The Status of Supply Chain Risk Management in Manufacturing Small and Medium Enterprises (SMEs) in South Africa

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DECLARATION

I declare that this thesis is my own unaided work. It is being submitted to the Degree of Doctor of Philosophy to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

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(Signature of Candidate)

29……….. day of May…………….., 2020……………

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ABSTRACT

This research explores that status of supply chain risk management (SCRM) in manufacturing small and medium enterprise (SMEs) in South Africa. This is accomplished through the development of a conceptual framework based on the extant literature on SCRM, risk and risk management in SMEs and risk theory. The framework is tested through a mixed-method multiple case study design in eight South African manufacturing SMEs of different sizes in the furniture and metal industries in Gauteng, South Africa. This approach addresses theoretical gaps relating to the lack of frameworks that develop and present a holistic approach to better understand how supply chain risk is managed in SMEs, as well as, methodological gaps where there is a call for more case study based empirical studies on SCRM, and in particular in SMEs.

A significant finding of this research is that while SME owner-managers do not have formal risk management procedures like their counterparts in large organisations, they informally follow risk management processes advocated in the literature, namely, the risk identification, risk analysis and risk handling aspects of the formal process. This finding, supported by the evidence, is significant as the literature has been ambivalent. Hence, this research is ground-breaking as it provides for a strong position on this debate. These implicit processes make use of environmental scanning for ongoing risk identification, risk analysis and risk handling is exhibited in the owner-manager's conversations and actions regarding risk to and in the business. Prevention and mitigation are the most common risk handling modes employed by SME owner-manager and are based on the experience; knowledge and intuition of owner-managers.

This research contributes through another important finding in that SMEs possess risk management capabilities. Risk management capability is demonstrated by the OMs in this research through their capability to leverage resources and use them effectively in preventing and/or mitigating risk. This research, hence, augments

Lindbom et al.’s (2015) theoretical proposition of risk management capability by providing empirical evidence that tests and supports the proposition.

Further key findings of this research are that supply chain risks are not the most prevalent risks in manufacturing SMEs in South Africa. Risks within the company operational environment, such as, financial, strategic and operations risks, take precedence. Supply chain risks on the demand side receive more focus than those on the supply side

DEDICATION

For my Dad

Ivan Sunjka

1938 - 2018

And in thanksgiving to My Lord and God

Through Him and with Him and in Him

In the unity of the Holy Spirit

All glory and honour is Yours

Almighty Father

For ever and ever

Amen

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1. Sayed, Z. & Sunjka, B.P., 2016, 'Investigating and evaluating the influence of supply chain structure on supply chain risk', South African Journal of Industrial Engineering 27(3), 122–135.

Peer-reviewed conference papers

2. Sunjka, B.P. & Emwanu, B., 2015, 'Risk Management in SMEs in South Arica' IAMOT 2015 Proccedings, Cape Town, South Africa

3. Sunjka, B.P. & Emwanu, B., 2013, 'A conceptual framework for the analysis of supply chain risk management in small and medium manufacturing enterprises in South Africa', SAIIE25 Proceedings, Stellenbosch, South Africa.

4. Sunjka, B.P. & Sklar-Chik, M., 2012, 'Supply Chain risk and Small and Medim Manufacturing Enterprises in South Africa', CIE42 Proceedings, Cape Town, South Africa.

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CHAPTER 1

INTRODUCTION

As the world economy has become more globalized and interconnected, supply chains have become increasingly extended and complex. This complexity means that small and medium enterprises (SMEs) that form part of these global supply chains, focused on operations such as manufacturing, testing, purchasing, and logistics, are more influential in the supply chains (Kull et al., 2018). These SMEs are, however, vulnerable to the stresses passed from both sides of their supply chains, particularly the ripple effects from the market as experienced by the large downstream companies (Organisation for Economic Co-operation and Development (OECD), 2009). These result in risk exposure for the SMEs and the supply chain network (Finch, 2004) that result in disruptions that maybe costly. This was clearly evident during the 2008 Financial Crisis which resulted in a decrease in sales overall (OECD, 2009). This fall in sales had a significant impact on SMEs resulting in widespread shortages of working capital in SMEs and a decrease in their liquidity. Coupled with increased payment delays on receivables and increased in inventories, there was a corresponding increase in reported defaults, insolvencies, and bankruptcies among SMEs globally (OECD, 2009). Thus, to be sustainable and remain competitive, SME's while vulnerable to risks, need to manage these risks including risks within their Supply Chains.

Literature examining Supply Chain Risk Management (SCRM) in SMEs is sparse and research in this area is limited (Thun et al. 2011; Ellegard, 2008). This can certainly not be due to a lack of interest in SMEs, but perhaps, as Baumol (1993) and You (1995) suggest, it is because of the heterogeneous nature of SMEs that makes them particularly difficult to study as a research entity and, hence, to form coherent theories to describe their behaviour. Theories developed for large enterprises cannot just be transferred to SMEs, as they are very different in nature to their large counterparts, mainly due to the number of constraints under which they operate (Falkner and Hiebl, 2015; Newberry, 2006). SMEs may be less sustainable and less competitive than large firms because they have less management and business expertise, lack of adequate financing and are subject to cumbersome regulatory and bureaucratic requirements (Kull et al., 2018; Sunjka and Emwanu, 2015). Other constraints on SMEs include, continuously changing and rapidly evolving political, economic and social environments in general, supply chain disruptions that are unplanned or business environmental disruptions, such as, transportation delays and port stoppages due to strikes or accidents, supplier incapacitation due to fires or earth quakes or floods (Sunjka and Emwanu, 2015; Newberry, 2006).

While the published research on SCRM in SMEs has been limited over the last 18 years (2000 – 2018) (Fig. 1.1 below), there has, however, been an increase in the number of publications over the second half of this period, possibly indicating an increased interest among academics in SCRM in the context of SMEs (Appendix 1.1, Table A1.1 and Appendix 1.2, where both appendices provide analysis of SCRM in SMEs papers). This may well support the need for further research on SCRM in SMEs.

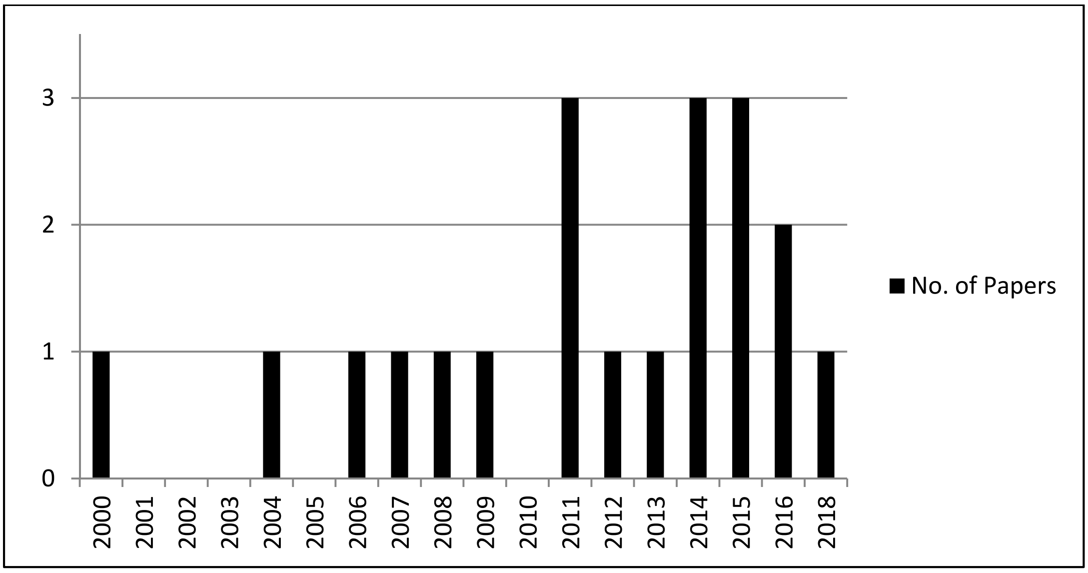


Figure 1.1 Peer-reviewed publications related to SCRM and SMEs (generated by author)

Among the peer-reviewed journal literature on Supply Chain Risk Management (SCRM) that has proliferated over the last fifteen years, as the field of research has evolved, a handful of articles, critically reviewing the field, have emerged at intervals. These papers collectively provide a "state of the field" review of the published literature on SCRM spanning thirteen years (2003 – 2016). The sixteen journal publications were analysed to identify research gaps in SCRM (Appendix 1.3, Table A1.3a). An additional five relevant industry studies (Appendix 1.3, Table A1.3b) provide an industry-based perspective on the state of SCRM. A review of the current publications on SCRM in SMEs and the “state of the field” publications in SCRM reveal a number of research gaps. These include the factors that influence SCRM in SMEs, the development of theory to better understand how supply chain risk is managed in SMEs and the methodological approaches for examining SCRM in SMEs. These aspects are further explored in the next sections.

1.1 Factors that influence SCRM in SMEs

A number of potentially influential factors emerge from the literature. These include the SME owner manager, risk management practices in the SME and risk management tools and techniques.

In SMEs the most important decisions are made by the CEO / Owner and these tend to be based more on intuition and experience, and less on quantitative information (Murray and Barajas, 2014). The manner in which decisions are made does not seem to change by including subjective attributes into the decision criteria, but instead, the way the decision results were communicated and recorded is altered. SME owner-managers make supply chain decisions based on a variety of inputs, or sometimes exclusively based on intuition (Niemann et al., 2018).

Additionally, perception of supply chain risk is also dependent on the owner-manager and the position of the company in the supply chain (Lavastre et al., 2014) with regard to activity sector and markets (regional, nation, global).

According to Murray and Barajas (2014), SMEs are less inclined to adopt formalized risk management tools unless they are applicable to many types of supply chain decisions, easy to use, and produce useful results. Therefore, supply chain risk management practices employed by SMEs tend to be defensive in nature (Ellegaard, 2008) where reactive instruments, such as, safety stocks, overcapacity in production and storage and back-up suppliers are utilized (Norlaile and Aby Bakar, 2015; Thun et al., 2011).

Ellegaard (2008) found that owner-managers reduced risk probability by avoiding exposure to unnecessary risk sources and events, thus, minimizing resource consumption. It is, hence, possible to manage supply chain risk without resources and expertise-demanding information-retrieval practices, especially in companies where these practices are often unavailable. It is, therefore, apparent that SMES adopt suitable reactive instruments, reflecting the exact mix of practices that provides security and are supportive of creating resilient supply chains (Thun et al., 2011; Ellegaard, 2008).

According to Ritchie and Brindley (2000), the increasing use of information and communication technology (ICT) has changed the supply chain (SC) structure from a traditionally perceived linear model to an amorphous configuration. This, in turn, has affected the nature and number (complexity) of relationships, that is, the inter-organizational networks that need to be managed by the owner-manager in the supply chain. It, hence, increases risk exposure for large enterprises (LEs) as well as SMEs, who are partnering in the supply chain (Finch, 2004). But, while supply chain relationships may increase risk exposure they may, however, be leveraged to mitigate risk. In practice, Ellegaard (2008) and Lavastre et al. (2014 & 2012), through empirical studies, found that SMEs tend to seek dependable and responsive suppliers, with similar interaction attitudes, resulting in more being "local" suppliers. While this may limit their supply chain partner options, it in turn fosters source loyalty, relaxed and personal interactions, protection of proprietary knowledge and exchange fairness. Nallusamy and Ambedkar (2016) revealed that SMEs, to satisfy the requirement of OEM and Tier 1 customers, would go as far as sacrificing profit to maintain good relationships. Thus, SMEs are more likely to develop close relationships with their partners, where geographical proximity and long-term continuity in relations are considered effective risk mitigation methods.

A very limited array of tools, techniques and approaches has been proposed for risk management in SMEs. A structured approach for the identification, assessment, and mitigation of supply chain risks based on the specific requirements of SMEs and the existing literature is developed by Jüttner and Ziegenbein (2009). Singhal et al. (2011) model supply risks using artificial neural networks to represent the underlying complexities of the risk issues. They believe that these techniques may assist SMEs in making vital decisions within complex business risk environments, without having to invest in expensive external expertise. A Vendor Selection Template (VST), based on PEST Analysis, is developed by Murray and Barajas (2014) to enable SMEs to apply SCRM at the point where it has the most influence i.e. vendor selection. Faisal (2016) proposes a risk index, which is a single numerical value to aid in analysing and benchmarking supply chains on risk susceptibility dimension. The risk index provides a means of continuously monitoring the risk susceptibility of a supply chain and therefore assists in the development of new strategies to counter supply chain risks effectively.

