to ensure the on-going success of the organisation.
Managing with Agility: Excellent organisations are widely recognised for their ability to identify and respond effectively and efficiently to opportunities and threats.	Not mentioned.

EFQM Concepts	EFQM Model Criteria
Succeeding through the Talent of People: Excellent organisations value their people and create a culture of empowerment for the achievement of both organisational and personal goals.	People: Excellent organisations value their people and create a culture that allows the mutually-beneficial achievement of organisational and personal goals. They develop the capabilities of their people and promote fairness and equality. They care for, communicate, reward and recognise, in a way that motivates people, builds commitment and enables them to use their skills and knowledge for the benefit of the organisation.
Sustaining Outstanding Results: Excellent organisations achieve sustained outstanding results that meet both the short and long-term needs of all their stakeholders, within the context of their operating environment.	Business Results: Excellent organisations achieve and sustain outstanding results that meet or exceed the need and expectations of their business stakeholders.

Source: <http://www.efqm.org/efqm-model/model-criteria>

These results substantially extend the body of work relating to BE models and the inclusion of agility as an enabling factor, to the extent that both EFQM and MBNQA have recognised the importance of agility but have yet to incorporate it as an enabler.

2. This study seems to be the first to demonstrate empirically the Sharifi and Zhang model of Organisational Agility.

The Organisational Agility model was explained by the constructs as defined by Sharfi and Zhang (1999). As mentioned in this thesis, the bulk of research was around Agile manufacture, Supply chain agility, and Network agility. Very few researchers focused on organisational agility and its relationship with business performance, in the context of business excellence. Many researchers had expanded the Sharifi and Zhang's definition to include elements of business excellence (Eshlaghy et al., 2010; Vinodh et al., 2012) such as leadership, improvement, and people/culture. However, this study makes an empirical study of organisational agility.

3. This study demonstrates empirically the relationship between Agility and its effects on Performance (as defined by EFQM)

Although the EFQM definition of performance is detailed, this was not developed by academic research. This definition was established initially by MBNQA and then adopted by EFQM and other Business Excellence programs around the world, including Australia's Business Excellence Framework. A number of academics (Bou-Llusar et al., 2005, 2009) have used CB SEM to examine the relationships of EFQM enablers and a firm's performance, but did not include Agility. Since the research around EFQM enablers and performance had already been done, it was decided to focus the research on Agility and its effects on Performance, as defined by EFQM.

4. This study is one of the few academic research studies conducted on BE enablers in Australia.

The literature review in this research study highlighted the limited number of research studies conducted in the area of business excellence in Australia. Most recently, the implementation of improvement programs such as Lean and Six Sigma have been researched in this region. This study extends the academic study to BE enablers in Australia. Specifically, it provides new insights and confirmation of agility constructs (agility drivers and enablers) in the Australian context.

6.4.2 Contributions to management practice

The study also makes a number of key contributions to management practice. The key contributions include the following:

1. The study highlights the important effect that the *Competitive environment* has on a firm's performance in relation to a BE framework.

While this statement seems to be intuitive, Agility had not been considered as a business excellence enabler. As stated above, only recently have EFQM and MBNQA added Agility as a 'concept' but with little explanation around how an organisation can become agile or how to measure its agility. The implications for management are significant. If the primary driver for an organisation to implement a BE framework is to become more competitive, and if the current BE enablers (i.e., Leadership, People, Strategy, Partnership & Resources, Processes, Products and Services) start off being similar between organisations, then the key differentiator will be its ability to sense the competition's changes in these enablers, and have the ability within the organisation to respond and counteract there initiatives. The inference here is that firms have the ability to sense these changes.

2. The study provides business leaders a method of measuring their organisation's agility capability.

Similar to the EFQM self-assessment questionnaire, business leaders can apply agility questions to assess their level of organisational agility preparedness.

3. The results of the study clearly demonstrate the importance of expanding the definition of business performance.

In the past, business performance was synonymous with accounting performance. Recent popular publications of Kaplan and Norton's (2006) Balanced Score Card (BSC) have been

difficult to implement in Australia (Bedford et al., 2008). Many organisations have started to implement wider definitions of performance but have had difficulty in sustaining these programs. Often, the reasons include the lack of understanding about BSC, and the difficulty in establishing measurement systems (Northcott & Taulapapa, 2012). Therefore, expanding the definition of business performance to include financial, process, customer, and supplier results provides a more holistic approach.

4. This study, being an Australian-based research effort, demonstrates the current view of senior executives that BE enablers and agility play an important role in being competitive.

The literature review highlighted the level of interest in implementing BE frameworks in Australia and the amount research conducted in this field. The fact that the last Australian Business Excellence Award was made in 2008 highlights this level of interest.

5. This study highlighted the importance of business leaders to be vigilant and keep abreast of regulations and market conditions, especially when developing strategy.

Part of the Agility constructs in this study were market conditions and regulations. The example of the Australian Banking industry highlighted the important role that regulation plays. As was discussed in Chapter 1, the Australian banking industry withstood the GFC, and for the past 15 years, bank profits steadily grew. The question to be asked then was, “Is there a role for protective regulation?” The Australian banking industry has defended its profit results by stating that they contribute to Australia’s superannuation and retiree’s pensions and that any changes to the ‘Four Pillar’ policy that introduces competition will

impact profits in the future (<http://theconversation.com/bank-profits-grow-and-so-does-the-criticism-whos-right-19875>). Conversely, too much protection will cause the local banks to fall behind their international counterparts. The discussion around protectionism and free trade is beyond the scope of this research and has been researched in detail, especially in light of the GFC (Gawande et al., 2011) but this study highlighted the effects of *regulations and market conditions*, especially when developing strategy.

6. The research results demonstrate the importance of business leaders' understanding of technology and how it can assist them in becoming more agile.

There are many aspects of technology and how it can assist them. One key area is in Information Technology. The literature review highlighted many examples of how network agility can influence business performance. Closely related to this is how firms integrate their information systems, and more importantly, how they convert this data into useful information. As was stated earlier, the definition of agility was how quickly firms sense changes in the business environment. Organisations today are looking towards the application of Big Data, not only to provide real time measures, but also to develop predictive models about customer preferences in products and service (Manyika et al., 2011).

7. This study raises the question on the effort and cost required to make an organisation more agile.

While this study enhanced our understanding of agility as an enabler to business performance as defined by EFQM, it also raises the question on how much effort and cost is

required to make an organisation more agile. When examining agility drivers and capabilities, it becomes apparent that investment in people and infrastructure is significant. However, one can also argue that the cost of *not* being agile far exceeds the investment. Therefore, business leaders need to include investment in developing employee capabilities to become more resilient to change, as well as providing the technology to sense changes occurring, as discussed in the previous section. This reinforces the work conducted by Skerlavaj et al. (2007), and Anderson and Anderson (2010), regarding the importance of change management capabilities and business performance.

8. The study raises the question of the role of governments and how they can help organisations drive business improvement.

Most Business Excellence programs such as EFQM and MBNQA have some form of government support. In Australia the Business Excellence Awards were administered by SAI Global and as mentioned earlier, the program has been inactive since 2008. The Australian Federal Government does sponsor Business Excellence through the Department of Industry's Enterprise Connect Group. They offer consulting support via the EFQM self-assessment questionnaire (the same questions used for the analysis of this research). The use of this service by Australian Businesses has not been overwhelming. In looking for potential organization that could participate in this study, the researchers approached Enterprise Connect and were informed that only 80 organisations had utilized their Business Excellence consulting services. A greater effort may be required by Government

Departments such as Enterprise Connect to convince organisations to adopt Business Excellence practices, specifically around agility.

9. This study raises the issue of the role of Boards and how they should encourage their administrations to adopt Business Excellence practices.

Similarly to point 8 above, Business Boards have a significant role to play in driving business performance through the adoption of Business Excellence practices. Knowledge of Business Excellence programs is limited and those boards that are aware of these programs are skeptical of their success. Introducing the concept of agility as an additional business excellence enabler may give the boards the impetus to look at these models and consider the implementation of these programs.

6.5 Limitations of the study

This study has made important contributions to the knowledge of organisational agility and how it impacts a firm's performance. These contributions will influence both researchers and managers interested in this topic of study. Nevertheless, the study has a number of limitations.

As discussed in Chapter 1, only Australian firms were considered for this research. As explained in the literature review (Javidan et al., 2006; Denison et al., 2004; Jayamaha et al., 2009), there are differences between Australian business culture and the rest of the world. It is believed that most of the research in the area of Business Excellence, and Business Excellence modelling specifically, has been conducted outside Australia. Given the

important contributions of this study, this researcher believes there is value in replicating the study in other countries.

Another limitation was the size of the organisations chosen to take part in the survey. As was discussed in Chapter 3, firms with employee numbers ranging between 50 and 250 were chosen, i.e., small and medium sized (SME) companies. This was based on the likelihood of finding senior executives who would be willing to take part in the survey. Typically, senior executives of large organisations have difficulty finding the time to participate in surveys. Given that larger organisations have the resources to implement BE frameworks and that the recipients of MBNQA and EFQM awards have been large organisations, the researcher believes there is value in replicating the study to include organisations with greater than 250 employees as their familiarity with these frameworks could reveal different results.

There is a tendency for response rates to be affected negatively by the interview duration during the survey. Another key limitation linked to the response rate is the size of the organisation being surveyed.

- Time: Appendix 3.1 shows the average length of the survey was around 11.5 minutes. Chapter 4 discussed the response rate of survey participants which, at 25 percent for a telephone survey, is quite low.
- Size of organisation: Anseel et al. (2010), in conducting a meta-analysis on response rates among social science research program, quotes a mean response for senior managers as 34 percent. Their analysis covered surveys conducted between 1995

and 2008. They also confirmed that the response rates for senior executives (34 percent) are lower than other organisational respondents (37 percent).

It is unfortunate that over the recent years that “the current survey mania tends to cheapen and threaten the entire enterprise of surveying”; (Dillman, 2002, p. 479). It has been shown (Anseel et al., 2010) that incentives to survey participants has improved response rates.

Data access restrictions meant that measures of business performance were reliant on the judgement of the senior executives rather than objective data sets. This issue was addressed by managing issues related to common method variance as suggested by Podsakoff et al. (2003). The results suggested that common method variance was not a meaningful problem in this research; nevertheless, it is an issue that readers should be aware of and provides an opportunity to extend and replicate the study.

Another limitation of this research was that a single point of reference from each organisation was used to conduct the analysis, and therefore we do not know the variation within the firm in terms of responses that could change the outcome of the findings. To overcome this, multilevel analysis is suggested (Heck, 2001; Rigdon et al., 2010).

Finally, the research asked participants their opinion regarding agility and how it impacted performance. This research did not take into account the time taken to implement agility capabilities within the organisation and then measure its effects on business performance, so there is a clear case to extend the study by using a longitudinal design as well as a cross-sectional design.

6.6 Recommendations for further research

There are a number of opportunities to extend this current research, some of which have already been presented in the foregoing sections. Additional opportunities are presented in this section.

First, given that the research was restricted to medium-to-large firms (50 to 250 employees), there is a clear opportunity to extend the scope to include larger firms, that is, greater than 250 employees. The rationale for extending the work into a broader context is related to the fact that the framework tested in the present research has not been examined in large firms and this may provide important insights. For example, the key latent variable that was being examined was Agility. Agility and size of firms are correlated; that is, smaller firms tend to be more agile than larger ones. Further research, conducting a comparison of large versus small firms and their impact on performance with the new model, may produce interesting results and further enhance the original model.

Second, the basis for this research was the anomalies in the Australian Banking and Chemical industries as it relates to BE applications and performance. This study focused on the impact on agility and business performance as defined by EFQM. Expanding the study to include all the EFQM enablers (Leadership, People, Strategy, Partnership and Resources, Processes, Products and Services) and to look at cause-and-effect relationships, will yield a more comprehensive study. This expanded study should also include the non-firm measures (Societal and People) of EFQM performance. It should be noted that conducting such

research will require significant resources to acquire the data, especially in the Australian context.

