

THE UNIVERSITY OF HULL

Supply Chain Risk Management: Harnessing organisational culture to
optimise the management of risks along the supply chain

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by

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Abstract

Disruptions to supply chains, whether they are natural, accidental or intentional, are increasingly distorting supply chain performance. Given that such disruptions are unlikely to decrease in the short term, supply chain risk mitigating solutions will play an increasingly significant role in the management of supply chains.

The research acknowledges the existence of a wide range of approaches to mitigate risks across supply chains, yet argues that most approaches are not sustainable or effective if they are not supported by the culture of an organisation.

Whilst the areas of supply chain risk, risk mitigating strategies and organisational culture as topics, have been researched in great levels of depth, it has been identified that the relationship between all three areas and particularly the relationship between organisational culture and supply chain risk management has been largely ignored.

The research argues that the culture of an organisation can be harnessed strategically to enhance the effectiveness of risk management along the supply chain. As part of such approach, businesses need to create an environment in which supply chain risk management is a core facet of business activities and thus the mitigation of risks is more likely to develop naturally.

The thesis investigates the relationship between different organisational culture types and supply chain risk management, developing theoretical assertions, which outline how different organisational cultures can be harnessed to effectuate a change in supply chain risk management efficiency.

In pursuit of meeting the requirements of the research questions, four leading international organisations with different organisational cultures were researched. Data was collected by way of conducting semi-structured interviews,

researcher observation, as well as additional documentation in various forms was collected. Interviews were transcribed and evaluated in conjunction with additional data that was collected during site visits and triangulated by means of researcher observation.

The thesis clearly identifies strong relationships between different organisational cultures and organisational approaches to risk management in the supply chain. Moreover, the research uncovers that some types of organisational cultures are more conducive to managing risks in the supply chain than others. Based on this, the study provides a detailed overview of how traits from different organisational cultures can be harnessed to effectuate a change in an organisation's approach to risk and risk management in the supply chain.

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1.0 Introduction

1.1 Research background

In February 2007, the UK experienced heavy snowfalls, disrupting air traffic, the rail network as well as roads for a number of days, costing the UK economy and estimated £400million (Metro, 2007), whilst in 2010 the UK economy suffered an estimated £6bn loss in revenues for the same reasons (Inman, 2010). Meanwhile, in Germany and across Europe, airports gradually ran out of de-icing fluid, rendering staff unable to de-ice planes, escalating the number of grounded passengers and freight.

Four years later, in 2011 the world witnessed severe earthquakes and a tsunami in Japan and New Zealand, which directly affected 121 organisations of a sample of 550, headquartered in 18 countries, operating in 12 different industry sectors (Business Continuity Institute, 2011).

During the same year parts of Sony's UK supply chain were disrupted significantly when one of the companies' major distribution centres was looted in August 2011 as part of riots throughout the UK. During that period, UK retailers claim to have lost a minimum of 7,500 hours of trading time, whilst 11,000 members of staff were affected by violent acts (Anonymous, 2011), having extensive impacts on supply chain networks backing these retailers.

In 2013, the developed world was shocked when the cold reality of supply chain complexity surfaced as a result of 1130 garment workers losing their lives in the Rana Plaza disaster (Aston, 2013), affecting supply chains and retailers globally. One year later, a different supply chain related glitch resulted in Porsche having to recall all 785 "911 GT3" models after discovering a faulty subcomponent could lead to vehicles catching fire during use (Woodall & Brown, 2014).

Adding a further dimension to the physical risks, the 2013 Small Business Technology Survey revealed that 94% of small business owners in the United States are worried about cyber attacks along their supply chains (Zimmerman, 2013). Recognising this, the U.S. Government has made cyber risk mitigation a priority, responding to an array of attacks on the CIA's main computer, as well as other governments internationally (Harness, 2014).

Following an extensive survey by the Business Continuity Institute, published in 2011, 85% of the 550 organisations from over 60 countries have experienced at least one disruption in 2010, whilst 40% of these disruptions originated from suppliers beyond tier one (Business Continuity Institute, 2011). Amongst the sample, the disruptions led to a loss in productivity in just under 50% of the participating organisations, whilst 32% of the organisations lost revenue due to supply chain disruptions (Business Continuity Institute, 2011).

The survey was repeated in 2013 revealing that 75% of a sample of 500 companies experienced at least one supply chain disruption in 2012, with 42% of failures emanating from partners beyond tier one (Business Continuity Institute, 2013).

The underlying reality is that disruptions to businesses and therefore supply chain networks are on the increase (Forbes, 2013). Even though not all incidents are directly relevant to all organisations at the same time, their connectedness through their supply chain network raises the relevance and potential of disruptions through partners. Thus, whilst the number of incidents is gradually and steadily increasing, the impact of incidents is also becoming more relevant to firms even though they may not be directly impacted.

Given the changing nature of the operating environments of supply chains, it is fair to deduce that supply chain risks are becoming increasingly relevant and topical for organisations. Thus, in the pursuit of customer satisfaction and commercial competitiveness, organisations and supply chains will be drawn to

increasingly invest in managing risks and potential disruptions within their supply chain networks (Jüttner, 2005).

Research in this area clearly shows that the immediate aim of such investments is generally targeted at the development of strategies and techniques to enable the identification, impact forecasting, mitigation and preparation for supply chain risks (Hallikas et al., 2004; Tuncel & Alpan, 2010; Khan & Zsidisin, 2012). Often these solutions include approaches such as six sigma, FMECA matrixes, question positioning approaches and many others such as the formation of dedicated industry groups, the institutionalising of risk assessment processes or the increasing proliferation of risk identification platforms (Culp, 2013).

Applied correctly, these implicate great opportunities in synchronising and improving processes, mitigating against disruptions, and mapping potential risks for example. However, often a key component of the success of the application of these initiatives is continuity and the consistency at which these procedural solutions are applied. For most organisations this is where the challenge really lies - the human variable.

Whilst many of the procedural solutions can be bought in or implemented by professionals from consultancies on behalf of an organisation, the continuous application and improvement of these solutions can only be delivered by the organisations' own population. Thus the tricky part resides in the continuous motivation of staff, the training and the generation of a culture that is conducive to these organisational needs. Moreover, organisations often strive to become highly competent at risk management by installing new systems, bringing in consultants and so on, whilst the organisation's own staff often lack the intuitiveness, knowledge and autonomy to deal with risks as they arise.

In awe of this, Lord Levene made a determinative statement pointing out:

“Companies need to recognise that the risk environment has changed and that they cannot rely on century management techniques to solve century problems.”

Lord Levene (2004, as cited in Zurich, 2009)

Based on the emerging reality that the game for executing successful supply chains is changing, exacting more flexibility and innovative solutions from supply chains, whilst the more common approaches to pursue this are fading in effectiveness, it is suggested that the missing piece is organisational culture.

It is argued that if organisations as part of supply chain networks aim to remain sustainable and competitive in the increasingly turbulent markets of the coming decades, they need to fundamentally rethink the way they organise and motivate themselves and their partners in order to enable their supply chains to become more resilient.

1.2 Motivation and inspiration

The decision to embark on a PhD journey was made after working in the capacity of a Research Associate to the Logistics Institute and the Centre for Adaptive Science and Sustainability at the University of Hull.

Within this capacity, the author has witnessed the increasing levels of risks along supply chains and the resultant need and interest for organisations to manage these more effectively as highlighted in section 1.1. Recognising that existing methods to mitigate risks in the supply chain proved non-optimal, the author was compelled to develop research in this area.

Furthermore, the author has developed a natural attention for supply chains and business generally, growing up in an entrepreneurial household, throughout developing a keen interest in the theoretical aspects of managing supply chains.

Moreover, having been educated about aspects of supply chain risk management by way of completing a Master's degree in Logistics and Supply Chain Management, as well as having experienced the effects of disruptions in supply chains first hand, the author developed an innate understanding of the immense importance and popularity of this field within industry.

Combining the educational background with the personal interests in supply chains and the management of risks therein, the author was compelled to specialise in this field and to contribute to knowledge in this area.

With this motivation as a background, the author undertook a detailed and thorough review of the literature, identifying not only an under researched area but also a potentially of the relationship between an organisation's culture and the inherent approach to managing risks along supply chains, providing a differentiated modality to managing supply chain risks.

Beyond this, the author anticipates to build a career in the area of supply chain risk management, recognising that a PhD not only amplifies his professional credibility within this field, but also is a key stepping stone in his personal development.

1.3 Research objectives

The objectives of the research have been refined over the course of the research period and are stated below:

1. To provide an overview of the relationship between organisational culture and supply chain risk management.
2. To develop a strategic framework and a set of guidelines that aid business to understand how organisational culture can be employed to effectuate desired levels of supply chain risk management more naturally in companies.
3. To enable a different perspective on supply chain risk management strategies for the future.

In line with the objectives of the research, the thesis focuses on the development of alternative methods and perspectives to enhance the effectiveness of managing risks along supply chains. More specifically, it researches individual case companies in detail, to deduce how an organisation's culture impacts on the approach to and the behaviour of managing risks along a company's supply chain or supply chains. Thus the study focuses on the actions of four organisations to deal with risks in the supply chain(s) and their organisational culture, seeking relationships between organisational cultures and supply chain risk management approaches. Based on this, recommendations are made to outline how organisational cultures can be employed to effectuate a change in the effectiveness of managing risks along supply chains.

1.4 Structure of the thesis

This section is dedicated to outlining the structure of the thesis.

1.4.1 Chapter 2.0: Literature review

The literature review is divided into six key sections. These form the building blocks of the research area and are closely linked to each other by the route the whole of the chapter takes through the relevant fields.

To begin with, section 2.1 reviews the nature of the changes, supply chains have experienced over the last decades. In particular it examines the differences between traditional and modern supply chains. As part of this it is outlined how changes in the market place have impacted upon the operating environments of supply chains and how, as a result of this, supply chains have changed over time.

Following this background, the review proceeds to outline the risks supply chains face in today's markets and considers how not only the changing market environment poses risks for supply chains, but also how those actions taken by supply chains and companies imply further risks for the supply chain. A key focus in section 2.2 revolves around supply chain complexity, which is regarded as pivotal in discussing supply chain risk management in the twenty first century.

Having critically discussed risk in supply chains including the sources of risks in section 2.2, section 2.3 focuses on the management of risks in the supply chain. This section concentrates on the objectives driving supply chain risk management as well as it outlines models, tools and techniques, which have been developed to mitigate risks in supply chains. Moreover, this chapter also discusses prevalent barriers organisations face when dealing with risks along the supply chain. This section connects all previous sections by outlining that many of those issues faced by supply chains today, are resultant from those ideologies of operating supply chains in the past. Furthermore, it outlines how

the traditional ways of running supply chains are not fit for purpose in today's volatile markets.

Section 2.3, with the arguments therein, steers firmly to the concept of resilience and why it is becoming increasingly important for supply chains to become more resilient. Thus section 2.4 examines the concept of resilience, provides reasons for its growing importance and outlines how those traditional ideologies of running supply chains explained in previous sections present significant barriers to achieving resilience in modern supply chains.

Following this, section 2.5 deduces that for supply chain risk management to be efficient and effective, it needs to form a part of the very nature of how organisations and supply chains are governed. Pursuing this inference further, recognising that traditional ways of operating supply chains in modern markets are insufficient, the literature review focuses on organisational culture as a vehicle to managing risks in supply chains more effectively.

Following sections 2.1 to 2.5, a conclusion summarises the findings from the literature review and outlines existing gaps therein. Based on these, research questions have been developed to address them. The research questions are presented along with justifications for each of them in section 2.8.

Following each sub-section of the literature review, bullet points are presented summarising the key findings from each of the parts. Below these summary bullet points, a further list of bullet points is presented, cumulatively reflecting the formation of the research idea.

1.4.2 Chapter 3.0 Methodology

This chapter is dedicated to the identification of suitable methods and methodologies for the research. As part of the discussion and identification of the most appropriate research process, the epistemological, ontological and axiological stance of the research are explained and justified in detail. Selecting

the appropriate methodology is key to undertaking and delivering valuable research. As a result, this chapter discusses every detail considered when the research study was designed, from its ontological stance to the data collection and analysis methods.

From a range of possibilities, ontologically the research takes a constructivist stance in combination with an interpretivist research approach. Given the objectives of the study, the research logic is inductive, employing a case study method. As part of this, semi-structured interviews were carried out and triangulated with additional company documents that were collected as well as researcher observations.

In total, four organisations were selected for interviews following an information-based sampling approach, selecting key cases. All interviews followed an interview protocol where the point of theoretical saturation determined the number of interviews.

Interviews were transcribed shortly after recordings were made and analysed in due course. Interviewees were selected together with a contact person at each case company, using a combination of purposive and snowball sampling techniques. The collected data was analysed using a wide range of techniques from coding and constant comparison to pattern matching.

First, cases were analysed on a case-by-case basis followed by a cross-case analysis. The findings are presented in a combination of diagrams, summary tables, theory models, as well as descriptive text.

1.4.3 Chapter 4.0 Description of the cases in context

Following the methodology, chapter 4.0 provides a contextual overview of the different case studies that have been selected for the research.

In addition to providing vital background information to each of the cases in terms of the company history, growth anticipation and the supply chain setup, chapter 4.0 also details justifications for the selection of the companies on a case-by-case basis.

1.4.4 Chapter 5.0 Individual case analyses

Chapter 5.0 features the detailed analysis of each case company on a case-by-case basis.

To start with, each case analysis provides an overview of the interview background, followed by the following sections:

- Risk background,
- Risk management staff,
- Risk management in the supply chain,
- Organisational culture,
- Linking supply chain risk management and organisational culture,
- A case summary.

Following a consistent approach to analysing the data from all cases and presenting the findings in a similar fashion, amplifies the ability to compare and contrast findings. Moreover, the order of the different sections of chapter 5.0 generates a logical flow of data within each case, making the identification of a link between supply chain risk management and organisational culture more recognisable.

The sections of the individual case analyses are synchronised across all cases and are aligned with the sections of the interview protocol.

1.4.5 Chapter 6.0 Cross-case analysis

Following the analysis of data on a case-by-case basis, chapter 6.0 provides an analysis of all cases together.

This chapter compares and contrasts the findings from the different cases by critically discussing these. In synchronisation with the previous chapter and the interview protocol, this chapter follows the below order:

- Interview background,
- Risk background,
- Risk management staff,
- Risk management in the supply chain,
- Organisational culture,
- Linking supply chain risk management and organisational culture,
- Cross-case analysis summary.

The rigorous comparison of the findings in this chapter, draws out key insights into the relationship between organisational culture and risk management in the supply chain, and provides clues about the influence an organisation's culture has on supply chain risk management, how different supply chain environments influence organisational cultures as well as it generates understandings of how organisational cultures may be harnessed to support supply chain risk management.

1.4.6 Chapter 7.0 Theory development

Following the analysis of cases individually as well as collectively in the cross-case analysis, chapter 7.0 presents the novel empirical contributions of this research.

More specifically, chapter 7.0 presents the novel contributions by way of highlighting their relevance to theory, practice or both.

1.4.7 Chapter 8.0 Discussion and response to research questions

Based on the findings from the data analyses generally and specifically the novel contributions developed in chapter 7.0, chapter 8.0 directly responds to the research questions of the thesis. Harnessing key findings from each of the

analyses sections, it delineates answers to the research questions and compares the key findings of the research with relevant literature from chapter 2.0.

Following the direct response to the different research questions in the context of existing literature, the chapter outlines the implications of the findings for theory as well as practice.

1.4.8 Chapter 9.0 Conclusions

Chapter 9.0 concludes the study and summarises the thesis's key contributions. More specifically, the chapter highlights general contributions made by the study, the contributions to theory as well as the contributions to practice. This includes a strategic framework along with a set of guidelines practitioners may employ to effectuate a change in an organisation's approach to managing risks in the supply chain.

In addition to this, the chapter also reflects on the research objectives as well as it provides a discussion of the limitations of the research. Furthermore, this chapter also delineates directions for future research in this field.

1.5 Introduction summary

Having provided a background to the research along with the motivations and inspirations, the research objectives as well as having provided an overview of the different chapters featured in this thesis, the following chapter presents the review of the literature.

2.0 Literature review

This chapter is designated to providing an overview of the status quo of literature in the field, as well as it highlights the gaps therein, allowing for the formulation of research questions. The review of the literature comprises of six key areas, which are critical to the research.

Beginning with the changing nature of supply chains, it identifies different risks in supply chains, discusses current models of risk management, the need for supply chain resilience, organisational culture and introduces the concept of designing resilience into supply chains. By way of this, the review explores the potential links between organisational culture and supply chain risk management.

The chapter concludes by formulating research questions designed to fill the gaps within existing literature.

2.0.1 Methodology for reviewing the literature

With the review of management and organisational studies, being particularly challenging due to the trans-disciplinary (Tranfield et al., 2003), fragmented nature of the field (Whitley, 1984), careful consideration of the approach to the literature review needed to be afforded.

In recognition of this and the immense volume of information in the respective fields, it was imperative to apply a rigorous, systematic approach to reviewing the material. In pursuit of providing a scientifically sound approximation of the state of play in organisational culture and supply chain risk management, it was decided to design and perform a replicable and transparent review of the literature, minimising researcher bias (NHS Centre for reviews and Dissemination, 2001).

Where the value of traditional literature reviews lies in that these are generated by experts with detailed knowledge of the issues in a field, traditional reviews

are often unbalanced in their selection of discussion material. Moreover, the past 20 years have witnessed an explosion in the publication of research as well as the sources available to researchers. Hence, the risk of failing to recognise important work in associated areas is amplified (Denyer & Tranfield, 2006). Owing to this, one of the difficulties in performing a rigorous and scientifically valuable literature review in the traditional way, is finding an unbiased balance of relevant and reliable information, rather than a partial view of a particular research issue.

With the aim of producing a comprehensive, objective, as well as reliable authoritative summary about the research topic- rather than a partial assessment of a comprehensive sample of the authors' favoured studies, a systematic approach to the review has been performed to present a scientific summary of the evidence (NHS Centre for reviews and Dissemination, 2001; Petticrew & Roberts, 2006) (figure 2.1).

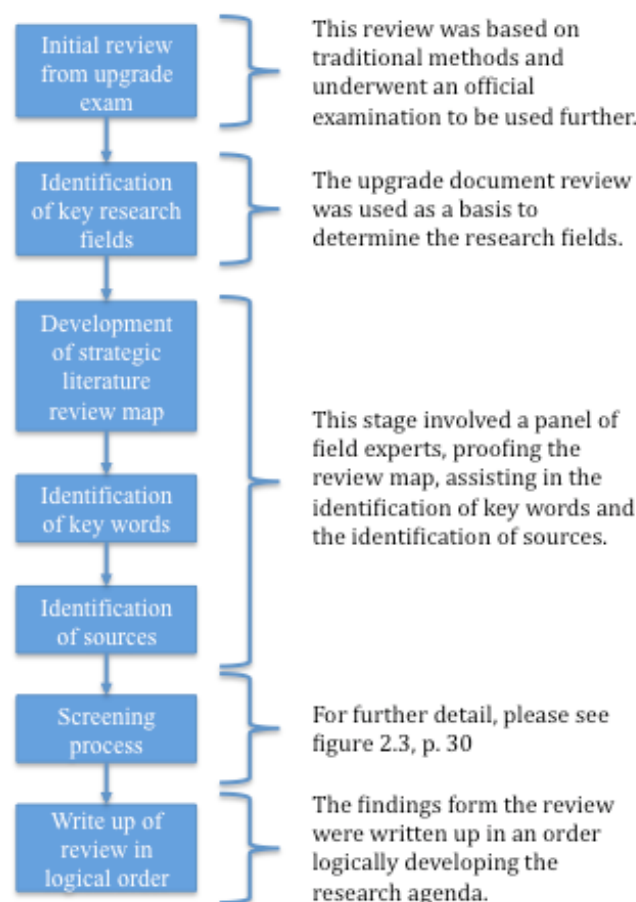


Figure 2.1 Systematic approach to reviewing the literature

Expanding on figure 2.1, the literature review process was based on a traditional approach to reviewing the literature. This unstructured review was undertaken to identify a research area, as well as to demonstrate the value of research in the chosen field of research. Moreover, it was important to undertake such a review to build a mind map of the field of research as is explained later in this section. The unstructured review was examined and passed by senior faculty of the University of Hull during an examination.

Following this process, the research fields comprising organisational culture, supply chain management and supply chain risk management, were approved and formed the basis of the systematic review of the literature that was to follow. These fields were chosen as the overlap of all three areas had been identified not to have been researched in any depth.

Thus, based on the approved review, the areas of organisational culture, supply chain management and supply chain risk management were selected as key components of the research.

Thematically, the thesis (area 4) is positioned between the research fields of organisational culture, supply chain management as well as supply chain risk management as outlined by figure 2.2 below.

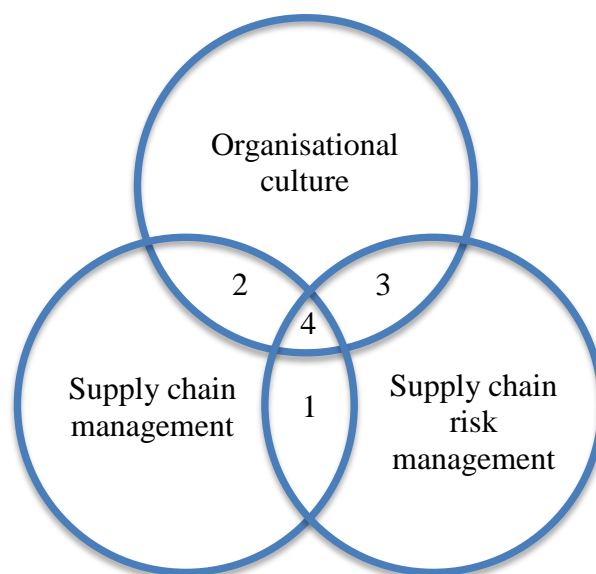


Figure 2.2 The scope of the research

At this stage, a panel of three purposely-selected experts was brought together to identify key words, relevant to the research questions and building blocks of the literature review (as depicted in figure 2.1). Experts were identified by their expertise within the field and contacted by email and invited to the university for half a day of discussions on the research topic.

Experts from the panel included an Emeritus Professor from Cranfield University who is recognised globally for his thought leadership in supply chain management, logistics and organisational performance, a global expert and a senior lecturer in supply chain risk management, both of whom are academics as well as have extremely high levels of involvement with international, leading companies, regularly delivering keynotes to industry globally. The third expert was a lecturer specialised in operations management and risk management, with an industrial working background.

Following the generation of a map of the systematic review (Petticrew & Roberts 2006; Greenhalgh et al., 2004)(appendix 1) together with the experts, key words or search terms were selected to target relevant material in the different areas, later forming the structure of the literature review. Key words (appendix 1), were identified per research area, which based on the experience of the experts, would yield the most relevant information and documents.

Subsequently to the development of a map for the systematic review (Greenhalgh et al., 2004) and the identification of key search terms for the review (Petticrew & Roberts, 2006), the expertise of the experts was harnessed to nominate the most relevant sources for material for the review (Morgan, 2006). These sources comprised of a mixture of academic journals, non-peer reviewed journals, conference papers, leading consultancy publications, websites, electronic databases and prominent textbooks (appendix 1) (Morgan, 2006). In addition to this, cross-referencing was also applied where relevant.¹

¹ For a map of the strategic literature review, a list of keywords, as well as the sources considered (excluding cross-referenced sources), please refer to appendix 1.

After hand searching all identified literature, going back 10 years (one third of the age of supply chain management as a concept), electronic databases were used to identify further, relevant material. Upon completion of the initial collection of relevant information (based on titles and abstracts), all material was read in detail and duplications, as well as irrelevant material was excluded (Petticrew & Roberts, 2006).

The search of electronic sources, including databases (following the approach as detailed in appendix 1), produced the below pool of electronically available material:

Table 2.1, Summary of electronic sources used

Source	Number of relevant papers	Years
Accenture reports	4	2009, 2011, 2012
Business Continuity Institute	1	2011
California Management Review	4	2003, 2005
Cranfield School of Management report	1	2003
Deloitte	1	2013
Group and Organization management	3	2007
Harvard Business Review	27	2003, 2006, 2008, 2009, 2011-2013
Human Relations	13	2001, 2003, 2004, 2008-2010
IBM Global Business Services	2	2008, 2009
International Journal of Physical Distribution & Logistics Management	30	2004, 2005, 2008-2012
International Journal of Logistics Management	23	2004-2010, 2012
International Journal of Logistics – Research and Applications	12	2003, 2006, 2010, 2012
International Journal of Operations and Production Management	8	2006, 2007, 2011
International Journal of Production Economics	25	2004, 2006-2012
International Journal of Production Research	5	2010, 2011
Journal of Business Logistics	12	2008-2012

Journal of Operations Management	29	2003, 2004, 2006, 2007, 2009, 2010, 2011
KPMG	2	2011, 2012
Leadership Quarterly	2	2004
Marsh	2	2012, 2013
MIT Centre for Transportation and Logistics	2	2012, 2013
MIT Sloan Management Review	17	2004-2010
Organization Science	27	2003-2009, 2011, 2012
Organization Studies	8	2009, 2011
Production & Operations Management	16	2005-2007, 2009, 2011, 2013
Production Planning and Control	4	2008, 2009
Roland Berger Strategy Consulting	1	2012
SASCOM Magazine	1	2007
Supply Chain Management: An International Journal	19	2003, 2004, 2006, 2008, 2011, 2012, 2013
The Economist	1	2009
The Leadership & Organization Development Journal	4	2004, 2007
World Economic Forum	2	2012
Zurich Municipal	6	2009- 2012

Following the gathering of the electronic documents from the identified sources based on the key words, these were complimented by paper-based material from the library including academic textbooks, books targeted at professionals, conference material and so forth (Morgan, 2006), also approved by experts. The final pool of relevant information comprised of around 370 different documents, which were reviewed in detail.

Cross-referencing was undertaken and additional relevant material was added to the pool of these documents after having been screened for relevance and duplication. Once a pool of pertinent information had been identified, all material was read again, highlighting relevant passages. These were eventually worded into the relevant sections of the literature review, following an order reflecting the logical development of the research gap (figure 2.3).

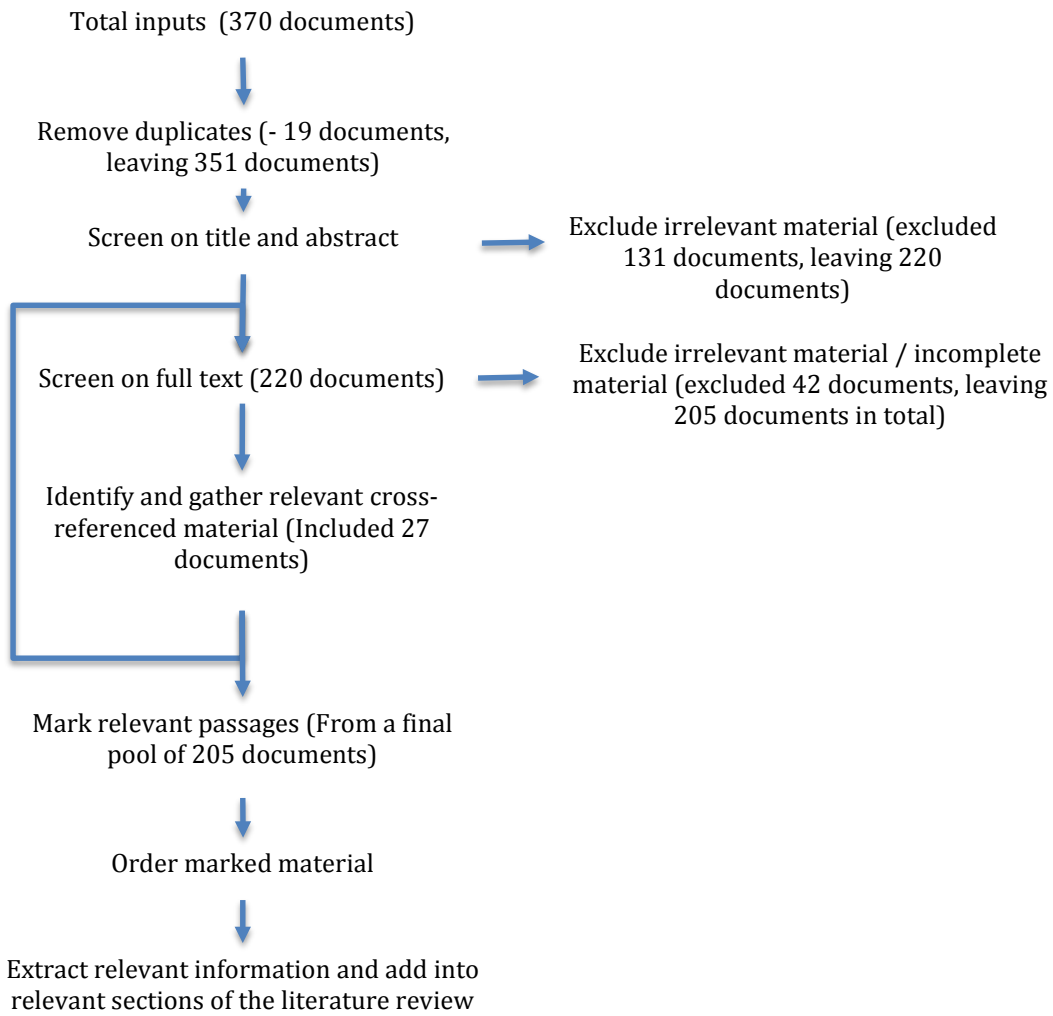


Figure 2.3 Screening process for the systematic review of the literature

Whilst the scope was largely defined by detailed upfront research in a traditional fashion, research gaps were identified systematically through generating detailed notes on the connection between different concepts, highlighting areas, which the literature did not cover in any detail (Petticrew & Roberts, 2006). Based on these gaps, research questions were formulated to specifically target these areas, seeking the development of knowledge within these (Morgan, 2006).

Owing to the thematic positioning of the research (figure 2.2), the literature review thematically analyses the literature covering its content in a logical order as depicted in table 2.2

Table 2.2 Overview of thematic analysis and structure of literature review

Research area	Indicative content covered
Supply chain management	<p>Supply chains are changing</p> <ul style="list-style-type: none"> • Supply chains of the past • Today's Supply Chains <p>Risk in supply chains</p> <ul style="list-style-type: none"> • The concept of risk • The different risks • Supply chain complexity: The source of many risks
Supply chain risk management	<p>The management of risks in supply chains</p> <ul style="list-style-type: none"> • Supply chain risk management • Existing models to manage risks in the supply chain • Tools and techniques to manage risks in the supply chain • Barriers to managing risks in the supply chain <p>Supply chain resilience</p> <ul style="list-style-type: none"> • Supply chain resilience a background • The increasing importance of resilience
Organisational culture	<p>Organisational culture a background</p> <ul style="list-style-type: none"> • The relevance of organisational culture • Organisational culture and the supply chain • Different models to evaluate organisational culture <p>Designing resilience into supply chains</p> <ul style="list-style-type: none"> • The need for natural and intuitive resilience

2.1 Supply chains are changing

2.1.1 Supply chains of the past

In order to understand the complexities and risks that today's supply chains face, it is necessary to consider the nature of the supply chains of the past. This is, as a significant volume of issues in today's supply chains arises, through applying the criteria and rules that have been developed in the past, to modern supply chains.

In the past, supply chains were characterised by long periods of relative stability (Christopher & Holweg, 2011), low levels of customer power and supply chains, compared to those of today, were shorter and thus more 'manageable'. With this as a backdrop, measures of success of supply chains revolved around the generation of value for consumers whilst increasing the margins for all links in the supply chain (Wyssocki, 2000).

As a result of such relative stability and limited forces redirecting the focus of supply chains, supply chain executives increasingly began to concentrate on raising efficiency by cutting costs from their operations, establishing control to reduce variability, reducing inventory and to compete increasingly on cost (Christopher & Holweg, 2011). For many years this approach worked very well and companies as part of supply chains profited significantly from this approach.

Increasingly, supply chains extended globally and benefited from cheaper labour and raw material offerings, more profitable financing opportunities, new product markets, as well as in many cases inducements offered by host governments to attract foreign capital (AlHashim, 1980, Kogut & Kulatilaka, 1994).

According to Kern et al., (2012), strategies such as outsourcing, the reduction of inventory, just-in-time concepts and increasing firm cooperation generated very lean supply chains, which, in an environment of relative stability enabled the most cost-effective operating models, maximising economic benefits for partners.

In support of this, Tang (2006) argues that while environments were characterised by stability, supply chains aimed to improve financial performance by increasing revenues (more products launched more often), reducing cost (reducing the supply base, just-in-time inventory) and by minimizing assets for example.

Over the years, as supply chains became more and more efficient, the market environment also began to change. Markets began to be characterised by growing customer power (so much so that today, they actively influence supply chains) (Griffiths et al., 2000), disruptions to the delivery of value to customers, volatility of governments, exchange rate fluctuations and changes in global markets to name a few (Chopra & Sodhi, 2004).

2.1.2 Today's supply chains

As supply chains have increasingly become global through driving cost reduction opportunities around the world, the extension of supply chains has collaterally induced the exposure to vulnerabilities presented by operating in different markets, and those, associated with high levels of interdependency of companies for example (Yip, 1989).

Furthermore, literature clearly outlines that modern supply chains are increasingly characterised by crises and shocks. For example, Christopher and Holweg (2011) enunciate that even before the global financial crisis of 2008, supply chains were increasingly being disrupted due to changes in oil prices, fluctuations in the Baltic Dry Index, natural disasters and many others. These incidents of course did not occur for the first time, however, due to the emerging linkages between supply chains and thus countries, many more risks became more relevant to a larger group of organisations (Harland et al., 2003).

Following the same school of thought, Tang (2006) outlines that the world is becoming increasingly uncertain and vulnerable. In explanation the author outlines that the past decade has been party to terrorist attacks, wars,

earthquakes, economic crises, devaluation of currencies and cyber attacks (Tang, 2006) and so on, all of which invariably have an impact on supply chains.

Further, the author contends that optimisation initiatives of supply chain executives in the past, have created longer and more complex supply chains, which have exposed these to become more vulnerable to disruptions (Tang, 2006). From a cost point of view, Barry (2004) denotes:

“An enterprise may have lowest over-all costs in a stable world environment, but may also have the highest level of risk – if any one of the multiple gating factors kink up an elongated global supply chain!” (Barry, 2004, p. 695)

Following on from this, Lee (2004) enunciates, that the efficiency of past supply chains implies a hidden cost, should a disruption occur. This is as the lean nature of supply chains governed by cost optimisation, offers a limited ability to react to disruptions, which in many cases renders supply chains unable to recover (Tang, 2006).

Taking this further, Kleindorfer and Saad (2005) argue that the optimisation strategies of the past can amplify the fragility of modern supply chains. Similarly, Kern et al., (2012) argue that any significant disruption to a supply chain, irrespective of its nature, may result in the collapse of the chain as a whole.

Evidence for this is plentiful and is reflected in the cases of Ericssons' mobile phone business which was disrupted in May 2000 and consequently stopped the production of mobile phones, or Ford having to close five production plants for several days after air traffic was suspended following 9/11 (Tang, 2006), to name a few.

Of course it would be flawed to assume that all current and future disruptions are the product of those supply chain optimisation decisions made in the past. However, literature suggests that many of those decisions taken to optimise

supply chains during the past decades expose today's supply chains to the risk of disruption (Christopher & Peck, 2004).

Moreover, given the fact that supply chain executives and managers have been trained and educated to optimise supply chains by cutting cost, improving margins and transforming supply chains to become increasingly lean (Christopher & Towill, 2001), has meant that today's decisions about supply chain strategies are often made following principles which, given the nature of modern supply chains, are out of date (Christopher & Holweg, 2011).

Reviewing existing literature, it has become evident that modern supply chains are highly complex networks. These comprise of collaborating and competing organisations globally, which are often inextricably linked (Baird et al., 2011). This relationship, implies that risks are not exclusive to individual organisations but are relevant to the supply chain network as a whole, even though solutions to managing these risks may vary between organisations of the same supply chain.

Furthering this argument, Barry (2004) outlines the increasing vulnerability of supply chains on one hand and an elevated level of complexity in the modern business world on the other. According to the author, this disrupts supply chains not only more often, but with a much more significant impact on business continuity (Barry, 2004). In support of this, Manuj and Mentzer (2008), as well as Wagner and Bode (2008) enunciate that global organisations face increasingly unstable operating environments across markets. In fact, Zhang et al., (2010) claim that supply chain disruptions with varying intensity occur almost daily, impacting even the most prepared organisations.

Owing to literature, the risk profile of supply chains is changing significantly. So much so that traditional standards of governing supply chains are often ineffective in managing risks faced by modern supply chains (Christopher & Holweg, 2011). Prior to reviewing existing methods to manage risks in the

supply chain, it is necessary to examine risks in the supply chain, to provide a basis for further review.

The next stage of this literature review is dedicated to examining the concept of risk, identifying different supply chain risks, as well as it introduces the concept of supply chain complexity as a major catalyst for risks in the supply chain. This will provide a background to the management of risks in supply chains.

Summary points

- The operating environments of supply chains are changing.
- Supply chains have to adapt to increasingly volatile operating environments.
- Supply chain strategy decisions of the past have exposed modern supply chains to risks of disruption.

2.2 Risk in supply chains

Having identified the increasing relevance of risk in supply chains, this section of the literature review is dedicated to investigating risk as a concept and to identifying different risks typically associated with supply chains. Moreover, section 2.2 provides an overview of the work undertaken to identifying different risks in supply chains (2.2.1, 2.2.2), as well as it reviews the relevance of different risks to varying industries or organisations (2.2.3). Furthermore, it discusses complexity as a key catalyst for risks in the supply chain (section 2.2.3). Herewith, this section provides a precursor for reviewing supply chain risk management in section 2.3.

2.2.1 The concept of risk

Risk in the context of supply chains is historically described as “the financial or competitive disadvantage as a consequence of a failed implementation of best-practice” (Khan & Zsidisin, 2012). Given the multidimensional nature of the construct, however, risk does not have to have a negative impact (Khan & Burnes, 2007). Moreover, as the word risk is derived from the verb “to dare”

(Bernstein, 1996), it has different meanings for different people (Khan & Zsidisin, 2012). Bernstein (1996) further explains that a core component of the concept of risk is choice. In literature this is explained in that the actions one chooses to take, depend on the freedom one has to choose between options (Bernstein, 1996).

When defining risk, literature tends to focus on the negative impact of the combination of the probability or frequency of a defined hazard and the magnitude of consequences (Khan & Burnes, 2007). In line with this, Jüttner (2005) defines supply chain risk as the possible disruption of flows between organisations. This negative perception of risk is echoed across academic literature where the definitions of risk are most commonly a derivative of:

...the gravity of negative effects and the potential for unwanted negative consequences, which may have an influence on the achievement of project objectives (Royal society, 1992).

Furthermore, Chiles and McMackin (1996) propagate that a manager's perspective of risk more closely reflects that of economic loss. This is as risk implies a probability of uncertainty (Williamson, 1985). From an accounting perspective, risk would be defined as the inability to detect irregularities in audit data, representing the risk of audit irregularities, as well as the risk of being caught ignoring these irregularities (Spekman & Davis, 2004).

From a more holistic perspective, Deloach (2000) defines risk as "the level of exposure to uncertainties" or "the chance of a defined hazard occurring" as per Norrman et al., (2004). This definition is built on a much earlier definition of risk by Mason-Jones and Towill (1998), who enunciate that risk is the exposure to significant disturbance arising from vulnerabilities, affecting a supply chain's ability to effectively serve end-customers.

When reviewing risk as a concept it is also important to consider vulnerability as a concept. With respect to this, it is important to recognise the work of Knight

(1921), who outlines that risk and uncertainty are intimately linked, however, not the same. According to Knight (1921), risk is measurable and estimates of a risks' probable outcome can be made, whilst uncertainty is not quantifiable and thus no probable outcomes can be identified.

For the purpose of this research, vulnerability is interpreted as a primary outcome of the management of risks in the supply chain (Svensson, 2000, 2002, 2004; Wagner & Bode, 2006). In other words, the exposure to a potential disruption of a supply chain is a result of risk management decisions. This stance is consistent with a more recent description of the concept of risk by Christopher and Peck (2004).

Nonetheless, it is important to note that whilst risk is most commonly perceived as something negative, the very concept of risk also encapsulates the hope of gain (Khan & Burnes, 2007; Wu & Olson, 2008).

Simchi-Levi et al., (2002) for example indicate that risk can present a basis for competitive advantages. Here fore it is necessary, however, to appreciate the level of risk a company can handle (Simchi-Levi et al., 2002). Sheffi (2001) echoes this by encouraging companies to examine risk levels and defend against excessive risk by keeping strategic inventory, aiming to capitalise on risks, competitors have not mitigated or cannot mitigate against. This can be used as a buffer to disruptions and can enable companies to keep fulfilling customer needs whilst working-out solutions (Sheffi, 2001).

As outlined throughout section 2.1, supply chains are changing and constantly forced to adjust to their environment to remain competitive. Not surprisingly, some of the strategic decisions of the past decades contribute to amplifying the complexity and vulnerability of supply chains to disturbances (Speier et al., 2011; Carvalho et al., 2012). In fact literature as reviewed in section 2.1 suggests that supply chain trends such as outsourcing, globalisation, reduction of the supplier base and so on, have intensified risks in supply chains (Norrman, et al.,

2004; Khan & Burnes, 2007; Manuj & Mentzer, 2008; Christopher et al., 2011; Giannakis & Louis, 2011).

Summary points:

- Risk is mostly regarded as something negative.
- Risk is part of the nature of doing business.
- Risk management is becoming increasingly relevant in today's supply chains.

2.2.2 The different risks

The literature review has revealed that given the diversity of risks and the increasing complexity of supply chains, it is virtually impossible to identify every possible risk or vulnerability to a supply chain (Khan & Burnes, 2007). Thus it is argued that the known risks in supply chains only present a certain proportion of all risks to a supply chain (Khan & Zsidisin, 2012).

When reviewing the literature on different types of risks in the supply chain, it appears that earlier studies tend to concentrate on the identification of different risks, whilst later studies aim to categorise risks into groups. Moreover, it transpires that practitioner oriented documents focus predominantly on the different risks, rather than categories of risk.

For example, a study by Wu et al., (2006) classifies supply chain risks into two different types. Internal risks and external risks. This view is supported by Trkman and McCormack (2009), who advocate that in order to distinguish between different risks, risk sources need to be categorised into constructs of uncertainty. Namely endogenous and exogenous risk categories. According to their research, endogenous risks revolve around relationships, market disturbances and technology disturbances, whereas exogenous risk or uncertainty refers to terrorist attacks, strikes, inflation rates and so on (Trkman & McCormack, 2009; Peck et al., 2003).

A more detailed approach is taken by Speier et al., (2011) who group risks into operational risks, supply, uncertain or disruption risks such as natural and man-made disasters. Furthering this, the authors argue that certain disruptions can be created intentionally (Kleindorfer & Saad, 2005) for strategic reasons. These may include sabotage, theft and terrorist attacks to name a few (Speier et al., 2011). Here the ability to generate a disruption may form a competitive advantage for supply chains that are resilient to these disturbances or risks as outlined in section 2.2.1.

Research has also revealed that regardless of the nature of the risks (internal, external, intentional or unintentional), disruptions may generate significant impacts on the short- and long-term operational and financial performance of supply chains (Kleindorfer et al., 2005). Research further showed that supply chain disruptions can reduce shareholder value, lower stock prices (Hendricks & Singhal, 2003), reduce brand equity, erode customer confidence (Speier et al., 2011) or lead to operational disruptions, reputational losses, delivery delays, quality issues and many more (Khan & Zsidisin, 2012).

Crucially, Trkman and McCormack (2009) identified that disruptive events such as natural disasters or terrorist attacks attract more attention more frequently than other risks such as changes to market environments, customer power; or taste or shifts in technology for example. This ignorance towards some risks can have a significant impact on the relationship between supplier attributes, supply chain performance and of course increase the exposure to disruptions of a supply chain as a whole.

An entirely different view on the assessment of risks is provided by Borison and Hamm (2010), who explain that over many years, two opposing views have developed on how to assess / view different risks. For example, the objectivist or frequentist view exhibits that risk is an objective property of the physical world and associated with the different levels of probability of a particular risk happening. Alternatively, the subjectivist or Bayesian view considers risks to be a result of the judgement of the observer and not solely a function of the physical

world (Borison & Hamm, 2010). As part of this view, historical data is complemented by additional information on particular risks and reviewed collectively (Borison & Hamm, 2010). The authors contend, however, that both views feature significant flaws in their application.

On the whole, supply chain risks are plentiful and evidently, much research has been devoted to the identification of different risks. Research by Chopra & Sodhi (2004) for example, identified nine basic sources of supply chain risk including disruptions, delays, systems, forecasts, intellectual property, procurement, receivables, inventory, and capacity. On the other hand, Harland et al., (2003) identified that the main sources of supply chain risks are related to different branches of management. These include strategy, operations, supply, customer relations, asset impairment, competition, reputation, financial markets, legal, as well as fiscal and regulatory requirements.

Alternatively, a report by Cranfield School of Management at Cranfield University recognises five sources of supply chain risks including process, control, demand, supply and environmental risks (Peck et al., 2003) (figure 2.4).



Figure 2.4 The different sources of risks in the supply chain and their linkages, adapted from Peck et al., 2003

This is consistent with later work of Christopher and Peck (2004) who maintain these to be the main sources risks in the supply chain. Moreover, this approach appears to be largely consistent with the work of Tang and Tomlin (2008) who

identify six different types of supply chain risk, including supply risk, process risk, demand risk, intellectual property risk, behavioural risk and political/social risk.

A more holistic approach is taken by Kaplan and Mikes (2012), who categorise supply chain risks into preventable, strategy and external risks. This approach differs from other frameworks, in that it focuses on strategic benefits through risks. Kaplan and Mikes (2012) argue that preventable risks arise from within an organisation and generate no strategic benefit, whilst strategy risks are taken to generate superior strategic returns. External risks refer to uncontrollable risks and revolve around mitigation measures (Kaplan & Mikes, 2012). Nevertheless, the view that risks can present a basis for possible strategic advantages is seldom in literature.

In contrast to the above academic work, the World Economic Forum has published a global risk map for 2012, which categorises risks, presenting more detail about categories than prevalent academic work (figure 2.5).

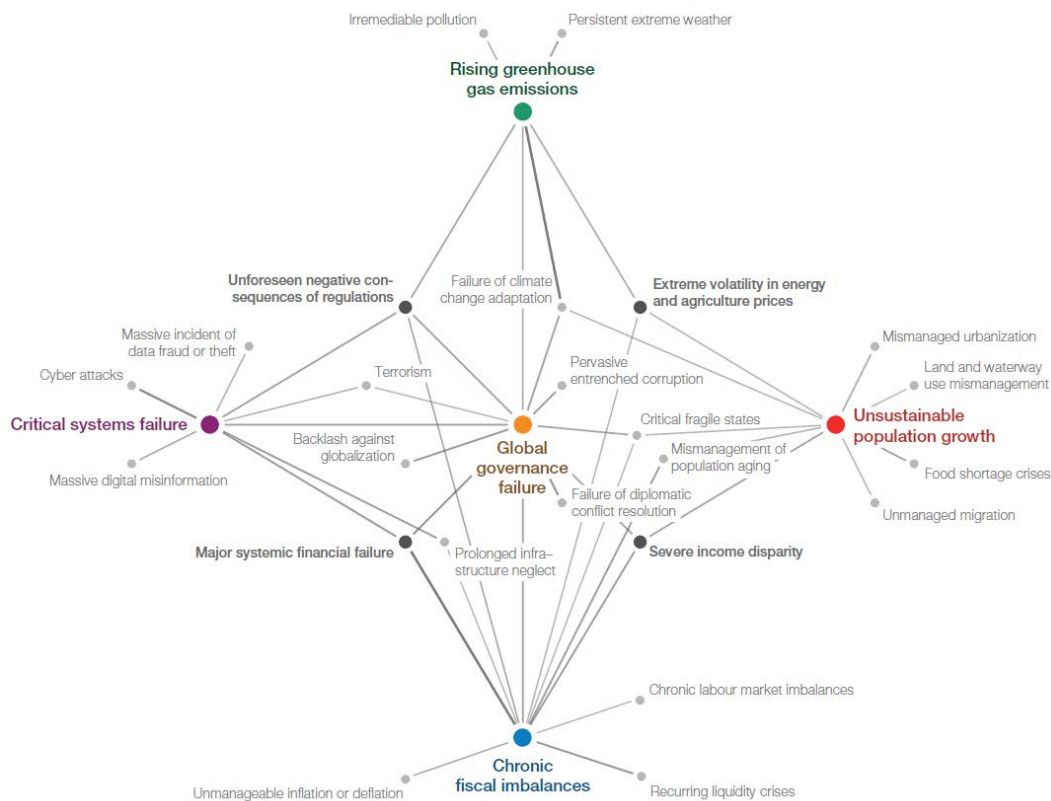


Figure 2.5 Global risk map 2012 (World Economic Forum, 2012)

Whilst there are a significant number of views on the different risks in supply chains, a view that is consistent across academic research and practitioner literature appears to be that high likelihood, low impact risks (often associated with co-ordinating supply and demand) are the most common risks in supply chains (Kleindorfer & Saad, 2005), whilst low likelihood high impact risks affect organisations in a major way (Chopra & Sodhi, 2004; Kleindorfer & Saad, 2005).

Regardless of the classification of risks, it is obvious that there are a whole range of risks, some of which are more common than others (Chopra & Sodhi, 2004). Furthermore, different risks apply to different supply chains, depending on their supply chain design (Trkman & McCormack, 2009). Due to this, a large proportion of supply chain risks are attributable to the level of complexity within supply chains (Christopher & Towhill, 2001; Norrman et al., 2004; Tang, 2006).

Summary points:

- There is a tremendous diversity of risks impacting supply chains.
- Earlier studies reviewed individual risks, whilst later studies concentrate on the categorisation of risks.
- Risk is in many ways a product of different factors such as supply chain design, the operating environment, operating procedures etc.
- Supply chain complexity is a key contributor to risks in the supply chain.

2.2.3 Supply chain complexity: The source of many risks

The literature reviewed so far revealed that a large number of supply chain risks and vulnerabilities are linked to the complex nature of supply chains. In fact the design of a supply chain has a significant impact on its complexity and operational modality (Trkman & McCormack, 2009).

When reviewing literature on supply chain complexity, it becomes evident that organisations do not only operate one supply chain or are part of only one supply chain but various different ones (Emmett, 2008). This is as each company has different suppliers with different customers for different products (Emmett, 2008), all of which need to be managed. In fact, Jüttner (2005) argues that modern supply chains are highly complex due to the parallel physical and information flows necessary to deliver the right products at the right place, in the right quantities, in a cost-effective way.

Relating to this, Barry (2004) identified that globalisation, due to the increase in dependencies across borders amplifies transportation, cultural and exchange risks along supply chains. This finding is further supported by Thun and Hoenig (2011).

Moreover, Kern et al., (2012) outline that initiatives such as outsourcing, inventory reduction, just-in-time operating modalities and so forth, which are highly characteristic of supply chain initiatives of the past decades have created leaner supply chains, which are also more complex, fragile and susceptible to disruption (Kleindorfer & Saad, 2005) in today's volatile markets. Due to the complex nature of supply chains in combination with what seems to be a mismatch between strategy and the market environment, supply chains appear to be disrupted increasingly with rising levels of impact (Barry, 2004). This is consistent with the findings of sections 2.1.1 and 2.1.2, highlighting the changing nature of the operating environments of supply chains.

A similar perspective, stressing the significance of supply chain design and complexity within these, is provided by Bakshi and Kleindorfer (2009). The

authors argue that the design of resilient supply chains, featuring lower levels of vulnerability to any kind of disruption, has become a dominant subject in the more complex supply chain environment ushered in by globalisation (Bakshi & Kleindorfer, 2009).

In support of the above view, a research report by Marsh (2012) points out that most supply chains have been focusing on efficiency, low cost, speed to market, and in pursuit of this, adopted outsourcing, the consolidation of physical assets and suppliers, just-in-time manufacturing, as well as the relocation of production to low cost sources. Despite the benefits of these initiatives, they also increase the complexity of supply chains through increasing geographic span, generating interdependencies, eliminating redundancies and by amplifying the reliance on an increasing number of tiers in the supply chain (Marsh, 2012). This increase in the reliance and other factors has developed into a lack of resilience and a broadened risk profile (Marsh, 2012).

Given this increase in these inextricable linkages, it transpires that a disturbance to any part of a supply chain network may have an impact on companies that are part of that network. Moreover, as companies generally do not have full visibility of their supply chain network (Emmett, 2008), it is becoming increasingly difficult to prepare for disruptions. This relationship between supply chain complexity and environmental uncertainty has been researched by Emmett (2008) and is depicted in table 2.3.

Table 2.3 General classification of industries in relation to operating environments, by Emmett, (2008), p.3

	High Complexity	Low Complexity
High Uncertainty	Capital intensive industries: Aerospace Shipbuilding Construction Fitness for purpose (of product)	Fast moving consumer goods: Cosmetics Textiles Food and drink Time to market
Low Uncertainty	Consumer goods: Automotive White goods Electrical goods Value for money	Staple primary industries: Paper Glass Simple components Price (from production productivity)

Owing to the above research by Emmett (2008), different industries operate in different environments, which have an impact on the complexity and the level of uncertainty. In fact, the author's research identifies that industries can be classified by the levels of complexity of manufacturing products (product complexity) and the degree of uncertainty (market volatility) within these markets. Due to this, supply chains within different industries are faced with a different risk profile (Hallikas et al., 2004), which arguably requires a differentiated approach to manage risks in the supply chain.

Having reviewed risk as a concept, the most commonly cited risks in supply chains, as well as the role of supply chain complexity, the next section focuses on the management of risks in the supply chain.

Summary points:

- Supply chain complexity is a key contributor to risk portfolios in supply chains.
- Different industries have different risk profiles.
- Complexity is more often than not, a result of strategic decisions of the past decades.

Building the research agenda:

- Supply chains have to contend increasingly with disruptions.
- Risk is a core aspect of doing business.
- Risks are highly diverse and determined by a variety of supply chain factors.
- Complexity is a key contributor to supply chain risks and is an outcome of traditional supply chain management behaviours, developed for stable markets.

2.3 The management of risks in supply chains

Having established that supply chains are changing to adapt to the increasingly volatile market environments of today, along with having examined the concept of risk, different risks, risk categories, as well as complexity in supply chains, this

section focuses on the management of risks in the supply chain. It concentrates on the objective of risk management, different models and techniques of risk management, as well as some of the barriers hindering risk management in modern supply chains.

2.3.1 Supply chain risk management

Owing to the above, it is not surprising that the management of supply chain risks is becoming a key challenge to supply chain continuity (Trkman & McCormack, 2009). In fact, when considering that risk is predominantly perceived as having a negative impact on supply chain performance, it is not surprising to find that organisations increasingly invest in the mitigation of risks generally.

Khan and Zsidisin (2012) support this by advocating that the management of supply chain risks is and will remain a key challenge for organisations in the future (van der Vorst & Beulens, 2002). An obvious assumption, when evaluating the increasing number of supply chain performance disruptions through earthquakes, economic crises, strikes, terrorist attacks and other events over the last decade (Tang, 2009).

To manage the response to disruptions more effectively, leading authors advocate that risk management approaches need to be developed that manage risk more effectively (Khan & Burnes, 2007; Giannakis & Louis, 2011). In fact Khan and Zsidisin (2012), as well as Neiger et al., (2009) maintain that the objective of managing supply chain risks must be to position companies in such a way that risks can either be avoided or their impact is managed effectively.

In fact, supply chain management is not a new discipline. As long as uncertainty in supply chains has created risks, supply chain managers have attempted to manage these. As a result of this, a wide range of concepts exists on how to manage risks in the supply chain (Christopher & Holweg, 2011).

Moreover, the concept of supply chain management celebrated its 30-year anniversary in 2012 (Christopher & Holweg, 2011) following Kransdorff and Allen first publishing an article about the concept in 1982 in the Financial Times (as cited in Christopher & Holweg, 2011).

Since then, supply chains have experienced an increase in complexity and thus an amplified exposure to supply chain risks, which has had significant impacts on the effective management of supply chains as outlined previously.

In fact, given the lasting volatility of global markets, it is argued that supply chain risks are unlikely to reduce (Khan & Zsidisin, 2012), but rather to amplify in coming years. Thus, in the pursuit of customer satisfaction and commercial competitiveness, organisations will be drawn to increasingly invest in managing risks along their supply chains (Jüttner, 2005).

In support of this, Trkman & McCormack (2009) write that the risk of supply chain disruptions is a key focus of practitioners and researchers alike. According to their work, supply chain risk management is becoming increasingly important and is aimed at the development of modalities to identify, assess, analyse and manage vulnerabilities and risks along supply chains (Trkman & McCormack, 2009).

In terms of the overall strategies of risk management, Hallikas et al., (2004) outline that there are five strategies for managing risks including risk transfer, risk taking, risk elimination, risk reduction, as well as the analysis of individual risks. This research is similar to that of Haller (1986) who denotes that the basic risk handling options revolve around avoidance, reduction, transfer, the bearing of risks and the sharing of residual risk amongst partners.

In fact, the above assertions are reflected in research by Peck et al., (2003) who define supply chain risk management, arguing that the concept revolves around “the achievement of ideals of fully integrated efficient and effective supply chains, capable of generating a sustaining competitive advantage, balancing

downward cost pressures and the need for efficiency, with effective means to manage the demands of market-driven service requirements and the known risks of routine supply chain failures (Peck et al., 2003, p. 12).”

An alternative definition of supply chain risk management is provided by Jüttner et al., (2003), defining the concept as “the identification of potential sources of risk and the implementation of appropriate strategies through a coordinated approach of supply chain members to reduce supply chain vulnerability.” This definition was later adopted by Manuj and Mentzer (2008), as well as Ponomarov and Holcomb (2009). Given the fact that this definition encapsulates key aspects of other, popular descriptions of the concept, as well as it reflects Christopher’s (2010) definition of supply chains², this definition has been adopted for the purpose of this research.

Nonetheless, Gaonkar and Viswanadham (2004), denote that there are only two types of approaches to risk management. Designs, which have a built in tolerance for disruption or those that enable their containment post disruption (Gaonkar & Viswanadham, 2004).

Given the reviewed definitions of the concept, it has become evident that supply chain risk management aims to develop tools, strategies, and methods that enable the identification, impact forecasting, preparation, as well as the mitigation of risks in the supply chain (Khan & Zsidisin, 2012; Hallikas et al., 2004; Tuncel & Alpan, 2010).

Adhering to the fact that risk is a core part of business operations (section 2.2), it is suggested that there are significant advantages and disadvantages to risk taking and risk avoidance (Pfohl et al., 2010). For the purpose of this research, the term risk management encapsulates risk taking (taking risks to maximise opportunity) as well as risk avoidance (risk mitigation to minimise disruption).

² “The management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole” (Christopher, 2011, p.3).

This is as both variants are a form of managing risk towards a desired outcome, whether this is to minimise disruption or to maximise opportunity.

Moreover, as risk is a core aspect of business operations and is reflected in the future outcomes of business decisions in the way of human resource management, financial management, product management and supply chain management (Khan & Zsidisin, 2012). Consequently, the management of risks will play an increasingly important role in the future development of supply chains. This view is consistent with the work of Trkman and McCormack (2009) as examined above.

Drawing on this perspective, Girotra and Netessine (2011) argue that whilst risk is often something supply chains strive to eliminate, it should be employed where strengths of a supply chain can deal with certain risks more effectively than competitor supply chains.

More specifically, the article argues that supply chains can generate value by handling a certain risk better than competitors and thus should take on more of that risk (Merton, as cited in Girotra & Netessine 2011). This view is consistent with research by Khan and Zsidisin (2012), as well as Wu and Olson (2008) who argue that risks can encapsulate the hope of gain as illustrated in section 2.2.1 of the literature review.

Adhering to Khan and Zsidisin (2012), translating strategy into tactical and operational objectives, effective risk management should be made more achievable (top-down approach). Following this approach, Khan and Zsidisin (2012) advocate that such strategy provides a basis for staff accountability, performance measurement and reward, pushing operational efficiency at all levels (IRM/AIRMIC/ALARM, 2002, p.2).

As business decisions are heavily influenced by a company's culture (Barnett & Karson, 1987; Hynes, 2009), it is anticipated that an organisation's culture also plays a key role in the management of risks in supply chains. Literature

indicating a connection between organisational culture and risk management in the supply chain in more detail is reviewed in sections 2.5 and 2.6 of this chapter.

Having outlined a background to the management of risks in the supply chain, sections 2.3.2 and 2.3.3 will focus on existing models, tools and techniques to deal with risks in the supply chain.

Summary points:

- With rising levels of risks and volatilities, supply chain risk management is becoming increasingly popular.
- Supply chain risk management is defined as the identification of potential sources of risk and the implementation of appropriate strategies through a coordinated approach of supply chain members, to reduce supply chain vulnerabilities.
- Supply chain risk management will increasingly focus on the exploitation of risks.

2.3.2 Existing models to manage risks in the supply chain

Given the increasing number of disruptions to supply chains in combination with the increasing levels of impact these have on them, it is not surprising that a wide range of models has been developed to manage risks in the supply chain (White, 1995; Simon et al., 1997).

Hallikas et al., (2004) for example, propose a four-step model to manage risks in the supply chain. The four steps revolve around the identification, the assessment, the management and monitoring of risks. This approach is highly common in literature in that it is continuous, beginning with the identification of risk and ending with risk monitoring.

In contrast to this, Bode and Wagner (2009), Kleindorfer and Saad (2005), as well as Tang (2006) outline that the risk management process can often be organised in three steps, including risk identification, risk assessment and risk mitigation. This approach to risk management does not clearly outline the

necessity of continuously monitoring risks and thus is criticised by Kern et al., (2012). Owing to their assertions, Kern et al., (2012) have developed their own risk management model, encapsulating a common four-stage process contributing a risk performance stage (figure 2.6).



Figure 2.6 Conceptual model of supply chain risk management, by Kern et al., (2012)

A very similar model to the above, is provided by Manuj and Mentzer (2008). This model consists of five stages, including the identification, assessment and evaluation of risks, the selection of appropriate risk management methods, the implementation of a supply chain risk management strategy and the mitigation of risks, which flows back into the risk identification (Manuj & Mentzer, 2008).

Another common, yet slightly more detailed model to manage risks in the supply chain is offered by Tang (2006). According to this framework, the key enablers for supply chain risk management revolve around improved coordination and collaboration with upstream and downstream tiers for demand visibility and efficient supply. This needs to be complemented with modifying process design and product design to enable risk management at the appropriate level (Tang, 2006, figure 2.7).

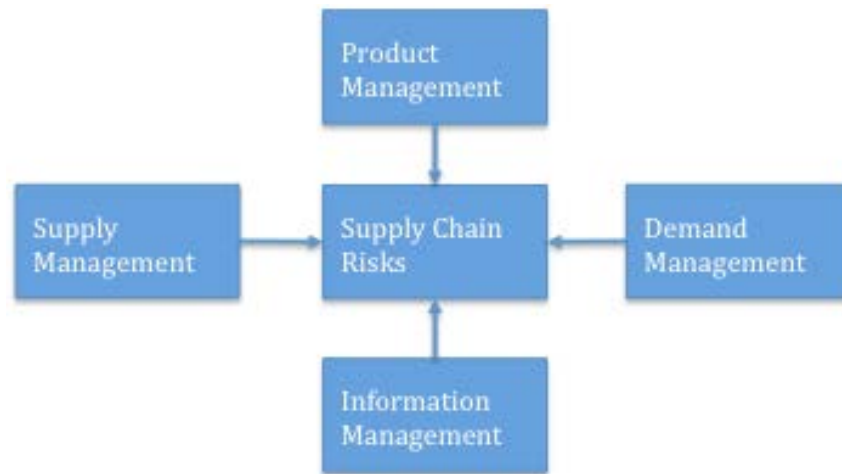


Figure 2.7 The four basic approaches for managing supply chain risks, adapted from Tang (2006), p. 453

As part of this model, different strategic and tactical solutions are proposed as shown in table 2.4.

Table 2.4 Strategic and tactical plans for managing supply chain risks, by Tang, (2006), p. 454

	Supply management	Demand management	Product management	Information management
Strategic plans	Supply network design	Product rollovers and product pricing	Product variety	Supply chain visibility
Tactical plans	Supplier selection, supplier order allocation, and supply contracts	Shift demand across time, markets, and products	Postponement and process sequencing	Information sharing, vendor managed inventory, and collaborative planning, forecasting and replenishment

An altogether different model, was developed by Harland et al. (2003). This model focuses on supply chains as networks. The six stage approach constitutes supply chain mapping, the identification and current location of risks, risk assessment, risk management and the formation of collaborative supply network strategies, followed by the implementation of these. In elaboration of this, Harland et al., (2003) explain that supply chain risk management is directly influenced by the choice of tools, the available techniques to minimise risks as well as the attitudes towards particular risks presented in figure 2.8.



Figure 2.8 A conceptual model for supply chain risk management, adapted from Harland et al., (2003), p. 830

Reflecting on the above model more closely, it is important to note that attitudes towards risk management are considered as a key determinant for the supply chain risk management process.

A more recent, continuous framework for the management of risks in the supply chain is provided by Ghadge et al., (2013). Whilst this model is based on standard risk management models (risk identification, risk assessment and risk mitigation) such as those outlined above, this model applies a different approach to the management of risks than standard models (figure 2.9).

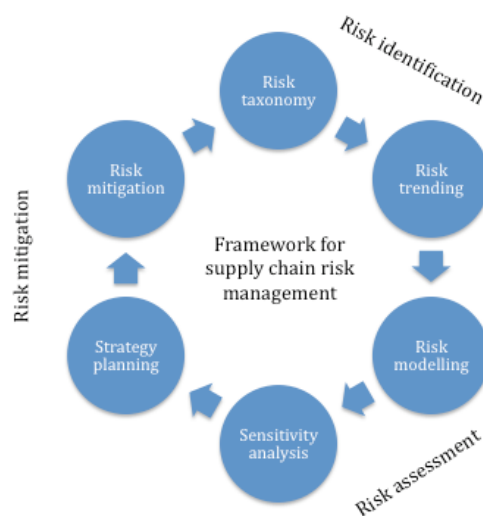


Figure 2.9 Framework for supply chain risk management, adapted from Ghadge et al., (2013), p. 525

Whilst the authors model (Ghadge et al., 2013) is based on standard risk models, it provides more detail in that each of the three stages encapsulates a continuous feedback loop, as well as each stage is divided into further components, providing a more thorough model for the management of risks than previous models.

In addition to the aforementioned models, one of the most recent and prominent models to manage risks revolves around the concept of structural flexibility. This approach, which is a mixture of models, tools and techniques allows a supply chain to adapt quickly to fundamental changes in its' respective environment (Christopher & Holweg, 2011). For this to become possible, however, it is necessary that companies fully comprehend their centres of gravity (Christopher & Holweg, 2011)³. This view is reflected in assertions by Gaonkar and Viswanadham (2004).

Moreover, Christopher and Holweg (2011) stress that for this approach to be effective, it needs to be distinguished between the efficient (traditional) and the adaptable (modern) supply chain as illustrated in table 2.5.

Table 2.5 The efficient versus the adaptable supply chain, adapted from Christopher and Holweg (2011), p.

	Efficient supply chain	Adaptable supply chain
Focus	Establish control to reduce variability and thus cost to compete	Embrace volatility and develop superior ability to adapt
Decision time horizon	Short-term, quarterly results	Long-term viability, while maintaining positive cash flow
View on turbulence	Bad, as it causes instability and cost	Inevitable, hence the need to pre-empt it by creating adaptable structures
Approach to dealing with turbulence	Use SIX SIGMA and other tools to eradicate it where possible	Use tools to increase flexibility "bandwidth" to cope

In elaboration of table 2.5, Christopher and Holweg (2011) maintain that traditional supply chains lack the ability to adapt to environmental changes quickly, as they have been designed to be efficient rather than flexible. On the other hand, adaptable supply chains that embrace structural flexibility are likely to reflect dual sourcing, asset sharing, flexible labour arrangements, and so forth (Christopher & Holweg, 2011). A drawback of this model, as exhibited in figure 2.10, is that it is likely to be more costly in the short run, whilst in the long-run it incurs healthy returns (Christopher & Holweg, 2011).

³ Centres of gravity are referred to as the connection between supply and demand.

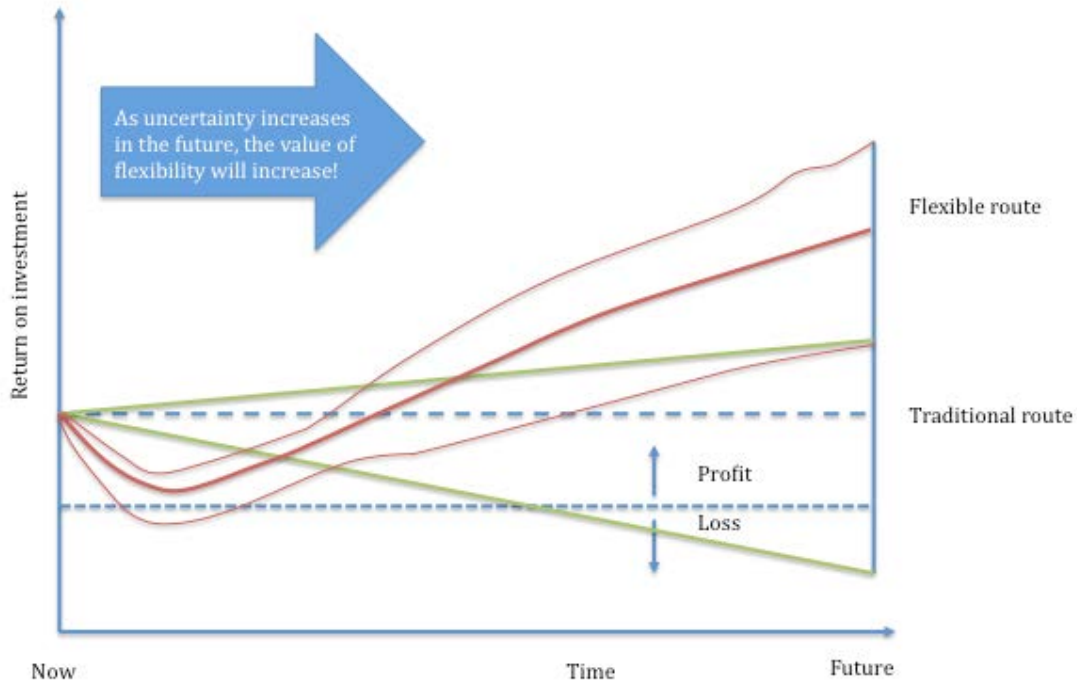


Figure 2.10 The value of investing into more flexible supply chain models, by Christopher and Holweg (2011), p. 76

In support of incurring higher short term costs to realise healthy returns in the long-run, Taleb et al., (2009) write that whilst theory propagates that efficiency and the maximisation of shareholder value do not allow redundancy, redundancy, especially in today's turbulent markets is a highly valuable asset.