Thus, while factors, such as, the SME owner manager, risk management practices in the SME and risk management tools and techniques have been introduced in the SCRM literature for SMEs, they have not been explored in much detail.

1.2 Theory development

Conceptual frameworks and models relating to SCRM in SMEs are important as a basis for investigating the phenomenon of supply chain risk management in small and medium enterprises. Ritchie and Brindley (2000) propose an amorphous supply chain model that illustrates the modification in the form of and relationships in supply chains as a result of changes in information and communication technologies (ICT) which give rise to new risks. Conceptual models for natural risk hedging with financial and physical components in supply chains, that involve an SME as the supplier to an OEM, are presented by Hoffman (2011). These frameworks are not tested by the authors. Lavastre et al. (2012) develop a conceptual model for SCRM that incorporates attitude towards risk, tools used to identify, understand and estimate risks and risk mitigation techniques to minimize risk in the Supply Chain. In their second paper, Lavastre et al. (2014) extend their theoretical framework for SCRM bringing together characteristics of the firm and characteristics of the respondents, perceptions of supply chain risk, characteristics of the relationship with industrial partners (and, consequently, the characteristics of the suppliers), risks mitigation methods used in SCRM, and the SCRM outcomes. They test their framework empirically through a survey.

While the focus areas cover certain risk and risk management concepts and the frameworks/models developed address some theoretical gaps in the research on SCRM in SMEs, they fail to develop and present a holistic approach to better understand how supply chain risk is managed in SMEs.

Khan and Burnes (2007) suggest that there is a lack of understanding of risk in the SCRM research community, and propose that research into supply chain risk must be located within the broader study of risk, that is, risk theory and risk management (p.210). Extending this, they suggest that the implications of the subjective-objective debate regarding the nature of risk must be considered for development of tools and frameworks for supply chain risk management (p.211). In support of this, Singhal et al. (2011) and Ghadge et al. (2012) believe that behavioural elements such as human/ organization risk propensity and the role of various personality traits, context and experience need to be included in SCRM models, while Tukamuhabw et al. (2015) advocate for the increased utilisation of theoretical frameworks to enhance understanding in SCRM.

1.3 Methodological Approaches

There is a broad and continuing call for more rigorous empirically grounded research in SCRM (Kilubi, 2016; Tukamuhabw et al., 2015; Ho et al., 2015; Sodhi et al., 2012,;Singhal et al., 2011; Khan and Burnes 2007; Jüttner et al., 2003) based on case studies (Ho et al., 2015; Sodhi et al., 2012; Khan and Burnes, 2007), as well as mixed methods (Kilubi, 2016) founded in solid conceptual frameworks (Tukamuhabw et al., 2015; Sodhi et al., 2012) and literature reviews (Singhal et al., 2011). Williams et al. (2008), suggest a need for innovative qualitative and quantitative research methods, while Tang et al. (2011) call for more mathematical modelling. Whatever method used, it should have a direct impact on industry (Kilubi, 2016; Ghadge et al., 2012). Kilubi (2016) also calls for longitudinal studies to assess company performance over time in the light of SCRM implementation.

Of the studies conducted so far on SCRM in SMEs (Appendix 1.1, Table A1.1 and Appendix 1.2) over half of the papers involved some form of empirical method (case-study, interviews or surveys) (Fig. 1.2 below).

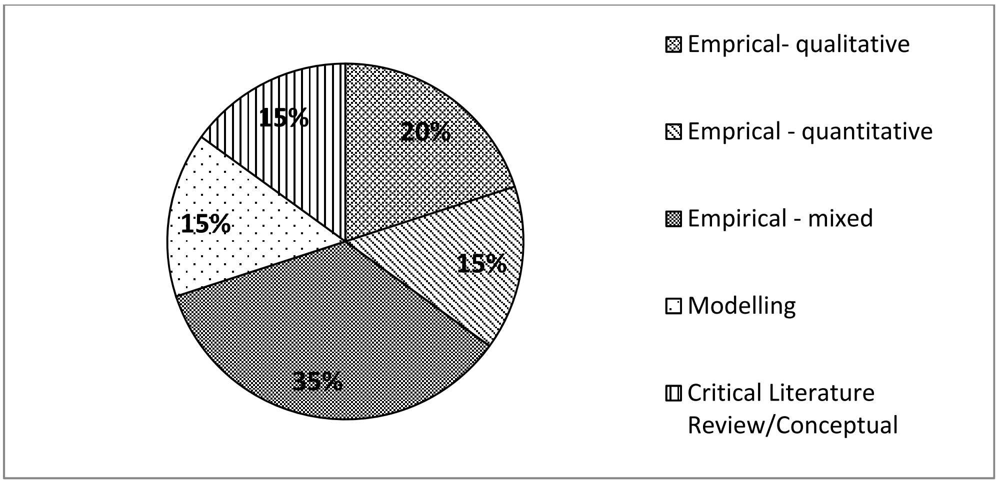


Figure 1.2 Methodological approaches in all 20 papers (see Appendix 1.2)

Surveys (empirical quantitative) were exclusively utilized in three studies (15 %) (Aghapour et al., 2015; Yaakub and Mustafa, 2015; Thun et al., 2011). Qualitative methods were solely applied in three studies (15%) (Norlaile and Aby Bakar, 2015; Jüttner and Ziegenbein, 2009; Ellegaard, 2008) while modelling was singular to another three papers (15%) (Faisal, 2016; Jafarnejad et al., 2014; Faisal, 2013). A combination (mixed-methods) of a survey and either, modelling (Nallusamy and Ambedkar, 2016) or qualitative interviews (Lavastre et al., 2014 & 2012; Murray and Barajas, 2014), were used in four (20%) papers. Mixed methods in the form of modelling and field testing were used by Singhal et al. (2011) and Faisal et al. (2006 & 2007). Modelling techniques included digraph and matrix methods, Quality Function Deployment (QFD), Artificial Neural Networks (ANN), Interpretive Structural Modelling (ISM) and Fuzzy Preference Relations (CFPR). Critical literature reviews form the basis of the three remaining papers (15%) (Hofmann, 2011; Finch, 2004; Ritchie and Brindley, 2000), which seek to investigate different concepts in relation to risk in supply chains that incorporate SMEs.

This indicates that, considering the few papers using empirical methods, there is considerable scope for the application of empirical methods in further studies.

1.4 Context of SMEs

Less than half of these empirical studies in the studies of SCRM in SMEs identified were located in the Far East and Africa in developing countries: India (2), Malaysia (3) and South Africa (1) (Appendix 1.2, Analysis of SCRM in SMEs papers). These investigations are a genesis in addressing the deficiency identified by Tukamuhabw et al. (2015) who allude to empirical studies being limited to large companies in developed countries. The remaining four studies were conducted in developed European countries: Switzerland, Denmark, France and Germany. The definitions of SMEs used differ across these regions, with SMEs in Europe generally being larger than those in the Far East. These factors may have an influence on the results of the studies and their comparability. A common factor, however, was that the studies were concentrated on the manufacturing sector.

Accenture (2014), Simangunsong et al. (2012), Singhal et al. (2011), Vanany et al. (2009) and Jüttner et al. (2003), however, all suggest the need for specific SCRM approaches for different industries and sectors. This is because “different industries and sectors have different business environments, opportunities and limitations thus a common risk management framework may not be effective” (Singhal et al., 2011: p.34). This requires the assimilation of risk issues from industry practice (Kilubi, 2016).

1.4.1 South Africa

Only one paper that investigated an aspect of supply chain risk, global sourcing risk management, in SMEs in South Africa could be located. Niemann et al. (2018) conducted an empirical study of global sourcing risk management approaches of small clothing and textile retailers in Gauteng, South Africa. Semi-structured interviews were conducted with 12 SMEs. The findings were similar to those of the papers reviewed above, that is, that small clothing and textile retailers in South Africa did not have any formalised risk management processes, but that informal approaches were applied at the sole discretion of the owner.

1.5 Motivation

Research on Supply chain risk management (SCRM) is nascent where extant research leaves deficiencies (Khan and Burnes, 2007; Williams et al., 2008; Rao and Goldsby, 2009; Jüttner et al., 2003), particularly in the context of manufacturing small and medium enterprises (SME's) (Niemann et al., 2018; Ellegard, 2008; Faisal et al., 2006; Finch, 2004). It would, then, be important to explore in more detail the various factors, identified in the previous sections that affect supply chain risk management in SMEs. These factors include the influence of the owner manager, the supply chain risk management (SCRM) practices employed SMEs, SCRM the tools and techniques used by SMEs and how the context of the SMEs impacts supply chain risks. Finally, the context (industry, sector and country) in which SMEs operate would seem to play a role in SCRM in SMEs. Supply Chain Risk Management in SMEs in the South African context has received very limited attention hence presenting a new context to be investigated.

1.6 Purpose

The purpose of this research is to explore the status of Supply Chain Risk Management (SCRM) (defined as Risk Management Capability (RMC)) in selected South African SMEs. This will be accomplished by developing and elaborating on the constructs of a theoretical/conceptual framework based in risk theory, applying a subjective lens (the owner-manager) to the understanding of risk in the supply chain.

The critical research question for this study follows.

1.7 Critical Research Question

What is the status of Supply Chain Risk Management (SCRM) in manufacturing Small and Medium Enterprises (SME) in South Africa?

1.8 Research Objectives

The specific objectives of this research are to:

1. Develop a conceptual framework for SCRM in SMEs from the literature
2. Elaborate the theoretical constructs of the conceptual framework in an empirical context i.e. selected manufacturing SMEs in South Africa
3. Assess the risk management capability (RMC) of selected manufacturing SMEs in South Africa

1.9 Research Method

This research seeks to, initially; explore the status of SCRM (the phenomenon) in selected manufacturing SMEs in South Africa (real-life context), where limited research exists, and then makes assessments of their risk management capability (RMC). This exploration and assessment is guided by the conceptual/theoretical framework developed. Thus, while this study is largely exploratory in nature - a "what" critical research question is posed (Yin, 2009); followed by complementary theoretical questions, proposed through the framework, which this study attempts to answer. In the process, differences and similarities across companies of different size and in different industries are explored to obtain a broad and holistic insight.

The nature of this research is, therefore, well suited to a primarily qualitative, holistic, multiple or collective case study approach.

1.10 Ethical Considerations/Clearance

Ethics clearance from the University of Witwatersrand Human Research Ethics Committee (Non-medical) was obtained prior to the commencement of data collection. The ethics clearance number is H14/04/29 (see certificate in Appendix 4.2).

1.11 Delimitations

1. The timeframe for the data collection of this research is constrained to six months from June to November 2014.
2. Participating South African companies are limited to only industries and companies willing to participate in the research.
3. It is recognized that this research is not generalisable because of its limited context.

1.12 Assumptions

It is assumed in this research that it is more likely to observe the phenomenon of SCRM in well-established SMEs i.e. have been in operation for more than 10 years (have survived well past infancy i.e. 3.5 years) and are more operationally mature.

1.13 Outline of the Thesis

Chapter 1 introduces the background for this research. A gap analysis is presented leading to the motivation and purpose of the research. This is further refined through the Critical Research Question (CRQ) and the research objectives. The chapter concludes with an outline of the research method, the ethical considerations and delimitations for the research.

Chapter 2 explores the current body of knowledge pertaining to the key concepts and definitions in Supply Chain Risk Management (SCRM), followed by a critical review of the relevant literature relating to risk and risk management and SMEs . This builds on the review of papers in chapter 1 in identifying the gaps addressed by this research.