Third, associated with the suggestion above, while conducting the expanded research to include all the enablers, a study on the mediating and moderating effects of all the enabler variables will be of significant interest and will enhance the knowledge of BE models.

Fourth, this research was conducted in Australia. Given the differences between Australian business culture and environment and the rest of the world's, repeating this study in other regions would provide additional insights to the Business Excellence enabling factors and the differences that may exist from region to region.

Fifth, the current research surveyed businesses across many industries. Many industries have specific conditions (for example, the Australian banking industry is highly regulated) that may highlight different aspects of the agility construct factors. Linked to this suggestion is the issue of applying BE models to government departments and non-profit organisations. By expanding the analysis to include non-competitive environments, the agility construct which includes competitive environment, is negated and therefore its impacts on the other construct variables would extend our insights.

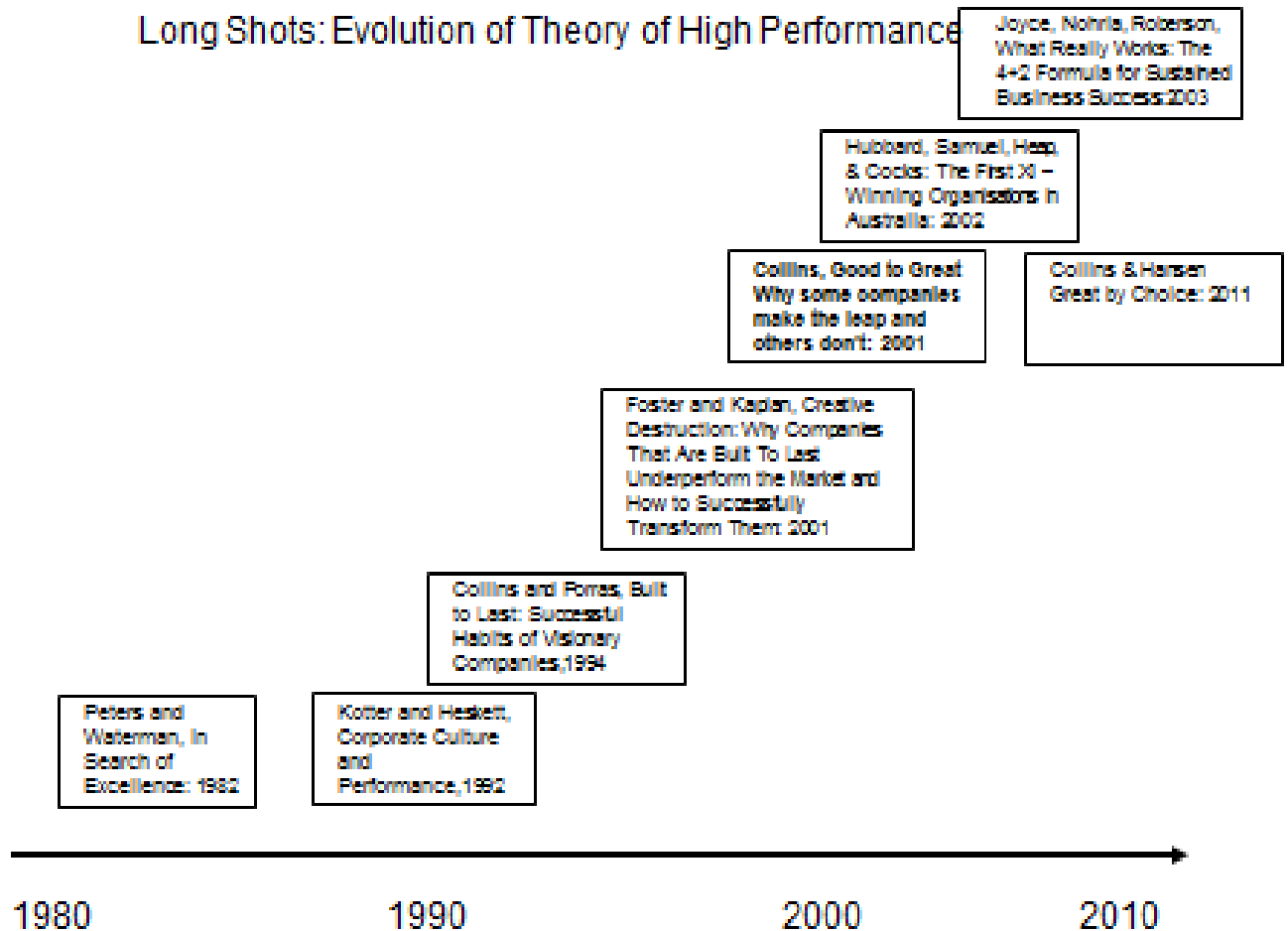
Sixth, since structural equation modelling is based on an attitudinal surveys and this research was based on taking a single response from each firm, conducting a 'within firm' or multilevel analysis (Rigdon et al., 2010) to understand the variation of attitudes, will significantly enhance understandings of the various enabling factors of the BE model.

Seventh, this study focused on private firms. Local, State, and Federal Government departments were not considered. Government departments' performance is measured on meeting budget, and more recently customer satisfaction, as opposed to profit and market share. Consequently, competition would not be a consideration for agility and therefore the agility construct would not include competition and market conditions/regulations. Expanding the research to include government departments will enhance our understanding of how agility will impact public sector organisational performance.

Finally, longitudinal studies using more advanced statistical techniques should be considered, where resources to conduct such a study are available. Doing so will enable us to understand the time effects of changing an organisation to become more agile, and observing the impact on business performance.

Appendices

Appendix 1: Evolution of Theory of High Performance



Appendix 2: ISO 9001:2008 Registered Companies Australia 2014

<http://cab.ias-anz.org/CABPublic/Pages/PublicSearch.aspx>

	Company name	ISO 9001:2008 Registered
Banking	Commonwealth Bank	No
	Westpac Banking Corporation	No
	NAB	Yes
	ANZ Bank	No
	Suncorp	No
	Bendigo and Adelaide Bank	No
	Macquarie Bank	No
	HSBC	No
	ING Bank	No
	Investec	No
	Rabo Bank	No
	Citigroup	No
	Nufarm	No
Chemical Oil and Gas Processing Utilities	Incitec Pivot	Yes
	Orica	Yes
	3M	Yes
	CSR	Yes
	Rio Tinto	Yes
	BHP	Yes
	Bluescope	Yes
	Amcor	Yes
	Caltex	Yes
	BP	Yes
	Shell	No
	Orbital	Yes
	Arrium	No
	Santos	No
	Fortescue	No
	Dupont	No
	Alinta	No
	AGL	Yes
	Sydney Water	Yes
	Huntsman	Yes
	HB Fuller	No
	BASF	Yes
	Bayer	Yes
	Luxfar (Linde)	Yes
	BOC	Yes
	Air Liquide	Yes

Appendix 3: The Survey Instrument

Business Excellence Survey

[BACKGROUND INFORMATION FOR INTERNAL CLIENT REFERENCE ONLY]:

Understanding the factors that drive business excellence.

The Global Financial Crisis (GFC) and Australia's ability to insulate the economic impact has been the focus of media and community attention over the past four years. Prior to the GFC, High Performance Theories were popularised by books such as 'Good to Great' (Collins 2001), stating that the road to business excellence was through a few key factors. These multinational companies that were once held as shining examples faltered with some being taken over or requiring government assistance to stay operational. Research on the root causes of high performance have been limited and, to date, no one has examined factors like competition and government regulations in high performance models, as well as key factors that interact.

This research project is being undertaken at the Macquarie Graduate School of Management by Mr. Vik Kortian and Professor Norma Harrison and this forms one component of the requirements towards the degree of Doctor of Philosophy in Business Administration for Mr. Vik Kortian.

The project title is 'A study of Agility in Business Excellence Structural Equation Models for Australian firms'. The model will be developed from the attached survey. This survey is intended to be completed by senior executives of your organisation who are familiar with all aspects of managing your organisation (CFO, COO etc.).

The survey asks questions about your organisations Agility and relates these to Organisational Results. We expect the survey will only take about 5 to 10 minutes to complete. If there are any queries with the survey questions please do not hesitate to contact the student researcher 0417 664 945.

You may withdraw from the project at any time and have your comments removed from the records and you have the right not to answer any questions you may find too personal or intrusive. It is not expected that there will be any discomfort or inconvenience experienced by any participants whilst completing the survey. There are no foreseeable risks to the participants.

Steps will be taken to protect your privacy. Respondent and Company names will not be used in any publications or disseminated reports. Permission to conduct the research has been granted by the Macquarie University's Human research Ethics Committee.

The research outcomes are intended to offer organizations a better understanding of good business practices leading to sustainable high performance, the transformational initiatives necessary for longevity, and examining whether these practices are universal or unique to certain geographical and/or economic contexts such as Australia.

We thank you in anticipation of your support in completing this survey.

[CATI INTRODUCTION]:

Hello, my name is _____, calling from I-View on behalf of the Macquarie Graduate School of Management. May I please speak to **[INSERT CONTACT NAME FROM SAMPLE]**?

We are conducting a short survey as part of a research project undertaken at the Macquarie Graduate School of Management: this survey asks questions about your organisation's Agility, and relates these to Organisational Results. We expect the questions will only take about 5 to 10 minutes to complete.

Is now a good time for you to take this survey?

[IF YES, PROCEED WITH INTERVIEW]

[IF NO, OFFER PROACTIVE CALLBACK FOR DIFFERENT TIME]

[IF NECESSARY]: This research is undertaken by Mr. Vik Kortian and Professor Norma Harrison, and forms part of the requirements towards the degree of Doctor of Philosophy in Business Administration for Mr. Vik Kortian. The project title is 'A study of Agility in Business Excellence Structural Equation Models for Australian firms'. A model will be developed from the following survey, which is intended to be completed by senior executives of your organisation who are familiar with all aspects of managing your organisation (CFO, COO, etc).

[IF CONCERNS ABOUT RESEARCH LEGITIMACY]: If there are any queries with the survey questions please do not hesitate to contact the student researcher Mr. Vik Kortian on _____. Steps are taken to protect your privacy. Respondent and Company names will not be used in any publications or disseminated reports. Permission to conduct the research has been granted by the Macquarie University's Human research Ethics Committee.

Section A: Demographics

S1. Which of the following would *best describe* your role?

[READ OUT; SINGLE RESPONSE]

1. Decision Maker or Manager familiar with all aspects of managing the organisation.
2. Decision Maker or Manager familiar with most aspects of managing the organisation.
3. I am Decision Maker or Manager, but I am not familiar with most aspects of our organisation.
4. I am not a Decision Maker or Manager within this organisation.

[IF S1 = CODE 1 OR 2, CONTINUE. ELSE IF CODE 3 OR 4, TERMINATE]

[VARIABLES PRE-FIXED WITH 'HQ' ARE HIDDEN: DO NOT ASK THESE TO THE RESPONDENT – SIMPLY CAPTURE THE VALUE FROM THE SAMPLE]

S2. Overall, does your company have 50 employees or greater?

[READ OUT; SINGLE RESPONSE]

1. Yes
2. No
99. [DO NOT READ OUT] Don't know

[IF S2 = CODE 1, CONTINUE. ELSE IF CODE 2 OR 99, TERMINATE]

HQ1. Name of Company: [CAPTURE COMPANY NAME IN BACKGROUND FROM SAMPLE]

Q2. And which of these would best describe the business unit for which you are responding to this survey?

[READ OUT; SINGLE RESPONSE]

1. Company
2. Division
3. Plant or Site

[POSITION QUESTIONS D3 → D6 AT THE END OF THE SURVEY, AFTER J3]

D3. Contact Name: [PIPE-IN FROM SAMPLE; EDITABLE BY INTERVIEWER]

D4. Contact Position: [PIPE-IN FROM SAMPLE; EDITABLE BY INTERVIEWER]

D5. Phone: [PIPE-IN FROM SAMPLE; EDITABLE BY INTERVIEWER]

D6. If you'd like to be sent a summary of the results from this research when it's completed, would you like to provide us with your email – used only for this purpose?