So far, the literature review has revealed that models to manage risks in the supply chain, whether they are of a proactive or reactive nature can reduce risks and thus are becoming increasingly important (Wieland & Wallenburg, 2012). It is not clear, however, if structured models (as depicted in figures 2.6 – 2.8) to manage risks in the supply chain also offer improved levels of performance, agility and robustness (Wieland & Wallenburg, 2012).

Having examined some of the most common models to manage risks in the supply chain, it has been noted that models in general are concerned with the management of risks in the supply chain at a strategic level. Thus, it is further necessary to examine some of the most common tools and techniques used to manage risks in the supply chain.

Summary points:

- A wide range of models exists to manage risks in the supply chain.
- To be effective, the risk management process and models need to be continuous.
- The financial rewards of supply chain risk management models are most likely to be realised in the long term, rather than the short term.

2.3.3 Tools and techniques to manage risks in the supply chain

Following the review of some of the most widely cited models to manage risks in supply chains, this section of the literature review examines some of the most widely cited tools and techniques. To this point, it has been revealed that models of risk management are concerned with strategies, whilst tools and techniques revolve around the actual methods applied to manage risks.

When reviewing the literature for tools and techniques to manage risks in the supply chain, it becomes apparent that a wide variety of methods to manage risks exists. For example, a comprehensive review by Lavastre et al., (2012) has identified 21 different techniques to minimise risk in the supply chain. However, whilst this review includes a wide range of techniques employed to manage risks in the supply chain (table 2.6), it is not inclusive of all available techniques.

Table 2.6, Techniques to reduce supply chain risks, adapted from Lavastre et al., (2012), p.832

Techniques to reduce risks in the supply chain
Activity planning using Advanced Planning Systems (APS)
Responsiveness, reactivity thanks to Supply Chain Event management (SCEM)
Safety stocks
Vendor owned inventory (VOI) or in-house
External safety stocks which are co-owned by the partners
Dual sourcing (or dual manufacturing)
Establishment of emergency scenarios
Introduction of strict and formal procedures that are systematically applied
Appointment of a risk manager who convenes a SCRM group
Communication and exchange of information (forecasting, operations)
Geographical proximity to partners
Cultural proximity with partners
Long term continuity in partnerships
Introduction of sanctions and penalties for misconduct, faults, mistakes
Introduction of rewards in absence of misconduct and faults
Assisting providers/suppliers in improving their performance
Forecast accuracy
Reduced number of suppliers
Centralisation of decisions
Centralisation of operations (stocks, production and / or distribution)
Presence of a focal firm which coordinates the supply chain

When reviewing table 2.6, it appears that some of the listed techniques require a fairly large supply chain commitment over a considerable amount of time. For example, the generation of safety stocks or the establishment of cultural proximity amongst partners is associated with lengthy processes.

Tools on the other hand, as can be seen in table 2.6, revolve around actual processes to be followed in the identification, mitigation or the monitoring of risks such as the questioning approach, the failure mode, effects and criticality analysis and so on. These tools, because they vary in complexity may be challenging to implement or execute, yet require a lower level of commitment from supply chains than models.

Table 2.7, Risk management tools, adapted from Lavastre et al., (2012), p.

Risk management tools
Question positioning approach (“What if?”)
Internal and external processes mapping (Value Stream Mapping)
Scores method (a measure of intensity by aggregation)
Pareto diagram, ABC ranking
FMECA (Failure Mode, Effects, and Criticality Analysis)
Ishikawa Diagram, Brainstorming
PDCA Cycle, Deming cycle, 6 sigma, permanent improvement

In addition to the above tools, Gaudenzi and Borghesi (2006) advocate that the Delphi method (Miccolis & Shah, 2000) is a further useful tool in scenario planning, critical-path analysis as well as root-cause analysis within supply chains.

Reflecting on the tools and techniques so far, it is argued that whilst tools can be used to implement some of the earlier techniques, they also represent risk management solutions in their own right.

Another highly effective and commonly cited tool to manage risks in the supply chain is the risk matrix by Norrman et al., (2004). This tool enables the classification of different risks according to their probability and severity (figure 2.11), aiding supply chains to associate different levels of criticality to different risks.

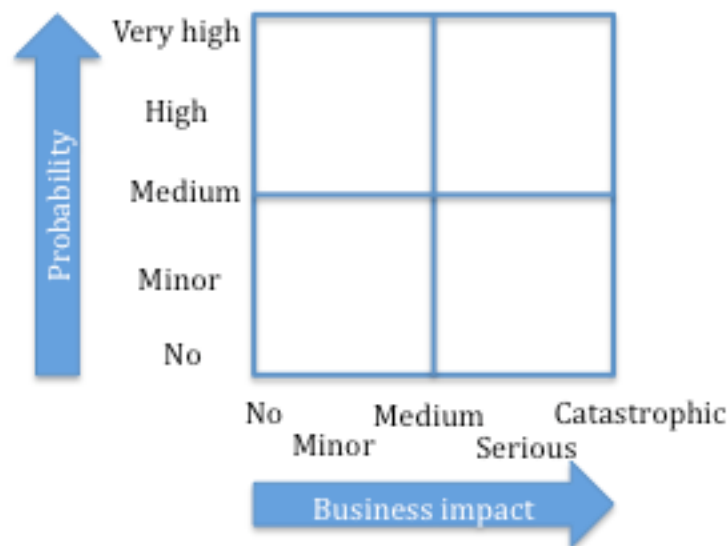


Figure 2.11 The risk matrix, by Norrman et al., (2004), p. 43

Having highlighted a selection of the most prominent risk management tools and techniques it is vital to contend that even the “best practice” does not guarantee safety from disruption (Peck, 2006; Tang, 2006). Nonetheless, the motivation driving risk management revolves around mitigating risks and transforming potential losses into possible gains.

More importantly, Underwood et al., (2011) point out in a KPMG report, that there is no “silver bullet” to managing risks in the supply chain. A supply chain’s approach to risk management must be based on where it is today and where the supply chain wants to be in the future (Underwood et al., 2011). There is no plug and play version to supply chain risk management as each supply chain’s approach must be unique, based on its’ situational and environmental specificity (Underwood et al., 2011).

Following the review of a range of models, tools as well as techniques to manage risks in the supply chain, it is necessary to review barriers typically associated to effectively managing risks in the supply chain. It has become evident that whilst a plethora of modalities to manage risks exist, often the implementation, execution and continuous application are hindered. The next section focuses on the most prominent barriers to doing so.

Summary points:

- There is a wide range of tools and techniques to manage risks in the supply chain.
- Techniques appear more resource intensive than tools to manage risks.
- No “plug-and-play” solutions exist. Solutions must be designed specifically to fulfil the requirements of individual supply chains.

2.3.4 Barriers to managing risks in the supply chain

Having outlined some of the most popular models, tools as well as techniques to manage risks in the supply chain in sections 2.3.1, 2.3.2 and 2.3.3, consideration must also be paid to the difficulties around the implementation, execution and continuity of some of these solutions. Holistically, given the plethora of options to manage risks, a solution to doing so should be available for any supply chain.

However, despite the examples of organisations that have managed to build supply chain structures that are more conducive to performing well during disruptions (UPS, HP, Johnson & Johnson, etc.), there is a wide range of supply

chains that experience significant problems in effectively managing risks as outlined in section 1.0.

When reviewing literature on the barriers towards risk management, a fundamental barrier appears to exist in the application of traditional values and ideologies when managing today's supply chains (Kern et al., 2012; Christopher & Holweg, 2011). As outlined in section 2.1, today's supply chains operate in vastly different market conditions than those the bespoke ideologies and values were created for.

Moreover, as discussed in section 2.1.1, the focus of supply chains has traditionally been to reduce cost by outsourcing, just-in-time concepts, increasing cooperation to build lean supply chains, and maximising the economic benefits for partners (Kern et al., 2012). However, as markets have begun to change and become more turbulent, the stability necessary for the above-described maximisation of profits began to diminish.

As a result of applying old ideologies to new markets, supply chains most commonly lack the ability to adapt to environmental changes quickly as they have been designed to be efficient rather than flexible (Christopher & Holweg, 2011). Despite this, literature advocates that too often traditional rules of managing supply chains are being exercised. In fact, the focus on raising efficiency and the desire to maximise shareholder value negates investment into risk management, capacity redundancy and so forth (Taleb et al., 2009).

Given the evidence that market environments are changing, it appears imperative for supply chains to rethink how to do business (Tummala et al., 2006), with a view to generating operational modalities that are conducive to operating in today's volatile markets.

In fact, Christopher and Holweg (2011) argue that as supply chain management models need to distance themselves from targets of lowest global cost and allow

for management accounting procedures to provide the freedom to evaluate supply chain decisions differently.

Taking the above view further, Girotra and Netessine (2011) argue that whilst risk is often something supply chains strive to eliminate, it should be employed where the strength of a supply chain can deal with a particular risk more effectively than competitors. By embracing risks in such a way, supply chains can in fact generate value and should take on more of those risks (Merton, as cited in Girotra & Netessine 2011). This is consistent with the work of Khan and Zsidisin (2012), as well as Wu and Olson (2008) as presented in section 2.3.1.

In contrast to the demands Girotra and Netessine (2011) make, Borison and Hamm (2010) point out that many organisations have taken on risks that are too large to handle, applying flawed risk management strategies. The authors argue that there is a positive correlation between the extensive reliance on traditional risk management and the level of risk that is unknowingly being taken on, resulting in a higher probability of failure (Borison & Hamm, 2010).

Whilst the views of Girotra and Netessie (2011) appear to make sense given the volatile operating environments of today's markets, adverse examples as researched by Borison and Hamm (2010) lead authors such as Christopher and Holweg (2011) to assert that more research into effective supply chain risk management needs to be carried out.

In any case, a supply chain management approach that allows risk embracing behaviour to generate competitive advantages, especially in today's markets, needs to be considered carefully, and more importantly, demands a fundamental change in the way supply chains have been executed traditionally (Tummala et al., 2006; Christopher & Holweg, 2011).

A further significant barrier and direct outcome of the traditional approach to managing supply chains revolves around finance. This is as the quantification of risks impacts and the management of these is extremely complex and

complicated. Thus it is forbiddingly difficult to calculate a return on investment on risk management solutions. Often, and this is consistent with section 2.2.1, the subjective nature of the concept of risk makes it difficult to calculate the value of risk measures, and more importantly the probability and level of a return on the investment (Miller, 1992). This amplifies the difficulty in justifying investment as certain disruptions may never occur of course, in which case any investment would not realise a return.

Moreover, given the turbulence and constant introduction of new risks in the supply chain, Sheffi (2005) argues that the use of frequentist or Bayesian methods to manage high impact low probability risks is often negated. This is as the absence of historical data prohibits the use of these predictive statistical tools to allow for the mitigation of certain risks (Sheffi, 2005). Thus, the quantification of risks, the risk likelihood and a potential return on investment from risk management initiatives are hugely complex to calculate.

Furthermore, Christopher and Holweg (2011) outline that not enough research has been carried out to allow supply chains to benchmark and determine what “good” or appropriate supply chain risk management in unstable environments should reflect. The authors argue that a lack of benchmarking and learning from best practice examples slows the development of effective supply chain risk management.

Besides the above barriers to risk management that are an outcome of the application of traditional management methods to modern supply chains, organisations examining supply chain risks often have a limited focus as explained in section 2.2.3. Most commonly the attention is limited to physical disruptions through natural disasters for example (Marsh, 2012). However, as section 2.2.2 has demonstrated, supply chains are also susceptible to political, social unrest, cyber attacks, raw material shortages and many more. According to literature, the reason for this is that supply chains are often regarded as being physical, failing to consider the importance of knowledge, relationships, skills, people and so forth (Marsh, 2012).

Moreover, it must be noted that the above are not exhaustive of all barriers to managing risks in the supply chain effectively. However, the examples are representative of the most commonly cited barriers. Reflecting on literary assertions, further barriers arise from supply chains as complex systems, the constantly changing demands on supply chains and so on.

Following the identification of the most commonly cited barriers to the effective management of risks in the supply chain, it transpires that risks are hard to quantify, hard to predict, plentiful and whilst methods to manage them exist, these are not always easily employable for a wide range of reasons. Moreover, traditional ideologies to manage supply chains do not appear to be conducive to managing risks in today's volatile market environments.

Given this background, the next section of the literature review revolves around supply chain resilience and the reasons for why supply chains should continue to revolutionise supply chain management ideologies to allow for supply chain risk management to become more effective, allowing these to become increasingly sustainable.

Summary points:

- The variety of risks that can impact supply chains is vast. It is often complex and complicated to quantify risk and returns on the investment into resilience.
- Traditional supply chain management ideologies significantly hinder investments into supply chain risk management.
- Due to the complexity inherent in establishing resilience in the supply chain, there are few examples of resilient enterprises.

Building the research agenda:

- Given the rising levels of volatility and the fast-paced nature of today's markets, supply chain risk management is becoming increasingly important.

- Numerous models, techniques and tools exist to manage risks in the supply chain, however, given the complexity of supply chains and other factors, these are not always successful.
- Reviewing barriers collectively, it is argued that a cultural shift is necessary in the way supply chains are orchestrated and evaluated.

2.4 Supply chain resilience

Having discussed the change of global markets, the concept of risks, supply chain complexity, ways to manage risks in the supply chain and also considered the difficulties supply chains face when trying to manage risks, the next stage of the review is dedicated to reviewing literature on resilience. The purpose of this is to provide an understanding of why supply chain executives expose supply chains to the tremendous difficulties of instilling resilience into supply chains when there is the probability that no disruption may occur or else, every competitor will be affected equally when disruptions occur.

2.4.1 Supply chain resilience a background

As outlined in previous sections, the elevated frequency of heavy rain, excessive wind, accidents, terrorist attacks, strikes, cyber attacks, market fluctuations and so forth increasingly disturb supply chains globally (Carvalho et al., 2012). According to research by Hendricks et al., (2008) these disruptions can affect a supply chain's performance, profitability, sales, cost structures, inventories and so on, in a negative way.

In fact, Ponomarov and Holcomb (2009) outline that any activity a supply chain undertakes implies the inherent risk of an unexpected disruption. With the ubiquitous aim of supply chains to generate and enhance value for customers remaining unchanged (Bowersox et al., 2000), supply chains have been forced to develop ways in which they can deliver this objective, whilst operating in turbulent markets, accepting that from time to time the normal processes will be disrupted.

In order for supply chains to defend against a loss of the provision of value to customers, the concept of supply chain resilience becomes important. When searching the literature for a definition of the term resilience, it transpires that the term has been defined numerous times in different disciplines (Ponomarov & Holcomb, 2009). For example, in the field of material science, resilience is referred to as the ability of a material to recover to its original shape following a deformation (Sheffi, 2005). From a biological perspective, resilience is defined as the degree, manner and pace of restoration of initial structure and function in an ecosystem after disturbance (Clapham, 1971; Westman, 1987).

From an organisational perspective, the concept is referred to as the capacity to adjust and maintain desirable functions under challenging or straining conditions (Weick et al., 1999; Edmondson, 1999; Bunderson & Sutcliffe, 2002).

For the purpose of this research, and in the context of supply chains, resilience will follow the definition provided by Khan and Zsidisin (2012) referring to the concept as:

“the ability of a system to return to its original or desired level of operation, after having been disturbed”.

Whilst the ability of supply chains to absorb disturbances effectively has always been a core element of operating, the importance of resilience has gained significant momentum (Sheffi, 2005). This is as it is becoming increasingly important for supply chains to be suitably flexible to cope with uncertainties inherent in the rapidly changing and volatile market environments (Chopra & Meindl, 2004).

More specifically, the review to this point has highlighted, that the negative reputation of risk and the increasing levels of complexity in supply chains initiates risk management, leaving supply chains more or less vulnerable to these risks. Furthermore, the ability to manage risks effectively also leads supply

chains to respond to risks more or less effectively increasing or decreasing their resilience.

Summary points:

- There are various definitions of resilience in different disciplines.
- Resilience is becoming increasingly important in the field of supply chain risk management.
- Resilience allows supply chains to consistently deliver value to customers in markets characterised by change and volatility.

2.4.2 The increasing importance of resilience

Whilst the concept of resilience was traditionally concerned with merely the management of risks, modern interpretations refer to it as “the positioning of a firm, enabling it to deal with and gain from disruptions more effectively than competitors” (Sheffi, 2005).

In fact, Stolz (2004) argues that a supply chain’s resilience forms a key building block of sustainability, allowing supply chains to perform at a higher level than less resilient competitors during challenging conditions.

The above perspectives, appear to be consistent with the work of Girotra and Netessine (2011), Merton (as cited in Girotra & Netessine, 2011), Khan and Zsidisin (2012), as well as Wu and Olson (2008), who advocate that organisations should embrace certain risks and actively seek those they can manage effectively to gain a competitive advantage (as illustrated in section 2.2.1).

Moreover, it is argued in literature that to survive into the future, supply chains must increase the ability to return to their normal or desired level of operation, after having been disturbed (Khan & Zsidisin, 2012). This necessitates the development of organisational competencies to react to unforeseen disruptions at any point (Peck, 2005; Carvalho & Cruz-Machado, 2007; Ji & Zhu, 2008).

Following the above described school of thought, Pettit et al., (2013) enunciate that supply chain vulnerability decreases and capabilities increase as supply chain resilience grows. The authors stress, however, that the cultivation of supply chain resilience is not merely focussed on the combination of strengths, but a mixture of strategically balancing capabilities and vulnerabilities of a supply chain (Pettit et al., 2013).

This perspective is in part consistent with that of Sheffi (2005), who advocates that supply chain resilience can be developed in three different ways. In explanation, Sheffi (2005) proposes that resilience can be generated by increasing redundancy within a supply chain, building flexibility or by adapting the corporate culture to embrace risks in the supply chain. These three ways are consistent with the research outcomes by Christopher and Holweg (2011) as well as Taleb et al., (2009) for example, as described in sections 2.3.1 and 2.3.2.

As a result of the increasingly turbulent market environments and the different potential benefits associated with the effective management of risks, Ponomarov and Holcomb (2009) advocate that supply chains must be designed with event readiness, efficient and effective disruption response and disruption recovery in mind.

This, however, as outlined by Sheffi (2005) as well as other research, reviewed in sections 2.3.1 and 2.3.4, necessitates a shift in the way supply chains are managed and their performance is evaluated. In other words, the culture that is required to manage risks within organisations as part of supply chains needs to become more risk embracing and should allow for the management of risks by moving away from management ideologies and cultures that prescribe lowest global cost for example (Christopher & Holweg, 2011).

Following the discussion of resilience as a concept and its relevance in the field of supply chain risk management, it has become apparent that when combining the discussion of resilience with other reviewed literature from previous sections, the concept of culture becomes relevant. This is as current approaches

to managing risks in the supply chain are often impeded upon by ideologies and cultures that are simply out of date and thus not conducive to getting the most out of modern supply chains.

Moreover, as supply chain management is defined as “the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole” (Christopher, 2010), it is argued that supply chains are made up of companies which determine the way supply chains behave.

Moreover, it is argued that this definition is indicative of some of the risks and barriers to effective supply chain management, as it focuses on cost reduction. Given this relationship, it is further deduced that the culture of an organisation is determinative in the way organisations approach the management of risks as a supply chain. Following this line of thought, the next section of this review will focus on organisational culture.

Summary points:

- Some supply chains are naturally more resilient to certain risks than others.
- Supply chains can use their resilience towards certain risks into a competitive advantage.
- Organisational culture appears to be linked to the way in which companies manage risks in supply chains.

Building the research agenda:

- The reason for an increased interest in supply chain risk management is the response to recognising environmental uncertainties whilst aspiring to maximise value for customers and surviving into the future.
- The concept of resilience is regarded as a potential source of competitive advantage and is linked to organisational culture.

2.5 Organisational culture

Based on the previous sections, it has become evident that the approach of organisations, constituting supply chains, are often unsuited for the effective management of risks in today's ever changing markets. In fact, the literature review has exhibited that the ideologies that are applied to orchestrate today's supply chains are reflective of those modalities that have been developed for the stable markets of the past (sections 2.1 and 2.2) as outlined by Christopher and Holweg (2011) for example. As a result of this mismatch, according to Kleindorfer and Saad (2005), the levels of risk organisations are facing in today's increasingly volatile markets are amplified (sections 2.1, 2.3, 2.4).

Moreover, literature exhibits that a fundamental barrier to improving the management of risks in the supply chain resides in the way organisations think about, and evaluate supply chain performance (Christopher & Holweg, 2011; Girotra & Netessine, 2011).

Taking this further, certain streams of literature indicate that cultural change is necessary to enable more effective supply chain risk management (Sheffi, 2005; Taleb et al., 2009; Christopher & Holweg, 2011). Owing to literature reviewed in the foregone sections, it has become evident that this cultural change must originate from organisations themselves, as these form supply chains by collaborating, in pursuit of delivering superior customer value.

Despite the prevalence of research that is focussed on methods, tools and techniques to manage risks in the supply chain, as highlighted in sections 2.3.1 – 2.3.3, it appears that a fundamental catalyst in the transformation to effective risk management in today's markets has virtually been overlooked by literature. In fact, Kaplan and Mikes (2012) enunciate that many risks and certainly operational risks are best managed by guiding people's behaviours and decisions towards desired norms. Norms, values and beliefs, as the following sections will discuss, form, amongst other things an organisations' culture.

2.5.1 Organisational culture a background

When reviewing literature for a definition of the concept of organisational culture, one of the most common descriptions is a variant of “the way we do things around here” (Lundy & Cowling, 1996).

A more scientific definition of the concept by Smit and Cronje (1992), which was later adopted by Hellriegel et al., (1998), defines organisational culture as “the components of routine behaviour, norms, values, philosophy, rules of the game and feelings, all of which form part of an organisation’s culture.”

In more detail, the concept has also been defined as:

“...a communicatively constructed, historically based system of assumptions, values, and interpretive frameworks that guide and constrain organisational members as they perform their organisational roles and confront the challenges of their environment.” (Lane, no date, p. 10)

Recognising the various definitions of the concept, (Ott, 1989; Schein 1990; Davies et al., 2000), it is not possible to list all of them, however, the general direction researchers appear to have consensus over is that organisational culture relates to patterns of values, behaviours and artefacts that are shared by members of organisations (Hofstede, 1980; Trice & Beyer, 1993; Pothukuchi et al., 2002).

In support of this, Scott et al., (2003) denote that organisational culture constitutes components such as language, behaviour, beliefs, values, assumptions, symbols of status and authority, as well as myths and rituals, all of which characterise and define an organisation. Given the complexity of the concept of organisational culture, the authors further outline, that little agreement exists amongst academics on how to define and thus observe and measure the concept (Scott et al., 2003).

Nonetheless the types of research into organisational culture can be classed into three categories (Dauber et al., 2012). The dimensions approach (measuring organisational culture empirically relating to other variables of interest), interrelated structure approaches (linking organisational culture to other characteristics), and typology approaches (clustering of organisations into categories) (Dauber et al., 2012).

Key examples of work in these areas include Hofstede et al., (1990), Chatterjee et al., (1992), Sagiv and Schwarz (2007) for the dimensions approach, Allaire and Firsirotu, (1984), Hatch (1993), Homburg and Pflesser (2000), and Schein (1985) for the interrelated structure approach, whilst key examples of typology approaches are provided by Cartwright and Cooper (1993) and Handy (1993), for example (Dauber et al., 2012).

Based on the different parts of literature reviewed, it has become evident that research in the field predominantly focuses on the way organisations go about enacting collective preferences to achieve organisational missions and goals (Dowty & Wallace, 2010). In this respect, organisational culture represents “the shared understandings, which through subtle and complex expression, regulate social life in organisations” (Ouchi & Wilkins, 1985, p. 458).

In other words, organisational culture is representative of the core values, assumptions and beliefs which are shared amongst members of an organisation and are exhibited by actions especially from leaders and managers (Johnson & Scholes, 1984; Morgan, 1991; Locke & Kirkpatrick, 1995; Cook, 1998). Thus an organisation’s culture provides guidance to members of an organisation in their day-to-day decision making processes (Andriopoulos, 2001) and actions or behaviours.

Having provided an overview of the concept of organisational culture, by way of stipulating a number of definitions and outlining how the concept is relevant to operating organisations in general, it is necessary to determine the importance of organisational culture within supply chains in more detail.

Summary points:

- Organisational culture has been defined numerous times and encapsulates values, beliefs, artefacts, language, behaviours, norms etc., shared by members of an organisation.
- Organisational culture has a significant impact on the behaviour of employees of an organisation and thus the organisation as a whole.
- As organisational culture determines organisational behaviour and organisations make up supply chains, organisational culture should impact supply chain behaviour and thus influence the management of risks in supply chains.

2.5.2 The relevance of organisational culture

Recognising that no single way to manage risks in the supply chain exists, which is especially true for low probability high impact risks (Sheffi, 2005), it is argued that the best modality to managing risks may not revolve around particular tools or techniques, but the general attitude towards dealing with risks.

Over the past decades, much research has been devoted to investigating the impact of organisational culture on firm performance (Marcoulides & Heck, 1993; Petty et al., 1995; Denison & Mishra, 1995; Flamholtz & Kannan-Narasimhan, 2005; Yilmaz et al., 2005) and it has been widely accepted that the concept has a significant impact on organisational performance (Cadden et al., 2013).

Furthermore, a particular group of scholars has pointed to the ability of firms to generate competitive advantages by harnessing their diverse organisational cultural backgrounds (e.g., Barney, 1986; Cameron & Quinn, 2005). For example, research by Martins and Terblanche (2003), has identified that the culture of an organisation has a direct impact on the level of creativity and innovation within a firm. It was identified that there is a strong positive correlation between the supportive culture towards risk taking, support for change and the way mistakes are handled (to name a few) and the level of creativity and innovation in the organisation (Martins & Terblanche, 2003).

Further research also revealed that it is entirely possible for firms to recruit staff with creative characteristics, setting standards for performance, providing feedback, involving staff in decision making, to enable innovation and creativity, however, not achieving either (Martins & Terblanche, 2003) due to the operational constraints and a lack of cultural support. This is as the organisational culture is a key contributor to the level at which innovation and creativity occur in an organisation (Shaughnessy, 1988; Pienaar, 1994; Johnson, 1996; Judge et al., 1997; Tesluk et al., 1997; Tushman & O'Reilly, 1997).

It is argued that the failure of a culture to provide a stimulating background for members of an organisation to achieve desired performance levels, significantly hinders the performance and efficiency of that organisation (Furnham & Gunter, 1993) as well as the supply chain in the wider sense. In fact, research findings by Hofstede and Bond (1988) have revealed statistical evidence for a link between national culture and economic growth.

Moreover, research by Žitkus and Junevičius (2007), exposed a connection between the exogenous environment of an organisation (e.g. economic, social, political etc.) and the decision making of managers, as well as the development of an organisation as a whole.

Literature further outlines that the decision-making framework provided by an organisation's culture has a distinct impact on the behaviour of the individuals therein. Hence an organisation's culture can promote or demote certain behaviours.

Moreover, as an organisation's culture, by its nature has a significant impact on its success (Martins & Terblance, 2003), it is not surprising that much research has been devoted to developing different theories, models and frameworks aiming to explain organisational culture and its impact on firm performance (Hall & Weiss, 1967; Schein, 1985; Hofstede et al., 1990; Sagiv & Schwarz, 2007).

Following the identification of a clear connection between the concept of organisational culture and firm performance, literature that concerns supply chains and organisational culture is reviewed in the next section.

Summary points:

- Organisational culture is seen to have an impact on the management of risks in organisations.
- Organisational culture can provide a basis for competitive advantages in the market place.

- Organisational culture is a key determinant for employee and organisational behaviour and thus a change in organisational culture may effectuate behaviour overall.

2.5.3 Organisational culture and the supply chain

Having provided an overview of the relationship between organisational culture and firm performance, the next stage of this literature review focuses on the connection between organisational culture and the supply chain.

Considering the different components of the literature review so far, a key question is, why do some supply chains respond to disruptions more effectively than others?

According to Sheffi (2005), the answer to this question is not the differentiated design of some supply chains, but the DNA of organisations that makes up supply chains. More specifically, Sheffi (2005) explicitly researched the impact of the concept of organisational culture on the resilience of organisations internally, not the supply chain.

In this sense, Sheffi (2005), refers to an organisation's DNA as the code that provides instructions for the development and the running of an organisation to members. In an organisational sense, the DNA represents the organisational culture, which provides a basis for decision-making (Andriopoulos, 2001).

Whilst this research also considers organisational culture to play a significant role in the behaviours of organisations generally, this research goes beyond the contexts of Sheffi's (2005) research in that it researches the impact of an organisation's culture on the supply chain beyond its organisational boundaries. Moreover, Sheffi does not apply a particular method or model to identify or distinguish between different cultures, yet views culture more holistically than this research.

In fact, Whitfield and Landeros (2006), outline that based on the significance of organisational culture in supply chains, increasing amounts of research have attempted to uncover the relevance of inter-organisational cultural fit on the performance of supply chains as a whole. In fact research by Barney (1986), as well as Cameron and Quinn (2005) has outlined the benefits of harnessing an organisation's cultural qualities in the context of managing supply chains.

Whilst potential benefits of harnessing cultural aspects in supply chains are significant, this process requires a detailed understanding of organisational cultural traits of supply chain partners (Fawcett et al., 2008; Shub & Stonebarker, 2009), which can be complex. Moreover, for the maximisation of benefits based on organisational cultures along a supply chain, all partners must be willing and able to synchronise the desired cultural aspects along a supply chain (Barringer & Harrison, 2000; McIvor & McHugh, 2000). Considering the complex nature of supply chains as well as the tacit nature of culture, this can present a hugely difficult task.

Further evidence for the relevance of organisational culture in a supply chain context is provided by an early piece of research by Bates et al., (1995), who advocate that organisational culture has a substantial influence on manufacturing strategy. Taking this further, McAfee et al., (2002) enunciate that supply chains need to synchronise corporate cultures along a supply chain before commencing operations. This is in line with research outlining that cultural factors have a significant impact on supply chain planning and decision making (Cooper & Ellram, 1993; Lassar & Zinn, 1995; Cooper et al., 1997; Mentzer et al., 2001; McAfee et al., 2002; Min et al., 2007).

In contrast to the work of Barringer and Harrison (2000), Mello and Stank (2005) outline that incompatible cultures along a supply chain can have differing impacts on the performance of a supply chain. They explain that performance can in some instances be high even if little synchronisation of cultural values exists amongst partners (Mello & Stank, 2005).

A different approach is taken by the work of Homburg and Pflesser (2000) who concentrate on depicting the relationship between organisational cultural fit in the context of organisational performance, rather than investigating the synchronisation of organisational culture and supply chain performance as depicted in figure 2.12.

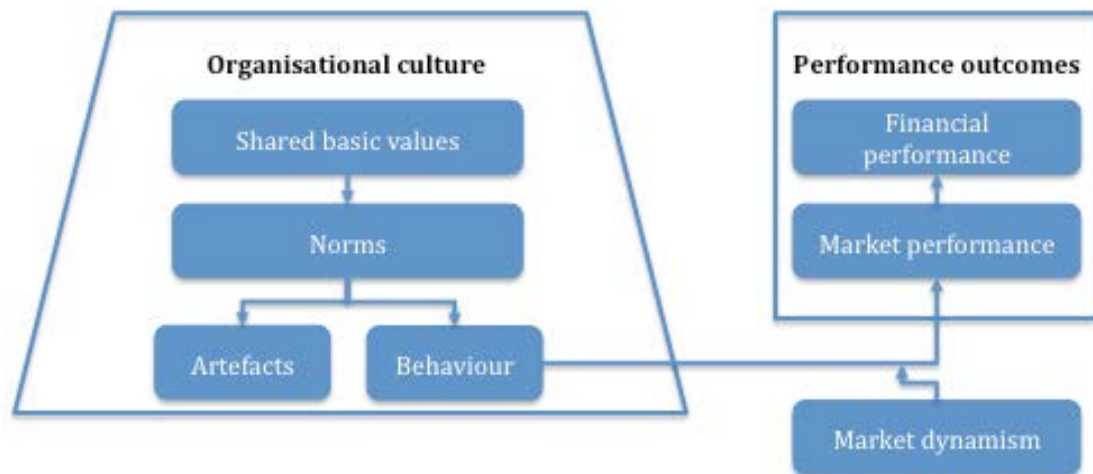


Figure 2.12 A multiple-layer model of market-oriented organisational culture: measurement issues, by Homburg and Pflesser (2000).

When reviewing figure 2.12, it becomes apparent that an organisation's culture has a clear impact on the financial and market performance of a supply chain. In fact, the authors outline that through shared values of an organisation's population norms are generated, which provide the basis for decision-making. This in turn leads to the level of performance in the market place (being influenced by the nature of the market) and thus impacts the financial performance of an organisation.

Whilst the authors have identified a link between the concept of organisational culture and financial performance, the nature of the relationship, negative or positive, is not outlined.

Moreover, whilst literature does feature studies on the relationship between general cultural aspects and supply chain performance the field has only relatively recently received attention. Compared to other fields as outlined in sections 2.3.2 (models to manage risks) and 2.3.3 (tools and techniques to manage risks), for example, it has received very little attention.

Beyond this, it transpires that whilst some research has been undertaken to identify the relationship between organisational culture and supply chain performance, less research has been undertaken to investigate the impact of organisational culture on the management of risks in the supply chain. Despite the fact that research on the whole outlines that there is some form of relationship between supply chain risk management and organisational culture, no research was found that outlines this relationship in any detail.

Summary points:

- The cultural DNA of some organisations enable supply chains to deal with disruption more effectively than others.
- Organisational culture has an impact on supply chain behaviour and performance.
- The relationship between organisational culture and risk management are not explored in any detail.

2.5.4 Different models to evaluate organisational culture

Having reviewed organisational culture as a concept as well as its' relevance for organisations and supply chains, this section of the literature review focuses on the different models available to categorise organisations by reference to their organisational culture.

Research by Hofstede (1980), as well as Trompenaars (1992) has identified cultural differences between nations globally. According to the research, distinct variances exist on the basis of continuums such as individualism versus collectivism, neutrality versus emotionality, specificity versus diffuseness and universalism versus particularism to name a few (Trompenaars, 1992).

Owing to the above research, a particular stream of literature, recognising cultural components such as core values, assumptions, interpretations and approaches, denotes that just as nations are characterised by cultural facets, so

are organisations (Cameron & Quinn, 1998). Hence, it is argued that it is possible to categorise different organisations into groups by reference to their culture.

This is an important finding, as an organisation's culture provides a basis for decision making and thus may have a significant impact not only on the financial performance (Homburg & Pflesser, 2000) and the levels of creativity (Shaughnessy, 1988; Pienaar, 1994; Johnson, 1996; Judge et al., 1997; Tesluk et al., 1997; Tushman & O'Reilly, 1997) for example, but also other areas of business performance and behaviour.

With respect to this, Übius and Alas (2009) assert that a competing values framework is a key tool in organising and interpreting diverse organisational phenomena or cultural components. Moreover, they maintain that after researching several thousand organisations, over 80% of the sample fall into one or more of the cultural types of the framework (Übius & Alas, 2009). Nonetheless, a certain proportion of the sample also exhibited cultural traits from all categories (Übius & Alas, 2009).

The competing values framework as applied by Übius and Alas (2009), constitutes four types of culture including clan, adhocracy, hierarchy and market as depicted in figure 2.13.

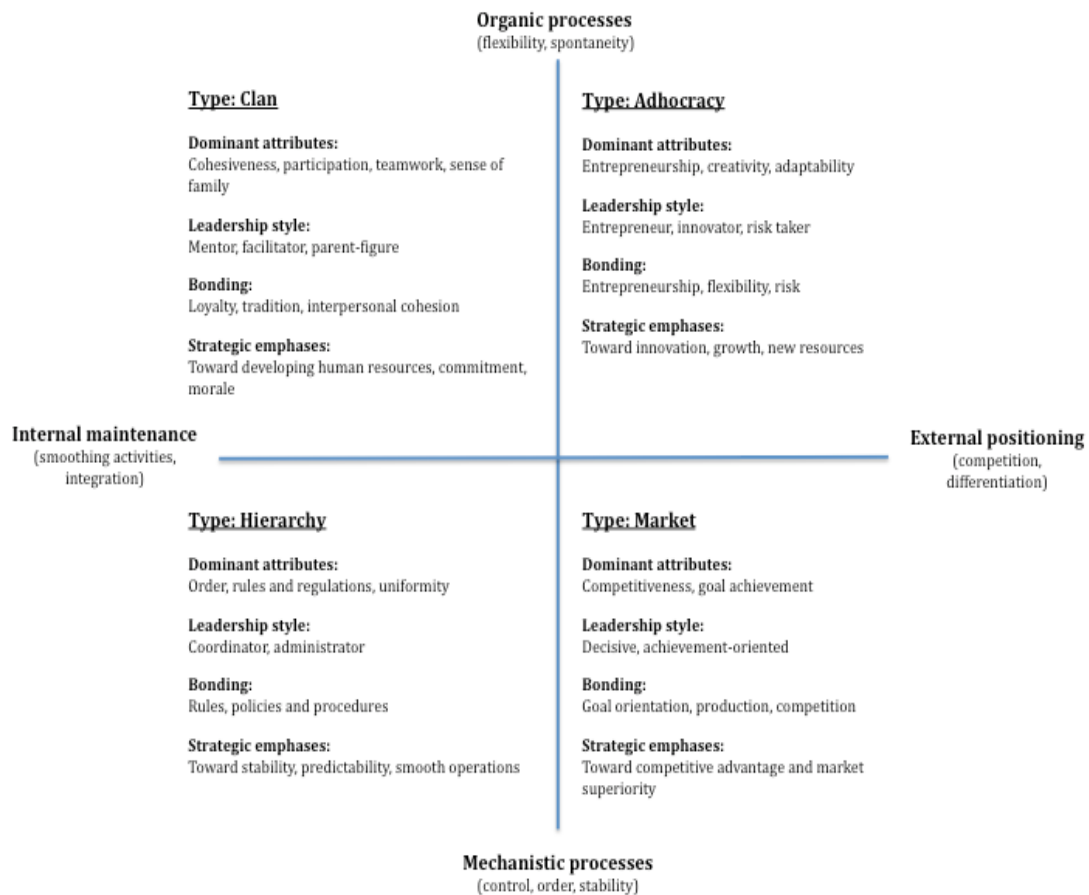


Figure 2.13 A model of organisational culture types by Deshpandé et al., (1993), as adapted from Cameron and Freeman (1991), and Quinn (1988)

The model categorises organisational cultures into four types by means of two continuums of organic to mechanistic and internal maintenance versus external maintenance. By way of this, the framework distinguishes between flexible / spontaneous types and control / order / stability characteristics on one continuum. On the other it differentiates between smoothing activities / integration versus competition / differentiation. In addition to this, the framework offers further details on the four different cultural types, typically associated with different cultures in each segment of the model.

Based on these axes, an adhocracy culture typically is associated with entrepreneurship, innovation, flexibility and a high ambition for growth. A market culture on the other hand, is defined by competitive behaviours, a high level of achievement orientation, production and is motivated by achieving market superiority for example. In contrast to this, a hierarchy culture is focussed on order and regulations, standardisation, the reliable coordination of

processes and is geared towards stability and predictability. Lastly, a clan culture is characterised by cohesiveness, teamwork, a sense of family, loyalty for example.

Despite the distinctly different cultural natures the model identifies, Deshpandé et al., (1993), as well as previous authors of this model outline that the model encapsulates evolutionary change. More specifically, the authors regard an organisation's culture as flexible, outlining that an organisation's culture can be influenced by internal and external forces.

Given the breadth of research in the area of the organisational categorisation by reference to culture, the model developed by Quinn and Rohrbaugh (1983), which was later adopted by Quinn and Spreitzer (1991), as well as Cameron and Freeman (1991) and adapted to its current form by Deshpandé et al., (1993) is of course not the only model available to categorise organisations by means of their culture, however, it is one of the most widely cited and applied.

In fact, the competing values framework encompasses key aspects from other frameworks that are available to classify cultures, as well as it is, owing to its polar nature (axes structure), one of the most user-friendly and effective models to accurately categorise organisation's by way of their culture.

In support of this, Gregory et al., (2009) point out that the competing values framework is the most popular and effective way to assess culture and organisational performance. Owing to the importance and reputation of the competing values framework, it will be employed for the purpose of this research.

Moreover, whilst the model is arguably the most effective framework to classify organisations by their cultural components, no research was identified which employs the competing values framework in connection with the management of risks along the supply chain or in close connection with risk management as a discipline.

Following the overview of the most popular frameworks to assess culture and organisational performance (Gregory et al., 2009), as well as having justified its application, the next section of the literature review focuses on bringing the different sections of the literature review together, inducing the formation of the research outline.

Summary points:

- There are a number of models to categorise countries and organisations by way of their cultural stigma.
- A number of studies have used different models to differentiate between cultures and verified their applicability.
- Organisational culture is a complex concept, which provides guidance to members of an organisation or supply chain, when making decisions.

Building the research agenda:

- Organisational culture is a key determinant of behaviour in organisations and supply chains.
- Organisational culture to some degree determines organisational behaviour and thus is relevant to supply chain risk management.
- Organisational culture can be used to classify organisations into categories and may reveal a link between organisational culture and its approach to managing risks.

2.6 Designing resilience into supply chains

Recognising that supply chains are changing and having discussed the risks today's supply chains are faced with, the most common modalities to manage risks in supply chains were outlined followed by a discussion on resilience, the ultimate reason for managing these. Upon this, a link between organisational performance (as part of supply chains) and organisational culture was made and a significant gap in the literature was identified. More specifically, it was identified that a knowledge gap exists pertaining to the relationship between an organisation's culture and the risk management approach companies, making up supply chains, take.

2.6.1 The need for natural and intuitive resilience

Combining the reviewed literature from the different sections, it may be argued that for risk management to be truly effective, risk management readiness needs to be reflected in an organisation's culture.

As discussed in sections 2.5 to 2.5.3, literature denotes that organisational culture predominantly addresses "how organisations go about enacting collective preferences to pursue organisational missions and goals" (Dowty & Wallace, 2010). In this respect, organisational culture represents "the shared understandings, which through subtle and complex expression regulate social life in organisations" (Ouchi & Wilkins, 1985, p. 458).

In other words, organisational culture is representative of the core values, assumptions and beliefs, which are shared amongst members of an organisation and are reflected in actions especially from leaders and managers (Johnson & Scholes, 1984; Morgan, 1991; Locke & Kirkpatrick, 1995; Cook, 1998).

Following this stream of literature, it may be argued that there is a link between organisational culture and attitudes to risk (Andriopoulos, 2001). This is as organisational culture provides guidance to members of an organisation in their decision making processes (Andriopoulos, 2001). It is further suggested that risk management practices are characterised by organisational values, and hence define the modality of doing business (Barney, 1986), as well as performance in today’s turbulent markets.

In support of this, Gattorna (2006) proposes “focus” (effort to improve viability) and “control” (coordination and integration) as two distinct dimensions for determining organisational culture in leadership styles. The research proposes that there are specific characteristic expectations and justifications for organisational resource and risk management. Thus there are differences in the management of risks, based on the traits of the leadership style, which to some degree constitutes culture (table 2.8).

Table 2.8, Characteristic expectations and justifications for organisational risk management in terms of LOW and HIGH GRID and GROUP, adapted from Dowty & Wallace, (2010), p.59

	LOW	HIGH
GRID	Simple structure; expect and justify risk taking as either opportunity or reaction to oppression by rule structures	Complex structure; expect and justify risk taking through institutionally defined rules and goals
GROUP	Weak integration; expect risks to be tempered by new combinations and technologies, justify risk through sacrifice of the whole for the parts	Strong integration; expect risks to form from new combinations and technologies, justify risk through sacrifice of the part for the whole

Elaborating on table 2.8, the authors explain that the differing intensities of leadership cultures (GRID and GROUP) have a significant impact on the approach to risk management. As part of this model, a GRID culture reflects how different

individuals as part of a group take on different roles (limited similarity between people or significant similarity), whilst a GROUP culture describes how closely staff are bonded in their activities (weak bonds or strong bonds between people and activities) (Dowthy & Wallace, 2010).

With respect to this, it is suggested that in order for companies to be able to design risk out of supply chains, the organisational culture must reflect this (Barney, 1986). In other words, an organisation's culture needs to enable employees to have the freedom to embrace and to deal with risks.

In fact, Sheffi, (2005) enunciates that culture has a significant impact on resilience as the organisational culture instils a set of principles in members of an organisation regarding the response to disruption or situations, in which the normal operating procedures do not offer guidance or are too slow to react.

Sheffi (2005) proceeds to argue that a key differentiator between those companies recovering quickly from disruption (or benefit from it) to those, which recover more slowly (or do not recover) is the organisational culture (Sheffi, 2005). Specific capabilities facilitating this difference include continued information sharing amongst informed employees, the empowerment of employees enabling action taking, passion for work, as well as the conditioning for disruption (Sheffi, 2005).

Whilst the research by Sheffi (2005) clearly outlines the significance of organisational culture in terms of the effectiveness of risk management, as well as the necessity for risk management to be reflected in the culture of an organisation, a relationship between different cultures and supply chain risk management approaches is not indicated.

Moreover, Sheffi's (2005) research focuses on the relationship between organisational culture and organisational resilience, not organisational culture and supply chain resilience. Given that organisations form supply chains and contribute to the overall culture of a supply chain, influencing the management

of risks along this chain, it is necessary to investigate the relationship between these factors in greater depth.

Nonetheless, it has been proposed that certain aspects of organisational cultures adopted by different organisations as part of a supply chain will naturally be somewhat similar if the focus is shared (Martin et al., 1983). However, whilst the basic aim to mitigate risks may be shared, significant differences are expected to be found between organisations operating in different industries.

Synthesising existing research, it is argued that the key to effective, sustainable and continuous risk management, is an organisational culture that provides members of organisations with the appropriate set of principles to deal with disruptions and risks before, during or after they have an impact. This approach would make the holistic process of managing and dealing with risks or disruptions more natural to the day-to-day operation of organisations.

Moreover, as supply chains increasingly liken themselves to extended networks of collaborating organisations, these must display a culture that is conducive to effective risk management in their individual environments. This approach would enable a higher level of risk management efficiency across supply chains as tools or techniques to manage risks (sections 2.3.2 and 2.3.3) would be more natural and acceptable.

Based on the foregone sections of the literature review, some evidence exists that supply chains that excel at risk management, need to have a culture that actively promotes risk and has a long-term view (forgiving mistakes) rather than a short-term approach (non forgiving) (Locke & Kirkpatrick, 1995), especially with regards to returns on investment as illustrated in section 2.3.4.

Moreover, given the rapidly changing markets and volatile operating environments, it may even be necessary for organisations to develop skills to manage their organisational culture (Barney, 1986) with a view to adapting to

different operational environments. Such competence may be regarded as a competitive advantage beyond that of adapting quickly to risks and disruptions.

Summary points:

- Organisational culture is a guide to organisational members in achieving organisational goals.
- If supply chain risk management is to become truly efficient, organisational culture needs to reflect this and therewith enable organisations to act accordingly.
- Additional competitive advantages may be established through developing the ability to manage organisational culture, maximising event readiness.

Building the research agenda:

- The environments supply chains operate in are changing and supply chains are looking for ways to adapt to increasingly complex and volatile markets.
- In response to rising levels of risk and volatility, practitioners and academics have developed a wide range of tools and techniques to manage risks in supply chains.
- Due to the complexity, traditional methods of managing supply chains and many other factors, often these methods are not applicable or effective.
- In pursuit of developing more resilient supply chains, recognising the multitude of barriers using traditional risk management tools, organisational culture becomes relevant.
- Culture provides a basis for decision-making, guides behaviour and so forth. As organisational cultures have a significant impact on the behaviour of organisations and supply chains, organisational culture may present an alternative perspective to optimising the management of risks along supply chains.
- Whilst a link has been established between organisational culture and risk management, the exact nature of this relationship has not been researched.

2.7 Literature review conclusion

Having provided a critical overview of literature in relevant fields, it can be deduced that risks to supply chains are increasing in number as well as impact. This trend is predicted to continue for the foreseeable future. In response to this, academics and practitioners alike have developed a plethora of tools and techniques to manage risks in supply chains. The aim of this being to increase the resilience of organisations and supply chains to become more stable in increasingly unstable market environments and to continue to provide superior customer value at less cost to the supply chain as a whole” (Christopher, 2011).

Literature further outlines that whilst existing tools, techniques and models, may be highly effective if applied correctly, solutions are not generic and need to be adapted to the specific organisational and supply chain risk profiles. As a result of the inherent complexity, more often than not, attempts to manage risks in the supply chain are ineffective, generating significant losses for organisations as part of supply chains.

Given this difficulty in the process of attempting to manage risks, certain streams of literature outline that a significant barrier to the effective management of risks remains to be the ideologies and values upon which organisations and supply chains are evaluated. It is argued that traditional modalities of assessing supply chain performance must evolve to reflect today’s markets. As a result of this, it is reasoned that supply chain executives need to fundamentally rethink the ways in which performance evaluations are carried out and begin to build risk and disruption readiness into supply chains.

Where performance traditionally is viewed through a cost perspective, this research, in line with much other research argues that performance measurements must include and recognise costs and efforts to manage risks along supply chains. This is as a more tolerant attitude to the expenditure into risk management (whatever form these may take) is seen to enable the adaptation to modern markets more effectively.

In extension to this, certain streams of literature have also proposed that the ability to adapt more rapidly to changing market environments will become a key competitive advantage in markets of the future.

Furthermore, research outlines the importance of organisational culture with reference to organisational performance and supply chain resilience. Despite the clear connection between the concepts, comparatively little research has been carried out, investigating the exact relationship between the concepts. In fact, no research was identified, that clearly outlines the relationship between different cultural types and the approach to risk management of organisations in supply chains.

Based on the literature review, it has been deduced that organisational culture plays a key role in the performance of the management of risks in organisations and thus impacts the ability of supply chains to respond to disruptions collectively. It is further understood that the most efficient and effective forms of risk management in terms of resilience achievement are displayed by organisations, which have managed to build risk or resilience readiness into their operations, although this field of research is young and more work needs to be undertaken to understand this relationship.

Following this, it is argued that in order to perform the management of risks most effectively, this process must become part of the operating nature of organisations that form supply chains. Moreover, a key ingredient in establishing resilience across supply chains is that it must be reflected at the core of an organisation and cannot be “bolted-on”. An aspect, which has been largely overlooked within existing literature.

However, to understand the bespoke relationship in detail, to provide an insight into how risk management could be improved more naturally, it is necessary to understand the relationship between different organisational cultures and the risk management approaches inherent in these.

Based on this, a gap in existing knowledge would be closed as well as the research would enable recommendations for industry on how to naturally instil resilience into supply chains. This, from an industrial perspective, would make risk management more affordable, effective and efficient.

2.8 Research gap

The literature review has clearly revealed the increasing relevance and importance of supply chain management, as well as supply chain risk management in modern markets. Moreover, it was possible to identify a plethora of challenges hindering the implementation of risk management methods in supply chains as outlined in section 2.3.

As a potential solution to some of the identified barriers in section 2.3 the literature review explored the concept of organisational culture. This concept as reviewed in sections 2.5 and 2.6 has a relationship with both other concepts in that it is seen to have a significant impact on these. However, whilst it has been identified that a relationship exists between all three concepts, the nature of this connection is not clear.

In other words, it has not been identified how different types of organisational culture impact upon the approach to and performance of supply chain risk management. Reflecting on the impact organisational culture can have on other performance areas such as innovation, creativity and other facets of organisational performance, as outlined in sections 2.5 and 2.6, it is proposed that organisational culture could be a key contributor to the performance and effectiveness of risk management along supply chains.

As a research topic, the research will address area four of figure 2.14. This represents the overlap of all three research fields and, in difference to areas 1, 2 and 3, has not been researched in any depth.

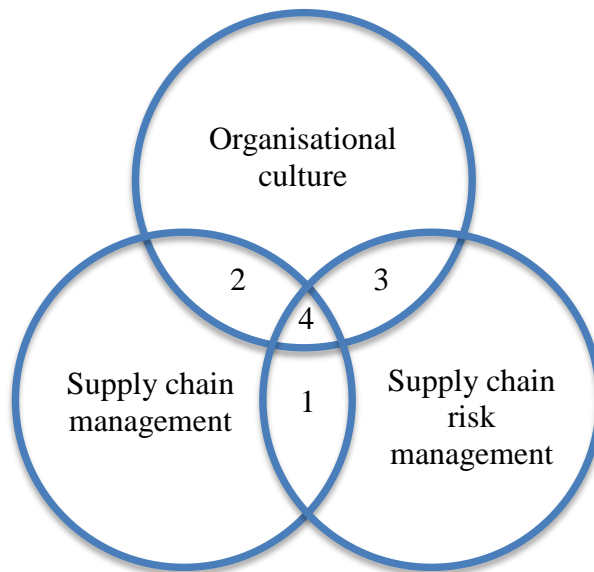


Figure 2.14 The scope of the research

2.9 Research questions

Given the growing importance of supply chain management, supply chain risk management and the impact organisational culture can have on the performance and behaviour of organisations in general, bearing in mind the limited success and applicability of generic traditional supply chain risk management tools, the following research questions have been derived from systematically reviewing existing literature:

1. *What is the relationship between organisational culture and supply chain risk management?*

Whilst literature outlines connections of organisational culture to various other concepts such as organisational performance or resilience, little research has been undertaken to understand the connection between organisational culture and supply chain risk management.

2. *How do different organisational cultures influence the approach to supply chain risk management?*

Following on from question one, it is necessary to investigate the possibility of different links between certain types of cultures and approaches to supply chain risk management.

3. *How do different supply chain environments (risks / disruptions) influence organisational culture?*

Based on investigating the nature of relationships between different cultural types and supply chain risk management approaches, it is important to explore the relevance of different supply chain environments on possible relationships between the concepts.

4. *How can organisational culture be employed to support supply chain risk management?*

The fourth research question pulls together the research thesis, making recommendations about how different organisational cultures can be harnessed strategically, to support the effective management of risks along the supply chain. This research question builds on findings from all previous research questions of this thesis.

The research project focuses on the nature of the relationship between organisational culture and supply chain risk management, exploring potential modalities to harness an organisation's culture to effectuate a change in the approach and the effectiveness of risk management along supply chains.

3.0 Methodology

This chapter of the thesis is designated to providing a detailed overview of the most suited research process for this study. Within this chapter the research approach, design, methodology, the methods for data collection, the techniques for analysing data, as well as the quality implications of the overall research will be outlined.

In pursuit of this, the chapter begins by exploring the ontological and epistemological underpinnings of the research, which logically follow the research gap. Based on the justification of the philosophical position, the methodology and methods the research employs are outlined.

3.1 The philosophical position of the research

Following a thorough, systematic review of relevant literature as outlined in section 2.0.1, a research gap was identified. This in turn was the basis for the development of distinct research questions, designed to address the identified gap.

The next stage to undertaking quality, academic research, revolved around identifying the most appropriate research philosophy or the research approach (Grix, 2002). It was vital to base this on the nature of the research, the research questions, as well as the researcher's philosophical position.

In line with this, the first stage of this chapter is dedicated to identifying the most suited ontological research approach, which had significant implications for the subsequent decisions around the epistemological approach and the research methodology, as these logically followed the ontological stance (Grix, 2002).

3.1.1 Ontological approach

Ontology as a concept revolves around the nature of reality and is concerned with what constitutes social reality (Blaikie, 2000). Being concerned with 'what

we may know' (Grix, 2002), ontology offers a continuum of positions with two distinct schools of thought at either end. Objectivism and constructivism.

Under the objectivist view, social phenomena and their meanings exist independently from social actors (Grix, 2002; Bryman & Bell, 2007). In other words, social phenomena would exist or occur also in the absence of social actors. In contrast to this, the constructivist perspective suggests that social phenomena and categories are not only created through interaction of social actors, but that they are constantly being revised by these (Bryman, 2001).

When reviewing the key components of the research, organisational culture and supply chain risk management, it is argued that these are constructs of social interaction rather than to exist independently from social actors. Moreover, it is advocated that the social actors that construct these social phenomena contribute to their evolution through their interactions over time.

These views are consistent with those of the researcher, in who's view organisational culture as well as supply chain risk management are constructs which are dependent on the social actors within them.

Based on this reasoning, the research took a constructivist approach. As the research field is largely dominated by social constructs, which are understood to be generated by the actors within them, it was imperative to assume a philosophical standpoint reflecting the nature of those fields being researched. Moreover, it is advocated that a mismatch between the perception of social reality and the research field may have led to compromised research outcomes.

Given the subjective nature of organisational culture, risk and supply chain risk management, it is advocated that the application of the objectivist perspective would naturally have disabled a true understanding and effective exploration of the social constructs under investigation, negating their application within this research.

3.1.2 Epistemological approach

Following the identification and justification of the ontological approach demanded by the nature of the research, the next step revolved around the identification of the epistemological position of the research. This was a key stage of the research, as it is concerned with the theory of knowledge focusing on the methods used, validation of the research, social reality and the ways of gaining knowledge (Blaikie, 2000; Brix, 2002).

Moreover, whilst ontology focuses on what constitutes social reality, epistemology is concerned with how and what is assumed to exist, can be known (Blaikie, 2000; Grix, 2002). Similarly to ontology, there are two distinct perspectives in the 'theory of knowledge' (Johnson & Duberley, 2000; Grix, 2002; Collis & Hussey, 2003). Whilst a range of different epistemological positions exists to generate knowledge, this section's overview is limited to an elucidation of the most suited perspectives to this research. Incidentally, these perspectives are also the most dominant epistemological stances and are referred to as positivism and interpretivism (Grix, 2002; Collis & Hussey, 2003).

Positivism is an epistemological position, which demands the application of methods from the natural sciences to study social reality and beyond (Grix, 2002). Moreover, pure positivists regard themselves as independent from the research and will consider only externally apparent and measurable data sources such as numerical data, statistics or data from experiments (Collis & Hussey, 2003; Saunders et al., 2007; Bryman & Bell, 2007).

In contrast to this, interpretivism is a perspective that demands approaches, which respect differences between people and objects of the natural sciences. This requires the social scientist to consider the subjective meaning of social actions (Bryman, 2001). Moreover, interpretivism assumes that humans take up social roles impacting upon social phenomena, thus advocating that it is necessary to include these roles and interactions in contributing to knowledge (Saunders et al., 2007)

Given this distinct contrast between the two epistemological perspectives, it is apparent that the distinct positions not only require the application of very different research methodologies, but in fact will lead to very different views on the same social phenomena (Grix, 2002). Furthermore, it is important to note that whilst some researchers recognise only these two positions, others regard epistemology as a continuum with positivism on one side and interpretivism on the other (Kuhn, 1996).

Following these assertions, it was essential to adopt the most appropriate perspective to the research area, which is aligned with the ontological position to enable the understanding of the phenomena being studied.

Critically reflecting on the nature of the research area, as well as the ontological approach of this study, which most often is combined with interpretivism, the epistemological perspective this research study took was of the interpretivist nature.

When reviewing the two contrasting positions of positivism and interpretivism in combination with the chosen ontological approach, interpretivism presented a more logical choice. Further justification for this resides in the proposition that organisational culture and supply chain risk management are largely social constructs, which are subjective in nature.

Thus, understanding the relationship between these social constructs demanded a philosophical approach that allowed for the capturing of data beyond those advocated by natural science stances. In other words, it is reasoned that the social constructs and phenomena that were being researched could not be captured in isolation of their environmental and social background.

Furthermore, given the ever-increasing complexity and integration of supply chains on a global scale, a positivistic approach would unlikely have reflected the full reality of supply chain risk management behaviour and thus would not have

offered explanations or 'Verstehen' of the relationship between the different research components (Bryman & Bell, 2007).

Beyond this, it was also important to consider that risk, which is a key part of this study, in its perception and as a concept is subjective. As a result of this it was maintained that a positivist approach to researching a subjective phenomenon is unsuitable. Furthermore, it is argued that the clinical application of natural science methods (as advocated by positive orthodoxy), (Bryman & Bell, 2007) would not have made it possible to uncover the nature of the relationship and connection between the studied fields.

Synthesising the above, a positivistic approach to the research would not have sufficed. Given the contextual and environmental specificity of the study, it was necessary to adopt an interpretivist phenomenological approach. Moreover, as the research aim was to generate supply chain management strategies based on organisational culture to optimise risk management, rather than to test these, the interpretivist phenomenological research approach appeared logically more appropriate.

3.1.3 Research axiology

Having identified the most appropriate epistemological approach for the study, it was important also to consider the research axiology. Axiology is concerned with the judgements about value (Saunders, et al., 2007). According to Heron (1996) researchers demonstrate their values during all stages of the research process.

For example, conversational encounters such as interviews enable unique opportunities to build understanding, based on the views of research participants, reflecting inherently subjectivity (Tufford & Newman, 2010). In expansion to this, Starks and Trinidad (2007) argue that the approach to the research has a significant impact on the research outcome as the researcher is the instrument for analysing the research data.

Owing to these views, it is somewhat inevitable that the researcher will transfer some of his or her own assumptions, values, interests, emotions or theories to the research project (Tufford & Newman, 2010). Thus in pursuit of maximising the credibility and integrity of the research, it is vital for researchers to consider and understand their impact on the research project as a whole (Saunders et al., 2007).

Based on understanding the impact a researcher has on a study, it is imperative for researchers to minimise the potentially negative effects of unacknowledged preconceptions regarding the research (Tufford & Newman, 2010). This technique is referred to as bracketing and is seen to amplify the rigor of research projects (Tufford & Newman, 2010).

Methods that can be used for this include the writing of memos throughout data collection to reflect on researcher engagement (Cutcliffe, 2003), the use of a reflexive journal (Ahern, 1999) or using an outsider during interviews to highlight preconceptions and biases (Rolls & Relf, 2006). The measures that were taken to minimise the influence of researcher values during data collection and analysis included the writing of memos and the use of a reflexive journal. The use of these is explained in more depth in sections 3.5 and 3.6.

3.1.4 Review of the philosophical research basis

As the ontological position of the research logically preceded the epistemological stance, which determined in part the methodology, it was important to ensure that the approach to the image of social reality and the approach to the theory of knowledge for the research study were compatible (Grix, 2001). Furthermore, as the choice of different ontological and epistemological positions inevitably informs the choice of methodologies and thus delivers a different understanding of the same social phenomena (Grix, 2001), it was vital to justify this stage thoroughly.

In pursuit of positioning the different perspectives, Burrell and Morgan (1979) have developed a framework to classify the institutionalisation of intellectual activity (Grix, 2001). These classifications or paradigms are equivalent to the term 'established academic approaches' according to which academics use common theories and terminology rooted in paradigmatic assumptions, agreed methods and practices (Rosamond, 2000; Grix, 2001).

According to Burrell and Morgan (1979), there are four distinct paradigms, including functionalism, interpretivism, radical humanism and radical structuralism. Each of these paradigms is affected by objective and subjective social theory (seeing the world) and by the level of regulative or radical views of sociology (Burrell & Morgan, 1979) as shown in figure 3.1 below.

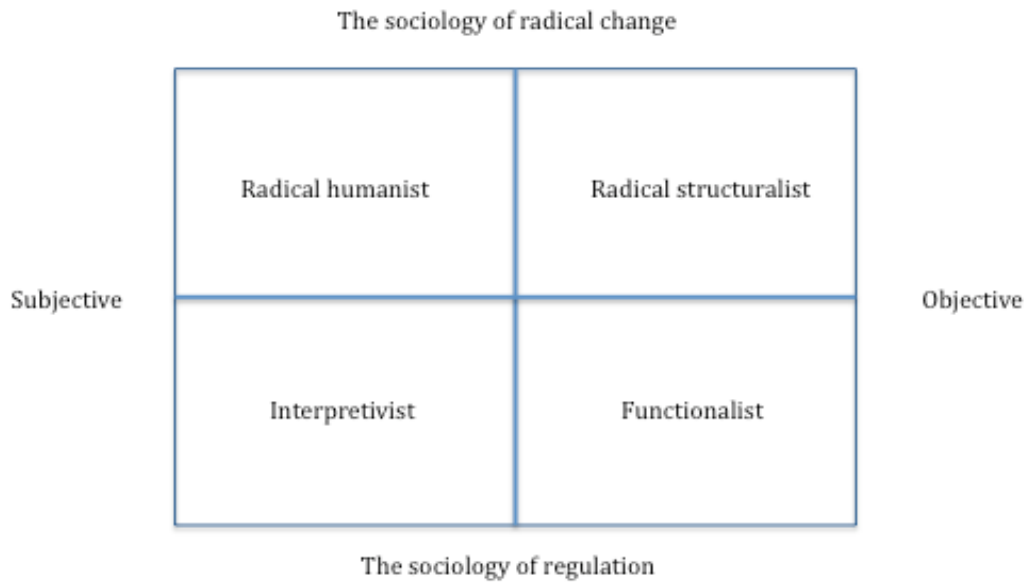


Figure 3.1 Social paradigms by Burrell and Morgan (1979)

As described in sections 3.1.1 and 3.1.2, based on the ontological and epistemological schools of thought in combination with the assumptions about human behaviour, the most appropriate approach to this research study was to combine a constructivist ontological approach with an interpretivist epistemological perspective.

This approach is a common choice in social research as the constructivist ontological view is most often combined with an interpretivist school of thought (Burrell & Morgan, 1979; Saunders et al., 2007).

Elaborating on this, figure 3.2 depicts the relationship between the different constructivist and objectivist paradigms.

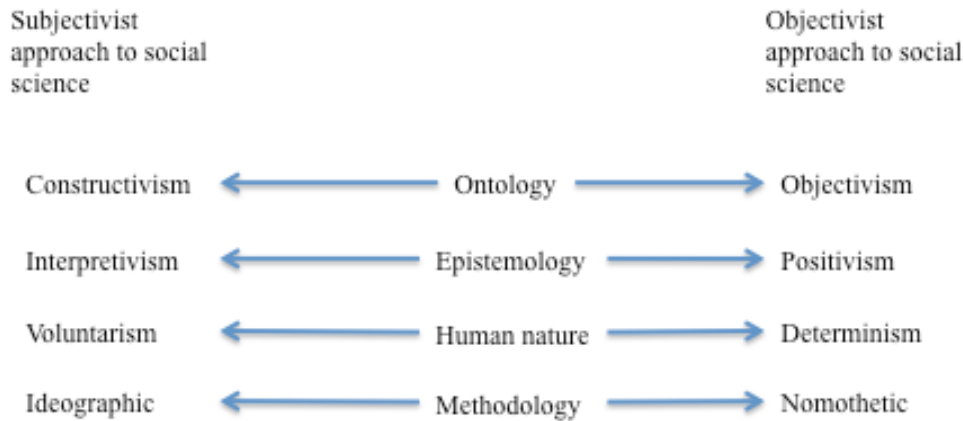


Figure 3.2 The subjective / objective dimension by Burrell and Morgan (1979)

As can be obtained from figure 3.2, the approach this research took was consistent with the constructivist paradigm of social research and as a study is situated in the bottom left quadrant of figure 3.1. More precisely, this approach adheres to the perspective that humans are active and aware of what is happening in social situations, capable of making conscious choices about actions, rather than actions of humans being motivated from external structural forces of society (McNeill & Chapman, 2005).

Nonetheless, it is important to note that these paradigms, which are applied to view and make sense of the world, are constantly challenged by anomalies that cannot be explained by current paradigms (Bryman & Bell, 2007) and thus are often revised or combined with other paradigms leading to a paradigm shift (Grix, 2001).

As outlined in sections 3.1.1 and 3.1.2, ontology as well as epistemology represent continuums between constructivism and objectivism or interpretivism and positivism (Kuhn, 1996; Economidou-Kogetsidis, 2011) amongst which researchers must position their studies.

As the research demands the view that people assume roles and are conscious decision makers of their actions, which the researcher agrees with, this study, as justified in sections 3.1.1 - 3.1.3, took a constructivist interpretivist approach.

Furthermore, given the nature of the research in combination with its philosophical approach, the research relied on qualitative data. This is as qualitative data is more interpretive in nature (Grix, 2001) and seeks characteristics, qualities or inherent traits (Landman, 2000). Quantitative measures on the other hand typically focus on numbers or statistics, which enable counting, measurement and mathematical comparison (Grix, 2001).

As can be obtained from figure 3.2, this type of approach is closely associated with positivism, whereas the ideographic or qualitative approach is closely linked to the interpretivist approach. Due to this, quantitative methods are more closely suited to test theory, whilst qualitative measures more commonly focus on the interpretation of historical or cultural significance, generating theory. Based on this, quantitative data is more conducive to objective research and thus of limited value when following a subjectivist trajectory.

3.2 Research logic

Having chosen and justified the philosophical and paradigmatic approaches for this research, the next stage of the research plan revolved around the research logic (Bryman & Bell, 2007; Saunders et al., 2009).

The research logic describes the method or steps taken in research and, like different methodologies, defines the ways in which knowledge is produced or obtained from research. This is described in section 3.1 and was informed by the paradigmatic assumptions of the research (Grix, 2001).

Research logic offers two distinct approaches, which revolve around a deductive and an inductive model (Bryman & Bell, 2007; Saunders et al., 2009). The deductive approach is concerned with the deduction of hypotheses from existing knowledge and then continues by empirically scrutinising or testing these (Bryman & Bell, 2007). This approach is also known as hypothetico-deductive research, which is dedicated to generating hypotheses from theory to prove or disprove these by means of empirical data (Grix, 2001).

Holistically, deductive research is based on clear assumptions that will be used to understand or solve particular research problems (Grix, 2001). Because this approach is based on theory, deductive research is theory driven (Grix, 2001) and most commonly applied in positivistic research approaches (Allan, 2009).