In Chapter 3 the Conceptual Framework that forms the theoretical basis, founded in Risk Theory, for this research is developed. This is achieved by building on the key themes that emerged from the critical review of the relevant literature pertaining to Small and Medium Enterprises (SMEs) which includes, SCRM and SMEs, and Risk and Risk Management in SMEs and the key concepts and definitions in Supply Chain Risk Management (SCRM). Next, the key concepts in risk theory, relevant to the themes identified are explored, followed by an exploration of pertinent concepts in the risk management literature. Finally, the conceptual framework is presented with the development of theory and research questions to guide this study.

In Chapter 4 the methodological approach, described in section 1.9 above, used in this research to operationalize and test the theoretical framework is developed. The multiple case study approach chosen is motivated and elaborated. Validity and reliability requirements are explored and established in the context the case study approach. Yin's (2009) case study protocol forms the basis for the detailed presentation and development of the multiple case study research design, the research instruments (survey, semi-structured interviews, observation and visual sense-making), the analytical approach (within-case analysis and across case analysis) and the case study report structure.

Chapter 5 provides contextual analysis of risk the broader macro-environment in which manufacturing SMEs operate. This environment involves factors external to the company (SME) such as economic, politic, social-economic and technological factors that frequently determine whether an SME is successful or not. These factors impact the organisation generally, and more specifically, the industry in which the SME operates.

In Chapter 6 the within case analysis and results for the pilot case is presented. The case report is presented in the format outlined in section 4.3.4 in chapter 4. A brief reflection on the triangulation approach and learnings from the case concludes the chapter. The remaining seven case reports and associated appendices are contained in Appendix 6.

Chapter 7 presents the within-industry cross-case analyses and results for the furniture and metal industries. The chapter follows the same format as the single case the preceding chapter where the research questions (RQs) are addressed sequentially. The cases in the furniture industry were first analysed. Summaries of the cases and the full case reports are contained in Appendix 6. The cross-case analysis per industry was performed after the industry related within-case analyses have been completed.

Chapter 8 presents the across-industry analyses and results. A comparative cross-case analysis is done which is the culmination of the analyses for the Furniture Industry and the Metal Industry based on the within industry analyses in chapter 7. This chapter follows the same format as the single case and cross-case analyses done in the preceding chapters where the research questions (RQs) are addressed sequentially.

In Chapter 9 the findings of this research are critically examined. The first section discusses the development and testing of the conceptual framework, addressing the first two objectives of this study. This is accomplished through the consideration of the theory questions associated with the components of the conceptual framework and takes the form of pattern-matching. Emergent themes are identified within the theory question discussions and evaluated in terms of their relevance to the conceptual framework. The second section critiques research quality in the context of the methodological approach (validity and reliability). In the last section, learnings from the within case and cross-case analyses are elaborated.

Chapter 10 concludes this research by firstly, reviewing the objectives and the critical research question. The limitations of the research are then outlined, followed by its contribution to the body of knowledge on supply chain risk management and finally recommendation on further research directions are made.

CHAPTER 2

LITERATURE REVIEW

This literature review commences with an exploration of the applicable theoretical concepts in risk theory and risk management in the context of the definition of a Small and Medium Enterprise (SME). This is followed by a meta-analysis of the current body of knowledge pertaining to the key concepts and definitions in Supply Chain Risk Management (SCRM) (Section 2.1). A critical review of the relevant literature relating to risk and risk management and SMEs (section 2.2) is then presented. This builds on the review of current papers on SCRM in SMEs in sections 1.1 to 1.4 in chapter 1. Together these two reviews lead to the identification of the gaps addressed by this research.

2.1 Definition of a Small and Medium Enterprise

In most countries, both quantitative and qualitative criteria are used to identify firms that can be classified as SMEs. There is no universally accepted definition for a SME (Storey, 1994). Quantitative criteria, such as, number of employees, differs across national definitions, but consensus in the literature reveals the following common qualitative criteria (Storey, 1994; Hatten, 1997 as cited by Niemen, 2006): a small business or SME is

i. Independently owned, operated and financed, where one or very few people manage the business without a formalised management structure, and does not form part of a large enterprise,

ii. Has a relatively small share of the marketplace or relatively little impact on the sector/industry in which it operates.

This highlights the primacy and centrality of the owner and manager in the operations and decision-making of the SME (Simmons et al., 2008; Watson and Robinson, 2003; Nunes et al., 2012).

In South Africa, the National Small Business Amendment Act No.29 (2003) (Table 2.1) provides quantitative criteria for the classification of Small businesses. These quantitative criteria have been subject to criticism because (Nieman, 2006):

i. there is no single criterion specifying “smallness”, but three different specifiers (Columns 1, 2 and 3) where the Act does not clarify whether only one or all criteria need to be fulfilled to classify class.

ii. comparative analysis over time is difficult based on the monetary criteria, as indices need to be developed to account for price changes (inflation).

Table 2.1 Classification of manufacturing SMEs (National Small Business Amendment Act No.29, 2003)

Sector or sub-sector in accordance with the Standard Industrial Classification	**Size of Class**	**Total Full-time Equivalent (FTE) of paid employees** **Less than**	**Total Turnover** **Less than**	**Total Gross Asset Value (fixed property excluded)** **Less than**
Manufacturing	Medium	200	R 51 mill	R 19 mill
	Small	50	R 13 mill	R 5 mill
	Very Small	20	R 5 mill	R 2 mill
	Micro	5	R 0.2 mill	R 0.1 mill

For the purpose of this research a Small Enterprise incorporate the Medium and Small classes in the manufacturing sector in the Schedule of the Act. These are identified through the number of Total Full-time Equivalent (FTE) paid employees. Of particular interest for this research is the notion of a single (or very few people) manager/owner where the business is without a formalized management structure. The literature on Risk Theory is explored in this context.

2.2 Risk Theory

No particular risk theory that applies to SMEs could be located. Theories on Risk tend to be primarily discipline dependent (e.g. Enterprise Risk Management (RM), operational risk management, Corporate Governance and Risk Management, Financial RM) (Riesch, 2012, Hansson, 2012). To understand what risk theory would apply to SMEs, it is useful to find a theoretical risk framework that is largely discipline independent. Roesser et al. (2012) provide a landscape that “reflects the current state of the art in risk theory” (p2) reflecting the contributions of numerous disciplines through different perspectives, such as, mathematical approaches in decision-theory, risk perception research, theories on risk ethics, and social organisation for risk management. Hansson (2012) specifically contributes by providing philosophical perspectives on Risk Theory as he draws on various disciplines (such as, engineering, medicine, statistics, economics, psychology, sociology, epidemiology and anthropology) to elicit some of the key theoretical concepts that underlie the discipline specific risk theories. In combination, these authors provide a comprehensive overview of Risk Theory that may be used as a basis for the examination of risk and its applicable constructs in a particular area of research, for example, risk in SMEs. This blended framework (Figure 3.1 below) is used to explore the different concepts of risk, how they may relate to SMEs and what recent research in SMEs has referred to these concepts.

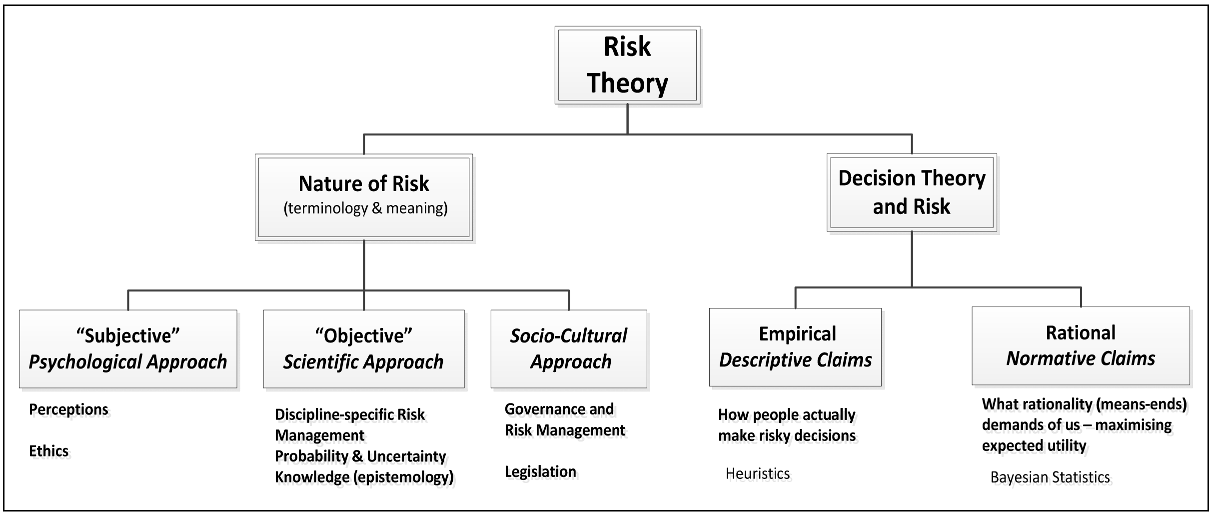


Figure 2.1 Risk Theory Conceptual Framework (adapted from Roesser et al., 2013; Hansson 2012)

In research on risk, philosophical sub-disciplines contribute to terminological clarification, where, the different terminologies and meanings of the word, "risk" allude to its nature (Roesser et al., 2013). In colloquial language, risk is generally and imprecisely, referred to as "a situation in which we do not know whether or not an undesired event will occur" (Hansson, 2012, p10). In scientific or technical disciplines (which would most likely apply to manufacturing SMEs) today, the word has varied applications and specialized meanings (Hansson, 2004). For example, some of the more prevalent definitions are: "risk" is "an unwanted event", "the cause of an unwanted event" or "the probability of an unwanted event" all of which "may or may not occur" (Hansson, 2004; Moller et al., 2006), or the uncertainty of an event happening where the outcome may be severe (Riesch, 2012).

Riesch (2012) identifies five strata of uncertainty that relate to the diverse risk concerns of the various disciplines, that is, uncertainty of the outcome, the parameters, the model, acknowledged inadequacies and implicit assumptions, and unknown inadequacies. Those uncertainties that are quantifiable are risks (Knight 1971) and may be treated probabilistically. Formal probabilistic models provide a tool for modelling situations in which an undesirable event may or may not occur (uncertainty) where the possible outcomes are known and their probabilities can be determined (Hansson, 2004).

Not all situations can, however, be adequately modelled in this way, that is, knowledge of the situation is so incomplete that no meaningful probabilities can be estimated (Hansson, 2012). These unmeasurable situations are defined as uncertainties (Knight 1971). Cases that are not amenable to probabilistic modelling are in complex human interactions, where independent agents may influence the choices of others, try to predict these choices and, then, adjust decisions based on these predictions (Hansson, 2012). This, may, often be the case in complex supply chain interactions and relationships (Slack and Lewis, 2011). Similarly, in cases where a series of interdependent decisions may influence an outcome, these cannot be adequately treated with probabilistic models because as Hansson (2004) argues, these “objectivist” models do not take into consideration the research done on “subjective risk”, that is, the “Psychological Approach” (Moller, 2012; Renn, 1992). The latter perspective takes into account the “risk perceptions” of a particular person.

The majority of real-life situations are characterised by decisions “under uncertainty” (Tversky and Kahneman, 1974). Hansson (2004) suggests that due to human cognitive limitations, the rational individual is unable to consider all possible outcomes and their probabilities. Only some uncertain possibilities will, thus, be considered, while the reliability of other possible outcomes will be taken for granted. These considerations may, however, have cognitive biases that stem from reliance on judgemental (decision-making) heuristics commonly employed in thinking under uncertainty (Tversky and Kahneman, 1974). These heuristic principles "reduce the complex tasks of assessing probabilities and predicting values to simpler judgemental operations" (Tversky and Kahneman, 1974, p.1124). They are, however, prone to error. The first of the three heuristics, "Representativeness", deals with the judgement of the probability of an event based on its similarity or resemblance to another event. The second heuristic is called "Availability" where judgments of probability or frequency are made based on the ability to recall certain information more efficiently than other information. Lastly, the "Adjustment and Anchoring" heuristic may be employed. This heuristic relies on estimated (adjusted) data based on suggestions, incomplete information or partial computations as the basis for reaching a final conclusion or answer (Tversky and Kahneman, 1974). Dual Process Theory (DPT), the framework employed to describe these phenomena, consists of two systems. System 1 is intuitive, perceptive, automatic, emotional and unconscious, and leads to quick heuristic judgements to reduce complexity and effort. Alternatively, system 2 is rational, deliberate, attentive and analytical, requiring concentration and effort in the decision-making process (Tversky and Kahneman, 1974).