[SINGLE RESPONSE]

1. Yes [RECORD EMAIL]: _____
2. No

HQ7. ASIC Code: [CAPTURE ASIC CODE IN BACKGROUND FROM SAMPLE]

HQ8. Annual revenue: [CAPTURE REVENUE IN BACKGROUND FROM SAMPLE]

HQ9. Employee size: [CAPTURE EMPLOYEE SIZE IN BACKGROUND FROM SAMPLE]

HQ10. Line of business: [CAPTURE LINE OF BUSINESS IN BACKGROUND FROM SAMPLE]

Section B

B1. We'd like you to rate your organisation's **flexibility**: for each of the following statements, please answer on a scale of 1 to 7 where 1 is Strongly Disagree, and 7 is Strongly Agree.

You may use any number in between.

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Our organisation can adjust product or service volume as customer demands vary.
2. Our organisation can change its processes and structure with changing business conditions.
3. Our people have the skills to work in different departments or processes as the needs arise due to changing business conditions.

Section C

C1. Using the same scale, how would you rate your organisation's **responsiveness** on the following statements...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Our organisation can perceive or anticipate changes in business or market conditions.
2. Our organisation can respond by making the necessary organisational / process changes as a result of the changed business or market conditions.
3. In those situations where the organisation did not anticipate business or market changes it responded to these changes quickly.

Section D

D1. Please think now about the **competencies in your organisation**, how would you rate...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Our organisation has the appropriate Information technology to deal with the changing market and business conditions.
2. Our organisation has the appropriate industry technology to deal with the changing market and business conditions.
3. Our organisation introduces new products and services more frequently than our competitors.
4. Our new products / services are of a higher quality than our competitors.
5. Our new products / services are produced more efficiently than our competitors.
6. Our people accept and show little resistance to the organisational / process changes.
7. When organisational / process changes are made very few incidences / errors occur.

Section E

E1. For the **speed** of your organisation, how would you rate...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Our organisation introduces new products and services quicker than our competitors.

2. Our organisation can make organisational structural / processes changes quickly.
3. Our organisation is one of the early adopters of new technology in our industry / markets.

Section F

F1. Please think about the **competitive environment** in your organisation, how would you rate...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. The number of competitors in our industry / markets has increased.
2. Our competitors are predominantly local.
3. The difference in market share amongst the main competitors is small.
4. Barriers to entry in our markets are high.
5. Price is a key differentiator amongst our competitors.

Section G

G1. Now, considering your organisation's **market conditions and regulatory environment**, please rate the following...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. The Industry we compete in is highly regulated.
2. The regulations are effective in protecting the consumer.
3. The regulations are not restrictive to business growth.
4. New regulations are introduced to reflect the changing business environment.
5. New products / services are introduced into the markets frequently.
6. New products / services are introduced as a result of customer driven requirements.
- 7.

Section H

H1. Please think of your **technological environment**, how would you rate...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Our organisation must adopt new IT systems in order to remain competitive in our market / industry.
2. Our organisation must adopt new product / production/ service technologies in order to remain competitive in our markets.
3. Our markets and industries rely on new external technology / technologies for their development of new products / services.

Section i Customer Results

I1. In terms of **customer results**, would you say in the past 12 to 24 months that your...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Customer satisfaction has improved
2. Customer consolidation has improved
3. Communication with customers has improved
4. Customer complaints have decreased

Section J: Key performance Results

J1. For your organisation's **financial results**, would you say that in the past 12 to 24 months...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Market share has improved
2. Sales per employee have improved
3. Profit levels have improved
4. There has been a noticeable improvement in financial results

J2. For your organisation's **external results**, would you say in the past 12 to 24 months that...

[READ OUT; REPEAT SCALE AS NECESSARY]

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. The number of suppliers has decreased

2. Quality of raw materials / service providers has improved

3. Relationships with suppliers have improved

4. Supplier management has improved

J3. Finally, thinking about **performance regarding your processes** in your organisation, would you say that in the past 12 to 24 months...

BANNER ACROSS:

1 - Strongly Disagree

2

3

4

5

6

7 - Strongly Agree

99 - [DO NOT READ OUT] Not applicable/Don't know

DOWN THE SIDE:

1. Process efficiency has improved
2. Knowledge about efficient operation management has improved
3. The quality of our products / services has improved

[CONSIDER COMPLETE; STANDARD THANK and CLOSE]

Appendix 3.1: Table of duration of interviews.

Completes	Average Interview Length
1	16.58
1	14.17
5	11.54
11	11.77
14	12.55
15	11.28
10	11.70
24	11.62
24	11.02
36	11.43
9	10.04
150	11.50

Appendix 3.2: Formative and Reflective Constructs

The relationship between constructs and their measures in the form of reflective versus formative is a key issue in the execution of structural equation modelling (Hair et al. 2013). In a reflective measurement model causality is from the construct to its measure. They can be viewed as a representative sample of all the possible items available within the conceptual domain of the construct. Formative measurement models are based on the assumption that the indicators cause the construct. An important characteristic of formative indicators is that they are not interchangeable, compared to the case for reflective measurement models, which are.

Table A1: Attributes of Reflective versus Formative Constructs

Issue	Reflective Construct	Formative Construct
Causal Property	Indicators are realised from construct to indicators	Indicators are explanatory from indicators to construct
Measurement Error	Established practices important at the item level	Statistical assessment is problematic, but should be done at the construct level
Internal Consistency	Indicators should possess internal consistency	Internal consistency is not implied
Correlations	Should be high	Not expected
Identification	'Rule of three'	Two emitting paths plus formative indicators
Error Terms	Yes, at indicator level	No - only disturbances at construct level
Measurement Interchangeability	Removal of an item does not change the essential nature of the underlying construct	Omitting an indicator is omitting a part of the construct

Source: Freeze and Rasche (2007, p. 1484)

Appendix 4: Raw data from survey responses.

Sample Item - Primary SIC Text

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Accident and Health Insurance	1	0.7	0.7	0.7
Advertising Agencies	1	0.7	0.7	1.3
Alkalines and Chlorine	1	0.7	0.7	2.0
Amusement and Recreation Services, Not Elsewhere Classified	1	0.7	0.7	20.7
Architectural Services	1	0.7	0.7	3.3
Books: Publishing, or Publishing and Printing	1	0.7	0.7	4.0
Business Consulting Services, Not Elsewhere Classified	2	1.3	1.3	5.3
Business Services, Not Elsewhere Classified	2	1.3	1.3	60.7
Chemicals and Allied Products, Not Elsewhere Classified	1	0.7	0.7	7.3
Child Day Care Services	2	1.3	1.3	80.7
Coal Mining Services	2	1.3	1.3	10.0

Coating, Engraving and Allied Services, Not Elsewhere Classified	1	0.7	0.7	100.7
Colleges, Universities and Professional Schools	1	0.7	0.7	11.3
Communications Equipment, Not Elsewhere Classified	1	0.7	0.7	12.0
Communications Services, Not Elsewhere Classified	1	0.7	0.7	120.7
Computer Programming Services	1	0.7	0.7	13.3
Computer Related Services, Not Elsewhere Classified	1	0.7	0.7	14.0
Computers and Computer Peripheral Equipment and Software	1	0.7	0.7	140.7
Concrete Block and Brick	1	0.7	0.7	15.3
Construction and Mining (Except Petroleum) Machinery and Equipment	1	0.7	0.7	16.0
Courier Services, except by Air	1	0.7	0.7	160.7

Crude Petroleum and Natural Gas	1	0.7	0.7	17.3
Current-Carrying Wiring Devices	1	0.7	0.7	18.0
Dairy Farms	1	0.7	0.7	180.7
Drinking Places (Alcoholic Beverages)	1	0.7	0.7	19.3
Drugs, Drug Proprietaries and Druggists' Sundries	1	0.7	0.7	20.0
Durable Goods, Not Elsewhere Classified	1	0.7	0.7	200.7
Eating Places	7	40.7	40.7	25.3
Electric Services	1	0.7	0.7	26.0
Electrical Apparatus and Equipment, Wiring Supplies and Construction Materials	2	1.3	1.3	27.3
Electrical Equipment for Internal Combustion Engines	1	0.7	0.7	28.0
Electrical Industrial Apparatus, Not Elsewhere Classified	1	0.7	0.7	280.7
Electrical Machinery, Equipment and Supplies, Not Elsewhere Classified	1	0.7	0.7	29.3
Electrical Work	2	1.3	1.3	300.7

Electronic Parts and Equipment, Not Elsewhere Classified	1	0.7	0.7	31.3
Elementary and Secondary Schools	2	1.3	1.3	320.7
Elevators and Moving Stairways	1	0.7	0.7	33.3
Employment Agencies	1	0.7	0.7	34.0
Engineering Services	3	2.0	2.0	36.0
Facilities Support Management Services	1	0.7	0.7	360.7
Family Clothing Stores	1	0.7	0.7	37.3
Flour and other Grain Mill Products	1	0.7	0.7	38.0
Flowers, Nursery Stock and Florists' Supplies	1	0.7	0.7	380.7
Food Products Machinery	1	0.7	0.7	39.3
Forestry Services	1	0.7	0.7	40.0
Fruit and Vegetable Markets	1	0.7	0.7	400.7
Furniture Stores	1	0.7	0.7	41.3
General Contractors-Nonresidential Bldgs,other than Industrial Buildings & Wareh	3	2.0	2.0	43.3

General Government, Not Elsewhere Classified	1	0.7	0.7	44.0
General Industrial Machinery and Equipment, Not Elsewhere Classified	1	0.7	0.7	440.7
Groceries and Related Products, Not Elsewhere Classified	1	0.7	0.7	45.3
Grocery Stores	1	0.7	0.7	46.0
Hand and Edge Tools, except Machine Tools and Handsaws	1	0.7	0.7	460.7
Hardware Stores	1	0.7	0.7	47.3
Health and Allied Services, Not Elsewhere Classified	1	0.7	0.7	48.0
Heavy Construction, Not Elsewhere Classified	2	1.3	1.3	49.3
Highway and Street Construction, except Elevated Highways	1	0.7	0.7	50.0
Home Health Care Services	3	2.0	2.0	52.0
Homefurnishings	1	0.7	0.7	520.7
Hotels and Motels	3	2.0	2.0	540.7
Individual and Family Social Services	1	0.7	0.7	55.3

Industrial and Commercial Fans and Blowers and Air Purification Equipment	1	0.7	0.7	56.0
Industrial Inorganic Chemicals, Not Elsewhere Classified	1	0.7	0.7	560.7
Industrial Supplies	1	0.7	0.7	57.3
Insurance Agents, Brokers and Service	3	2.0	2.0	59.3
Investors, Not Elsewhere Classified	2	1.3	1.3	600.7
Irish Potatoes	1	0.7	0.7	61.3
Land Subdividers and Developers, except Cemeteries	1	0.7	0.7	62.0
Land, Mineral, Wildlife and Forest Conservation	1	0.7	0.7	620.7
Landscape Counselling and Planning	1	0.7	0.7	63.3
Legal Services	1	0.7	0.7	64.0
Legislative Bodies	7	40.7	40.7	680.7
Life Insurance	1	0.7	0.7	69.3
Livestock Services, except Veterinary	1	0.7	0.7	70.0
Local Passenger Transportation, Not Elsewhere Classified	1	0.7	0.7	700.7

Local Trucking Without Storage	1	0.7	0.7	71.3
Management Consulting Services	2	1.3	1.3	720.7
Management Services	3	2.0	2.0	740.7
Medical, Dental and Hospital Equipment and Supplies	1	0.7	0.7	75.3
Membership Organisations, Not Elsewhere Classified	1	0.7	0.7	76.0
Metal Mining Services	1	0.7	0.7	760.7
Miscellaneous Metal Ores, Not Elsewhere Classified	1	0.7	0.7	77.3
Miscellaneous Retail Stores, Not Elsewhere Classified	1	0.7	0.7	78.0
Mortgage Bankers and Loan Correspondents	1	0.7	0.7	780.7
Motor Vehicle Dealers (New and Used)	2	1.3	1.3	80.0
Motor Vehicle Supplies and New Parts	1	0.7	0.7	800.7
Noncommercial Research Organisations	1	0.7	0.7	81.3
Offices of Holding Companies, Not Elsewhere Classified	1	0.7	0.7	82.0