Following this approach, theory that is generated forms the basis for governing the collection of data. As a result of the outcome of the testing of hypotheses, theory will be confirmed or revised as depicted in figure 3.3 (Bryman & Bell, 2007).



Figure 3.3 The process of deduction by Bryman and Bell (2007), p. 11

The alternative to the deductive or top-down research logic is the inductive or bottom-up approach. Inductive research is most commonly associated with the generation of reasoning from the particular to the general (Grix, 2001). This is as inductive research generates knowledge from conclusions of the particular leading to theories or abstract ideas (Grix, 2001).

More specifically, applying inductive research logic, the researcher deduces the implications of their research to form theory, which did not previously exist, initiating the research in the first place (Bryman & Bell, 2007). Following this research logic, theory is the product of research as depicted in figure 3.4 (Bryman & Bell, 2007).

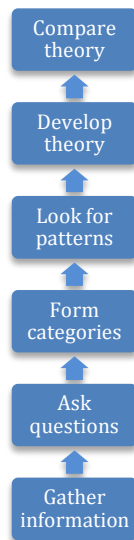


Figure 3.4 The process of induction, by Bryman and Bell (2007), p.12

Given this approach to research, inductive research is most commonly associated with interpretivism (Grix, 2001; Allan, 2009) and is based predominantly on qualitative data, as can be observed from figure 3.5.

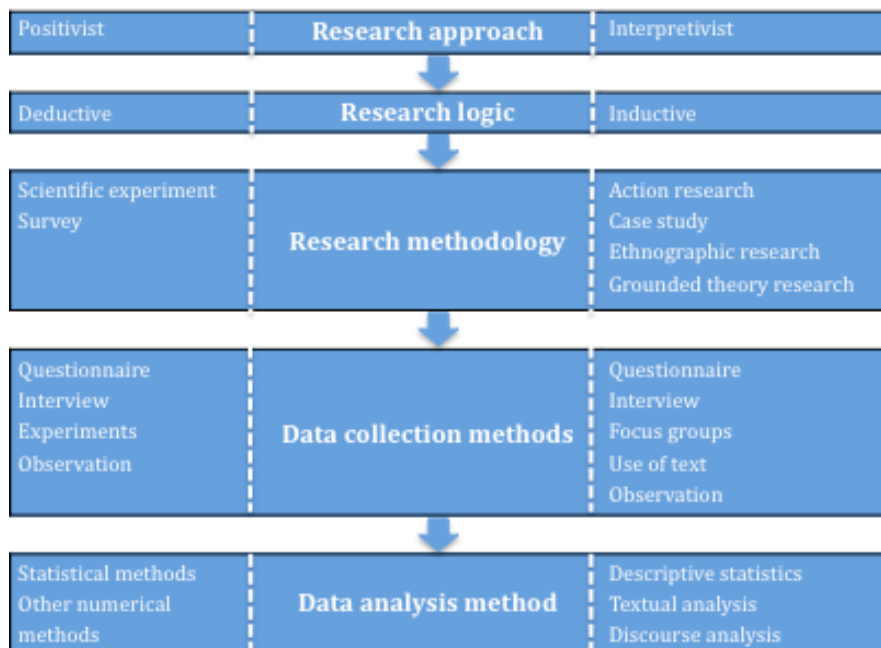


Figure 3.5 A simplified summary of the research process by Allan, (2009)

Reflecting on the philosophical position of this research study, having identified a theory gap around how organisational culture can be employed to support and improve risk management practices along supply chains, the research logic of this study had to be inductive. Moreover, as no theory existed elucidating the

nature of the relationship between the concepts being researched, a deductive approach to this study would not have been credible or possible (Saunders et al., 2009).

Despite this choice, it is important to note, that a deductive logic harbours an element of induction just as induction includes a degree of deduction (Bryman & Bell, 2007). This is as the deductive process contributes and shapes theory, just as the inductive research process may render the researcher searching for conditions in which their theory may be proved or disproved (Bryman & Bell, 2007) beyond the initial generation of theory.

Owing to the above, this study took an inductive approach to generate theory which in later research may be used in deductive studies such as surveys for example, to test the theory further by proving or disproving it.

3.3 Research methodology

Following the prior philosophical considerations including the critical deliberation of axiological impacts and the declaration of the research logic, the next stage of the research process was to ascertain the most appropriate research strategy or methodology (Allan, 2001). According to research methodology literature, this should logically follow the chosen research path and is in line with figure 3.5 above.

Derived from the Greek *methodos*, this section revolves around “the path towards knowledge” and the “reflections on the quest for knowledge-gathering” (Grix, 2001, p.29). Due to its definition, methodology is often misunderstood and used interchangeably with research methods, the research approach and on occasion the paradigmatic approach (Grix, 2001).

Given this confusion, it is important to outline the perspective this research takes, which is that whilst epistemology is representative of the overarching philosophical nature of research and concerns the origin, the limitations of human knowledge and the way in which knowledge is gathered, methodology

focuses on the discussion of how specific types of research should be undertaken (Grix, 2001).

Thus, methodology is representative of the critical study of the research methods and their use (Grix, 2001). Methods in turn are concerned with the techniques and procedures researchers employ to gather and analyse data (Grix, 2001). The methods used in this study will be outlined in section 3.5.

According to Grix (2001) as well as Allan (2009), the methodological approach of the research is supported by and reflected in particular ontological and epistemological positions. Due to this, the ontological and epistemological stance of a research project, in part determine the approach and research methods of a project, as these are at best aligned with the systems of understanding and researching reality (Grix, 2001).

Given this basis, methodology deals with the logic of research and is concerned with the modality of generating and testing theory (Grix, 2001; Saunders et al., 2007; Bryman & Bell, 2007).

Hence in pursuit of aligning the research approach or methodology with the philosophical underpinnings of this study (Creswell & Clark, 2006), the subjective nature of the research and its resultant positioning as constructivist interpretivist needed to be respected. More specifically, as the research considers participants to have an active role in shaping social phenomena, it was imperative to include and examine these roles and interactions when carrying out this research (Saunders et al., 2007).

As the design of the methodological approach must reflect the philosophical assumptions of the research (Creswell & Clark, 2006), Allan (2009) proposes that action research, case studies, ethnographic research and grounded theory research present the most appropriate methodologies to contribute to knowledge generated through the chosen philosophical approach (figure 3.5).

This view is largely consistent across literature (Saunders et al., 2007; Bryman & Bell, 2007).

Considering the different available options, action research focuses on the management of change and according to Saunders et al., (2007) encapsulates the close partnership between practitioners and researchers. This iterative approach to research generally presents a spiral, entailing three levels of enquiry including the purpose of the research, the involvement of practitioners and the process of diagnosis, planning, taking action and evaluation (Saunders et al., 2007).

Given this background, action research is most commonly applied to focus on action and is used to promote change in organisational situations, in which the researcher takes part (Saunders et al., 2007).

Owing to figure 3.5, an alternative methodological approach is presented by the case study (Allan, 2009). This approach is representative of a strategy for undertaking research in the form of an empirical investigation of a specific contemporary phenomenon within its context. To do so following this methodology, it is necessary to evaluate different sources of evidence (Saunders et al., 2007). Case studies are generally used to study contemporary phenomena based on a restricted sample of a population in detail (Grix, 2001). The case study methodology is a highly common approach to research in supply chain management with around 31% of all research carried out, using this approach (Burgess et al., 2006). In contrast to other methodologies, this form of research allows for the use of a variety of quantitative, as well as qualitative methods to generate knowledge about contemporary phenomena in their contexts (Grix, 2001).

Case study research features three dominant types (Yin, 2002), which are reflective of either a descriptive, exploratory or an explanatory nature. Of these, the descriptive case aims to provide a detailed account of a particular issues, persons or processes (Grix, 2001). The exploratory case study appears most relevant as it traditionally aims to explore an area with a view to generating an

understanding of contemporary phenomena (Mills et al., 2010). On the other hand, the explanatory case approach is the most common approach in social sciences research of this type (Grix, 2001). This approach seeks to generalise results by generalising findings from a single case to other cases (Grix, 2001).

Ethnographic research, as the name suggests is most commonly used to research behavioural patterns between group members, symbols of identity formation, language and so forth (Grix, 2001). This type of research is rooted in anthropology and aims to explain the social world in the way that inhabitants would describe it (Saunders et al., 2007). This requires the researcher to engage in the culture or language setting over extended periods of time to experience the social world being researched (Saunders et al., 2007).

The last most common research methodology as proposed by Allan (2009), revolves around grounded theory. Grounded theory as introduced by Glaser and Strauss (1967) is often regarded as the purest example of theory building through a combination of inductive and deductive research logic (Saunders et al., 2007).

This research methodology is most commonly applied in pursuit to predict or explain behaviour with an emphasis on building theory (Goulding, 2002). Moreover this approach to research promotes the building of theory and hypotheses of relationships between concepts post data collection (Grix, 2001). Moreover, the grounded theory methodology seeks to interpret data in the context of the social and cultural surroundings of the research (Holloway, 1997).

However, the grounded theory strategy does not offer data collection methods (Denzin & Lincoln, 2000) and thus grounded theorists have been criticised for collecting insufficient or inappropriate data (Lofland & Lofland, 1984). As a result, grounded theory can be based on and uses various forms of data collection approaches (Star, 1989).

Holistically, the grounded theory approach focuses on the generation of early analytic schemes, rendering the collection of data problematic or disputed (Denzin & Lincoln, 2000). Given this criticism, Deniz and Lincoln (2000) argue that most grounded theory depends on data collected through field or ethnographic research.

Having identified and discussed the most commonly applied research methodologies, it has become apparent that the ethnographic as well as the action research based approaches were not suitable for this study. This is as the research aims and objectives could not be aligned with the more general applications and output of these approaches.

In fact, whilst ethnographic research focuses on researching behavioural patterns, similar to this research in that it seeks to explore relationships between concepts, it focuses on the behavioural patterns between symbols, languages, and members of groups for example. This was significantly different to the aims of this research, as a result of which this approach was unsuited.

Equally, as this research was not aimed at exploring changes in organisational situations by way of focusing on the management of change, an action research approach too was unsuited.

On the other hand, the case study approach appeared much more suited to this study, with some relevance also of the grounded theory approach. As it is vital that the design of the methodological approach is aligned with the philosophical assumptions of the research, which guide the data collection and analysis (Creswell & Clark, 2006), a classification model by Ellram (1996) along with others was employed to aid with this decision (table 3.1).

Table 3.1, Classification of research methods according to key research objectives and questions, adapted from Ellram, (1996), p. 98

Objective	Question	Examples of appropriate methodologies
Exploration	<p>How, why</p> <p>How often, how much how many, who, what, where</p>	<p>Qualitative</p> <ul style="list-style-type: none"> • Experiment • Case study • Participant observation <p>Quantitative</p> <ul style="list-style-type: none"> • Survey • Secondary data analysis
Explanation	How, why	<p>Qualitative</p> <ul style="list-style-type: none"> • Experiment • Case study • Grounded theory • Participant observation • Ethnography • Case survey
Description	<p>Who, what, where, how many, how much</p> <p>Who, what, where</p>	<p>Quantitative</p> <ul style="list-style-type: none"> • Survey • Longitudinal • Secondary data analysis <p>Case study</p> <ul style="list-style-type: none"> • Experiment • Grounded theory • Participant observation • Ethnography • Case survey
Prediction	<p>Who, what, where, how many, how much</p> <p>Who, what, where</p>	<p>Quantitative</p> <ul style="list-style-type: none"> • Survey • Longitudinal • Secondary data analysis <p>Qualitative</p> <ul style="list-style-type: none"> • Case study • Experiment • Grounded theory • Participant observation • Ethnography • Case survey

When reviewing table 3.1 based on the research questions as outlined in section 2.9, the case study methodology appeared most appropriate. This is as three of the research questions including research question four fitted the exploration objective, whilst the fourth matched the descriptive objective. Applying this framework, merely one of the research questions fitted the application of a grounded theory approach, whilst all matched a case study approach.

Taking this further, it is also outlined in literature that the nature of the data that was to be collected, played a key role in the identification of the necessary research methodology. Bearing in mind the subjective nature of the research study, the concepts and the empirical nature of the data, table 3.2 advocated the use of the case study methodology or the ethnographic approach. Whilst the case study methodology appeared to be a strong match using this second indicator, the research did clearly not represent an ethnography and had already been dismissed using indicator one (table 3.2).

Table 3.2, Basic research design, by Ellram, (1996), p.96

		Types of analysis	
		Primarily Quantitative	Primarily Qualitative
Type of data	Empirical	Survey data, secondary data, in conjunction with statistical analysis such as: Factor analysis Cluster analysis Discriminant analysis	Case studies, participant observation, ethnography. Characterised by: Limited statistical analysis, often non-parametric
	Modelling	<ul style="list-style-type: none"> • Simulation • Linear programming • Mathematical programming • Decision analysis 	<ul style="list-style-type: none"> • Simulation • Role playing

Reflecting on the recommendations made based on table 3.1, clearly advocating the necessity to employ a case study method, table 3.2 further cemented this view. As the research necessitated a qualitative, empirical approach based on the research gap, the nature of the researched fields, as well as the objectives of the study, table 3.2 clearly recommended the use of a case study method. Moreover, reflecting on table 3.2, the grounded theory approach was not featured in the primarily qualitative, empirical research.

Moreover, whilst the grounded theory approach is most commonly used to seek relationships between concepts (Grix, 2001), according to Ellram (1996) this methodology was not ideally suited to the objective of this research. This is, as grounded theory approaches tend to develop new theory in largely under researched fields (Grix, 2001; Saunders et al., 2007). In the case of this research, however, it was clear that a relationship between organisational culture and supply chain risk management existed, yet the nature of the relationship between the concepts was unknown.

Furthermore, owing to the poor data collection methods grounded theory is commonly criticised for in combination with a mismatch of three out of four research questions, and only one partial match, it was evident that this methodological approach to the research was non-optimal.

Additionally, whilst both Eisenhardt (1989) and Benbasat et al., (1987) argue that the grounded theory approach would amplify the empirical validity and generalisability of the research, generally a weakness of case studies, Strauss and Corbin (1990) argue that it is best not to conduct a literature review prior to data collection. They advocate that in cases where research components or parts of the research components have been researched in depth⁴, it is highly likely that existing theory would be tested rather than new theory would be generated.

Thus, in an attempt to avoid any distortion of the research outcome or a breach of the philosophical underpinnings of this research, a grounded theory approach had to be dismissed.

Having identified the case study approach to have been the most suitable methodology, Yin (2002) maintains that case studies are ideally suited to researching complex organisational and management studies, which is reflective of this research. In extension to this, the case study methodology enables detailed investigations of meaningful characteristics of real life occurrences. In

⁴ This applies to the research components of organisational culture and supply chain risk management individually, not in connection to each other.

fact, Benbasat et al., (1987) enunciate that the case study methodology is ideally suited to exploratory investigations, which was the objective of this study.

Similarly to the framework provided by Ellram (1996), Yin (2002) also provides a structure outlining the suitability of different research methodologies based on the phrasing of the research questions (table 3.3).

Table 3.3, Relevant situations for different research strategies, as adapted from Yin, (2002), p.6

Strategy	Form of research question	Required control over behavioral events?	Focuses on contemporary events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case study	How, why?	No	Yes

Amongst the available strategies as outlined by table 3.3, the case study methodology was the most relevant. This is as the research questions revolved around 'how' and 'why' questions. Whilst one research question was a 'what' question, table 3.1 advocates its suitability to a case study approach when the objective is to be descriptive, which was true of the particular research question.

Moreover, in the case of this research the focus was on contemporary events and no control over the behavioural events of the sample was required. Synthesising tables 3.1 and 3.2 in the context of the intended research all indicators demanded the application of a case study approach.

This was reflected in that around 31% of the research in the field of supply chain management is based on case studies compared to a far lower percentage

employing a grounded theory approach (Burgess et al., 2006), highlighting the relevance of this approach in the given field.

Considering all perspectives and critical discussion points, honouring the adherence to ontological and epistemological guidelines, a case study methodology was clearly the most suitable approach to this research. This was reflected in that the aim and objective of the research were to provide a basis for generalisation to theoretical propositions, rather than to the population in general (Yin, 2002). Moreover, it was not anticipated to develop a theory outlining that different concepts are related to one another, yet to explore the nature of the relationship between two concepts which literature outlined were connected. This process was most suited to a case study methodology and thus a grounded theory approach to this study in its sole application or in combination with the case study methodology had to be dismissed.

In support of this, it is argued that the field of supply chain risk management is dominated by contemporary phenomena in which behavioural and contextual boundaries are not vivid enough, to employ methodologies other than a case study (Yin, 2002).

3.3.1 Case study design and research design components

Having been led to employing a case study approach in section 3.3, it has also been identified that given the research area and aims of the study, an exploratory case study approach was most suitable.

Moreover, as it was anticipated to explore the nature of the relationship between organisational culture and the approach to supply chain risk management as outlined in section 2.9, it was necessary to research more cases than one. It was deemed that a thorough analysis of a single case (Kumar, 1999) may have provided a detailed understanding of the phenomenon in one context (Grix, 2001; Yin, 2002), yet this would only have provided an overview of the

relationship in one setting, rather than an understanding of the relationship between the concepts more generally.

In order to enable a true understanding of the relationship between organisational culture and the approach to supply chain risk management, it was necessary to consider this relationship in a number of different contexts. This necessitated a multiple case approach (Grix, 2001; Yin, 2002). However, working with a number of cases as opposed to a single case is often seen to compromise the depth of the individual cases (Saunders et al., 2007).

In the case of this research, however, it is advocated to be more valuable, in fact imperative to collect data from different cases enabling the comparison of these as an understanding of differences in varied contexts was anticipated (Yin, 2002). As a guide to choosing the most appropriate case study design, Yin (2002) provides a framework designating the applicability of different designs to different research projects (figure 3.6).

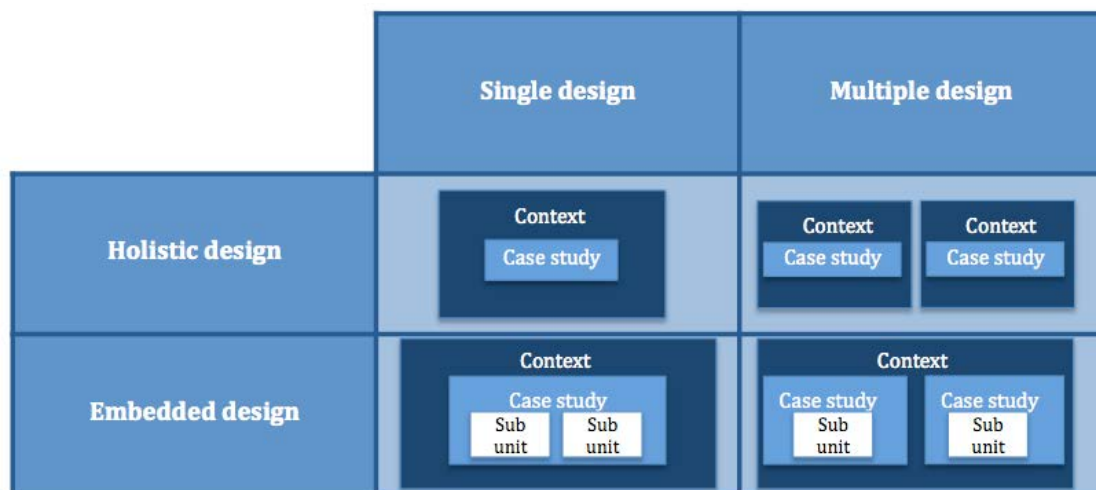


Figure 3.6 Basic types of designs for case studies by Yin (2013), p. 46

Having identified the necessity to employ a multiple case approach to enable the comparison between cases, the next stage was to identify whether a holistic or embedded design was required (Yin, 2013).

This decision was based primarily on the unit of analysis of the study, which was a component of the research design (Yin, 2013). The components of the research

design revolve around the research questions of the study, the propositions (if necessary), the unit(s) of analysis as well as the logic, linking data to the propositions and the criteria for interpreting the findings (Yin, 2013).

Having outlined the research questions in section 2.9, it was further necessary to outline the propositions of the research, guiding the search for relevant data in pursuit of answering the research questions (Yin, 2013).

The proposition of the study was that as literature outlined for organisational culture to have an impact on the way organisations do business, organisational culture also had an impact on the approach to supply chain risk management. Thus organisational culture could represent an important vehicle to optimising supply chain risk management. It was argued that by understanding the nature and relationship between different organisational cultures and approaches to supply chain risk management, a significant contribution could be made by way of offering alternative routes to increasing the efficiency and effectiveness of amplifying supply chain resilience.

Given the above proposition of the exploratory research study, the unit of analysis was represented by the different companies or cases. This was as each organisation was studied as a particular case in its context, rather than departments or individual persons within the organisation (Yin, 2013).

Moreover, as the different core concepts such as organisational culture exist as a result of the interaction of actors in each organisation collaboratively, the unit of analysis had to be the organisation as a whole, rather than the concepts or individuals. As a result of this, each organisation was representative of a 'case', which was researched in depth.

Further justification for the different organisations to represent cases, was provided by the phrasing of the research questions as presented in section 2.9. The questions were specifically designed to fill a research gap which revolved around the ability and modality to employ organisational culture to improve risk

management, demanding a multiple case approach with different cases as a basis for exploration and theory building.

The components revolving around linking data to propositions and interpreting the findings will be outlined in section 3.5.

3.4 Case selection

Based on the necessity to carry out research following a case study methodology, the next stage of the research process was to identify a suitable process for the identification and selection of cases to be researched.

As it was not feasible to collect data from all possible organisations, a sampling technique needed to be devised that reduced the amount of data to be collected whilst still representing the wider population (Saunders et al., 2007). This was necessary to derive a comprehensive understanding of the event under study (Fidel, 1984). Moreover, this allowed for the credible development of theoretical statements about the observed phenomenon (Fidel, 1984).

However, whilst case studies are an established methodology to generate an in-depth-understanding of certain phenomena under study (Marshall & Rossman, 1999), it was important to select an adequate sample in size, allowing for the development of preliminary theory describing a phenomenon (Eisenhardt, 1989).

Moreover, Yin (2002) enunciates that whilst approaches such as survey research rely on representative sampling, this method was not appropriate for the case study methodology. In the case of the chosen methodology, the size of the cases was determined by the number of cases necessary, to obtain saturation (Yin, 2002). Saturation is reached when no new findings are revealed through the data from additional cases.

In addition to this, Saunders et al., (2007) advocate that the number of cases has a direct impact on the depth to which different cases can be investigated. They argue that the less cases a study researches, the more rigorous the investigation can be into each case (Saunders et al., 2007). This is further supported by Yin (2013).

Combining the above statement with the detail required by the designated research questions and the arguments from section 3.3.1, it was evident that more than one case is necessary. Equally, it needed to be ensured that the number of cases needed to be kept fairly small in order to research each case in sufficient depth as advocated by Saunders et al., (2007), Yin (2013), Eisenhardt (1989) and others.

Reflecting on this, it is argued that a single case would not have been sufficient to answer the research questions (see section 3.3.1), whilst research across too many cases would also have compromised the findings and the quality of the research. In other words a sample that was either too small or too large would not have enabled the generation of quality conclusions or theory, failing the aims and objectives of the research (Eisenhardt, 1989; Saunders et al., 2007; Yin, 2013).

Reviewing literary recommendations on the most appropriate sample size, Yin (2013) as well as Ellram (1996) advocate that six to ten cases are representative of a suitable sample size although this decision is relative to the aims of each individual research project.

Owing to the work of Meredith (1998) and Eisenhardt (1989), however, it is advocated that a sample size of around four to ten cases is sufficient. These authors focus more on the relationship between the number of cases and the depth of studies and advocate that a lower number of cases is more favourable, so long saturation can be reached and a thorough, quality comparison of cases is enabled.

On the other hand, authors such as Lijphart (1971, 1975), Meckstroth (1975), Przeworski & Teune (1970), as well as Skocpol and Somers (1980) advocate that in certain circumstances a study using two cases can be adequate, providing saturation is reached and the objectives of the research can be achieved.

Reflecting on the literary recommendations regarding adequate sample sizes, it appeared that ten cases were the absolute maximum for case studies whilst a single case was the absolute minimum. Whilst studies comprising of a single case or two cases may have been sufficient, it is argued that a sample of four was an adequate number necessary to develop complex theory.

Given the depth of research within cases that was required to contribute to knowledge in line with the aims and objectives of the research, it was decided to research four case studies in detail. A sample of four was adequate as it balanced the level of depth required with the overall information collected, with the number of cases needed to make justifiable inferences regarding the phenomenon under investigation. Moreover, as the competing values framework features four different types of culture, it was necessary to represent each of the cultures equally, minimising biases between cultures.

3.4.1 Case selection technique

Following the decision to research four cases in-depth (to answer the research questions based on the research gap), it was important to outline the techniques available to identify suitable cases.

Sampling techniques available for this can be divided into two distinct forms including probability and non-probability samples (Saunders et al., 2007). Probability samples assume that it is possible to answer research questions by statistically estimating the features of a population based on a sample of the population (Saunders et al., 2007). As a result of this, probability samples are used mostly in experimental or survey research (Bryman & Bell, 2007; Saunders et al., 2007).

In contrast to probability sampling techniques, non-probability sampling techniques are used when it is not possible to answer research questions based on statistically oriented measures of a population (Saunders et al., 2007). Whilst it may still be possible to generalise findings based on non-probability samples to the population under research, the findings would not be valid on a statistical basis (Saunders et al., 2007).

Given the different technical approaches to sampling, non-probability sampling methods are most commonly employed for the purpose of case study research (Saunders et al., 2007). This is as probability samples are more closely related to the positivistic methods of natural sciences whilst non-probability sampling is more closely related to interpretivist research.

Nevertheless, according to Seawright and Gerring (2008), there is a danger that researchers introduce biases into their research when selecting cases in a non-probabilistic fashion. For this reason Sekhon (2004) advocates that a quantitative methodological approach to sampling is less biased. However, this is a perspective from a positivistic school of thought, which as explained in various sub-sections of chapter 3.0 was not an appropriate approach to this research.

Moreover, given the relatively small sample size that was necessary to answer the research questions appropriately, as elucidated in section 3.3.1 and 3.4, a probabilistic approach to establishing the sample size required would have led to a sample that was substantially unrepresentative of the population or phenomenon (Seawright & Gerring, 2008). According to the authors this is particularly true for samples, which constitute five cases or less (Seawright & Gerring, 2008).

Owing to the literary recommendations reviewed, it was been decided to employ a non-probabilistic approach to sampling cases. This approach is in line with the philosophical underpinnings of the research and was seen to enable the answering of the research questions reliably and in sufficient depth. In this context, sufficient depth is defined by an illustrative and representative sample,

encompassing all cultures represented by the cultural framework used for this research, reaching theoretical saturation, a state where the addition of new cases does not contribute any new insights. According to the reviewed literature, this would not have been possible employing a probabilistic sampling technique in the case of this research.

Having identified the necessity to employ a non-probabilistic sampling technique, it was essential to identify a particular approach within this type of sampling. According to Saunders et al., (2007), there are a number of non-probability sampling techniques as depicted in figure 3.7 below.

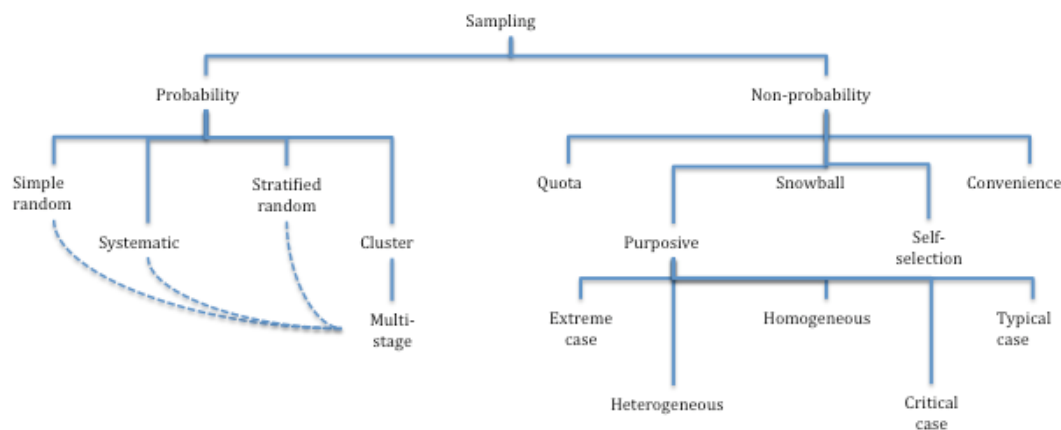


Figure 3.7 The different types of sampling by Saunders et al., (2007), p.207.

Reviewing the non-probability sampling techniques as depicted in figure 3.7, quota sampling is a technique similar to probabilistic sampling techniques as it aims to represent the population as a whole (Saunders et al., 2007). In contrast to this, convenience or self-selection techniques are more subjective, although leave no grounds for representation, negating the generalisation of findings in a statistical sense (Saunders et al., 2007).


Referring to the space between quota and convenience sampling as a continuum, purposive sampling, as well as snowball sampling are not as quantitatively focussed as quota sampling or as subjective as convenience samples. For purposive as well as snowball techniques, the sample size is dependant upon the research questions, research objectives, what needs to be investigated, what will have credibility and the usefulness of samples for example (Patton, 2002).

Following this, Patton (2002) argues that the validity and knowledge gained from the research is reliant on the data collection and analysis skills rather than the sample itself. As a result, generalisations about findings are made about theory rather than the population of which the sample is a part and is based on the theoretical inferences, which are based on the collected data (Saunders et al., 2007).

According to Saunders et al., (2007), snowball samples are most commonly used where the identification of suitable cases is difficult. As part of this technique, the identification of new cases is based on referrals of existing cases. Whilst this approach does not feature a high likelihood of representation, the selected cases will feature the desired characteristics (Saunders et al., 2002).

Similarly to snowball samples, purposive samples also have a low likelihood of representation, although this is determined by the choices of specific cases. Here the researcher may choose cases that are extreme, heterogeneous, homogenous, critical or typical in nature. Whilst purposive sampling is generally applied when the number of cases that are being researched is low, the focus in choosing samples, determining the nature of these, varies (table 3.4).

Table 3.4, Choosing non-probability sampling techniques, adapted from Kervin (1999) and Patton (2002) in Saunders et al., (2007), p. 228.

Type	Likelihood of sample being representative	Applicability	Nature
Quota	Reasonable to high, representation depends on selection of variables	Where probability samples are negated by cost and time constraints	Probabilistic
Purposive	Low, representation depends on researcher choice: Extreme Heterogeneous Homogeneous Critical Typical	Small samples Focus: Unusual or specific Key themes In-depth Importance of case Illustrative	
Snowball	Low, desired characteristics features	Cases are difficult to define	
Self-selection	Low, but self-selected	Mainly for exploratory research	
Convenience	Very low	Limited variation in population	Non-probabilistic

Evaluating the characteristics of the different non-random sampling techniques in table 3.4, a purposive sampling approach appeared most suited to this research. This was as a purposive or judgemental sampling approach allows the researcher to select those cases, which are most appropriate to answering the research questions in order to meet the research objectives (Saunders et al., 2007).

Moreover, given the research questions and objectives of this research, it is argued that quota, convenience and self-selection techniques are less conducive to reaching the objectives and answering the research questions than purposive or snowball techniques.

Having made this decision, snowballing appeared slightly less effective than purposive sampling for this research, as the representation of the findings is lower than that, derived through purposive sampling. As it was important for the

research findings to be representative on a theoretical basis, the purposive sampling approach was selected.

This type of sampling is most appropriate when sample sizes are small and where cases need to be informative enabling the exploration of phenomena (Neuman, 2000).

Having identified the purposive sampling technique to have been the most relevant, it was further necessary to outline the focus in the selection of cases. Making this choice it needed to be considered that the research was deemed to explore the nature of the relationship between organisational culture and the approach to risk management, based on which inferences were to be made, to improve the effectiveness of risk management along supply chains. Given the differentiated foci of the approaches, the heterogeneous approach appeared most suited.

Moreover, this approach required the researcher to choose maximum variation cases to explore and explain key themes that were being observed, amplifying the value of the research significantly. Following this approach, vastly different organisations were selected from different industries, being impacted upon by differentiated environmental specificities. This was seen to amplify the differences in variables of the cases, amplifying the value of the approach (Seawright & Gerring, 2008).

Cases were identified by means of detailed background research, enabling an understanding of the suitability of the study, as well as their applicability. More specifically, the first stage to identifying suitable organisations revolved around identifying market leading organisations which had experienced significant disruptions in their past. This was established by reviewing publically available company reports, stock exchange data and trade journals for example. Following this, organisations were approached using a contact letter to establish a dialogue, to generate interest and to set up an initial meeting. This enabled the discussion of the research and allowed for the researcher to interview at least

one contact person about their understanding of the organisation's culture, using the interview protocol as shown in appendix 2. Reviewing the notes from interviews in combination with researcher observation, as well as the publically available documentation cases were selected for further research.

Whilst all cases reflected the culture identified using this process, the selection process dictated to terminate the research should the culture have been different during further research. In such a case, a different company would have to have been selected using the same approach.

The different cases selected, including justifications are represented in section 4.5 along with an outline of the piloting approach in section 3.7.

3.5 Research methods and case study protocol

Having outlined and justified the research approach including the research logic, methodology, the case study design as well as the case selection technique and so forth in sections 3.1-3.4, the next sections of this chapter will focus on the research methods the research employed, as well as the development of the case study protocol.

3.5.1 Data collection methods; interviews and data collection

Given the background of the research including its philosophical position, the data to be collected needed to be qualitative in nature. To do so, the interview approach was most appropriate. This approach features four distinct techniques, revolving around structured, semi-structured, unstructured and group interviews (Grix, 2001).

Structured interviews are the most rigorous and inflexible approach to carrying out interviews (Grix, 2001). Using this approach, fixed questions are asked in a predetermined order, logging the responses of interviewees. This is repeated across all interviewees allowing responses to be compared directly on a question-by-questions basis. This approach removes any researcher input from the data collection process and in its nature is similar to a survey approach (Frey

& Fontana, 1991). Whilst this enables the mitigation of researcher influence, it also limits any opportunity to discover or explore unexpected areas (Grix, 2001).

Semi-structured interviews, as the name suggests, are similar to structured interviews, yet slightly more flexible in their application (Saunders et al., 2007). This approach requires the interviewer to ask a set of predetermined questions across all participants, yet allows him or her the freedom to explore unexpected areas or lines of enquiry (Grix, 2001). The results of these interviews may be textual or they may be compared, contrasted or converted into statistics depending on the questions (Grix, 2001).

Unstructured interviews are based on a random list of concepts or questions, which the researcher asks as he or she sees fit during the interview (Frey & Fontana, 1991; Grix, 2001). This technique is often used to develop research avenues or formal discussions, which were not previously considered. Data from these types of interviews may not be compared, as the flow of each interview is highly random (Grix, 2001).

In contrast to the above techniques, which tend to be carried out on a one-to-one basis, group interviews or focus groups involve a large group of individuals (Saunders et al., 2007). Whilst group interviews can follow one of the above three approaches (structured, semi-structured, unstructured), they involve groups of individuals relevant to a study (Grix, 2001). In such interviews, the interviewer acts as a facilitator (Punch, 2000) who introduces different topics for the group to discuss. Whilst this technique may prove beneficial in that participants can explain complex issues under research, there is a danger that facilitators push a group towards desired answers (Grix, 2001). Moreover, it may be argued that participants may not feel to be at liberty to discuss certain topics in attendance of certain other participants, compromising the data being collected.

Evaluating the different interviewing techniques, it became apparent that some interviewing approaches were more suited to this research study than others.

For example, where the data collected through group interviews may have been compromised through the lack of freedom for some parties to communicate their perception of reality, unstructured approaches were too flexible and uncoordinated to have provided the necessary guidance and structure to answer the research questions.

Moreover, whilst an unstructured approach to interviewing may have been beneficial when researching complex cultural realities, the diversity of the data would highly likely have rendered results to be incomparable. As this was necessitated by the research study, this approach transpired to be unsuitable. On the other hand, it is also argued that a structured approach would have been too inflexible given the subjective and complex nature of organisational culture, in that it would have mitigated any exploration of unexpected lines of enquiry (Grix, 2001).

Having critically reflected upon the benefits and drawbacks of the different interview types in light of the aims and objectives of the research, it was evident that a semi-structured approach to interviewing was necessary. This is also reflected in table 3.5, which assigns the relevance of different interview types to research categories.

Table 3.5, Types of interviews compared to research categories, adopted from Saunders et al., (2007), p.314.

	Exploratory	Descriptive	Explanatory
Structured		✓✓	✓
Semi-structured	✓		✓✓
Unstructured	✓✓		

✓ ✓ = more frequent, ✓ = less frequent

Even though the above table outlines semi-structured interviews to be more common in explanatory research, it also advocates its use in exploratory research approaches. This interpretation is consistent with the view of Frey and Fontana (1991) who denote the appropriateness of the chosen approach in field research. Moreover, owing to the necessity to replicate questions across cases in

order to compare data from different cases in pursuit of answering the research questions, an unstructured approach to the research had to be dismissed and a semi-structured approach was to be used.

Furthermore, even though it was expected that the collected data would be more targeted and generally less in quantity than if an unstructured technique were to be employed, the amount of data and complexity needed to be considered seriously, especially when researching multiple cases. This consideration is reflected in the choice to investigate four cases in depth (sections 3.3.1 and 3.4), keeping a healthy balance between the level of data and data manageability (section 3.4.1).

Nevertheless, it is important to note, that the use of interviews as a sole method to collect data is generally insufficient (Grix, 2001) and thus interview data was to be complemented by other sources of data as outlined later in this chapter. Beyond the identification of the most suitable interview technique, it is also imperative to demonstrate how each interview was conducted in detail.

Each of the semi-structured interviews followed a predetermined set of questions, which were replicated across all interviews within all cases. Interviews were held on a face-to-face basis, at the premises of the organisations that were researched. This enabled the researcher to observe not only the interviewee in their 'natural' work environment but also other employees. This way, the researcher was able to triangulate responses from interviewees with observations from within the different organisations. This form of cross checking responses goes beyond the triangulation between different cases more generally⁵. Moreover, researcher observations proved particularly useful in understanding and interpreting cultural facets of each organisation⁶.

The interviews that were carried out allowed the participants to add additional information where they felt it was necessary and enabled the researcher to

⁵ The different approaches to triangulating the study are discussed in section 3.6.

expand discussions in areas that had either not previously been considered or needed further explanation from sides of the interviewee. Using this technique the researcher was guided by the pre-set questions, ensuring the interviews were not led arbitrarily (Bryman & Bell, 2007). All interviews were recorded and subsequently transcribed to limit the confusion of context and to mitigate the risk of losing data (Bryman & Bell, 2007; Saunders et al., 2009).

In addition to this, a field notebook was also used in conjunction with a reflexive journal to record any additional data and information and to record critical and analytical thoughts about the work being undertaken. Beyond the initial collection of data, several follow up interviews could have been held, had additional questions arisen during data analysis or otherwise.

In addition to the interviews, published documents as well as other sources of data (e.g. emails, presentations, company reports / documentation and other relevant materials) were collected and reviewed critically. Beyond this, conducting interviews at the sites the interviewees' work at also allowed for researcher observation. Relying on multiple data collection approaches is highly common in inductive, theory building research and increased the overall quality of a study, having improved the substantiation of findings (Eisenhardt, 1989).

Moreover, data was evaluated on an individual basis, as well as it was triangulated with responses from other interviewees (Eisenhardt, 1989). Another purpose of this, was to provide an additional perspective to the research as well as it aided the establishment and evaluation of the internal validity of the project.

All records from the different cases were held digitally as well as in printed formats within designated folders. These were examined individually prior to cross-examining the contents. Further details on the analysis of the data can be found in section 3.5.2 and 3.5.3.

The data was collected from four purposely-selected case studies as outlined in section 3.3.1. Within these, interviews were held face-to-face with participants from different hierarchical levels of each organisation. This was important to examine if messages from participants were consistent throughout the different organisational levels of the cases. Involving different hierarchical levels within interviews aided in determining the integrity and validity of data within cases.

As cases had to be heterogeneous to maximise value for the study (section 3.4.1), yet display key themes, it was decided to select organisations from different industries on the basis that these had experienced supply chain disruptions and represented a leading organisation in their industry sector to some degree. This may have been through being the largest operator, having the highest market share, offering leading products and so forth. Here fore a detailed review of secondary data was necessary, prior to establishing contact with each of the cases.

Researching representative, heterogeneous and illustrative cases was important to maximise the ability to explore and explain key themes that were being observed across a varied sample, amplifying the value of the research. Moreover, selecting heterogeneous cases amplified the differences between variables, thus amplifying the value of the approach (Seawright & Gerring, 2008).

Based on the specific case requirements, background research was undertaken on different potential cases to determine their relevance for the study. This included detailed reviews of publically available company information such as website material, company reports and materials released through the press.

Depending on the suitability of different cases (based on disruption evidence and market position), a relevant individual of that organisation was contacted with a standardised contact letter to generate a dialog and to enquire the willingness of participation of the potential case company. This was essential to mutually minimise a potential loss of time and efforts between the researcher and a case company.

For positive enquiries a meeting was arranged during which the researcher could visit the relevant site and outline or present the research background in more detail, as well as a pilot of the interview was conducted. This was a key stage in identifying the dominant organisational culture. For this, the interview protocol was triangulated with publically available documentation as well as researcher observation. More specifically, the researcher's interpretation of the organisations cultures was guided by the competing values framework and used all data collected for determining an organisation's culture. More specifically, it was searched for traits and behaviours reflecting the organisational cultural descriptions featured in the competing values framework. Based on the closeness of these observations and the descriptions in the framework, organisations were classified. For the purpose of collecting relevant data to do so, the interview protocol proved highly useful.

An evaluation of this was sufficient to determine the suitability of a potential case. For example, if an organisation had experienced a significant disruption in the past, reflected a heterogeneous culture to the other selected cases and held a market leadership position, the research process with that company was continued. On the other hand, had one of these three areas not been met, the company would not have been selected for further research.

Where it was decided that a case was suitable, relevant interviewees were identified based on information from the pilot as well as other discussions from the first meeting. If all of these stages were completed successfully, subsequent interview dates were arranged for five interviews. From the point of contacting the organisation until research project completion, regular contact was kept with the relevant personnel in the case companies. This was important to inform companies about progress, as well as to enable the possibility to return to the company for further research if necessary.

Owing to the above, five candidates were interviewed per case as data from this number of interviews was valid and theoretical saturation within cases was reached. More specifically, when the data gathered from the different interviews

was compared and contrasted within cases, it became evident that the content of each of the interviews were consistent, and no opposing content was identified. As a result of the consistency of the responses with one another in combination with the consistency of these with the additional data collected, it was deemed that saturation within cases was reached. Moreover, the addition of new interviews or other data would not have contributed new or alternative findings.

Thus, the combination of the different sources of data from individual cases was sufficient as saturation was reached (Eisenhardt, 1989). Should this not have been the case after five interviews, further interviews would have been conducted until saturation was reached. Please see figure 3.8 below for a process flow detailing the identification of cases.

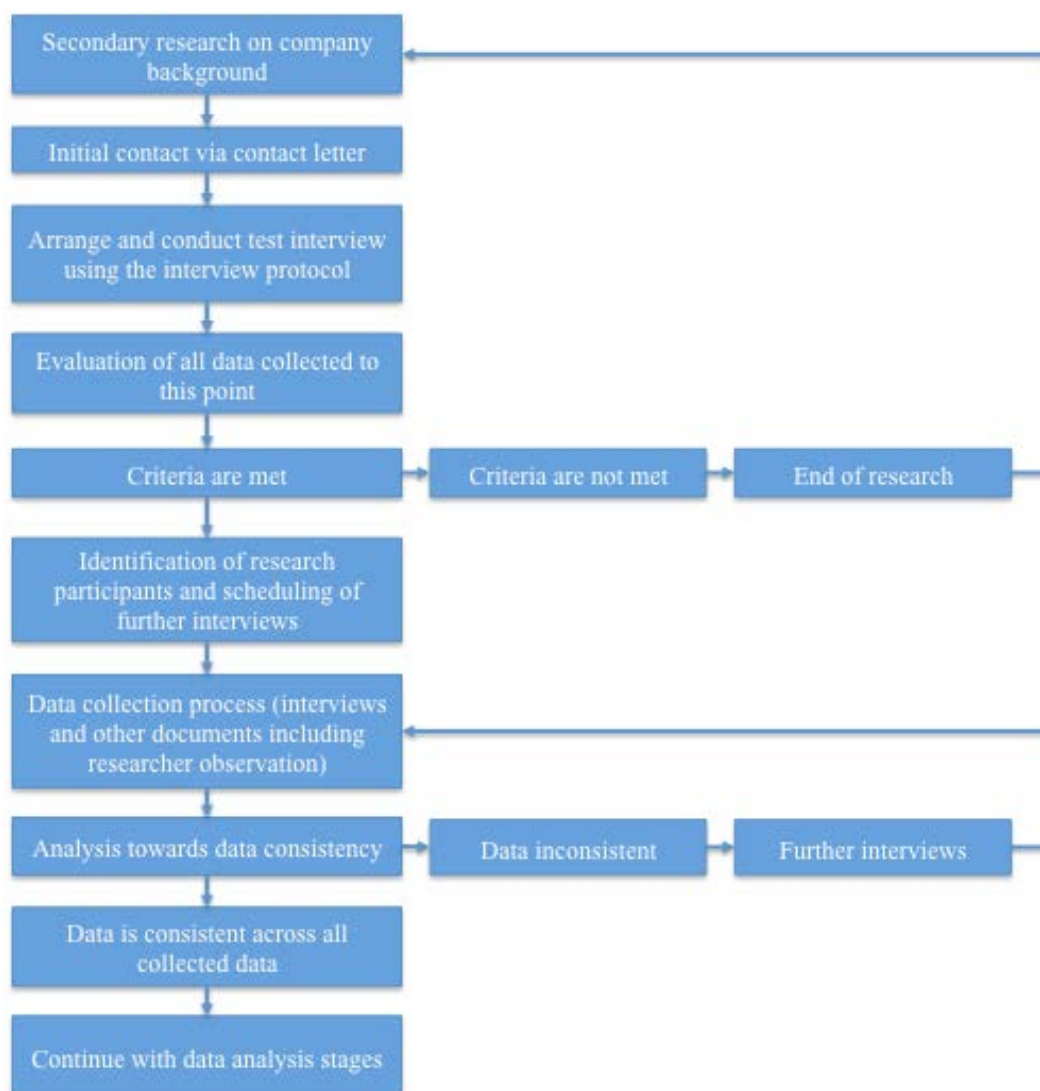


Figure 3.8 Case selection process flow diagram

A similar approach to the above was also used in maximising the reliability of the study generally. Here, harnessing the saturation of cases internally, in combination with findings from the pilot cases, it was ensured that the themes from different cases were consistent and not conflicting. More specifically, data pertaining to different risk management approaches and organisational cultures were compared and contrasted across cases to identify whether findings were consistent. Had this process indicated that cultural traits, shared by different organisations, reflected different approaches to managing risks, further research had to have been undertaken until all data sources led to a consistent finding. This would have necessitated the research of further cases beyond the four cases selected.

Interviews included at least two senior managers, two middle managers as well as one operations focussed candidate or shop floor equivalent, from relevant areas of the businesses⁷. Moreover, only candidates that had risk management experience, an understanding of the organisational culture within the organisation, or those who have worked through a disruption at the company or one of its customers were considered for interviews. Had the synthesis of the data provided by different participants within a case not been consistent, further individuals would have been selected applying the same criteria until saturation was reached.

This was essential as some or all of these experiences qualified candidates to provide data relevant to answering the research questions. To mitigate the general researcher bias in the selection of research participants (Robson, 2002), this research study clearly outlines the choice of organisations as well as informants based on their relevance in advance of selecting these.

In addition to the above, the research process demanded that ethical implications of the research were outlined (Spradley, 1980; Merriam, 1988;

⁷ Job roles of interview candidates are listed in the interview background sections for each case (sections 5.1.1, 5.2.1, 5.3.1 and 5.4.1).

Marshall & Rossman, 1989). As this research took an overt approach, it was possible to inform participants about the objectives of the research prior to interviews. Before each interview, participants were informed about how their input would be used and any questions about the interviews more generally were answered. It was also ensured to obtain written consent from participants. Where necessary a non-disclosure declaration was raised and signed by all relevant parties.

Given the above approach, interviewees participated at their own will and for the protection of candidates, it was been decided to keep participant as well as organisation names confidential. This was seen to raise participation along with the preparedness to contribute data freely. Moreover, the chosen approach was seen to eliminate any potential harm to participants as a consequence of their responses.

3.5.2 Interview questions and protocol development

Based on the data collection methods outlined in section 3.5.1, section 3.5.2 focuses on the development of the interview question protocol, which was adhered to throughout all interviews.

In order to increase the reliability of the research (section 3.6), in line with carrying out semi-structured interviews (section 3.5.1.1), it was necessary to develop an interview protocol (Easterby-Smith et al., 2002; Yin, 2013). Using this protocol, the researcher ensured the replication of the same approach and questions across all interviews, supplementing this with questions or discussions beyond the protocol where relevant (Grix, 2001).

Moreover, the semi-structured interview process allowed the researcher to probe responses and provided the freedom to enquire about areas candidates introduced which had not previously been considered (Saunders et al., 2007).

For the above-mentioned reasons, it was important to designate questions, allowing for the answering of the research questions. Questions were also

designed to enable the respondents to reflect on their own views on particular topics (Saunders et al., 2007). This was to provide a snapshot of the respondents' reality at the point of data collection (Marshall & Rossman, 1999).

Reflecting on the necessity to replicate interviews, it needs to be noted, however, that whilst an interview protocol delivers a common basis for interviews generally, every interview will be slightly different, depending on the respondents' feedback. To mitigate against this, an interview protocol was used and is seen to have been a vital response to maximising the reliability of the study (Saunders et al., 2007).

Based on the selection criteria for cases and interviewees, questions were designed in such a way that all participants could answer all questions. Interviewees did have the right to refuse to answer questions so long they could indicate their reasons for doing so.

As it was important to remain realistic in terms of interview durations with a view to participation levels (Saunders et al., 2007), it was decided to design a protocol of questions, which took around one hour (interviewing time) to complete. This ensured enough time was available to get sufficient data to answer research questions, whilst the amount of time was deemed acceptable for any research participant to invest in the research. It was expected that whilst some interviews would exceed the 60 minute target, others may not take 60 minutes.

Reviewing the research questions in section 2.9, it was decided to structure the interview questions in specific clusters. These clusters reflect different data collection areas relevant for the questions and provided guidance to the researcher and interviewee during interviews.

The first section of the interview protocol contained questions about the company background as well as the participant, providing a perspective for

analysis as well as a mechanism to double check the suitability of candidates for the research.

The second cluster of questions focused on the risk background of each organisation, probing for a definition of supply chain risk as a concept, enquiring about examples of supply chain disruptions, company reactions and future plans for mitigation to name a few. This section in particular provided an overview of the approach to risk management based on the organisational perception of risk as a concept.

The third and fourth clusters investigated the personnel resources as well as the processes for managing risk in each of the organisations. Here, specific questions sought to gauge the level of investment the companies had made to deal with risk from a personnel or financial perspective for example. Questions within this cluster also enquired about how the management of risks was allocated amongst staff and the process for doing so. Beyond this, questions were targeted to provide an insight into the future mitigation of risks and the planning for potential disruptions.

The fifth cluster revolved around organisational culture specifically and was designed to provide an overview of the participants' perceptions of the culture as well as their views on how this impacted operations more generally. It further investigated how the organisational culture was promoted and enquired how the organisational culture was impacted upon by operational variables.

Following the five main clusters, a small number of additional questions (cluster six) were posed revolving around the support the different cases needed to improve their risk management processes, which traits of the organisation were conducive to risk management, as well as those obfuscating the management of supply chain risk. For a copy of the interview protocol, please refer to appendix 2.

The clustering of the interview questions as outlined above, is based on different research questions. For example, clusters two and five provided data for answering research question one, whilst data from clusters three, four and five enabled the response to research question two for example (figure 3.8). Clusters two, five and the questions in cluster six provided an answer to question three (figure 3.8). The combination of the answers to all three research questions was then judged collectively, allowing the researcher to make inferences, evaluating behaviour and answering research question four (figure 3.9).

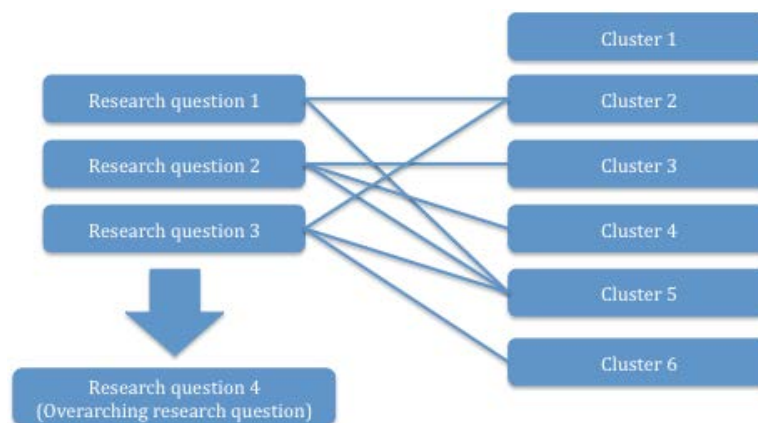


Figure 3.9 The relationship between research questions and interview protocol question clusters

In fact answers to research questions two, three, as well as research question four were based particularly on the cross-examination of responses on a case-by-case basis.

Through the answers to the posed questions, and in particular research question four, it was derived at theoretical as well as practical implications which constituted a large part of the contribution of the study as outlined in section 1.3. Beyond organising the interview in clusters, the questions were set-up in a way that the cross verification of respondent's answers was possible. For this, questions from different clusters were related and allowed the researcher to evaluate whether the responses of interviewees were coherent.

For example, respondents were asked if a budget was available for the management of supply chain risks in one section and in another if there was a member of staff focussing specifically on dealing with risks. Answers to these

needed be consistent, otherwise further questions would have been prompted, cross checking the respondent's replies. For the such situations, follow-up interviews would have been undertaken. This approach to examining and maintaining the chain of evidence (Yin, 2013) was a key step towards maximising the construct validity of the research.

3.5.3 Data analysis strategy

Prior to elucidating the details of the processes to analyse the collected data, it is necessary to outline the holistic approach to analysing the case studies. As outlined in section 3.3, the methodological approach to this research had to be a case study. Equally, it was decided to research four purposively selected case studies in depth, which would be interpreted to answer the research questions.

When reviewing literature on the available strategies to analyse case studies, the two most cited approaches are presented by Yin (2013) as shown in figure 3.10, and Creswell (2007) as depicted in figure 3.10.



Figure 3.10 Strategy for case study analysis by Yin (2013)⁸

Yin's (2013) model provides a clear step-by-step process for the analysis of cases. Following this model, the first stage revolves around the data collection, followed by the generation of individual case reports, which are then compared on a cross-case basis. This will generate theory encompassing the phenomena discovered in each of the cases. Based on these inferences, policy implications are defined and a cross-case report is composed. When reviewing this model, it

⁸ The whole model extends to the left yet for this illustration is not depicted. For a complete version of the model, please refer to Yin (2013, p. 57)

needs to be considered that the policy implications revolve around theory that was developed prior to the commencement of the study, which informs the choice of cases.

As this particular study was not based on a theory deduced from literature, yet pursued the generation of theory through inferences drawn from the collected data, it may be argued that Yin's (2013) approach was not suited to this research in its entirety.

An alternative to this strategy is provided by Creswell (2007). This model, as depicted below, appears to have a higher focus on the environmental specificity of each individual case, lending itself more to a constructivist interpretive approach as reflected by this study. Moreover, the model reflects a higher focus on inferring theory from case data than the model by Yin (2013).

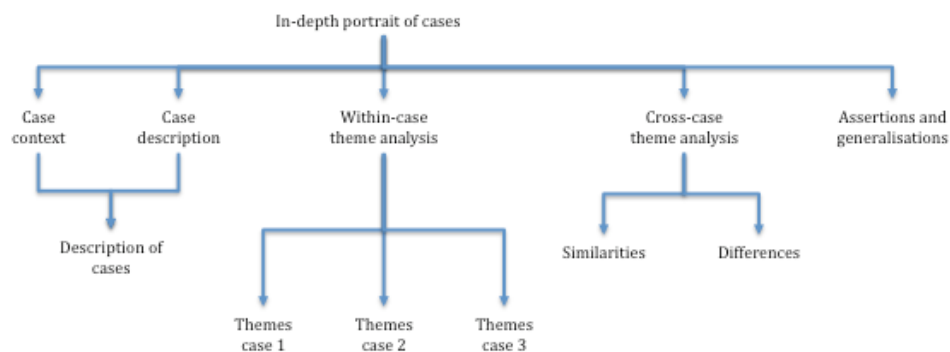


Figure 3.11 Framework for analysing case studies by Creswell (2007)

Reflecting further on figure 3.11, it appears that the model focuses exclusively on themes derived through coding in the cross-case analysis. As this study by its nature is interpretive, it is argued that a lot of relevant context may be neglected in analytic stages preceding the generation of themes. For the aforementioned reason, it is advocated that the framework in figure 3.11 is also less than optimal for this research study.

Synthesising the two most commonly cited strategies to analyse case studies, it was decided to combine those aspects of the existing models, which were most suited to this research, tailoring the existing strategies to the specific

requirements of the study. It is advocated that this amplified the relevance and value of the approach of the holistic analytic strategy. Moreover, the developed approach as depicted in figure 3.12 enabled the answering of the research questions and the accomplishment of the research objectives at a higher level than the existing models would have.

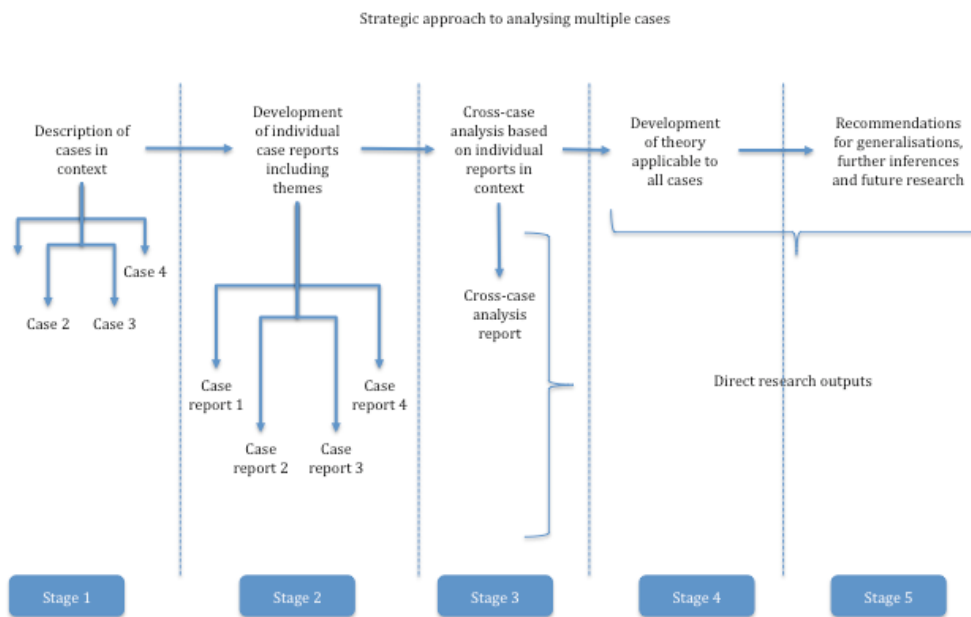


Figure 3.12 Strategic approach to analysing case studies

Following the above model, stages one and two revolved around the description and analysis of the chosen cases in their context. This is similar to the model of Creswell (2007), although it allows the generation of a report based on each of the cases as per Yin's (2013) model. These reports were then used in summary formats to be analysed against each other in a cross-case analysis in stage three. Based on the collective analysis a report was generated together with result summaries in different formats.

Using the findings from the individual case analyses as well as the findings from the cross-case examination the research questions were responded to directly, putting the findings into the context of existing literature. At this stage, theory was developed in pursuit of the research objectives, as well as guidelines for practitioners were developed encapsulating findings from all cases.

Following this, the limitations of the research were reflected upon and recommendations for further research were made. As the recommendations are rooted in the findings of the study they present a basis for future, deductive or further inductive studies.

3.5.4 Data analysis technique

Having outlined the strategy to analyse the chosen cases in pursuit of answering the research questions and to develop theory in line with the objectives of this study, it is necessary to outline in detail the techniques employed to analyse the data.

When reviewing literature one of the most used decision trees for qualitative analysis techniques, has been developed by Denzin and Lincoln (2000) (figure 3.13).

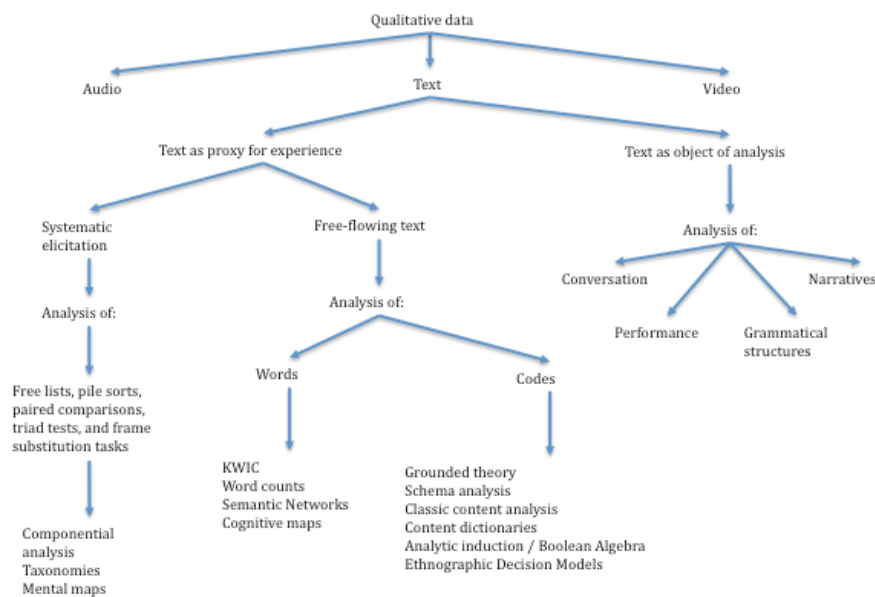


Figure 3.13 Typology of qualitative analysis techniques by Denzin and Lincoln (2000), p. 771.

Using figure 3.13 researchers employing the decision tree, ultimately being led to the most appropriate data analysis technique, based on the choices along the framework.

Using the above typology to inform the selection of the most appropriate data analysis technique, it needs to be outlined that the data collected was in text format. Moreover, given the philosophical background to this research as outlined in section 3.1, it was decided to view the collected data (text format) as an account or proxy, reflecting the experience of interviewees.

Adhering to this approach, the accounts of the interviewees provided a basis for reality, which the researcher interpreted further, rather than the text itself being

the object of analysis. This enabled researcher interpretation although the interviewee's response was used as a basis for reality for interpretation.

Continuing on the decision tree, as the data was representative of free-flowing text, it needs to be outlined whether the analysis would focus on individual words or codes, which were derived from passages of text for example. Given the interpretive approach of the study, which was necessitated by the nature of the research, it is advocated that the focus had to be on codes rather than words. This is as the codes approach was more suited to a qualitative approach than its' more quantitatively focussed alternatives, focussing on words.

Having derived at this stage, there were six techniques to choose from⁹. Out of those proposed by Denzin and Lincoln (2000), in figure 3.12, the grounded theory technique aims to make sense of experiences in the most rigorous and detailed manner possible Denzin and Lincoln (2000). Core to this process is the identification of categories or themes, which emerge from the codes developed from interviewee responses.

Following this particular technique, the researcher becomes increasingly grounded in the collected data and develops a richer understanding of how a phenomenon works, enabling the development of theory.

Schema analysis on the other hand, is based on linguistic and social traditions, assuming that people use cognitive simplifications to understand the complex world around them (Casson, 1983). This analysis technique focuses on extracting hints within text, to reconstruct thinking processes resulting in behaviours (Quinn, 1997). This technique predominantly studies discourse, metaphors and proverbs to make sense of data (Denzin & Lincoln, 2000).

An alternative to the above two data analysis techniques is the classical content analysis approach. This comprises of techniques to reduce text to a unit-by-

⁹ It is important to outline at this stage that the six available approaches are representative of techniques to analyse data, rather than methodological approaches.

variable matrix, analysing the resultant matrix quantitatively to test hypotheses (Denzin & Lincoln, 2000). Moreover, in contrast to other techniques, classic content analysis assumes that codes of interest have been established prior to analysis (Denzin & Lincoln, 2000).

A further technique to analyse data, revolves around content dictionaries. These are computer based and automate the coding of text. Here, researchers assign words to one or more categories based on predefined rules, which are then used to deconstruct texts by assigning them to words and categories.

Analytic induction and Boolean tests represent a technique for constructing causal explanations of phenomena by means of closely examining cases. This technique comprises of a series of stages, which define a phenomena and propose and explanation (Denzin & Lincoln, 2000). Following the formation of an explanation the next case is studied in a similar format and the explanation is reviewed on the basis of the next case. If the explanation is applicable, the next case gets reviewed. Should it not be able to explain a case, the explanation will be altered to include the case.

The last technique as per figure 3.13, revolves around ethnographic decision models. This technique is based on causal analyses, which predict behavioural choices depending on specific circumstances (Denzin & Lincoln, 2000). This technique is most commonly based on decision charts which employ “if-then” statements to link criteria to behaviours that are being researched (Denzin & Lincoln, 2000).

Having outlined the different relevant techniques to analysing data based on the decision tree presented in figure 3.13, it is also important to revisit the nature of the research, the questions, as well as objectives as their dimensions are distinctly different (figure 3.14) and inform the choice of data analysis techniques.



Figure 3.14 Dimensions of qualitative data analysis by Saunders et al., (2007), p. 479

Reviewing figure 3.14, it needs to be highlighted that an interpretivist approach, although often assumed, does not equate to a less robust or rigorous analysis (Tesch, 1990; Coffey & Atkinson, 1996), yet merely designates to the application of different analytical measures.

Respecting the inductive nature of the research, it was necessary to employ data analysis techniques reflecting this. In contrast to the deductive analysis approach, which is based on the utilisation of theory from literature, the inductive approach explores data to identify themes and issues to be focused on (Glaser & Strauss, 1967; Schatzman & Strauss, 1973; Strauss & Corbin, 1998; Yin, 2002). According to Yin (2002), such approach enables the development of a conceptual framework, which guides the analysis of data.

Considering the nature of the research, the research questions, research objectives, as well as the data that was to be collected, it was decided to employ a range of applications to analyse the data. This was in line with the assertions of Coffey and Atkinson (1996) and Tesch (1990) above, who argue that use of different analytical measures in interpretivist approaches leads to robust and rigorous analyses.

The research followed a clear case study approach in its methodological, methods as well as research strategy approach, which was necessitated by the research and outlined in section 3.3. Moreover, using different indicators to inform the choice of the data analysis technique in pursuit to maximising the value of analysis and subsequent findings as part of the case study methodology and strategy, this approach to analysing the data clearly was the most suited option.

Thus, rather than employing just one of the techniques to analysing data as outlined in figure 3.12, this research harnesses different techniques inherent in these to maximise the value for this particular study.

Even though the aim revolved around generating the most rigorous and detailed manner to analyse qualitative data in this research, much like a grounded theory approach, this research was not reflective of this method in that it also employed alternative techniques not reflected in this approach.

Thus the research approach is consistent with the case study methodology and utilised techniques to maximise the understanding and rigour of data analysis whilst minimising researcher bias.

Following the above approach, the first stage to analysing the data involved the careful transcription of interview recordings. This was done as soon as possible after interviews and additional notes from the reflexive journal and the field notebook were attached as an appendix to each transcript. Furthermore, notes about the general conduct of interviewees were also included.

Each interview was transcribed based on the interview protocol, altering questions where necessary and filling in participant responses on a question-by-question basis. This made it easy to identify responses and ensured responses were interpreted on the basis of what participants were asked. To minimise loss of data, transcripts were prepared straight after interviews and in parallel to the data collection process.

Following the initial completion of each transcript, audio recordings were listened to for a second time, correcting any potential mistakes within the transcript. This process is referred to as data cleaning (Saunders et al., 2007) and was seen as an important step in the preparation for data analysis as it ensured each transcript was identical to the interview that was conducted (figure 3.15).



Figure 3.15 Process flow depicting the approach to analysing the data

Whilst some sources suggest a benefit in having research participants review transcripts at this stage (Saunders et al., 2007) the risk of interviewees altering language and answers was seen to be too great a risk of compromising data integrity. However, participants were provided with the opportunity to review a draft case summary of their organisation post data analysis.

Subsequent to the completion of interviews within cases, and the collection of all other relevant data, transcripts of the interviews were prepared. These were reviewed line-by-line (Swandelowski, 1995), maximising the researcher familiarity with the data. Following this, all transcripts were entered into a database in full, for ease of further analysis.

Transcripts, were stored together with additional sources of data such as documents, notes, etc. During the initial stages of the data collection and analysis, it was started to identify emerging patterns for example (Saunders et al., 2007), which were noted in the reflexive journal. These included relationships between organisational cultural traits, organisational behaviour, risk management efforts and so forth.

In addition to using a reflexive journal and other tools as outlined above, it was also worked with intermediate diagrams, mind maps, as well as sketches to visualise relationships, between different respondents' responses as well as to record the first building blocks of theory that was formed later. Sketches and diagrams were also employed to keep track of the origin of data.

Given the complexity and wealth of data that was collected, it was essential to group the data into categories to enable a detailed analysis, mitigating against the risk of developing an impressionistic view of what the data suggested (Saunders et al., 2007).

Once all interviews had been entered into the database, important components of the respondents' answers were highlighted, for further evaluation on a case-by-case basis. These included specific information on disruptions, company behaviour, mitigation efforts such as investments as well as specific tools to name a few. This data was complemented with relevant, additional data from the individual cases such as company reports, data from presentations and so forth, constantly evaluating the consistency of the different forms of data.

Following this stage, specifically the highlighted components from each interview were checked for their consistency within cases (e.g. evidence for mitigation actions). This process helped in determining whether further interviews were necessary or whether responses were coherent and consistent, rendering further interviews unnecessary (figure 3.8, p. 132). The process of collecting further data is outlined in sections 3.5.1.1 and 3.5.1.2.