Not addressed by either Roesser et al. (2013) or Hansson (2012) (Figure 3.1), and corresponding with this dual system (DPT), is the Recognition-Primed Decision (RPD) model that falls within the Naturalistic Decision-Making (NDM) paradigm (Klein, 2008). NDM is concerned with how people actually make decisions in real-world contexts, particularly under challenging conditions such as limited time, uncertainty, high risk, ambiguous objectives, and instability (Klein, 2008). The RPD model is a combination of intuition (pattern matching) and analysis (conscious, deliberate mental simulation), and describes how people use their experience in the form of a repertoire of patterns to make extremely rapid decisions (Klein et. al., 1986). Pattern matching involves defining the primary causal factors operating in the situation and highlighting the most relevant cues, providing expectancies, identifying plausible goals, and suggesting typical types of reactions in that type of situation (Klein, 2008). Thus, when a person needs to make a decision quick reference can match the situation to the learned patterns. If a clear match is identified, then the most typical course of action can be deployed.

Where there are, however, no comparable options, a course of action is evaluated through “using mental simulation to imagine how it would play out within the context of the current situation” (Klein, 2008, p.457). In this way, extremely rapid decisions, without comparing options, can be executed (Klein, 2008). DPT, NDM/ RPD may well apply to the decision-making processes of the owner-managers in SMEs.

Modern Decision Theory (MDT), however, regards subjective probability as the quantified opinion of the ideal human being, that is, the axiomatic theory of rational decision-making (Tversky and Kahneman, 1974). Bayesian Decision Theory is an exemplar in this rule-driven domain: “For Bayesians, a rational approach to risk depends on the agents’ utilities and subjective probabilities that measure the strength of their desires and beliefs, respectively” (Roesser et al., 2013 p10). Representation theorems are the models used to show that an agents’ beliefs and desires can be represented as numerical probabilities and utilities (Roesser et al., 2013). MDT has been criticised most notably through the “Ludic Fallacy” that argues that there are inexorable deficiencies in representing reality through specific models, and that absolute reliance on models conspires against their limits (Taleb, 2007).

A Socio-Cultural Approach not addressed by either Roesser et al. (2013) or Hansson (2012) (Figure 3.1) is the Relational Theory of Risk proposed by Bonholm and Corvellec (2011). This theory is “about the interpretative nature of risk that answers the key theoretical and practical questions of why and how something is considered a risk” (p.175).The theory seeks to establish a risk relationship “between a risk object and an object at risk” (p.175). The relationship between a risk object and an object at risk is “the relationship an observer establishes between a risk object and an object at risk” (p. 180). It is socially constructed, causal and “bound to action and decisions to act” (p.181). Risk objects may be “physical, cultural, or social artifact” such as “a natural phenomenon…a manufactured product … a nationalist ideology, or a social behavior” (p. 177) and “resemble[s] hazards in the sense that they refer to something that is identified as dangerous” (p. 179). The designation of an object as risky “is a creative act, in the sense that it introduces risk into the social space... depends on conditions of possibility in the natural and social world… [and]… is culturally constrained” (p.179). Objects at risk are “endowed with a value that is considered at stake”, where value refers to something “held to be of worth, be it life, nature, principles, or a state of affairs” (p.179).

Uncertainty reduction is also a value-laden process i.e. not solely based on knowledge (information) (Hansson, 2004). It has to do with what the individual decision maker values e.g. self-preservation, human life, wealth, among many others. The logical extension of the consideration of values in the decision-making about risk is the inclusion of ethical issues. The ethical perspectives of the decision-maker influences to an extent what he/she values (Singer, 1991). Ethical considerations also form part of risk analysis and risk management when risk is defined as the probability of unwanted outcomes (Hansson, 2012). The decision, as to which “unwanted outcomes” to take into consideration, in a cost-benefit analysis will involve ethical deliberation. The ethical notions of justice, fairness, equity and autonomy must be accounted for in determining acceptability of risk (Roesser et al., 2013). This is particularly relevant to the issue of Safety.

Risk and Safety, while being closely related, are often treated as antonyms (Moller, 2012). This, however, may prove problematic as safety does not imply the absence of risk; as this is realistically potentially unachievable (Bonholm et al., 2015). Rather it denotes an “acceptable” level of risk associated with a particular possible event (Derby and Keeney, 1981). The notion of “acceptable risk” is dependent on the way in which it is determined as acceptable, and at any place or time is determined by society (public opinion and institutions) (Daniellou et al., 2011). The notions of subjective safety, concerning persons’ beliefs about safety and objective safety which is independent of such beliefs present a dichotomy (Bonholm et al., 2015) for the determination of “acceptability”. If risk is measured quantitatively, the magnitude or expected value of harm may be used to determined acceptability (Derby and Keeney, 1981). The criticism of this method is that risks, even small magnitude risks, are compounding in nature, and their additive effects may require further justification (Moller, 2012). Cost-benefits analysis may also be considered, but this method elicits objections to the comparability of risk and benefits on a single monetary basis, and that the value of the benefit may supersede the possibility of harm, leading to moral debate on aspects such as agency, rights and volition (Moller, 2012).

The consideration and treatment of risks associated with safety cannot be ignored, especially in technology based organisations (Daniellou et al., 2011). Safety related risks may be managed in various way, through inherent safety (removal of the risk), mitigation (putting safety measures in place), and safety factors (using safety reserves) or through redundancy in safety barriers (Hansson, 2012; Daniellou et al., 2011). This is particularly pertinent to manufacturing SMEs, where technology is most likely to be used in the manufacturing processes, which has led to focus in the literature on the issue of Health and Safety (Jørgensen et al., 2010; Roçu et al., 2010).

The risk constructs and approaches outlined in the preceding framework, taken collectively, suggest that contextual and descriptive definitions, together with the SME and its industry sectors, play an important role in risk analysis and management. Just as significantly, the perceptions and decision-making processes of the owner-manager contribute substantially to the conceptualisation of risk and the risk context. Risk management as a formal process will be explored next.

2.3 Risk Management

"Risk consciousness permeates almost every area of societal life" (Roesser et al., p. 23). Modern risk analysis has grown from the seeds of probability theory applied to insurance risk issues (Almer, 1967) and from "scientific methods for identifying causal links between adverse health effects and different types of hazardous activities" (Corvello and Mumpower, 1985, p. 107). Society (individuals and groups) has, historically, then responded to these identified risks by employing a variety of techniques for managing the adverse effects of these risks. These methods include, avoiding or eliminating the risk, regulating or modifying the activity to reduce the magnitude and/or frequency, reducing the vulnerability of exposed persons and property, developing and implementing post-event mitigation and recovery procedures, and instituting loss-reimbursement and loss-distribution schemes through such mechanisms as insurance systems (Corvello and Mumpower, 1985).

This “Socio-Cultural Approach”, elucidated by Renn (1992), is primarily concerned with the ways in which our conceptions of risk are formulated by social contexts in our societies (Moller, 2012), that is, “how social agents create and use boundaries to demarcate that which is dangerous” (Clarke and Short, 1993, p. 79 as cited by Moller, 2012). Individual and societal decisions regarding, for instance, elections, nuclear power, diseases and environmental issues, are made based on information regarding likelihood and consequences disseminated from a plethora of different sources using various risk analysis methods (Roesser et al., 2013).

The majority of disciplines (engineering, science, medicine, economics and finance) that use risk analysis as an integral part of their processes use similar formal models of risk that are based on objective assessments of probability, and the minimization of negative impact (Hansson, 1993). This is referred to as the “Scientific Approach” (Moller, 2012). These models take the form of formal Risk Management. Verbano and Venturini (2011) propose nine (9) main development paths in the field of risk management (RM). These include, strategic risk management (SRM), financial risk management (FRM), enterprise risk management (ERM), insurance risk management (IRM), project risk management (PRM), engineering risk management (EnRM), supply chain risk management (ScRM), disaster risk management (DRM) and clinical risk management (CRM) where the distinguishing factors are the field of application, key characteristics, risks considered, and tools and techniques used. This corroborates the propositions of Accenture (2014), Simangunsong et al. (2012), Singhal et al. (2011), Vanany et al. (2009) and Jüttner et a.. (2003) presented in section 2.2.2 ii, and themes ii and iii identified at the end of section 3.1, that specific RM approaches are required for different industries and sectors or different contexts.

Some forms of formal, documented frameworks for risk management have been developed within some of the development paths identified by Verbano and Venturini (2011). These include, the Basel Accords (1988, 2004, 2010-2018) for financial institutions, COSO (Committee of Sponsoring Organizations of the Treadway Commission), ERM Framework (2004), ISO 31000 Risk management – Principles and guidelines (2009), PMBOK (Project Management Body of Knowledge) (2017), INCOSE (The International Council on Systems Engineering) (2015), International Risk Government Centre (IRGC) (2005) – disaster risk management. These frameworks, do however, all propose a similar overarching process for Risk Management which involves risk planning, risk identification, risk analysis, risk response planning and risk monitoring and control.

For the purpose of this research, the process proposed by the ISO 31000 (2009) is chosen for elaboration because the standard was "developed through a consensus-driven process over four years, through seven drafts, and involving the input of hundreds of risk management professionals around the world" to "achieve consistency and reliability in risk management by creating a standard that would be applicable to all forms of risk" (Purdy, 2010, p.881). It also incorporates the establishing of context prior to the risk assessment process (Fig. 3.2).

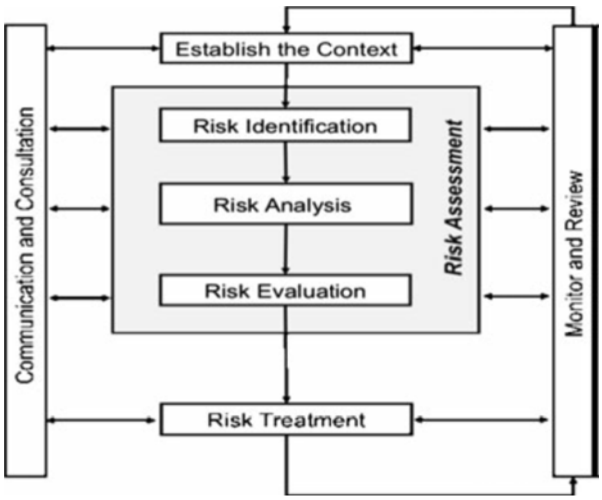


Figure 2.2 The risk management process in ISO 31000 2009 (originally from Purdy, 2010: p. 883)

The process begins with a context analysis that examines the strategic objectives for the contextual entity and the factors (external and internal) that may impact on successfully achieving these objectives. This is an essential precursor to the risk assessment process that comprises risk identification, analysis and evaluation.

Risk identification requires a systematic process that classifies and categorises potential risks to which the entity may be exposed i.e. "what could happen, how, when, and why" (Purdy, 2010, p.884), threats and opportunities, facilitating and inhibiting conditions (Verbano and Venturini, 2011). Risk analysis seeks to determine the level of risk exposure as expressed (qualitatively and or quantitatively) through a combination of risk consequences, and the likelihood of those consequences. The purpose of the analysis is to gain a detailed understanding of each risk depending on of the type of risk, the information available, and the purpose for which the risk assessment output is to be used (ISO 31000). This also requires consideration of the effect and reliability of existing controls and any control gaps (Purdy, 2010). Risk evaluation then determines a threshold of acceptability (Verbano and Venturini, 2011) through a prioritization process based on the level of risk exposure (from the risk analysis) and the contextual objectives (from the contextual analysis). This risk assessment leads to the development of a strategy or set of control processes for the handling/treatment of the various risks in order of priority. A number of potential risk responses is outlined by ISO 31000 (2009) as follows:

i. Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
ii. Taking or increasing the risk in order to pursue an opportunity;
iii. Removing the risk source;
iv. Changing the likelihood;
v. Changing the consequences;
vi. Sharing the risk with another party or parties (including contracts and risk financing);
vii. Retaining the risk by informed decision (ISO 31000:2009).