Oil and Gas Field Exploration Services	1	0.7	0.7	820.7
Oil and Gas Field Services, Not Elsewhere Classified	1	0.7	0.7	83.3
Pharmaceutical Preparations	2	1.3	1.3	840.7
Plastics Materials, Synthetic Resins and Nonvulcanisable Elastomers	1	0.7	0.7	85.3
Plumbing, Heating and Air Conditioning	1	0.7	0.7	86.0
Power, Distribution and Specialty Transformers	1	0.7	0.7	860.7
Racing, Including Track Operation	1	0.7	0.7	87.3
Radio Broadcasting Stations	1	0.7	0.7	88.0
Real Estate Agents and Managers	2	1.3	1.3	89.3
Regulation and Administration of Transportation Programs	1	0.7	0.7	90.0
Religious Organisations	1	0.7	0.7	900.7
Residential Care	1	0.7	0.7	91.3
Sheet Metalwork	1	0.7	0.7	92.0

Skilled Nursing Care Facilities	1	0.7	0.7	920.7
Special Trade Contractors, Not Elsewhere Classified	1	0.7	0.7	93.3
Sporting and Athletic Goods, Not Elsewhere Classified	1	0.7	0.7	94.0
Steel Works, Blast Furnaces (Including Coke Ovens) and Rolling Mills	1	0.7	0.7	940.7
Tax Return Preparation Services	1	0.7	0.7	95.3
Theatrical Producers (Except Motion Picture) and Miscellaneous Theatrical Servic	1	0.7	0.7	96.0
Timber Tracts	1	0.7	0.7	960.7
Unit Investment Trusts, Face-Amount Certificate & Closed-End Mgmt Investment Off	1	0.7	0.7	97.3
Water Transportation Services, Not Elsewhere Classified	1	0.7	0.7	98.0
Wines, Brandy and Brandy Spirits	1	0.7	0.7	980.7

Women's, Children's and Infants' Clothing and Accessories	1	0.7	0.7	99.3
Wrecking and Demolition Work	1	0.7	0.7	100.0
Total	150	100.0	100.0	

HQ8. Annual revenue

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 101472	1	0.7	0.7	0.7
1030206740. 7	1	0.7	0.7	1.3
10323775	1	0.7	0.7	2.0
10493778	1	0.7	0.7	20.7
1057641	1	0.7	0.7	3.3
10581259	1	0.7	0.7	4.0
10600000	1	0.7	0.7	40.7
1102532	1	0.7	0.7	5.3
11137749	1	0.7	0.7	6.0
117101874	1	0.7	0.7	60.7
11769354	1	0.7	0.7	7.3
11808038	1	0.7	0.7	8.0

12181305	1	0.7	0.7	80.7
12515919	1	0.7	0.7	9.3
12767810	1	0.7	0.7	10.0
1282237	1	0.7	0.7	100.7
12870913	1	0.7	0.7	11.3
13040812	1	0.7	0.7	12.0
13083625	1	0.7	0.7	120.7
13102094	1	0.7	0.7	13.3
13456628	1	0.7	0.7	14.0
13507913	1	0.7	0.7	140.7
13522595	1	0.7	0.7	15.3
13594414	1	0.7	0.7	16.0
1366707	1	0.7	0.7	160.7
13713473	1	0.7	0.7	17.3
142795000	1	0.7	0.7	18.0
15320647	1	0.7	0.7	180.7
15896724	1	0.7	0.7	19.3
16043135	1	0.7	0.7	20.0
165687000	1	0.7	0.7	200.7
16597676	1	0.7	0.7	21.3
16681456	1	0.7	0.7	22.0
16869525	1	0.7	0.7	220.7

16944768	1	0.7	0.7	23.3
17031286	1	0.7	0.7	24.0
170525000	1	0.7	0.7	240.7
173427000	1	0.7	0.7	25.3
17787006	1	0.7	0.7	26.0
18000000	1	0.7	0.7	260.7
19011020	1	0.7	0.7	27.3
19263283	1	0.7	0.7	28.0
19265107	1	0.7	0.7	280.7
1967363	1	0.7	0.7	29.3
20464679	1	0.7	0.7	30.0
205264000	1	0.7	0.7	300.7
21500000	1	0.7	0.7	31.3
21761419	1	0.7	0.7	32.0
2215762	1	0.7	0.7	320.7
225620000	1	0.7	0.7	33.3
22861691	1	0.7	0.7	34.0
23325336	1	0.7	0.7	340.7
24604970	1	0.7	0.7	35.3
24796547	1	0.7	0.7	36.0
24829574	1	0.7	0.7	360.7
250000	1	0.7	0.7	37.3

250703021	1	0.7	0.7	38.0
25586466	1	0.7	0.7	380.7
256688000	1	0.7	0.7	39.3
25730294	1	0.7	0.7	40.0
26356256	1	0.7	0.7	400.7
26459428	1	0.7	0.7	41.3
26665723	1	0.7	0.7	42.0
26823499	1	0.7	0.7	420.7
26980724	1	0.7	0.7	43.3
27045331	1	0.7	0.7	44.0
275081000	1	0.7	0.7	440.7
27656103	1	0.7	0.7	45.3
27937457	1	0.7	0.7	46.0
28106773	1	0.7	0.7	460.7
28765511	2	1.3	1.3	48.0
2897391	1	0.7	0.7	480.7
29121818	1	0.7	0.7	49.3
30031285	1	0.7	0.7	50.0
3030195	1	0.7	0.7	500.7
30441764	1	0.7	0.7	51.3
31029227	2	1.3	1.3	520.7
31235995	1	0.7	0.7	53.3

3204099	1	0.7	0.7	54.0
32166518	1	0.7	0.7	540.7
32622616	1	0.7	0.7	55.3
33283619	1	0.7	0.7	56.0
34184650	1	0.7	0.7	560.7
34912825	1	0.7	0.7	57.3
34968194	1	0.7	0.7	58.0
3534473	1	0.7	0.7	580.7
35529388	1	0.7	0.7	59.3
35567454	1	0.7	0.7	60.0
36161000	1	0.7	0.7	600.7
36245153	1	0.7	0.7	61.3
36938435	1	0.7	0.7	62.0
37172000	1	0.7	0.7	620.7
37655867	1	0.7	0.7	63.3
37767141	1	0.7	0.7	64.0
37857527	1	0.7	0.7	640.7
38000000	1	0.7	0.7	65.3
3888669	1	0.7	0.7	66.0
38961699	1	0.7	0.7	660.7
39346464	1	0.7	0.7	67.3
41529973	1	0.7	0.7	68.0

417659000	1	0.7	0.7	680.7
42355245	1	0.7	0.7	69.3
42461038	1	0.7	0.7	70.0
42515000	1	0.7	0.7	700.7
43057000	1	0.7	0.7	71.3
43242991	1	0.7	0.7	72.0
45024227	1	0.7	0.7	720.7
4668683	1	0.7	0.7	73.3
4748775	1	0.7	0.7	74.0
4754550	1	0.7	0.7	740.7
48756178	1	0.7	0.7	75.3
5050575	1	0.7	0.7	76.0
51609726	1	0.7	0.7	760.7
53160800	1	0.7	0.7	77.3
53402592	1	0.7	0.7	78.0
54407726	1	0.7	0.7	780.7
5723960	1	0.7	0.7	79.3
57591000	1	0.7	0.7	80.0
5968006	1	0.7	0.7	800.7
60299714	1	0.7	0.7	81.3
6689522	1	0.7	0.7	82.0
68341396	1	0.7	0.7	820.7

68467192	2	1.3	1.3	84.0
6874422	1	0.7	0.7	840.7
7154783	1	0.7	0.7	85.3
72303000	1	0.7	0.7	86.0
72684338	1	0.7	0.7	860.7
72779472	1	0.7	0.7	87.3
73334910	1	0.7	0.7	88.0
7359032	1	0.7	0.7	880.7
74068659	1	0.7	0.7	89.3
7545031	1	0.7	0.7	90.0
76472445	1	0.7	0.7	900.7
7656464	1	0.7	0.7	91.3
77077321	1	0.7	0.7	92.0
7719524	1	0.7	0.7	920.7
79127082	1	0.7	0.7	93.3
8117000	1	0.7	0.7	94.0
81507550.7	1	0.7	0.7	940.7
8216655	1	0.7	0.7	95.3
89102000	1	0.7	0.7	96.0
89892723	1	0.7	0.7	960.7
92976673	1	0.7	0.7	97.3
94919731	1	0.7	0.7	98.0

95580000	1	0.7	0.7	980.7
9662641	1	0.7	0.7	99.3
9681135	1	0.7	0.7	100.0
Total	150	100.0	100.0	

HQ9. Employee size

	Frequency	Percent	Valid Percent	Cumulative Percent
100	17	11.3	11.3	11.3
103	1	0.7	0.7	12.0
104	1	0.7	0.7	120.7
106	1	0.7	0.7	13.3
110	3	2.0	2.0	15.3
111	1	0.7	0.7	16.0
113	1	0.7	0.7	160.7
114	1	0.7	0.7	17.3
116	1	0.7	0.7	18.0
119	1	0.7	0.7	180.7
120	2	1.3	1.3	20.0
125	1	0.7	0.7	200.7

Valid

130	3	2.0	2.0	220.7
144	1	0.7	0.7	23.3
146	1	0.7	0.7	24.0
147	1	0.7	0.7	240.7
150	11	7.3	7.3	32.0
153	1	0.7	0.7	320.7
160	5	3.3	3.3	36.0
161	1	0.7	0.7	360.7
163	1	0.7	0.7	37.3
164	1	0.7	0.7	38.0
170	1	0.7	0.7	380.7
180	2	1.3	1.3	40.0
193	1	0.7	0.7	400.7
194	1	0.7	0.7	41.3
200	7	40.7	40.7	46.0
215	1	0.7	0.7	460.7
216	1	0.7	0.7	47.3
223	1	0.7	0.7	48.0
226	1	0.7	0.7	480.7
235	1	0.7	0.7	49.3
241	1	0.7	0.7	50.0
242	1	0.7	0.7	500.7

250	2	1.3	1.3	52.0
51	1	0.7	0.7	520.7
52	2	1.3	1.3	54.0
53	2	1.3	1.3	55.3
55	7	40.7	40.7	60.0
56	1	0.7	0.7	600.7
57	1	0.7	0.7	61.3
60	10	60.7	60.7	68.0
62	2	1.3	1.3	69.3
63	1	0.7	0.7	70.0
64	1	0.7	0.7	700.7
65	2	1.3	1.3	72.0
67	1	0.7	0.7	720.7
68	1	0.7	0.7	73.3
70	8	5.3	5.3	780.7
71	2	1.3	1.3	80.0
72	1	0.7	0.7	800.7
75	3	2.0	2.0	820.7
80	13	80.7	80.7	91.3
82	1	0.7	0.7	92.0
83	1	0.7	0.7	920.7
84	2	1.3	1.3	94.0

86	1	0.7	0.7	940.7
88	1	0.7	0.7	95.3
90	4	20.7	20.7	98.0
95	2	1.3	1.3	99.3
97	1	0.7	0.7	100.0
Total	150	100.0	100.0	

HQ10. Line of business

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid AGED CARE AND DISABILITY SERVICES	1	0.7	0.7	0.7
AIR CONDITIONING CONTRACTORS	1	0.7	0.7	1.3
ARCHITECTURAL SERVICES	1	0.7	0.7	2.0
ASBESTOS REMOVAL AND SOFT DEMOLITION CONTRACTORS	1	0.7	0.7	20.7
BUILD AND SUPPLY TELECOMMUNICATION SOLUTIONS	1	0.7	0.7	3.3