Subsequently, parts of the data were reorganised in categories of relevance of the same case. Here, related responses (within cases) were group together by their relevance and evaluated collectively on a topic-by-topic basis. More specifically, the highlighted components and additional data was grouped together under the different relevant sections of the interview protocol. This form of reduction and reorganisation led to further categorisation, amplifying the manageability of the data in pursuit of answering the research questions (Saunders et al., 2007). During this process it was imperative to keep a clear record of the origin of different sources of the data components to ensure that data was interpreted in the context it was gathered in.

This was particularly important for the identification of the different cultural types of the organisations. The dominant organisational cultures of different organisations were identified on an interpretive basis, using primary interview data, secondary data such as internal company documentation (emails, presentations, newsletters) and crucially, researcher observation. Working with these different forms of data, the cultural composition of the different organisations were interpreted applying the competing values framework (figure2.11).

More specifically, all data collected was used and applied to the competing values framework. During this process, the different behaviours and actions of each of the companies were evaluated against those characteristics reflected by the competing values framework and the positioning of each of the cases was deducted. For example, had an organisation reflected predominantly attributes such as order, rules, uniformity over other traits, it would have been classed as hierarchical. Nonetheless, the positioning of each company on the chosen framework was influenced by cultural traits from different culture types, all of which were part of the model, shifting the positioning around the framework, reflecting most appropriately, its cultural orientation.

Furthermore, the selection of cases was also important to cover all four cultures of the competing values framework. Here the accurate and careful selection of

cases based on the used framework (competing values framework) ensured that a high level of theoretical saturation was achieved. This is as the addition of new cases from the different cultural types would not have contributed new insights to the study (see sections 3.4.1 and 3.5.1).

Following this process, the behaviours and actions of the different organisations were evaluated based on the identified organisational culture. During this process, special attention was paid to identify and ensure the organisational cultural interpretation and the organisational behavioural data were coherent. This was necessary to ensure a chain of evidence within the data analysis, as well as to warrant the integrity of the data and the analysis throughout the research. Had the organisational cultural interpretation presented a mismatch with the organisational behaviour and risk management efforts, for example where a company was highly market driven and risk taking in nature, whilst striving for stability and smoothing operations, the data would have been flawed.

It is important to outline, that the use of four cases could reduce the level of reliability of the study by way of representing a limited sample population. However, given the adherence to literary recommendations, as well as having designed a research approach that focuses on the theoretical saturation of findings within cases as well as across cases, on top of being representative of all dominant organisational cultures represented by the theoretical framework this study employs, the reliability of the research results is very high.

Having drawn out the most important components of interviewee responses, the next stage revolved around coding these extracts on a question-by-question basis. These in-text passages were coded using open coding (Taylor & Bogdan, 1984; Lincoln & Guba, 1985; Strauss & Corbin, 1990; Bogdan & Biklen, 1992; Bernard, 1994; Lofland & Lofland, 1995; Agar, 1996). This was done, by generating a more concise summary of the respondents' responses throughout all interview questions. During this process, responses from participants were summarised and shortened to maximise the manageability of the data.

Following the first two stages of coding of all responses, the summary codes of each of the participants were transformed into one response, encapsulating the key points from all respondents within cases. This stage eliminated duplication and drew out the key points respondents made on a case-by-case basis.

The in-case analyses of the different cases were used to generate individual case reports, which were represented in chapter five. These featured the key points of the analysis and were aligned with the structure of the interview protocol (appendix 2). Data is represented in text format, as well as figures and tables where appropriate.

Following the analysis of the different organisations on a case-by-case basis¹⁰, pattern matching was employed to compare and contrast findings from different cases. Here, the key themes or patterns that arose between the different organisations cultures and approaches to risk management were compared for their similarities and differences between cases using the case database. For this process, the case summaries from the individual cases were used. These followed the structure of the interview protocol (e.g. company background, risk background, supply chain risk management staff, supply chain risk management resources and organisational culture), which enabled the direct comparison of findings from the different cases, maximising data manageability, limiting the mixing of data.

More specifically, the data from each of the cases was compared on a question-by-question basis. Moreover, each of the cases was compared with each of the other cases, as well as all cases were compared together. Following this process findings from case one were compared with findings from cases two, three and four, case two was compared with cases one, three and four and so on, as well as all cases were compared collectively based on the findings from the individual cases. For this, a database was created which in its setup was identical to the individual cases yet contained more entries to encompass all cases (table 3.6).

¹⁰ Please refer to appendix 3 for examples of case data.

Table 3.6 Extract from database used for analysing cases on a cross-case basis

	Key findings from				Summary
	Case A	Case B	Case C	Case D	
Company background					
Products / Services					
Type of business					
Company size employees					
Company size turnover					
Risk background					
Define supply chain risk					
Examples of incidents that influenced performance					
Top five risks					
How is the company planning for these					
Responses to incidents					
Top five barriers					
<i>Changes:</i>					
Number					
Impact					
Ability to respond					
Risk management staff					
Member of the board					
Risk management allocation					
Autonomy of individuals					
How many to manage risk (FTE)					
<i>Changes:</i>					
3-5 years					
5-10 years					
Issues with recruitment					

For this process, case summaries were used, as well as it was referred back to the case data from each of the cases. This process of comparison stretched throughout all analysis stages, within cases as well as across cases during the cross-case analysis. This constant comparison method (Glaser & Strauss, 1979) aided the development of theory encapsulating all cases. More specifically, as findings from individual cases were compared with findings across cases, the propositions and theory development was constantly revised until the theory that was developed encapsulated findings from all cases.

During this process, notes from the reflexive journal and the field notebook were especially useful to compare and contrast the findings from each of the cases, as well as to ensure the data was being interpreted in the context it was gathered in.

Memoing as a technique was also employed to record relationships amongst different concepts, employing specifically code and theory notes. Code notes were used to describe emergent concepts (the links between different cultural traits and approaches to managing risks, i.e. tools, techniques etc.), whilst theory notes were generated as summaries about the researcher's interpretations of the data being reviewed (Strauss & Corbin, 1990).

Here, the different cases and the theory that was developed were analysed and refined until the theory encompassed the findings from each of the different cases as well as the cases collectively. This led to the development of recommendations in line with the objectives of the research.

Following the in-depth cross-case data analysis, findings were presented in chapter six and follow the order of the interview protocol (appendix 2) in alignment with the findings from the individual cases. This enables a comparison of the findings in a structured and replicable manner. Data is represented in text format, as well as figures and tables where appropriate.

Subsequently to chapter six, chapter seven, based on the individual case analyses and the cross-case analyses responds directly to the research questions of this study, putting the findings into the context of existing literature. This is preceded by outlining the practical and theoretical contributions of this research, as well as the limitations of the research are outlined.

Generally, the findings of the study are presented using diagrams, tables, summary matrixes, as well as descriptive text. It is advocated that this approach to the representation of findings was most conducive to illustrating findings highly effectively and efficiently.

Reflecting on the approach to analysing the data in general, it is evident that the methods taken are highly systematic and scientific. In fact, the process is based on a specially developed strategic framework for analysing data, which led to a specific path of analyses, harnessing valuable tools from different analyses

methods such as content analysis for instance. This approach was necessary to maximise the value inherent in the data, as well as to ensure the minimisation of researcher biases and the mixing of data for example.

3.6 The quality of the research design

Having outlined data collection methods along with the interview protocol and data analysis approach, it is important to reiterate factors determining the quality of the chosen approaches, demonstrating the steps taken to maximise the quality of the research processes.

Given the subjective nature of some projects, case studies are most commonly employed to explore, explain, describe or predict (Ellram, 1996) social phenomena. Using case studies, it is important to consider the implication of the design towards the quality of the project at the outset as well as during the conduct of the case study (Yin, 2014).

For this, the world of social research offers four quality measures for empirical studies, revolving around construct, internal and external validity, as well as reliability (Yin, 2014). The considerations made in sections 3.4.1 to 3.4.4 will be used to demonstrate the steps taken in order to maximise the overall quality of the research.

3.6.1 Construct validity

Construct validity is concerned with the extent to which the chosen measurement questions truly measure the presence of those constructs that are intended to be measured (Saunders et al., 2007).

Due to the subjective nature of collecting data and analysing case study data, research is often criticised for the possibility that the research output may be representative of the researcher's own impressions, rather than to represent a genuine scientific reflection (Yin, 2014).

To mitigate against potential researcher biases of this nature and to establish the validity of the construct, researchers must clearly define the different key

components of the research, as well as to clearly justify the operational measures that appropriately match the concepts based on previous, recognised academic work (Yin, 2014).

In pursuit of this, multiple sources of evidence were considered during data collection as well as a chain of evidence was generated during the collection of data, validating and linking data logically. Beyond this, a draft report was reviewed by key participants of the research (Yin, 2014) as depicted in table 3.7.

Table 3.7, Approaches to ensuring the quality of the research design, adapted from Yin (2014, p. 41)

Quality measures	Approach	Relevant phase
Construct validity	<ul style="list-style-type: none"> • multiple sources of evidence • Establish chain of evidence • Key informants to review draft case report 	Data collection Data collection Write up
Internal validity	<ul style="list-style-type: none"> • Pattern matching • Explanation building • Addressing of rival explanations • Use logic models 	Data analysis Data analysis Data analysis Data analysis
External validity	<ul style="list-style-type: none"> • Theory in single-case studies • Replication logic in multiple-case studies 	Research design Research design
Reliability	<ul style="list-style-type: none"> • Work to case study protocol • Develop case study database 	Data collection Data collection

3.6.2 Internal validity

Internal validity is primarily concerned with the extent to which findings can be credited to interventions rather than a suboptimal research design (Saunders et al., 2007). According to Grix (2001), this type of validity is most relevant in explanatory case study designs as the explanation of behaviours needs to be based on all and not just some of the relevant factors.

Whilst it is especially important to establish a high level of internal validity in explanatory or causal studies (Grix, 2001), it is also vital for this to be considered in detail in exploratory, descriptive, as well as predictive studies.

In pursuit of establishing a high level of internal validity, researchers can apply a number of different approaches. As in this case, a mix of approaches to analyse the data was adopted. These included pattern-matching, explanation building the use of logic models or the consideration of alternative explanations to findings during the data analysis stage (Yin, 2014).

As outlined in section 3.5.4, this research used pattern matching within as well as across cases, used explanation building, as well as it considered and addressed rival explanations between cases, forming theory encompassing all explanations. Moreover, visual depictions were also employed to graphically demonstrate relationships between concepts and thus maximised the thinking on research questions and other important factors.

3.6.3 External validity

In contrast to the concept of internal validity (most relevant for explanatory cases), external validity is very important for all case study types and objectives.

External validity revolves around the generalisability of the findings beyond the researched case(s), to other contexts (Yin, 2014). Given the nature of case studies, the ability to generalise findings to other contexts has been criticised widely, especially in the case of single holistic or single embedded designs (Saunders et al., 2007; Bryman & Bell, 2007; Yin, 2014).

Much of this criticism arises when case studies are compared with statistic approaches such as surveys. Here one needs to understand, however, that surveys seek statistic generalisation, whereas case studies typically seek analytic generalisation (Yin, 2014). Thus the research methodologies are very different in their philosophical approach and in the aims and objectives of what the research is pursuing.

As analytic generalisation seeks to generalise findings to a broader theory (Yin, 2014), researchers can raise the external validity of their study by generating theory in individual cases and try to replicate this across other cases. This form of replication logic allows researchers to accumulate knowledge across different

cases and to build theory that explains social phenomena across the different cases.

Owing to the work of Yin (2014), the approach this research took to maximising external validity, was to generate theory within cases exploring aspects demanded by the research questions. These theories were then combined to form theory, which explained social phenomena across all cases. This approach is described by the data analysis strategy (section 3.5.3).

3.6.4 Reliability

The reliability of research is concerned with the way a study is undertaken. More specifically, the objective of this measure of the quality of research revolves around the ability to re-perform a study in exactly the same way using the same cases, ending-up with to the same results and conclusions. In such a case the reliability of a case study are deemed high.

The objective of generating a reliable case study approach is to limit errors and researcher biases that could compromise the study as much as possible. According to Yin (2014), the key to establishing a highly reliable research study approach is to operationalise as many stages of the data collection process as possible.

In order to maximise the reliability of the research, a case study protocol documenting the different actions necessary to collect data was used. The protocol clearly designates the exact steps taken to select cases as well as it provided a step-by-step guide for the collection of data. In addition to this, a case study database was used to collect all data and information relevant to the individual cases and the different cases collectively (Yin, 2002).

Furthermore, processes to analysing the data have been described in detail throughout chapter three, enabling researchers to follow the exact same processes when selecting cases, collecting data, analysing and interpreting data

as well as key processes to analysing data have been documented in process flows (figures 3.8, 3.9, 3.12, 3.15 as well as table 3.6).

According to Yin (2014), a good indication of the reliability of a case study would be if an auditor or third person could repeat the study, arriving at the same results. In response to this, the case study protocol was reviewed by a number of individuals familiar with the conduct of reliable case study research. These individuals were a leading professor and senior lecturer in the field of this research, which were not involved in the research previously, yet acquainted with the researcher.

Moreover, the interview protocol, which forms a part of the case study protocol, was piloted in a number of interviews prior to the collection of data as outlined in section 3.7.

3.7 The pilot study

Given the importance of the interview technique as part of the data collection process, it was necessary to undertake a feasibility study (Polit et al., 2001), prior to embarking on the collection of data from the purposively selected cases.

Holistically, pilot studies provide an overview of potential hazards with the research protocol, methods or other aspects of the project (Teijlingen & Hundley, 2001). More specifically, advantages through the application of pilot studies can deliver advance warnings about potential project issues, lead to the identification of practical issues with research procedure, as well as pilot studies can highlight potential problems with the data collection method or technique (Teijlingen & Hundley, 2001).

Given these benefits, pilot or feasibility studies are undertaken to enable the researcher to understand if the data collection approach yields appropriate data (Baker, 1994), as well as to understand if the questions are phrased appropriately for respondents to be able to answer them (Saunders et al., 2007).

Pilot studies are also useful in understanding how data is best recorded and if the data that is collected, is the right data to answer research questions. Beyond this, a pilot study also enables the researcher to try out and get comfortable with the conduct of the interview. For a more expansive list of the benefits of using pilot studies, see table 3.8.

Table 3.8, Reasons for using pilot studies in research, adapted from Teijlingen and Hundley (2001), p. 2

Reasons for using pilot studies in research
Develop and test the adequacy of research instruments
Assess the feasibility of a (full-scale) study
Design a research protocol
Assess whether a research protocol is realistic and workable
Establish whether the sampling frame and technique are effective
Assess the likely success of proposed recruitment approaches
Identify logistical issues which might occur with interviews
Estimate variability in findings to help decide on sample size
Collect preliminary data
Determine the resource requirements of the research
Assess the data analysis technique to identify possible issues
Researcher training

Based on the recommendations of pilot participants as well as the findings, the interview protocol should be amended to make it as effective as possible. Most commonly, adjustments revolve around the structure of the interview (raising content validity) (Saunders et al., 2007), the phrasing of questions, which has an impact on the data collected, as well as the time it takes to complete interviews.

Owing to the work of Teijlingen and Hundley (2001), it is necessary to carry out pilot studies with individuals or larger groups who are as similar to the research sample as possible. This will maximise the value of the pilot in that the trial study is carried out in a setting that is as close to the real interviews as possible. In pursuit of maximising the value of the pilot studies, the study piloted the interview protocol with voluntary representatives from organisations with a similar background to the cases of the purposive sample.

3.7.1 Pilot study cases

In line with the recommendations from section 3.7, two pilot interviews were completed. Volunteers for these interviews were selected from companies that took a leading role in their industry and have experienced supply chain disruptions.

Amongst the chosen companies, one company was a market leader in the textile sector, serving a niche market in Europe and the USA, whilst the other was a global manufacturing company producing mostly paper-based products.

Within each organisation, one volunteer was identified who had worked through a company disruption, and was chosen on the basis of having a very good understanding of the organisational culture.

This selection process is mostly reflective of the selection process for the full study and the processes followed to establishing contact and setting up pilot interviews mirrored the interview protocol.

All interviews were carried out at the head quarters of the pilot cases and interviews were recorded and subsequently transcribed. Participants were informed of the research project, as well as their role as part of the pilot case.

3.7.2 Approach to analysing pilot interviews

Transcripts from the interviews were double checked and read in detail. Each transcript was analysed separately, before themes from both interviews were cross-analysed on a cross-case basis. This approach is reflective of the data analysis strategy of the full study.

Following the preparation of transcripts, relevant text passages were identified to which themes were allocated and coded. The analysis from each interview and the cross-case analysis were then examined to understand whether the gathered data was sufficient to answer the research questions.

It is important to note at this stage, that the primary role of the pilot revolves around the testing of the interview protocol, rather than to present a miniature study seeking to draw theoretical inferences. As a result, the main focus of the pilot case analysis revolves around the improvement of the interview protocol, with a view to maximising the efficiency and effectiveness of the core data collection process. Nevertheless, some analysis has been performed.

Whilst the pilot study focuses predominantly on the process of data collection by means of using an interview protocol, volunteers were also asked about their

general willingness to share relevant documentation, email correspondences and so forth. At the piloting stage it was deemed sufficient to obtain an overview of what may be shared and what may not be shared, rather than to physically collect and analyse this material. This decision was made as the pilot is predominantly concerned with the testing of the interview questions rather than the in-depth analysis of data.

3.7.3 Pilot case one

The first pilot interview was conducted with the European supply chain director of a traditional manufacturing business supplying mainly paper-based products. The interview was held at the company's UK headquarters during June 2013. The visit took two and a half hours, which included a site tour and the interview, which lasted around one hour and twenty minutes.

At the time of the interview, the volunteer had been with the company for almost two decades and had worked through a number of supply chain and company disruptions. As a result of his long employment, the interviewee had an innate understanding of the organisational culture. The respondent's responsibilities as a supply chain director spanned the whole of Europe and Russia.

With around 60,000 employees globally the organisation is market leader in numerous countries with a turnover of \$21 billion dollars globally. Within Europe, this equates to around 4000 employees, generating a turnover of around 3.5 billion dollars.

During the interview the respondent was able to provide a holistic overview of the organisations' supply chain, explaining its positions within the supply chain. As part of this, important data was gained highlighting the supply chain relationships and the approaches to collaborating across the supply network.

Data was also obtained regarding organisational disruptions as well as supply chain disruptions, which have affected the company over the past few years.

Here, using specific examples, data was collected providing a detailed overview of the disruption causes as well as the business reactions to these.

Using this as a background, the volunteer was able to provide an organisational definition of supply chain risk and outlined how the organisation generally responds to risks. Here subtle references were made to the organisational culture of the organisation, which provided an insight in the behavioural motivations of the organisation and its relationships within the supply chain.

Building on this, further data generated through the protocol, exposed how the reactions of the organisation related to the organisational culture and enabled an overview of the outcome of certain steps taken in response to disruptions. As part of this section of the protocol, a clear overview of the steps taken towards mitigating risk within the organisation and also within the supply chain was established.

Encouraging the volunteer to elaborate on the risk management resources (financial and staff), the protocol enabled a vital insight into the investments the organisation has and is making towards the mitigation of internal and external risks. The volunteer also outlined how the management of risks is allocated amongst staff and exposed the levels of freedom different hierarchical levels have in responding to risks.

Reflecting on the underlying approach of the organisation to the management of risks, explained through examples, resource allocation and so forth, data was also gathered on the nature of the organisational culture. This data not only enabled an insight into the organisational culture but also those things influencing the culture over time.

The data clearly exhibited detailed links between the product nature, supply chain environment as well as the market environment, the approach to risk management, as well as the organisational culture. Moreover, data revealed that whilst the organisational culture had a significant impact on the approach to risk

management, the environmental specificity also had an impact on the development of the organisational culture over time, responding to changes in markets, disruptions and so forth.

In the case of the first pilot, low margins and a highly competitive market environment lead to a culture, which is highly risk averse. This in turn significantly limited the expenditure on risk management programmes and rather concentrated on cutting cost, driving balance sheets.

The key to mitigating supply chain disruptions was based on the organisational culture, which evolved with disruptions, leading the organisation to dual source supplies for example. However, whilst some efforts were made to mitigate risks, the major focus was on success, which the organisational culture defined through the profit and loss accounts. This approach limited the appetite for undertaking projects revolving around risks, as investments into managing risks were perceived as risky investments.

Based on the data collected and the insights gained into the relationship between the concepts of organisational culture, risk appetite and the approach to risk management, it was possible to respond to the research questions from a case perspective. More specifically, it was possible to make inferences about the nature of the relationship between organisational culture and the approach to supply chain risk management. Beyond this, it was possible to outline how the organisational culture was influenced by the supply chain environment the case operated in. This relates directly to research questions one and three.

As research question two necessitates a direct comparison between cases, this research question could not be responded to at this stage, as only one interview had been conducted in a single company. As for research question four, this also relies on the evaluation of different cases and thus could not be answered after only one interview.

Reflecting on the interview generally, it was suggested that the length of the interview was quite long. In fact, the volunteer pointed out that whilst one hour for an interview was certainly acceptable, longer interviews could compromise the quality of interviewee responses or participation.

Based on the volunteer's feedback, the evaluation of the flow and the data gathered, the interview was optimised. This included the removal of questions that generated duplicate responses, as well as those which did not generate useful data for the response to research questions.

Following the suggestions and learning from the first pilot interview, the interview protocol was amended and used for the second pilot case.

3.7.4 Pilot case two

The second pilot case was undertaken with the group operations director of a fashion retail organisation, catering to a niche customer market in Europe and the USA. Operations were largely Internet based, yet the organisation did operate a few physical stores in its primary markets. The interview based on the improved interview protocol took sixty minutes.

The respondent had considerable experience within the company, as well as a supply chain wide overview of operations. In addition to having worked through recent organisational and supply chain disruptions, the volunteer was also able to reflect in detail on the organisational culture.

Serving a niche market, the organisation was a small organisation employing around 400 employees globally, generating a turnover of £30 million pounds. Whilst the size of the organisation was small compared to the first pilot case, the case represented a clear leadership position within the niche it operated in.

Adhering to the interview protocol, the interviewee was able to clearly outline the company background, providing a perspective to the subsequent responses.

Following this general background, vital data was collected pertaining to the organisational definition and perspective on risk management.

As part of this background important data revealed different risks the organisation faced, as well as it outlined past risk responses and the perceived risk trends of the future. Beyond this, data also revealed how the organisation perceived its ability to respond to risks in the future, based on current actions.

Following the interview protocol further, vital insights were gained to understand how the management of risks is allocated within the organisation and the resources available for the mitigation of risks. As part of this section, the volunteer outlined the approach to the companies' supply chain management and linked this to disruptions, which had occurred in the past.

Crucially, this link was not made in the previous interview, as the questions did not encompass this line of enquiry previously. Moreover, it was also possible to collect data around the perception of how the company's resource profile would change in pursuit of mitigating supply chain risks in the future.

Within this section much vital data was gathered describing the approach of the organisation towards mitigating risks incurred through the supply chain, especially with a view to procurement and lead time delays resultant from customs procedures.

Based on the previous discussions directed through the interview protocol, vital information was also gained about the organisational culture. Data in this section described the nature of the organisational culture and how this impacted the day-to-day operations of the business in detail.

Moreover, the transcript exhibited a detailed insight into how the organisational culture has evolved through supply chain disruptions. According to the data, this has generated more freedom for employees to focus on making the organisations supply chain more resilient.

Beyond these findings, data also revealed that the organisational culture was not only influenced by the environmental specificity of the organisations supply chain but in fact the supply chain risk management approach was a result of the organisational culture. This in turn appeared to be impacted by the supply chain environment.

More specifically, it transpired that supply chain disruptions such as customs delays and sourcing issues have impacted the business performance changing the organisational culture from an entrepreneurial, risk laden approach to a more cautious one, focussing increasingly on the mitigation of risks, limiting disruptions to operations.

Reviewing the interview data holistically, it became evident that sufficient data was gathered to respond to research questions one and three, which is consistent with the data gathered through the first pilot.

Examining the data from both pilot cases collectively, inferences could also be made to respond to research question two, as well as research question four. This is as a response to these questions must be based on the comparison of several cases, which was enabled through the second pilot interview, undertaken in a different company.

Reviewing the flow of the interview based on the amended protocol, as well as the data generated, it is evident that the protocol poses questions, which generate sufficient relevant data to answer the research questions. Moreover, it transpired that the amended version of the protocol did not generate repeat answers, whilst sufficient data was collected on the company background.

In addition to this, more relevant data was gained about the risk perception and trends, which was lacking in the first data set. Furthermore, the interview duration was also optimised to one hour. As no further suggestions were made by the second volunteer and the data gathered was sufficient, the amended protocol was clearly fit for purpose.

3.7.5 Reflecting on the pilot study

The purpose of the pilot study, as discussed in section 3.7.2, was to test or trial the interview protocol with a view to examining its ability to guide the research interviews and to generate sufficient relevant data to answer the research questions (Baker, 1994; Teijlingen & Hundley, 2001).

Reviewing the data gathered from the first pilot case, it became evident that the protocol was slightly underdeveloped in parts and needed to be amended to exclude unnecessary questions and to include questions to gather data in areas not previously considered. Moreover, it was also identified that the initial protocol was too expansive taking too much time for respondents to complete.

Having amended the protocol on the basis of these findings, the second interview gathered more relevant data by means of using more focussed questions, excluding some of those questions and data deemed unnecessary. Moreover, whilst the structure of the protocol remained consistent, some sections were reduced and others expanded to maximise the collection of relevant data. Moreover, using the improved interview protocol, the interview duration was optimised to last sixty minutes.

It needs to be noted, however, that whilst the interview protocol may be completed adequately within one hour, the duration of interviews is largely dependant upon the length to which respondents are prepared to go in their answers (Clough & Nutbrown, 2007). Hence it is expected that whilst some interviews will last around one hour, others may last longer.

Beyond the vivid benefits of using a pilot to the protocol content, the pilot study also proved highly useful in practicing the administration of the protocol (Teijlingen & Hundley, 2001). Running the interview in a real situation maximised the familiarity of the researcher with the protocol. Whilst the focus during the first interview was predominantly on the interview questions, the researcher was better able to concentrate on the flow and content of the respondent's responses. This skill will be helpful in maximising the efficiency of

the interviews and the data gathered in future interviews. Moreover, this will amplify the ability to synthesise the responses during the course of the interviews.

It also became evident that the semi-structured approach to the interview provided sufficient guidance to the researcher, whilst it allowed the interviewees to expand in areas not previously considered (Grix, 2001; Saunders et al., 2007). Beyond this, the semi-structured approach likewise enabled the researcher to pursue particular lines of enquiry as introduced by the respondents (Grix, 2001; Saunders et al., 2007).

Reflecting on the structure of the protocol, participants perceived the logical flow of the protocol as useful. The different clusters of questions follow the literature review and were seen to enable respondents to build up arguments, linking different sections as they progressed through the interview.

Undertaking the interviews at the company sites, which is part of the protocol, added extra value, particularly with respect to observing the behaviour of individuals within their place of work. More specifically, being at the sites in person, as demanded by the interview protocol enabled the researcher to triangulate interview data (Schein, 1996) pertaining to the organisational culture.

Furthermore, the additional provision of the research background prior to commencing the interview¹¹ helped to focus the respondent expanding the answers of respondents in areas they felt were relevant.

Reviewing the outcome and conduct of the pilot study, no issues were experienced with regards to the recording or transcribing of interviews.

Data gathered through the pilot exhibited that it would be possible to display findings as outlined within the data analysis section (section 3.5.4).

¹¹ The research background, as well as objectives are communicated clearly prior to scheduling interviews.

Based on the testing and subsequent improvement of the interview protocol, the following chapter provides an overview of the selected cases in their context along with justifications for their selection. This is in line with the strategic approach to analysing case studies that was developed for this research and is depicted in figure 3.10 in section 3.5.3.

3.8 Methodology summary

Based on the critical discussions throughout chapter 3.0, this research takes a constructivist interpretivist position, presenting inductive research logic. Due to the research area, a multiple case study approach, based on heterogeneous cases, will be used which is based on semi-structured interviews, researcher observation and the collection of additional company documentation. Data will be analysed using a range of different analysis tools to maximise the understanding of the data in its context. Findings will be presented in different ways such as tables, diagrams as well as text format.

Following the detailed elucidation of the methodology for this research, the following chapter introduces the different cases along with justifications for selecting these.

4.0 Description of the cases in context

As outlined by the strategic approach to analysing case studies, exhibited in figure 3.10 (section 3.5.3), it is necessary to provide a description of the cases in their context, prior to analysing the individual cases in depth. In pursuit of this, chapter 4.0 will provide a general overview of the different cases, as well as further justification for choosing the different companies. Herewith chapter 4.0 forms the basis for the in-depth analysis of the individual cases in chapter 5.0.

4.1 Case A

The first case, Case A, is a UK based branded fashion retailer. Case A focuses on retailing quality branded fashion items at affordable prices. The company targets predominantly young trendy individuals, although, following demand signals has begun to introduce items appealing to a wider range of customers. The company designs and retails a wide assortment of fashion items, ranging from T-shirts to accessories, all of which are based on a few key principles.

The UK based branded fashion company was founded in the 1980's and since its inception has experienced considerable growth. The brand, representing the core element of the business, was born a number of years after the company was founded and has significantly contributed to the popularity and growth of the company.

Following the launch of the brand, the company was able to amplify sales in domestic markets, as well as it began to venture into the wider European market.

Given the rapid growth of the company and soaring demand for the brand, Case A decided to change its company structure and enlisted on the stock market. This was seen to be a key move for the organisation to support its international growth ambitions.

In pursuit of the expansion plans, the company acquired a number of international partner organisations to further strengthen its position in certain European markets.

Following the successful acquisition of partner organisations in European countries, the next stage of the expansion process revolved around the strengthening of the brand image. To do so, the company decided to synchronise its branding of stores. In addition to this, the company also implemented a domestic and foreign wholesale operations model, to support the demand for the brand whilst strengthening its brand image.

The above decisions by the case company have not only enabled the amplification of sales in domestic as well as foreign markets, but have also allowed the company to communicate key brand messages to the customer.

Since its brand inception, the company has achieved a strong year-on-year growth and has expanded its network considerably. Case A trades in over one hundred countries and sells its products through more than four hundred stores globally. However, not all of these stores are wholly owned stores, as the company also relies on franchises, licences and concessions to sell its products. In addition to this, the company operates a number of online websites in different countries, which significantly contributes to sales.

To protect the brand image, discounts are strictly controlled and are not offered in branded high-street stores.

Due to the rapid growth in demand, the company has experienced significant growth in sales and has supported this through consistently increasing the number of stores, concessions, franchises, online stores and so forth globally.

Whilst the brand's predominant market started out to be the UK followed by European markets, the company was able to build a significant portfolio of stores throughout other global regions. Responding to the brand appeal, customers

have enabled the brand to develop a strong presence in international markets outside Europe. The aim of the organisation going forward is to significantly expand the availability of the brand's products and thus to grow and expand on a global scale.

The organisation plans to do so by expanding its product portfolio to appeal to a wider range of customers and by continuously redeveloping and refreshing its product offering.

4.2 Case B

The second case study, Case B, is one of the world's leading mail and logistics services companies. The company provides a diverse portfolio of products and services to its wide range of customers. Activities span from the delivery of mail to manufacturing, consultancy, as well as supply chain orchestration.

In terms of its structure, the company is a foreign owned organisation, which is listed on the stock exchange. Given its capabilities and range of offerings globally, it has experienced a steady growth over recent years. The company is committed to consistently and effectively respond to its customers' needs on a local and global scale.

Key to the ability to maximise value for customers is the company's capability to operate efficiently in diverse market environments, based on an innate understanding of the different markets globally.

To support its wide range of customers and to supply demand, the organisation has undertaken a number of acquisitions globally. This was a key step for the company to build its network, as well as to strengthen its position in domestic and global markets.

The expansion strategy of the organisation, has not only allowed it to demonstrate its logistical service capabilities to customers, but also to enter new

markets, whilst growing profits. Furthermore, the exposure to and expertise in different global markets has enabled the company to serve and support its customers at an increasingly effective level.

Given the case company's broad network of operations in combination with its expertise of local and global markets, it provides a vital backbone to international trade, empowering its customers to operate more successfully in their respective markets.

Today, the case company's network has a significant global reach and spans over more than 220 countries and territories. With a strong focus to be chosen as the world's leading logistics provider, the organisation perceives its responsibilities to be much broader than just to be a logistics company.

The company strives towards adding value to the communities it is active in, by operating in-tune with its customers and by meeting environmental needs. Moreover, the company consistently develops innovative solutions for customers and the communities it works in, maximising value for stakeholders, whilst operating responsibly.

4.3 Case C

Case study three is a leading supplier of components to various industry sectors. Whilst the core business of Case C revolves around the supply of components to the automotive industry, products are also supplied to other industries.

The marketing and product strategies of the case company are based on offering unique product components that are of premium quality, enabling customer products to perform better. In addition to this, the organisation is highly committed to the environment, as well as the communities it operates in and with.

Case C began its operations over a century ago and has existed in its current form for over a decade. Whilst the organisation supplies its products to customers all over the world, its strongest customer bases are located on the European and Asian continents.

The company's core business is based on a strong brand, which has been built strategically over the years. Throughout its history the brand has delivered product components, which were linked to a number of significant performance achievements. As a result, the brand has become renowned for reflecting strength, performance and superiority.

Part of the success of the company is based on its brand reputation, which stretches beyond the company's core markets. Given the company's competitive nature, it has been able to grow revenues consistently over past years.

Being committed to working closely with its customers, Case C strategically harnesses its understanding of customer needs to develop innovative products, empowering customer products to perform at higher levels.

In terms of product distribution, the company sells either directly to customers or through approved distributors. Exploiting its competitive nature, the company has managed to achieve continuous revenue growth over the years and is committed to broadening its portfolio of products to enable customers to perform better, in a wider range of their activities.

Case C aims to continue to build its brand reputation by developing premium product components enabling customer products to perform at higher levels through innovative solutions, based on unique products. The company aims to achieve this by increasingly collaborating internally and externally to innately understand customer needs, leading to the development of more customised product components.

4.4 Case D

Case D, is a leading innovator and manufacturer of systems and products to cultivate fruits and vegetables, as well as to extend the lifecycle of these. The company targets predominantly fruit and vegetable producers and enables these to improve the quality of produce whilst extending the lifetime of these, to allow customers to secure better market prices for their produce.

The company is a foreign, privately owned business, which has experienced consistent growth year-on-year, based on providing innovative, novel solutions to its customers. A key driver for the success of the company is its innate understanding of customer needs.

Moreover, Case D provides an extensive level of product tailoring to customers, which it harnesses as a basis for the exploitation of market opportunities and product innovations.

In addition to working very closely with its customers, the company has also developed strategic links with regulators. Certifications from certain regulators are essential as the products and systems Case D develops, are used to store food products. Moreover, Case D has also developed a financing system with certain cooperatives and banks to offer product-financing plans to customers.

The company sources product components from a wide range of suppliers, either directly or through distributors on a product basis and sells its products to customers globally. Despite selling products globally, Case D's predominant market is the European Union. Furthermore, whilst most sales are direct, the company also distributes products through a number of strategic partners.

Given the highly seasonal nature of the market Case D operates in, it relies heavily on seasonal staff during peak period to amplify its production capabilities. For storage systems, demand cycles peak prior to and during

harvest times, whilst demand for other products is spread more widely throughout each year.

Case D is keen on growing its share of the market and to grow its customer base by way of delivering innovative, tailored solutions for customers. In line with this, the organisation aims to expand its business by continuously developing innovative new products that enable customers to amplify their market potential.

4.5 Justification for choosing cases

Key criteria for the selection of the case companies, revolved around the relevance of the industry, the positioning of the different cases within the industry sector, as well as criteria such as the existence of distinct hierarchical levels, whether the cases had experienced supply chain disruptions and other qualifying criteria. These included the availability of relevant interviewees, supply of relevant documentation, as well as time. A further key criterion revolved around the heterogeneity of cases. This was important to enable an unbiased exploration of the nature of the relationship between organisational culture and the approach to risk management of organisations in general.

The above detailed criteria are reflective of section 3.4 (case selection) of the methodology chapter.

A summary of the key criteria and the ways in which the companies qualify these, are illustrated in table 4.1.

Table 4.1 Justifications for selecting different cases.

	Case A	Case B	Case C	Case D
Industry relevance	The fashion industry is recognised to be one of the most volatile and seasonal industries.	Logistics as an industry is an enabler for other industries.	The manufacturing industry sector (of Case C) is more stable and more dependant than other industries.	This manufacturing sector is characterised by high seasonality and its susceptibility to risk.
Company relevance in market	Leadership position in its sector, as well as one of the fastest growing.	Leadership position based on service and size.	Leadership position based on product quality.	Leadership position based on product capabilities.
Distinct hierarchical levels	Hierarchical levels are distinct and sufficient for candidate selection.	Hierarchical levels are distinct and sufficient for candidate selection.	Hierarchical levels are distinct and sufficient for candidate selection.	Hierarchical levels are distinct and sufficient for candidate selection.
Supply chain disruptions	Disruptions are somewhat infrequent, some significant.	Disruptions are frequent.	Disruptions are infrequent but significant.	Disruptions are frequent, some significant.
Relevant interviewees	Candidates have experienced disruptions with the company and / or have an innate understanding of the organisational culture.	Candidates have experienced disruptions with the company and / or have an innate understanding of the organisational culture.	Candidates have experienced disruptions with the company and / or have an innate understanding of the organisational culture.	Candidates have experienced disruptions with the company and / or have an innate understanding of the organisational culture.
Heterogeneous	Yes. The company is unlike any other of the sample.	Yes. The company is unlike any other of the sample.	Yes. The company is unlike any other of the sample.	Yes. The company is unlike any other of the sample.
Dominant organisational culture¹²	Market.	Hierarchy.	Clan.	Adhocracy.

The industry relevance qualifiers are case specific and not necessarily industry specific.

¹² The classification of organisation's by means of their cultural orientation is based on the organisational culture tool (competing values framework) by Deshpandé et al., (1993), figure 2.10, p. 53.

5.0 Individual case analyses

Having provided a description of the individual case study companies in their contexts in chapter 4.0, this chapter presents a detailed analysis of the individual cases, prior to the cross-case analysis in chapter 5.0. This is in line with the strategic approach to case studies as exhibited in figure 3.10 (section 3.5.3).

The subsequent analyses of the case studies are closely based on the sections of the interview protocol, ensuring that all cases are analysed using an identical approach. As a result, each case analysis will feature the following key sections:

- Interview background,
- Risk background,
- Risk management staff,
- Risk management in the supply chain,
- Organisational culture,
- Linking supply chain risk management and organisational culture, as well as
- A case summary.

5.1 Case analysis Case A

5.1.1 Interview background

Case A, is a UK based, branded fashion retailer, focussed on retailing quality branded fashion items at affordable prices. Case A was purposively selected based on a pilot interview, which exhibited that the company satisfied all qualification criteria as outlined in table 4.1, section 4.5.

In total, interviews were spread over one month and included three site visits by the researcher. Each time, the researcher visited a different site, depending on the workplace of the interviewees. Locations of interviews included the company's head quarters, the main distribution centre and a warehouse, used by the company. All visited sites were located in the United Kingdom.

In total, five members of staff were interviewed. The interviewees were chosen together with a contact person at the case company and were selected based on their involvement with risk management, disruption experience with the case company, as well as their understanding of the organisation's culture.

Interview candidates included the global head of logistics, the group strategist, a supply chain manager, a communications manager, as well as a depot manager. All interviewees were helpful in getting access to additional company documentation.

During the site visits the researcher received a tour of the different sites enabling researcher observation, which was especially helpful in gathering data pertaining to organisational cultural aspects. In addition to interview data and notes from researcher observations, it was possible to collect additional company documentation such as company reports, presentations, as well as poster material.

5.1.2 Risk background

Reviewing the data related to the risk background of Case A, it becomes evident that the company has experienced a number of disruptions internally, as well as in the wider supply chain. These disruptions were resultant from a combination of risks, some of which the company recognised and chose to ignore, whilst others had not been considered.

According to all data collected, the most significant disruption revolved around a systems implementation, which went wrong. In more detail, Case A had identified inefficiencies in its processes due to a lack of synchronisation of its inventory management software packages. Due to the rapid growth of the business and a lack of coordination, different software packages were being used in different parts of the business to monitor and control inventory levels.

The lack of synchronisation was identified as a risk, which the organisation reacted to by implementing a different software package that could support the company as a whole. The new system would be rolled out across all departments in different stages, to minimise disruptions to operations.

Whilst the implementation of the software package across the first few departments went well, members of staff were hesitant towards the second phase of the roll out. As the system went live during the second stage of the synchronisation process, it quickly became apparent that a lack of staff training, as well as a poor 'specking' of the system prior to it going live, caused a huge disruption.

According to one interviewee:

"...the UK supply chain came close to total failure. The business was close to a point where it could not move stock to its stores."

As a result of the above incident, which occurred prior to the company's peak season, Case A was forced to officially downgrade its profits on the stock market. Moreover, the recovery on the back of the disruption lasted an estimated six months.

In addition to this disruption, Case A has also experienced disruptions originating from the wider supply chain. According to the data, these disruptions include severe order fluctuations, which temporarily intensified the pressure on the supply chain, weather disruptions, supply delays, as well as quality, to name a few.

Whilst participants perceived the above risks as temporary, a constant risk for Case A was perceived to revolve around its growth. More specifically, participants outlined that due to the increasing demand for the company's products, Case A regularly outgrows its infrastructure in terms of capacity. This was perceived as a risk, because it was seen to have a significant impact on the

safety of personnel, the ability to “get products out of the door”, risks around an uncertain growth of demand, as well as the ability to receive goods and serve customers.

Despite the growth being keenly anticipated by Case A, data reveals that the company’s approach to growth has caused significant disruptions for the organisation and its supply chain. Evidence for this is reflected in a response from an interviewee below:

“Over a period of 3-4 years, the business absolutely exploded in size and it effectively outgrew the supply chain.”

Recognising the potential impact of the company’s risks associated to growth, these have been designated a specific section of the company’s annual report. It is stated that the organisation faces a potential risk in lacking the ability to sufficiently support the company’s planned growth.

Reflecting on the most significant disruptions Case A has experienced, participants were also able to outline the top risks the company faces from their own perspective.

According to the participant responses, the most cited risks revolved around safety, the reliance on supply chain partners, the reliability of internal systems, the company’s development for growth, as well as the flow of products along the supply chain and sourcing.

When analysing these risks, it appears that the majority of the significant risks as mentioned above relate, in some form, to the most significant disruptions the company has experienced. In fact, the systems implementation failure, which significantly disrupted the business, as well as the risks inherent in the development for growth, are listed directly.

Holistically reflecting on the risk profile of Case A, one participant outlined that the organisation faces three key risks areas as follows:

“...Can you move your product from your sourcing within countries through the supply chain and actually get it into a DC in time? Can you service your customers, from the DCs out within the timelines to hit the market place etc.? And the third thing of course is that you are reliant on all of your business partners being capable, solvent etc., to deliver all the aspects of their particular operational focus.”

Taking the most cited risks based on the participant responses, as well as additional company data, it was possible to apply Cranfield’s framework (Peck et al., 2003) of the sources of supply chain risks, to classify these into process, control, demand, supply and environmental risks. This provides an overview of Case A’s risk profile (figure 5.1). For this purpose, the different risks that were mentioned across all data collected (within case) were categorised using the sources of supply chain risk framework and subsequently tallied, leading to figure 5.1.

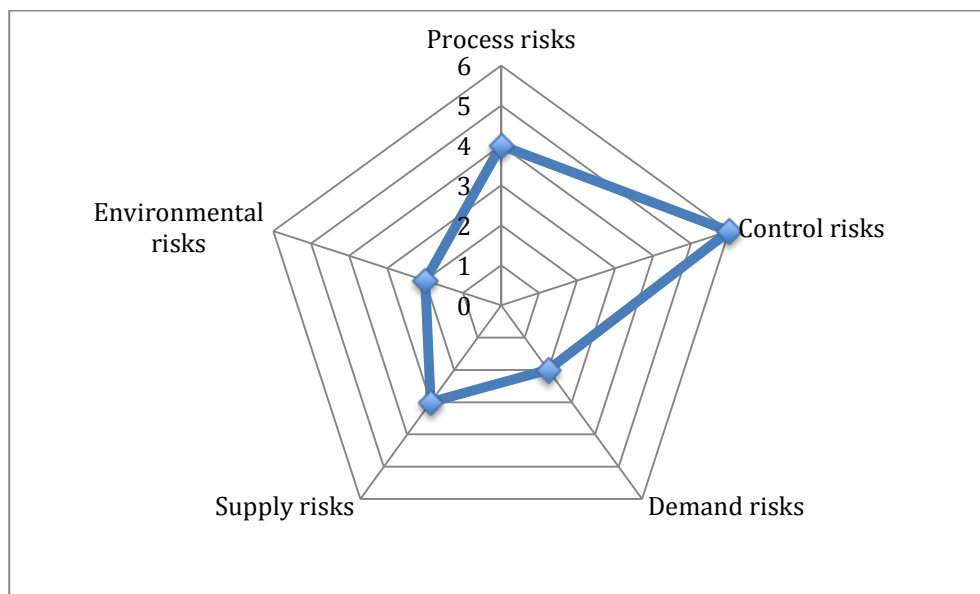


Figure 5.1 Risk profile of Case A (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses and other company data¹³.)

¹³ To generate this diagram, different risks that were mentioned in the data were counted, tallied and categorised into the different sources of risks.

Reviewing figure 5.1 in detail, it transpires that the largest number of risks Case A faces, revolve around control risks. These refer to risks pertaining to the control over governing an organisation's processes. Moreover, the risk inherent in this category refers to risks associated to the ability to apply these rules.

In Case A, risks associated to controllability such as systems, information and communication, the general organisation of the company, as well as contractual agreements for example, were perceived as the most significant risk area. Second to this were process risks. These revolve around forecasting, the control over the flow of products along the supply chain, as well as processing systems and so forth. The analysis of all collected material showed that other risks such as supply, demand and environmental risks were perceived as much lower.

Having discussed the key risks and risk areas as perceived by Case A, interviewees were also asked to define supply chain risk from a company point of view. With respect to this, it was interesting to find, that whilst there was an organisational definition of supply chain risk, different departments had adapted this definition to their specific functional areas (table 5.1).

Table 5.1 Departmental definitions of supply chain risk

	Definition of supply chain risk
Company	Supply chain risk is an operational failure that affects the ability to deliver sales in line with expectations.
CEO	Supply chain risk is the failure to capitalise on sales or profit.
Sourcing department	Supply chain risk is about breaching ethical trading standard, which might result in adverse publicity, and also the risk within our supply chain, is of an unauthorised product or copycat product being created.
Supply chain department	Supply chain risk is the inability to effectively meet customer demand / satisfaction by effectively using the supply chain.

Reflecting on the differentiated definitions of supply chain risk, it may be argued, that whilst departmental definitions of supply chain risk vary, their content is reflective of the company definition of the concept.

Following the analysis of all relevant data pertaining to the risks and disruptions Case A has experienced, the responses to past disruptions and risks were explored.

Reflecting on the data, a key response to risks and particularly disruptions was to learn from these to ensure disruptions would not repeat themselves. Based on this learning, one of the organisation's predominant responses revolved around bringing in experts, to support weaker areas of the business. Having recognised a major weakness of the business to be its supply chain (due to rapid growth and a lack of control), supply chain experts who have collected vast experience working for similar companies have been employed to strengthen this area of the business.

As a result of bringing in supply chain experts, the organisation also reviewed the performance, the working relationship, as well as the ability of supply chain partners to support the anticipated growth of Case A. Depending on the performance and capabilities of current and potential partners, a further response has been, that the supply chain was reconfigured with a view to mitigating current risks, as well as future risks.

In addition to this, work has also been undertaken to synchronise internal processes to improve communication, controllability, as well as to generate visibility of inventory to name a few. Whilst this process has been on-going, the company has also learned from past disruptions (i.e., system implementation failure etc.), adapting its approach. This is reflected in that specific protocols have been agreed and communicated, which forbid changes to systems during or shortly before peak seasons.

Synthesizing case data pertaining to risk mitigation actions, table 5.2 exhibits the key efforts undertaken by Case A to manage risks in the supply chain.

To generate this table, the different risk mitigation efforts, as they appeared within all case data (individual cases), were counted, listed and subsequently classified, harnessing Peck’s sources of supply chain risks framework (Peck et al., 2003). This approach is consistent with the process used for classifying the risks in all risk profile figures of this study.

Table 5.2, Efforts to manage risks in the supply chain by Case A¹⁴

Efforts to manage risks					
Effort	Case A	Effort	Case A	Effort	Case A
Benchmarking	D,P	Economic climate monitoring	E	Raised business continuity plans	C,E,P,S
Bringing in experts	C, D,P, S	Evaluated criticality of stock	C,D,P,S	Redistribution or removal of staff	C
Business process synchronisation	C,P	Increased information sharing	C,D,S	Risk mapping	P,S
Capacity building	C,D,S	Learning from incidents	D,P	Scenario planning	C,E,S
Change supply chain partners	C,S	Multiple sourcing	C,P,S	Six Sigma	C,P,S
Constant product redevelopment	C,D	Organisational trend planning (infrastructure)	D	Stricter contracts	C,P,S
Developed specific rule for specific process	C,P,S	Product merges	D	Targeted project into specific disruption	C,P

(The above table details the not only the efforts but also outlines the sources of risk these target, e.g. P = process, C = control, D = demand, S = supply, E = environment.)

For more details on the efforts to manage risks as well as the reach of the different efforts, please refer to appendix 4.

Reviewing table 5.2, it transpires that the focus of supply chain risk mitigating actions has been targeted largely towards internal processes, rather than on the

¹⁴ This table was generated by listing the different efforts and projects highlighted within the data.

supply chain. Reviewing the risk profile of Case A (figure 5.1), the efforts to manage risks by the company seem aligned with this.

More specifically, according to the risk profile, the biggest risk areas are control and process risks, which are classed as internal risks. Hence, approaches such as bringing in experts, raising business process synchronisation, product redevelopment, learning, and introducing stricter contracts, are all targeted directly at the improvement of the controllability and procedural effectiveness of the business.

Moreover, reviewing the disruption history of the organisation, it appears that the responses to risks and disruptions are predominantly reactive. This finding is supported by a quote from an interviewee, outlining that:

“At the moment, in the business there will be a high level of focus on risk management because of what has happened. It is like anything, you pay more insurance when you have just had a disaster and if nothing has happened for 10 years you wonder why you are paying it.”

Given the above statement, it may be argued that the focus on risk management is largely reactive and attributable to recent, significant disruptions. This is consistent with the strong risk adversity of the organisation. Where the focus in previous years was fixated predominantly on growth and taking risks openly, recent disruptions have shaken the business, in response to which, it has developed a more holistic view on performance.

When categorising the efforts taken by Case A to manage risks in the supply chain (table 5.2) in a similar fashion to the process used to generate the risk profile (figure 5.1), it transpires that whilst the predominant risk management focus revolves around mitigating control risks, much work has also been undertaken to reduce process and supply risks (figure 5.2).

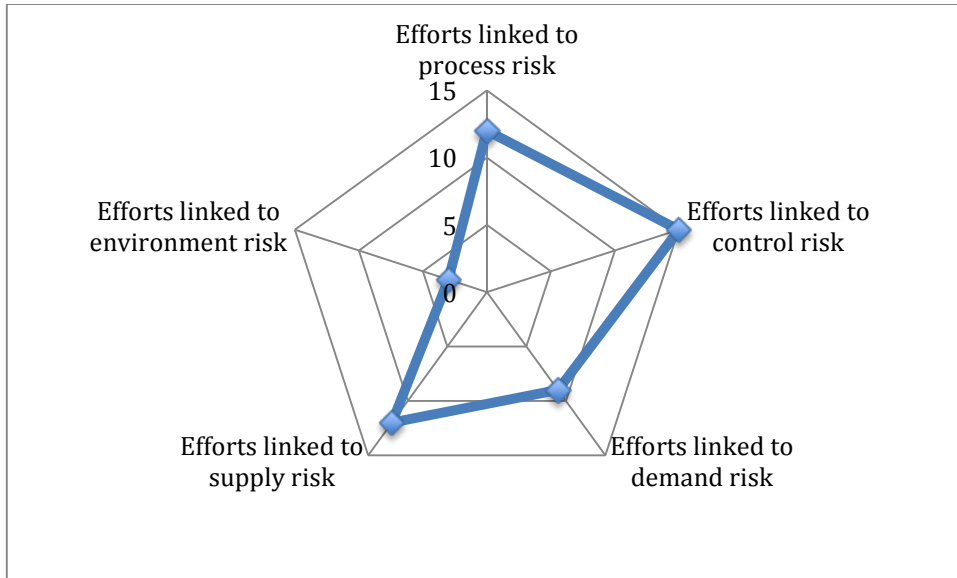


Figure 5.2 Efforts taken to manage risks by Case A (This diagram is based on table 5.2 and is of a purely qualitative nature and was created by interpreting interviewee responses.¹⁵)

When mapping both, the risk profile as well as the efforts taken to manage risks on the same graph, it becomes evident, however, that the perceived risks and the efforts to managing risks are not closely aligned (figure 5.3).

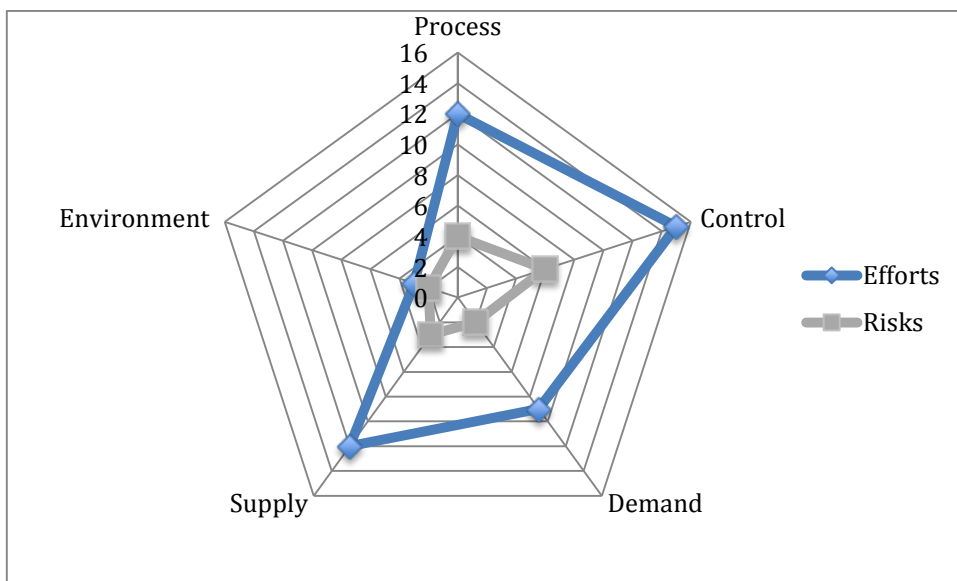


Figure 5.3 Efforts to manage risks versus risk areas in Case A (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

The strongest area of focus is control, closely followed by process, supply, demand and then the environment. It is argued, that the strong focus to mitigate

¹⁵ To generate this diagram, different efforts made to manage risks were tallied and categorised into the different sources of risks they were set to mitigate against. Furthermore, efforts to manage risks have been counted in all sources of risk they were applicable to (table 5.2). The efforts taken by organisations were identified by going through all data and listing the different actions.

risks in the supply chain, as a result of significant disruptions, is reflective of the strong risk adversity of Case A.

Furthermore, the environment as a source of risk was, with the exception of currency fluctuations and weather disruptions, not mentioned and thus does not receive as much attention as other areas. Moreover, the partial neglect of the environment as a risk source appears synchronised with the reactive risk management approach of Case A. As the disruptions from environmental sources were limited, only a few actions focus on this.

Synthesizing the risk areas and the efforts to manage risks as exhibited by Case A, it was possible to develop a risk attitude, which for Case A is as follows:

Risk is different for different areas of the business and a key focus is to reduce failures as much as possible, to minimise lost profit opportunities.

Based on this risk attitude, the responses of Case A to risks can be explained. More specifically, the main focus of Case A has been growth, which is still the case. However, due to recent significant disruptions the company has realised that certain areas of the business have received too little attention and as a result have become too weak to support further growth.

Thus in pursuit of continuous growth, the organisation is allocating differing levels of attention to those areas, which have “risked” growth such as the control over the business (i.e. communication, visibility, etc.), process (i.e. flow control, systems etc.), supply (i.e. lead times, capacity, etc.), as well as demand (i.e. order fluctuations, trends, etc.).

Based on the risk perception of the participants, as well as the efforts the company is taking to mitigate risks along its supply chain, the data shows that whilst the incidents and risks within the supply chain were perceived to remain largely the same, interviewees expected the ability of the company to deal with risks to rise significantly. This was seen to be the result of the broad approach

the organisation is taking to manage risks in the supply chain, which in turn, is seen to decrease the impact of disruptions on the business.

Key points:

- Case A has experienced a number of disruptions, which have impacted its approach to risk holistically.
- Different departments have different definitions of the concept.
- Supply chain risks and efforts to manage these are partially aligned.
- Case A perceives the mitigation of risks to be a key step in pursuing growth.

5.1.3 Risk management staff

Reviewing the data regarding the staff dedicated to risk management, it becomes evident that the company's approach follows a top down method. Whilst every member of staff has a role in mitigating risks, the ultimate responsibility of risk actions lies with staff higher up in the organisation as reflected in the below quote:

"...Risk filters down. Big things are dealt with at the top and trickle down. Everyone has to do their little bit. So the management at the local level operates and clears risk and resolves problems as they see fit."

In line with the above statement, the risk management responsibility on an organisational level resides with the Chief Operating Officer (COO). This is a supply chain expert that has been hired by the business specifically to strengthen weaker parts of the business including the supply chain. Below this, the responsibility lies with functional and operational managers, followed by team leaders and so forth.

Whilst the risk management responsibility ultimately lies with the COO, the hierarchical approach does provide employees in lower levels, such as on the shop floor, with the ability to flag up risks. Then, depending on the business

impact of agreed mitigation actions, different levels will be tasked with their implementation.

According to the interviewees, this process of delegating risk management based on hierarchical levels, is key in generating the visibility of risks throughout the supply chain, but also to retain control over risk mitigating actions.

In addition to the hierarchical approach to managing risks, the data has also revealed, that whilst the number of internal employees who are employed to manage risks is low (2 to 3 members of staff), the company outsources the management of risks in certain functional areas.

For example, where Case A has decided to outsource non-core functions such as logistics, it has more recently developed agreements that contractually bind their third party logistics providers to autonomously manage risks associated with the transportation and storage of inventory.

In response to this, the company's third party logistics providers have employed risk managers at key sites of Case A to oversee and manage these risks.

As the business recognises risks as a threat to maximising profit opportunities, the data clearly exhibits that Case A is expecting to increase the number of functional experts which will, based on their functional expertise, be able to manage their risks automatically as a function of their day-to-day job. More specifically, the organisational view reflected that risk management is not a process external to the requirements of any job but an integral part of it:

“Most people would say that is your day job there and then risk is something over here. So I can either have a day job manager doing that there and another manager managing risk, or I can say I have a manager there and part of their job is to manage risk. I do not subscribe to either of those views. If you are a competent manager then it is a question of your degree to manage risk and so we recruit the highest calibre of people that you can find.”

From the above quote, it becomes evident why Case A does not have a dedicated risk management budget. Due to the inextricable nature of risk management and the day-to-day job of employees, risk management is not seen to be any different to the normal operating expectations of staff. As such, funding is available to manage risks, however, financial resources are not ring-fenced and would be taken out of the normal operating budget of the relevant departments.

As a result of this, any risk mitigation activity has to be presented as a business case, which must be reviewed in detail before a decision is made regarding its implementation.

Key points:

- Risk management follows a hierarchical top-down approach.
- Risk recognition is everyone's responsibility, risk management isn't.
- Some functional risks are outsourced.
- The number of people dedicated to managing risks will increase.
- Risk management is a more extreme version of a job, not an add-on.

5.1.4 Risk management in the supply chain

The supply chain of Case A, is set up in such a way that Case A designs and sells its own goods. Products are designed at the company's head quarters, whilst the manufacture of these is outsourced to producers all over the world. Garments are then sold through the company's own stores, franchises, licences, concessions or online stores.

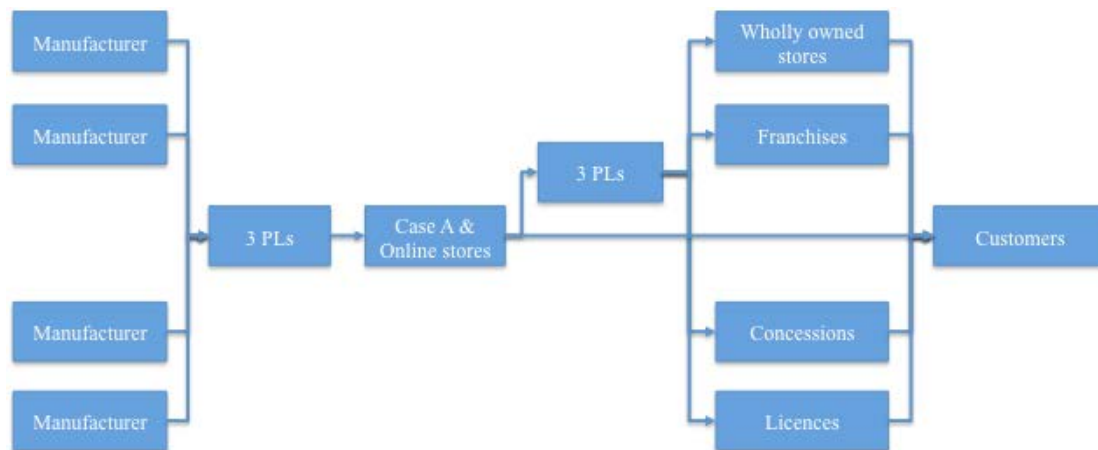


Figure 5.4 Supply chain illustration of Case A

Given the company's apparent dependency on some of its suppliers in combination with past supply chain disruptions, Case A has developed a prioritised supplier management approach. As part of this, critical suppliers or suppliers which are less reliable are monitored more closely than others.

To support this, a network planning team has been formed to plan order cycles more effectively internally, to provide suppliers with more demand visibility. This is seen to enable suppliers to plan more effectively, raising performance, whilst it also allows Case A to control partners more closely:

"As we are beginning to understand our quality standards and demands better, we are beginning to demand these from our suppliers too. So in some cases we are looking for new partners and in other cases we are working with them to prepare them etc."

Furthermore, the data also reveals that contracts are being awarded increasingly, with a view to the company's anticipated growth. More specifically, Case A has begun to review and evaluate the capability of current and potential supply chain partners to support the company's anticipated growth. Part of the motivation for this supply chain restructuring process, is targeted at minimising future supply chain risks. For example, recognising the volatility in the market, as well as the lead-time for certain products, the location of producers plays a key role in supplier selection.

Reviewing the risk mitigating actions of Case A collectively, it becomes apparent that a significant amount of work has been done to mitigate risks throughout the supply chain. For example, sourcing models have been reviewed, dual sourcing has been introduced in some cases, efforts have been undertaken to identify supply chain weaknesses and so forth. Moreover, it transpires that whilst many actions may not have been labelled as risk mitigating actions, the impact of these has clearly been targeted at the mitigation of risks.

Furthermore, despite the range of mitigating actions that have been undertaken in the supply chain, it has become evident that the majority of the work has been focussed internally. Nonetheless, the organisation is recognising that:

“A supply chain can make or break you.”

Responding to this view, Case A is increasing the number of supply chain experts internally, to strengthen this area of the business. Thus, whilst figure 5.5 illustrates that the current focus of the risk mitigating actions is clearly internal (solid box), Case A strives to shift its risk management focus towards the wider supply chain (dotted box).

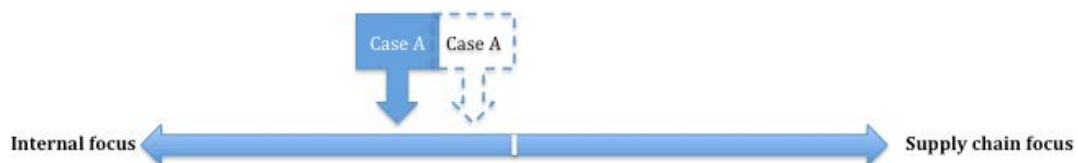


Figure 5.5 The risk management focus of Case A (This diagram is based on the qualitative interpretation of case data.¹⁶)

Evaluating the risk management focus of Case A, against the backdrop of disruptions as highlighted in section 5.1.2, it is confirmed that the risk mitigating actions of the company are predominantly reactive. However, recognising the expansion of risk-mitigating actions to the wider supply chain, the data suggests that the approach of Case A to risk is showing signs of becoming more proactive.

¹⁶ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the focus on risk management the company displayed, particularly interpreting the area of impact of foci.

In the context of this study, a reactive approach to managing risks is based on a disruption occurring, in response to which mitigation actions are designed to prevent similar events from happening in the future. A proactive approach revolves around companies taking the initiative to develop ways of mitigating possible risks that have not occurred or lead to disruptions to that point¹⁷.

This behaviour has been identified as proactive, as the organisation is undertaking actions to mitigate risks based on their potential occurrence, rather than as a reaction to a disruption or incident. Companies that predominantly react to risks reflect a reactive approach to managing risks. Data that indicates either behaviour revolves around participant statements, as well as company documentation, outlining the preparation of mitigation solutions based on different disruption possibilities or the reaction to disruptions following incidents.

In summary, companies responding to risks after a disruption has occurred react to risks (reactive), whilst companies putting in place mitigation actions prior to disruptions occurring are regarded as proactive in managing risks.

Furthermore, as the most significant disruptions have been internal, which was the most immediate focus of the company, and these are being addressed, the company is beginning to increase its influence over external risks.

Increasing the level of supply chain expertise within the business, the company is gradually raising its focus in this area to minimise disruptions to its ability to exploit profit opportunities. This, as a behaviour, can be explained through the risk attitude of the organisation, and is reflected in the different departmental definitions of supply chain risk.

Key points:

- The predominant risk management focus is internal.

¹⁷ These definitions are based on the research, and are consistent with existing practitioner and academic literature.

- Case A increasingly recognises its dependency on the supply chain network.
- Risk mitigating actions are largely reactive.
- Actions are reflected in the company's risk attitude and its definitions of supply chain risk management.

5.1.5 Organisational culture

Interviewees have described the organisational culture of Case A as:

- ❖ Friendly,
- ❖ Entrepreneurial,
- ❖ Open,
- ❖ Sales focussed, as well as,
- ❖ Competitive.

The above key traits of the culture are consistent with researcher observations, as well as additional data that was collected. Referring to strategic changes in the business, interviewees outlined that changes such as bringing in experts, as well as an increasing focus on the mitigation of risks, was indicative of the culture undergoing change.

However, as the business is relatively young, many individuals who helped to set up the business are still involved and are holding onto certain cultural aspects of the company's past. Moreover, as the business has experienced rapid growth over an extended period of time, it became evident that this has impacted the culture, in that the culture is undergoing change to enable the business to pursue some of its core attributes and goals.

For example, as the business has clearly recognised that the organisational culture provides a background to its actions (i.e. entrepreneurship, sales maximisation etc.), it has also recognised that some aspects inherent in its entrepreneurial attitudes such as risk taking, have caused disruptions within the business. Moreover, evidence from the past reveals, that the lack of long-term relationships and adhoc ordering, which is representative of the company's entrepreneurial traits, have led to poor supplier relationships.

Clearly recognising these risks, which were induced in part through cultural traits, Case A has identified that to sustain growth and to enable the company to

maximise sales (these are stronger traits of the core culture), certain organisational behaviours had to be altered.

A key driver for this was the strategic hiring of staff, who had experience in working within large corporations, who could help facilitate a change in the culture and behaviours, with a view to achieving Case A's core goals of competitiveness, sales orientation, market leadership and so forth. This was done by allowing these, newly recruited members of staff in high positions, to change behaviours by influencing the values of their colleagues. To cement these behaviours rules and regulations were put in place.

For example, the level of communication and teamwork were increased, in line with the general operational visibility and the growing control-ability of the business. As a result of this, the culture and the approach to business was becoming more structured, meaning more policies and procedures were used to guide operations.

In addition to the above actions, which were aimed at influencing the organisational culture, data also showed that the culture is being communicated and enforced through regular town hall meetings, involving all staff on a site basis, as well as a general newsletter is distributed every six months. This contains information regarding the organisational culture, goals of the organisation, its performance and so forth.

Over and above this, data from researcher observations has also exhibited that the culture of the organisation as well as the cultural feel of its customers are communicated strongly through imagery on walls, computer desktops, as well as products typically associated with customers. Further evidence for this resides in the below quote:

“We very strongly communicate the culture in terms of the type of products we sell and the cultural feel of the customer. We do this through posters and imagery on the walls, clothing, photos etc., so we constantly remind people of the people we sell to.”

The above quote further links to the goal driven behaviour of the organisation, in that the communicated culture is highly customer centric.

Using data collected on the organisational culture and applying it to a cultural categorisation tool as provided by Deshpandé et al., (1993) it transpires, that the organisation is representative of a market culture with some traits of the adhocracy culture (figure 5.6).