Continually guiding the above process (Fig. 3.2) are the two overarching processes of communication and consultation (with internal and external stakeholders), and monitoring and review (to ensure that appropriate responses occur to changes in the risk environment).

As mentioned above, Verbano and Venturini (2011) consider supply chain risk management (SCRM) as one of the development paths in the field of risk management. This is subsequently explored.

2.4 Supply Chain Risk Management (SCRM)

In this section the key concepts and definitions related to SCRM are distilled from the literature. To identify the existent collection of papers for review, an initial search was done on Google Scholar followed by further searches of electronic journals in the following databases: Compendex, Ebsco, Emerald, InderScience, JSTOR, Web of Science, Wiley Online Library and Science Direct. The groupings considered are SCRM definitions, vulnerability and resilience, processes and approaches. Keywords used to locate the publications were: “SCRM”, “supply chain risk management” and “literature review”. The terms “research gaps”, and “research agenda” were also included as these types of papers usually include extensive literature reviews.

Among the peer-reviewed journal literature on Supply Chain Risk Management (SCRM) that has proliferated over the last fifteen years, as the field of research has evolved, a handful of articles, critically reviewing the field, have emerged at intervals. These papers collectively provide a “state of the field” review or meta-analysis of the published literature on SCRM spanning thirteen years (2003 – 2016). The sixteen journal publications were analysed using thematic content analysis (Appendix 2.1, Table A2.1a and b) to identify definitions of supply chain risk and supply chain risk management (SCRM), risk sources and consequences, risk management strategies/process and SCRM related concepts (such as vulnerability and resilience). The following sections explore definitions of risk, supply chain risk and supply chain risk management (SCRM), the particular concepts of vulnerability and resilience, and SCRM processes.

2.4.1 Risk, Supply Chain Risk and Supply Chain Risk Management

Two perennial definitional debates appear in the literature, that is, the definition of supply chain risk and supply chain risk management (Ho et al., 2015; Collichia and Strozzi, 2012; Singhal et al., 2011; Tang and Musa, 2011).

Collichia and Strozzi (2012) and Ghadge (2012) draw on Knight (1921), as the seminal source, for defining risk. They point out that Knight distinguishes between risk and uncertainty, which are often confounded (Singhal et al., 2011) in the literature. As Knight (1921) explains, “[t]here is a fundamental distinction between the reward for taking a known risk and that for assuming a risk whose value itself is not known,” A known risk is “easily converted into an effective certainty,” or a probabilistic dimension while “true uncertainty” is “not susceptible to measurement”(I.I.26). This alludes to two measurable dimensions of risk in terms of effective uncertainty: likelihood and impact (Faisal et al. 2006). Risk can then be broadly defined as “exposure to a premise, the outcome of which is uncertain” (Rao and Goldsby, 2009, p.100).

This leads to the definition of SC risk offered by Jüttner et al. (2003) who defines ‘‘risk’’ as ‘‘the variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective values” (p.200). Supply chain risks, hence, comprise ‘‘any risks for the information, material and product flows from original supplier to the delivery of the final product for the end user’’ (p.200). Collichia and Strozzi (2012) use this risk definition. There are some minor variations on this definition, which refer to scope, presented by subsequent authors. These include, Tang and Musa (2006) who distinguish between operational (“inherent uncertainties such as uncertain customer demand, uncertain supply, and uncertain cost” (p.26)) and disruption risks (“natural and man-made disasters” (p.26)). Pfohl et al. (2010) add to Jüttner et al.’s (2003) definition that the “financial network, as well as the social and institutional network” where risk “might have negative effects on the goal achievement of single companies and the whole supply chain” (p.34). Ho et al. (2015) provide a broader definition of supply chain risk, which captures similar definitions offered by Tang and Musa (2011), Simangunsong et al. (2012) and Ghadge et al. (2012), and state that “the likelihood and impact of unexpected macro and/or micro level events or conditions that adversely influence any part of a supply chain leading to operational, tactical, or strategic level failures or irregularities” (p.5035).

Supply Chain Risk Management (SCRM) may be described through the concepts of, what should be done to manage supply chain risk, how supply chain risk should be managed and the motivation for managing supply chain risk (refer to Table 2.4b in Appendix 2). Thus, SCRM should manage risk within the supply chain (Tang and Musa, 2011; Tang, 2006; Jüttner et al., 2003) using a structured approach (Kajüter, 2003 cited by Pfohl et al., 2010) as “an extension of the within-firm risk management ideology” (Rao and Goldsby, 2009: p.101) such as enterprise risk management (Sodhi et al., 2012), and be embedded in the planning and control processes of the supply chain (supply chain management) (Sodhi et al., 2012; Kajüter, 2003 cited by Pfohl et al., 2010) .

This should be done by identifying (Singhal et al., 2011; Tang and Musa., 2011; Tang, 2006; Jüttner et al., 2003; Christopher et al., 2003 cited by Collichia and Strozzi, 2012) and assessing risks and their impacts (Singhal et al., 2011) and implementing appropriate risk management strategies (Wieland and Wallenburg, 2012 cited by Kilubi and Haasis, 2015; Collichia and Strozzi, 2012; Singhal et al., 2011) through inter-organisational collaborative efforts (Ho et al., 2015; Collichia and Strozzi, 2012; Tang and Musa., 2011; Tang, 2006; Jüttner et al., 2003). Continuous risk assessment (Wieland and Wallenburg, 2012 cited by Kilubi, 2016) using quantitative and qualitative risk management methodologies (Ho et al., 2015) facilitate this SCRM process.

SCRM is important because supply chain risk needs to be managed (Ho et al., 2015; Kajüter, 2003 cited by Pfohl et al., 2010) to reduce supply chain vulnerability (Wieland and Wallenburg, 2012 cited by Kilubi, 2016; Christopher et al., 2003 cited by Collichia and Strozzi, 2012; Jüttner et al., 2003) and to ensure profitability and continuity (Tang and Musa., 2011; Tang, 2006) of the supply chain and its individual entities.

Thus, drawing the above concepts, SCRM may be defined as, the management of risk within the supply chain by implementing appropriate risk management strategies, based on risks identified and assessed, through collaboration between supply chain partners to reduce supply chain vulnerability.

2.4.2 SCRM concepts: Vulnerability and Resilience

Two particular concepts in SCRM that are relevant to this study, by its nature, are vulnerability and resilience. The term vulnerability is interrelated to the concept of risk (Collichia and Strozzi, 2012). It may be defined as "the propensity of risk sources and risk drivers to outweigh risk mitigating strategies" (Jüttner et al., 2003: p.200) where "random disturbances [arising from risks within the SC as well as risks external to the SC (Christopher and Peck, 2004)]… lead to deviations in the supply chain from normal, expected or planned activities" (Svensson, 2000 cited by Collichia and Strozzi, 2012), thus causing adverse consequences on the supply chain. On the other hand, the concept of resilience refers to the ability of an organization to maintain its function unchanged, or nearly unchanged, when exposed to perturbations and /or to quickly return to a functioning initial state after disturbance (Collichia and Strozzi, 2012; Pfohl et al., 2010).

2.4.3 SCRM Processes

SCRM strategies should, therefore, reduce the vulnerability (Rao and Goldsby, 2009) and increase the resilience (Collichia and Strozzi, 2012) of the supply chain. The implementation of the SCRM process, based on the systematic risk management process (Pfohl et al., 2010), is advocated as the basis for achieving this. The four stages of this process, collectively derived from Ho et al., 2015; Sodhi et al., 2012; Singhal et al., 2011; Pfohl et al., 2010, are risk identification, risk assessment, risk handling and risk control.

Risk identification involves the detection of risk types, factors or both (Ho et al., 2015). Identification of risk types comprises risk classification or categorization (Ghadge et al., 2012; Singhal et al., 2011; Pfohl et al., 2010) of risk factors i.e. risk sources (Simangunsong et al., 2012; Tang and Musa, 2011; Rao and Goldsby, 2009; Jüttner et al., 2003) and/or risk drivers (Pfohl et al., 2010). Most authors (Jüttner et al.; 2003; Rao and Goldsby, 2009; Pfohl et al., 2010; Simangunsong et al., 2012; Ghadge et al., 2012; Ho et al., 2015) classify 3 primary risk sources, that is, the environmental or external uncertainties from factors outside the supply chain (external forces such as weather, earthquakes, political, regulatory and market forces) (Wagner and Bode, 2008), which are outside a company's direct areas of control; organisational uncertainties which come from the focal company; and supply chain-related (supply side and demand side, material, information and financial flows (Tang and Musa, 2011)) uncertainty that arises within the realm of control of the focal company or its supply chain variables, that cannot be predicted with certainty and that impact on the supply chain outcome variables (objectives). Rao and Goldsby (2009) add another two sources, as proposed by Ritchie and Marshall (1993), from which business and organizational risks emerge i.e. problem-specific factors and decision-maker related factors due to imprecise or wrong decision rules (Pfohl et al., 2010).

Risk assessment was not addressed in any detail by the authors who alluded to it (Pfohl et al., 2010; Singhal et al., 2011; Sodhi et al., 2012; Ho et al., 2015). Risk assessment is associated with the probability of an event occurring and the significance of the consequences (Harland, Brenchley, and Walker 2003 as cited by Ho et al. 2015). This involves the assessment of macro or environmental risk, supply and demand risk, manufacturing, financial and information risk and other general risks that impact the supply chain (Ho et al., 2015).

"To mitigate" means to "make less severe, serious, or painful" (Oxford Dictionary, 2001). The term "risk mitigation" is used by some authors to incorporate risk handling approaches that do not just mitigate risk. Singhal et al. (2012) proposes three such "risk mitigation" approaches i.e. "Shaper" where efforts are made to avoid the risk, "Acceptor" where the risks and uncertainties are accepted and managed and "Recovery" which draws on continuity management and development of quick recovery plans. Simangunsong et al. (2012) refer to similar approaches under the banner of "Uncertainty Management" strategies. These include reducing uncertainty, acceptance and minimization of the impact of uncertainty, and mitigation (lessening the adverse effects of the outcome of supply-chain activities. Tang (2006) proposes that risk may be mitigated through four basic approaches (supply management, demand management, product management, and information management) that a firm could deploy through a coordinated/collaborative mechanism.

Within the SCRM literature the risk monitoring and control process has, comparatively, received significantly less attention (Ho et al., 2015). This process monitors and controls identified risks, residual risks, identifying new risks, ensuring the execution of risk plans, and evaluating their effectiveness in reducing risk (Waters, 2010). Effective SCRM executes this process by deliberately adopting appropriate measures in order to mitigate and manage supply chain risks (Kilubi, 2016; Jüttner et al., 2003; Norrman and Jansson 2004).

Ghadge et al. (2012) and Kilubi (2016) both distinguish between proactive and reactive risk mitigation approaches. Kulubi (2016) describes the proactive approach as identifying plausible causes of supply chain risks and assessing their likelihood, and then planning and initiating appropriate counteractions before an adverse event occurs. On the other hand, the reactive approach is effect-oriented and strives to mitigate the negative impact of an incident, that is, immediate action is not taken on the risk but the aim is to arrest the harm initiated by the risk.

2.4.4 SCRM in SMEs

The next step in reviewing the SCRM literature is to explore how the aforementioned definitions, concepts and processes relate to and are applied in SMEs. The extant literature on SCRM in SMEs was reviewed in chapter 1, section 1.1.

2.5 Risk and Risk Management in Small and Medium Enterprises

Because of the limited published research on SCRM in SMEs (Thun et al., 2011; Ellegard, 2008) as outlined in Chapter 1, a review of the literature on risk and risk management in SMEs was conducted to corroborate and supplement the factors that influence SCRM in SMEs in section 1.1 (in Chapter1) and to identify key gaps in the literature. Thirty-five relevant articles, over a period of the last twenty one years (1995 – 2016), were identified and reviewed (Appendix 2.2, Table 2.2). Keywords used to locate the journal publications were: “risk” or “risk management” in “SMEs”, “Small and Medium enterprises” and/or “small business”.

This section provides a critical review of the relevant literature concerning Risk and Risk Management in Small and Medium Enterprises (SMEs). The review includes, analysing the extant literature on SCRM and SMEs in the context of the research gaps identified in section 1.1 (in Chapter 1), and then extracting relevant themes that emerge from this literature and the literature on Risk and Risk Management in SMEs.