CATAMARAN CHARTER SERVICES	1	0.7	0.7	4.0
CATERING SERVICES	1	0.7	0.7	40.7
CHILDCARE SERVICES AND THE OPERATION OF A PRIMARY AND SECONDARY SCHOOL	1	0.7	0.7	5.3
CHURCH ADMINISTRATION	1	0.7	0.7	6.0
CLOTHING STORES	1	0.7	0.7	60.7
COAL MINING SERVICES	1	0.7	0.7	7.3
COAL MINING, HOLDING COMPANY	1	0.7	0.7	8.0
COMMERCIAL AND RESIDENTIAL BUILDING CONSTRUCTION CONTRACTORS	1	0.7	0.7	80.7
COMMERCIAL CONSTRUCTIONS	1	0.7	0.7	9.3
COMMERCIAL, RESIDENTIAL AND INDUSTRIAL BUILDING CONTRACTORS, HOLDING COMPANY	1	0.7	0.7	10.0
COMMUNITY HEALTH CENTRE	1	0.7	0.7	100.7
CONCRETE CIVIL CONTRACTORS	1	0.7	0.7	11.3

CONSTRUCTION AND OPERATION OF WIND FARMS	1	0.7	0.7	12.0
DAIRY HERD IMPROVEMENT SERVICES	1	0.7	0.7	120.7
DEMOLITION AND EXCAVATION CONTRACTORS	1	0.7	0.7	13.3
DISABILITY SUPPORT SERVICES	1	0.7	0.7	14.0
DISTRIBUTOR OF CONSTRUCTION EQUIPMENT AND CRANES	1	0.7	0.7	140.7
DOCUMENT STORAGE SERVICES	1	0.7	0.7	15.3
EARLY CHLDHOOD SERVICES	1	0.7	0.7	16.0
EARTHMOVING AND CIVIL CONTRACTORS	1	0.7	0.7	160.7
ELECTRICAL CONTRACTORS, TRUSTEE COMPANY	1	0.7	0.7	17.3
ENGAGED AS ELECTRICAL AND MECHANICAL CONTRACTORS	1	0.7	0.7	18.0

ENGAGED IN APPAREL MANAGEMENT SERVICES, HOLDING COMPANY	1	0.7	0.7	180.7
ENGAGED IN BOOK PUBLISHING	1	0.7	0.7	19.3
ENGAGED IN COMPUTER PROGRAMMING SERVICES, HOLDING COMPANY	1	0.7	0.7	20.0
ENGAGED IN CONSTRUCTION MANAGEMENT SERVICES	1	0.7	0.7	200.7
ENGAGED IN PROVIDING RAW MATERIALS FOR ENERGY STORAGE SYSTEMS, NETWORKS AND DEVICES, HOLDING COMPANY	1	0.7	0.7	21.3
ENGAGED IN RACING, INCLUDING TRACK OPERATION	1	0.7	0.7	22.0
ENGINEERING AND ENVIRONMENTAL CONSULTANCY SERVICES	1	0.7	0.7	220.7
ENGINEERING SERVICES	1	0.7	0.7	23.3

EXPLORATION, DEVELOPMENT, PRODUCTION, AND WHOLESALE OF HYDROCARBONS	1	0.7	0.7	24.0
FACTORY CONSTRUCTION SERVICES, HOLDING COMPANY	1	0.7	0.7	240.7
FAMILY RESTAURANT, FRANCHISE COMPANY	1	0.7	0.7	25.3
FASTFOOD CHAIN RESTAURANT	1	0.7	0.7	26.0
GENERAL INSURANCE AGENTS	1	0.7	0.7	260.7
GOVERNMENT PORT AUTHORITY	1	0.7	0.7	27.3
HERITAGE AND CONSERVATION SERVICES, TRUSTEE COMPANY	1	0.7	0.7	28.0
HOLDING COMPANY FOR AN ORGANISATION ENGAGED IN THE MANUFACTURING AND WHOLESALE OF POWER TRANSFORMERS	1	0.7	0.7	280.7

HOLDING COMPANY WITH SUBSIDIARIES ENGAGED IN MANUFACTURING & WHOLESALE OF FLAVOURS AND FRAGRANCES	1	0.7	0.7	29.3
HOME AGED CARE SERVICES	1	0.7	0.7	30.0
IMPORT AND WHOLESALE FOOD PRODUCTS, HOLDING COMPANY	1	0.7	0.7	300.7
IN-HOME CARE SERVICES, TRUSTEE COMPANY, HOLDING COMPANY	1	0.7	0.7	31.3
INDUSTRIAL BLASTING AND PROTECTIVE COATING CONTRACTORS	1	0.7	0.7	32.0
INSURANCE BROKER SERVICES	1	0.7	0.7	320.7
INSURANCE UNDERWRITING AGENCY	1	0.7	0.7	33.3
INVESTMENT COMPANY, HOLDING COMPANY	1	0.7	0.7	34.0
INVESTORS	1	0.7	0.7	340.7
IT CONSULTANT	1	0.7	0.7	35.3

JEWISH COMMUNITY CHARITABLE SERVICES	1	0.7	0.7	36.0
JOINT VENTURE IN MINERAL SAND MINING	1	0.7	0.7	360.7
LANDSCAPING SERVICES, HOLDING COMPANY	1	0.7	0.7	37.3
LAW FIRM	1	0.7	0.7	38.0
LEGAL SERVICES, TRUST COMPANY	1	0.7	0.7	380.7
LIFE REINSURANCE CARRIERS	1	0.7	0.7	39.3
LIVESTOCK FARM, AUCTION LIVESTOCK, REAL ESTATE AGENCY	1	0.7	0.7	40.0
LOCAL AND INTERSTATE TRUCK CARTAGE CONTRACTORS, TRUST COMPANY	1	0.7	0.7	400.7
LOCAL COUNCIL OFFICES	1	0.7	0.7	41.3
LOCAL COUNCIL SERVICE	1	0.7	0.7	42.0
LOCAL GOVERNMENT CITY COUNCIL	1	0.7	0.7	420.7
LOCAL GOVERNMENT COUNCIL	5	3.3	3.3	46.0
MANAGING A RETAIL RESTAURANT	1	0.7	0.7	460.7

MANUFACTURE AND INSTALLATION OF SYNTHETIC SPORTS SURFACING AND EQUIPMENT, HOLDING COMPANY	1	0.7	0.7	47.3
MANUFACTURE AND REFUBISH ENGINEERING EQUIPMENT, HOLDING COMPANY	1	0.7	0.7	48.0
MANUFACTURE AND RETAIL OF WINE	1	0.7	0.7	480.7
MANUFACTURE AND WHOLESALE CONSTRUCTION SUPPLIES, HOLDING COMPANY	1	0.7	0.7	49.3
MANUFACTURE AND WHOLESALE HAND TOOLS, HOLDING COMPANY	1	0.7	0.7	50.0
MANUFACTURE AND WHOLESALE INDUSTRIAL CHEMICALS	1	0.7	0.7	500.7
MANUFACTURE AND WHOLESALE SECURITY CONTROL EQUIPMENT	1	0.7	0.7	51.3
MANUFACTURE COPPER ELECTRICAL CABLE	1	0.7	0.7	52.0

MANUFACTURE ELECTRONIC COMPONENTS, HOLDING COMPANY	1	0.7	0.7	520.7
MANUFACTURE ELEVATORS AND ESCALATORS AND ENGAGED IN INSTALLATION, MAINTENANCE, REPAIR AND REFURBISHMENT SERVICES	1	0.7	0.7	53.3
MANUFACTURE FOOD AND BEVERAGE MACHINE	1	0.7	0.7	54.0
MANUFACTURE METAL ROOFING EQUIPMENT	1	0.7	0.7	540.7
MANUFACTURE PHARMACEAUTICALS, MANUFACTURES FOOD PREPARATIONS	1	0.7	0.7	55.3
MANUFACTURE PHARMACEUTICAL PRODUCTS	1	0.7	0.7	56.0
MANUFACTURE PLASTICS MATERIALS AND RESINS, HOLDING COMPANY	1	0.7	0.7	560.7
MANUFACTURE WHOLESALE OF FIRE DETECTION SYSTEMS, TRUST COMPANY	1	0.7	0.7	57.3

MANUFACTURE, REFURBISH AND SERVICE INDUSTRIAL SOOT BLOWERS, FURNACE CAMERAS AND CONTROLS	1	0.7	0.7	58.0
MANUFACTURER AND WHOLESALE OF ELECTRICAL AND TELECOMMUNICATIONS CABLES, HOLDING COMPANY	1	0.7	0.7	580.7
MANUFACTURER AND WHOLESALE OF FLOUR MILL PRODUCTS, TRUST COMPANY	1	0.7	0.7	59.3
MARKETING CONSULTING SERVICES	1	0.7	0.7	60.0
MEDICAL INDEMNITY INSURANCE SERVICES	1	0.7	0.7	600.7
METAL MINING SERVICES	1	0.7	0.7	61.3
MINING OF MISCELLANEOUS METAL ORES	1	0.7	0.7	62.0
MORTGAGE MANAGEMENT	1	0.7	0.7	620.7
NEW AND USED MOTOR VEHICLE DEALERS	1	0.7	0.7	63.3

OIL AND GAS EXPLORATION, HOLDING COMPANY	1	0.7	0.7	64.0
OIL AND GAS FIELD SERVICES	1	0.7	0.7	640.7
ONLINE ADVERTISING AND MARKETING SERVICES	1	0.7	0.7	65.3
OPERATE BLUE GUM PLANTATION	1	0.7	0.7	66.0
OPERATES AS EYE RESEARCH INSTITUTE	1	0.7	0.7	660.7
OPERATES CHILD CARE CENTRES	1	0.7	0.7	67.3
OPERATES DAIRY FARM	1	0.7	0.7	68.0
OPERATES EMPLOYMENT AGENCIES	1	0.7	0.7	680.7
OPERATES HOTEL	1	0.7	0.7	69.3
OPERATES IRISH POTATOES FARM	1	0.7	0.7	70.0
OPERATOR OF DRINKING PLACES	1	0.7	0.7	700.7
OPERATOR OF EATING PLACES	1	0.7	0.7	71.3
OPERATOR OF FURNITURE STORES	1	0.7	0.7	72.0

OPERATOR OF HOTELS AND MOTELS	1	0.7	0.7	720.7
OPERATOR OF LOCAL PASSENGER TRANSPORTATION	1	0.7	0.7	73.3
OPERATOR OF LOCAL TRUCKING WITH STORAGE	1	0.7	0.7	74.0
OPERATOR OF THEATRICAL PRODUCERS (EXCEPT MOTION PICTURE) AND	1	0.7	0.7	740.7
PRIMARY AND SECONDARY COLLAGE	1	0.7	0.7	75.3
PROFESSIONAL LEGAL TRAINING SCHOOLS, HOLDING COMPANY	1	0.7	0.7	76.0
PROJECT MANAGEMENT, INSTALLATION AND SERVICE OF ENGINEERING EQUIPMENT	1	0.7	0.7	760.7
PROPERTY AND PROJECT DEVELOPMENT SERVICES	1	0.7	0.7	77.3
PROVIDE ALUMINIUM FINISHING SERVICES	1	0.7	0.7	78.0
PROVIDES FORESTRY SERVICES	1	0.7	0.7	780.7

PROVIDES HEALTH SERVICES FOR SKIN CANCER	1	0.7	0.7	79.3
PROVIDES MINING CONSULTANCY SERVICES	1	0.7	0.7	80.0
PROVISION OF MANAGEMENT, SERVICING AND CONSTRUCTION OF DISTRIBUTION NETWORKS	1	0.7	0.7	800.7
RADIO BROADCASTING STATIONS	1	0.7	0.7	81.3
RAINFOREST CABLE WAY SERVICES, INVESTMENT COMPANY	1	0.7	0.7	82.0
REAL ESTATE AGENTS AND MANAGERS	1	0.7	0.7	820.7
RESIDENTIAL AGED CARE, TRUSTEE COMPANY	1	0.7	0.7	83.3
RESIDENTIAL AND COMMUNITY AGED CARE SERVICES, HOLDING COMPANY	1	0.7	0.7	84.0
RESORT HOTEL	1	0.7	0.7	840.7
RESTAURANT	1	0.7	0.7	85.3