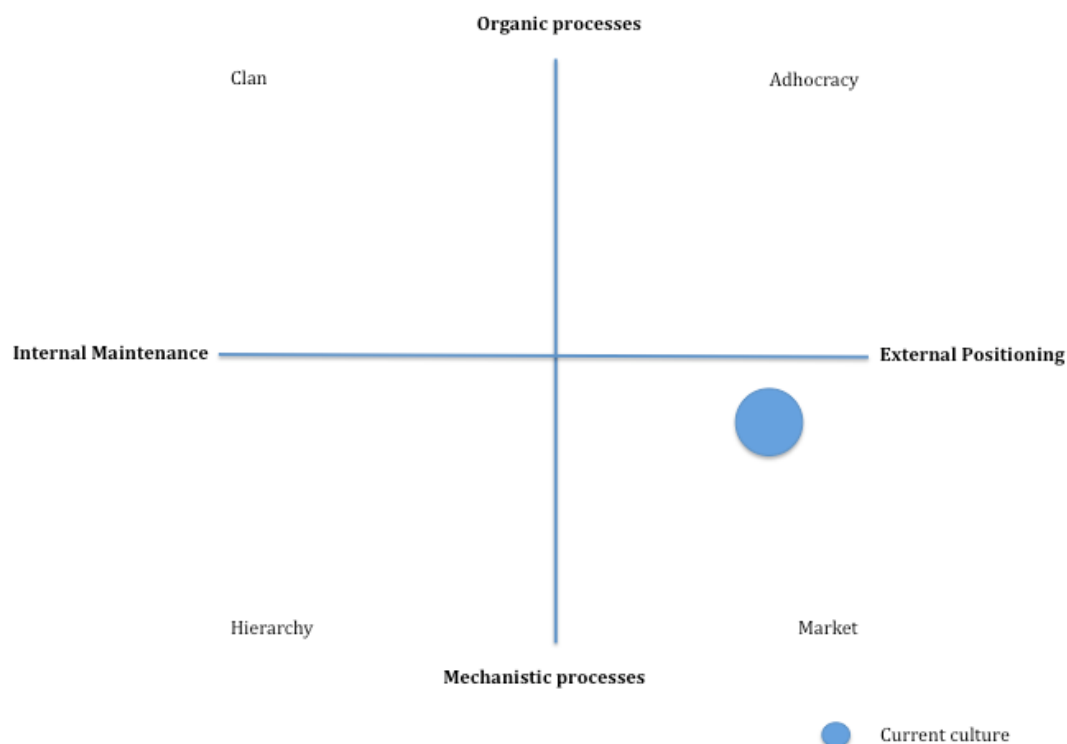


Figure 5.6 The organisational culture of Case A (This diagram is based on the qualitative interpretation of case data.)¹⁸

Elaborating on figure 5.6, the orientation towards growth, competitiveness, as well as the achievement-oriented approach of the business, clearly identify the organisation as a market culture. However, given the entrepreneurial background of the business and the emphasis on growth, the culture also exhibits signs of an adhocracy culture. As these facets are weaker than the market culture traits, the current culture of the business is situated in the bottom right field of figure 5.6, and close to the border of the adhocracy culture.

¹⁸ The current culture of the organisation was interpreted based on applying all relevant data to the competing values framework. Cultures are termed “current” as cultures may evolve over time.

Synthesising the data further, it is argued that the drive to increasing the level of control through introducing more stringent operating procedures and rules will move the organisational culture further towards a hierarchy culture. Furthermore, as the company strategically distances itself from its entrepreneurial history, it will exhibit less traits of the adhocracy culture, situating it more centrally in the market culture (and closer to the hierarchy culture).

This organisational cultural shift to become more controlled is reflected in that actions of employees are becoming monitored more closely. Whilst the culture still empowers members of staff to flag up risks and encourages employees to mitigate risks, the process for doing so has become more structured and controlled. This in turn is reflected in the hierarchical approach, the organisation is applying to managing projects within the business.

In addition to this, the job roles of employees are becoming more defined, which aids members of staff to understand the expectations from them, as well as it supports the measurement of performance and the assigning of accountabilities from a business perspective.

Having clearly identified the organisational culture of Case A, it has also been possible to establish that the culture of Case A has been impacted by the supply chain disruptions it has experienced. This is in line with its reactive approach to the management of risks in the supply chain.

For example, as the company has experienced significant disruptions internally, the business has taken the decision to revisit and reorganise its processes with a view to mitigating similar disruptions in future. This is reflected in the below quote:

“To put it bluntly, the business got bit and we have reacted and now we are going forward, I think that is the bottom line of it. That is part of the culture because the

incident woke us up in a way. What happened thereafter was a reaction to it based on our experience and not wanting to go through it again.”

The above statement relates directly to the increasingly risk averse nature of the business, which signifies the reduction of entrepreneurial cultural traits, that is actively being enforced by Case A's risk mitigating actions. Furthermore, the hierarchical approach of Case A to manage risks, is reflected in the company's pursuit to gaining more control of the business and is echoed in that interviewees pointed out that the key enabler for risk management is top-level support.

Based on the analysis of data from Case A, it is evident that the company's behaviour is dominated by the organisational culture (solid box) (Figure 5.7).

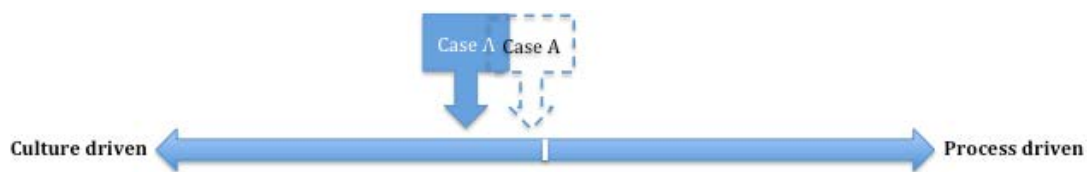


Figure 5.7 The drivers of organisational behaviour in Case A (This diagram is based on the qualitative interpretation of case data.¹⁹)

Focusing on the company's operational actions, it is evident that cultural traits such as entrepreneurship, goal and sales focus, competitiveness and so forth, are stronger forces than procedural guidelines. Although, recognising the organisational cultural changes, in combination with the increase in procedures to amplify the levels of business control, it is argued that the company's behavioural drivers are shifting towards a balance between cultural and procedural drivers (dashed box).

Key points:

- The organisational culture of Case A is representative of a market culture, although it exhibits influences from other culture types.
- The organisational culture is influenced by experiences the business makes along its supply chain.

¹⁹ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the nature of the drivers of organisational behaviour.

- The business is actively reengineering its culture.
- Case A's behaviour is predominantly driven by its culture.

5.1.6 Linking supply chain risk management and organisational culture

Reviewing all case data, it transpires that there is an inextricable link between organisational culture and risk management. This is as the organisational culture forms the basis of the company's drivers, the focus of the organisation, the way it behaves and thus also its motivations to manage risks in the supply chain.

When the organisational culture revolved predominantly around entrepreneurial traits, Case A was willing to take on more risks such as lower levels of supplier and relationship management, differentiated operating solutions for different departments and so forth. However, whilst the business has grown significantly employing this approach, it has also experienced substantial disruptions on the basis of these operating modalities.

As a result of these disruptions, the business recognised that its culture, driving this behaviour, was misaligned with the continuous growth targets of the company. In fact, the business increasingly recognised that whilst the focus of the business (i.e. sales, customer focus, etc.) needed to remain the same, the risks resultant from its entrepreneurial behaviour needed to be managed more closely.

In response to this, Case A has become more cautious and calculating in the way it operates, which is mirrored particularly in its efforts to manage risks. Here, the company has changed its attitude from being risk taking to being more risk averse. This is exemplified in key risk management projects, which have been implemented in areas, which were identified as being weak or risky.

For example, a lack of synchronisation of the internal operating infrastructure, as well as the supply chain generally, have been identified as weaknesses and

experts have been employed specifically, to strengthen these key areas to mitigate risks from them.

Further evidence for this resides in the increasingly hierarchical and procedural approach the company is taking to operating the business. This risk mitigating behaviour is in line with the underlying aim to continue the maximisation of sales based on a customer centric approach, which reflects the core traits of the organisation's culture.

The analysis also highlights that a more formalised approach to risk management is being established by Case A, to enable the continuous pursuit of its core foci and traits. This is achieved, by influencing the organisational culture, to manage risks more controllably, effectively and in synchronisation with the supply chain environment.

Moreover, as the organisation has become more risk averse, it increasingly designs its supply chain with risk mitigation in mind. More specifically, the company purposely chooses to work with partners, it believes, can support and sustain its growth going forward.

Holistically, the approach to risk management of Case A is reactive to disruptions in the supply chain. Data further reveals, that as the company has grown rapidly, the culture of the organisation was becoming less integrated. As the culture is being reengineered and aligned with the business's future aspirations, Case A increasingly focuses on the wider supply chain. This enables the organisation to mitigate external risks to the organisation, which may otherwise compromise the successful pursuit of its goals.

Synthesising this relationship, it is evident that whilst business operations have a significant influence over an organisation's culture, this is a two way process. The analysis clearly shows that events in the supply chain have impacted the organisation's culture, whilst the culture impacts business operations and specifically the approach to supply chain risk management, exposing the company to more or less risks along the supply chain (figure 5.8).

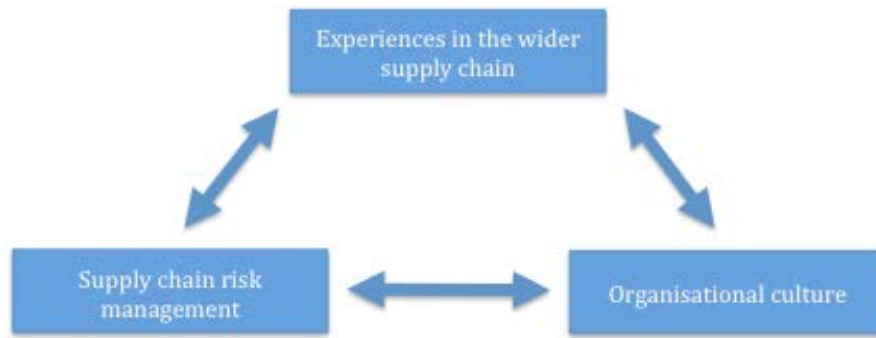


Figure 5.8 The relationship between experiences in the supply chain, organisational culture and supply chain risk management in Case A

Figure 5.8 is further supported by the quote below:

“You could perceive a more cautious general approach within the business would take you to a more cautious supply chain and equally if you went back to the kind of entrepreneurial buccaneering days there would have been higher risk.”

Moreover, the relationship between organisational culture and supply chain risk management is also mirrored in the efforts of Case A, to establish a more balanced culture versus process approach to driving operations.

Recognising the inextricable links between organisational culture and supply chain risk management, Case A has made significant investments to align its organisational culture and its organisational focus with the operating environment. With respect to this, the data clearly outlines that an organisation’s culture is key to the behavioural focus of a company and it needs to be aligned with the growth plans of the business, which in turn necessitate resilient operating modalities. Hence an organisation’s culture plays a pivotal role in enhancing the reduction of risks, thereby supporting the achievement of organisational targets.

Key points:

- Organisational culture has a clear impact on risk management.
- The supply chain environment has an impact on an organisation’s culture.

- An organisation's culture can be employed to facilitate / support supply chain risk management.
- The culture of an organisation must be aligned with its operational goals, to enhance the effectiveness of supply chain risk management.
- Organisational culture, experiences within a supply chain's operating environment, and supply chain risk management are closely linked.

5.1.7 Case A summary

As per the foregone analysis, Case A is a UK based, branded fashion retailer, which has undergone a significant change in its organisational culture, as well as its approach to managing risks.

Reacting to internal and external disruptions to the business, Case A has begun to realign its organisational culture with its business objectives, which has had an impact on its approach to risk management. Moreover, the cultural approach of the organisation has been impacted by its risk management attitude as well as the experiences within the supply chain.

Aspects of the organisational culture are reflected in multiple forms throughout the organisation's behaviour and particularly in its approach to supply chain risk management. Based on the data, there is a close link between the organisation's culture and its approach to managing risks in the supply chain.

For a summary of the key points from the analysis of Case A, see table 5.3.

Table 5.3 Summary table Case A

Case summary table	
	Case A
Risk profile	Risks are mostly internal revolving around growth, processes and the controllability of the business. External risks have an impact on the business and are being addressed increasingly.
Biggest disruption	Systems implementation failure, leading to significant profit losses.
Biggest mitigation effort	The biggest focus in terms of risk management effort revolves around the control of the business and its processes. This appears resultant from a major disruption. Increasingly focus is also being placed on the upstream supply chain is becoming more process driven, moving away from its original entrepreneurial, risk embracing origin.
Risk management prompt	The biggest effort was initiated by a disruption. In line with the risk averse nature of the business, efforts to mitigate risk in the wider supply chain are taking on a more proactive.
Cultural type	Market culture. The predominant emphasis within the company is sales. With the change of the organisational structure, most focus is placed on the generation of profit and goal achievement. There is a drive to improve internal policies and procedures for more controllability, the standardisation of processes towards predictability and stability.
Risk drive	Slight more culture driven than process driven due to the company history. With various changes in the business this is being altered to be more balanced.
Focus	The predominant focus is internal as most disruptions have occurred in this area, although due to the risk attitude, work focussing on external risks is being increased.
Network relationship	Previously adhoc, becoming more transactional and efficiency oriented.
Importance of KPIs	Previously limited and increasingly focussed on accountability, performance and deliverables.
Level of information sharing	Initially low, sub teams were working in silos. Work is being done to improve information sharing as well as processes are being synchronised.
Risk accountability	Individuals are expected to flag up risks and incidents although are limited in the ability to react directly. A hierarchical approach is used to mitigate risks.
Risk attitude	Risk averse. - Risk is different for different areas of the business and a key focus is to reduce failures as much as possible to minimise lost profit opportunities.

5.2 Case analysis Case B

5.2.1 Interview background

The second case that was researched as part of the study, is one of the world's leading mail and logistics services companies. Case B provides a wide portfolio of products and services to its diverse range of customers and was purposively selected, based on its strong position in the market place, as well as the fact that its services are a key enabler for other industries. Further reasons and justifications for selecting Case B are depicted in table 4.1, section 4.5.

Research interviews were spread over one month and took place at four different sites, based on the interviewees' locations. Sites visited by the researcher included the division's head quarters, a key distribution centre, a warehouse, as well as a site, housing the strategic unit of the business. Three of the four visited sites were located in the United Kingdom, whilst the fourth site was located in Continental Europe.

In total, five members of staff were interviewed. Candidates were chosen based on their experience with risk management, disruption experience at the case company, as well as on their understanding of the organisational culture. Interviewees were selected together with a contact person at Case B.

Positions held by the candidates included the global project and re-engineering manager, a regional operations manager, the business continuity manager for Europe, the global director for business information and market intelligence, as well as a field support manager. All interviewees were helpful in getting access to additional documentation.

In addition to interview data, the researcher was also able to gather data from observations during site visits. This was particularly useful in researching the organisational culture, as well as it played a key role in triangulating data from interviews and other collected data. Alongside data from interviews and

researcher observation, data was also collected in the form of company reports, internal communication (emails, fliers, leaflets, presentations), as well as external communication (presentations, newsletters).

5.2.2 Risk background

Reviewing the data pertaining to the risk background of Case B, it becomes evident that the company faces internal, as well as external risks to the supply chain. Evidence for this exists in the type of disruptions Case B has experienced, ranging from power failures and the loss of IT equipment to force majeure type incidents.

As Case B controls, plans and handles supply chains on behalf of its customers, the risks relevant to Case B's supply chains are highly diverse. As a result of this, examples of disruptions to the supply chains the company orchestrates, include:

- ❖ Damage to cargo,
- ❖ Delayed shipments,
- ❖ Supply of cargo space,
- ❖ Industrial action,
- ❖ Miscommunication,
- ❖ Staff mismanagement,
- ❖ Reputational damage,
- ❖ Political unrest,
- ❖ Strikes,
- ❖ Delays at customs,
- ❖ Weather disruptions and many more.

Whilst the above list is not exhaustive of all disruptions the company has experienced, it indicates Case B's diverse exposure to risks and disruptions. The analysis of Case B focuses primarily on its business of orchestrating customer supply chains.

According to collected data, the outbreak of the Icelandic volcano Eyjafjallajökull, caused one of the most significant disruptions to Case B. This is as a wide range of customer supply chains relied on logistics solutions based in or using routes through areas that were affected by the ash cloud.

“The ash cloud was a huge disruption for us because many of our customers’ supply chains were affected and because it was not something we saw coming.”

As a result of the eruption of Eyjafjallajökull, air shipments were disrupted, which slowed or halted customer supply chains. According to the data, given the types of cargo, the type of transportations some shipments required, as well as the location of cargo, it was not always possible to effectively reroute shipments.

During this period the company’s main focus revolved around generating visibility in terms of critical cargo, carrier availabilities and the rerouting of shipments to enable supply chains to continue operations through finding alternatives to normal operations.

A further significant disruption to the operations of Case B was the loss of a warehouse. Due to a fire in one of Case B’s facilities, a warehouse with all its contents was lost. Whilst this incident was not as severe as the impacts incurred through the volcanic eruption, it presented a significant supply chain disruption nonetheless.

Consolidating all risks the interviewees cited, as well as those listed in additional data collected from Case B, it was possible to plot these on a radar diagram. For this purpose, the different risks that were mentioned across all data collected (within case) were categorised using the sources of supply chain risk framework and subsequently tallied, leading to figure 5.9. Risks were classified into process, control, demand, supply and environmental risks, using a framework provided by Cranfield University (Peck et al., 2003).

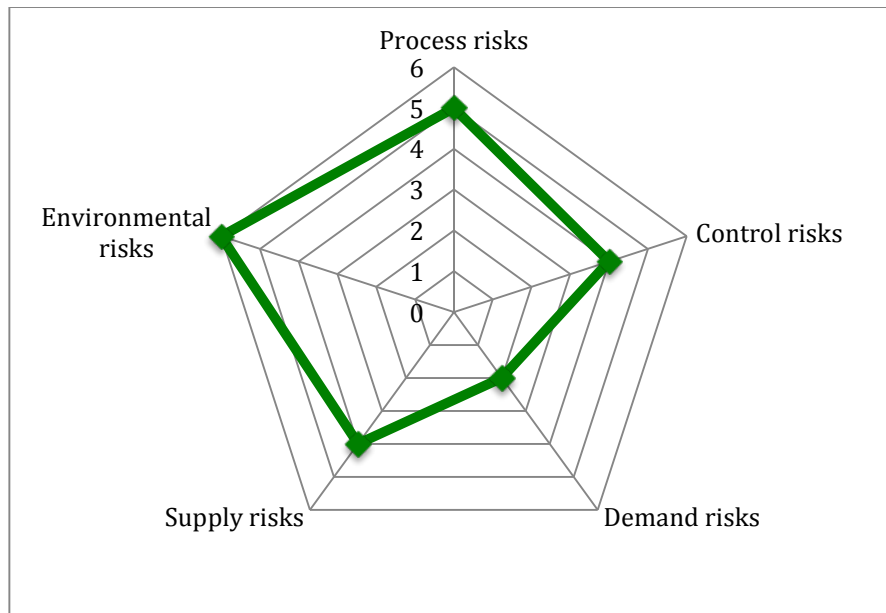


Figure 5.9 Risk profile of Case B (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses and other company data.²⁰)

Reviewing figure 5.9, it transpires that whilst the risk profile of Case B is fairly balanced, environmental risks were cited most frequently.

Moreover, whilst different environmental risks were cited six times in all collected data, risks in the process risk category were cited five times, control and supply risks four times and demand risks only twice. Thus, whilst environmental risks (i.e. force majeure type risks, weather disruptions, etc.) represent the biggest risk area for Case B, demand risks such as demand fluctuations, lead time uncertainties and so forth represent the lowest area of risk to the business.

Following the identification of the most significant risks and disruptions the business has experienced and perceives going forward, data was also gathered with respect to a definition of risk from an organisational perspective.

Synthesising the definitions of supply chain risk provided by interviewees, it transpires that these were largely synchronised. Moreover, the definitions of supply chain risk, as provided by participants were aligned with additional documentation that was collected.

²⁰ To generate this diagram, different risks that were mentioned in the data were counted, tallied and categorised into the different sources of risks.

Within Case B, supply chain risk is defined as:

“Anything that disrupts customer satisfaction in delivering goods to customers or anything that could disrupt the level of service to customers”.

Interestingly, this definition of supply chain risk is very broad and reflects that the range of risks the company faces is highly diverse. In fact, it was also pointed out that:

“Supply chain risk is everything that has to do with disruptions but also in terms of where risk is situated.”

Synthesising the data, it is argued that the broad view Case B has on supply chain risk, is a result of the diversity of risks Case B faces when operating customer supply chains.

Following the overview of the supply chain risks and disruptions Case B has experienced, the responses of the company to these have also been explored.

Given the business model of Case B, which revolves around orchestrating supply chains on behalf of its customers, the most significant response to risks and past disruptions has been to maximise the collaboration with customers. A key initiative of this has been the maximisation of the level of visibility within different supply chains to identify critical nodes, risks, potential disruptions and so forth.

Moreover, as the foundations for any supply chain risk are laid when customers place work requests, a key initiative of Case B is to maximise data integrity:

“... the start is always a customer transport request. The risk always starts at the beginning of the process because you need clean data to work with. Once it is booked it is about monitoring and identifying if there are risks in terms of disruptions and exceptions but the biggest risks you will face at the start.”

In addition to generating higher levels of risk and disruption visibilities relevant to customer supply chains, a further key focus has been the identification of flexibilities and alternatives to the normal operating solutions. This has been done to enable quicker responses to incidents within the supply chain, should these occur.

Moreover, the proactive approach to managing risks in customer supply chains is based on the company's view that risks will happen, which in turn is reflected in Case B's commercial offering of orchestrating supply chains more cost effectively and reliably than its customers.

Aiming to do so, Case B significantly invests in the modelling of risks, scenario planning, risk probability calculations etc., to generate a greater understanding of its own, as well as its customer's supply chains.

Furthermore, in pursuit of managing risks and disruptions more effectively, a software tool has been developed which consolidates disruption data, making it available to all operators. This generates disruption visibility enabling staff to proactively manage risks, minimising the level of disruptions to customer services.

However, as the efforts Case B affords to manage risks in different customers' supply chains is closely linked to the risk appetite of its customers, where the level of effort to understand and manage risks is very much dependant upon how much customers are willing to pay for this service. In addition to this, Case B's ability to implement particular solutions is also based on the readiness of customers for these. In fact as one interviewee outlined:

"The biggest issue we sometimes have in helping customers is that often customers are not ready for some solutions we provide."

Examining all data relevant to the management of risks in Case B's supply chains, table 5.4 exhibits the key efforts the company has undertaken to manage these.

To generate this table, the different risk mitigation efforts, as they appeared within all case data (individual cases), were counted, listed and subsequently classified, harnessing Peck's sources of supply chain risks framework (Peck et al., 2003). This approach is consistent with the process used for classifying the risks in all risk profile figures of this study.

Table 5.4 Efforts to manage risks in the supply chain by Case B²¹

Efforts to manage risks					
Effort	Case B	Effort	Case B	Effort	Case B
Audit of suppliers	S	Disruption trending	D,E,S	Review of supplier supply chains	S
Business impact analysis	E,S	Economic climate monitoring	D,E	Risk assessment process developed	E,P
Contingency planning	C,E,P,S	Increased collaboration with customers	D,P	Risk criticality mapping	C,E,P
Critical node mapping	D,P,S	Increased information sharing	C,D,E,S	Risk likelihood analysis	C,D,E
Dedicated risk personnel	P	Process redesign	C,P,S	Risk mapping	S
Desktop practice exercises	E,P	Product redistribution plans	D,P	Scenario planning	C,E
Developed specific solution tools	C,P	Raised business continuity plans	D,P	Stricter contracts	C,S
Developed a generic risk response process	C,D,P	Recovery planning based on frequent disruptions	C,P	Supplier criticality analysis	S
Developed disruption dashboard	C,D,E,P,S	Review of customer supply chains	D,S	Supply chain mapping	E,P,S
Disruption matrix	D,E,P				

(The above table details the not only the efforts but also outlines the sources of risk these target, e.g. P = process, C = control, D = demand, S = supply, E = environment.)

For more details on the efforts to manage risks as well as the reach of the different efforts, please refer to appendix 4.

Reflecting on table 5.4, it becomes evident that the efforts to manage risks in the supply chain have been fairly balanced. Although, it transpires that whilst

²¹ This table was generated by listing the different efforts and projects highlighted within the data.

environmental risks represent the highest threat area for Case B, this is not directly reflected in the efforts to manage risks. However, when reviewing the efforts to manage risk collectively, some aspects of different solutions are relevant and can be used to manage environmental risks.

For example, the redesign of processes, desktop practice exercises, the generation of business continuity plans, as well as the increased level of information sharing along with the development of a disruption dashboard are solutions targeted primarily at control, process and supply risks, although they could have a significant impact on the ability to manage environmental risks or disruptions.

When examining figure 5.4 collectively in its entirety, it transpires that the majority of efforts are designed primarily to maximise the ability to provide resilient, value-adding activities for customers.

Recognising the unpredictability of some risks along with the risk inherent in business operations more generally, as reflected in the below quote:

“... it is about knowing that there will be a disruption and making sure you can deal with it.”

Case B intimately focuses on its own processes and supply chain capabilities to maximise its abilities to support and add-value to customer supply chains under normal circumstances and particularly during disruption. In fact, this approach is reflected in the company’s business proposition, which revolves around orchestrating customer supply chains, whilst delivering predefined, guaranteed savings.

Based on this, it is argued that the approach to risk management in terms of building capabilities is increasing. This is to strengthen the company’s commercial offering and to enable customers to choose from different supply chain risk management options.

“It is the customer’s choice, we do make recommendations but it is for the customer to decide what should or should not be done.”

Bearing this in mind, when categorising the efforts taken by Case B to manage risks in the supply chain (table 5.4) using an identical approach as in the classification of the risk profile, it becomes evident that efforts to manage process risks have dominated the risk mitigation work (figure 5.10).

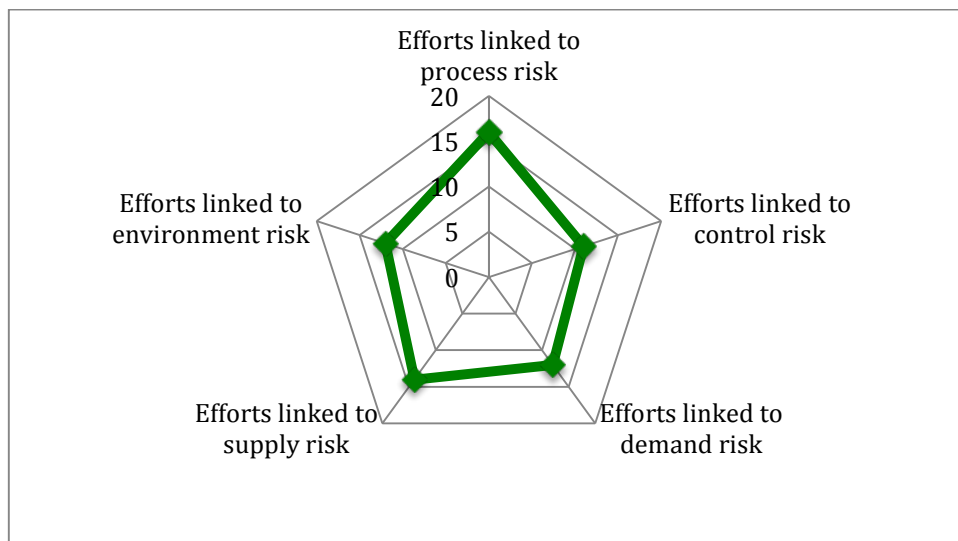


Figure 5.10 Efforts taken to manage risks by Case B (This diagram is based on table 5.4 and is of a purely qualitative nature and was created by interpreting interviewee responses.²²)

Whilst work to minimise process risks has dominated the efforts to manage risks in the supply chain, the overall work to manage risks have been largely balanced. In fact, the maximum difference between the number of efforts dedicated to either process, control, demand, supply or environmental solutions is five (figure 5.11). Due to this number being low, it is argued that the efforts to manage risks by Case B are fairly evenly spread.

²² To generate this diagram, different efforts made to manage risks were tallied and categorised into the different sources of risks they were set to mitigate against. Furthermore, efforts to manage risks have been counted in all sources of risk they were applicable to (table 5.4). The efforts taken by organisations were identified by going through all data and listing the different actions.

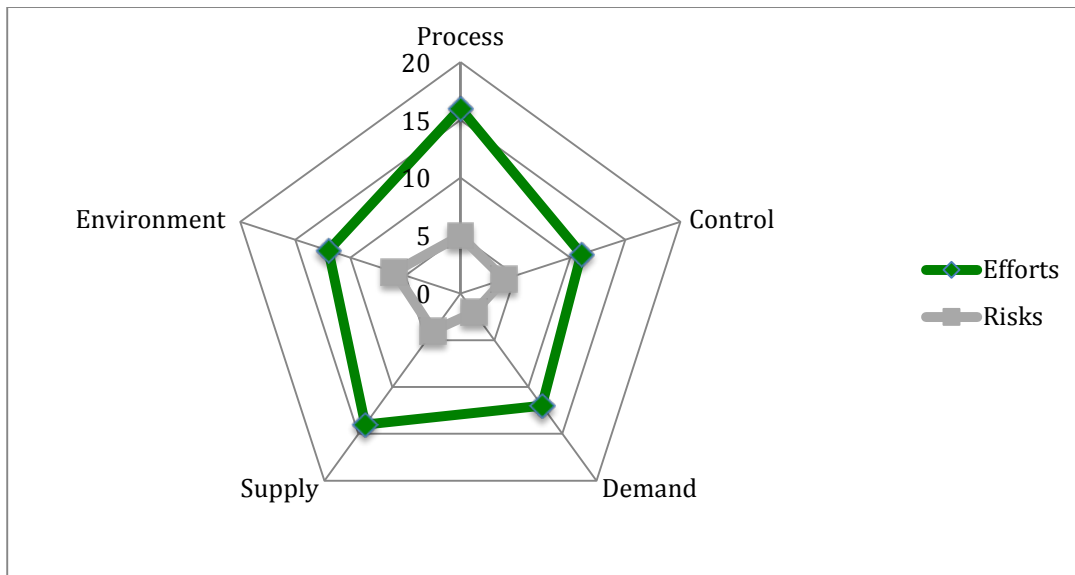


Figure 5.11 Efforts to manage risk versus risks areas by Case B (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

Reflecting on figure 5.11 specifically, it becomes apparent that the efforts to manage supply chain risks clearly outweigh the number of risks in each area. Furthermore, whilst the shapes of the efforts and risks are not aligned, all risk areas lay comfortably within the efforts made to manage the risks in the specific areas.

Examining figure 5.11 further, it transpires that the volume of efforts made by the organisation to manage risks in the supply chain goes beyond the identified risks and thus the efforts to manage supply chain risks and the perceived risks are not closely aligned. At this stage, it may be argued, that this is the result of offering differentiated risk management solutions to customers.

Despite the balanced approach to supply chain risk management Case B exhibits, the company does recognise that:

“There are some risks against which you just cannot do anything.”

This statement is reflective of the broad focus of the company's supply chain risk management focus. Synthesising the company's risk profile, the efforts made to manage risks in the supply chain, as well as other relevant data, it was possible to generate the risk attitude of Case B as shown below:

It is about understanding there will be a disruption but also knowing or figuring out what the second step is going to be. It is about how can you ensure the business keeps continuing and that is quite important also for the customer.

Reflecting on the risk attitude, the motivation for Case B's efforts becomes evident. As Case B operates supply chains on behalf of its customers, its key business offering revolves around the ability to consistently deliver value added supply chain orchestration services, especially during disruptions. By demonstrating this ability consistently, Case B desires to become the world's leading logistics services provider.

As part of this strategy the company needs to provide reliable, resilient logistics and supply chain orchestration services beyond those of the competition, as well as those, customers can perform themselves. Based on this, the organisation is focussed on developing diverse mechanisms, which maximise the proactive and reactive management of risks and disruptions, it can apply to customer supply chains.

As part of this, the organisation develops mitigating actions for known risks, whilst it also searches for ways of dealing with risks, which may not be forecasted or managed such as force majeure type incidents.

Reviewing participant responses with regards to a potential change in the number of risks, their impact, as well as the ability to respond to supply chain risks in the future, it transpires that Case B expects the number of impacts to remain largely similar. Furthermore, the analysis showed, that whilst the impact

of risks and disruptions was seen to increase, the types of impacts would remain consistent.

Given the amount of work the organisation is undertaking to manage risks in the supply chain, it is forecasted that Case B's ability to deal with risks will increase. Nonetheless, although Case B would be prepared and capable to deal with risks more effectively, its ability to do so, depends on the readiness and commitment of customers on a case-by-case basis. This is as customers ultimately choose the solutions Case B implements as part of their working contracts.

Key points:

- The risk profile of Case B is highly diverse as it operates supply chains on behalf of a diverse range of customers.
- Risks and disruptions are inevitable, only some can be mitigated.
- Efforts to manage risks are diverse and outweigh the risk profile of Case B.
- A key focus is generating visibility within supply chains to understand these, and to offer operational alternatives should they be needed.
- Solutions are linked to customer risk appetite and readiness.

5.2.3 Risk management staff

Examining data from Case B pertaining to the staff that is dedicated to managing risks, it transpires that the responsibility to manage risks falls on every member of staff. However, whilst risk management is part of everyone's role, there are different hierarchical levels to this process.

“It is filtered down with different levels of responsibility. Everybody will identify their risk and work alongside them, a specific person above them will then project manage how to mitigate them or reengineer how we deal with the customer for example.”

The above approach is consistent throughout the organisation in that individuals are responsible for risks in their area and as a result, the higher a member of staff is situated in the organisational hierarchy, the wider the operational field and risk responsibility.

“This is dependent upon the level of the issue. Operators have autonomy over their shipments, although decision freedom depends on the impact on the rest of the system. Operations managers are fully empowered. The level of empowerment is also linked to the scope of work with the customer. So there is a hierarchy with clear lines or responsibility.”

In addition to this, each site operated by Case B has an incident management team. This team is made up of members of staff who have taken up the additional responsibility of working in this team, springing into action should a risk or incident occur.

Examining the data, it transpires that whilst lower levels of staff are responsible for their own areas and focus more on operational risks, higher ranks are concerned more with the strategic management of risks.

It further transpires, that whilst the management of risks in the supply chain is recognised as highly important and thus is part of everyone’s job role, the number of people who are employed on a full time contract to manage risks is very low.

“The management of risk is part of everyone’s job description due to the nature of the business but we also have people who focus directly on that.”

This attitude is reflected in the approach the organisation takes to risk, in that:

It is everybody’s responsibility, people accept that risk mitigation is part of their job description because risk is going to happen.

Whilst the organisation recognises the management of risks in customer supply chains to be a key part of the commercial offering and a source of Case B's competitive advantage, the data indicates that staff has not been hired specifically to manage risks.

In fact, Case B relies heavily on training its staff for this purpose. More specifically, different types of training have been administered for different levels within the organisation, ranging from brainstorming exercises, desktop scenario responses, as well as workshops to name a few.

Moreover, the data also reveals that an increase in the number of people dedicated to risk management will depend on business expansions, risks in the supply chain and so forth, going forward. In the short term, it is expected that numbers may increase slightly, although the key focus will remain to be on the training of staff. This will ensure that the management of risks becomes increasingly integral to employee's jobs, whilst staff training is seen to amplify the ability of Case B to manage risks.

For the long term, the data clearly exhibits that the number of dedicated personnel to manage risks in the supply chain will increase, in line with business expansions, increasing volatility in the market place, and an increasing level of commitment to risk management from customers.

Key points:

- Case B employs a hierarchical approach to the management of risks in the supply chain.
- Risk management is part of everyone's job.
- Lower levels in the organisation focus on operational risks, whilst higher levels focus on strategic risks and managing risks strategically.
- Key to managing risk effectively is the training of staff.

5.2.4 Risk management in the supply chain

As Case B orchestrates supply chains on behalf of its customers, the risks Case B faces are highly diverse. Examples of supply chains orchestrated by Case B range from healthcare supply chains to natural resource supply chains. Activities along these supply chains, apart from their orchestration, include anything from sourcing, to reverse logistics.

Given that the business of Case B is based on organisations outsourcing the operation of their supply chains and contracts to the case company, risk management is a key focus. In fact, Case B reassures its customers by offering guaranteed savings based on contractual agreements on an annual basis.

Consequently the level of management of tiers along the different supply chains is very close.

“We manage supply chain partners very closely. There is a daily call, weekly as well as monthly performance updates. Once a quarter, operations managers have a quarterly meeting with customers on top of KPI calls. This is all to generate visibility in the supply chain to mitigate risk and giving them reassurance that we are in control of whatever situation. “

The close management of actors within customer supply chains also plays a key role in understanding customer supply chains in detail. This in turn is related to risk management as stated below:

“In a way, the close management is purely to manage risk because the risk we face is not to be able to operate supply chains properly. As part of that, we try to remove complexity and to manage our customers but also ourselves more effectively.”

As each supply chain is different and as customers have different attitudes towards risk management, the level if this significantly varies between supply chains.

“Every client is different. For particular customers we have to prove where every component of products originates from to the most remote supplier, whilst others demand less visibility.”

The level of involvement is further reflected in the contractual agreements Case B has with its customers. In fact, these determine the level of risk management and performance that is being delivered by the company.

Moreover, the data analysis has shown that the budgets to manage risks in the supply chain are impacted by this. In fact, whilst Case B has budgets for the development of innovative solutions, their application in customer supply chains are often restricted.

“Money is available depending upon the case that can be made although in part this is tied to customer contracts. Internally money is available although some contracts do not require certain solutions. Internally there is money to develop solutions though.”

Relating to this, when reviewing collected data with regards to supply chain design, it transpires that most customer supply chains are setup before their orchestration is outsourced to Case B and often the flexibility to redesign these is limited. However, Case B does reserve the right to suggest improvements as reflected in the below quote:

“The supply chain structure depends on the customer as we operate their supply chains. However, we do make recommendations to improve their supply chains. Actually they often do not understand their supply chains and we do a lot of mapping etc., for them to show potential risks from a strategic perspective.”

Owing to the above quote, the selection of supply chain partners is based largely on customer demands, although this is a harmonised process, where customers choose external suppliers based on suggestions by Case B. Internally, however,

the case company chooses its own suppliers with a view to their ability to deliver adequate services for and on behalf of customers.

As has been highlighted by the data, the efforts Case B undertakes to orchestrate supply chains are largely focussed on demonstrating its ability to manage supply chains and in particular risks within these. In fact, a wide range of work has been undertaken to identify, manage and mitigate against risks in customer supply chains.

Even though supply chain risks have also been identified within the network of Case B, the main focus of risk mitigating actions has been within customer supply chains. This is consistent with the area of risk Case B perceives to be the most significant.

“The biggest risk is the start of a customer request. The risk always starts at the beginning of the process because you need clean data to work with. Once it is booked it is about monitoring and identifying if there are risks in terms of disruptions and exceptions but the biggest risks you will face at the start.”

As a result of risk stemming predominantly from customer supply chains, the focus of Case B in terms of risk management is clearly on the external supply chain (figure 5.12).



Figure 5.12 The risk management focus of Case B (This diagram is based on the qualitative interpretation of case data.²³)

Reviewing the collected data pertaining to the management of risks in the supply chain, it transpires that Case B anticipates risk management to become more integrated into the normal operations of supply chains. As part of this, the

²³ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the focus on risk management the company displayed, particularly interpreting the area of impact of foci.

propensity to manage risks will play an increasingly important role in the design of supply chains.

Key points:

- Case B recognises most risks to stem from within customer supply chains.
- The case company is proactive about managing risks.
- Case B's customers determine risk management efforts.
- The case company's potential risk management performance is often compromised due to pre-existing supply chains and a lack of customer readiness.

5.2.5 Organisational culture

Key attributes interviewees highlighted when describing Case B's organisational culture included:

- ❖ Friendliness,
- ❖ Process drive,
- ❖ Customer focus,
- ❖ Collaboration and coordination,
- ❖ Hierarchical as well as,
- ❖ Process and rules based.

The above traits, by means of which interviewees described the organisational culture, are consistent with researcher observations.

Reviewing all data collected on the organisational culture, it transpires that the organisation's internal culture is based on rules and policies, which guide the organisation as a whole. Due to the size of the organisation, a core culture has been developed, which reflects key traits such as customer focus, market orientation, hierarchies, order and stability. These traits generate a base culture, which motivates members of staff to engage in their daily jobs.

Working with this as a background, the culture does provide some element of freedom, where this is to support the customer focus of the organisation. This has led to the development of differentiated cultural approaches to customers. In other words, whilst there is a clear core culture, establishing a corporate flavour of operations, the approach to different customers is adapted with a view to maximising benefits of the relationship.

“We adopt different approaches for different customers, this includes the adoption of different cultures. For example we have put in key locations close to our customers and employ local people to make our customers feel at home. So it is a localised “personalised” approach.”

The above described approach is reflected in that the organisation’s business offering revolves around its ability to adapt its competencies to operating supply chains of the most diverse customers. This requires a coordinated approach, which is dedicated and adapted to different customers and operating environments.

“We have a core culture and cultures in different locations are based on this but are also slightly different. For example in our region the cultures are very proactive and we have driven this from the top because of our customers needs. But in other countries they are lagging behind a bit because the customers are not ready.”

The company’s differentiation is also clearly exhibited through the product and service portfolio offered by Case B. As outlined previously, the applied product and service solutions are determined by the state of customer supply chains, as well as the level to which customers outsource the operation and improvement of their supply chains. Owing to the different contractual agreements and customer needs, each solution is differentiated.

“Our scope of work is in effect defined by what the customer wants. We make recommendations based on our data and they choose what they think is best for them, whatever that may be.”

Holistically, the data highlights that the business model of Case B demands a coordinated approach to business and providing value. This is aimed at establishing an organisational focus and operational control. However, the ability to tailor solutions in terms of the approach, processes and procedures is key in the company's value proposition to its customers.

With respect to this, researcher observation in particular has exhibited that the complex culture is reinforced by a lot of staff training. This consists of a variety of approaches and is undertaken constantly, to guide employee behaviour, as well as to remind staff of the organisational core culture.

“We do a lot of training, so people know what they can do, should do and identify issues early. The training is reinforced constantly. So locally we do workshops, town hall sessions and the strategic approaches are communicated in a document type approach. We also have a 15-20 minute meeting every morning to discuss all issues so people do not work in isolation. So there are very clear guidelines.”

As a result of the necessary coordination in combination with the demanded flexibility, the organisational culture clearly reflects traits of a hierarchical culture with some elements of a market culture. More specifically, the dominant culture of the organisation is a hierarchical one, as the company is strongly characterised by facets of this culture. However, given its strong focus on the customer and achievement in general, the culture also exhibits traits of a market culture (figure 5.13, using the cultural categorisation tool as provided by Deshpandé et al., (1993)).

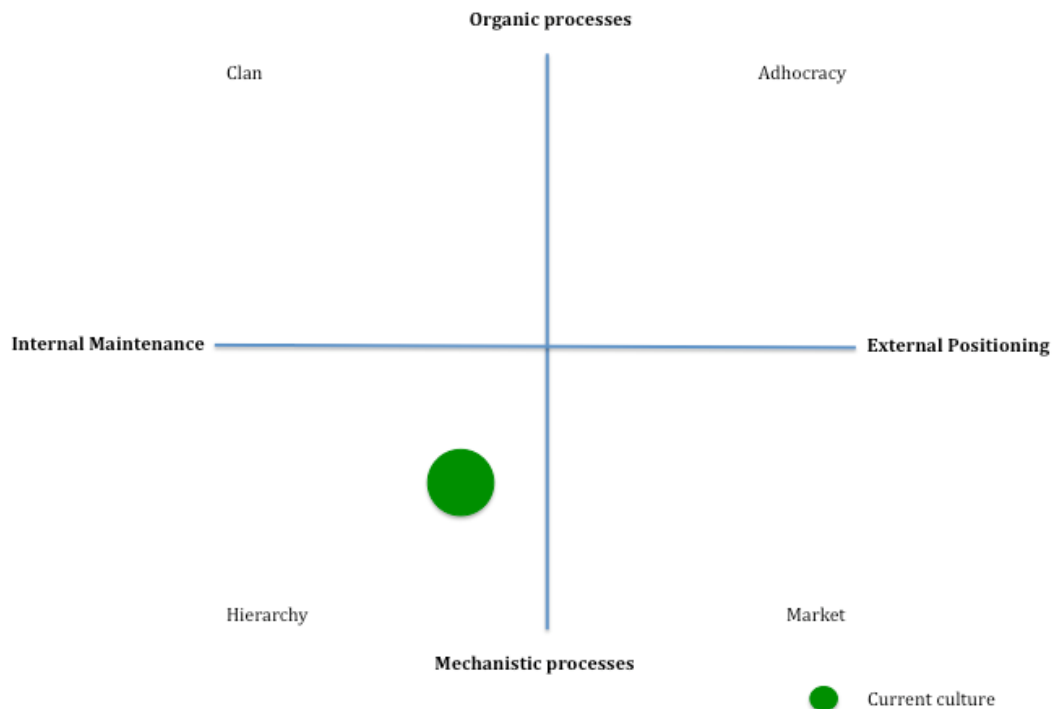


Figure 5.13 The organisational culture of Case B (This diagram is based on the qualitative interpretation of case data.)²⁴

Reflecting on this, it is argued, that the proactive approach to risk management internally, is reflected in the organisational culture, as there is a strong drive for stability and controllability (hierarchy culture). Moreover, given this background, Case B has expanded this risk management focus / capability by turning it into a commercial offer, aiding other organisations in orchestrating supply chains in a controllable fashion. Thus it emerges that the organisation has harnessed some of its core organisational traits, to develop a service to other businesses.

When reviewing data regarding the distribution of risk management amongst members of staff, it becomes apparent that the ability and autonomy to manage risks is linked to different levels within the hierarchy.

“The ability to do something depends on the potential impact, the level of the decisions etc. We empower the staff fully but we still want to have a hand on what those decisions are. They are empowered to take decisions on their shipments and

²⁴ The current culture of the organisation was interpreted based on applying all relevant data to the competing values framework. Cultures are termed “current” as cultures may evolve over time.

whatever they need to do but they need to make sure they provide visibility so everyone knows what is going on.”

Moreover, the previous quote also clearly exhibits that whilst staff have the ability to manage risks to some degree, depending on their hierarchical level, the desired controllability and visibility clearly exhibit traits of a hierarchical culture. Moreover, it was identified that a key reason for Case B to deliver the high levels of training to employees, is to reinforce the understanding people have of their roles, what they are expected to do and the organisational culture.

“The culture is key as it focuses everyone on the things they should be doing.”

Despite the hierarchical approach, the culture clearly communicates that all members of staff contribute to the experience the customer has, regarding the services Case B delivers. Given its strong focus on the customer, it is argued that Case B tries to balance the organisational control and staff empowerment with a view to maximising customer value.

Following the analysis of the organisational culture of Case B, it transpires that processes predominantly drive the company’s behaviour (figure 5.14).



Figure 5.14 The drivers of organisational behaviour in Case B (This diagram is based on the qualitative interpretation of case data.²⁵)

Whilst processes, predominantly govern the company, it is clear that the organisation also harnesses its culture for success. More specifically, whilst the organisation has turned key aspects such as controllability, the pursuit of stability and so forth into tradable services (i.e. supply chain orchestration, risk management, etc.), it also utilises its culture to focus and motivate staff members by reinforcing the company’s processes.

²⁵ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the nature of the drivers of organisational behaviour.

Furthermore, due to recognising the importance of strategically coordinating its core culture internally, as well as within the market place, Case B has developed customer solutions, which reflect customer cultures. This is exhibited by having a “localised and personalised approach” towards customers, allowing customers to experience a more tailored, valuable service.

Key points:

- The company’s organisational culture is representative of a hierarchy type, although it exhibits facets of a market culture.
- Case B’s behaviour is predominantly driven by processes, which are reinforced by its organisational culture.
- Organisational culture and a tailored cultural approach to customers is a key element of the commercial offering of Case B.
- The organisational culture empowers employees to manage risks based on different hierarchical tiers, to sustain control over the business.

5.2.6 Linking supply chain risk management and organisational culture

Reviewing all collected data, it has become evident that there is a strong link between Case B’s organisational culture and its approach to risk management. In fact, it transpires that the organisational culture, which reinforces organisational processes, guides the behaviour of employees in their approach to manage risks in different supply chains.

Moreover, it has been revealed, that as a result of its size and the fact that the core industry Case B operates in (logistics), is heavily influenced by disruptions, it has developed a number of processes, which govern organisational behaviour. These processes form part of the organisational culture, which exhibits traits that are geared towards stability, controllability and so forth, aiming to mitigate risks the company faces along its own and its customer supply chains.

Following the development of operations, which allow higher levels of controllability, stability and resilience in its own volatile operating

environments, Case B identified elements of its core business to be tradable. As a result, the case company began to offer supply chain orchestration services based on its operational processes, exhibiting key traits of its organisational culture.

Realising the importance of its organisational culture, Case B specifically adopts its customers' cultures in dedicated customer teams to maximise the effectiveness and value of the relationships. This in turn is closely linked to the strong customer focus Case B exhibits.

Moreover, the company offers business services that are based on Case B's own organisational culture and combines these with its ability to adapt its own procedural and cultural solutions to customer supply chains. This is reflected in the way risks are managed, supply chains are controlled and contracts are delivered upon.

Furthermore, the link between Case B's organisational culture and its approach to risk management in the supply chain, is also exhibited in that it recognises the multitude and presence of risks within its markets by directing its culture towards managing these.

"There will be a disruption, and so it is about knowing or figuring out what the second step is going to be."

In addition to the above, it also transpires that whilst Case B is predominantly process driven, it does empower employees to deal with risks to predefined ratios. In fact, as every supply chain is different, the flexibility employees have to manage the diverse risks of differentiated supply chains is reflective of the organisation's emphasis on controllability and stability. This is as it recognises that some degree of operational freedom is necessary to develop tailored solutions to risks in different supply chains, maximising their effectiveness and efficiency.

“The flexible approach to risk management is reflected in the culture. That is the key thing that keeps the relationship as strong as it is and the collaboration on making sure that any risks and challenges are clearly understood by both organisations.”

The apparent link between the organisational culture and risk management, is further highlighted in that interviewees clearly outlined that a different organisational culture would significantly change the company’s approach to risk management.

“If we were to change our culture that would certainly change how we manage risk. It is just trying to get people to understand that risks will happen, how we react to them is what makes the difference.”

The data also exhibits that the nature of different supply chains has an impact on the culture of dedicated customer teams. In fact, as customers often have little visibility within their supply chains, staff of Case B operating these, regularly struggle with their operation initially, which impacts upon the team culture.

“If the supply chains of our customers were less complicated, it would remove a lot of the angst on the team because the team will see the supply chain and it is just not logical and they panic. So if the risks are reduced there would be less panic and fear.”

As the trust between Case B and its customers increases, customers are increasingly accepting risk management suggestions by the company. This in turn amplifies the controllability of operations, allowing the culture of different customer teams to become more aligned with Case B’s core culture.

Synthesizing this relationship, it is argued that whilst Case B’s organisational culture determines the company’s approach to managing risks in supply chains generally, the exposures to different supply chains also has a significant impact

on the culture of customer teams and the resultant approach to risk management (figure 5.15).

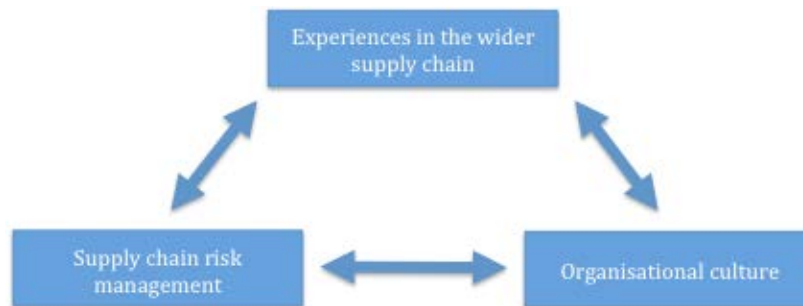


Figure 5.15 The relationship between experiences in the supply chain, organisational culture and supply chain risk management in Case B

Recognising the close link between organisational culture and the approach to risk management in the supply chain, Case B has developed a way in which its organisational culture informs and develops its operating processes, whilst its operating processes inform and develop its culture.

As the organisational culture forms a basis for risk management in the supply chain, the company recognises the necessity to be able to adapt its risk management approach to different customer needs. This in turn demands certain levels of flexibility from the key operating principles, which enable the company to deliver tailored, valuable supply chain risk management solutions for its diverse range of customers.

Key points:

- Organisational culture and risk management are closely linked.
- Case B's organisational culture is a key enabler for effective risk management in the supply chain.
- An organisation's culture, risk management and the supply chain-operating environment are inextricably linked.
- A hierarchical culture employs processes to govern behaviour to a greater extent than culture.

5.2.7 Case B summary

Case B is a world leading provider of a wide range of logistics and supply chain products and services. Focussing on its supply chain orchestration and risk management services, the company has identified cultural traits, which are conducive to managing risk in the supply chain and has decided to commercialise these capabilities.

Orchestrating supply chains on behalf of its customers, Case B harnesses key organisational strategic emphases to operate customer supply chains controllably and stably. The company constantly experiences supply chain disruptions within its own, as well as its customer's networks, which has led to a proactive approach to risk management.

Cultural traits are reflected throughout Case B's operations and these are harnessed to maximise the value of commercial offers to customers. Case B strategically employs traits of its own, as well as its customer's organisational cultures to offer tailored services, generating a "personalised, localised approach" to service.

For a summary of the key points from the analysis of Case B, please refer to table 5.5.

Table 5.5 Summary table Case B

Case summary table	
	Case B
Risk profile	Most risks are external to the company in the supply chain. Risks do also exist internally but these are significantly lower.
Biggest disruption	Environmental such as natural disasters and weather. Other big disruptions due to frequency are strikes, customs delays and political unrest.
Biggest mitigation effort	The biggest effort is delivered in optimising and developing processes to deal with disruptions. This is motivated through the largest risk area being environmental which the organisation has no influence over yet is focussed on developing mechanisms to manage these. Overall risk efforts are spread evenly.
Risk management prompt	Disruptions are frequent. Whilst a large proportion of the risk management efforts are reactive, a large proportion of work is done to mitigate disruption repeats. Risk management prompts are mixed between reacting to disruptions and proactively creating solutions to effectively deal with risks outside of the companies control.
Cultural type	Hierarchical culture. There are clear rules and regulations for processes and situations. Orchestration of the organisation is clearly hierarchical and the strategic emphasis is aimed at establishing stability, controlability and mitigating risk on behalf of customers. There are cultural aspects which represent certain traits of the market culture such as goal orientation and market superiority.
Risk drive	The approach to risk management is clearly process driven although clearly linked to the cultural traits of the organisation. Moreover, sub cultures of the overall organisational culture are strategically targeted towards specific markets.
Focus	As most disruptions are outside of the control of the company, the organisation focusses on developing robust and resilient processes across supply chains to maximise the ability to deal with disruptions. Whilst internal solutions are being developed, the main focus lies in collaborating effectively with partners in the supply chain to strengthen weaker parts of the supply chains.
Network relationship	There is a clear focus on building relationships, although some relationships are purely transactional.
Importance of KPIs	KPI's and performance matrixes are very important.
Level of information sharing	Information sharing is key and being increased in areas where this adds value.
Risk accountability	Individuals are expected to flag up risks and incidents and have some authority to deal with these. There are clear guidelines for the management levels of autonomy relating to risk.
Risk attitude	Risk embracing. There is a tolerance for risks and disruptions. Risks will happen and thus a key focus is to build systems that have disruption readiness instilled in them.

5.3 Case analysis Case C

5.3.1 Interview background

Case C, a leading supplier of components to the automotive, as well as other industry sectors, was the third case to be researched. Case C's business model is based on offering unique product components that enable customer products to increase their performance. The company was purposively selected, based on the nature of its operating environment and its position within the market amongst other factors, as outlined in table 4.1, section 4.5.

All interviews were carried out during two site visits to the headquarters of Case C. Interviews were carried out during July 2013 and involved five members of the relevant hierarchical levels. Interviewees included the head of finance for supply chain globally, a global customer fulfilment manager, Europe and Africa planning resilience manager, the Asia and Pacific supply chain director, as well as the director of global procurement.

As some interviewees were based at different locations globally, video teleconferencing was used, which worked in an identical fashion to the face-to-face interviews. Candidates were selected based on their experience with risk management, disruption experience with the case company, as well as on their understanding of the organisational culture. Interviewees were selected in collaboration with a contact person at Case C.

During one of the site visits, the researcher was given a tour around the premises, which enabled the collection of data through researcher observation. Data collected during the tour was particularly helpful in researching the organisational culture, as well as it enabled the triangulation of findings.

In addition to interview data and data from researcher observation, it was also possible to collect other vital sources of data such as company reports, presentations and external communication material, to name a few.

Interviewees were very helpful in getting access to data and were willing to answer all questions in sufficient depth. Interview candidates acted in a professional manner during all interviews.

5.3.2 Risk background

Analysing the risk background of Case C, it transpires that the case company has experienced a number of disruptions to its supply chain. In fact, the majority of disruptions to Case C's operations were caused by external sources.

More specifically, the data revealed that the most significant disruptions to the case company were a quality failure, as well as a single source supplier failure, both of which originated from Case C's upstream supply chain. Both disruptions have had a significant impact on the brand reputation, which is a key element of Case C's marketing strategy and product.

“The main disruptions have been a quality recall as a result of some quality failures in the supply chain and a single source supplier failure. Both were supply side issues and impacted the gross margin and reputation of the brand.”

Analysing the company's data further, it transpires that both disruptions, as cited by all interviewees, were closely linked to the business model of Case C. In fact, as the product offering of Case C is built on offering unique, high quality products, the company restricts its sourcing options. More specifically, in order to generate product uniqueness, the company sources unique raw materials from single source suppliers.

“When you buy our products, it will say use for these particular brands, and you know these are putting their name on there because they have done certain tests and they understand what is in it and the rest of it. So there you are really getting down to certifications of plants, factories, raw materials, because they will only give their name if they understand how it has got put together and what is in it.”

Moreover, the data also reveals that in order to produce certain products, specific manufacturing processes have been developed, as well as specific suppliers had to undergo certifications to ensure product quality. Given the expense and time it takes to certify sourcing options and producers, Case C has generated a supply chain, which is highly restricted in terms of its sourcing possibilities.

However, given the inextricable links between the business model, the nature of the product, as well as the design of the supply chain, it may be argued that a key driver in the level of risk the company faces, revolves around the specific product certifications.

“So the business model on one level relies on sponsorship or endorsement, which drives differentiation and potentially single sourcing and it may not be that it is single sourcing that is the issue, the issue is certification. So it may well be that I could use different components to make the same product, but only one allows us to make certain product claims.”

Given the most recent disruptions Case C has experienced, it transpires that as the business largely focussed on reducing inventory and reducing cost along the supply chain (in the past), it is increasingly recognising the risk impact the business model has on the supply chain.

“We have been squeezing genuine dollar bills out of our supply chain and the business model focussed mainly on cost not value. What the business is waking up to, is that the disruptions have not got that much to do with supply chain, but a lot of it is driven by how the business makes its money.”

Given that the uniqueness of products present a core element of the brand and are key to the company's success in the marketplace, the organisation increasingly focuses on identifying and managing different risks within the supply chain, with a view to protecting the brand.

When reviewing the participant responses in combination with any additional data regarding the top five risks the company is facing, the following areas emerge:

- ❖ Supplier failures,
- ❖ Certifications and the business model,
- ❖ Manufacturing capacities
- ❖ Product quality, as well as,
- ❖ People safety.

This is consistent with the most recent disruptions Case C has experienced, and designates Case C's upstream supply chain to be a key vulnerability. Naturally, given the industrial background, interviewees also perceived people safety to be a significant risk.

Classifying the different risks Case C perceives by way of harnessing Cranfield's model to categorise different sources of risks in the supply chain (Peck et al., 2003), the risk profile of the company becomes apparent (figure 5.16). For this purpose, the different risks that were mentioned across all data collected (within case) were categorised using the sources of supply chain risk framework and subsequently tallied, leading to figure 5.16.

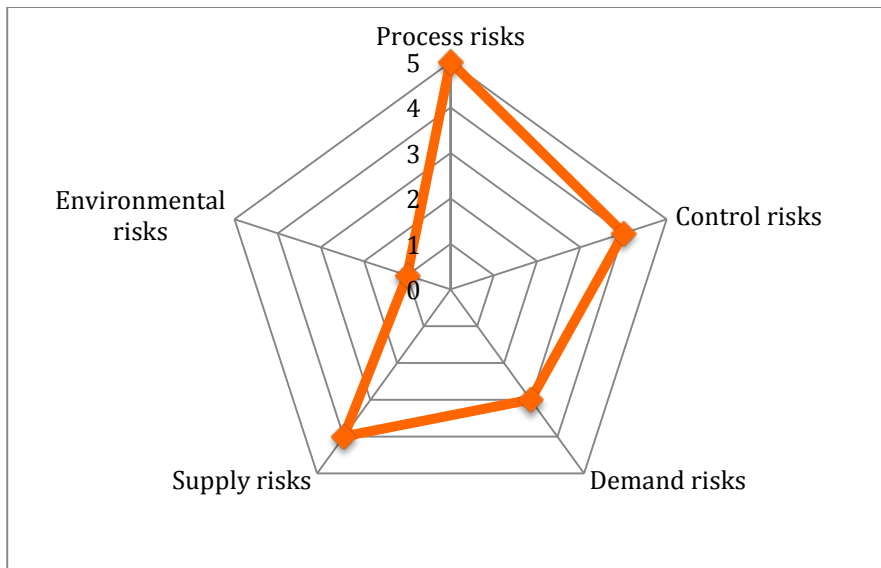


Figure 5.16 Risk profile of Case C (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses and other company data.²⁶)

When reviewing figure 5.16, it transpires that the most risks Case C faces, revolve around process risks, closely followed by control and supply risks.

Considering that process risks refer to risks associated to key processes, which enable an organisation to operate, such as flow control and other elementary processes to maintain an organisation's competitive advantage (Peck et al., 2003), it is argued that the core business concept fits into this category. In fact, as the business concept appears to be the key reason for many upstream-related risks, process risks make up the largest proportion of the supply chain risks, Case C faces.

The next biggest risk areas the company faces are control and supply risks. These risks typically revolve around the rules, systems and procedures that provide control over processes and resources (control risks), whilst supply risks refer to disruptions of the flow of products and information in the upstream supply chain.

Furthermore, whilst environmental risk sources are perceived as very low, the data revealed that demand risks on the other hand, which relate to disruptions

²⁶ To generate this diagram, different risks that were mentioned in the data were counted, tallied and categorised into the different sources of risks.

associated with the flow of products, information in the downstream supply chain and so forth, were perceived as relatively high.

Following the identification of the risk profile of Case C, based on perceived risks and disruptions the company has experienced, data was also collected with respect to the organisational definition of supply chain risk.

When reviewing the data pertaining to a definition of the concept, it becomes evident that risk is perceived predominantly as something that could have a negative impact on the business.

“Risk management is about managing danger or managing bad risk.”

“Anything that can happen that can disrupt our business.”

“We define risk as something potentially negative rather than positive.”

Moreover, it transpires that most definitions by interviewees were focussed on protecting the brand and its reputation, rather than the supply chain as a network. However, recognising the importance of the supply chain, the definitions of supply chain risk, do encapsulate aspects of this:

“Anything that can happen that can disrupt our business, so it is the risk of being unable to procure, produce and deliver the products to our customers.”

In addition to the above data on risk, data was also gathered on how Case C has responded to risks and disruptions in the past.

After carefully analysing the relevant data, it transpires that the responses to risks and disruptions are largely geared towards generating visibility of critical products, raw materials and suppliers. In fact, a project has been launched, which specifically focuses on the identification, the evaluation and the management of risks in the supply chain.

Moreover, with an increasing understanding of the impacts the business model has on the supply chain, the company has undertaken significant efforts in generating greater supply chain flexibilities, whilst retaining the unique nature of its products. In addition to this, work has also been carried out, to consider the supply chain and sourcing impact of product designs going forward.

For a list of the key efforts Case C has undertaken to manage risks in the supply chain, please refer to table 5.6. To generate this table, the different risk mitigation efforts, as they appeared within all case data (individual cases), were counted, listed and subsequently classified, harnessing Peck's sources of supply chain risks framework (Peck et al., 2003). This approach is consistent with the process used for classifying the risks in all risk profile figures of this study.

Table 5.6 Key efforts to manage risks in the supply chain by Case C²⁷

Efforts to manage risks					
Effort	Case C	Effort	Case C	Effort	Case C
Audit of suppliers	S	Disruption trending	C	Review of product design	C,D,S
Bowtie diagrams	C,P,S	Evaluated criticality of stock	D,P,S	Risk criticality mapping	C,E,P,S
Business process synchronisation	C,P	Increased production flexibility	D,E,P,S	Risk likelihood analysis	E,P,S
Capacity building	D,S	Multiple sourcing	S	Risk mapping	D,P,S
Critical node mapping	C,D,P,S	Product quality improvement	D	Risk to product mapping	D,P,S
Critical raw material mapping	P,S	Product redistribution plans	C,D,E,S	Root cause analysis	C,P
Critical supplier mapping	P,S	Raised business continuity plans	C,D,P	Specific Resilience program launched	D,P,S
Customer criticality analysis	D,P	Recovery planning based on frequent disruptions	C,D,P,S	Supplier criticality analysis	S
Dedicated risk personnel	C,E	Review of inventory policy	S	Supply chain mapping	C,D,P,S
Disruption matrix	C,S				

(The above table details the not only the efforts but also outlines the sources of risk these target, e.g. P = process, C = control, D = demand, S = supply, E = environment.)

For more details on the efforts to manage risks as well as the reach of the different efforts, please refer to appendix 4.

Reviewing the efforts made by Case C to manage risks in the supply chain, it becomes evident that these are aligned with the key risk areas. In fact, efforts such as supplier audits, the evaluation of stock criticality, increased production flexibility and so forth are associated with mitigating process risks, as well as control risks.

²⁷ This table was generated by listing the different efforts and projects highlighted within the data.

In fact, reviewing the efforts to manage risks holistically, it becomes apparent that many of the efforts Case C is undertaking, are relevant for a range of different risks the company faces. For example, whilst the mapping of critical raw materials is primarily associated to supply risks, it may also be associated with process risks, in that the flow of products may be compromised as a result of critical raw materials.

Furthermore, the extensive engagement with managing risks in the supply chain is reflected in that the company increasingly focuses on value rather than cost. More specifically, the company increasingly recognises that its ability to serve customers reliably, relies on understanding the relationship between its business model and its supply chain. This approach is reflected in the type of actions Case C is taking to manage risks in the supply chain.

“We have been squeezing genuine dollar bills out of our supply chain and the business model and so procurement focussed on cost not value. So for many years we drove the P&L not the holistic performance.”

The targeted approach of Case C to managing risks becomes even more apparent when applying Cranfield’s framework (Peck et al., 2003) to categorise sources of risks in the supply chain to the company’s efforts (figure 5.17).

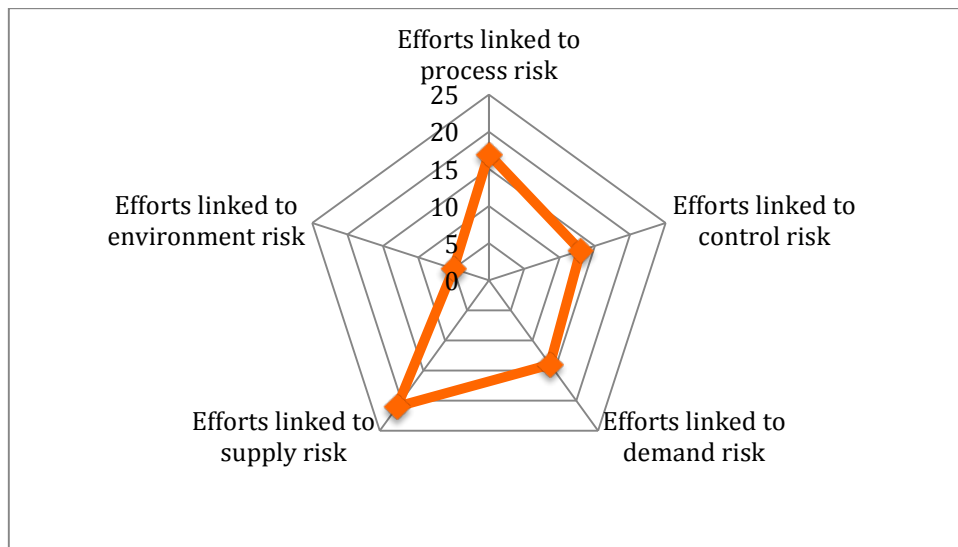


Figure 5.17 Efforts taken to manage risks by Case C (This diagram is based on table 5.6 and is of a purely qualitative nature and was created by interpreting interviewee responses.²⁸)

Reviewing figure 5.17 in detail, it becomes apparent, that whilst efforts to manage supply risks dominate risk mitigation actions, these are closely followed by efforts associated to minimise process, demand, and control risks. Whilst figure 5.17 does not appear to be completely aligned to figure 5.16 (risk profile), when plotting both the risk profile and the efforts to manage risks on the same diagram, a high level of harmonisation between the two emerges.

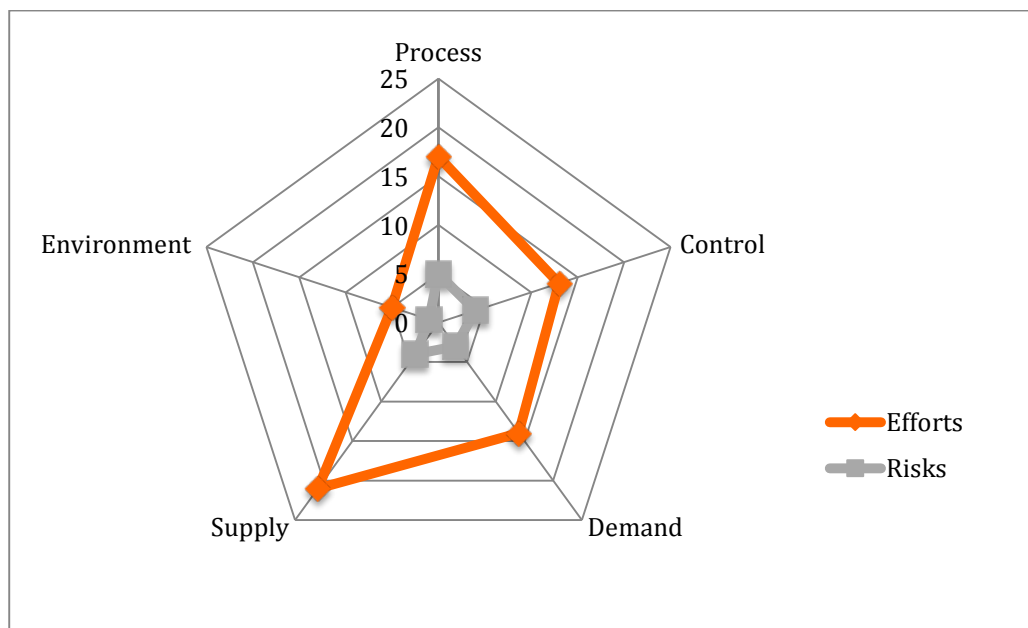


Figure 5.18 Efforts to manage risk versus risk areas by Case C (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

Reflecting on figure 5.18, it is evident that efforts to manage risks outweigh risks in all areas. Moreover, reflecting on the shape of both data series, it is obvious that efforts extended on the different risk areas are mostly aligned.