Three overarching themes were identified in the literature and are considered in the next sections. These are the owner-manager, the risk environment and risk management practices and risk management capability (Appendix 2, Table A2.2). In conjunction with the extant literature on SCRM and SMEs presented in section 1.1 (in Chapter 1), research gaps within these themes are subsequently elucidated.

i. The Owner-manager

Wiesner et al. (2007) propose that leadership in SMEs is frequently dominated by and centred on the owner-manager, where his/her personal identity and the reputation of the firm are closely intertwined, similar to business success and personal success. SMEs show little separation between the entrepreneur's strategic thinking and decision making and firm's formal planning system (Lyles et al. 1993). In contrast to larger firms, SME owner-managers are often part of the management team where his/her intuition and experience are important for managing the firm (Dickinson, 2001). This supports the primacy and centrality of the owner and manager in the operations and decision-making of the SME (Simmons et al., 2008; Watson and Robinson, 2003; Nunes et al., 2012) as reflected in the definition of small business.

Some published studies have investigated the "subjective risk" of the owner-manager (Gilmore et al., 2004; Sauner-Leroy, 2004; Forlani and Mullins, 2000; Palich and Bagby, 1995). It is suggested that the inherent characteristics and ability of owner/managers are key determinants of the nature and level of business conducted (Simmon et al., 2009). Furthermore, the beliefs and attitudes of founding entrepreneurs have an influence on risk management practices in SMEs (Sparrow, 1999). Additionally, risk is "particularly critical to SME owners because there is little separation between business and personal risk [assets and wealth] in a SME … the majority of SME owners have a less than fully diversified investment portfolio; with the majority of their wealth being tied up, either directly or indirectly (as security), in their businesses” (Watson and Robinson 2003, p778). This is corroborated by Gilmore et al. (2004), who conclude that owner-managers are reluctant to engage in activities that may “jeopardise the relative security that they worked so hard to attain” (p358). Sauner-Leroy (2004) emphasises that “the manager’s behavior with regard to risk is an important and even crucial parameter in the explanation of actual risk taking” (p14). Some research has been conducted on risk perceptions of entrepreneurs regarding new business ventures (Palich and Bagby, 1995; Forlani and Mullins, 2000), but these studies do not address risk in the daily operations of the SME (Gilmore et al., 2004). The above is supported by the findings of Murray and Barajas (2014) and Niemann et al. (2018) with regard to supply chain risk outlined in section 1.1 in chapter1.

Owner-managers are, thus, pivotal to risk management and supply chain risk management, and to understanding risk management and supply chain risk management in SMEs. There is, however, not a clear or coherent understanding of the nature of the influence of the owner-manager in this realm. This presents a gap in the research on risk management and supply chain risk management in SMEs.

The owner-manager and the entrepreneur are often treated synonymously, resulting in the owner-manager being attributed with particular risk-taking characteristics. This is possibly due to risk propensity featuring in most definitions of the characteristics of entrepreneurs, although it is still debated (Antonites and Wordsworth, 2009; Palich and Bagby, 1995). On the one hand, this risk-taking propensity is seen to be moderated and calculated as opposed to extreme and uncontrolled risk-taking (Morris et al., 2008). The “value of the risk-taking dimension is that it orients the firm towards the absorption of uncertainty as opposed to a paralyzing fear of it” (Kraus et al., 2012, p166). On the other hand, Palich and Bagby (1995) suggest that entrepreneurs do not see themselves as risk takers. Their pursuit of opportunities that others may disregard is attributed to their perception of a positive outcome rather than a predisposition towards risk-taking. Also, potentially contributing to the notion that entrepreneurs are risk-takers is that Busenitz and Barney (1997) found that entrepreneurs are inclined to employ heuristics and biases to simplify and speed their decision making in the complex and risky decision environments. This may suggest that entrepreneurs do not spend enough time assessing the situation and considering the options, hence, labelling them as risk-takers.

Equating the owner-manager with the entrepreneur is problematic as owner-managers and entrepreneurs may exhibit different characteristics (Carland et al., 1984; Begley and Boyd, 1987). Carland et al. (1984) make the distinction based on the purpose of establishing the business, where the entrepreneur's objectives are profit and growth, as opposed to the small business owner desiring to further his/her personal goals. The entrepreneurial business will be "characterized principally by innovative behaviour and will employ strategic management practices in the business" (p.358) whereas the small business is the "primary source of income and will consume the majority of one's time and resources … [and] [t]he owner perceives the business as an extension of his or her personality, intricately bound with family needs and desires" (p.358). Begley and Boyd (1987), however, distinguish the entrepreneur as the founder of the enterprise whereas the non-entrepreneur is a "chief executive who is running a small business firm that he/she did not found" (p.100). There is, thus, no conclusive evidence in the literature as to whether the risk taking propensity of the entrepreneur is higher than that of the non-entrepreneur or whether the owner-manager (non-entrepreneur) is distinguishable from the entrepreneur. For the purpose of this research they will be treated synonymously.

Numerous notions of the nature of risk in SMEs are implied in the literature. These include, "variability in possible outcomes" where entrepreneurs "appeared willing to accept a considerable degree of hazard, or possible downside …presumably in pursuit of potentially significant gains" (Forlani and Mullins 2000, p.305), the use of the standard deviation in profit as the variability (risk) measure (Watson and Robinson 2003), uncertainty, defined as "any unpredictable event that disturbs the production process in a manufacturing system" (Koh and

Saad 2006, p.110) where fire-fighting techniques are employed to deal with uncertainty (Koh et al., 2000), discontinuity in "production lines, supply chain and infrastructure provision" where "'continuity of business' supported by good planning and robust technical systems was emphasised but more as part of business as usual, than of resilience" (Sullivan-Taylor and Branicki 2011, p.5572).

Hence, no singular notion of risk has been associated with SMEs. This, thus, requires further investigation.

ii. The Risk Environment

Risk in SMEs has also been studied from within many different risk contexts, including macro-economic (Kraus et al., 2012; Gunasekaran et al., 2011; Ma and Lin, 2010; Sauer-Leroy, 2004), financial (Nunes et al., 2012; McConaughy et al., 2001; Altman and Sabato, 2007; Antonites and Wordsworth, 2009; Gilmore et al., 2004), legislative (Tang and Tang, 2012), technological (Faisal et al., 2006), health and safety (Jørgensen et al., 2010), human resources (Gunasekaran et al., 2011; Howard and Jawahar, 2002), supply chain risks (Faisal et al., 2006; Sullivan-Taylor and Branicki, 2006; Gunasekaran et al., 2011); research and development (Nunes et al., 2012); and environmental (Wedawatta and Ingirige, 2012). These suggest that SMEs operate within complex risk environments, where "different industries and sectors have different business environments, opportunities and limitations" (Singhal et al., 2011: p.34) and, thus, requires the assimilation of risk issues from industry practice (Kilubi 2016).

In review of the risk and risk management literature in SMEs, Verbano and Venturini (2013) reviewed 33 articles on risk management for small and medium firms, published in English between 1999 and early 2009. Most articles (more than half) focused on operational risk (information technology, production planning and process management), followed by financial risk (about a third) (access to finance), strategic risk (the remainder) (innovation), suggesting that research is required in more diverse risk categories and environments. This research explores the diversity in risk categories in the SME companies that formed part of this study.

The risk environment is, hence, an important factor in the understanding of risk and risk management (including supply chain risk and supply chain risk management) in SMEs, and requires further investigation.

iii. Risk Management Practices and Risk Management Capability

According to Verbano and Venturini (2013) about one-third of the papers they reviewed focused on the whole risk management process, with risk evaluation and risk identification being the next focal areas. Risk treatment received the least focus where only four possible handling techniques were suggested (i.e. retention, avoidance, sharing and reduction). This would suggest that when considering the limited resources of SMEs (Sullivan-Taylor and Branicki, 2006; Gunasekaran et al., 2011), it would not seem feasible that formal specialized risk management (RM) processes would be utilized by SMEs. Many formal RM approaches, designed specifically for large organizations, are too complicated and costly for SMEs (Gao et al., 2011). Their resource constraints prohibit them from employing specialists at every position in the firm, thus their focus is on their core business with generalists in the administration functions (Matthews and Scott 1995).

Risk contexts, external to the SME, such as economic, politic, social-economic and technological factors frequently determine whether an SME is successful or not (Wiesner et al., 2007). To a large extent these factors are outside the control of a single owner-manager, but in contrast, the owner-manager has significant control over the employment of management strategies, and the choice of employing particular management practices in the organisation (Wiesner et al., 2007).

SMEs, "when compared to large enterprises…[appear]… to manage risk by following a reactive, informal or apparently unstructured, intuitive and incremental approach …rather than there being one 'ideal' risk management profile…" (Poba-Nzaou and Raymond, 2011 p.185-186 citing Bergeron et al., 2004). This is corroborated Murray and Barajas (2014), Norlaile and Aby Bakar (2015), Thun et al. (2011) and Ellegaard (2008) with respect to supply chain risk management as outlined in section 1.1 of chapter 1.

Corvellec (2009) suggests that the nature of risk management should be explored in such a way that the practice of managers in risky situations, involving “hazards and uncertainty”, are accounted for and revealed. This must be “inclusive of what these practices reflect in terms of organisational learning, ideological options and organisational power games, even in organisational contexts in which people do not openly use a risk vocabulary to deal with contingencies” (p.300). He cautions that the “[m]echanical implementations of set risk management models are not only likely to destabilise and disrupt existing practices of risk management, but they may even increase the risks that the organisation is exposed to” (p.301).

There is, thus, a gap in the way in which risk management in general and by extension supply chain risk management is explored in SMEs, that takes into account the practice of managers in risky situations.

The lack of recognition of the implicit risk management practices in SMEs may have, subsequently, resulted in the risk management capability of SMEs being criticized and challenged in the literature. This lack of capability is attributed to deficiency of infrastructure, RM skills, human capital and adequate management knowledge and training (Blanc Alquier and Lagasse Tignol, 2006; Gao et al., 2011). While this may be the case other researchers consider SMEs to possess some survival instincts through their exposure to a higher level of environmental uncertainty and strength in terms of behavioural characteristics such as flexibility, adaptability and innovation (Sullivan-Taylor and Branicki, 2006).

The assessment of the risk management capability of SMEs, consequently, presents a gap that requires further research.

2.6 Research Gaps

The research gaps and key themes that emerge from the literature reviewed on risk and risk management in SMEs are the owner - manager (OM), the risk environment, risk management practices and risk management capability. These are summarised as follows:

i. The OM theme addresses the centrality of the OM in the SME and the lack of separation between the OM and the firm. The theme includes the ‘subjective’ notion of risk according to the beliefs and attitudes of the OM, how the OM views risk, and the risk-taking propensity of the OM (vs that of the entrepreneur). Further research on risk management and supply chain risk management in SMEs is required to enhance the understanding of the nature of the influence of the owner-manager in this realm. In addition, associated with this gap is the fact that no singular notion of risk has been associated with SMEs, and hence, requires further research.

ii. The risk environment, in the literature, has largely focused on the macro-environment, which is external to the SME, while little has been researched or written about Supply Chain Risk Management (SCRM) in SMEs. The risk environment is an important factor in the understanding of risk and risk management (including supply chain risk and supply chain risk management) in SMEs, and requires further investigation.

iii. The formal risk management (RM) approach has been largely referred to in the literature as what should be implemented, in whatever form, by SMEs, and has been used as the benchmark against which to evaluate the Risk Management Capability of SMEs. The informal, inherent approach to RM has started emerging in the literature as a possible, legitimate practice for managing risk in SMEs. This alludes to gaps in how risk management and by extension, supply chain risk management, is explored in SMEs that takes into account the practice of managers in risky situations, and how risk management capability is assessed in SMEs. This research attempts to address this gap as one of its contributions.

The next chapter builds on the literature review in this chapter and develops a conceptual framework that is used as a basis for the rest of this study.

CHAPTER 3

CONCEPTUAL FRAMEWORK

The Conceptual Framework that forms the theoretical basis, founded in Risk Theory, for this research is developed in this chapter. This is achieved by building on the key themes that emerged from the critical review of the relevant literature in Chapter 2. Each concept in the framework is further elaborated from the literature to enable the development of research and sub-research questions associated with the concept. These questions are used to develop the protocols in chapter 4.