RETAIL COLLECTABLE COINS AND NOTES, HOLDING COMPANY	1	0.7	0.7	86.0
RETAIL FAST FOOD FRANCHISE	1	0.7	0.7	860.7
RETAIL FRESH FRUITS AND VEGETABLES	1	0.7	0.7	87.3
RETAIL HARDWARE STORE	1	0.7	0.7	88.0
RETAIL SUPERMARKET	1	0.7	0.7	880.7
SALES AND SERVICE OF POWERTRAIN COMPONENTS	1	0.7	0.7	89.3
SUBSIDIARY OF A COMPANY ENGAGED IN MANAGEMENT CONSULTING, PROJECT PLANNING AND ENGINEERING SERVICES FOR VARIOUS MARKETS	1	0.7	0.7	90.0
SYSTEMS ENGINEERING SERVICES	1	0.7	0.7	900.7
TAXATION CONSULTANTS	1	0.7	0.7	91.3
WHOLESALE AND RETAIL OF CARS AND ACCESSORIES	1	0.7	0.7	92.0
WHOLESALE ELECTRONIC PARTS EQUIPMENT	1	0.7	0.7	920.7

WHOLESALE FLOWERS	1	0.7	0.7	93.3
WHOLESALE INDUSTRIAL BEARINGS	1	0.7	0.7	94.0
WHOLESALE LIGHTING SYSTEMS	1	0.7	0.7	940.7
WHOLESALE MEDICAL PRODUCTS	1	0.7	0.7	95.3
WHOLESALE OF TEXTILE SHEETS AND MANCHESTER	1	0.7	0.7	96.0
WHOLESALE PHARMACEUTICAL PRODUCTS	1	0.7	0.7	960.7
WHOLESALE PLASTIC, GLASS & STEEL, HOLDING COMPANY	1	0.7	0.7	97.3
WHOLESALE POWER TRANSMISSION EQUIPMENT	1	0.7	0.7	98.0
WHOLESALE PRINTING EQUIPMENT, HOLDING COMPANY	1	0.7	0.7	980.7
WHOLESALER OF WOMEN'S APPAREL	1	0.7	0.7	99.3
WHOLESALERS CHEMICALS AND ALLIED PRODUCTS, HOLDING COMPANY	1	0.7	0.7	100.0
Total	150	100.0	100.0	

Appendix 5: Ethics Committee Approval Letter

MACQUARIE
UNIVERSITY



Faculty of Business & Economics
Human Research Ethics Sub Committee
Building E4A, Room 707
MACQUARIE UNIVERSITY NSW 2109

Phone +61 (0)2 9850 4826
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Email yanru.cuyang@mq.edu.au

12 September 2011

Professor Norma Harrison
MGSM
Macquarie University, NSW 2109

Reference: 5201100622(D)

Dear Professor Norma Harrison

FINAL APPROVAL

Title of project: A Study of mediating and moderating variables in business excellence Structural Equation Models (SEM) for Australian firms.

Thank you for your recent correspondence. Your response has addressed the issues raised by the Faculty of Business & Economics Human Research Ethics Sub Committee, and you may now commence your research. The following personnel are authorised to conduct this research:

Norma Harrison - Chief Investigator/Supervisor
Vik Kortian - Co-Investigator

Please note the following standard requirements of approval:

1. The approval of this project is **conditional** upon your continuing compliance with the *National Statement on Ethical Conduct in Human Research (2007)*.
2. Approval will be for a period of five (5) years subject to the provision of annual reports. **Your first progress report is due on 12 September 2012.**

If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report on the project.

Progress Reports and Final Reports are available at the following website:
http://www.research.mq.edu.au/researchers/ethics/human_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).
4. Please notify the Committee of any amendment to the project.
5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that might affect continued ethical acceptability of the project.
6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at: <http://www.research.mq.edu.au/policy>

Faculty of Business & Economics Human Research Ethics Sub Committee
MACQUARIE UNIVERSITY

http://www.research.mq.edu.au/researchers/ethics/human_ethics

www.mq.edu.au

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide Macquarie University's Research Grants Officer with a copy of this letter as soon as possible. The Research Grants Officer will not inform external funding agencies that you have final approval for your project and funds will not be released until the Research Grants Officer has received a copy of this final approval letter.

Yours sincerely

Alan Kilgore
Chair, Faculty of Business and Economics Ethics Sub-Committee

REFERENCES

- Adler, P. S., Goldoftas, B., & Levine, D. I. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization science*, 10(1), 43-68.
- Ahmad, M., Zakuan, N., Jusoh, A., Tasir, Z., & Takala, J. (2013). *Meta-analysis of the relationship between TQM and Business Performance*. Paper presented at the IOP Conference Series: Materials Science and Engineering.
- Allmon, D. E., Chen, H. C. K., Pritchett, T. K., & Forrest, P. J. (1997). A multicultural examination of business ethics perceptions. *Journal of Business Ethics*, 16(2), 183-188.
- Agarwal, A., Shankar, R., & Tiwari, M. (2007). Modeling agility of supply chain. *Industrial Marketing Management*, 36(4), 443-457.
- Aguinis, H., Gottfredson, R. K., & Wright, T. A. (2011). Best-practice recommendations for estimating interaction effects using meta-analysis. *Journal of Organizational Behavior*, 32(8), 1033-1043.
- Anand, G., Ward, P. T., Tatikonda, M. V., & Schilling, D. A. (2009). Dynamic capabilities through continuous improvement infrastructure. *Journal of Operations Management*, 27(6), 444-461.
- Anderson, D., & Anderson, L. A. (2010). *Beyond change management: How to achieve breakthrough results through conscious change leadership*: John Wiley & Sons.
- Anderson, E. W., Fornell, C., & Mazvancheryl, S. K. (2004). Customer satisfaction and shareholder value. *Journal of Marketing*, 68(4), 172-185.
- Anseel, F., Lievens, F., Schollaert, E., & Choragwicka, B. (2010). Response rates in organizational science, 1995–2008: A meta-analytic review and guidelines for survey researchers. *Journal of Business and Psychology*, 25(3), 335-349.
- Arteta, B., & Giachetti, R. (2004). A measure of agility as the complexity of the enterprise system. *Robotics and Computer-Integrated Manufacturing*, 20(6), 495-503.
- Ashrafi, N., Xu, P., Sathasivam, M., Kuilboer, J.-P., Koehler, W., Heimann, D., & Waage, F. (2005). *A framework for implementing business agility through knowledge management systems*. Paper presented at the E-Commerce Technology Workshops, 2005. Seventh IEEE International Conference on.
- Balnaves, M., & Caputi, P. (2001). *Introduction to quantitative research methods: An investigative approach*. Sage.
- Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. *Journal of management*, 36(1), 256-280.

- Beaumont, N. B., Sohal, A. S., & Terziovski, M. (1997). Comparing quality management practices in the Australian service and manufacturing industries. *International Journal of Quality & Reliability Management*, 14(8), 814-833.
- Bedford, D., Brown, D. A., Malmi, T., & Sivabalan, P. (2008). Balanced scorecard design and performance impacts: some Australian evidence. *Journal of applied management accounting research*, 6(2), 17-36.
- Bergh, D. D., Hanke, R., Balkundi, P., Brown, M., & Chen, X. (2004). An assessment of research designs in strategic management research: The frequency of threats to internal validity. *Research methodology in strategy and management*, 1, 347-363.
- Bernardes, E. S., & Hanna, M. D. (2009). A theoretical review of flexibility, agility and responsiveness in the operations management literature: toward a conceptual definition of customer responsiveness. *International Journal of Operations & Production Management*, 29(1), 30-53.
- Bou-Llugar, J. C., Escrig-Tena, A. B., Roca-Puig, V., and Beltran-Martin, I. (2005). To what extent do enablers explain results in the EFQM excellence model? *International Journal of Quality & Reliability Management*, 22(4): 337-353.
- Bou-Llugar, J. C., Escrig-Tena, A. B., Roca-Puig, V., & Beltrán-Martín, I. (2009). An empirical assessment of the EFQM excellence model: evaluation as a TQM framework relative to the MBNQA model. *Journal of Operations Management*, 27(1), 1-22.
- Buckley, M. R., Cote, J. A., & Comstock, S. M. (1990). Measurement errors in the behavioral sciences: The case of personality/attitude research. *Educational and Psychological Measurement*, 50(3), 447-474.
- Cano, R. C., Carrillat, F. A., Jaramillo, F. (2004). "A meta-analysis of the relationship between market orientation and business performance: evidence from five continents." *International Journal of Research in Marketing* 21(2): 179-200.
- Chakraborty, A., & Leyer, M. (2013). Developing a Six Sigma framework: perspectives from financial service companies. *International Journal of Quality & Reliability Management*, 30(3), 256-279.
- Chakraborty, A., & Tan, K. C. (2012). Case study analysis of Six Sigma implementation in service organisations. *Business Process Management Journal*, 18(6), 992-1019.
- Chen, W.-H., & Chiang, A.-H. (2011). Network agility as a trigger for enhancing firm performance: a case study of a high-tech firm implementing the mixed channel strategy. *Industrial Marketing Management*, 40(4), 643-651.

- Chen, Y., Wang, Y., Nevo, S., Jin, J., Wang, L., & Chow, W. S. (2014). IT capability and organizational performance: the roles of business process agility and environmental factors. *European Journal of Information Systems*, 23(3), 326-342.
- Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling: JSTOR
- Cho, H., Jung, M., & Kim, M. (1996). Enabling technologies of agile manufacturing and its related activities in Korea. *Computers & Industrial Engineering*, 30(3), 323-334.
- Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *International Journal of Logistics Management*, 15(2), 1-14.
- Christopher, M., & Towill, D. (2001). An integrated model for the design of agile supply chains. *International Journal of Physical Distribution & Logistics Management*, 31(4), 235-246.
- Chung, S., Lee, K. Y., & Kim, K. (2014). Job performance through mobile enterprise systems: The role of organizational agility, location independence, and task characteristics. *Information & Management*.
- Cohen, J. (1992). A power primer. *Psychological bulletin*, 112(1), 155.
- Collins, J. (2005). Level 5 Leadership: The Triumph of Humility and Fierce Resolve. (cover story). *Harvard Business Review*, 83(7/8), 136-146.
- Collins, J. C. (2001). Good to great: Why some companies make the leap... and others don't. Random House.
- Collins, J. (2009). *How the mighty fall*, New York: HarperCollins.
- Collins, J., & Hansen, M. T. (2011). Great by Choice: Uncertainty, Chaos and Luck-Why Some Thrive Despite Them All. Random House.
- Corredor, P., & Goñi, S. (2011). TQM and performance: Is the relationship so obvious? *Journal of business research*, 64(8), 830-838.
- Crocitto, M., & Youssef, M. (2003). The human side of organizational agility. *Industrial Management & Data Systems*, 103(6), 388-397.
- Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological bulletin*, 52(4), 281.
- Crook, T. R., Todd, S. Y., Combs, J. G., Woehr, D. J., & Ketchen Jr, D. J. (2011). Does human capital matter? A meta-analysis of the relationship between human capital and firm performance. *Journal of applied psychology*, 96(3), 443.