Furthermore, as supply and capacity issues have resulted in the biggest disruptions for Case C, it is not surprising to see that the level of effort dealing with risks on the supply and process side are the highest. Synthesising the above data further, it was possible to develop a risk attitude for Case C:

²⁸ To generate this diagram, different efforts made to manage risks were tallied and categorised into the different sources of risks they were set to mitigate against. Furthermore, efforts to manage risks have been counted in all sources of risk they were applicable to (table 5.6). The efforts taken by organisations were identified by going through all data and listing the different actions.

Risk of supply is intrinsic in the business model and it has to be worked out how best to deal with that to deliver on the reputation of the brand.

Given the business model of Case C in combination with the efforts undertaken to manage risks going forward, it may be argued that Case C is risk embracing. However, whilst the business increasingly focuses on the management of risks as a result of concentrating on value, collectively this is a reactive approach.

“The business model is risk embracing yet experiences from the past have triggered processes to line this up with more resilience.”

This quote and previous assertions are consistent with other data collected, which outline that whilst the number of disruptions to Case C’s supply chain are expected to remain similar, their impact is expected to decrease as the ability to deal with disruptions will increase. This is based on the proactive approach the case company is taking to manage risks in the supply chain. Moreover, as the company is increasing its understanding of how the business model impacts on its supply chain, Case C’s ability to mitigate risks is amplified.

Key points:

- Case C has experienced a number of significant disruptions, as a result of which, the company has shifted its performance focus from cost to value.
- Definitions of supply chain risk are focussed predominantly on the protection of the brand.
- The efforts to manage risks in the supply chain are closely aligned with the risks Case C perceives.
- The case company increasingly focuses on the supply chain as a basis for delivering on behalf of the brand.
- Risk management efforts are designed to be relevant to several risk areas rather than individual ones.

5.3.3 Risk management staff

Analysing the case data with respect to risk management staff, it transpires that risk is predominantly managed on a project basis.

“There are no risk managers, work is done more on a project basis.”

As risk managers do not exist within Case C, the accountability for the different risk projects lies with individuals higher up in the organisation and is split based on global regions.

“Risk management and resilience management is becoming more and more as an accountability for the different regions and the top management people in the different regions. We have regional risk management processes, which get escalated globally and we review globally in terms of improvements.”

Analysing this further, the data clearly exhibits that specifically the global vice president, the global marketing vice president, as well as the head of the special products unit, have the responsibility to manage risks in the supply chain. All of these are members of the board, reflecting a hierarchical approach to risk management.

These senior members will define projects to increase resilience along the supply chain and allocate work packages to the relevant regions. Based on the type of project and the area it is relevant for, project managers will be chosen, who are responsible for these projects.

Examining the data, it is argued, that as the company has only relatively recently begun to focus on how risks in the supply chain can be managed effectively, the accountability lies with top-level managers. Thus, as the company becomes more confident with the management of risks, risk management will become increasingly integrated and part of everyone’s job description.

“The head of supply chain and the head of our SPU have addressing risk in their performance contracts. And there are some others and we look to expand this until it becomes a part of everything not just a limited scope.”

Whilst projects to increase supply chain resilience are the responsibility of senior level managers, data from Case C also reveals that the general identification of risks is expected from every member of staff.

“Everyone has the ability to flag up concerns which can be solved collectively or can be escalated to the appropriate levels. This depends on the potential impact on the business.”

In line with the regional, project based approach to risk management, it becomes apparent that whilst no specific budget exists to manage risks in the supply chain, funding to do so is available for risk management initiatives. In fact, the availability of funding is based on the strength of the business case.

“We do not really have a designated budget. If we need money there is some money set aside in the SPU budget though. So if we can make a business case, there is money and it comes from different areas depending on what it is you are trying to do.”

Given the project-based approach to managing risks in the supply chain, it was not possible for interviewees to state the number of full time equivalents (FTEs) managing risks. Whilst members outlined that safety management is everyone’s responsibility, the management of risks was clearly not as evolved and as a result, not as widely adopted.

Based on the drive to increase the management of risks along the supply chain in pursuit to protect the brand and its reputation, all data highlights that the number of dedicated risk management personnel will increase in the short, as well as the long term.

“We will have an increase in quality risk management and we will see a dramatic increase in those people employed to manage those specific risks. (Vendor quality assurance team and quality audit team).”

Moreover, interviewees outlined that whilst numbers would simply increase in the short term, the long term would be reflective of making risk management a part of everyone’s job.

“The number of people to manage risk and resilience will inevitably increase. Both, as part of everyone’s job and as FTEs.”

In pursuit of this, interview data revealed that whilst it has not been recruited specifically for risk managers, it has been challenging to find individuals who are experts in risk management and have a background in other functions. This appeared to be a particular issue in the area of procurement, as the below quote exhibits.

“Finding good procurement people with a holistic skill set and competency base is very very hard.”

Key points:

- Supply chain risk management in Case C is reflective of a top-down approach.
- Risk identification is everyone’s responsibility, risk management isn’t currently but is increasingly becoming part of everyone’s job.
- The number of staff dedicated to risk management will increase.
- Finding risk experts with a holistic skill set is very challenging.

5.3.4 Risk management in the supply chain

Case C’s supply chain is set up in such a way that the company procures raw materials, which it assembles following strict certified processes, prior to selling either directly to customers, or through approved distributors. Due to product

certifications, Case C may not produce any product anywhere, but has to produce specific products at certain locations using predefined processes. Moreover, Case C sources some raw materials from unique suppliers, amplifying the complexity and lack of flexibility of its supply chains:

“We have hundreds of suppliers supplying components, final assembly is done in house. Retail is a mixed model of direct and indirect selling to customers in excess of 10 thousand.”

Synthesizing the above information, figure 5.19 depicts a high-level outline of Case C’s supply chain.

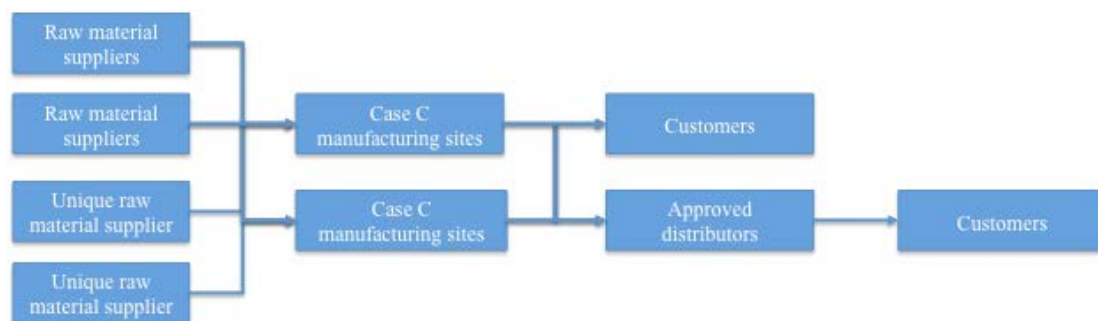


Figure 5.19 Supply chain illustration of Case C

When considering the expanse of Case C’s supply chain, sourcing from around 2600 suppliers and selling to tens of thousands of customers, the complexity of the supply chain network becomes apparent.

Given this complexity in combination with the reliance on and inflexibility with some of Case C’s supply sources, the company has developed a prioritised approach to supplier management. Whilst this is not purely a response to the disruptions Case C has experienced in the past, it represents a key approach in managing risks along the company’s supply chains.

“We manage the larger spends and the larger suppliers much more closely than the smaller ones. We define and segment the suppliers into those that we see as highly strategic and crucial and for those we have a specific supplier strategy. For smaller ones we do not have as robust a process.”

Recognising the supply risk exposure inherent in the business model, data also reveals that Case C works closely with its suppliers to manage sourcing risk as best as possible.

“We recognise that our business is highly dependant on managing risk that is sometimes inherent in our vendors and in the relationship with our vendors and we work together to establish improvement plans for some of those 200 risks that we have identified in our solve work stream.”

In fact, the data reveals that much collaborative work is being undertaken with suppliers, to identify critical components and how flexibility around these can be generated, whilst protecting the offer of unique products.

“We have also looked at critical components and also our product design aspects. So looking at how we design critical components into products making them unique but also exposing the business to supply risks.”

Furthermore, in pursuit to raising the reliability of the supply chain, Case C has added key criteria into the selection of supply chain partners, which revolve around supply capacity and continuity plans. Recognising the implications of sourcing unique raw materials, the company is selecting suppliers based on their ability to demonstrate the continuity of supply. As one interviewee put it:

“From a risk management perspective we have become more clever about how we procure. We have begun to carry out audits of suppliers, their sites, staff etc., and of course internally we are trying to work together more especially in terms of product design.”

Given the above, it is evident that Case C recognises key risks in its supply chain and focuses on the reduction of these. Furthermore, evidence also suggests that the supply chain is being designed or redesigned with reliability in mind where product certifications allow for this.

“We are trying to reduce the risk by diversifying critical supplies and changes will manifest themselves over that period of time to improve the design of the supply chain.”

As most disruptions the case company has experienced, originated from the supply chain, rather than the case company itself, although are resultant from its business model, the focus of supply chain risk mitigating actions has been fairly balanced (figure 5.20).

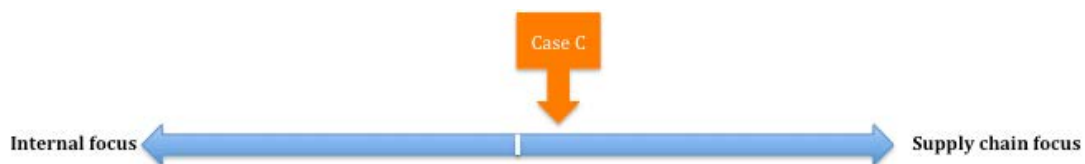


Figure 5.20 The risk management focus of Case C (This diagram is based on the qualitative interpretation of case data.²⁹)

More specifically, whilst a wide range of actions to understand the implications of the business model, as well as the lack of control and visibility over the supply chain have been undertaken, the data clearly shows that the wider supply chain has received slightly more focus. Nevertheless, the focus of managing risks internally and in the wider supply chain is fairly balanced.

In pursuit of protecting the brand image, supply chain risk mitigation work initially began internally and has expanded to the wider supply chain, with a particular focus on upstream tiers, which is seen to be a reoccurring key point of failure.

In fact, the company has developed a formalised holistic approach to risk management, which is applied throughout the business. This approach encapsulates three key processes, which revolve around protect, solve and prevent. Key stages in these processes revolve around the strategic location and building of safety stock to protect against supply disruptions, to solve risks by

²⁹ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the focus on risk management the company displayed, particularly interpreting the area of impact of foci.

devising specific projects to “fix” risks and to prevent the generation of new risks through designing products by considering the risk implications of these.

Given the disruptions and the drive to protect the brand from adverse reputational incidents, interviewees outlined that going forward there will be an increasing focus on risks and how to protect the business from disruptions.

“We will go on to solve issues in the supply chain and work out ways to protect our business from disruptions. Also there will be better circulation of the risks and risk actions.”

Key points:

- Case C recognises its business model to be at the core of many supply chain disruptions.
- The majority of disruptions and risks originate from the upstream supply chain.
- Risk management is fairly balanced between internal and external foci.
- The responses to risks are mostly reactive, based on past disruptions although solutions are increasingly rolled out across the rest of the supply chain.

5.3.5 Organisational culture

When reviewing data on the organisational culture of Case C, the most common descriptions included:

- ❖ Very cohesive,
- ❖ People are driven to do the right thing by the brand,
- ❖ People not process dependent,
- ❖ Family culture with a performance edge,
- ❖ Very performance and customer focused, as well as,
- ❖ Hugely passionate and believing in the brand.

Given the above descriptions of the organisational culture, it transpires that the strong brand and the association of employees with this, are the key motivator for behaviours. In fact, interviewees outlined, that:

“A lot of people have been here a very long time, there is a huge passion and belief in the brand and people genuinely are driven to do the right thing by the brand.”

Furthermore, given the entrepreneurial, people focussed approach of Case C, the company relies predominantly on people rather than processes. As a result, the culture generates the risk of knowledge loss, should people decide to leave the business.

“There is a lot of passion for the brand, the value of the brand and for the customer. It is not very strong in processes, because it is very entrepreneurial, everybody undertakes their own mini adventure.”

“If we do things 10 times, we do them in 10 different ways so often you rely on those people because they have the experience.”

However, despite the potential risks of losing knowledge, given the dependency on people, the strength of the brand is also seen as a way to attract new staff and retain current staff.

“The culture is highly infectious. The people in the organisation, I mean things are not perfect, things never are but the pride and the sense of belonging is incredibly inspirational. Even sometimes when we have people applying for jobs who are not really clear on what they want to do but they know they want to work for us.”

Owing to these findings, it is evident that the key drivers for organisational behaviour are the brand image and reputation, which form the organisational culture and values.

Given recent disruptions the company has experienced, it is argued that the increasing focus on establishing more standardised processes is a result of recognising the risks inherent in Case C’s high dependency on people. In fact, this is reflected in the drive to mitigating against process and control risks as depicted in figures 5.17 and 5.18. Moreover, it is argued that the drive to mitigate risks in these areas is largely in pursuit of protecting the brand from repeated disruptions.

This assertion is consistent with one of the work streams of the company’s resilience project, which revolves around the protection against disruptions, the solving of risks and the prevention of generating new risks. Furthermore, it becomes apparent that the chosen wording for the key stages of the resilience programme are reflective of the drive to “do the right thing” for the brand.

Given the high dependency on people rather than processes, the culture promotes, the current risk profile in terms of process, control and supply risks can be explained. As there have been no standard processes and procedures to follow when managing risks, the company has in the past predominantly fixed risks in the short term, rather than to concentrate on the longer-term performance.

“Where that leaves you is, because you are never forced to really sit down and understand how efficient your process is, and design it and think about it because it is being run by people, no one has ever really stopped to understand at a structural

level or a systemic level what risks we are running because people are in there kind of diffusing the risks. If you do not put systems and processes in place to manage and cascade risk up and down, you end up in a place just managing crisis.”

In addition to the above, the data has also exhibited that the business model is key to many risks as it drives the development of unique products, which are based on unique raw materials and certifications. However, it also transpires that where the culture has generated a lot of risks in the supply chain previously, it is also the dominant driver for removing risks, having identified these and worked out how the culture can be harnessed to do so.

“In the past we created our products and a lot of differentiation without taking into account risk. Now with having more understanding the resilience approach is bringing the issue to the top level who are cosponsoring this. So where the culture created these problems in the beginning, it is not helping to solve the issues.”

The above relationship between the culture and the approach to risk management clearly demonstrates the inextricable links between the two. In fact as one interviewee outlined:

“Culture and the risk management approach are inextricably linked. As we analyse our risks and build mitigation plans and we put so much more time than ever before into these elements it influences our culture and our behaviours. It is a circular flow you see and the more risk averse people become and the less risk tolerant people become the more the organisational culture changes the approach and focus on risk mitigation plans.”

When applying the organisational cultural data collected from Case C to the cultural categorisation tool provided by Deshpandé et al., (1993), it becomes clear that Case C is representative of a clan culture (figure 5.21).

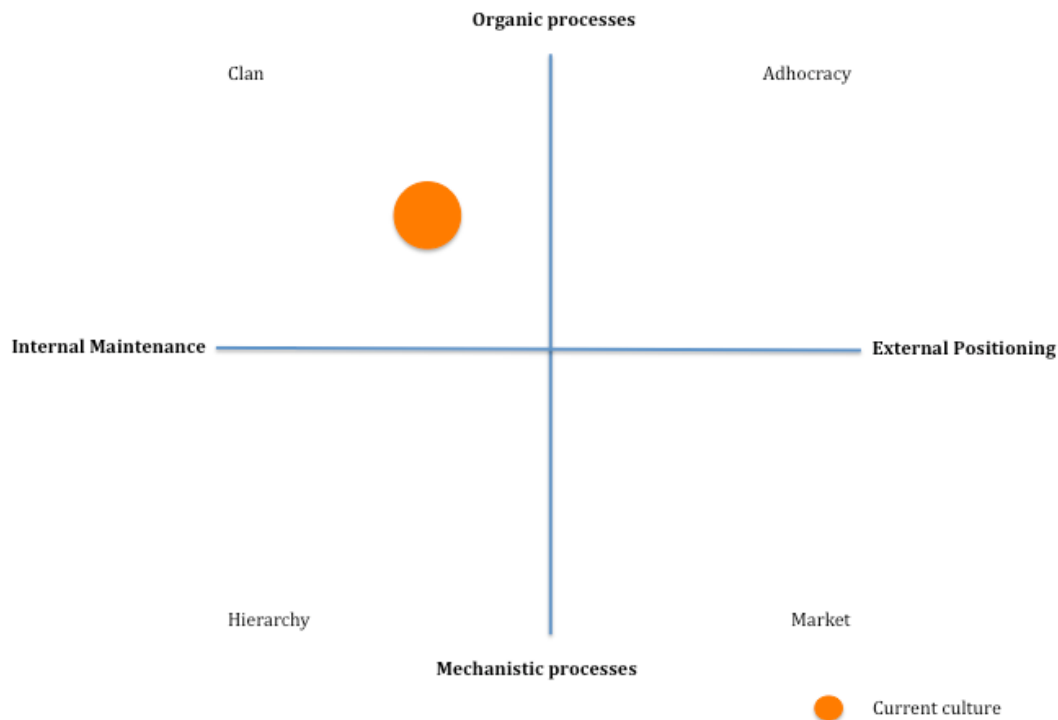


Figure 5.21 The organisational culture of Case C (This diagram is based on the qualitative interpretation of case data.)³⁰

Synthesizing all data collected regarding the organisational culture of Case C, the case company clearly reflects a clan culture. More specifically, traits such as the cohesiveness, sense of family, as well as the apparent brand loyalty and reliance on people, clearly identify the culture of Case C as a clan culture.

In addition to this, however, the culture also represents elements of entrepreneurialism and risk taking by way of the core business concept, which are a central part of the organisation’s culture. Given the strong customer focus of Case C, elements of a market culture are also reflected in the data. As a result of these influences, the culture is situated fairly centrally within the clan culture, yet slightly towards the adhocracy culture.

As the approach to risk management also reflects some traits of a hierarchy culture, the position is situated slightly below the centre of the field. It is argued that with increasing levels of control and more standardised processes, which

³⁰ The current culture of the organisation was interpreted based on applying all relevant data to the competing values framework. Cultures are termed “current” as cultures may evolve over time.

are being implemented, the positioning of the culture will move further towards the hierarchy culture.

Despite the influence of traits from different cultures, the dominant cultural facets within Case C are unmistakably reflective of a clan culture. This is reflected in the behaviour of employees who are:

“Genuinely driven to do the right thing by the brand.”

Moreover, the strong focus on people which emanates from the company, attracts new members of staff and is a further indicator for the strong clan culture and sense of belonging present in Case C.

Furthermore, the approach to risk management largely reflects a movement to protect the brand from any disruptions, which could effect this negatively.

“People are highly committed to the brand and genuinely try to do the best for the brand.”

“People identify with the brand to the degree where they want the best for it. There is a very strong element of the culture in the behaviour of the employees.”

To support employees in managing risks in the supply chain, the organisation’s culture appears to provide employees with increasingly clearer guidelines. Given past incidents and past issues around controllability, the approach to this appears to be increasingly managed.

“Within reason the culture provides freedom, but there are clear boundaries. People have the freedom to take risks but they will have to show that they understood what they did and what they have put in place to prevent that from happening and so within reason they can take risk. So address, except, mitigate, prevent or change actions.”

This process is stated within the code of conduct which is available to every member of staff. Beyond this, the culture of Case C is clearly communicated by the cultural feel within the Case company, which is supported by imagery and other memorabilia throughout the organisation. Moreover, the organisation clearly communicates and celebrates success in anything it is involved in, which in turn radiates a sense of belonging, fostering the organisational core culture.

Given the strong cultural influence on the organisational behaviour, all data collected exhibits that a change in the organisational culture would result in a change in the approach to risk management. In fact, an interviewee outlined:

“A change in our culture could damage our approach to risk management. For us, our culture drives the management of risks.”

Reflecting on the data pertaining the organisational culture holistically, it transpires that Case C is clearly driven by its culture (figure 5.22).



Figure 5.22 The drivers of organisational culture in Case C (This diagram is based on the qualitative interpretation of case data.³¹)

However, given recent disruptions and an evolving understanding of the impact of the business model on the supply chain and vice versa, it is argued that as the company attempts to reduce its dependency on people by implementing some more processes and procedures, it will distance itself slightly from an almost exclusively culturally driven approach (dashed box).

In addition to this, it is argued that there is a clear link between the increased use of processes to protect the brand, in that risks will still be taken in the form of launching new, unique products on a similar basis as it has always been done, however, decisions will be considered in greater depth.

³¹ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the nature of the drivers of organisational behaviour.

“When I say embracing, it is in the sense that taking a new product to markets, taking risk in the sense of creating more value but it is not that the company will allow doing something without understanding the risk or the impact to the market or the community of the employees.”

In fact, whilst a slight change to the approach to doing business is being driven consciously, the organisation recognises its organisational strength and dependency. It is argued that Case C relies on its organisational culture for success, yet seeks to align it more closely with business and market needs to protect the brand from disruptions, in pursuit of continuously living up to the brand reputation.

Key points:

- The organisational culture is representative of a clan culture, although it also exhibits traits of other culture types.
- Case C’s organisational culture exhibits signs of responding to experiences across its supply chain.
- The business is consciously influencing its culture to increase its ability to mitigate disruptions.
- Case C is predominantly driven by its organisational culture.
- The case company relies on its cultural traits for its success within the market place.

5.3.6 Linking supply chain risk management and organisational culture

Synthesizing all data collectively, it is evident that a strong link exists between the organisational culture of Case C, and the approach to risk management. In fact, the data clearly shows that the organisational culture is a key driver for Case C’s risk management along its supply chain.

As Case C’s commercial offering revolves around supplying unique, high quality products, much of the product differentiation is contributed by using unique components. Moreover, as this necessitates the procurement of raw materials

from unique suppliers, the business model exposes the supply chain to significant levels of sourcing risk.

“Our supply chain design has to do largely with the business model which is a core element of the brand but also a key contributor to risk.”

Following several disruptions, caused by the rigid supply chain design, the organisation has identified that these partially compromise its commercial offering and the values the brand reflects. In fact, the strong association with the brand, which itself reflects performance, quality, reliability and being the best, forms a large part of the organisational culture.

Owing to this, it is argued that as Case C increasingly realises the impact of supply chain disruptions on the brand image, the organisational culture generates an increased level of risk management. According to the data, this is clearly a response by employees to protect the brand from damage to its reputation. Moreover, the sense of pride and belonging the brand radiates and instils in the company’s employees, is seen to be a key driver in this.

“Culture drives the management of risk, and people genuinely are driven to do the right thing by the brand. In general the culture and strong association of people with the brand is very positive.”

Given this drive to protect the brand many of the risk management actions of staff can be explained. In fact, it is argued that the personal approach of staff to risk management is also reflected in the wording of the key stages of the resilience program, which revolve around protect, solve and prevent. Crucially, all of the stages are geared towards the identification, management and mitigation of risks as perceived by members of the organisation.

“Working here is like working in your own business, you can make decisions, and changes and that is very positive about the culture. There is a lot of passion for the brand, the value of the brand and for the customer. It is not very strong in

processes, because it is very entrepreneurial, everybody undertakes their own mini adventure to try and make things better."

Given this approach to risk management, which is clearly based on the organisational culture, it is argued that the way the resilience project is designed, allows members of staff to get involved on a small level. In fact, the design of the project enables employees to relate to the brand, which in turn motivates the staff to protect the brand through feeling responsible for its' success.

"Risk management is kind of everyone's job, and we try to involve everyone in it by giving them the opportunity to chip in and that is very positive."

Furthermore, even though the organisation strives to increase the level of control and standardisation over the approach to risk management, this too will be rolled out across the business to engage employees across the organisation. According to the data, increased levels of visibility and collaboration internally will play a key role in ensuring new products are launched with an understanding of the risk implications of new product designs.

Further cultural influences have been identified in the way supply chain design is approached, as well as how relationships are being managed with a view to improving reliability of supply for example.

Whilst the data has clearly exhibited that the organisational culture is pivotal in the approach to risk management, the data also revealed, how experiences within the supply chain have had an impact on driving risk management via a protective organisational culture (figure 5.23).

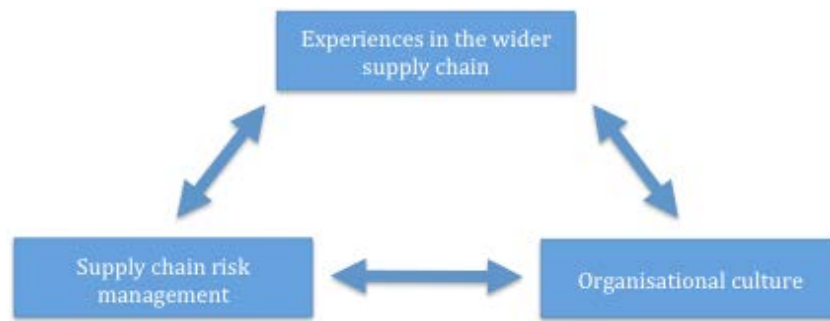


Figure 5.23 The relationship between experiences in the supply chain, organisational culture and supply chain risk management in Case C

Having identified the organisational culture to be a key driver of the business, in terms of the product offering, supply chain design, as well as its risk profile and the approach to risk management, Case C recognises its commercial success to be based on its organisational culture.

As a result of this, Case C will continue to harness its culture strategically to ensure the success of the brand. Moreover, whilst processes will play an increasingly important role in the running of the business to increase standardisation of processes, visibility, risk mitigation and controllability, these will be integrated into the culture to ensure they are naturally taken up and applied by staff.

Key points:

- Case C’s organisational culture has a clear impact on the approach to risk management in the supply chain.
- The disruptions along the supply chain have had an impact on the behaviour of the business.
- The organisational culture of Case C is being harnessed strategically, to make risk management more natural and effective.
- There is a close link between the supply chain environment, supply chain risk management and the organisational culture.
- The company’s organisational culture is a key driver of business performance, and is reflected in the approach to risk management along the supply chain.

5.3.7 Case C summary

Case C is a leading supplier of components to the automotive, as well as other industry sectors, offering unique product components that enable customer products to increase their performance.

Having experienced a number of supply chain disruptions, Case C has reactively harnessed its strong organisational culture to develop risk management techniques in pursuit of protecting the company's brand image. Given the strong brand association of employees, actions to ensure the brand reputation is served, appear natural to the behaviour of Case C.

Whilst the core business concept instils high levels of risk in the supply chain, the organisational culture of the case company seeks to mitigate these, to protect the brand, whilst retaining the business offering and brand image. The organisational culture is reflected in all aspects of the organisation's behaviour, especially in the approach to managing risks in the supply chain.

For a summary of the key points from the analysis of Case C, please refer to table 5.7.

Table 5.7 Summary Table Case C

Case summary table	
	Case C
Risk profile	The business model is built on offering unique, high quality products which naturally instils supply risks. Whilst the design of products is key to success in the market, external risks are significant.
Biggest disruption	The biggest disruptions revolve around supplier failures and shortages of product components.
Biggest mitigation effort	Mitigation efforts are split between critically evaluating product design and manufacture with a view to understanding the risk basis better, whilst a significant amount of work is being done along the supply chain to generate higher levels of supply reliability. Efforts are in largely synchronised with risks and disruptions.
Risk management prompt	Most mitigation work is prompted by the desire to protect the brand from loosing reputation through letting customers down. Whilst efforts are in part motivated through disruption events, proactive work is also being done by rolling efforts out across the supply chain.
Cultural type	Clan culture. The culture most strongly exhibits a sense of family, loyalty and a strong focus on commitment and developing human resources. This being the strongest cultural element, there are some traits of adhocracy and market culture.
Risk drive	The approach to risk management is clearly driven by the culture which motivates staff to want to protect the brand. Here a lack of procedures and a high reliance on people was identified which the organisation is critically reflecting upon.
Focus	The organisation recognised that the root cause of many disruptions is resultant from the business model which offers unique products at the premium end. As a result product design is being reviewed to understand this in more detail, whilst work is being undertaken to enable the supply chain to deliver more reliably and consistently. It appears to be a balanced approach although slightly more focussed on the supply chain as this is the area most disruptions emanate from.
Network relationship	Due to the criticality of many suppliers and customers, there is a prioritised approach to relationship management in the supply chain.
Importance of KPIs	The reputation and performance of the brand is paramount and reflected in the culture and behaviour of staff. Whilst there are processes to monitor this in most areas, performance appears automatic.
Level of information sharing	Information sharing appears limited in areas and a work is being undertaken to increase the level of information sharing.
Risk accountability	Employees have the freedom to respond to risks depending on the business impact. There are processes and lines of delegation. The organisation encourages a collective approach towards risk management.
Risk attitude	Mixed. The business model at its core is risk embracing (unique products), whilst the culture drives employees to protect the brand and its promises to customers by working hard to understand and mitigate disruptions.

5.4 Case analysis Case D

5.4.1 Interview background

The fourth case that was researched as part of the research project is a leading innovator and manufacturer of systems and products to cultivate fruits and vegetables, as well as to extend the lifecycle of these. Case D was purposively selected for this research, based on fulfilling all qualification criteria as outlined in table 4.1, section 4.5.

Research interviews were carried out towards the end of 2013, and coincided with the end of the company's peak season that year. All interviews were completed within one month and were carried out during two site visits to the company's head quarters. All research interviews were carried out in Germany.

Interview candidates were chosen in collaboration with a contact person at the case company and were selected based on their involvement in risk management, their disruption experience at the case company, as well as their understanding of the organisational culture. In total, five members of staff were interviewed.

Positions held by interview participants included the sales director, the procurement director, a shop floor manager, the owner of the business, as well as a customer service representative. Throughout all interviews candidates were supportive in obtaining access to additional company documentation.

During one of the research visits, the researcher was taken on a tour of the premises, enabling researcher observation. This was particularly useful in gathering data pertaining to the organisational culture of Case D, as well as data from observations enabled the triangulation of findings.

In addition to interview recordings and data from researcher observation, data was also collected by means of obtaining company reports, email exchanges, company presentations and so forth.

5.4.2 Risk background

Examining the risk and disruption related data, as obtained from Case D, it is evident that the case company has experienced a number of supply chain disruptions. It transpires that Case D has experienced disruptions both in its upstream, as well as its downstream supply chain.

Reviewing the data in detail, it becomes evident that the most significant disruption the case company has experienced was on the demand side. More specifically, due to a customer using one of Case D's products incorrectly, almost all of that customer's harvest perished. As a result, the customer took Case D to court, which resulted in significant publicity issues for Case D, even though the company was not found guilty. According to the data, this incident resulted in significant sales losses over a certain period, and led to the company working much closer with customers going forward.

“One of our customers had trouble using one of our products and lost about 70% of their harvest. Given the impact on their business the customer tried to claim compensation, blaming our products. It turned out that the customer had not understood how to operate the product correctly, but in his view it was our fault. In the market, that created a lot of bad publicity and our sales dropped as a result of that.”

In addition to the downstream disruptions, evidence also suggests, that the case company experiences regular disruptions along its upstream supply chain. Here, quality inconsistencies, component lead times, as well as component shortages impact the ability of Case D to reliably manufacture its components during peak periods.

“We have had a range of disruptions such as product components not being fit for purpose in terms of food regulations and safety, and also lead time issues because of the seasonality of the market.”

As the above quote suggests, a key reason for the disruptions within the upstream supply chain are caused by the high volatility within the market place. Firstly, demand is highly seasonal, rendering sales to be clustered almost exclusively around harvest periods for different foods. Secondly, the demand is hard to forecast as the quality and volume of harvests are largely determined by weather conditions during a certain period, ultimately before the harvest.

“Demand for us is heavily reliant on harvests which are determined by the weather ultimately before the harvest. So for example, it can seem as though a harvest is going to be massive because trees are full of fruit for example but if it rains during the last two weeks before things like cherries are harvested, the harvest is ruined because the sugar content in the fruit means they will effectively suck up the water and burst.”

Given this high level of unpredictability and volatility within the market, Case D minimises the level of inventory it carries, in order to be able to invest in the development of new products. The data further indicates, that as a result of this strategy, Case D passes the demand fluctuations of customers onto suppliers, who are often unable to supply product components at short notice.

The risk of disruptions based on the highly volatile demand cycles, are further exacerbated by the transactional relationships Case D has with its suppliers.

“We buy relatively small amounts of products and only at certain times of the year depending on a number of factors. Also most of the components we buy are unique and only sold to us by large distributors. Now because we mostly base our decisions on price, availability and so on, as customers we don't provide predictable or regular demand.”

Beyond the aforementioned risks, data also reveals that regulators and product certifications represent compliance risks to Case D. As the case company produces products to enhance the quality of food products, as well as products to

store these, the materials the company uses to manufacture its products need to comply with consumer protection and food safety regulations.

Evidence suggests, that whilst testing is being carried out prior to product launches, changes in regulations, as well as changes to product components significantly impact Case D.

“It is imperative to understand and comply with food safety regulations, as our products come in direct contact with foods over extended periods of time. That also means that if regulations change that can have a huge impact in terms of product recalls for example.”

When categorising all risks identified within Case D, using Cranfield’s framework to classify the different sources of risk in the supply chain (Peck et al., 2003), the company’s risk profile becomes visible (figure 5.24). For this purpose, the different risks that were mentioned across all data collected (within case) were categorised using the sources of supply chain risk framework and subsequently tallied, leading to figure 5.24.

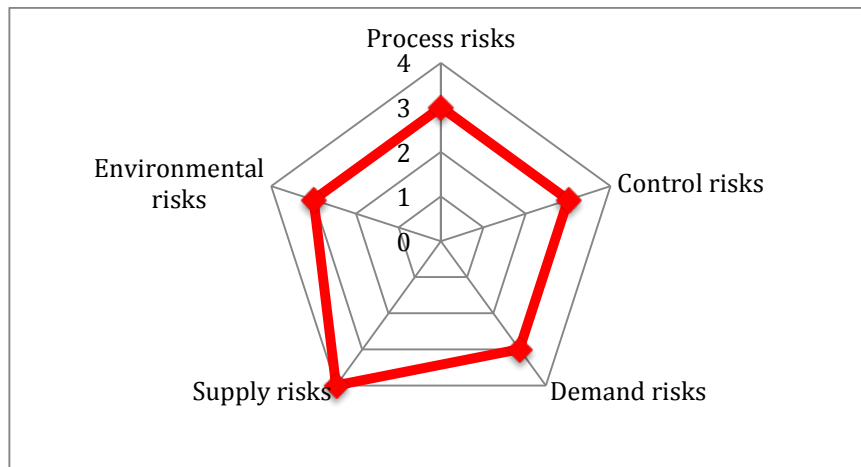


Figure 5.24 Risk profile of Case D (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses and other company data.³²)

When reviewing figure 5.24 in detail, it transpires that Case D is very sensitive to risks along the supply chain. Reflecting on the organisation generally, it is argued that given the size of the organisation (SME), disruptions to the business are

³² To generate this diagram, different risks that were mentioned in the data were counted, tallied and categorised into the different sources of risks.

significant, in that the organisation has limited resources to fall back in case of any disruption.

Reflecting on figure 5.24 further, it becomes apparent that the risk profile of Case D is largely balanced, with the exception of supply risks.

With respect to this, it is argued that due to size of the company, as well as its close collaboration with customers and regulators, Case D perceives the highest level and most risks to stem from the upstream supply chain.

“The least amount of control we have in our supply chain is upstream, because of the relationship with our suppliers but also because of the infrequent demand we provide coupled with the lack accuracy we can provide in our demand forecasts.”

As a result, risks associated with supply, feature more often across all collected data than any other sources of risk, such as process (forecasting, flow control), control (innovations, communication), demand (volatility, product) and environment (regulations, weather) risk.

In addition to collecting data on those risks, Case D perceives to be most relevant to its operations, data was also gathered to investigate the organisational definition of supply chain risk.

Reviewing the data pertaining to a definition for supply chain risk within the company, it transpires that these were largely synchronised, focussing on the company's ability to serve customers.

“Risk in the supply chain is the potential of an incident or several incidents happening that have the propensity to disturb our ability to fulfil services promised to the customer.”

Reflecting on this definition, it may be argued that Case D's perception of being more in control of downstream risks than upstream risks, is reflected in this

definition. Moreover, as data has exhibited, Case D feels more in control of downstream risks, due to investing heavily in customer care programs, whilst upstream relationships with suppliers are not close enough, to control risks to the same degree.

Furthermore, given that the case company relies on developing innovative product solutions for customers, it may be argued that Case D is largely reliant on sourcing highly specialised materials as enablers for product innovations. With respect to this, the data exhibits that in pursuit of developing innovative, new products, large sums of money are being invested regularly (upstream and including the focal company), where on occasion these costs are sunk.

“The nature of what we do is clearly risk taking because we invest a lot of money into the development of new products, many of which never make it to the market. Sometimes that is because solutions are too specialised for particular customers or, and mostly because we cannot find the technology or parts we need on the right scale to enable the products to go onto the market.”

As a result of the disruptions along the upstream, as well as downstream supply chain, in combination with the reliance on customers for innovations and suppliers as enablers, Case D has implemented key solutions to manage risks in both the upstream, as well as the downstream supply chain as depicted in table 5.8. To generate this table, the different risk mitigation efforts, as they appeared within all case data (individual cases), were counted, listed and subsequently classified, harnessing Peck’s sources of supply chain risks framework (Peck et al., 2003). This approach is consistent with the process used for classifying the risks in all risk profile figures of this study.

Table 5.8, Efforts to manage risks in the supply chain by Case D³³

Efforts to manage risk					
Effort	Case D	Effort	Case D	Effort	Case D
Benchmarking	S	Increased collaboration with customers	D,E	Review of inventory policy	C,E,S
Bringing in experts	C,P	Increased production flexibility	D,P,S	Review of product design	D,S
Capacity building	D,S	Learning from incidents	E,P	Risk likelihood analysis	C,E,S
Change supply chain partners	S	Multiple sourcing	S	Risk to product mapping	D,E,S
Constant product redevelopment	D	Process redesign	P	Supplier criticality analysis	S
Customer criticality analysis	D	Product quality improvement	D		
Evaluated criticality of stock	D,S	Product redistribution plans	C,P		

(The above table details the not only the efforts but also outlines the sources of risk these target, e.g. P = process, C = control, D = demand, S = supply, E = environment.)

For more details on the efforts to manage risks as well as the reach of the different efforts, please refer to appendix 4.

Synthesizing the contents of table 5.8, it becomes evident that most efforts Case D has implemented to manage risks in the supply chain, revolve around external risks. More specifically, efforts such as customer criticality analyses, changing supply chain partners, bringing in experts (on product components and innovation support), supplier criticality analyses, multiple sourcing and so forth are clearly geared towards managing risks along the upstream as well as the downstream supply chain.

As the efforts, that can be linked to managing supply risks, represent the majority of risk mitigating actions, this is consistent with the risk profile of Case

³³ This table was generated by listing the different efforts and projects highlighted within the data.

D (figure 5.24), which outlines that supply risks are most cited in all company records.

Reflecting on table 5.8 further, it becomes evident that the efforts that can be associated with environmental, control and process risks, also appear aligned with the risk profile of Case D (figure 5.24). However, whilst demand risks were identified to be slightly less significant compared to supply risks, an almost equal amount of efforts was dedicated to managing demand related risks.

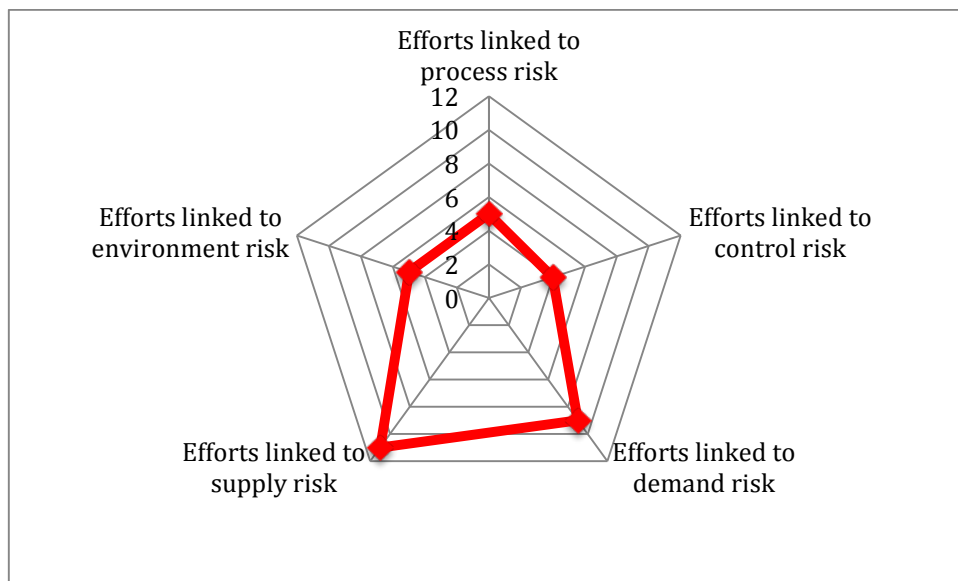


Figure 5.25 Efforts taken to manage risks by Case D (This diagram is based on table 5.8 and is of a purely qualitative nature and was created by interpreting interviewee responses³⁴.)

Expanding on figure 5.25, it becomes apparent that the majority of efforts by Case D to manage risks in the supply chain revolve around supply risks, followed closely by demand risks. Significantly less effort is dedicated to managing environmental, process and control risks.

When combining figures 5.24 and 5.24, the lack of alignment between the risk areas and efforts dedicated to managing these becomes apparent.

³⁴ To generate this diagram, different efforts made to manage risks were tallied and categorised into the different sources of risks they were set to mitigate against. Furthermore, efforts to manage risks have been counted in all sources of risk they were applicable to (table 5.8). The efforts taken by organisations were identified by going through all data and listing the different actions.

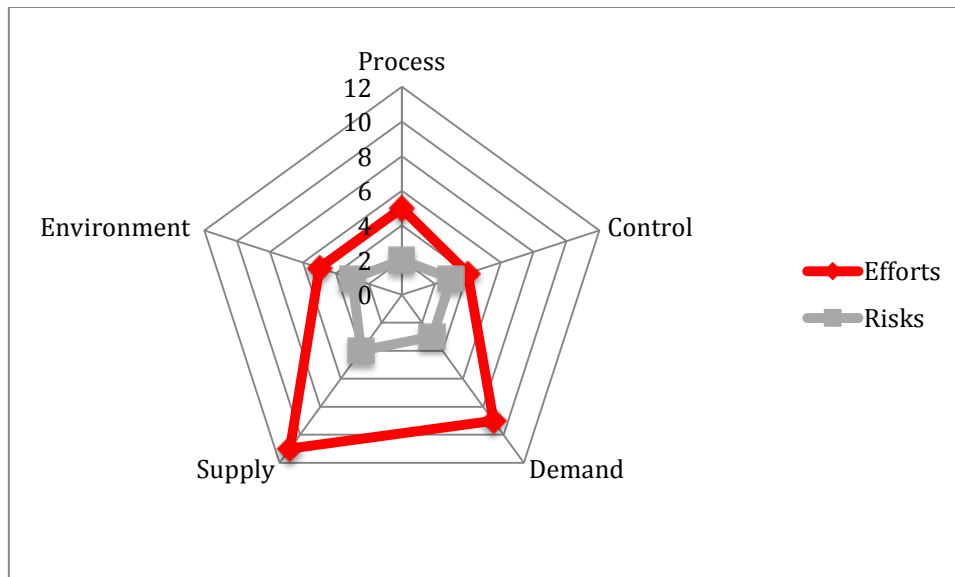


Figure 5.26 Efforts to manage risk versus risk areas by Case D (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

When reflecting on figure 5.26, it transpires that whilst the number of efforts to manage risks exceeds the number of risks in each area, some areas do so to a greater extent than others. For example, the number of efforts to manage control risks is only slightly higher than the number of risks in this area, whereas the number of efforts to manage supply risks far outweighs the number of risks perceived in that area.

With respect to this, the data reveals that Case D has experienced only a limited number of control and process disruptions, as a result of which, efforts to manage risks in this area are low. However, whilst Case D perceives changing regulations and adverse weather (environmental) to be significant risk sources, it also recognises that its ability to influence these are very limited.

“In a supply chain you always have certain risks you can do more about and some you can do less about. Things like the weather for example we can’t do anything about, although we are beginning to develop products that reduce the impact of the weather. On the other hand, we work closely with regulators to influence and have the visibility of regulatory changes that might affect our products. Whilst we can work closely together with these bodies, there is little more we can do to influence the risks we face in these areas.”

Given the high frequency of supply disruptions along with the level of impact these can have on the supply chain, a large number of efforts has been dedicated to identifying critical and unreliable suppliers, to multi source, increase collaboration, as well as to change suppliers where necessary.

The data further reveals that reacting to a significant disruption downstream, Case D has developed a comprehensive customer programme, as part of which critical customers (those needing regular assistance) are being identified and managed closely, to prevent future disruptions, similar to those of the past.

“We work very closely with the customer, and that is purely to manage risk. One because we can understand their needs better to make sure the money we invest in innovations is well spend and we reduce the risk of loosing money that way and also, we can to make sure customers use our products the way we designed them and not in any other way.”

With respect to this, a further interviewee outlined:

“We dedicate a lot of hours to customers and have generated a customer criticality index. Basically, we rank customers based on our experience with them and in how likely they will require assistance during peaks and allocate resources towards them to be ready when they need us. Given the incident we had in the past, whilst this is not the most cost effective approach, it is one that limits risk for us but also maximises our ability to learn from them for current and future products whilst mitigating incidents on their part.”

Synthesizing the risk profile of Case D together with the efforts made to manage these, as well as additional data, it was possible to establish a risk attitude for Case D as shown below:

Risk is a large part of our business in that we are an innovations company and we need to understand risk so we can work with them to exploit the market.

Evaluating the risk attitude of Case D, its risk mitigation actions along the supply chain can be explained. As Case D relies on learning about product gaps from customers to exploit these gaps in the market, it collaborates closely with clients to ensure that the development of new products is targeted at legitimate gaps in the market.

Equally, to enable the case company to deliver on customer desires, it needs to ensure its supply sources are reliable, especially during peak seasons and supply products, which comply with food safety regulations. This in turn explains the collaborations with regulators, as Case D tries to generate visibility of regulatory changes, impacting its product components.

In line with the risk areas, it transpires that Case D strategically targets efforts to manage risks in those areas it can influence and those that have presented the largest or most frequent disruptions to the company's performance.

When examining the data with respect to the future of risks, it becomes apparent that Case D expects the number of risks, as well as their impact to remain largely the same, whilst all data suggests that the ability to respond to the risks will increase. Interviewees outlined:

“Whilst we will be able to eliminate some risks, other risks will come up which we will have to deal with and it will be the same for impact.”

Key points:

- Case D has experienced significant disruptions in the downstream supply chain and frequent disruptions in the upstream supply chain.
- The risk perspective of the case company is geared towards its ability to deliver customer value.
- Whilst risk management efforts outnumber the risks in each area, some risks receive significantly more focus than others.
- The supply chain risk management actions of Case D focus predominantly on the external supply chain.

5.4.3 Risk management staff

Reviewing the data with respect to the allocation of staff to manage risks along the supply chain, it becomes apparent that whilst risk management is to be undertaken by all members of staff, a hierarchy approach is adhered to.

“Ultimately the final decisions lie with the owner but it cascades down. It is everybody's job in a way because people need to escalate risks or incidents so something can be done collectively.”

More specifically, Case D aims to involve every member of staff in the management of risks, based on their role. As each role within the business is defined by different processes and functions employees are responsible for, this responsibility also extends to the management of risks within the process or function.

“It is down to the individuals owning processes. They are responsible for what they do and therefore are responsible for those processes working seamlessly.”

As a result of making the management of risks inherent in different job roles by way of the ownership over processes, the approach to allocating staff to manage risks is hierarchical.

“It is like anything, it starts at the bottom but as you go higher within the company's hierarchy, the higher you get, the more responsibility you have in general and that translates into the responsibility to manage risk also.”

Furthermore, whilst every member of staff is encouraged to identify and flag up the risks they perceive, the autonomy of individuals to react to them is linked to their job role. In fact, one interviewee outlined that the individuals identifying risks are also encouraged to come up with solutions to these, as those people identifying risks may already have a solution to a given risk.

“People are always encouraged to improve what we do. Overall, people are expected to flag up risks and also think about solutions to the problems, which we

can deliberate over and possibly implement. Often the best solutions come from those people doing the job.”

Nevertheless, decisions about risk management mitigation solutions rest with heads of functional areas or the owner of the business.

“It is based on the functional areas people work in and ultimately the top of each function up to the owner.”

Based on the above approach to allocating staff to manage risks in the supply chain, it was not possible to establish a specific number of full time equivalents employed to manage risks. This is as the management of risks is a natural part of everyone’s job and not defined as a proportion within job roles.

“That is hard to say, it is not something in anyone’s job description, it is something that has to be done automatically as part of people’s remit and to an increasing level, in line with your overall responsibility within the business.”

Based on the analysis of the data, the risk management approach of Case D is also reflected in the way this process is managed. The performance of employees is evaluated based on their ability to run those tasks and processes they are responsible for, as effectively and efficiently as possible. As a result, evidence shows that individual members of staff, naturally aim to minimise disruption and continuously aim to improve those processes they are responsible for.

As a consequence of the model Case D applies to allocate the management of risks to individual members of staff, none of the data indicates an increase in the number of people managing risks over time, unless the business was to grow in size.

“I don’t think we would bring people in to specifically manage risk, but if the company was to grow in size, we would increase the number of people working

here and with that the amount of time we spend on managing risk, just because we have more people working here.”

Moreover, given the risk management approach the case company employs, it has not been recruited specifically for risk management experts. However, in line with the company’s approach, it has equally not been outlined that issues have occurred with respect to recruiting qualified staff.

“...if someone is good at what they do, they will automatically understand what to do to ensure things go well.”

Key points:

- Case D employs a hierarchical approach to managing supply chain risks.
- Members of staff are universally encouraged to engage in risk management, although the autonomy to react to risks varies between hierarchical levels.
- Individuals are responsible for managing risks amongst the processes they are responsible for.
- The management of risks is perceived as a key enabler for serving customers effectively and efficiently.

5.4.4 Risk management in the supply chain

The supply chain of Case D is set up in such a way that Case D designs and assembles products in-house, for which it sources product components globally. The products the case company produces are then sold directly to customers, or through partner organisations within the supply chain.

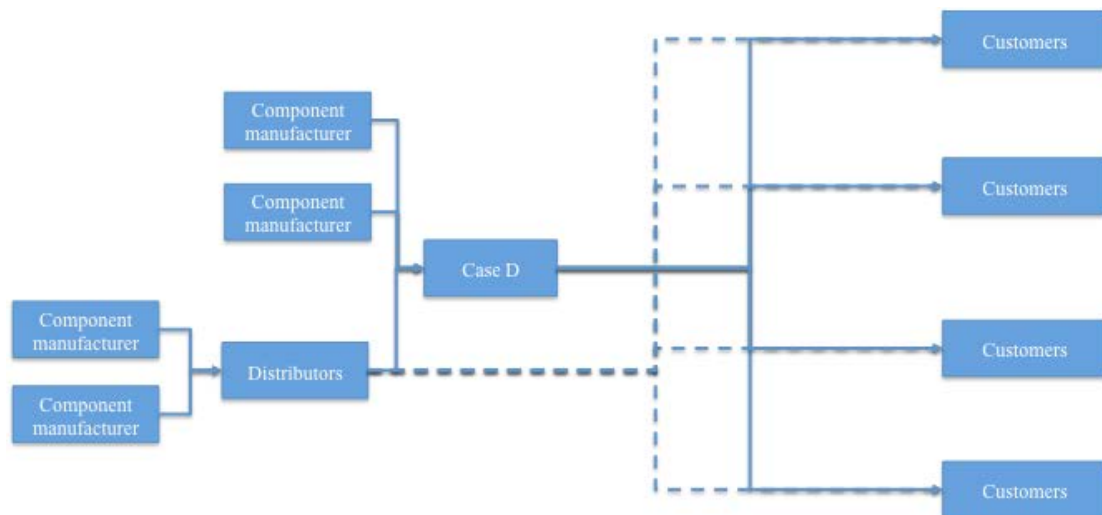


Figure 5.27 Supply chain illustration of Case D

In elaboration of figure 5.27, whilst some distributors supply Case D with product components and also act as distributors for the company's products, they do not get involved in customer service, product setup or any other activity, besides the sale of the products. Customer service and care are undertaken solely by the case company.

"A few of our suppliers, say for example some farming cooperatives also sell our products. This was a strategic decision, because they are made up of what are effectively our existing or potential customers, them selling our products makes a lot of commercial sense for us."

Given the importance of some of the distributors Case D's works with, in terms of distributing products, the case company has built up fostered sourcing relationships with these. The relationships with other component manufacturers are largely transactional and are based predominantly on component availability and price.

According to the data, most supply disruptions occur when sourcing from component suppliers directly, as a result of infrequent demand, and a resultant inability of suppliers to forecast Case D's demand.

On the other hand, relationships with customers as well as regulators, are monitored and managed very closely. This is a result of past disruptions, as well

as gathering market intelligence and the potential impact of regulatory changes on the product ranges of Case D.

“The relationship with regulators especially those authorities that test our products we manage very closely, because we need to clearly understand the impact different components may have on the kind of goods our customers store using our products. So we work very closely with them during product design, manufacture, testing and service.”

Reflecting on the risk mitigating efforts of Case D (table 5.8), it becomes evident that the case company has concentrated predominantly on mitigating risks in the wider supply chain, rather than internally. This is mirrored in the extensive efforts to build downstream relationships with customers, as well as regulators and distributors.

Whilst Case D recognises its ability to influence its market potential by way of investing in these relationships, it also recognises its partial inability to influence the consistency of supply from infrequent suppliers, as a result of the relationship. Whilst Case D recognises this as a weakness, it justifies the inefficient nature of the relationship by achieving cost and capacity targets.

Examining the efforts Case D has made to manage risks collectively, it becomes apparent that the supply chain risk mitigating focus is predominantly external.



Figure 5.28 The risk management focus of Case D (This diagram is based on the qualitative interpretation of case data.³⁵)

The external risk management focus Case D applies, can be explained when considering that the majority and most significant supply chain disruptions the

³⁵ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the focus on risk management the company displayed, particularly interpreting the area of impact of foci.

company has experienced (figure 5.24) were external. Further evidence for the external risk management focus resides in figure 5.25.

Evaluating the risk management actions Case D exhibits, against the backdrop of disruptions, it also transpires that the efforts to manage risks in the supply chain are largely reactive.

“Because we as a company have suffered from certain, repeated incidents in the supply chain, our main focus is on fixing the problems we have. Once we have done that and are confident with what we have done, I think we will become more proactive.”

Furthermore, the approach to risk management, is reflected in the risk attitude Case D has developed, in that the company’s ability to exploit the market is impacted upon by reoccurring disruptions based on risks, which reside in the wider supply chain.

Key points:

- Most risks reside in the wider supply chain of the case company.
- Case D’s risk management focuses predominantly on the mitigation of external risks.
- The case company manages risks reactively rather than proactively.
- Case D recognises its dependency on supply chain partners to exploit market opportunities and aims to optimise key relationships.

5.4.5 Organisational culture

The organisational culture of Case D was described by interviewees as:

- ❖ Entrepreneurial,
- ❖ Customer focussed,
- ❖ Team based,
- ❖ Target orientated, as well as
- ❖ Risk taking.

The characteristics used by interviewees to describe the organisational culture of the case company are consistent with observations by the researcher.

Reflecting on all data pertaining to the organisational culture of Case D, it is evident that Case D embraces risk. This is as the business model of Case D revolves around innovating and developing new, highly specialised and tailored products for customers. More specifically, the case company embraces certain risks by investing heavily into the development of products, knowing that not all products will generate a return on their investment.

“The nature of what we do is clearly risk taking, because we invest a lot of money into the development of new products many of which never make it to the market and swallow up a lot of investment until we decide to ditch them.”

In line with the company’s risk embracing traits, the organisation also exhibits entrepreneurial and customer focussed behaviours. More specifically, the entrepreneurial traits are exhibited by way of the company chasing market opportunities, in pursuit of growing profits by developing products to specifically meet customer needs.

With respect to this, the data revealed that the organisation’s culture drives staff to work closely with customers, to identify product needs to enable the targeted exploitation of sales opportunities. Here the development of tailored products is enabled by the entrepreneurial, risk embracing cultural traits of the company.

It is advocated that the traits reflected by the company’s culture are inextricably linked, in that the entrepreneurial aspirations on generating profits and exploiting sales opportunities, lead to a close customer focus, which enable the development of tailored products. This in turn induces investment risks that are justified through the entrepreneurial cultural aspects of Case D.

Further evidence for the risk-embracing attitude of Case D, is reflected in the high specialisation of products for specific customers. It is argued that the

greater the level of customisation, the lower the likelihood of the product being suitable for other customers. However, the higher the specialisation of products for particular customers, the higher their relevance to that customer and thus the higher the market price.

“We work with products that are all roughly the same, but the bits we add on to make them particularly suitable for certain customers. What that means is we go through great levels of effort to design products to meet customer needs precisely. But it also means we can charge higher prices in the market because the products are tailored to a massive degree.”

Synthesizing the above, the close collaboration with customers forms a key building block of the commercial offering of the company. This is reflected in the company’s entrepreneurial approach, which focuses on maximising market value through amplifying value for customers.

Moreover, whilst risk taking is inherent in the business model and the culture of the organisation, data also reveals that Case B strategically mitigates some risks, which are seen to impede upon its ability to pursue its entrepreneurial goals. For example, by closely collaborating with regulators and customers, certain risks, such as legislative impacts on products, demand variability and so forth are mitigated to some degree.

Based on the above insight, the organisational culture drives the mitigation of risks that are seen to have the potential to disrupt organisational goals. Taking this further, it is argued that the organisational cultural traits of Case D can be harnessed to reconstruct and explain the behaviours of the case company.

Using the data collected regarding the organisational culture of Case D and applying it to the cultural categorisation tool provided by Desphandé et al., (1993), it becomes evident that Case D’s organisational culture is representative of an adhocracy culture.

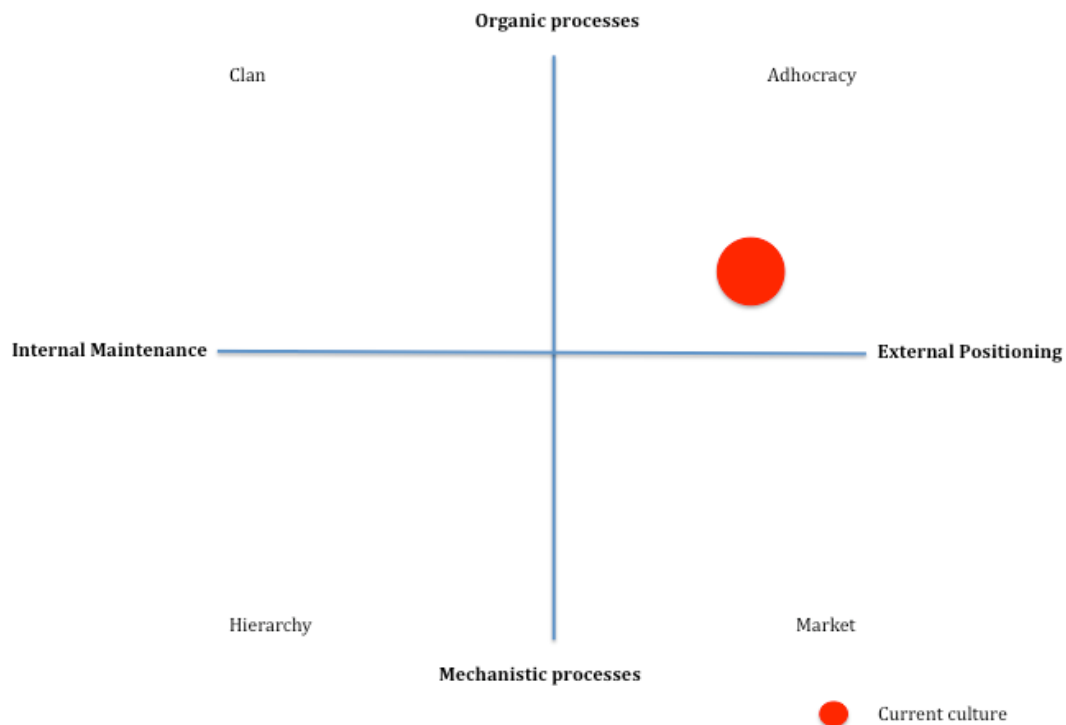


Figure 5.29 The organisational culture of Case D (This diagram is based on the qualitative interpretation of case data.)³⁶

Expanding on figure 5.29, whilst the culture of Case D is reflective of an adhocracy culture, it also exhibits strong traits of a market culture. This is due to the strong focus on the customer the case company exhibits. Furthermore, the culture of Case D also reflects some facets of a clan culture.

Moreover, interviewees explained that a key enabler in the market place was the internal, team-based approach Case D employed. According to the data, a key driving force in this, is the recognition of the drive and ambition of the owner and other members of the senior team, which is shared by members of the organisation.

“... to give you an example, the owner is always the first one to walk through the door in the morning and the last to walk out in the evening. And because he is tremendously encouraging, people genuinely believe in him and the company and adopt his way of working.”

³⁶ The current culture of the organisation was interpreted based on applying all relevant data to the competing values framework. Cultures are termed “current” as cultures may evolve over time.

Whilst a clear hierarchical structure exists within the case company, the approach of the employees and particularly the senior team remove the hierarchical feel, aiming to generate a team approach, which is in line with certain traits exhibited by a clan culture.

As a result of the strong influence of the market culture, Case D's organisational culture is situated firmly in the top right field of figure 5.29, although placed in close proximity to the market culture.

Reflecting further on the organisational culture of the case company, the risk management efforts can be explained. As Case D aims to maximise its market potential in line with its entrepreneurial cultural traits, it focuses closely on the customer. This focus enables the maximisation of value in the market place, as it allows Case D to develop products to the exact specifications of customers.

Moreover, recognising the high levels of risk inherent in the company's business model, it aims to reduce risks in frequently disrupted areas, to safeguard its entrepreneurial aspirations.

"We concentrate on mitigating those risks in which there is value. By that I mean risks that lead to frequent or significant disruptions and of those we concentrate on the ones we can actually influence."

Based on the above analysis, it is argued that the nature of the organisational culture has exposed Case D to significant levels of risks. More specifically, the risk embracing nature of Case D in combination with its approach to supply chain relationships and so forth, have resulted in a wide range of disruptions.

"Our culture defines in many ways who we work with, the risks we face and also in part determines the relationship we have with partners."

However, whilst the culture has a significant impact on the risks and disruptions Case D perceives and experienced, data also shows that disruptions in the supply chain have had an impact on the cultural approach of Case D.

In fact, in response to disruptions along the wider supply chain, the case company has begun to manage relationships upstream and downstream differently.

“I think the market we are in, somewhat shapes our culture because I believe the maximum value for customers is achieved through the approach we drive. And that is to do with the culture.”

This is also reflected in the way Case D allocates the management of risks to staff. The data clearly exhibits that employees are made increasingly responsible for the management of risks in the processes or functions they own (section 5.4.3).

This approach to managing risks is clearly supported by clan culture traits of the organisational culture which are harnessed to amplify the efficiency and effectiveness of the organisational market potential.

“The culture provides freedom to take part in improving the business. We try to work on issues together and keep everyone in the loop because visibility is key. We have a lot of very clever people working here and by keeping them in the loop we often come up with solutions the original people involved may not have come up with. It really amplifies the quality and innovativeness of solutions we have.”

Furthermore, when questioning interviewees specifically with regards to whether the organisational culture was reflected in the approach to risk management, all interviewees outlined that this was the case. In fact, the entrepreneurial, risk taking culture is reflected in the transactional relationships the company keeps with many of its suppliers for example.

Equally, interviewees also pointed out that if the organisational culture was to change, its approach to managing risks in the supply chain would also change. However, reflecting on potential changes, it became evident that all interviewees regarded the organisational culture of Case D as a key enabler for the company's success.

"Some aspects are key to the success of the business like the entrepreneurial background and we need to protect those but other aspects may change such as the use of processes and procedures to control operations in a more synchronised way."

Reflecting on the data pertaining the organisational culture of Case D collectively, it is argued that the case company is driven predominantly by its culture (figure 5.30).



Figure 5.30 The drivers of organisational behaviour in Case D (This diagram is based on the qualitative interpretation of case data.³⁷)

It has become evident that the case company's behaviour is based on its cultural traits such as entrepreneurialism, goal focus, market orientation and so forth. Further evidence for this claim is provided by the absence of hierarchy culture traits within Case D. The approach to the market, as well as risk management are driven largely naturally, based on the culture rather than processes and control mechanisms.

Key points:

- The organisational culture is representative of an adhocracy culture, although Case D also displays influences of other cultural types.
- The organisational behaviour is influenced by experiences the business makes.
- Case D regards its organisational culture as an organisational asset.
- The case company is clearly driven by its organisational culture.

³⁷ This diagram is of a purely qualitative nature and was created by interpreting data pertaining to the nature of the drivers of organisational behaviour.

5.4.6 Linking supply chain risk management and organisational culture

Reviewing all case data collectively, it transpires that there is a strong link between the organisational culture of Case D and its approach to risk management in the supply chain. In fact, the data clearly suggests, that the organisational culture of Case D not only provides a basis for organisational behaviour generally, but also the risk management efforts of the organisation.

More specifically, the adhocracy culture of the business implies a high level of risk tolerance, which is mirrored in the entrepreneurial, cultural traits the company is exhibiting. This is reflected in the company's efforts to develop innovative and highly specialised products for customers, implying high levels of risk in terms of development costs, a lack of transferability of products and so forth.

"We work with products that are all roughly the same, but the bits we add on to make them particularly suitable for certain customers. What that means is we go through great levels of effort to design products to meet customer needs precisely."

In addition to this, the data also clearly exposes that the risk embracing nature of the business has a significant impact on its supply chain performance. This is as the company has experienced frequent, as well as significant disruptions as a result of the way it manages its supply chain relationships.

The data further reveals, that as Case D has identified a link between its cultural traits, supply chain performance and the resultant propensity to fulfil its growth ambitions, the company has begun to mitigate against the most frequent and significant risks. It is argued, that this reactive risk management behaviour is attributed to the entrepreneurial risk embracing traits, which primarily focus on the exploitation of sales opportunities. According to the data, this is amplified by the stimulus to grow the business, which in turn is reflected in the market culture facets the company reflects.

An example illustrating this, is the approach Case D takes to mitigate against downstream risks, collaborating more closely with customers. Here an incident, which substantially impacted the company's market performance, was responded to by way of implementing an extensive customer care program, in pursuit of limiting similar disruptions from repeating.

The reactive risk management approach of Case D is also reflected in the way it manages its upstream relationships. Given the inconsistent supply the company has experienced, it has opted to multi-source from a range of suppliers on a transactional basis.

"Our culture defines in many ways who we work with, the risks we face and also in part determines the relationship we have with partners."

This transactional approach is in many ways reflective of key cultural traits of the adhocracy culture. However, as the case company is increasingly recognising flaws in this approach, it increasingly works with suppliers to develop more effective relationships. Arguably this behaviour is motivated by the company's market cultural traits and is in pursuit of serving customers more consistently and effectively.

Despite the high levels of risks, the organisational culture implies, the case company also recognises that some traits of its organisational culture are key enablers for its market success.

"Some aspects are key to the success of the business like the entrepreneurial background and we need to protect those but other aspects may change such as the use of processes and procedures to control operations in a more synchronised way."

Reviewing the organisational culture holistically, it transpires that the predominant focus of the organisation is on sales (as reflected in the entrepreneurial traits), whilst the management of risks is motivated in pursuit of continuously enabling the exploitation of sales opportunities. Thus the management of risks is secondary to the commercial targets.

Based on the foregone revelations, it is evident that there is a link between the organisational culture, the wider supply chain, as well as the experiences in the wider supply chain.

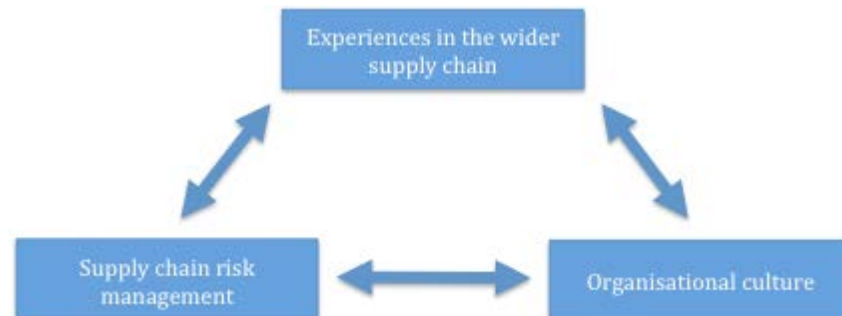


Figure 5.31 The relationship between experiences in the supply chain, organisational culture and the supply chain risk management in Case D

In elaboration of figure 5.31 in the context of Case D, it is argued that the organisational culture of the company determines the approach to risk management, which is predominantly a response to experiences in the wider supply chain, impacting the goals determined by the organisational culture.

Moreover, the data analysis clearly demonstrates that a change in the organisational culture would impact on the approach to risk management (section 5.4.5), which in turn would have an effect on the risk exposure of the company in the wider supply chain. In other words, if the entrepreneurial traits of the culture were less dominant, less risks would be taken and thus the propensity for disruptions within the supply chain would reduce.

“If we had a different culture we would perform differently. For example, if we were less entrepreneurial, we would probably take less risks and possibly deal less intimately with our customers because we would have a more standardised approach.”

“In some ways, if our culture was less risk embracing, we would have more safety stock, relationship management upstream.”