3.1 Key Themes from the Literature

Integrating the themes and patterns from the literature on SCRM, risk and risk management in SMEs from Chapter 2, the following key areas of focus and/or interest are identified:

i. **The Owner-manager**

The OM theme addresses the centrality on the OM in the SME and the lack of separation between the OM and the firm, the 'subjective' notion of risk according to the beliefs and attitudes of the OM, how the OM views risk, and the risk-taking propensity of the OM (vs that of the entrepreneur). SME owner-managers make supply chain decisions based on a variety of inputs, or sometimes exclusively based on intuition. Perception of supply chain risk is also dependent on the owner-manager and the position of the company in the supply chain with regard to activity sector and markets (regional, nation, global) (Lavastre et al., 2014).

ii. **Company characteristics**

Specific company characteristics such as size (turn over, number of employees), age, internal structure, structure, as well as qualitative characteristics, like flexibility, maturity, level of power and relation to the focal firm in the supply chain influence SCRM in an organization

iii. **The risk environment**

Risk sources, that is, the environmental or external uncertainties from factors outside the supply chain (external forces such as weather, earthquakes, political, regulatory and market forces which are outside a company's direct areas of control; organisational uncertainties which come from the focal company; and supply chain-related (supply side and demand side, material, information and financial flows) uncertainty that arises within the realm of control of the focal company or its supply chain variables, that cannot be predicted with certainty and that impact on the supply chain outcome variables (objectives)

iv. **The risk management process**

a. Formal processes that involve risk identification, risk evaluation, risk handling (techniques, such as, collaboration) and risk control, including tools and techniques versus Informal processes encompassing inherent undocumented heuristic practices that manage risk

b. Proactive approach in which the identification of plausible causes of supply chain risks and assessing their likelihood, and then planning and initiating appropriate counteractions before an adverse event occurs versus Reactive approach which are effect-oriented and strive to mitigate the negative impact of an incident, that is, immediate action is not taken on the risk but the aim is to arrest the harm initiated by the risk.

v. **Risk management capability (RMC)**

This has been largely unexplored in the literature. Literature that has examined risk management capability in SMEs has been critical potentially reviewing RMC from the perspective of large organizational measures. This provides scope for developing a means of evaluating RMC for SMEs.

These themes form the basis from which the conceptual framework is developed.

3.2 SME SCRM Framework Development

Drawing on the themes identified in the extant literature on risk and SCRM in SMEs (Chapter 1 and Chapter 2), the risk constructs in the conceptual risk theory framework (Fig 3.1) and the ISO 31000 (2009) standard, and positioning them in the context of the definition of the SME, the framework in Figure 3.1, is developed. The framework brings together the notions of "subjective risk" of the owner-manager and descriptive-based decision-making with implicit practice-based risk management.

In Fig. 3.1, the owner-manager, through his/her perceptions (including risk), knowledge and skills, filters what he/she sees and perceives as risks (through environmental scanning) in the macro-environment, supply chain environment and within the company. These filtered perceptions are translated by the owner-manager into informal principles, policies and processes for the management of risk (including supply chain risk) in the company environment. The degree of success of these informal principles, policies and processes in managing risk (including supply chain risk) may be evaluated and interpreted as (Supply Chain) Risk Management Capability. This is description expanded on in the next pages through the related theory. Research questions (RQ) are concurrently developed for the constructs in the framework. The research questions (RQ) are formulated in the theory-language of the particular field of study, that is, the theoretical or conceptual framework (Wengraf, 2001), while the sub-research questions (sRQ) are specific to the context of the particular research study.

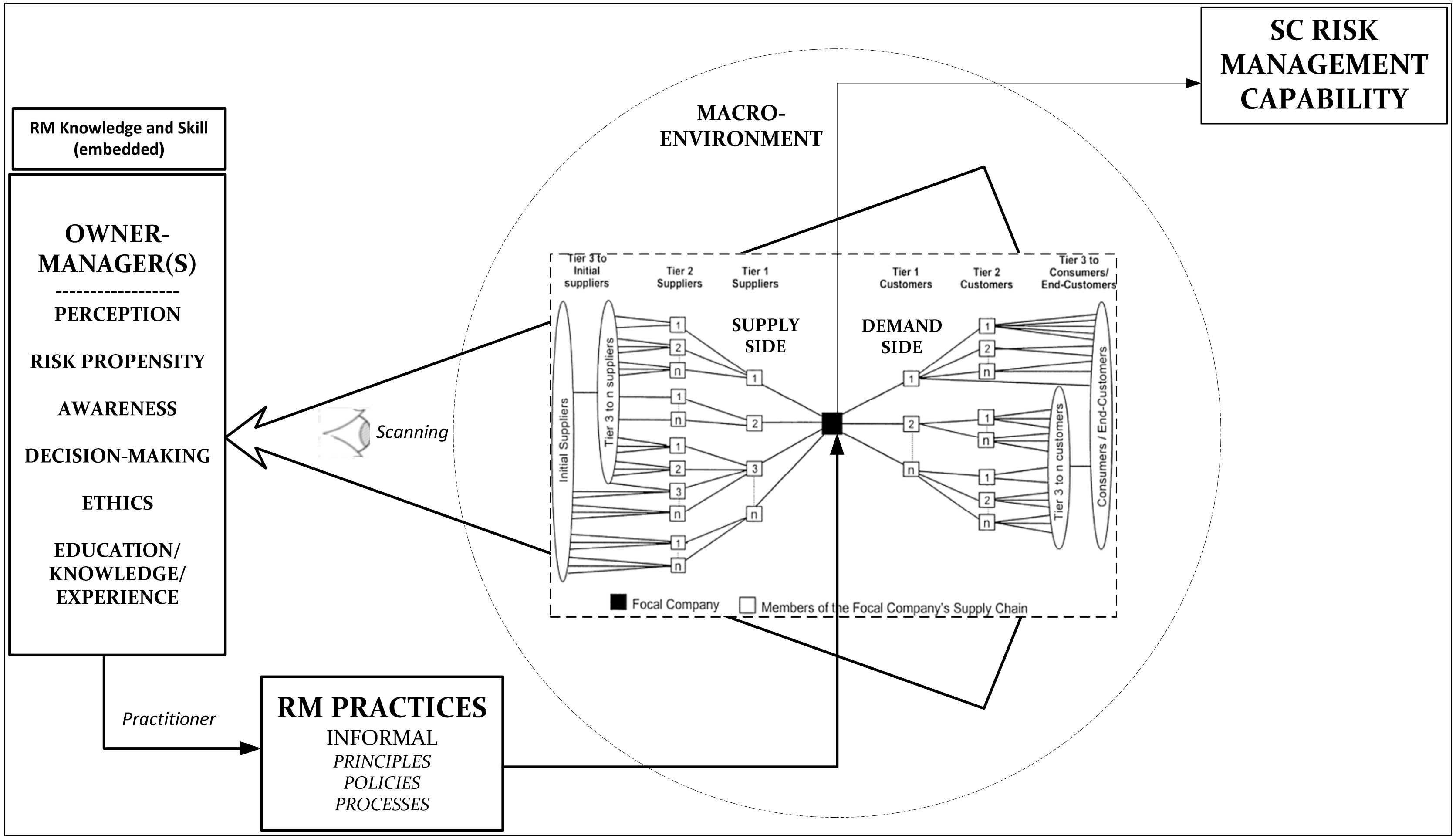


Figure 3.1 "Practice Approach" SCRM Conceptual Framework for SMEs (Supply Chain Map (from Slack and Lewis, 2011))

The framework (Fig. 3.3) places the owner-manager as pivotal, where his/her “subjective risk” assessments, perceptions, values and decisions-making processes have a significant influence, acting as a filter, on how risk is defined, of what information and knowledge is used for risk decision-making, the level of risk that is accepted within the enterprise and how it is dealt with in the form of informal business-as-usual practices. The education and, the knowledge and experience of the owner-manager are also included, as studies have shown that higher levels of these attributes in owner-managers have a positive impact on the capabilities and performance of the organisation (Kasseeah, 2012; Van Der Sluis et al., 2007; Gray, 2006). This leads to the first research (RQ) and sub-research (sRQ) questions,

RQ1: What does supply chain risk mean for SMEs, and in particular for the individual owner-manager?

> *sRQ1: How do manufacturing SME owner-managers in South Africa perceive risk in their businesses and in particular in their Supply Chains?*

As has already been mentioned in the key themes identified in section 3.1, the focal company characteristics, such as size (turn over, number of employees), age, internal structure, as well as qualitative characteristics, like flexibility, maturity, level of power and relation to the focal firm in the supply chain, influence SCRM in an organization. The following questions may then be posed,

RQ2: How does the nature of the SME (classification, life-cycle phase/maturity, history of survival, standards implemented, products, industrial sector, and supply chain structure) play a role in the supply chain risk management of the SME?

> *sRQ2: What is the nature of manufacturing SMEs in South Africa?*

The environment in which SMEs operate is the same as that of their larger counterparts. Within this environment, marketplace information is critical for firms to make informed decisions (Mohan-Neill, 1995). Mohan-Neill (1995) note that “Brush (1992) categorized studies on marketplace information scanning in entrepreneurship into three groups: (1) business planning behaviors; (2) market research activities; and (3) environmental scanning. Fahey and King (1977) characterized environmental scanning as “the process of seeking and collecting information about events and relationships in a company's environment” (p.11). The authors point out that market research activities are the methods utilized in the process of environmental scanning. These activities can be formal or informal according to Daft and Weick (1984) and business planning behaviours are the utilization of the information acquired by the venture (Mohan-Neill, 1995). The developed framework includes the supply chain and the internal organisation (focal company) environments in the scanning process. The supply chain is the system of organizations, people, technologies, activities, information and resources involved in moving materials, products and services through the manufacturing process, from the original supplier of materials (supply side) to the end customer (demand side) (Dorwood, 2015). The internal organisational environment comprises processes, people and systems within the firm including legal aspects, but excludes strategic and reputational facets (Girling et al., 2010).

In organisation studies, the notion of organisational practice is receiving increasing attention (Geiger, 2009; Gherardi, 2009) intending to provide “a new method for studying organizations beyond the formal, quantifiable and abstract” (Geiger, 2009, p.129). These studies have their foundations in Practice Theory, but Schatzi (2001) points out that there is no unified practice approach (p.11). The notion of a ‘practice’ has frequently been interpreted as synonymous with ‘routine’, or ‘what people really do’ (Gherardi, 2009). Additionally, ‘practice’ may refer to ‘performance in a range of professional situations’ and to ‘an element of repetition’ (Schön, 1983). Practices, thus, refer to a variety of human activities in which managers are involved in the execution of their regular professional activities (Schatzki, 2001) and organised by the a priori understandings, preferences, rules, routines, goals and structures that characterise an organisation (Corvellec, 2009). These practices are an assembly of experience-based rules (undesigned) that have been institutionalised, and now build an operational mode that is idiosyncratic to organisation and its commercial partners (Corvellec, 2009). Corvellec (2009) continues to explain that the management of risk unfolds within the tactics of everyday management and evolves incrementally, for example, from interactions with heterogeneous and circumstantial elements and are full of discoveries and even surprise. Risk management practices, take place on a micro-level and are embedded in the macro-social web of symbolic, technological, legal or economical elements of prevailing world views (Corvellec, 2009). They function as the locus “where bits and pieces of influential political, economic, symbolic or discursive structures, to name but a few, are combined in specific, but not always clearly identifiable, ways. Situated in endless patterns of contextual embeddedness to which they give an actual expression, risk management practices are observable, but too contingent to be amenable to prediction” (Corvellec, 2009: pp.299-300). Thus,

RQ3: How do SME owner-managers make decisions about supply chain risk in their businesses?