- Curkovic, S., Melnyk, S., Calantone, R., & Handfield, R. (2000). Validating the Malcolm Baldrige National Quality Award framework through structural equation modelling. *International Journal of Production Research*, 38(4), 765-791.
- De Cerio, J. M.-d. (2003). Quality management practices and operational performance: empirical evidence for Spanish industry. *International Journal of Production Research*, 41(12), 2763-2786.
- De Leeuw, A. C., & Volberda, H. W. (1996). On the concept of flexibility: a dual control perspective. *Omega*, 24(2), 121-139.
- Denison, R. D., Haaland, S., & Goelzer, P. (2004). Is Asia different from the rest of the world? *Organizational Dynamics*, 23(1), 98-109.
- Devinney, T. M., Richard, P. J., Yip, G. S., & Johnson, G. (2005). Measuring organizational performance in management research: a synthesis of measurement challenges and approaches. *Human Resource Management Review*, 8(3), Autumn 1998, 311-331.
- De Toni, A., & Tonchia, S. (2005). Definitions and linkages between operational and strategic flexibilities. *Omega*, 33(6), 525-540.
- Dillman, D. A. (2002). Presidential address: Navigating the rapids of change: Some observations on survey methodology in the early twenty-first century. *Public Opinion Quarterly*, 473-494.
- Dillman, D. A. (2011). Mail and Internet surveys: The tailored design method-2007 Update with new Internet, visual, and mixed-mode guide. John Wiley & Sons.
- Deutsch, M. (1973). The resolution of conflict. *American Behavioral Scientist*, 17(2), 248.
- Dove, R. (1999). Knowledge management, response ability, and the agile enterprise. *Journal of knowledge management*, 3(1), 18-35.
- Dreyer, B., & Grønhaug, K. (2004). Uncertainty, flexibility, and sustained competitive advantage. *Journal of business research*, 57(5), 484-494.
- Dyer, L., & Shafer, R. A. (1998). *From human resource strategy to organizational effectiveness: Lessons from research on organizational agility*. (CAHRS Working Paper #98-12). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies.
- Epstein, M. J. (2004). The drivers and measures of success in high performance organizations. *Performance Measurement and Management Control: Superior Organizational Performance*, 3-18.
- Escrig-Tena, A. B., Bou-Llusar, J. C., Beltrán-Martín, I., & Roca-Puig, V. (2012). Modelling the implications of quality management elements on strategic flexibility. *Advances in Decision Sciences*, 2011.

- Eshlaghy, A. T., Mashayekhi, A. N., Rajabzadeh, A., & Razavian, M. M. (2010). Applying path analysis method in defining effective factors in organisation agility. *International Journal of Production Research*, 48(6), 1765-1786.
- Eskildsen, J. K., Kristensen, K., Juhl, H. J., (2000). The causal structure of the EFQM excellence model. *MAAOE Conference Proceedings*
- Eskildsen, J. K., Kristensen, K., Juhl, H. J., (2001). The criterion weights of the EFQM excellence model. *International Journal of Quality and Reliability Management* 18(8/9), 783-795.
- Esposito Vinzi, V., Chin, W. W., Henseler, J., & Wang, H. (2010). Handbook of partial least squares: Concepts, methods and applications.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*, 41(4), 1149-1160.
- Feng, J., Prajogo, D. I., Tan, K. C., & Sohal, A. S. (2006). The impact of TQM practices on performance: A comparative study between Australian and Singaporean organizations. *European Journal of Innovation Management*, 9(3), 269-278.
- Feng, M., Terziovski, M., & Samson, D. (2007). Relationship of ISO 9001: 2000 quality system certification with operational and business performance: A survey in Australia and New Zealand-based manufacturing and service companies. *Journal of Manufacturing Technology Management*, 19(1), 22-37.
- Fernandes, V. (2012). (Re)discovering the PLS approach in management science. *M@n@gement*, 15(1), 101-123.
- Fletcher, R., & Bohn, J. (1998). The impact of psychic distance on the internationalisation of the Australian firm. *Journal of Global Marketing*, 12(2), 47-68.
- Flynn, B. B., & Saladin (2001). Further evidence on the validity of the theoretical models underlying the Baldrige criteria. *Journal of Operations Management*, 19(6), 617-652.
- Flynn, B. B., Schroeder, R., & Sakakibara, S. (1995). Determinants of quality performance in high-and low-quality plants. *Quality Management Journal*, 2(2).
- Fotopoulos, C. V., & Psomas, E. L. (2010). The structural relationships between TQM factors and organizational performance. *The TQM Journal*, 22(5), 539-552.
- Fornell, C., Mithas, S., Morgeson III, F. V., & Krishnan, M. S. (2006). Customer satisfaction and stock prices: High returns, low risk. *Journal of Marketing*, 70(1), 3-14
- Freeze, R., & Raschke, R. L. (2007). An assessment of formative and reflective constructs in IS research. Proceedings of the 15th European Conference on Information Systems ECIS2007 June 2007, St Gallen Switzerland, 1481-1492.

- Gadenne, D., & Sharma, B. (2009). An investigation of the hard and soft quality management factors of Australian SMEs and their association with firm performance. *International Journal of Quality & Reliability Management*, 26(9), 865-880.
- Ganguly, A., Nilchiani, R., & Farr, J. V. (2009). Evaluating agility in corporate enterprises. *International Journal of Production Economics*, 118(2), 410-423.
- Gillham, B. (2005). *Research Interviewing: The Range Of Techniques: A Practical Guide*. McGraw-Hill International.
- Gawande, K., Hoekman, B., & Cui, Y. (2011). Determinants of trade policy responses to the 2008 financial crisis.
- M. Gligor, D. (2014). The role of demand management in achieving supply chain agility. *Supply Chain Management: An International Journal*, 19(5/6), 577-591.
- Golden, W., & Powell, P. (2000). Towards a definition of flexibility: in search of the Holy Grail? *Omega*, 28(4), 373-384.
- Goldman, S. L., Nagel, R. N., & Preiss, K. (1995). *Agile competitors and virtual organizations: strategies for enriching the customer* (Vol. 8), New York: Van Nostrand Reinhold.
- Gómez-Gras, J. M., & Verdú-Jover, A. J. (2005). TQM, structural and strategic flexibility and performance: an empirical research study. *Total Quality Management & Business Excellence*, 16(7), 841-860.
- Grigg, N., & Mann, R. (2008). Review of the Australian Business Excellence Framework: A comparison of national strategies for designing, administering and promoting Business Excellence Frameworks. *Total Quality Management*, 19(11), 1173-1188.
- Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). *A primer on partial least squares structural equation modeling (PLS-SEM)*. SAGE Publications, Incorporated.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013b). Editorial-Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance. *Long Range Planning*, 46(1-2), 1-12.
- Handfield, R. B., Cousins, P. D., Lawson, B., & Petersen, K. J. (2014). How Can Supply Management Really Improve Performance? A Knowledge-Based Model of Alignment Capabilities. *Journal of Supply Chain Management*.
- Heck, R. H. (2001). Multilevel modeling with SEM. New developments and techniques in structural equation modeling, 89-127.
- Heckl, D., Moormann, J., & Rosemann, M. (2010). Uptake and success factors of Six Sigma in the financial services industry. *Business Process Management Journal*, 16(3), 436-472.

- Helo, P. (2004). Managing agility and productivity in the electronics industry. *Industrial Management & Data Systems*, 104(7), 567-577.
- Heras-Saizarbitoria, I., Marimon, F., & Casadesús, M. (2012). An empirical study of the relationships within the categories of the EFQM model. *Total Quality Management & Business Excellence*, 23(5-6), 523-540.
- Hofstede, G. H (1984). Culture's consequences: International differences in work-related values. Sage Publications, Inc.
- Hubbard, G., Samuel, D., Heap, S., Cocks, G. (2002). *The first XI: Winning organisations in Australia*. Milton: John Wiley & Sons Australia Ltd.
- Ireland, R. D., & Miller, C. C. (2004). Decision-making and firm success. *The Academy of Management Executive*, 18(4), 8-12.
- Ismail, H. S., & Sharifi, H. (2006). A balanced approach to building agile supply chains. *International Journal of Physical Distribution & Logistics Management*, 36(6), 431-444.
- Jacob, R., Madu, C.N. et al. (2004). An empirical assessment of the financial performance of Malcolm Baldrige Award winners. *International Journal of Quality & Reliability Management*, 21(8), 897-914.
- Javidan, M., Dorfman, P. W., De Luque, M. S., & House, R. J. (2006). In the Eye of the Beholder: Cross Cultural Lessons in Leadership from Project GLOBE. *Academy of Management Perspectives*, 20(1), 67-90.
- Jaworski, B. J., & Kohli, A. K. (1993). Market orientation: antecedents and consequences. *The Journal of marketing*, 53-70.
- Jayamaha, N., Grigg, N., & Mann, R. (2009). A study of the validity of three major business excellence models in the Asia Pacific region. *Total Quality Management*, 20(11), 1213-1227.
- Jenner, S. R. (1982). Analyzing cultural stereotypes in multinational business: United States and Australia. *Journal of Management Studies*, 19(3), 307-325.
- Johnson, M. D., Gustafsson, A., Andreassen, T. W., Lervik, L., & Cha, J. (2001). The evolution and future of national customer satisfaction index models. *Journal of economic Psychology*, 22(2), 217-245.
- Kamath, B., Klamath, V., Garg, A., & Prachi, P. (2013). TQM Implementation, Performance and Firm Profitability: A Causal Approach. *International Journal of Accounting and Business Management*, 1.
- Kanji, G. K. (1998). Measurement of business excellence. *Total Quality Management & Business Excellence*, 9(7), 633-643.

- Kanji, G. K., & Wong, A. (1999). Business excellence model for supply chain management. *Total Quality Management & Business Excellence*, 10(8), 1147-1168.
- Kanji, G. K. and W. Wallace (2000). Business excellence through customer satisfaction. *Total Quality Management & Business Excellence*, 11(7), 979-998.
- Kanji, G. K. (2002). Business excellence: make it happen. *Total Quality Management & Business Excellence*, 13(8), 1115-1124
- Kaplan, R. S., & Norton, D. P. (2006). Alignment: Using the balanced scorecard to create corporate synergies. Harvard Business Press.
- Karpin, D. (1995). Enterprising nation: renewing Australia's managers to meet the challenges of the Asia-Pacific century [Karpin report].
- Kaynak, H. (2003). The relationship between total quality management practices and their effects on firm performance. *Journal of Operations Management*, 21(4), 405-435.
- Khoo, H. H., & Tan, K. C. (2002). Using the Australian Business Excellence Framework to achieve sustainable business excellence. *Corporate Social Responsibility and Environmental Management*, 9(4), 196-205.
- Kirby, J. (2005). Toward a theory of high performance. *Harvard Business Review*, 83(7), 30.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Ed). New York: The Guilford Press.
- Kriauciunas, A., Parmigiani, A., & Rivera-Santos, M. (2011). Leaving our comfort zone: Integrating established practices with unique adaptations to conduct survey-based strategy research in nontraditional contexts. *Strategic management journal*, 32(9), 994-1010.
- Kroh, M. (2006). Taking 'don't knows' as valid responses: a multiple complete random imputation of missing data. *Quality and Quantity*, 40(2), 225-244.
- Kumar, A., & Motwani, J. (1995). A methodology for assessing time-based competitive advantage of manufacturing firms. *International Journal of Operations & Production Management*, 15(2), 36-53.
- Lam, S.-Y., Lee, V.-H., Ooi, K.-B., & Phusavat, K. (2012). A structural equation model of TQM, market orientation and service quality: evidence from a developing nation. *Managing Service Quality*, 22(3), 281-309.
- Lee, Y. M., & Yang, C. (2014). The relationships among network ties, organizational agility, and organizational performance: A study of the flat glass industry in Taiwan. *Journal of Management & Organization*, 20(2), 206-226.