Key points:

- Case D's organisational culture is clearly linked to the approach to risk management in the supply chain.
- The disruptions along the supply chain have had an impact on the behaviour of the case company.
- The organisational cultural traits are harnessed to exploit opportunities in the market place.
- There is a close link between the supply chain environment, supply chain risk management and the organisational culture.
- Culture, rather than processes, drive a company with an adhocracy culture.

5.4.7 Case D summary

Case D, is a leading innovator and manufacturer of systems and products to cultivate fruits and vegetables, as well as to extend the lifecycle of these.

The case company strategically harnesses its high risk appetite, reflected as part of its organisational cultural traits, to exploit sales opportunities within the market. Whilst the core cultural elements of Case D are risk embracing, there are also cultural facets, which promote the mitigation of risks, in pursuit of fulfilling organisational goals.

Whilst Case D acknowledges the risks inherent in its risk embracing market approach, it also recognises the potential gains intrinsic in the risks it takes, and regards these as necessary to remain competitive within the market place.

The organisational culture of Case D is reflected in all aspects of the organisation's behaviour and is representative of the approach to risk management the case company exhibits.

For a summary of the key points from the analysis of Case D, please refer to table 5.9.

Table 5.9, Summary table Case D

Case summary table	
	Case D
Risk profile	Most risks the company faces are external. It appears to have more control over downstream risks than upstream risks.
Biggest disruption	The biggest disruption revolves around a customer error which has led to a court case and adverse publicity within the market.
Biggest mitigation effort	The most extensive efforts towards the management of risk is afforded downstream where an extensive customer support and management system has been developed in response to past incidents.
Risk management prompt	The motivation to manage risk is driven by the desire to reliably provide products to customers that enhance their ability to secure best market prices. Whilst most efforts are reactive, there is evidence of risk management efforts that are being undertaken proactively.
Cultural type	Adhocracy culture. Case D is representative of an adhocracy culture with some traits representative of a market culture. As much of the work is based on teams and the collective effort of employees, certain aspects of a clan culture are also present.
Risk drive	The approach to risk management is clearly driven by culture. The entrepreneurial, market driven culture of the organisation, is clearly reflected in its attempts to manage risk in the supply chain.
Focus	As Case D has clearly identified that most disruptions are generated externally, both in the upstream and downstream supply chain, it has recognised to have different level of influence over these areas. Given the extensive efforts Case D has already made to mitigate risks in the downstream supply chain, current efforts are focussed mostly on the mitigation of risk from the upstream supply chain.
Network relationship	The management of customers is very developed, whilst the relationships with suppliers is predominantly of a transactional nature.
Importance of KPIs	Key performance indicators are very important within the company, although these appear to be communicated in an informal way.
Level of information sharing	Information sharing is key within the company and may be enhanced by its size.
Risk accountability	Employees are responsible for the processes they operate and the risk inherent in these. Whilst risk management does not appear in the contracts of individual members of staff, it is expected that staff naturally deal with risk in their areas.
Risk attitude	Risk is a large part of our business in that we are an innovations company and we need to understand risk so we can work with them to exploit the market.

5.5 Individual case analyses summary

Having thoroughly analysed the different case companies on an individual basis, it transpires that even though all cases engage in the management of risks along the supply chain, they all do so for different reasons and in different ways.

Moreover, the in-depth analysis has revealed that the a key driver for the way in which companies manage risks and also the extent to which this is done, is closely linked to an organisation's culture.

To examine the similarities and differences of the findings between cases in more detail, chapter 6.0 provides a detailed cross-case analysis.

6.0 Cross-case analysis

Having provided in-depth analyses of the different case study organisations, the cross-case analysis compares and contrasts the findings from the different cases in detail, forming the basis for the development of theory in chapter 7.0. This approach is in line with the strategic approach to analysing case studies (figure 3.10) as developed in section 3.5.3 (data analysis strategy), and follows the same sections as the individual case analyses sections.

More specifically, this chapter features a comparative analysis of the individual cases, based on the following key areas:

- ❖ Interview background,
- ❖ Risk background,
- ❖ Risk management staff,
- ❖ Risk management in the supply chain,
- ❖ Organisational culture, as well as,
- ❖ Linking supply chain risk management and organisational culture.

Taking this approach, the chain of evidence is maintained, flowing from the individual cases which have been analysed in detail individually, before analysing the findings from each of the cases collectively. Based on the cross examination of findings within this section, theory that explains findings from all cases is developed in section 7. It was important to generate this chain of evidence, to ensure that findings would not be lost or misinterpreted at any stage of the analysis process, whilst it also enables the reader to trace developed theory back to the individual cases for example. This approach is consistent with the research recommendations of Eisenhardt (1989), who suggests a similar build-up of the research process.

6.1 Interview background

Each of the four case study organisations was selected purposively based on a variety of qualifying criteria, such as the relevance of the industry, the market

position of the companies, experience with supply chain disruptions, the organisational culture, as well as other key criteria outlined in table 4.1, section 4.5.

Beyond this, case companies were also selected based on their organisational culture. This was important to represent all cultural types as identified by the cultural model, employed to categorise case companies by means of their organisational culture.

The case companies feature a diverse range of market leading organisations from different industry sectors, operating in highly differentiated markets. Whilst Case A, a fashion retailer, operates in a market characterised by seasons (seasonal market), Case D, a leading innovator and manufacturer of systems and products to cultivate fruits and vegetables operates in a highly seasonal market (highly seasonal market). Case B, on the other hand, a world leading logistics and service provider operates in a very volatile (volatile market), yet less seasonal market environment. In contrast to these companies, Case C, a leading supplier of components to the automotive industry, operates in a more stable market environment (stable market).

For each case, five interview candidates were selected in collaboration with a contact person at each company. Candidates in all cases were selected based on their position within the company, their experience with risk management as well as their understanding of the culture of that organisation. Each of the case companies offered a site tour of the different locations the researcher visited, enabling researcher observation. This proved to be particularly helpful in researching the organisational cultures of cases, as well as it enabled the triangulation of findings.

All interview candidates behaved professionally throughout all interviews and were helpful in obtaining additional case data.

Table 6.1 Interview background summary

	Case A	Case B	Case C	Case D
Type of business	Fashion retailer	Logistics service provider / Lead logistics provider	Automotive component manufacturer and marketer	Manufacturer of systems and products to cultivate fruits and vegetables
Nature of market	Seasonal (some volatility)	Volatile	Stable	Highly seasonal
Positions of candidates	Communications Manager, Depot Manager, Group Strategist, Head of Logistics, Warehouse Worker	Global Project and Re-engineering Manager, Global Director Business Information & Market Intelligence Services, Regional Manager, Business Continuity Manager Europe, Warehouse Operator	Financial controller & head of finance for supply chain globally, global customer fulfilment manager, Europe and Africa planning resilience manager, Asia pacific supply chain director, Director global procurement	Owner, Sales Director, Procurement Director, Customer Service Representative, Shop floor Manager
Number of interviews	5	5	5	5
Number of visits	3	4	2	2
Total interview time	6hours 40minutes	7hours 5minutes	7hours 55minutes	7hours 21minutes
Types of additional data collected	Company reports, presentations, poster material	Company reports, presentations, published industry insights, emails, leaflets.	Company reports, presentations, poster material.	Company reports, emails, presentations.
Site tour	Yes.	Yes.	Yes.	Yes.
Candidates helpful in obtaining additional data	Yes.	Yes.	Yes.	Yes.

6.2 Risk background

Reviewing the risk background of all cases collectively, it transpires that each case company has experienced a number of disruptions of varying gravity along their supply chains, which have had a significant impact on the performance of these.

More specifically, Case A has experienced a range of internal, as well as external disruptions, which have brought the company's supply chain close to total failure. In fact, the risk history of Case A includes significant, as well as frequent disruption examples. Reviewing the data, it transpires that Case A's most significant disruption originated from internal process failures, whilst the more frequent disruptions and risks revolve around demand variability, a lack of systems synchronisation and supply inconsistencies.

In contrast to Case A, all other cases exhibit a more diverse risk profile. Case B for example, faces risks that are mostly external to its own operations. Disruption sources are spread throughout the supply chain, which is a result of the diverse nature of the supply chains the company operates, on behalf of customers. The risks Case B faces, are frequent rather than significant, although evidence shows that significant disruptions (natural disasters) have impacted the company. The risks the company faces predominantly, revolve around the delay of shipments, damage to cargo or delays through third parties, such as customs, for example.

Whilst Case C exhibits a more balanced risk profile than Case A, it transpires that Case C faces mostly external risks (excluding environmental risks). However, as risk is a core building block of the commercial offering of the company, the risk profile of Case C is more complex than that of Case A or D for instance. In fact, whilst the business model implies key supply chain risks, the highest level of risks the organisation faces, stem from suppliers upstream. Furthermore, in contrast to Cases B and D, Case C faces seldom but significant risks, which predominantly revolve around supplier failures or capacity shortfalls (table 6.2).

In contrast to Cases A, B and C, Case D, exhibits the most balanced risk profile. Whilst most of the risks the company faces are external, risk tolerance is inherent in the business model, similar to Case C. Furthermore, risks and past disruptions predominantly originate from external, rather than internal sources. The data further reveals that similarly to Case B, most risks are frequent rather than significant. Despite a significant incident downstream, most risks revolve around supply inconsistencies (table 6.2).

Table 6.2 Risk overview of all cases

	Case A	Case B	Case C	Case D
Internal or external disruption	Internal and external	Mostly external	Mostly external	External
Disruption source	Upstream, internal and downstream	Upstream, internal and downstream	Upstream	Upstream and downstream
Nature of disruption	Significant as well as frequent	Mostly frequent	Infrequent but significant	Mostly frequent
Example of significant disruption	Systems implementation failure	Natural disaster	Supplier failure / capacity shortfall	Customer misuse and resultant law suit
Example of frequent disruption	Demand variability and supply inconsistencies	Delayed shipments, damage to cargo, customs delays	N/A	Supply constraints

The above observations are consistent with the risk profiles compiled for each of the cases, as can be obtained from figure 6.1.

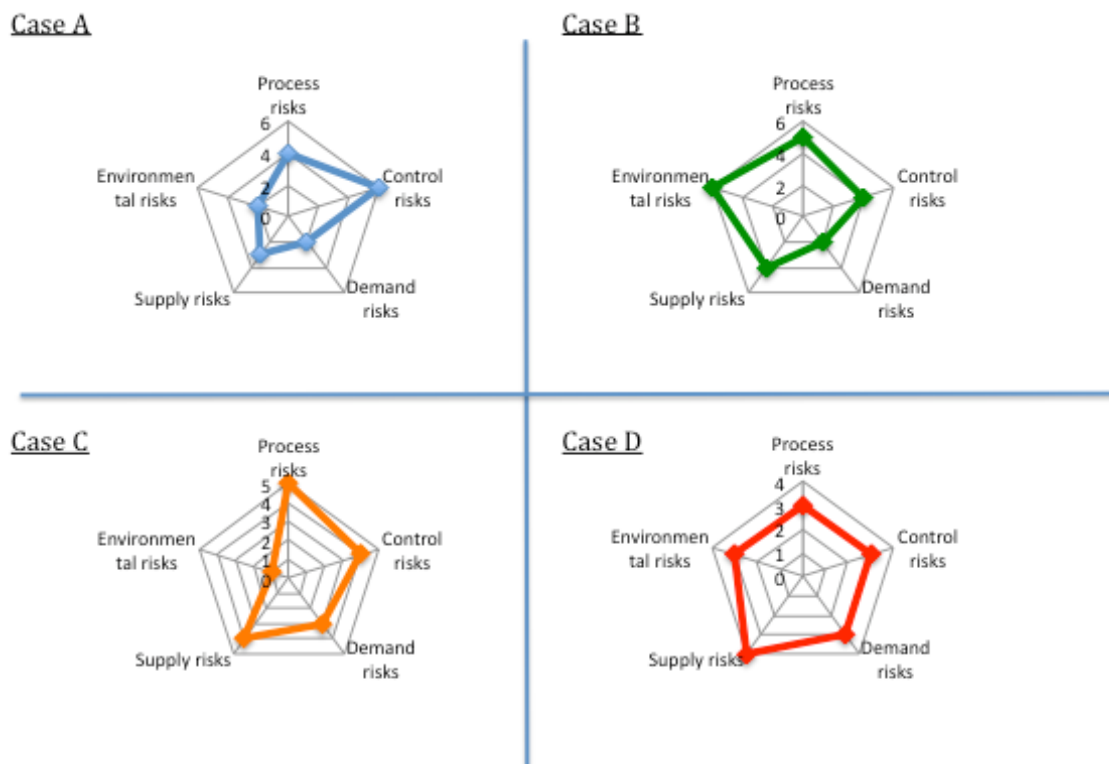


Figure 6.1 Risk profiles of all cases (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

Reflecting on figure 6.1, it becomes evident that the risk profiles of the four case companies vary significantly. Whilst Cases A and C exhibit an imbalanced risk profile and do not rate environmental risks highly, Cases B and D perceive environmental risks to be the opposite. Moreover, the risk profile of Cases B and D offer evidence to suggest that the supply chains of these companies are more exposed to a wider range of supply chain risks than Cases A and C.

Given the different supply chain environments of the case companies, it stands to reason that there are different causes for the risks the companies face.

Case A, for example, has experienced rapid levels of growth, which are to some degree attributable to the company's' entrepreneurial traits. However, whilst the company was growing rapidly, the ability to efficiently coordinate organisational behaviour and control the company decreased significantly, leading to a number of risks and disruptions, which have impacted the organisational performance negatively.

Having recognised the misalignment of the organisational behavioural approach and the market, Case A is reacting by focussing on the mitigation of disruption repetitions by managing certain risks more closely.

Whilst the risks Case A faces were and are clearly generated by the company's behaviour and its lack of adapting to the ever changing supply chain requirements, Case B faces risks for different reasons.

As Case B orchestrates highly diverse supply chains on behalf of its customers, the collective risk profile of Case B is extremely varied. However, as the service the organisation provides, revolves around the effective orchestration of supply chains, Case B's service offer presupposes its capability to manage supply chain risks as well as disruptions competently. Thus, Case B has had to develop a wide range of risk management solutions, which are applicable to the most diverse supply chains.

In contrast to Cases A and B, Case C has a business model, which risk is inherent in. This is as the case company's commercial offering is based on product differentiation through unique product components. This competitive strategy implies a high level of sourcing risk, which is reflected in the supply and process risks (product flow) the company faces (figure 6.1).

Case D, also drives risk by means of its commercial model and thus, is dissimilar to Cases A and B, whilst being similar to Case C in this respect. However, whilst Case C faces most risks upstream, Case D encounters significant risks both upstream and downstream, which is similar to Case A, rather than B or C.

Furthermore, reflecting on the different risk profiles of all cases (figure 6.1) it transpires that Case D (the smallest company of the sample) has a fairly high-risk profile compared to much larger companies of the sample. It is argued that the reason for this is a higher risk sensitivity of Case D compared to other cases, in that the organisation does not have as much resources to fall back on, should an incident occur, amplifying the impact of risks and disruptions for Case D.

Synthesizing the risk profiles of all cases, it transpires that whilst all case companies manage risk, they all do so in different ways. Whilst Case D operates an almost exclusively reactive risk management approach, focussing on past disruptions, Cases A and C appear more proactive than Case D. Despite this, the motivation of Cases A and C to manage risks is clearly based on past disruptions, although risk management solutions are being transferred to different areas of the business, to maximise the potential risk mitigation benefits.

On the other end of the continuum to Case D, Case B is the most proactive case company of the sample in terms of risk management. This is attributable to the commercial offering of the company, which necessarily encapsulates a detailed understanding of and capability to manage risks along the most diverse supply chains.

Analysing the cases on a cross-case basis further, reveals that the approach to risk management is reflected in the risk attitudes the companies exhibit. Where Case B has developed highly generic ways of managing risks, which can be adapted to different supply chains, Case D has developed highly specialised ways of mitigating risks, based purely on past disruptions. Furthermore, whilst case companies A and C, exhibit a more focussed approach to managing risks than Case B, the approaches by these companies also appear less restricted in their focus than those of Case D.

Table 6.3 Risk attitudes of case companies

<p><u>Case A</u></p> <p><i>"Risk is different for different areas of the business and a key focus is to reduce failures as much as possible to minimise lost profit opportunities."</i></p>	<p><u>Case B</u></p> <p><i>"It is about understanding there will be a disruption but also knowing or figuring out what the second step is going to be. How can you ensure the business keeps continuing and that is quite important also for the customer."</i></p>
<p><u>Case C</u></p> <p><i>"We have a business model which is build on uniqueness requiring unique product components. What this means is risk of supply is intrinsic in our business model and we have to work out how best to deal with that to deliver on our brand reputation."</i></p>	<p><u>Case D</u></p> <p><i>"Risk is a large part of our business in that we are an innovations company and we need to understand risk so we can work with them to exploit the market."</i></p>

Evidence for the differentiated approaches of the case companies to manage risks, is also provided by the types of efforts these have taken to manage risks in the supply chain (table 6.4).

Table 6.4 Efforts to manage risks in the supply chain by all companies

Efforts to manage risks														
Effort	Case A	Case B	Case C	Case D	Effort	Case A	Case B	Case C	Case D	Effort	Case A	Case B	Case C	Case D
Audit of suppliers		Green	Orange		Developed disruption dashboard		Green			Redistribution or removal of staff	Blue			
Benchmarking	Blue			Red	Developed specific rule for specific process	Blue				Review of customer supply chains		Green		
Bowtie diagrams			Orange		Disruption matrix		Green	Orange		Review of inventory policy			Orange	Red
Bringing in experts	Blue			Red	Disruption trending		Green	Orange		Review of product design			Orange	Red
Business impact analysis		Green			Economic climate monitoring	Blue	Green			Review of supplier supply chains		Green		
Business process synchronisation	Blue		Orange		Evaluated criticality of stock	Blue		Orange	Red	Risk assessment process developed		Green		
Capacity building	Blue		Orange	Red	Increased collaboration with customers		Green		Red	Risk criticality mapping		Green	Orange	
Change supply chain partners	Blue			Red	Increased information sharing	Blue	Green			Risk likelihood analysis		Green	Orange	Red
Constant product redevelopment	Blue			Red	Increased production flexibility			Orange	Red	Risk mapping	Blue	Green	Orange	
Contingency planning		Green			Learning	Blue			Red	Risk to product mapping			Orange	Red
Critical node mapping		Green	Orange		Multiple sourcing	Blue		Orange	Red	Root cause analysis			Orange	
Critical raw material mapping			Orange		Organisational trend planning (infrastructure)	Blue				Scenario planning	Blue	Green		
Critical supplier mapping			Orange		Process redesign		Green		Red	Six Sigma	Blue			
Customer criticality analysis			Orange	Red	Product merges	Blue				Specific Resilience program launched			Orange	
Dedicated risk personnel		Green	Orange		Product quality improvement			Orange	Red	Stricter contracts	Blue	Green		
Desktop practice exercises		Green			Product redistribution plans		Green	Orange	Red	Supplier criticality analysis		Green	Orange	Red
Developed specific solution tools		Green			Raised business continuity plans	Blue	Green	Orange		Supply chain mapping		Green	Orange	
Developed a generic risk response process		Green			Recovery planning based on frequent disruptions		Green	Orange		Targeted project into specific disruption	Blue			

When reviewing table 6.4 in detail, it transpires that Cases A and D have undertaken the least number of efforts (21 and 19 respectively), whilst Cases B and C have undertaken 28 efforts in number each. Judging the number of efforts, it may be argued that Cases B and C have been more generic in managing risks than Cases A and D.

However, when reflecting on the types of efforts the cases have undertaken to manage risks, it becomes apparent that Case D has focussed predominantly on

efforts that can be associated with and alleviate supply and demand risks. This is reflected in actions such as capacity building, changing supply chain partners, customer criticality analyses, multiple sourcing and so forth. This finding is in line with the risk attitude represented in table 6.3, as well as it reflects the highly targeted approach of Case D to manage risks based on past disruptions.

On the other hand, table 6.4 also clearly reveals the broad nature of the efforts Case B makes to manage risks. For example, risk management efforts such as business impact analyses, contingency planning, the development of a generic risk response process, employing dedicated risk personnel, the development of a disruption dashboard, disruption trending, increased information sharing and so forth, all reflect the generic nature of risk efforts Case B has developed. These efforts are in line with the company's risk attitude represented in table 6.3.

Moreover, Case B harnesses the generic nature of its supply chain risk management efforts, by applying these to specific customer needs. Thus Case B has developed generic solutions applicable to the most diverse supply chains, in line with its commercial offering.

Synthesizing table 6.4 further, it transpires that whilst Case C has undertaken the same number of efforts as Case B, suggesting an equally generic risk management approach, this is not the case. When examining the efforts made by Case C in more detail, it becomes evident that the efforts made by the case company, are largely aligned with the risk profile of the company (figure 6.1).

For example, as the biggest risk areas for Case C revolve around process and supply risks, efforts to manage risks specifically in these areas have been undertaken. Efforts such as capacity building, critical supplier mapping, business process synchronisation, as well as recovery planning based on frequent disruptions are specifically targeted at the disruptions Case C has experienced and are reflective of the risks the company perceives. This is consistent with the approach to risk management, which is less proactive than the generic risk

management approach of Case B yet less reactive than the approach to risk management exhibited by Case D.

Evaluating the data further, it has also been identified that the efforts to manage risks by Case A are reflective of the company's risk attitude. Whilst the company manages risks more proactively than Case D, for example, it, much like Case C, manages risks less proactively than Case B. This is demonstrated by the fact that Case A predominantly makes efforts such as bringing in experts, increased information sharing, product merges, stricter contracts and so forth, to manage process and control risks.

According to figure 6.1, these are the most dominant risk areas perceived by the case company. However, the data also indicates that the company has made efforts to reduce risks associated to supply and demand. Thus the company's efforts to manage risks in the supply chain, although based on disruptions, are less reactive and less restricted than those of Case D, yet less proactive and less general than those of Cases B or C.

Additional evidence for the above assertions is presented in figure 6.2, which categorises the risk management efforts of each case company by risk area.

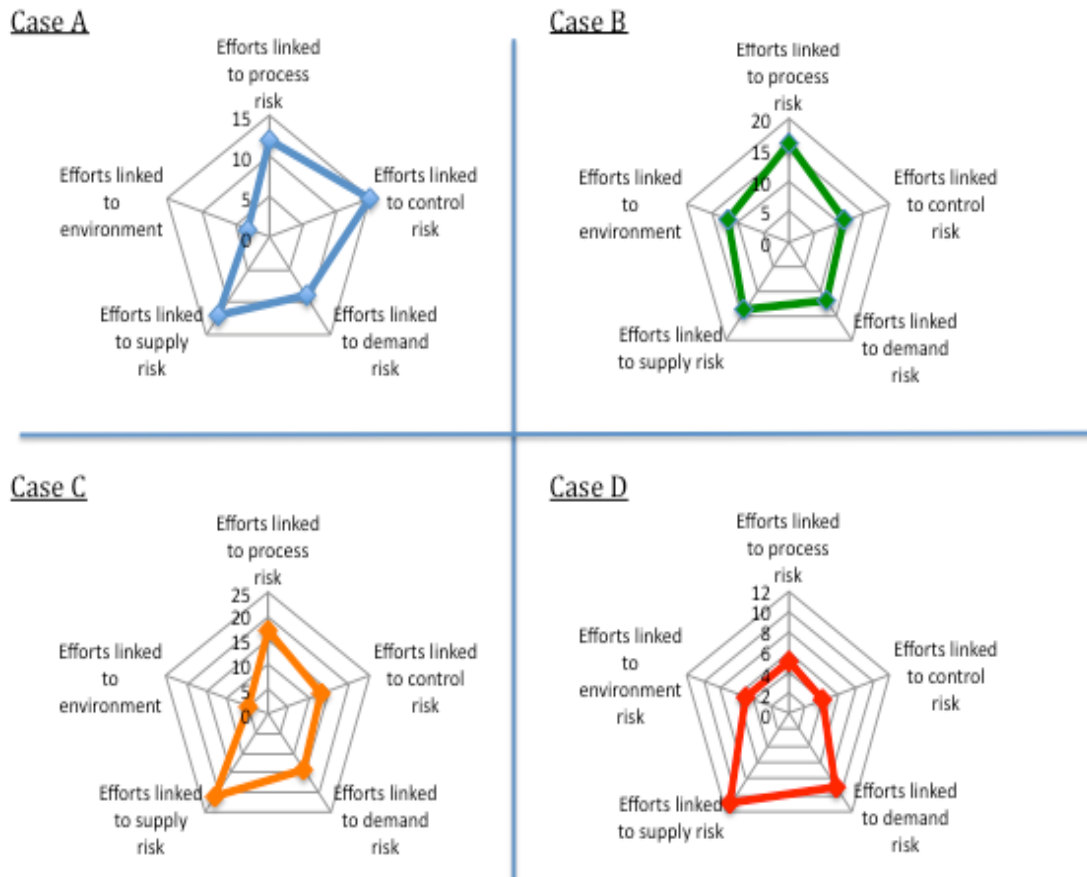


Figure 6.2 Efforts to manage risk by all cases (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

Reflecting on figure 6.2, it becomes apparent that the risk efforts case companies have made, are to a large extent reflective of the risk and disruption history of the organisations. According to the data, this is especially true for companies that manage risks reactively such as in Cases A, C and particularly Case D.

Furthermore, it transpires that in most cases, efforts to manage risks are expanded shortly after disruptions whilst these decrease over time. This is reflected in the example of Case B, which manages risks in the supply chain by using more generically applicable measures than any other case company, mirroring the high proliferation, high variety of disruptions it experiences in customer supply chains.

This trend becomes even more visible, when merging the risk profile with the efforts to manage risks. Moreover, when merging the two it transpires that the

efforts of some case companies to manage risks, are more synchronised with the risk areas, than those of others (figure 6.3).

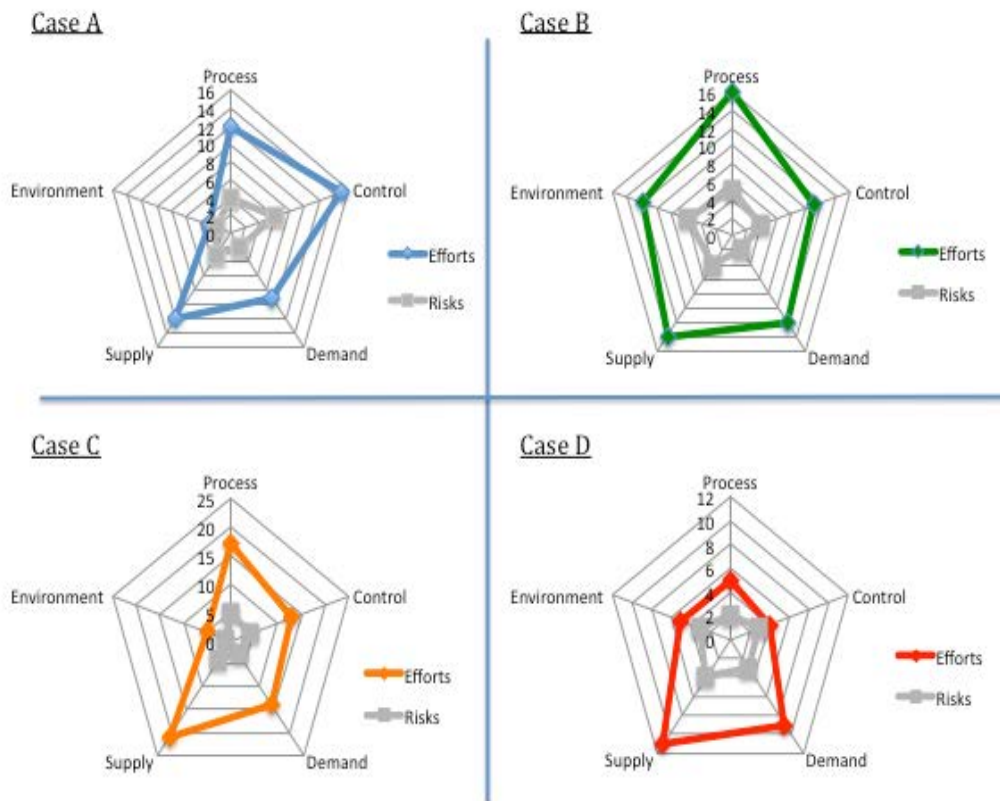


Figure 6.3 Efforts to manage risk versus risk areas for all cases (This diagram is of a purely qualitative nature and was created by interpreting interviewee responses.)

Examining figure 6.3, it emerges that the efforts made by Case B are most evenly spread across all risk areas when compared to the efforts of all other cases. It is advocated that this is a result of the diverse supply chains the company operates and reflects the company's response to the wide range of risks it manages across customer supply chains.

Furthermore, when comparing the shapes of both the risk areas and efforts to manage these, it transpires that Case B's efforts are least aligned with the risks its faces. Nevertheless, the efforts the company makes to manage risks, outnumber these in each area.

In contrast to Case B, the efforts of Case C are the most synchronised efforts in relation to the risks the company faces. More specifically, whilst the number of

risk efforts far exceeds the number of risks in each area, the shapes of both curves are synchronised, unlike those of Case B. This suggests that the efforts Case C extends to manage risks mirror the risk areas.

By reflecting more closely on the risk management efforts of Case C, as outlined in table 6.4, it transpires that whilst the risk management actions are less targeted than those of Case D, for example, the solutions the company develops to manage risks are applicable to a range of areas within the business. For example, the efforts to increase the company's product flexibility, have an impact on the sourcing options of the company (supply), as well as the ability to fulfil demand (demand), the ability to flow the product (process) and also reflect a higher level of controllability (control) from sides of the company.

Thus, Case C applies a more generic risk management process than Case B, but develops solutions that have an impact extending across larger areas of the supply chain, than those developed by Cases A and D.

Reflecting on Cases A and D, as represented in figure 6.3, it is evident that the shapes of the risk areas and efforts to manage risks are not as synchronised as those Case C exhibits. However, when examining the biggest risk areas the case companies perceive, it transpires that the shape the data series produce are synchronised. More specifically, whilst not all risks and efforts are represented by a similarly shaped curve, the biggest risk areas are clearly met by the largest amount of efforts to manage risks.

Examples for this in Case A, revolve around the areas of control, supply and process, and in the areas of supply and demand of Case D. Moreover, this relationship is reflected in the reactive nature of the risk management approach of both case companies, and is in difference to the more proactive approach of Case C, and the most proactive approach of Case B.

The above findings are consistent with the risk attitudes of each of the case companies and explanatory of the relationship between the different risks case companies face, and the efforts they undertake to manage these.

Moreover, the data further exhibits that the definitions of supply chain risk management different case companies have, are pivotal for the approach in which they manage risks in the supply chain.

For example, as the definition of Case A revolves largely around the controllability of the supply chain in pursuit of supplying customer demand, the risk management efforts largely revolve around control and supply risks.

Furthermore, the use of the word “anything” in the supply chain risk definition of Case B is reflective of the range of efforts the company has made. More specifically, the broad nature of the supply chain risk definition by Case B prescribes the least targeted approach of all case companies.

In addition to this, Case C also reflects a close relationship between its definition of risk and risk management efforts, in that the company focuses on procurement, production and delivery in both, its definition and the efforts to manage risks.

Coherent with the link between the risk definition and risk management efforts of Cases A, B and C, the supply chain risk definition of Case D is also reflective of its risk management efforts, focussing predominantly on supply and demand risk management (table 6.5).

Table 6.5 Risk management definitions of all cases

<p><u>Case A</u></p> <p><i>"Supply chain risk is the inability to effectively meet customer demand / satisfaction by effectively using the supply chain."</i></p>	<p><u>Case B</u></p> <p><i>"Anything that disrupts customer satisfaction in delivering goods to customer or anything that could disrupt the level of service to the customers."</i></p>
<p><u>Case C</u></p> <p><i>"Anything that can happen that can disrupt our business, so it is the risk of being unable to procure, produce and deliver the products to our customers."</i></p>	<p><u>Case D</u></p> <p><i>"Risk in the supply chain is the potential of an incident or several incidents happening that have the propensity to disturb our ability to fulfil services promised to the customer."</i></p>

(The definition of risk management used for Case A, stems from the supply chain department of Case A, for further information, please see table 5.1, section 5.1.2.)

Key points:

- There is a link between the operating environment and the risk profile of companies.
- Some companies are more reactive to risks than others.
- Companies that predominantly react to disruptions or risks are less likely to have a holistic approach to risk management.
- Some risk management solutions have a more diffused impact than others.
- There is a close link between the risk attitude, risk definition and the efforts extended to manage risks in the supply chain.
- The number of risk management efforts by all case companies was greater than the number of risks the companies perceived.

6.3 Risk management staff

Reviewing the data regarding the staff to manage risks, it transpires that all case companies apply a hierarchical approach to risk management. In fact, a representative or representatives of the board held the ultimate responsibility for risk management in the supply chain of each company.

For example, in Case A, the overall risk management responsibility resides with the Chief Operating Officer, who is a supply chain expert. Interestingly, this individual was specifically employed in this capacity, based on their supply chain expertise and the recognition that the supply chain of the organisation was a major weakness.

Case B exhibited a similar approach to the allocation of risk management, whereby directors of global functions were held responsible for the management of risks in their functional areas. This mirrors the approach of Case C, where the risk management responsibility was divided between the Global Vice President, the Global Marketing Vice President, the Head of the Special Products Unit and so forth, all of whom are members of the board.

Case D, on the other hand, a much smaller organisation, placed the risk management responsibility mainly on the owner of the business.

Despite the synchronised approach of allocating the ultimate risk management responsibility to heads of organisations, the approach to diffusing this accountability at lower levels, was significantly different between cases.

For example, whilst Case B employed a highly structured approach, whereby the management of risks was implicit in different job roles all the way to the lowest organisational levels, based on the nature of the business offer, the approach of Case A differed greatly. In fact, whilst Case A also encouraged the involvement of all staff members in the identification of risks, much of the risks the

organisations faced in non-core business activities were outsourced to supply chain partners.

Whilst neither Case C nor D appeared to outsource any risks, evidence shows that both organisations strongly encourage the involvement of all hierarchical levels in the identification of risks in the supply chain. In fact, whilst the key driver for this in Case C revolved around the protection of the brand, its reputation and values, Case D harnessed the ability of staff members to identify and manage risks as a performance indicator of staff.

Furthermore, whilst Case D, much like Case B relied heavily on the ability of all staff to identify and manage risks generally, Case C exhibits a project-based approach to the management of risks. As part of this, risk management projects are allocated to global regions, in accordance to which project managers are selected. These lead risk management projects and report progress to the board.

In contrast to the approach of Case C, the allocation of risk management in Case D resembles a more structured approach. In fact, the risk management expectation was closely linked to the job role of staff. Particularly in cases A and D, the management of risks is not regarded as something separate to the day job but as something that is inherent in the job role. This is as risk is seen to be inherent in business processes and thus it is expected from staff to manage risks in such a way that processes run as seamlessly as possible.

Whilst Case B follows a similar principle, the need to manage risks is included in every job contract, outlining specifically those behaviours that are expected from staff in terms of managing risks.

In addition to the above, data also reveals that whilst cases B, C and D do not employ staff specifically to manage risks in the supply chain, Case A appears to do so. In fact, according to the data two to three people were employed almost exclusively to manage risks in the supply chain. It was argued that whilst these individuals work mostly on the mitigation of risks, the primary reason for

employing them revolve around their expertise in areas Case A perceives as weaknesses.

Moreover, whilst case companies A and C expect for staff numbers focussing on risk management to increase slightly in the short-term, data from Cases B and D outlines that a change in the number of risk related personnel will be proportional to the development of the business. More specifically, data from Case B indicates that there is a close relationship between the number of customers purchasing supply chain orchestration packages, and the level to which these demand risk management as part of this service.

Similarly to Case B, data from Case D also depicts that an increase or decrease in the personnel to manage risks in the supply chain is inextricably linked to the increase or decrease in business generally.

In spite of the differing approaches to risk management staff in the short term, data from all cases exhibits that in the long-term, the key focus would revolve around increasingly integrating the management of risks into the day-to-day job of employees. According to the data, this will become increasingly possible as the confidence and experience to manage risks grows.

Owing to the above anticipated trend, the management of risks in the supply chain will become a more natural part of the different job roles across the hierarchies.

Furthermore, whilst Case B is already extensively training staff to manage risks, Cases A, C and D appear to do so to a lesser extent. This is a result of having taken up the management of risks more recently than Case B. Moreover, it is evident that the motivation and risk management competence varies significantly between Case B which offers supply chain risk management services on top of operating its own supply chains, as opposed to Cases A, C and D, which operate their own supply chains, but do not offer such services to other companies.

Key points:

- All case companies apply a hierarchical approach to risk management.
- Risk management responsibilities are allocated differently within the different case companies.
- Only one in four cases employs dedicated risk management personnel.
- One in four case companies actively outsources risk in non-core business activities.
- In the short-term, an increase in risk management personnel is expected, whilst the long-term focus will be to increasingly amalgamate risk management with job roles.
- The level of autonomy to respond to risks is linked to hierarchical levels, whilst risk identification is not.

6.4 Risk management in the supply chain

Reviewing the data from all individual case analyses, it is evident that the supply chains of the case companies are all vastly different from one another.

Case A, a fashion retailer designs products in-house, outsources the manufacture to different upstream supply chain partners globally and subsequently sells products, harnessing a network of own stores, franchises, licences, concessions, online facilities and so forth.

Case C, a component supplier to the automotive industry develops and designs products in-house, raw materials are procured globally and finally assembled in house, prior to being sold directly to customers, or through a network of approved distributors. Moreover, Case C unlike any other case company, bases its competitive edge on sourcing unique product components, which amplify the complexity and risks within the supply chain.

Case D, on the other hand, a manufacturing company that produces innovative systems and products to cultivate and extend the lifecycle of fruits and vegetables, procures prefabricated product components, which it assembles to

make products. These are sold either directly to customers or through approved distributors. In contrast to Cases A and C, Case D also offers an extensive level of aftermarket services, making up an increasingly large part of Case D's commercial offer.

Whilst Cases A, C and D operate their own supply chains, Case D offers supply chain orchestration services, ranging from sourcing raw materials to reverse logistics. As a result of this, Case D, whilst also owning infrastructure and operating its own supply chains, primarily operates supply chains on behalf of its customers.

Based on the different supply chain setups the companies are representative of, it emerges that the risk profile of each company is different, which in turn has a profound impact on the ways in which risks are managed.

More specifically, when reviewing the business models of each of the case companies, it transpires that Cases C and D have inherently built supply chain risks into their businesses. In fact, whilst the business model of Case D revolves around continuous innovations, Case C relies on unique components as a differentiator for its products. As a result of this, it is argued that both companies rely heavily on risks in the supply chain for commercial success.

Case B on the other hand, has transformed its abilities to manage supply chains into a commercial product, in which the management of risks is inherent. Thus, whilst risk management does not represent the core commercial offer of Case B as it does in Cases C and D, the company's ability to manage risks contributes significantly to its success in the market place.

For the above reasons, Cases C, D and B are different to Case A, as this case company actively tries to maximise the mitigation of risks, moving away from its entrepreneurial risk taking roots following severe disruptions. This will be examined more closely in section 6.5.

Furthermore, whilst companies A, C and D all manage their own supply chains, and thus are responsible for their resilience, Case B is not in a position to apply the risk management options it perceives to be most suited in many cases. This, as outlined in section 5.2.4, is a result of the contractual agreements with customers, and the fact that customers have different expectations in terms of the level they demand risks to be managed to, within their supply chains.

Thus, where Cases A, C and D are free to deploy risk management interventions they perceive necessary, Case B's ability to do so, depends on its ability to demonstrate the necessity of different solutions and the customers perceptions of different risks.

Further review of the data also reveals that Cases A, C and D in particular have developed more targeted solutions to manage risks in their supply chains than Case B has in the supply chains it orchestrates. It is argued that whilst Cases A, C and D have developed almost exclusively solutions to prevent disruptions from repeating in their supply chains, Case B has developed a portfolio of measures that consist of solutions developed for a range of different supply chains.

Moreover, whilst Cases A, C and D reflect a more reactive approach, based on past disruptions, the risk management of Case B exhibits a more proactive approach. This is necessitated by the high proliferation, high volume risks it is exposed to.

In addition to the above findings, the analysis of the individual case analyses also shows that whilst all case companies engage in risks management in the supply chain, the motivations for doing so are highly differentiated. For example, whilst Case B is motivated to manage risks in the supply chain to deliver on contractual agreements based on gain sharing and to grow its business service division, Case C mitigates risk predominantly to protect its brand reputation within the market.

In difference to the risk management motivations of Cases C and B, Case A is motivated to manage risks primarily to enable market growth and to amplify its

market share, whilst Case D focuses mostly on risk management to enable continuous innovations in pursuit of enhancing its customer's ability to perform more successfully within the market place.

Based on the examination of the data to this point, it is argued, that the different motivations and approaches to risk management in the supply chain are reflected in the solutions companies have developed. More specifically, whilst Cases A and D have applied approaches such as benchmarking to understand how other companies manage risks, and to understand in detail what other companies are doing, Case B exhibits a more holistic approach by developing solutions such as a disruption dashboard for example. This is a tool to provide disruption visibility across all the supply chains it operates, identifying disruptions that are relevant to specific supply chains.

Case B on the other hand, has applied solutions that focus on key supply disruptions, which have impaired the company's ability to deliver products to customers in line with the company reputation.

The data has also reveals that whilst Cases A and D have developed different solutions to different risks and applied them outright, Cases B and C have developed specific projects to manage risks. For example, evidence from Case C shows, that the company has developed a specific "resilience project", that is made up of three key stages, namely protect, solve and prevent. This approach is highly conducive to generating a company wide approach to risk management, as it gives risk management an identity.

A similar approach has been taken by Case B, which has implemented specific business continuity teams, as well as the company undertakes a number of desktop training exercises, involving a large number of staff.

For the aforementioned, it is argued that the risk management processes applied by Cases B and C are of a more formal nature than those applied by Cases A and D.

Reviewing the data further, it also transpires that the risk management efforts of the different case companies, is focussed on different areas of the supply chain (figure 6.4).

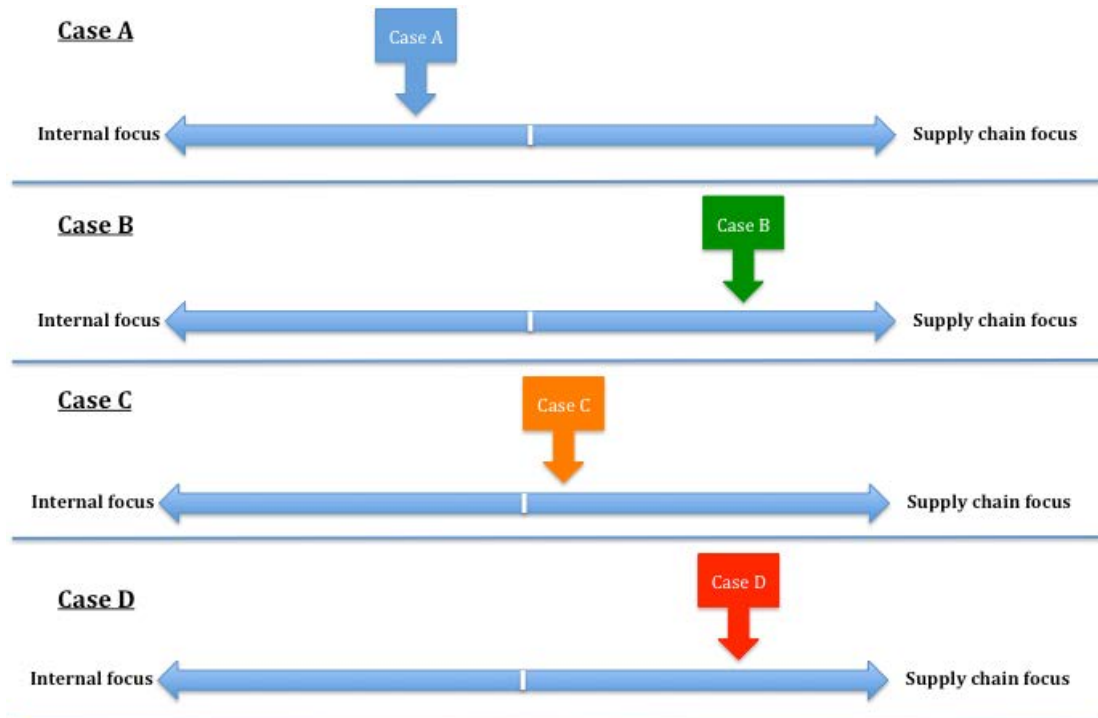


Figure 6.4 The risk management focus of all cases (This diagram is based on the qualitative interpretation of case data.)

Reflecting on figure 6.4, it becomes apparent, that whilst Case A focuses largely on mitigating disruptions from within the organisation, Cases B and D focus on mitigating risks predominantly from the wider supply chain. Amongst the sample, Case C exhibits the most balanced approach in terms of internal and external risk mitigation.

Linking the evidence from figure 6.4 to the risk profile of the different case companies, it emanates that the risk mitigation focus (internal vs. external) is aligned with the disruptions the different case companies have experienced. For example, Case B operates supply chains on behalf of its customers and thus focuses predominantly on the mitigation of risks from these external supply chains.

Equally, as the largest disruptions and risks for Case D stem from its upstream and downstream supply chain rather, than within the focal company, its risk mitigation actions focus on the wider supply chain.

In contrast to this, Case A focuses its risk management efforts within the company itself, as the largest disruption revolved around an internal software implementation failure.

Examining figure 6.4 further, it also transpires that Case C represents the most balanced approach to risk management in terms of the internal and external risk management focus.

Whilst the biggest risks Case C faces revolve around sourcing unique components for products (upstream supply risk), the company recognises the risk impact of its business model (internal risk). Responding to this, the company focuses on mitigating risks from the wider supply chain, by way of amplifying its sourcing flexibilities and collaborating externally to mitigate supply disruptions, whilst also designing products with the associated risk implications in mind.

More specifically, the company increasingly considers the risk implications of new product designs, to develop products that limit external risks, whilst upholding the company's core product offer.

Furthermore, whilst Case D also relies largely on risk for market success, the risk management actions of this company focus almost exclusively on the wider supply chain and not, like those of Case C on the company itself.

Key points:

- Whilst each company manages supply chain risks, the approaches to doing so are highly diverse.
- The motivations to manage supply chain risks vary greatly between all cases.
- Some companies are more proactive towards managing risks than others.

- Cases C and D have built risks into their core business model, which is a key contributor for success in the market.
- Some risk mitigating actions are more targeted than others.

6.5 Organisational culture

When reviewing all data pertaining to organisational cultures, it becomes evident that each case company represents a different type of organisational culture.

For example, whilst Case A is representative of a market culture, Case B represents a hierarchical culture, Case C a clan culture and Case D an adhocracy culture (figure 6.5).

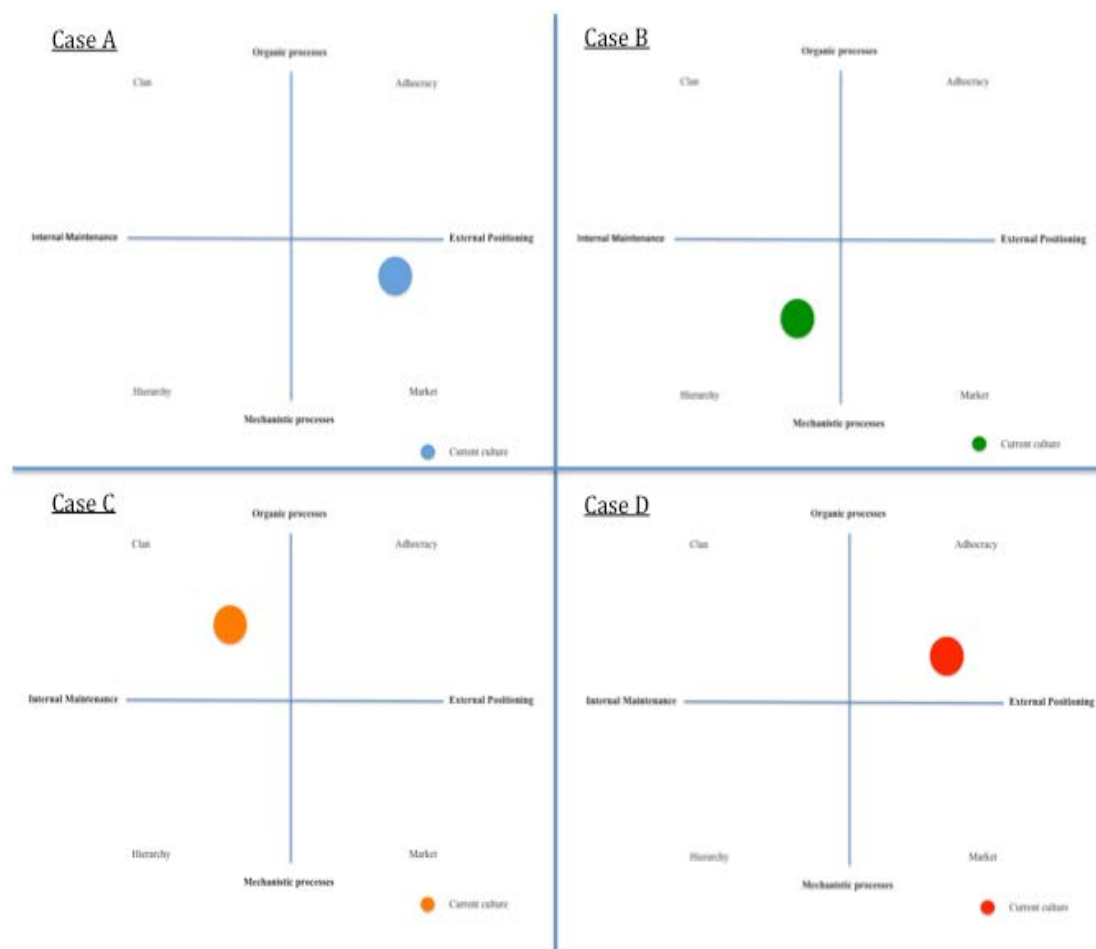


Figure 6.5 The organisational cultures of all cases (This diagram is based on the qualitative interpretation of case data.)

Whilst the dominant traits within each case company clearly designate the overall organisational culture, the data also reveals that less dominant facets also have an impact on the positioning of the organisational cultures (figure 6.5).

More specifically, reflecting on figure 6.5, it transpires that whilst Case A is clearly representative of a market culture based on its competitive nature, goal orientation and so forth, its culture is also strongly influenced by the company's entrepreneurial traits.

Similarly, Case B, based on dominant attributes such as order, rules and regulations, in combination with bonding rules such as policies and procedures, represents a hierarchy culture. However, it also reflects traits typical of a market culture such as goal orientation, competitiveness and market superiority, which positions Case B within the hierarchy field (figure 6.5), close to the market culture.

Case C, a company that is dominated by traits such as cohesiveness, loyalty, tradition and a sense of family, is representative of a clan culture. However, despite the prevalence of cultural traits associated with a clan culture, Case C also reflects facets of an adhocracy culture. These are represented by the level of risk acceptance that is implicit in the business model of Case C, as well as the entrepreneurial spirit of employees, when protecting the brand.

Furthermore, whilst Case D represents an adhocracy culture (entrepreneurship, risk taking, creativity etc.), its strong orientation towards the customer, positions Case D's culture in close proximity to the market culture.

Reflecting on the placement of the different case companies by means of their organisational cultures, it transpires, that whilst the dominant traits within the companies designate the cultural type of each case, the secondary and tertiary facets, present within the different cases, significantly influence these.

Having identified the different organisational cultures of each case company, it also emerges that the behaviour of each case company can be reconstructed by way of its culture.

For example, as Case A represents an organisational culture, which strives for competitiveness, that is achievement oriented and aims to establish market superiority, its predominant focus within the market revolves around growth, the exploitation of sales opportunities and competitiveness.

In a similar way, the cultural traits of Case C, which revolve around cohesiveness, tradition, a sense of family and so forth, are reflective of the behaviour employees take, when protecting the brand for example. More specifically, the recognition of and association with the brand tradition, leads employees to behave in such a way that the heritage of the company is continued.

Case D on the other hand, which reflects risk taking, entrepreneurship, adaptability and so forth, does not only take significant risks by constantly innovating products and so forth (adhocracy culture), it also collaborates very closely with the customer, which is reflective of the organisation's market orientation (secondary cultural traits).

Data from Case B also supports the existence of a close relationship between an organisation's culture and an organisation's behaviour. When researching the case company, it transpires that all behaviours by the organisation are controlled by rules, regulations, policies and procedures, which are reflective of a hierarchy culture. Moreover, it also transpires that the company's strong organisational focus on risk mitigation was mirrored by the strategic emphasis on predictability.

Given the organisational cultural background of Case B, it may be argued that the company's proactive risk management capabilities are a result of the company's culture.

In addition to the above, the data also reveals that each case company clearly recognises the relationship between its organisational culture and its behaviour as an organisation. In fact, evidence suggests that the different case companies strategically harness their cultural traits, to achieve organisational goals.

For example, Case A, a market culture, actively communicates the cultural feel of its target customer within the organisation by way of decorating the workplace walls with products associated with its customers. This way, the cultural feel of the customer is more easily adopted by employees and reflected in products that are being designed and sold. Moreover, researcher observation also revealed, that the large majority of employees within Case A were reflective of the target market, and thus more able to relate to the customer on a cultural basis.

Case C, on the other hand, reinforces its organisational culture by way of communicating the values, traditions and heritage throughout office buildings in a different way. The company decorates offices and communal areas with reminders of major achievements the company was and is involved in, such as timelines, trophies, vehicles and so forth. Using this approach, employees are constantly reminded of the core values of the organisation, which revolve around performance, being the best, enabling staff to personally associate with the company.

Furthermore, the data also reveals that the commercial success of Case C is based largely on the cohesion of employees, as a result of which the company works hard to retain and preserve its organisational culture. This is in difference to Case A, which has recognised weaknesses in its organisational culture and aims to align its culture more closely and strategically with the business model.

A different approach was taken by Case D, which manages its culture by way of providing cultural guidance through the senior management team. In this particular case, the owner and other senior members are highly involved in most operations and reinforce the business's values by interacting with employees at all levels.

This approach is similar to that of Case A, which relies largely on the importation of cultural values by way of recruiting staff with the desired cultural attributes. Whilst the approach of Case D is partly reflective of the approach of Case A, it is

argued that the management approach towards the organisational culture of Case D is largely enabled through the size of Case D.

In contrast to Cases A, C and D, it appears that Case B not only recognises the importance of its organisational culture with reference to its organisational performance, but it harnesses key traits of its organisational culture commercially. More specifically, it is argued that the capabilities Case B has developed to orchestrate supply chains and manage risks are based on the company's cultural drive to establish predictability, stability, and smooth operations (strategic emphases).

In fact, data from Case B further highlights that whilst Case B has a core culture, the company also adopts sub-cultures amongst customer facing teams, which are based on the core culture, yet encompass traits of customer cultures. This is managed strategically, to maximise the value of the relationship between Case B and its customers. Furthermore, the afore-described behaviour is indicative of the market cultural traits the case company reflects.

Examining the different organisational cultures and the approach to managing these by the different case companies, it transpires that the organisational cultures are not only pivotal for the behaviour of organisations, but they also vary significantly in their complexity. For example, whilst Case B represents a strong clan culture with limited influences from traits of other cultures, the culture of Case D (adhocracy) exhibits strong influences from a market culture. Similarly, whilst Case A is clearly representative of a market culture, it exhibits a strong influence from an adhocracy culture.

Case A, on the other hand, is actively trying to change its culture moving away from some of the adhocracy traits it deems to jeopardise its organisational goals, to reflect more traits of a hierarchy culture, amplifying the complexity of the company's cultural model.

Case B presents the most complex organisational culture of the sample. This case company, represents a hierarchy culture with influences from a market culture, yet has developed complex sub-cultures in pursuit to maximising value for customers. Whilst these sub-cultures are based on the organisation's core culture, this strategic approach amplifies the complexity of the company's organisational culture, even though it can be explained by its market culture traits.

Reflecting on the data from a different perspective, it also becomes apparent that whilst an organisations' culture has a profound impact on the behaviour of a company and thus its experiences in the market place, the experiences a company makes also influence its culture.

Whilst there is evidence to support this finding in each of the cases, the above-described relationship was most apparent in Case A. As the company has been influenced strongly by entrepreneurial traits in the past (adhocracy culture), it concentrated predominantly on taking risks to generate sales. Achieving sales growth at a rapid level, the case company failed to implement control mechanisms internally and externally, which exposed it to high levels of risks. These resulted in a significant business disruption, as a result of which the company began to strategically change its culture, to reduce entrepreneurial traits and increase hierarchy traits.

In difference to the approach Case A has taken to strategically realign its organisational culture, Case C recognises the suitability of its organisational culture and has chosen to harness this to overcome operational risks. More specifically, whilst Case B repeatedly experiences disruptions, which are linked to its core business values, the company exploits cultural traits such as loyalty, participation and teamwork, to respond to risks in the supply chain. This is seen to reinforce the culture of Case C.

In a similar fashion to Case C, experiences in the supply chain have also fostered the culture of Case B, which has continuously reinforced its cultural approach.

Data further reveals that Case D also benefits from this approach, which is reflected in the company's decision to move closer to its customers.

Despite the strong link between the organisational cultures and the behaviour of the case companies, the data analysis also highlights the role and influence of processes over organisational behaviour.

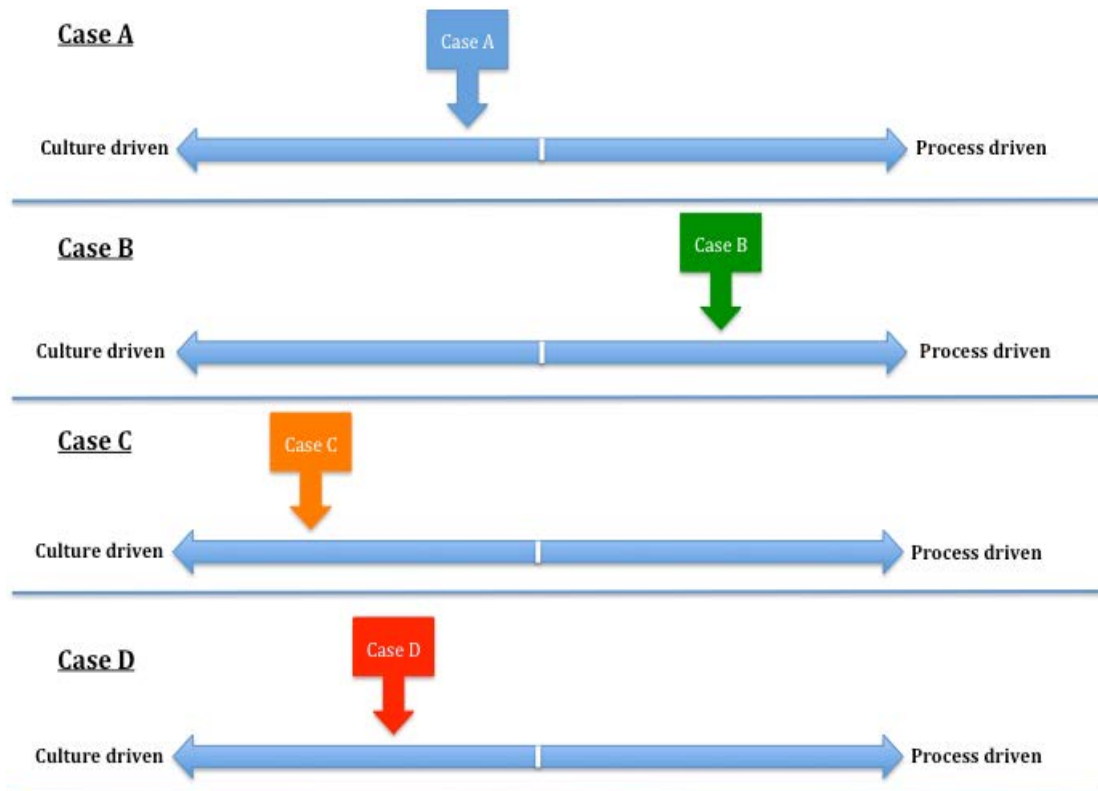


Figure 6.6 The drivers of organisational behaviour for all cases (This diagram is based on the qualitative interpretation of case data.)

Reflecting on figure 6.6, it transpires that whilst processes heavily impact the behaviour of Case B, the behaviours of cases A, C and D are influenced by processes to a lesser extent. Furthermore, whilst Case C exhibits the lowest degree of processes as drivers, Case A shows a higher degree of process influence over behaviours, which is in line with the cultural realignment strategy of the case company. Data further outlines that Case D, is less influenced by processes than Case A, yet significantly more than Case C.

On the basis of the above findings, it is argued that whilst Cases A, C and D appear to be driven by culture to a larger extent than Case B, the hierarchy

culture of Case B relies largely on processes and procedures as guides for behaviour. As a result of this, it is evident that there is a strong link between organisational culture and behaviour, even though it may at first sight appear that only some cases are driven by culture when in fact all cases clearly are.

Key points:

- Organisational cultures are made up by a dominant culture and a number of contributory sub-cultures.
- Organisational cultures can be used to explain organisational behaviour.
- Some organisational cultures are more complex than others.
- Organisations recognise the importance and influence of organisational culture and are using key traits to achieve or enhance their operational performance.
- Different organisational cultures imply different levels of risk in the commercial environment.

6.6 Linking supply chain risk management and organisational culture

Reviewing the data from all cases collectively, it transpires that there is a strong link between an organisation's culture and its risk management. In fact evidence from all cases strongly suggests, that whilst the organisational culture provides a basis for organisational behaviour generally, it also determines the approach to managing risks in the supply chain.

For example, data has shown that the entrepreneurial culture Case A used to exhibit, led the company to take significant risks in pursuit of growth in the market place, which was aligned with its market culture. However, based on a number of disruptions Case A experienced, which were attributable to its risk attitude at the time, the case company realised that the limited risk management (linked to the entrepreneurial traits), jeopardised its market growth. As a result of compromising the organisational goal of market growth, which is based on the market culture, Case A has begun to strategically realign certain cultural traits to optimise its approach to risk management.

More specifically, data from Case A reveals that the company is moving away from the adhocracy culture traits such as risk taking and entrepreneurialism to rely increasingly on the order, the policies and the procedures inherent in a hierarchy culture. According to the data, Case A is undergoing this strategic change to raise the level of control over its business and the supply chain in pursuit to enable the fulfilment of those goals, reflected in its dominant market culture.

A further example for the relationship between risk and organisational culture is provided by Case D, which reflects an adhocracy culture. In this case, key traits of the company reflect risk taking, entrepreneurship and so forth, much like those secondary traits of Case A (in the past), which have exposed the company to disruptions. According to the data, this is a result of the lack of risk management, which was partly facilitated by the organisation's culture.

Similarly to Case A, Case D also reacted to the disruptions jeopardising its organisational goals (inherent in the organisational culture) and has decided to collaborate more closely with its customers. Based on the data it is argued that Case A has recognised the risks to the fulfilment of its organisational goals implicit in its core culture (adhocracy), and strategically exchanges some of these for traits from the market culture, which are more conducive to pursuing its core goals.

Whilst Case C has also experienced a number of significant disruptions based on its business model and its core culture, much like Cases A and D, the company has harnessed key traits inherent in its organisational culture to manage risks more effectively, unlike Cases A or D.

More specifically, as Case C's business model revolves around differentiation through using unique components in the fabrication of its products, it exposes itself to risks in the supply chain, based on the adhocracy traits reflected in its business model and organisational culture. Recognising this risk as a key

propellant for market success, however, Case C has chosen to retain these traits unlike Cases A and D.

Furthermore, Case C harnesses key traits of its core clan culture to protect and enhance the brand by way of cohesion, loyalty, teamwork and by generating a sense of family, raising the responsibility experienced by all members of staff.

Thus, unlike Cases A and D, which strategically realign organisational cultural traits in pursuit of goals implicit in their core cultures, Case C harnesses key traits of its organisational culture to optimise its risk management.

However, whilst Cases A and D have chosen to strategically remodel certain aspects of their organisational cultures, data also reveals that whilst the influence of some traits was to be reduced, neither case company wanted to entirely eliminate these traits. This corresponds with the data from Case C, in that the company has, much like Case A and D identified the necessity of some of the risk promoting facets.

Case B presents further evidence for the distinct relationship between organisational culture and supply chain risk management. In this case, the data reveals that process driven hierarchical organisational core culture, aiming for predictability and stability, has led to a high level of risk management capabilities.

In fact, evidence from Case B suggests that the organisational culture of the company has led to the development of a wide range of modalities to manage supply chains and risks, which Case B was able to commercialise. In fact, it is argued that whilst the hierarchical culture led to the development of a high level of risk management capability based on strategic emphases such as stability, predictability and smooth operations, the company's traits, attributable to a market culture, have enabled the company to commercialise its risk management capabilities.

Given the above findings, it is evident that there is a close relationship between an organisation's culture, its risk profile and its approach to risk management. It emerges, that whilst Case B reflects the most evolved risk management capabilities, based on its organisational cultural traits, the culture of Case C results in that the management of risks is more natural and based less on formal procedures.

Furthermore, Cases A and D, both recognised a mismatch between goals inherent in their core cultures and a lack of risk management, hindering the effective pursuit of these organisational goals. As a result, both case companies have taken steps to strategically realign some of their organisational cultural traits to improve their approach and effectiveness of risk management in the supply chain.

Moreover, whilst the data clearly outlines the impact of different organisational cultures on the approach and capability of different case companies to manage risks along the supply chain, data also reveals the impact of risk profiles and disruptions on the culture of organisations.

In fact, disruptions along the supply chain of Cases A and D have impacted the organisational culture of the case companies to such an extent that the culture was changed. Recognising that some cultural traits of each of the companies were ineffective with a view to achieving goals of the core culture, both companies replaced these traits with those from other cultures promising a better fit to achieving organisational goals.

Similarly, Case C harnesses key traits of its organisational culture on the back of disruptions, with a view to strengthening those aspects, the company believes to strengthen its risk management. Much like Case C, Case B has also reinforced its organisational structure in response to disruptions, by commercially offering customers to apply more of the risk mitigating traits Case B's organisational culture reflects.

Reflecting on the relationship between organisational culture and risk management in the supply chain on the basis of the data, it transpires that certain organisational cultures impose a higher affinity towards embracing risk than others. It appears that cultural traits from an adhocracy culture lead to the highest level of risk acceptance.

This is reflected most vividly in Case D, and to some extent also in Cases A and C. Case B on the other hand, exhibits the lowest risk acceptance and is reflective of a hierarchy culture. With respect to this, the data reveals that cases reflecting a hierarchy culture or traits from this culture are more likely to exhibit higher levels of risk management.

Furthermore, the evidence also implies that companies reflecting traits of an adhocracy culture are more likely to have a higher risk tolerance, as reflected in Cases D, A and C. As a result, different organisational cultures lend themselves to risk management to different degrees.

This finding is in line with the risk attitudes of the different cases in that Case B represents the most risk averse company, followed by Cases A, C and D. Moreover, evidence also exposes that Cases B, D and A, although to a lesser extent, rely on the strategic management of risks in the market to increase their economic success. More specifically, whilst Case D heavily embraces risks by way of being an innovations company, Case B also drives a business model, which implies high levels of risks within the supply chain.

However, despite the risks innate in the business models of Cases C and D, both companies harness key traits of their organisational culture to strategically manage these. This is consistent with the behaviour of Case B, as well as the strategic remodelling of the organisational culture by Case A.

Beyond the identification of the nature of the relationship between different organisational cultures and the approach to risk management in the supply chain, the data also suggests that the effectiveness of risk management, inherent

in different organisational cultures is impacted by the nature of different markets.

With respect to this, the data reveals that an adhocracy culture as represented by Case D is most suited to highly seasonal markets, whilst a market culture such as that of Case A is more suited to seasonal markets. Furthermore, a culture such as that of Case C is most suited to stable markets, where a hierarchical culture such as that of Case B, appears most suited to a range of different markets characterised by volatility.

It needs to be noted, however, that the above finding is based on non-pure cultures such as exhibited by the case companies. In fact, the data reveals that it is unlikely for purely hierarchical, clan, adhocracy or market cultures to be highly applicable to particular markets. According to the data, this is only achieved through the complex amalgamation of traits from different organisational culture types.

Key points:

- There is a strong link between an organisational culture and risk management in the supply chain.
- Some organisational cultures are more conducive to risk taking, whilst others are more suited to mitigating risks.
- Whilst an organisational culture determines the level, approach and the effectiveness of risk management in the supply chain, risks and disruptions also have an impact on the culture of an organisation.
- Organisations strategically manage organisational cultures to achieve different risk management objectives.

6.7 Cross-case analysis summary

Having evaluated the similarities and differences between findings from the different cases in this chapter, it has become evident that companies increasingly

recognise the impact of different organisational cultural facets and work with these, to enable or effectuate desired behaviours.

Moreover, the cross-case analysis has also highlighted that organisations employ organisational cultural facets to manipulate the organisational perspectives on performance, increasing or decreasing the spectra by means of which success is measured. In fact, the in-depth cross-case analysis has shown that organisations increasingly recognise performance indicators that are in difference to traditional measures such as cost, sales and so forth.

More holistically, the cross-case analysis has exposed that the approach of organisations towards risks in the supply chain is determined by the cultural composition of the different businesses. As a result, organisational cultural facets play a pivotal role in the way organisations perceive risks, mitigate risks and more generally how these are managed.

Following the detailed cross-case analysis, chapter 7.0 outlines the development of the empirical contributions of this research based on the findings from the cross-case analysis in the form of diagrams and textual passages.

7.0 Theory development

In addition to highlighting the empirical contributions of this research in response to each of the research questions (chapter 8.0), this section is dedicated to presenting the contributions to theory and practice. More specifically, this chapter is dedicated to highlighting the key contributions based on all analyses and in particular the cross-case analysis. In fact, the creation of this chapter is based on the generation of a chain of evidence beginning with the individual case analyses. Cases were analysed individually and in detail prior to critically and carefully comparing the findings within the cross-case analysis. Having provided a thorough cross-case analysis, this chapter builds on the findings by contributing theory encapsulating findings from the different cases individually, as well as collectively. This approach is aligned with the recommendations of Eisenhardt (1989).

Thus this chapter details the theoretical and practical contributions of the research, linking these back to the relevant sections of the cross-case analysis.