- Lewis, M., Hornyak, R., Patnayakuni, R., & Rai, A. (2008). Business network agility for global demand-supply synchronization: a comparative case study in the apparel industry. *Journal of Global Information Technology Management*, 11(2), 5.
- Li, X., Chung, C., Goldsby, T. J., & Holsapple, C. W. (2008). A unified model of supply chain agility: the work-design perspective. *International Journal of Logistics Management*, 19(3), 408-435.
- Li, X., Goldsby, T. J., & Holsapple, C. W. (2009). Supply chain agility: scale development. *International Journal of Logistics Management*, 20(3), 408-424.
- Lin, C.-T., Chiu, H., & Chu, P.-Y. (2006). Agility index in the supply chain. *International Journal of Production Economics*, 100(2), 285-299.
- Liddell, W. W. (2005). Project GLOBE: A Large Scale Cross-Cultural Study of Leadership. *Problems & Perspectives in Management*, (3), 5-9.
- Malekifar, S., Taghizadeh, S. K., Rahman, S. A., & Khan, S. U. R. (2014). Organizational Culture, IT Competence, and Supply Chain Agility in Small and Medium-Size Enterprises. *Global Business and Organizational Excellence*, 33(6), 69-75.
- Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Byers, A. H. (2011). *Big data: The next frontier for innovation, competition, and productivity*.
- Mathiyakalan, S., Ashrafi, N., Zhang, W., Waage, F., Kuilboer, J., & Heimann, D. (2005). *Defining business agility: an exploratory study*. Paper presented at the Proceedings of the 16th Information Resources Management Conference, San Diego, CA.
- Mathrani, S. (2014). Using enterprise systems to enhance organizational agility. *Journal of Applied Computing and Information Technology*, 18(1).
- Meredith, S., & Francis, D. (2000). Journey towards agility: the agile wheel explored. *The TQM Magazine*, 12(2), 137-143.
- Mohammad, M., Mann, R., Grigg, N., & Wagner, J. P. (2011). Business Excellence Model: An overarching framework for managing and aligning multiple organisational improvement initiatives. *Total Quality Management & Business Excellence*, 22(11), 1213-1236.
- Monauni, M., & Foschiani, S. (2014). Agility Enablers in Manufacturing Systems- Contributions of the Production Network Perspective. In *Enabling Manufacturing Competitiveness and Economic Sustainability* (pp. 333-337). Springer International Publishing.
- Mondak, J. J., & Davis, B. C. (2001). Asked and answered: Knowledge levels when we will not take "don't know" for an answer. *Political Behavior*, 23(3), 199-224.
- Morgan, N. A. (2012). Marketing and business performance. *Journal of the Academy of Marketing Science*, 40(1), 102-119.

- Narasimhan, R., Swink, M., & Kim, S. W. (2006). Disentangling leanness and agility: an empirical investigation. *Journal of Operations Management*, 24(5), 440-457.
- Neal, P. (2004). X-Efficiency and Productivity Change in Australian Banking. *Australian Economic Papers*, 43(2), 174-191.
- Niendorf, B., & Beck, K. (2008). Good to Great, or Just Good? The Academy of Management Perspectives (formerly The Academy of Management Executive)(AMP), 22(4), 13-20.
- Niendorf, B., & Beck, K. (2008). Good to Great, or Just Good? *Academy of Management Perspectives*, 22(4), 13-20.
- Northcott, D., & Taulapapa, T. M. A. (2012). Using the balanced scorecard to manage performance in public sector organizations: Issues and challenges. *International Journal of Public Sector Management*, 25(3), 166-191.
- O'Neill, P., & Sohal, A. S. (1998). Business process reengineering: application and success-an Australian study. *International Journal of Operations and Production Management*, 18, 832-864.
- Olk, P., & Rosenzweig, P. (2009). The Halo Effect and the Challenge of Management Inquiry: A Dialog Between Phil Rosenzweig and Paul Olk. *Journal of Management Inquiry*.
- Olsson, U. (1979). Maximum likelihood estimation of the polychoric correlation coefficient. *Psychometrika*, 44(4), 443-460.
- Orr, S. (2010). Post global financial crisis international business strategies. *International review of business research papers*, 6(4), 324-336.
- Peters, T. J., & Waterman, R. H. (1982). In search of excellence: Lessons from America's best-run companies. Harper Paperbacks.
- Perry, C. (1998). A structured approach for presenting theses. *Australasian Marketing Journal (AMJ)*, 6(1), 63-85.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, 88(5), 879.
- Porras, J. I. and J. C. Collins (1994). *Built to last: Successful habits of visionary companies*. HarperBusiness.
- Porter, M. (1996). What's strategy. *Harvard Business Review*, 74(6), 61-78.
- Powell, T. C. (1995). Total quality management as competitive advantage: a review and empirical study. *Strategic management journal*, 16(1), 15-37.

- Power, D. J., Sohal, A. S., & Rahman, S.-U. (2001). Critical success factors in agile supply chain management-An empirical study. *International Journal of Physical Distribution & Logistics Management*, 31(4), 247-265.
- Rahman, S.-U., & Bullock, P. (2005). Soft TQM, hard TQM, and organisational performance relationships: an empirical investigation. *Omega*, 33(1), 73-83.
- Rahman, S., & Sohal, A. S. (2002). A review and classification of total quality management research in Australia and an agenda for future research. *International Journal of Quality & Reliability Management*, 19(1), 46-66.
- Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic management journal*, 25(1), 23-37.
- Rees, M. (2001). Is Australia another Anglo-American country?—a review of the Australian business cultural stereotype'.
Retrieved from: <http://marketing.byu.edu/htmlpages/ccrs/proceedings01/papers/rees.doc>.
- Reinartz, W., Krafft, M., & Hoyer, W. D. (2004). The customer relationship management process: its measurement and impact on performance. *Journal of marketing research*, 41(3), 293-305.
- Rigdon, E. E., Ringle, C. M., & Sarstedt, M. (2010). Structural modeling of heterogeneous data with partial least squares. *Review of marketing research*, 7, 255-296.
- Roberts, N., & Grover, V. (2012). Investigating firm's customer agility and firm performance: The importance of aligning sense and respond capabilities. *Journal of business research*, 65(5), 579-585.
- Rodriguez Cano, C., Carrillat, F. A., & Jaramillo, F. (2004). A meta-analysis of the relationship between market orientation and business performance: evidence from five continents. *International Journal of Research in Marketing*, 21(2), 179-200.
- Rosenzweig, P. (2007a). The halo effect, and other managerial delusions. *McKinsey Quarterly*, 1, 76.
- Rosenzweig, P. (2007b). Misunderstanding the nature of company performance: The halo effect and other business delusions. *California Management Review*, 49(4), 6.
- Rosenzweig, P. (2007). The HALO Effect. How Managers Let Themselves Be Deceived. London: Simon & Schuster UK Ltd.
- Russ-Eft, D., & Hoover, A. L. (2005). Experimental and quasi-experimental designs. *Research in organizations*, 75-96.

- Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS quarterly*, 237-263.
- Saunders, M., Mann, R. S., & Grigg, N. P. (2008). Utilisation of business excellence models: Australian and international experience. *The TQM Magazine*, 20(6), 651-663.
- Seidman, I. (2006). Interviewing As Qualitative Research: A Guide For Researchers In Education And The Social Sciences Author.
- Sharifi, H., & Zhang, Z. (1999). A methodology for achieving agility in manufacturing organisations: An introduction. *International Journal of Production Economics*, 62(1), 7-22.
- Sherehiy, B., Karwowski, W., & Layer, J. K. (2007). A review of enterprise agility: concepts, frameworks, and attributes. *International Journal of Industrial rgonomics*, 37(5), 445-460.
- Shoemaker, P. J., Eichholz, M., & Skewes, E. A. (2002). Item nonresponse: Distinguishing between don't know and refuse. *International Journal of Public Opinion Research*, 14(2), 193-201.
- Siggelkow, N. (2001). Change in the presence of fit: The rise, the fall, and the renaissance of Liz Claiborne. *Academy of Management Journal*, 44(4), 838-857.
- Sila, I., & Ebrahimpour, M. (2005). Critical linkages among TQM factors and business results. *International Journal of Operations and Production Management*, 25(11), 1123.
- Sirota, D., & Greenwood, J. M. (1971). Understand your overseas work force. *Harvard Business Review*, 49(1), 53-60.
- Škerlavaj, M., Štemberger, M. I., Škrinjar, R., & Dimovski, V. (2007). Organizational learning culture—the missing link between business process change and organizational performance. *International Journal of Production Economics*, 106(2), 346-367.
- Slater, S. F., & Atuahene-Gima, K. (2004). Conducting survey research in strategic management. *Research methodology in strategy and management*, 1, 227-249.
- Sull, D. (2009). Competing through organizational agility. *McKinsey Quarterly*, 1-9
- Swafford, P. M., Ghosh, S., & Murthy, N. (2008). Achieving supply chain agility through IT integration and flexibility. *International Journal of Production Economics*, 116(2), 288-297.
- Talwar, B. (2011). Business excellence models and the path ahead.... *The TQM Journal*, 23(1), 21-35.

- Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M., & Lauro, C. (2005). PLS path modeling. *Computational statistics & data analysis*, 48(1), 159-205.
- Thorndike, E. L. (1920). A constant error in psychological ratings. *Journal of applied psychology* 4(1): 25-29.
- Tripe, D. (1998). *Cost to income ratios in Australasian banking*. Department of Finance, Banking and Property, College of Business, Massey University.
- Vinodh, S., Aravindraj, S., Pushkar, B., & Kishore, S. (2012). Estimation of reliability and validity of agility constructs using structural equation modelling. *International Journal of Production Research*, 50(23), 6737-6745.
- Wang, H. (1997). Treatment of “don't-know” responses in contingent valuation surveys: a random valuation model. *Journal of Environmental Economics and Management*, 32(2), 219-232.
- Wayhan, V. B., McCallum, M. F., & Golyer, N. M. (2013). TQM and financial performance: are findings of direct effects methodological artefacts? *Total Quality Management & Business Excellence*, 24(1-2), 171-187.
- Williams, P., & Naumann, E. (2011). Customer satisfaction and business performance: a firm-level analysis. *Journal of services marketing*, 25(1), 20-32.
- Wetzels, M., Odekerken-Schroder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *Management Information Systems Quarterly*, 33(1), 11.
- Wilson, D. D., & Collier, D. A. (2000). An empirical investigation of the Malcolm Baldrige National Quality Award causal model. *Decision Sciences*, 31(2), 361-383.
- Yang, C., & Liu, H.-M. (2012). Boosting firm performance via enterprise agility and network structure. *Management Decision*, 50(6), 1022-1044.
- Yunis, M., Jung, J., & Chen, S. (2013). TQM, strategy, and performance: a firm-level analysis. *International Journal of Quality & Reliability Management*, 30(6), 690-714.
- Yusuf, Y. Y., Sarhadi, M., & Gunasekaran, A. (1999). Agile manufacturing: The drivers, concepts and attributes. *International Journal of Production Economics*, 62(1), 33-43.
- Zhang, D. Z. (2011). Towards theory building in agile manufacturing strategies—Case studies of an agility taxonomy. *International Journal of Production Economics*, 131(1), 303-312.
- Zelbst, P. J., Green Jr, K. W., Abshire, R. D., & Sower, V. E. (2010). Relationships among market orientation, JIT, TQM, and agility. *Industrial Management & Data Systems*, 110(5), 637-658.

Websites:

<http://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/Financial-Institutions-Performance-Survey/Major-Banks/Documents/major-australian-banks-half-year-2012v2.pdf>

<http://www.chemlink.com.au/chemecon.htm>

<http://www.pacia.org.au/reports/annualreports>

<http://www.rba.gov.au/publications/bulletin/2010/sep/1.html>

http://www.budget.gov.au/2008-09/content/myefo/html/part_2.htm

<http://dfat.gov.au/fta/chafta/>

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/1321.0>

<http://www.iview.com.au/accreditations.aspx>

<http://www.efqm.org/efqm-model/fundamental-concepts>

<http://www.efqm.org/efqm-model/model-criteria>

<http://www.nist.gov/baldrige/about/index.cfm>

<http://theconversation.com/bank-profits-grow-and-so-does-the-criticism-whos-right-19875>

[http://www.industry.gov.au/industry/Office-of-the-Chief-](http://www.industry.gov.au/industry/Office-of-the-Chief-Economist/Publications/Documents/Australian-Industry-Report.pdf)

[Economist/Publications/Documents/Australian-Industry-Report.pdf](http://www.industry.gov.au/industry/Office-of-the-Chief-Economist/Publications/Documents/Australian-Industry-Report.pdf)