7.1 Different types of organisational culture lead to different approaches to risk

Reflecting on the research findings, this study clearly demonstrates that different types of organisational cultures lead companies to adopt different approaches to risk in the supply chain. In fact, the research clearly uncovers that different organisational cultures have a distinct impact on the way companies approach risks.

For example, a hierarchy culture seeks to avoid risks, whilst an adhocracy culture pursues the taking of risks along supply chains, and a clan culture reflects more risk avoidance drivers than a market culture (figure 7.1).

Table 7.1, The risk orientation of different organisational culture types

	Risk avoidance	Risk taking
Adhocracy culture		●
Market culture		●
Hierarchy culture	●	
Clan culture	●	

Reflecting on table 7.1, it becomes apparent that the different organisational cultures exhibit a distinct risk orientation, which has a profound impact on the level of risk organisations face, as well as the degree to which companies engage in the management of risks along supply chains.

Whilst the influence of an organisation’s culture on its performance generally existed at the outset of this study, this research provides new insights into the relationship between different organisational cultures and the attitudes and approaches of firms towards risk management. These findings were contributed in particular by sections 6.2, 6.4, 6.5 as well as 6.6 of the cross-case analysis.

This represents significant theoretical contributions, as well as implications for practitioners who through this research are provided with an alternative strategy to managing risks in the supply chain. More specifically, the research exposes the risk management potential inherent in different organisational cultures, which can be harnessed to effectuate changes in the approach to risks along the supply chain, as well as the effectiveness of existing tools and techniques by way of providing a vehicle to establish different levels of risk management acceptance naturally.

Reflecting on the findings contributing to this contribution (section 7.1), it may be argued that the results may have been different, had organisations with different cultures, operating in different industry environments been researched. This, however, is unlikely as the research reflects a high level of theoretical saturation. This means that the addition of new cases would not have

contributed new or different findings. Nonetheless, it is suggested to repeat the study focussing specifically on this, as outlined within section 9.6.

7.2 The organisational cultural risk continuum

When synthesising the discovery of the relationship between different culture types and risk management, it transpires that there are different risk orientations inherent in the organisational cultures. This is reflected in figure 7.1, depicting a continuum that positions different culture types in relation to risk avoidance and risk taking.



Figure 7.1 The organisational cultural risk continuum (The above figure is based on the qualitative analysis of case data.)

Elaborating on figure 7.1, this research provides evidence highlighting that whilst a hierarchy culture is geared towards the management of risks and risk mitigation, an adhocracy culture is geared towards risk taking, with clan and market culture representing positions between these on the continuum.

Whilst the above assertions are theoretically highly valid, it needs to be noted that they are based on “pure” cultures. Thus, as an organisation’s culture is representative of a complex amalgamation of cultural traits from different organisational cultures (depicted above, figure 7.1), it is unlikely that any organisation represents a “pure” position on the above continuum (figure 7.1).

Instead, whilst an organisation’s culture will be typified by its most dominant trait, the position of a company on the organisational cultural risk continuum (figure 7.1) is determined by the interplay of the different cultural influences within an organisation. These claims are based on and substantiated by sections 6.4, 6.5 as well as 6.6 of the cross-case analysis.

The above contribution carries significant benefits for practitioners, in that these may use the above continuum to understand their organisational approach to risk management, harnessing this understanding in pursuit to improving it. Moreover, the findings as depicted in figure 7.1 provide a key academic contribution, in that previous research does not classify organisational cultures in the context of risk attitudes along the supply chain in this fashion.

7.3 Risk management characteristics of different organisational cultures

Based on section 7.2, this research further asserts that companies can strategically harness facets of different organisational cultures to naturally effectuate a change in the organisational approach or characteristics towards risk management.

These are reflected in table 7.2 and highlight the most dominant risk management characteristics on the basis of different cultures and cultural facets.

Table 7.2 Risk management characteristics of different organisational cultures

	Risk management characteristics
Adhocracy culture	Risk seeking, sales driven, entrepreneurial, growth focused
Market culture	Risk tolerant, customer focused, sales driven, competition
Hierarchy culture	Risk avoidance, stability, synchronisation, process focused
Clan culture	Risk avoidance, firm protection, loyalty, group thinking

Employing the classifications presented by table 7.2, organisations may harness or import different cultural traits to instil the risk management characteristics this research links to different organisational cultures. This contribution is

rooted specifically in sections 6.3, 6.4 and 6.6 of the cross-case analysis of chapter 6.0.

Reflecting on table 7.2 further, it is advocated that the different cultures as represented above can be used strategically in different market environments. For example, cultures that are more risk seeking or tolerant such as adhocracy or market cultures may be harnessed in highly volatile markets or in markets characterised by high levels of seasonality (textiles, drinks, certain foods). This was reflected particularly in cases A and D. Moreover, the findings show that adhocracy and market cultures are geared less towards risk prevention and more towards risk taking to generate opportunities.

Furthermore, it is argued that risk-seeking cultures can be harnessed strategically to amplify the returns companies make on different ventures, and thus as explained above are most suited to entrepreneurial or growth focussed organisations. This is aligned with the risk thinking of authors such as Khan and Burnes (2007), who interpret risk to include positive connotations, and not be reserved solely to reflect negative consequences as is argued most commonly. In other words, should an organisations ambition to be to grow quickly in a market, this research suggests it would benefit from adopting adhocracy or market type cultural traits.

Whilst previous research outlines that different types of markets reflect different levels of volatility, necessitating varied approaches to dealing with this (Emmett, 2008), previous research has not linked different market environments with different levels of volatility and the need for aligning this with an organisation's culture at the same time.

Risk avoiding cultures such as a clan culture for example, are most suited to stable markets (oil and gas, toiletries etc), whilst hierarchy cultures are suited to a variety of markets, given the drive towards generate stability. Nonetheless, whilst a hierarchy culture appears applicable to the widest range of market environments, it is less opportunistic than adhocracy or market cultures and

therefore less suited to volatile or highly seasonal markets if the strategy revolves around exploiting opportunities. This, as the research shows is as clan and hierarchy cultures are focussed on the mitigation of risks, rather than the generation of opportunities through harnessing risks, like adhocracy or market cultures.

Thus, if it was the intention of an organisation to become less risk taking and to focus more on stability rather than growth, strategically it would need to increasingly reflect cultural traits of a hierarchy or a clan culture.

Furthermore, it has become apparent that whilst the organisational cultures of different organisations impact and the approach to risks as per table 7.2, the different operating environments also impact an organisation's culture. This means that over time, an organisation's culture will be shaped by the environment.

In order to harness the benefits of different cultural traits, however, it is imperative to innately understand the potential impact of changes to the organisational culture in the context of the operating environment, as well as the impact such change may have on the organisation itself.

Nevertheless, the findings from the cross-case analysis clearly show that hierarchy and clan cultures are most suitable to mitigating risks and vulnerabilities along supply chains, whilst adhocracy and market cultures are more opportunistic in nature, lending themselves more to risk taking and managing risks with a view to generating opportunities through risk.

Table 7.2 provides a key contribution to theory, in that the risk management characteristics inherent in different organisational cultures have not previously been identified in this fashion empirically. Moreover, this contribution has significant practical implications as it provides a different perspective on the supply chain risk management efforts of organisations.

7.4 The relationship between organisational cultures, risks in the supply chain and market environments

Combining the contributions from sections 7.1 - 7.3, this research uncovers the relationship between different organisational cultures and the associated risk profile these generate in different market environments (figure 7.2).

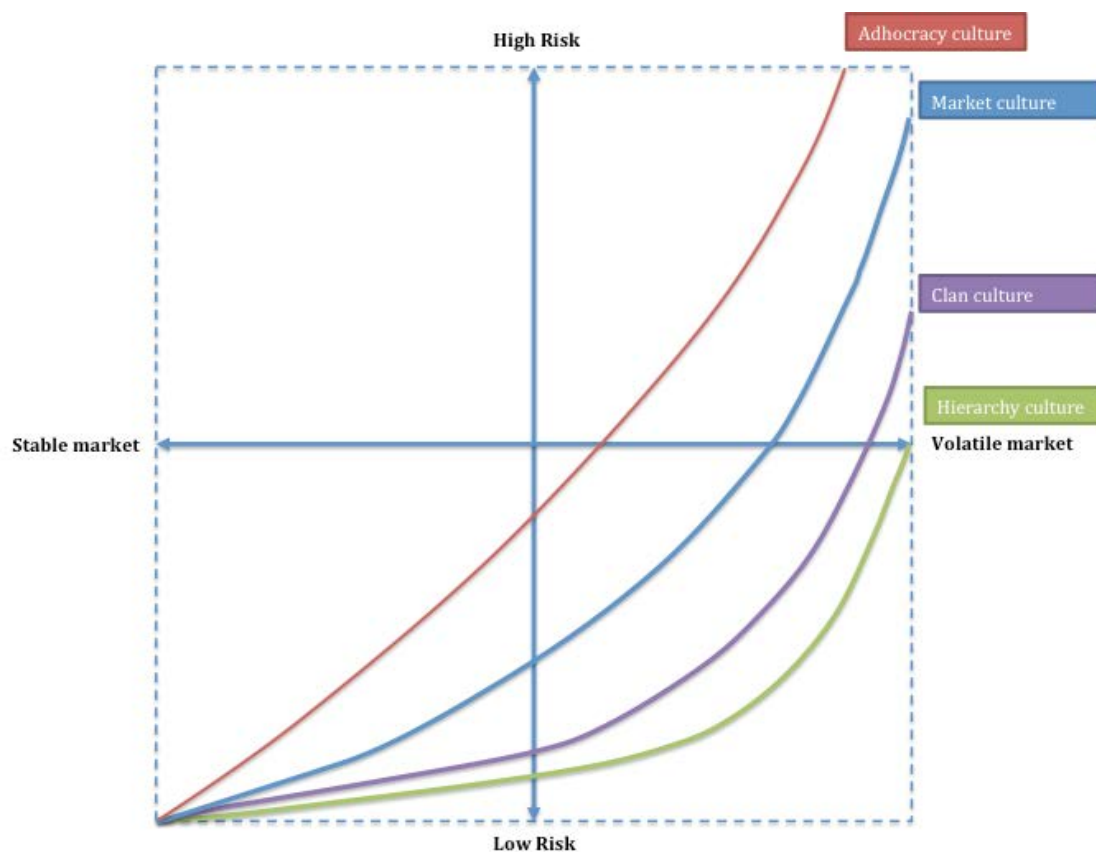


Figure 7.2 The relationship between organisational cultures, risk in the supply chain and market environments (The above figure is based on the qualitative analysis of case data.)

Figure 7.2 depicts the relationship between different cultures, market environments, as well as the level of risk and disruption companies are likely to face given different circumstances.

In fact, using figure 7.2 organisations may estimate the level of risk they face in given markets, based on their organisational cultural mix. The above figure is based on “pure” cultures, which can be used to estimate an organisation’s risk profile based on its organisational cultural composition in different market environments.

Reflecting on figure 7.2, as markets become increasingly volatile, the different organisational cultures dominating organisations amplify the levels of risk these face significantly.

For example, if an organisation were to reflect an adhocracy culture, in a stable market, the level of risk would be low, as the ability to predict the market would be high. Alternatively, in a highly volatile market, the risk profile of a company reflecting an adhocracy culture would be by far the highest (of all cultures) as the unpredictability of the market would lead to a high level of risks and disruptions.

On the other hand, a hierarchy culture would face the lowest levels of risk as the volatility of the market place increases as an organisation characterised by this type of culture constantly redevelops processes to maximise the predictability of the market with a view to minimising disruptions.

This can be explained by section 7.3, which outlines the natural drivers for risk management, or risk avoidance and risk taking of organisations on the basis of their most dominant culture.

More specifically, figure 7.2 outlines that an adhocracy culture reflects the highest level of risk in any market and exponentially so as markets become more volatile. A hierarchy culture, due to its focus on risk mitigation and the generation of stability incurs the least risk levels in any market environment. Slightly more risk is incurred by a clan culture, which reflects slightly higher risks in all market environments than a hierarchy culture. Taking this further, a market culture reflects the second highest levels of risk of all cultures, across all market environments, although still significantly less than an adhocracy culture.

Employing the discovery figure 7.2 depicts, the different levels of risk companies face as well as the approach to risk management these are likely to reflect can be estimated. These findings are contributed by cross examining findings from the individual cases as reflected in sections 6.2, 6.4, 6.5, and 6.6 of the cross-case analysis.

Figure 7.2 presents a further contribution to theory and practice, in that no previous work has uncovered the relationship between different organisational cultures and the associated risk profile these generate in different market environments in detail. Implications of this finding are relevant to both academia as well as practice.

7.5 Strategic framework for optimising the management of risks along the supply chain harnessing organisational culture

Owing to the findings of the research, managers can harness the different organisational traits in pursuit of effectuating a desired change in the approach to and the effectiveness of their organisational risk management along the supply chain.

More specifically, managers can strategically reinforce cultural attributes and traits that are aligned with the strategic direction of the organisation to effectuate or strengthen a behavioural change internally within the organisation, which will naturally radiate across the supply chain. This may be reflected in the approach organisations take in monitoring risks, the ways in which they work with different customer segments or tiers of suppliers for example. It needs to be noted, however, that depending on the environmental specificity and the levels of risk in the supply chain, not every organisation of a similar culture applies the same reach of mitigation actions across the supply chain. This is as the absence or presence of disruptions plays a key role in determining the intensity and reach of risk mitigation actions.

To enable this, the research has developed a strategic framework providing guidelines for practitioners to follow when harnessing organisational cultural traits to optimise the management of risks along the supply chain (figure 7.3).

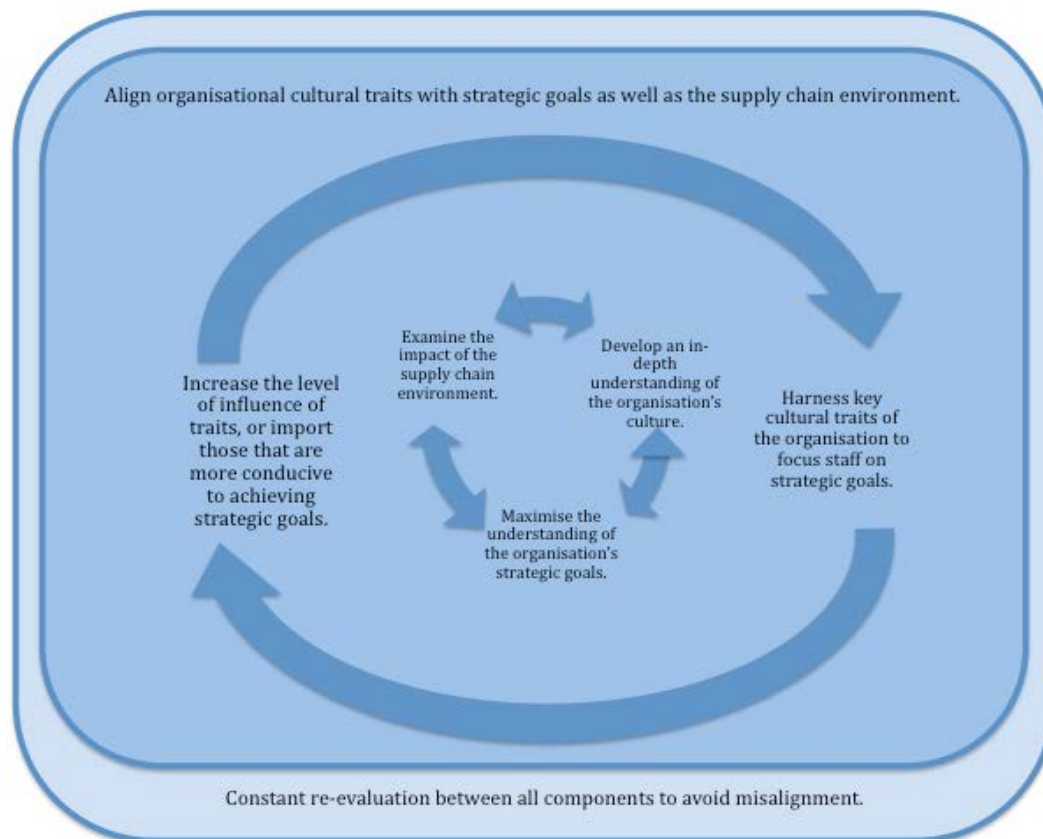


Figure 7.3 Strategic framework to optimise the management of risks along the supply chain, harnessing organisational culture

Elaborating on figure 7.3, the key guidelines for optimising the management of risks along the supply chain by way of harnessing an organisation's culture revolve around:

1. Developing an in-depth understanding of the organisation's culture.
2. Maximising the understanding of the strategic organisational goals.
3. Examining the supply chain environment and the impact this has on the business.
4. Recognising the goals of the organisation and harnessing traits inherent in the organisational culture by aligning these with the environmental specificities of the supply chain environment.
5. Harnessing the organisational culture to naturally focus staff on the organisational goals, using the key traits inherent in the organisational culture that are aligned with the strategic goals of the organisation.
6. Constantly re-evaluating the interplay between all components to avoid a misalignment between these.

Based on analysing the impact of an organisation's culture on its approach to risk in the supply chain in detail, it is also necessary to outline how an innate understanding of an organisation about its culture has impacts beyond an organisation's boundaries. With respect to this, the cross-case analysis has shown that whilst an organisation's culture has a distinct impact on the decisions it makes on any scale, the culture significantly influences its partners along the supply chain.

More specifically the research has shown that an organisation's culture impacts the risk management between different supply chain tiers. This may be in the form of the choice of partners or the levels of information exchange, collaborative incident recovery, the levels of contractual agreements or risk mitigation for example. Thus an organisation's culture not only impacts the approach a single organisation has towards risk but influences the relationship it has with other organisations and also drives the management of risks along the supply chain.

The framework presented in section 7.5 provides a unique contribution, outlining how practitioners can strategically harness an organisation's culture as a vehicle to effectuate a desired change in the effectiveness of the approach to managing risks in the supply chain. Whilst this contribution will have important implications for future research in this area, the greatest benefit of this contribution is of a practical nature.

Due to the nature of the proposed framework and its purpose, the implementation of the framework needs to be driven from the top-down. This is important as the framework is designed as a strategic tool to optimising risk management, which is typically driven in a hierarchical fashion.

Nonetheless, for the model to maximise its potential, it is vital for all levels of an organisation to be involved in the continuous application of it. Thus it is proposed that workshops, seminars as well as desktop exercises are being

undertaken in an inclusive fashion, for members of staff to understand not only the framework but also their own impact on the success of the organisation in managing risks.

Whilst this process should be driven from the top down, responsibilities of training, running workshops and so forth should cascade downwards within the organisation, ensuring the involvement of as many staff as possible, reflecting a bottom-up approach at the same time. Nonetheless, this approach needs to be aligned with the organisational culture of an organisation anticipating employing this framework.

Depending on the organisational setup, it is suggested to establish a risk management project office (one person) that feeds directly into the steering committee of the organisation. Below this should be risk management owners (typically department directors), who have the management of risks written into their job description. These should not be running the initiatives but be responsible for initiative execution and performance. Below this should be risk leaders, which are directly responsible for the implementation and execution of different risk activities.

The development of the strategic framework along with the set of guidelines for managers to optimise the management of risks along the supply chain is anchored in particular in section 6.6 of the cross-case analysis.

7.6 Theory development summary

Following the detailed development of novel empirical contributions, chapter 8.0 responds to the individual research questions introduced in section 2.9, identifying and elucidating how findings from this research relate to existing literature and thus contribute to theory development.

8.0 Discussion and response to research questions

Following the detailed and critical analysis of all cases individually, as well as collectively, this chapter responds to the research questions (section 2.9) and focuses on the generation of theory based on the findings from chapters 5.0 and 6.0. This is in line with stage four of the strategic approach to analysing case studies (figure 3.10, p. 90) as outlined in section 3.5.3.

Reengaging with literature reviewed in chapter 2.0, the research questions are responded to in the following order:

Research question 1:

What is the relationship between organisational culture and supply chain risk management? – section 7.1

Research question 2:

How do different organisational cultures influence the approach to supply chain risk management? - section 7.2

Research question 3:

How do different supply chain environments (risks / disruptions) influence organisational culture? - section 7.3

Research question 4:

How can different organisational culture be employed to support supply chain risk management? - section 7.4

It is important to remember at this stage, that the research is based on a purposively selected sample of case companies. As a result, theories that emerge

from this empirical study are highly applicable to contexts similar to those researched, even though their accuracy in vastly different contexts may be lower (Saunders et al., 2007; Bryman & Bell, 2007; Yin, 2013).

8.1 What is the relationship between organisational culture and supply chain risk management?

Reflecting on all different analyses carried out as part of this research, it transpires that there is a very close relationship between organisational culture and the supply chain risk management companies undertake.

In fact, the research has exposed that each case company reflects a different organisational culture, which is mirrored not only in the different companies' general behaviour, but particularly in the different approaches these take to manage risks along the supply chain.

In fact, as Hellriegel et al., (1998) and before them Smit and Cronje (1992), argue that organisational culture resembles "the components of routine behaviour, norms, values, philosophy, roles of the game and feelings." Thus, the behaviour of an organisation generally, is reflective of its culture, as maintained by Lundy and Cowling (1996), describing culture as "the way we do things around here".

Advancing on the assertions of the above authors, this research clearly identifies that different organisational cultures and the traits within these, naturally lead companies to adopt and develop different ways of managing risks in the supply chain. Moreover, unlike previous research, it was also identified that different organisational cultures result in different levels of involvement with risk in the first place. This is reflected in the approach Case B has taken (predominant hierarchy culture, high risk involvement and mitigation), as oppose to case companies exhibiting traits from either market or adhocracy cultures.

Furthermore, this study empirically uncovers that different organisational cultures generate different levels of stimuli to engage with risks and manage risks along supply chains, which are inherent in cultural facets making up

organisational cultures. This can be observed in the risk attitudes reflected by the different cases. For example, Case B (hierarchy culture) reflected the highest level of risk engagement, followed by Case C (clan culture) which monitors and manages risks to a lesser extent, followed by Case A (market culture) and Case D (adhocracy culture), both of which manage risks to a lesser extent than cases B and C.

Although this discovery is partially consistent with assertions by Furnham and Gunter (1993), who outline the importance of an organisation's culture in establishing environments conducive to achieving desired levels of performance, the findings of this research are far more detailed and differ contextually. This will be discussed in further detail in section 8.2.

Taking this further, whilst this study clearly identifies the impact organisational cultures have on the approach to managing risks in the supply chain, this research further highlights how the effectiveness of risk management can impact on an organisation's culture.

In fact, the findings clearly uncover how different experiences and performances of managing risks in the supply chain impact on an organisation's culture and attitude towards managing these. This will be discussed in further detail in section 8.3.

Furthermore, data from all cases also empirically proved that a change in either the organisational culture of a company or its approach to managing risks in the supply chain have an impact on the other. This is explained in that a different approach to managing risks will lead to alternative risk and disruption experiences along the supply chain impacting an organisation's culture, whilst a change in an organisation's culture will alter the risk profile of a company. This is reflected particularly in Case A, which as a result of disruptions along the supply chain (based on its cultural orientation) has undergone a change in its organisational culture. As a result, the company has begun to manage risks more

closely, transforming the risk profile of the organisation, leading to a different risk profile altogether.

Discovering and proving the impact an organisation's culture has on the management of risks in the supply chain and vice versa, this research also clearly exposes that companies can strategically harness different cultural traits to effectuate particular approaches to, or changes in the way risks are dealt with along the supply chain. This is reflected by data from Case B, which strategically harnesses cultural traits in customer teams to maximise value, as well as Case A, which has changed its risk profile on the basis of cultural change.

This finding is partially consistent with research by Furnham and Gunter (1993), who advocate that an organisation's culture is a key building block for achieving desired levels of performance. Moreover the findings are partially comparable with earlier research by Hofstede and Bond (1988) who have identified a link between national cultures and economic growth.

Nonetheless, whilst this research somewhat cements the findings of Furnham and Gunter (1993) and Hostede and Bond (1988), this research provides a perspective on the impact an organisation's culture can have on an organisation's approach to risk management, which has previously not been proved empirically.

In fact, the data outlines the necessity for companies to inherently understand and manage their organisational culture, with a view to adapting their behaviour to different and changing operational environments. This is reflected in the success of Case B in terms of managing risks along the supply chain and consistent with assertions by Barney (1986).

Although Barney (1986) does advocate the benefits of cultural adaptation to environmental specificities, this research advances on Barney's (1986) findings, by elucidating the benefits of cultural adaptation in a much more specific context.

Moreover, whilst literature by Sheffi (2005), Christopher and Holweg (2011), as well as Taleb et al., (2009), outlines the importance of organisational culture in the management of supply chains on a general level, this research provides an alternative and more detailed empirical perspective on culture and the cultural combinations necessary, to enable companies to operate in a more resilient way in modern operating environments.

Moreover, this research advances on the identification that there is a strong positive correlation between a supportive culture and the level of creativity and innovation in organisations (Martins & Terblanche, 2003), by exposing the detailed nature of the impact of organisational culture on risk management in the supply chain.

Key points:

- Organisational culture and supply chain risk management are inextricably linked.
- Organisational culture provides the basis for decision making when dealing with risks along the supply chain.
- Different cultures result in different approaches to risk management.
- A change in an organisation's culture effectuates a change in the approach to supply chain risk management.

8.2 How do different organisational cultures influence the approach to supply chain risk management?

This research clearly identifies that organisational cultures directly influence the approach to risk management, companies reflect. In fact, this research exposes how different organisational cultures lead to differentiated approaches to managing risks along the supply chain. Evidence for this resides in that each case company (heterogeneous sample based on the organisations' cultures) reflected a different approach to managing risks.

The research confirms that an organisation's culture acts as an organisation's "DNA", which forms the basis for behaviours (Sheffi, 2005), and contributes significant evidence exhibiting that an organisation's culture determines the approaches of companies in managing risks along the supply chain. This was observed in all cases.

More specifically, as the organisational cultures of the different case companies provide guidance for the day-to-day decision making processes for the members of an organisation (Andriopoulos, 2001), data from the different case studies clearly exposes how different organisational cultures lead to alternative decisions in terms of managing supply chain risks.

For example, whilst Case B (predominant hierarchy culture) constantly monitors and proactively manages risks, Case D (predominant adhocracy culture) engages in the management of risks to a much lower extent. Moreover, the research also highlighted the different motivations for managing risks, which in Case C (clan culture) revolve around brand protection, whilst in Case A the focus revolves around limiting the loss of profit opportunities.

In fact, the findings clearly uncover that as each case company reflects a heterogeneous culture approach, the companies' approach to managing risks along the supply chain are also significantly different. With respect to this, it needs to be noted, that no organisational culture of the sample was a "pure" culture, yet was representative of a unique amalgamation of traits from different culture types.

More specifically, whilst the research identifies four basic types of organisational culture in line with the work of several authors such as Quinn and Rohrbaugh (1983), Quinn and Spreitzer (1991), Cameron and Freeman (1991), as well as Deshpandé et al., (1993), data from all cases identifies that no company has a "pure" culture.

Based on the findings, this research clearly identifies that the most conducive culture to managing risks in the supply chain is a hierarchy culture. This is as the case company reflecting a hierarchy culture (Case B) exhibited the most advanced approach in terms of risk management, considering a wide range of factors. This is consistent with the strategic emphases innate in the hierarchy culture (stability, predictability, smooth operations), which are in stark contrast to risk acceptance (adhocracy culture, Case D).

The findings further uncover that organisations reflecting a hierarchy culture will naturally seek to develop modalities, which reduce instability, unpredictability, disruptions to operations and so forth.

Findings further uncover that the second most conducive organisational culture to managing risks is a clan culture (Case C). In fact, Case C focuses heavily on its own protection, harnessing the cohesiveness of staff, as well as other cultural facets such as loyalty and a sense of belonging.

The third most effective organisational culture towards managing risks in the supply chain was found to be the market culture (Case A). Whilst this culture partly aims to limit risks, it radiates more risk tolerance than the hierarchy (Case B) or the clan culture (Case C). Moreover, this type of culture primarily seeks competitiveness, competitive advantage and so forth, which are linked to a higher affinity towards taking risks to achieve strategic emphasis inherent in this culture.

The least advantageous culture in terms of managing risks in the supply chain was identified to be the adhocracy culture (Case D). In fact, the research exposes that organisations reflecting traits from this culture embrace risks, significantly limiting the efforts to manage risks along the supply chain.

On a theoretical level, these findings are related to assertions by Furnham and Gunter (1993), who outline the importance of an organisation's culture in establishing environments that enable desired levels of performance or

behaviours. Nonetheless, this research contributes a new and unique perspective on how different organisational cultures influence the approach of companies to manage supply chain risks in detail.

In fact, the research uncovers that whilst some cultures amplify the efforts taken to manage risks, others significantly limit the management of risks along supply chains. This is reflected in the risk averse approaches of Cases B and C and the risk taking approaches of Cases A and D.

Moreover, the research also exposed that as the organisational cultures represented in the sample are reflective of an amalgamation of facets from different cultural types, the level of influence or dominance of these traits was deterministic of the level and approach of companies to risk management along the supply chain.

Key points:

- Organisational cultures directly impact the approach to risk management.
- Some organisational cultural traits effectuate a higher affinity towards managing risks than others.
- The highest level of risk management engagement was identified in relation to traits from a hierarchy culture, followed by clan, market and adhocracy cultures.
- Organisational cultures are not purely one culture but are reflective of a blend of cultural traits from different cultural types.

8.3 How do different supply chain environments (risks/disruptions) influence organisational culture?

Based on the evidence, the data clearly demonstrates that a company's supply chain environment has a direct impact on its organisational culture. In fact, all cases provide evidence exhibiting that an organisation's culture is a product of its response to the supply chain environment, even though some companies

manage to align their organisational cultures more effectively with the environment than others.

This is exhibited particularly by Cases A, C and D, which have experienced supply chain disruptions based on their cultural orientation, leading these companies to realign their organisational cultures in pursuit of reducing risks and disruptions along the supply chain. Case B on the other hand identified that the close alignment of its cultural orientation with the operating environment generates a commercial opportunity by way of offering supply chain orchestration and risk management services.

Reflecting on all analyses, the research uncovers that a supply chain's environment, coupled with the approach by companies to manage risks within these result in the risk and disruption experiences a company faces. The research further exposes that this relationship has a significant impact on an organisations' learning, based on which a company's culture is either reinforced as in Case B or revised as in Case A, for example.

These findings are partially consistent with research by Barney (1986), who advocates that organisations need to learn to develop skills to manage their organisational culture in response to the rapidly changing markets and volatile operating environments.

Whilst the research is comparable to a certain degree, this study provides more specific and detailed insights into how different supply chain environments impact an organisation's cultural orientation, providing specific examples rather than holistic assertions.

The research also uncovers evidence proving that companies continuously evolve their organisational cultures, in pursuit of mitigating adverse impacts originating from their supply chain environments. Evidence for this exists in data form all cases.

This finding is supportive of research by Barringer and Harrison (2000), who highlight the importance of cultural alignment along supply chains to amplify performance of the supply chain as a whole. Nonetheless, this research contributes a more specific and contextualised perspective than the research by Barringer and Harrison (2000).

Moreover, this research does not concur with assertions by Mello and Stank (2005) who advocate that performance can in some instances be high even if little synchronisation of cultural values exists amongst partners. In contrast to the research by Mello and Stank (2005), this research clearly highlights the direct linkages between different levels of risk management and disruption experiences along the supply chain, highlighting the necessity to align an organisation's culture with its operating environment.

It needs to be noted, however, that whilst this study allows such claim, this research project, unlike the research by Mello and Stank (2005) does not focus directly on the synchronisation of organisational cultures between partners, but on the relationship between organisational culture and supply chain risk management specifically.

Furthermore, this research also clearly uncovers that as an organisation's culture is linked to its supply chain-operating environment, some organisational cultures (based on their operating environment) are more inclined to develop ways to manage risks than others, as seen in Case B.

Thus, this research provides a novel perspective demonstrating that given different operating environments, some organisations may generate a competitive advantage based on their organisational culture and the risk management approach inherent in this.

Although this assertion is comparable with research by Barney, (1986), Cameron and Quinn (2005), as well as Martins and Terblanche (2003) who advocate that an organisation's culture can form a basis for a competitive advantage the

assertions of the aforementioned authors are more generic. This research on the other hand specifically identifies a competitive advantage on the basis of an organisation's culture in the context of supply chain risk management.

Reflecting on the behaviour of the different case companies, this research clearly uncovers that all cases adapt their organisational cultures in pursuit of mitigating adverse effects emanating from their supply chain environment. By way of this, this research supports assertions by Kaplan and Mikes (2012) who enunciate that many risks and certainly operational risks are best managed by guiding people's behaviours.

In line with this, research by Sheffi (2005), outlining that the DNA of an organisation is a key building block of generating organisational resilience is also supported. However, in difference to research by Sheffi (2005) and Kaplan and Mikes (2012), this research project is less generic and thus contributes a detailed empirical insight into the relationship between the environment of a supply chain and its influence on the culture of an organisation.

Key points:

- There is a close link between the supply chain environment and the organisational culture of an organisation.
- The supply chain environment or a company, in part, determines the culture of an organisation.
- Some organisational cultures present a better fit with certain supply chain environments than others.
- Experiences in the supply chain, supply chain risk management and organisational culture are inextricably linked.

8.4 How can different organisational cultures be employed to support supply chain risk management?

This research provides novel empirical evidence that different organisational cultural traits can be harnessed to support and optimise the management of risks along the supply chain.

Given the identification of inextricable linkages between different cultural traits and the resultant approaches of organisations to manage risks in the supply chain (section 8.1), this research identifies that different organisational cultures designate the approach companies take to manage risks. Moreover, evidence denotes that a change in an organisation's culture leads to alterations in the approaches companies take to manage risks along their supply chains.

Evidence for this resides in data from Case A for example, which exhibited a significant change in its approach to risk management following changes to its organisational culture.

Based on this discovery, this research identifies and asserts that traits from hierarchical (Case B), as well as clan cultures (Case C) are conducive towards managing risks by aiming to generate stability, predictability (hierarchy culture), accountability, and protection (clan culture), whilst cultural traits such as sales growth, innovation (adhocracy culture, Case D) or competition, goal achievement (market culture, Case A), can limit the motivation to manage risks in the supply chain.

Moreover, this research uncovers that traits from a hierarchy (Case B) or a clan culture (Case C) lead to a higher affinity towards managing risks than those of market (Case A) or adhocracy cultures (Case D) do. Nevertheless, as the culture of an organisation is a complex construct generated by the interplay of cultural traits from different cultures, an organisation's approach towards managing risks is dependant upon the dominance of different traits making up a company's culture.

Given this revelation, this research advocates that organisations can harness specific traits of their organisational cultures or strategically import organisational cultural traits in order to effectuate a desired change in the approach to manage risks in the supply chain.

Evaluating the research findings holistically, this research provides evidence asserting that companies can support their approach to managing risks and optimise the effectiveness of this in the supply chain, by harnessing cultural traits which are conducive to the achievement of organisational goals.

However, given the inextricable linkages between an organisation's culture, its approach to risk management and its operating environment, organisations need to build an innate and detailed understanding of the interplay between these factors, considering the impact of changes to these in depth.

Owing to this finding, research by Barney (1986) is supported on a holistic scale, in that the data clearly denotes the necessity of companies to align their organisational culture, to complement or adapt to their operating environment. Nevertheless, this research focuses specifically on the adaptation of an organisation's culture in the context of supply chain risk management with a view to effectuating a change in the organisational approach to managing risks.

Moreover, whilst sources such as Sheffi (2005), Christopher and Holweg (2011), as well as Taleb et al., (2009), advocate that cultural change is necessary to enable more effective supply chain risk management, the findings of this research and their research are not related as these authors take a much broader view on organisational and supply chain cultures. Moreover, unlike the research by Sheffi (2005), Christopher and Holweg (2011), as well as Taleb et al., (2009), this research focuses specifically on the relationship between organisational culture and supply chain risk management.

This research also clearly uncovers that to enable an effective utilisation of cultural traits to support the management of risks in the supply chain, companies

must inherently comprehend the impact of certain traits reflected in their organisational cultures and harness those, conducive to managing risks, in order to pursue organisational goals.

This assertion is consistent with research by Fawcett et al., (2008) as well as Shub and Stonebarker (2009), who enunciate that an innate understanding of an organisation's culture is key in harnessing it as a benefit towards performance. Nevertheless, unlike the research by Fawcett et al., (2008) and Shub and Stonebarker (2009), this research exposes the importance of generating an innate understanding of the organisational culture in a context, which is more specific than the one the above authors refer to.

Of course, despite the beneficial potential of organisational culture to enable and amplify the effectiveness of risk management along the supply chain this research uncovers, the use of organisational culture is not a panacea to mitigate risks. However, it is a key component to reliably and repeatedly mitigate disruptions by synchronising the approach of staff towards managing risks in the supply chain, in a way that is in the meaning of the organisation.

This is reflected in particular by Case C, which harnesses its organisational cultural traits (cohesion, collective approach) to effectuate staff behaviour that is aligned with organisational goals, consistently and reliably mitigating risks and disruptions, protecting the brand from adverse impacts. This behaviour has also been identified in Case B, although this company motivates staff behaviour based on rules and regulations rather than personal involvement and identification with the company as in Case C.

Reflecting on the assertions within section 7.4, this research outlines that for supply chains to excel at risk management, a culture that promotes the management of risk is necessitated. This is comparable to the perspectives by Sheffi (2005) as well as Christopher and Holweg (2011), who advocate that current supply chain management cultures need to be re-evaluated to enable more effective supply chain risk management generally. Despite the connection

between the assertions, this research focuses specifically on different organisational cultures and the approaches towards risk management these effectuate.

Key points:

- Different organisational cultures result in different approaches to managing risks in the supply chain.
- Organisations must develop an innate understanding of the impact of different cultural traits and align these with organisational goals and the supply chain environment.
- Whilst an organisation's culture is a key determinant for the effectiveness of its risk management, it is not a panacea for mitigating risks ubiquitously.
- The cultural traits that can be used to support the maximisation of the efficiency of managing risks in the supply chain are different for different companies.

8.6 Discussion and theory development summary

Based on the findings from the individual case analyses and the cross-case analysis, chapter 8.0 provided a detailed response to the individual research questions in the context of existing literature. Whilst highlighting knowledge contributions on a question-by-question basis it is also inextricably linked to the development of further theoretical and practical contributions in chapter 7.0.

The following chapter will conclude the research project, highlight key contributions, reflect on the research objectives, discuss the limitations of the research and outline directions for future research in the field.

9.0 Conclusions

Having provided detailed responses to the individual research questions in the context of existing literature along with the development of further contributions in chapter 7.0, chapter 9.0 concludes this empirical study. The chapter summarises the key contributions of the research, reflects on its aims and objectives, discusses the limitations of the study, as well as it proposes future directions for research.

9.1 General contributions

Having researched four heterogeneous representative case studies in depth, it can clearly be demonstrated that:

- The relationship between organisational culture and supply chain risk management is inextricably linked.

The research clearly exposes a direct link between organisational cultures and the approaches organisations take to manage risks in the supply chain. Moreover, the study has revealed that the risk management experiences as a result of the approach to managing risks in the supply chain have a significant impact on an organisation's culture. This two-way relationship was clearly reflected by all cases.

- Hierarchy and clan cultures lend themselves more to managing risks in the supply chain than adhocracy or market cultures.

The findings of the study clearly exhibit that some cultures are more conducive to managing risks in the supply chain than others. For example, the dominant cultures reflected by cases B (hierarchy culture, geared towards stability, predictability, etc.) and C (clan culture, geared towards protection of the brand, family approach, etc.) clearly reflected a higher drive towards risk management than cases A (market culture, geared towards competition, market superiority,

etc.) and D (adhocracy culture, geared towards entrepreneurship, innovation, etc.).

- Supply chain environments shape organisational culture, impacting on the management of risks in the supply chain.

The research demonstrates how risk and disruption experiences along a supply chain have a significant impact on the organisational cultural composition of a company. In fact, disruption experiences along the supply chains of cases A, C and D, have resulted in an organisational cultural shift of these organisations, in pursuit of reducing supply chain risks going forward. Moreover, Case B has recognised its ability to manage risks and disruptions along the supply chain on the basis of its culture and commercialised risk management services inherent in this.

- Organisational cultural traits can be harnessed to effectuate a change in the approach to and effectiveness of managing risks in supply chains.

Given the direct link between different organisational cultures and the approach towards managing risks in the supply chain, the research clearly exposes the ability to manage risks along the supply chain by way of harnessing cultural traits. In fact, it transpires that organisation's can strategically harness different cultural traits to effectuate a desired change in its approach to managing risks along the supply chain. Whilst this finding is reflected in all cases, Case B in particular strategically manages cultural traits to effectuate desired changes in the organisation's approach towards managing risks. In Case B, this is reflected even in the customer facing teams of the company, which are culturally tailored towards its customers.

9.2 Contributions to theory

The findings of the research have clearly uncovered the pivotal role organisational culture plays in the management of risks in the supply chain.

Moreover, the analysis has also exposed that the suitability of organisational cultures to different supply chain environments varies greatly, as a result of which organisational cultures are constantly evolving. Based on this, the research clearly sets forth, that the strategic use and management of organisational cultures, can favourably support the management of risks along the supply chain.

Furthermore, this empirical study outlines that an organisation's culture is a key determinant for the approach organisations take in managing risks along the supply chain, and thus is reflective also, of the efficiency to which risks are mitigated.

This research provides novel empirical insights into the exact relationship between different organisational cultures and the management of risks along the supply chain. Moreover, the findings of the research not only identify the necessity for organisations to adapt their organisational culture to their operating environment in pursuit of sustainable performance, but it also provides details of how different companies have done so.

Reflecting on the analyses sections, the research clearly enables the following novel theoretical assertions:

- Organisational cultures can be harnessed to maximise supply chain risk management performance.
- Some organisational cultural traits increase risks, whilst others minimise risks in the supply chain by way of their impact on risk management.
- Companies reflecting dominant traits from hierarchical or clan cultures are more likely to mitigate risks, whilst companies representing adhocracy or market cultures are more likely to increase risks.
- An organisation's cultural orientation determines the choice, the use and the effectiveness of risk management actions, tools and techniques.
- The culture of an organisation can be used strategically to manage risks in the supply chain.

9.3 Contributions to practice

Based on the different theoretical assertions, it has been possible to develop a strategic framework, as well as a set of guidelines for practitioners to effectuate a change in the effectiveness of risk management along the supply chain.

More specifically, the research provides an alternative perspective on how to sustainably establish effective risk management practices along the supply chain. In fact the study clearly exposes how practitioners can harness traits from different organisational cultures to strategically influence the management of risks in the supply chain.

Using the approach proposed by this research, practitioners are able to generate more natural and intuitive ways of managing risks, having significant implications for the efficient and optimal management of supply chain risk going forward. Moreover, understanding the cultural and behavioural implications an organisation's culture plays a key role in enabling the effective management of risks along supply chains.

Based on the above findings, it is advocated that in pursuit of maximising the effectiveness of an organisation's approach to managing supply chain risks, practitioners must:

1. Understand the organisation's culture in detail.

It is vital to understand an organisation's culture in-depth to develop a basis for strategically harnessing cultural traits to optimise risk management in line with organisational ambitions.

2. Comprehend the strategic organisational goals.

Following the development of a detailed understanding of an organisation's culture, practitioners need to examine its strategic goals to be able to link

different cultural traits to strategic goals. This is necessary to evaluate the influence different traits need to have as part of the overall culture, determining organisational behaviour.

3. Evaluate the supply chain environment and the impact this has on the business.

Next, practitioners need to identify the impact the supply chain environment has on the organisation. This is important in that the application of different cultural traits needs to be aligned with a supply chain's environment. For example, a predominant adhocracy culture in a volatile market would reflect high levels of risks leading to high levels of disruptions. Whilst this may be an organisational strategy, the links between the different factors need to be considered in detail.

4. Consider the goals of the organisation and harness traits inherent in the organisational culture by aligning these with the environmental specificities of the supply chain environment.

Based on an in-depth understanding of the complex interplay between all factors, practitioners must then strategically harness those cultural traits enabling the pursuit of organisational goals, effectuating the desired risk management behaviour along the supply chain.

For example, hierarchy traits are most conducive to managing risks, whilst adhocracy traits are least suited to risk management although most conducive toward innovations. On the other hand, traits from a clan culture are focussed on the collective protection of an organisation limiting risks, whilst traits from a market culture will encompass a close focus on the customer, accepting higher levels of risks.

Thus, practitioners need to strategically balance and align the different cultural traits to enable and encourage natural staff behaviour towards organisational goals.

5. Utilise the organisational culture to naturally focus staff on the organisational goals, using the key traits inherent in the organisational culture that are aligned with the strategic goals of the organisation.

Understanding the different cultural traits within an organisation's culture including the implications of these on the behaviour of staff, practitioners can focus staff on the management of risks to the desired levels by promoting the necessary cultural facets. It is important that the promoted cultural traits are aligned with strategic organisational goals to ensure that the desired behaviour from staff is comprehensible and natural for staff.

6. Regularly re-evaluate the interplay between all components to avoid a misalignment between these.

Following the development of the optimal organisational culture to manage risks in the supply chain (this will be different for all organisations), it is important for practitioners to constantly re-evaluate the alignment of all factors. Practitioners need to ensure the organisational culture is managed in synchronisation with changes in the operational environment of a company, to continuously benefit from harnessing an organisation's culture in pursuit of optimising risk management along the supply chain.

Applying the developed strategic framework as depicted in figure 7.3 along with the set of guidelines described above, practitioners can naturally and sustainably optimise the risk management approach of their organisation. Therewith, the utilisation of an organisation's culture provides a novel and differentiated perspective for practitioners to manage risks along the supply chain, promising to complement existing methods, whilst amplifying the success and longevity of these significantly.

9.4 Reflecting on the research objectives

Reflecting on the contributions of the research, it is evident that the objectives of the study have been fulfilled as demonstrated below:

Objective 1: To provide an overview of the relationship between organisational culture and supply chain risk management.

The research provides a detailed overview of the relationship between the concept of organisational culture and supply chain risk management in different contexts.

Moreover, the research examines the relationship between the two concepts and identifies how different organisational cultural traits determine the organisational approach to risk management.

Objective 2: To develop a strategic framework and a set of guidelines that aid business to understand how organisational culture can be employed to make desired levels of supply chain risk management more natural in companies.

Based on an in-depth understanding of the relationship between organisational culture, supply chain risk management, as well as the impact of the supply chain environment, a detailed strategic framework and a set of guidelines has been created for practitioners.

This set of guidelines can be used to assist practitioners in effectuating a desired change in the organisational approach to manage risks along the supply chain. This is achieved by making supply chain risk management more or less inherent in the natural behaviour of staff, influencing the application of supply chain risk management strategies, tools and techniques.

Objective 3: To enable a different perspective on supply chain risk management strategies of the future.

The research provides a novel perspective on the management of risks along the supply chain, as it focuses on harnessing traits and capabilities that are innate in any organisation.

Using organisational culture traits to manage risks in the supply chain was previously not considered as a modality to manage risk and thus this research presents a novel strategy to doing so. Based on the data, whilst organisational culture has previously not been harnessed as a modality to managing risks along supply chains, it promises significant opportunities in the field of supply chain risk management.

This is as an organisation's cultural traits have a substantial impact on the behaviour of an organisation and thus a significant impact on the choice, application, effectiveness and longevity of different approaches to managing risks in the supply chain.

9.5 Limitations of the research

Whilst the research makes significant contributions to the academic, as well as the practitioner spheres, the limitations of the research also need to be considered.

As a systematic and structured approach was employed to identifying and reviewing material, there is only a limited risk of having ignored relevant material. However, as the research has been designed to explore an under explored field between three highly studied areas (scope of the research, figure 2.10, p.60), it was not possible to review all available material pertaining to the three fields.

A further limitation of the research is reflected in the size of the sample. Whilst the sample size is justified by the balance between the amount of data required

to develop the necessary understanding, as well as factors such as theoretical saturation, the physical amount of data that can be reviewed, methodological literature by Meredith (1998) and Eisenhardt (1989), and so forth, the ability to generalise findings is limited.

More specifically, whilst the findings suffice for the developed of theoretical assertions in the contexts of the different cases, the findings may not be universally applicable.

A further possible limitation of the research revolves around the selection of the interview candidates. These were selected in collaboration with a contact person at the company and as a result of their knowledge pertaining to aspects of the areas being researched. As interviewees were not selected randomly, it is possible that the data reflects some bias of responses. However, as theoretical saturation was achieved between interviews, this potential limitation to the study is regarded as low.

9.6 Directions for future research

Given the novel findings, as well as the theoretical and practical implications of this study, it is advocated that the research should be repeated, focussing on a wider sample to validate findings in different contexts, using randomly selected candidates. By way of this, it is expected that the generalisability of the findings will significantly increase.

In addition to the above recommendations, research should also expand into additional industry sectors. Although it is unlikely, different perspectives on the relationship between the two concepts could arise from researching different industries.

Based on the above assertions, it is advocated that the following areas should be addressed going forward:

- To expand this research across different industries using randomly selected case companies and interview candidates.
- To employ a different research approach to this study to provide a different perspective to researching the relationship between the concepts of organisational culture and supply chain risk management.
- To investigate the extent to which different cultural traits need to be present to effectuate a change in supply chain risk management behaviour.
- To explore how flexibly different organisational cultural traits can be used to manage supply chain risk management.

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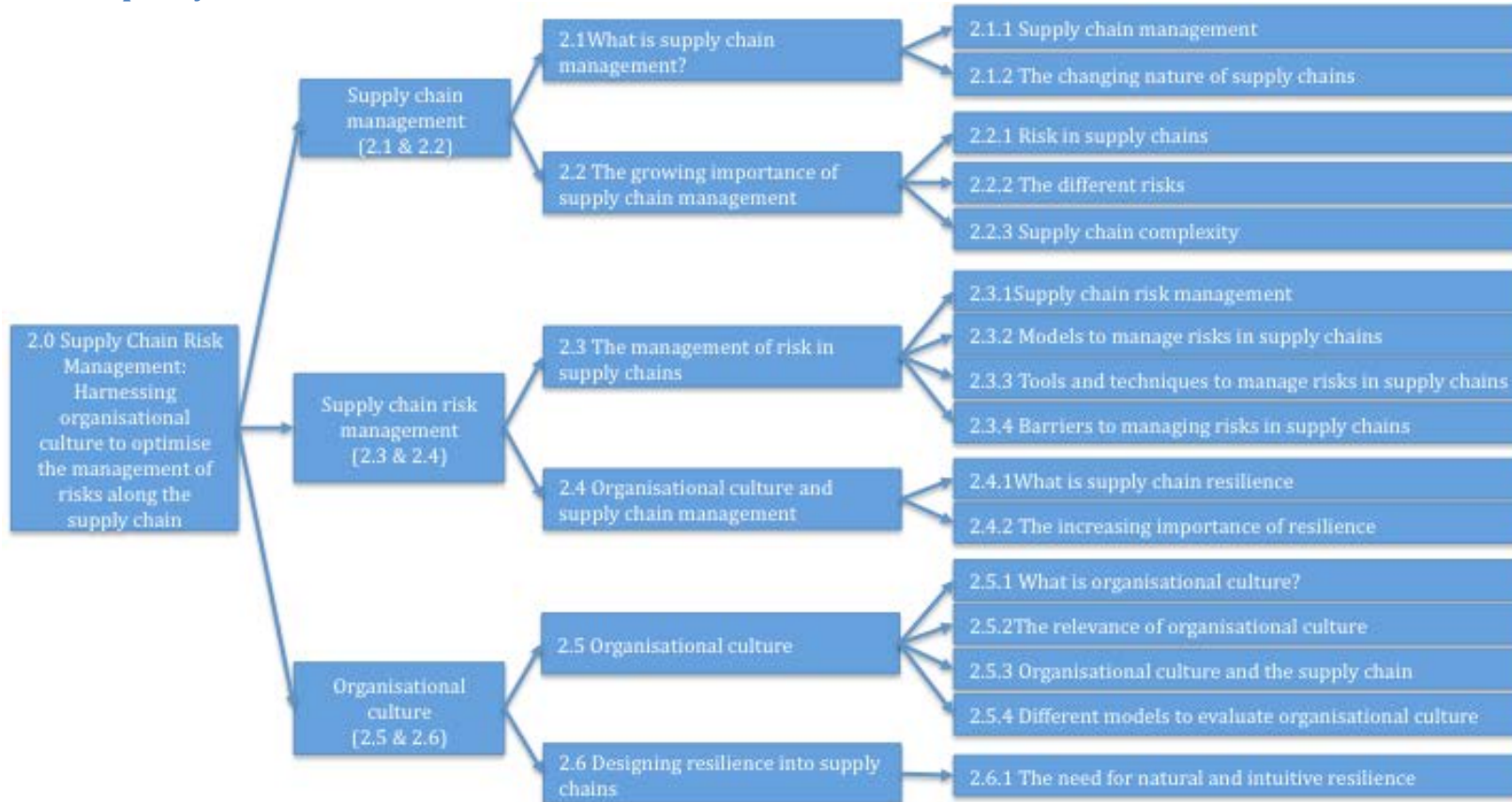
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Appendices

Appendix 1 The systematic review

Mind map of systematic literature review



Key words used

Section	Search terms
2.1	Supply chain management, management of supply, supply chains, supply chain change, supply chain volatility, supply chain stability, supply chain evolution.
2.2	Risk, Risk in supply chains, supply chain risk, supply chain disruption, complexity in supply chains, supply chain complexity.
2.3	Supply chain risk management, risk management in supply chains, models to manage risk in supply chains, supply chain risk management models, tools and techniques to manage risk in supply chains, risk management tools, risk management techniques, barriers to managing supply chain risks, barriers to risk management in supply chains.
2.4	Resilience, supply chain resilience, resilience of supply chains, robust supply chains, mitigating supply chain risk, mitigating risks from supply chains.
2.5	Organisational culture, culture of organisations, corporate culture, measuring culture, organisational culture types, organisational culture and performance, supply chain risk management culture, impact of organisational culture, organisational culture determinants, organisational culture risks, organisational culture supply chain, organisational culture supply chain risks.
2.6	Resilience, supply chain resilience, managing resilience, supply chain robustness, resilience tools, resilience techniques, resilience models,

List of sources for literature

Electronic journals	Management Science, Operations Research, European Journal of Operational Research, Omega, Journal of Management, Harvard Business Review, Journal of Management Science, California Management Review, MIT Sloan Management Review, Journal of Operations Management, Production of Operations Management, International Journal of Production Economics,
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	International Journal of Operations and Production Management, Supply Chain Management: An International Journal, Manufacturing & Service Operations Management, Production Planning and Control, International Journal of Logistics: Research & Applications, International Journal of Logistics Management, International Journal of Physical Distribution and Logistics Management, Journal of Business Logistics, Organisation Science, Organisation Studies, Leadership Quarterly, Human Relations, Research in Organisational Behaviour, Group & Organisation Management, Journal of Organisational Behaviour Management, Journal of Organisational Change Management, Culture and Organisation, Leadership and Organisational Development, Qualitative Research in Organisations and Management, Academy of Management, Learning & Education, Management Learning
Electronic databases	www.sciencedirect.com, www.webofknowledge.com, Google Scholar
Text books	Prominent text books
Technical reports	IBM, KPMG, Marsh, Roland Berger, Accenture, DHL, Zurich.
General websites	www.husdal.com, www.theirm.com, www.ted.com, www.garp.org, www.riskworld.com, www.risksig.com.
Non-peer reviewed journals	CIPS magazine, CILT magazine, Harvard Business Review, CSCMP Supply Chain Quarterly.
Other material	Conference papers, cross-referenced material, news websites (CNN, BBC, The Times, Forbes, The Financial Times).

Appendix 2 The interview protocol

Supply Chain Risk Management: Designing Resilience into the Supply Chain

Interview Protocol

This interview is part of a PhD research initiative, supported by the Logistics Institute of the University of Hull Business School.

The work considers the increasingly complex operating environments, supply chain networks are faced with and aims to evaluate the role of organisational culture as a way to manipulate resilience across supply chains. Key to such strategy is that businesses would create an environment in which supply chain risk management is a core part of business activities and thus the mitigation of risks would develop naturally.

Company Name:	
Location (main town/city):	
Contact Name:	Position:
Telephone:	
Interviewer:	Date:

1. Company background:

1.1 Products/services:

1.2 Type of business (manufacturer, distributor/retailer, developer, operator, contractor, installer, consultant, R&D)

1.4 Company size: Employees:

Turnover:

2. Risk Background:

2.1 How would your company define supply chain risk?

2.2 Could you provide a few examples of incidents in the supply chain that have influenced the performance of your business recently? (internal/external)

2.3 What do you perceive to be the top five risks to business / supply chain continuity? (list from top risk to bottom risk)

2.4 How is the company planning for these risks?

2.5 What have been the responses to previous incidents? (e.g. new products/services launched, change in suppliers/customers, different contractual agreements, different operating processes etc.)?

2.6 What are the top five barriers to managing risk in the supply chain (list from top barrier to bottom barrier)?

2.7 What sort of changes do you expect to experience in the next few years in terms of:

- The number of incidents/

- The impact of these;

- The ability of the company/supply chain to respond?

3. Supply Chain Risk Management Staff

3.1 Has a member of the board the responsibility to deal with the management of risk in the supply chain?

3.2 How is the management of risk allocated? (e.g. a supply chain risk management team, a supply chain risk manager, as part of everyone's job description, pure top down approach, etc.)

3.3 Do individual members of staff have the autonomy to react to incidents without getting approval?

3.4 How many people are employed to manage risk in your organisation and the wider supply chain, including board members and senior management (i) full time equivalents and (ii) other?

3.5 How do you see this changing:

- In the short term (3-5 years);

- In the long term (5 to 10 years)?

3.6 Have you experienced issues in the recruitment or the training of personnel that can effectively deal with the management of supply chain risk? (Please describe if this is the case.)

4. Supply Chain Risk Management Resources

4.1 Could you briefly outline the supply chain structure of your business (number of suppliers, number of customers, changes to these, etc)

- How closely do you manage these?
- What is the rationale behind this in terms of risk management?

4.2 Are there specific guidelines that standardise the selection of suppliers or customers?

- How do these relate to the management of risk in the supply chain? (e.g. credit check – financial, location – lead times/inventory levels, etc)
- Is the design of the supply chain considered as an important factor when evaluating risks?

4.3 What work has been done to identify, understand and counteract potential risks in the supply chain (supply chain map, risk scenario planning, business continuity plan, etc.)

4.4 Which area of the business is most at risk of disturbance?

- Do the company's supply chains risk mitigating actions focus on this?

4.5 Does the company have an allocated budget for the management/mitigation of supply chain risks? (If so, who is in charge of this?)

4.6 How do you see your companies supply chain risk management approach changing:

- In the short term (3-5 years);

- In the long term (5 to 10 years)?

5. Organisational Culture

5.1 Could you describe your organisational culture and the ways in which it affects business operations?

5.2 Is your company culture risk averse or risk embracing?

5.3 How critical do you perceive organisational culture to be with reference to supply chain risk strategy?

5.4 Does your organisational culture provide employees with the freedom to take risks / respond to risks without management approval?

- How do you manage this process?

5.5 How do you believe the culture of this organisation translates into the approach to risk management?

5.6 Do you think that a different organisational culture or a change in the organisational culture would lead to a different approach to risk management?

5.7 Could a change in the organisational culture impact upon the approach to supply chain risk management? (If so, how?)

5.8 How does the organisation's culture impact on its supply chain design? (Can you draw a connection between the two?)

5.9 Would you say that the current supply chain design shapes the culture?

5.10 Is a shift in organisational culture achievable in this organisation?

6. What kind of support would help you to achieve your top three supply chain risk management objectives? (please discuss what support would be

needed for this and how it would impact the mitigation of supply chain risks)

7. What characteristics of your organisational culture are most supportive / restrictive to managing risk more effectively?

8. What characteristics of your organisational culture are most supportive / restrictive to designing the supply chain?

Do you have any other comments to make?

Appendix 3 Holistic approach for analysing cases and examples of data

Holistic approach for analysing the data



Example of database showing an extract of the data used for further analysis:

	Global project and re-engineering manager	Global Director Business Information & Market Intelligence LLP Services	Regional manager	Business continuity manager Europe	
Company background					
Products / Services	Control tower, planning and handling of customers supply chains from factory to distributors or customers, including the monitoring of issues until the shipment is delivered. Troubleshoot issues and support solutions	Supply chain orchestration on behalf of the customer.	Storing and distributing goods for customers.	Store and distribute products on behalf of our customers to their customers. So we handle supply chains on behalf of our customers.	Supply chain orchestration on behalf of customers. This includes planning, handling supply chains from suppliers (manufacturers) to the customers customer doors.
Type of business	Value added services / LSP	LLP, we manage the forwarders and LSPs	LSP	LSP / LLP	Logistics service provider / Lead logistics provider
Company size employees	50 on site but 250 total.	250	Operationally about 500 across the region.	Operational in the region about 65,000 but for us around 300	250 on the control side and then shared operational staff, part of the same company or partners.
Company size turnover	€16 million	€16 million	N/A	The total turnover €4bn euros, 16 million euros for the function	€16 million
Risk background					
Define supply chain risk	Anything that disrupts customer satisfaction in delivering goods to customers at the right time, so quality of data, force majeure type incidents, capacity etc.	Everything that has to do with disruptions but also in terms of where risk is situated. So anything that could disrupt the level of service to customers.	Not meeting customer KPIs. That could be any number of things that happen on an operations that can affect delivery and the output of products on time.	Risk is anything that is to do with critical activities or processes. So anything that is stopping us from continuing our normal day to day activities.	Anything that disrupts customer satisfaction in delivering goods to customers or anything that could disrupt the level of service to customers.
Examples of incidents that influenced performance	Damage to cargo delayed transportation and a customers product launch. Industrial actions as well as political unrest in Cairo for example.	The ash cloud, disruptions like strikes, customs.	We had a fire in a loading bay where we had to evacuate the whole site and so the site was unmanned for that period of the disruption.	The loss of a warehouse would be one. But we have also had IT failures, power failures but also down to weather disruptions, impacting on our ability to deliver goods.	Severe weather, political unrest / strikes, IT and power failures, cargo damage, loss of supply.
Top five risks	Not shipping on time, damages, securing space on airlines, force majeure type incidents, industrial actions, staff mismanagement, customer miscommunication, reputational damage.	Customer localities, delays at customs, weather disruptions, forwarders not performing, compliance issues (import/export), customers holding back shipments.	Fire, IT failures, people availability, loss of key equipment and weather conditions.	The are three areas, site based risks, regional risks and local risks. And all risks fall into that so the loss of a warehouse would be a site based risk but the impact would potentially be much greater. Regional, we could have a fuel strike in a particular country and so on.	Different levels including: Force majeure incidents, industrial action, poor performance of partners, customs, data cleanliness, staff mismanagement, reputational damage, operational failures.
How is the company planning for these	Collaborate closely with customers to understand the weaknesses in their supply chain, support customers to mitigate risks, prepare shipments on behalf of customers, review customers supply chains, develop metrics and trending models for customers to improve their supply chains.	Tool developed that displays information about disruptions, which then can be linked to shipments. It graphically displays issues and links them to shipments to understand the impact on shipments. It is to provide adequate information for decision making.	Control measures are put in place, we have backup options for different scenarios and we have agreements for maintenance and contractors (for the maintenance of operational equipment) for example	We have a ten step process which is linked to external ISO standards. As part of the process there are things like: business impact analysis, basic risk assessments, solution tools etc. It basically helps us understand different risks and critical activities, dependencies and single points of failure etc.	Close collaboration with customers and supply chain reviews and mapping, big focus on data adequacy and visibility, ten step risk process was developed, dashboard developed for operators to highlight risks and impacts.

The above entries in black reflect response summaries from interviews and the key points were marked in green. These were synthesized to encapsulate all responses and were summarised in the column on the right. This process was repeated for all questions, across all interviews, and content was cross-checked and verified with additional data that was collected.

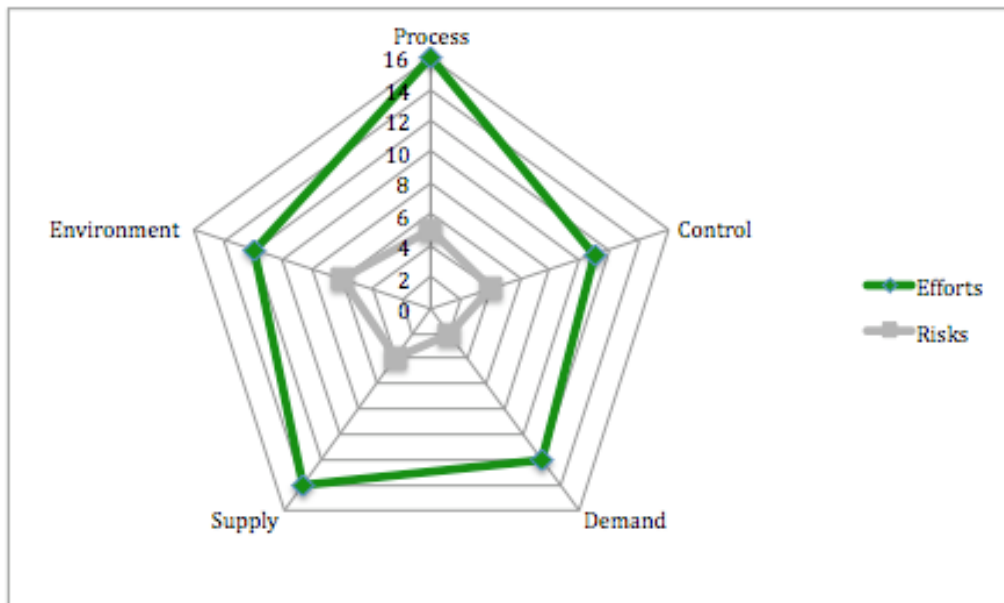
Example showing the generation and data of an analysis diagram:

Process risks Control risks Demand risks Supply risks Environmental risks

5 4 2 4 6

Efforts linked Efforts linked Efforts linked t Efforts linked Efforts linked to environment risk

16 11 12 14 12



The above tables were derived at through counting the different risks and efforts mentioned by participants on a case-by-case basis and verified using additional data. Risks and efforts were counted in number and associated to the relevant areas (i.e. process, control, demand, supply and environment), using the sources of supply chain risk model by Peck et al., (2003).

Appendix 4 Efforts to manage risks explanation table

Efforts to manage risks explanation								
Effort	Purpose	Reach	Effort	Purpose	Reach	Effort	Purpose	Reach
Audit of suppliers	Review supplier reliability	Upstream	Developed disruption dashboard	Created a dashboard to highlight possible disruption in advance	Internal use, monitoring the known supply chain	Redistribution or removal of staff	Optimisation of staffing	Internal
Benchmarking	Comparison of risk actions of competitors	Across the business	Developed specific rule for specific process	Process standardisation	Internal	Review of customer supply chains	Auditing the performance of customer supply chains	External
Bowtie diagrams	Identification of risk causes and impacts	Across the business	Disruption matrix	Generation of a matrix listing disruptions	Internal and external	Review of inventory policy	Assessing the applicability of inventory policies	Internal
Bringing in experts	Review of risk management performance and gaps	Across the business	Disruption trending	Calculation of disruption likelihood based on historic data	Internal and external	Review of product design	Examining product design with a view to reducing risks	Internal
Business impact analysis	Analysis of potential disruption impact	Across the business	Economic climate monitoring	Monitoring of changes in the economic environment	Internal and external	Review of supplier supply chains	Auditing the reliability of supplier's supply chains	External
Business process synchronisation	Reduction of operational complexity	Across the business	Evaluated criticality of stock	Identification of critical inventory	Internal	Risk assessment process developed	Creation of a standard procedure to assessing risks	Internal and external
Capacity building	Increasing capacity to mitigate against shortage	Internal and external	Increased collaboration with customers	Working more closely with customers to reduce the risk of disruptions	External	Risk criticality mapping	Identification of the criticality of different risks	Internal and external
Change supply chain partners	Choosing more reliable partners	External	Increased information sharing	Sharing more relevant information more often	Internal and external	Risk likelihood analysis	Assessing the probability of risks	Internal and external

Efforts to manage risks explanation								
Effort	Purpose	Reach	Effort	Purpose	Reach	Effort	Purpose	Reach
Constant product redevelopment	Designing products to reduce risk of disruptions	Internal	Increased production flexibility	Raising the flexibility of dealing with disruptions	Internal and external	Risk mapping	Mapping risk and their sources	Internal and external
Contingency planning	Creating plans for alternative ways of operating / recovery	Internal and external	Learning	Learning from disruptions and continuously improving risk management	Internal	Risk to product mapping	Mapping risks associated to different products	Internal
Critical node mapping	Identification of risk sources	Internal and external	Multiple sourcing	Reducing the dependence on suppliers	External	Root cause analysis	Identifying the cause of different risks / disruptions	Internal and external
Critical raw material mapping	Identification of raw material risks	External	Organisational trend planning (infrastructure)	Preparing for future expansions of the business	Internal	Scenario planning	Consideration and planning for different disruptions	Internal and external
Critical supplier mapping	Review of criticality of suppliers	External	Process redesign	Redeveloping processes with risk mitigation in mind	Internal and external	Six Sigma	Methodology of process improvement	Internal
Customer criticality analysis	Review of criticality of customers	External	Product merges	Removing the variety of products offered	Internal	Specific resilience program launched	Dedicated program to improve resilience	Internal and external
Dedicated risk personnel	Staff focussed solely on risk management	Internal	Product quality improvement	Improving the quality of products to mitigate risk of poor quality	Internal	Stricter contracts	Supplier and customer management	External
Desktop practice exercises	Preparation for disruption management	Internal	Product redistribution plans	Plans to redistribute products amongst customers the reduce shortages	Internal and external	Supplier criticality analysis	Assessing the criticality of suppliers	External

Efforts to manage risks explanation								
Effort	Purpose	Reach	Effort	Purpose	Reach	Effort	Purpose	Reach
Develop specific solution tools	Development of targeted mitigation actions	Internally developed and applied internally and externally	Raised business continuity plans	Created plans to operate during disruption	Internal and external	Supply chain mapping	Raising the visibility of the supply chain	Internal and external
Developed a generic risk response process	Development of a standard risk management process	Internal	Recovery planning based on frequent disruptions	Focussing on dealing with frequent disruptions	Internal	Targeted project into specific disruption	Dedicated program to investigate specific disruption	