> *sRQ3.1: How do owner-managers of manufacturing SMEs in South Africa assess risk in their Supply Chains? (Risk Identification)*
> *sRQ3.2: What do owner-managers of manufacturing SMEs in South Africa consider to be the most prevalent risks in their Supply Chains?(Risk Analysis)*
> *sRQ3.3: What actions (if any) do owner-managers of manufacturing SMEs in South Africa take when a risk is identified? (Risk Response/Handling)*

“These practices may be assessed and inferred as Risk Management Capability (RMC). A capability may be defined as the ability or power to do something (Soanes et al., 2001). Risk Management Capability has been assessed through RMC Maturity Models (Cienfuegos, 2013), where the objective is to measure the level of sophistication of organizational processes and facilitate the implementation of best practices. Cienfuegos (2013) cites the most widely utilised framework applying the maturity method to risk management was proposed by Hillson (1997). This model proposes four maturity levels (naive, novice, normalized, natural), which are measured in terms of four attributes (culture, process, experience and application) (Ren and Yeo, 2004; Hillson, 1997).

Cienfuegos (2013), however, points out that most of the models refer to a formal approach to risk management or the improvement of existing approaches, are diagnostic tools and are often representative of the large project and IT-oriented firms. It does not, thus, seem appropriate to use maturity models to assess RMC in SMEs. Risk Management Capability is, according to Gao et al. (2011), the creation and enhancement of the ability to develop and implement related strategies, techniques and systems in RM and to share and transfer RM practice" (Sunjka and Emwanu, 2015: p 1477). This leads to,

RQ4: How can Risk Management and SCRM Capability be assessed in SMEs?

sRQ4: What is the SCRM capability of manufacturing SMEs in South Africa?

3.2.1 Risk Management Capability

In the absence of appropriate models to assess risk management capability in SMEs, the following framework, developed by Lindbom et al. (2015), is broadly adapted (Chapter 3 and 4) to determine the RMC of the SME/OM. A detailed exposition of the framework is, thus, provided.

Lindbom et al. (2015), in seeking to relate capability and risk through reviewing thousands of associated papers, found that the concept of capability is seldom defined. From those definitions of capability that are related to risk, they discern the following trends:

"(1) capability is equated to resources,
(2) resources constitute an important component of capability" (p.47),

There, thus, appears to be a perceived link between capability and resources, but the nature of this association is problematic to define in relation to risk.

"(3) capability describes the ability to do something,
(4) capability is a capacity, and
(5) capability is a factor affecting an outcome or goal" (p.47)

Therefore, "capacity refers to the ability to prepare" and, thus, affects "the ability" to respond (capability) (p.47).

Lindbom et al. (2015) believe that capability to respond is not only related to available resources but to the nature of the event and the way in which resources are utilized in response to the particular event. With this as the premise, they proceed to develop a definition of capability as associated with established definitions of risk. They use Aven's (2012) ACU risk framework, which highlights "events (A), consequences (C), and uncertainties (U)" (p.47), as a basis. Risk is, thus, defined as "the uncertainty about and severity of the consequences of an event" (p. 47). Their utilization of the ACU framework is motivated by the argument that the event determines the level capability (low vs high) to manage the event and this capability, thus, governs the consequences of the event. They continue to argue that "this framework implicitly includes capability through the consequences, as these are said to depend on performance barriers (e.g. resources, level of competence and management attitude)" (p. 47).

They present a definition of the capability based on the following assumptions,

(1) Capability is associated with an agent (an organization, a person, a technical system or anything, for which capability is described).
(2) The capability of an agent is related to the ability to perform a task
(3) This capability is related to the ability to respond to a particular type of event i.e. risk-related event

Therefore, the capability of an agent to perform the task in an event is, thus, defined as (Lindbom et al., 2015),

Capability (definition) $= (C_T, U \mid A, T)$

The capability (the degree of success i.e. focus on what can be done) to perform a task (T) is reflected in the uncertainty (U) about and the severity of the consequences (C_T) of the task or activity given the occurrence of the initiating event (A). The evaluation of capability is, therefore, expressed in the ability to perform a task in such a way as to ensure the most positive outcome as a result of a initiating event, that, unaddressed will result in undesired consequences. For example, the number of lives saved by rescue workers, as opposed to, the number of lives lost had no rescue effort been deployed, or because the rescue effort was not executed as effectively as possible.

To assess capability, however, it needs to be described (Lindbom et al., 2015). This requires "descriptions of the initiating event (A), the performed task (T), the consequences (C_T) associated with the performed task, as well as, the uncertainties (U) concerning these consequences (Q) and the background knowledge (K), which form the basis for these descriptions"(p.47). The following expression, thus, presents a description of capability (Lindbom et al., 2015: p47),

Capability (description) = $(C_T, Q, K \mid A, T)$

The measure describing "uncertainties is subjective (knowledge-based, judgmental, Bayesian), and is dependent on the assessor's background knowledge" (p.47), in accordance with Aven (2012). Thus, capability can be described using "subjective probabilities to describe the uncertainty regarding the consequences associated with the performed task conditional on the fact that the event occurs and the task is performed" (p 47). "It also involves the description of the background knowledge, that forms the basis for the assessment and which is integral to the description of capability" (p.47). Hence, in "producing representations or descriptions of uncertainties and consequences, it may be necessary to use various assumptions, for example, models, previous experience and/or logical reasoning" (p 47). Lindbom et al. (2015) conclude that this definition of capability and its "descriptions, that include event, task, consequences associated with the performed task, uncertainties and knowledge base", is potentially "more useful than simply a list of resources and procedures" (p.47).

The descriptions of these parameters are essentially what is observed, perceived and interpreted by the person reporting on these factors. In the case of this research, the person would be the owner-manager of the SME.

This RMC framework is adapted and developed for SMEs in chapter 4 through this research.

3.3 Operationalising the Framework

Operationalisation is the process of connecting, via the use of indicators, the concepts in the framework to observable characteristics of the phenomenon (Gutierrez Perez and Pozo Llorente, 2006; Wengraf 2001). Conceptualisation specifies the meaning of a term, whereas operationalisation identifies the specific set of rules that will be used to indicate that the concept is present or not (Engel and Schutt, 2013). Empirical indicators are measurements, observations or data that are accepted as evidence for a particular theoretical concept (Wengraf, 2001). Indicators can be either quantitative or qualitative. Qualitative indicators are utilized for this framework as they demonstrate or describe qualities and characteristics, answering questions of Who? Where? What? and Why? (Mayoux, 2002).

A set of operational measures is developed from the literature for each conceptual grouping in the framework (Appendix 3.1), that is, Risk Management Capability and Practices (Table 3.1a), the Owner-manager Profile (Table 3.2b), Nature of the SME (Table 3.2c), Company Operational Risks (Table 3.2d), and Supply Chain Risks and Macro- Environmental Risks (Table 3.2e). The purpose of each concept is proposed with definitions and measures for each of the constructs within the concepts.

3.4 In Summary

In light of the disparate research on SCRM, risk management in SMEs, and the lack of a formal benchmark model for the assessment of risk management capability in SMEs, this research provides a foundation, in the form of a Supply Chain Risk Management Framework, for the investigation and understanding of supply chain risk management in SMEs. The development of the framework draws on themes identified in the extant literature on SCRM, risk and risk management in SMEs as the point of departure for the exploration of the theory of risk and associated constructs that describe the nature of SMEs. These conceptual ideas or theoretical constructs are then depicted graphically as a conceptual framework (Fig. 2.3), showing how they interact and interplay with each other. The main theoretical constructs of the conceptual framework are linked through the owner-manager who is the primary pursuer, collector and filter of information about events and relationships (risks) in the company's environment (external, supply chain and internal). The owner-manager is also the primary processor (decision-maker) of this information based on his knowledge, experience, perceptions, values and beliefs. Where there are no formal risk management processes, it is expected that inherent practices, that address risk in the company environment, will become evident. These will have evolved over time and through the management and leadership of the owner-manager. These risk management practices in the form of informal principles, policies and procedures, may be interpreted as Risk Management Capability.

The next chapter describes the development of the research design and method employed to empirically develop the theoretical framework constructs and assess the Supply Chain Risk Management Capability of the SMEs.

CHAPTER 4

RESEARCH DESIGN AND METHOD

This chapter describes the development of the research design and method, through which the conceptual framework to explore the status of SCRM, and then assess the risk management capability (RMC) of manufacturing SMEs in South Africa, is operationalised. The outline of the chapter is shown below.

4.1 Philosophical Paradigm

Describes the philosophical paradigm for this research

4.2 Methodological Approach

Motivates for a holistic multiple case study approach

4.3 Case Study Design for Validity and Reliability

Addresses in the design of this case study project

4.3.1 Construct Validity
4.3.2 Internal Validity
4.3.3 External Validity
4.3.4 Reliability
4.3.5 This Research: Validity and Reliability

4.4 The Case Study Protocol

Elaborates on the following:

4.4.1 Introduction to the Case Study Project
4.4.2 Data Collection Procedures
4.4.3 Analytical Strategy
4.4.4 Case Study Report Format

4.4.1 Introduction to the Case Study Project

The Critical Research Question, key premise, research and sub-research questions, the theoretical framework and the rationale for selecting the cases are reiterated.

4.4.1.1 Case Study Design
4.4.1.2 The rationale for selecting the cases
4.4.1.3 Ethics Clearance

4.4.2 Data Collection Procedures

4.4.2.1 The Survey (June 2014)

The survey design and data collection process is described.

4.4.2.2 Site Visits (July – November 2014)

The companies visited are presented; the semi-structured interview design and observation protocols are described.

4.4.3 Analytical Strategy

The multiple case study analytic strategy is described.

4.4.3.1 Within-case Analysis

Thematic Analysis, Coding and the choice of Causation Coding and the Analytical regime developed for this study is elaborated.

4.4.3.2 Cross Case Analysis

The cross-case analysis utilized in this study is described.

4.4.3.3 Macro-Environmental Risk Analysis

4.4.4 Case Study Report Format

The format of each case study report is outlined with sections that address the various research questions.

4.1 Philosophical Paradigm

Cresswell (2014) suggests that the worldview of a study should address the philosophical paradigm proposed in the research, a definition of the fundamental notions of the paradigm, and how the paradigm guided the research design.

The philosophical paradigm proposed for this study is post-positivistic critical realism.

Post-positivism presents both an epistemological (methodological approach to understanding the world and creating knowledge) and ontological (a stance on the nature of reality) philosophical paradigm (Fox, 2008). It challenges the positivistic assertions on the absolute truth of knowledge (Phillips and Burbules, 2000) broadening the spectrum of approaches available for understanding the world and generating knowledge, particularly “when studying the behaviour and actions of humans” (Cresswell, 2014 p 7). In the post-positivistic research paradigm the nature of reality is perceived more flexibly as “multiple, subjective, and mentally constructed by individuals” (Crossan, 2003: p52) where “true objectivity in seeking absolute truths can be an elusive goal” (Leedy and Ormrod, 2015 p7).

Post-positivism does, however, strive to seek and establish 'warranted assertibility', i.e. valid and reliable evidence for the existence of phenomena (Crossan, 2003; Forbes et al., 1999; Philips, 1990). This may be accomplished through the use of both qualitative and quantitative methods (Crossan, 2003) and is described as critical multiplism (Guba and Lincoln 1998). The term “critical” incorporates the positivistic requirements for “rigour, precision, logical reasoning and attention to evidence … [but]… is not confined to what can be physically observed” (Cook, 1985: p.52), while “multiplism” refers to the multiplicity of perspectives from which research may be approached and in the defining of research goals, research questions, methods and analyses, and the interpretation of results (Cook, 1985). Crossan (2003) explains that “[t]he use of flexible and multiple methods is desirable as a way of studying a small sample in depth over time that can establish warranted assertibility as opposed to absolute truth. The researcher interacts with those being researched, and findings are the outcome of this interactive process with a focus on meaning and understanding the situation or phenomenon under examination” (p 52).

Because post-positivistic approaches predominantly involve human beings, certain biases are introduced into the research, such as the way in which the researcher decides to measure variables and make the most logical inferences (Leedy and Ormrod, 2015). This fallibility in post-positivistic research has spurned an emphasis on “multiple measures and observations, each of which may possess different types of error, and the need to use triangulation across these multiple errorful sources” (Trochim, 2002, p. 52). Cresswell (2014) stresses the importance of cautious “observation and measurement of the objective reality” (p.7) accompanied by the development of “numeric measure of observations and studying the behavior of individuals” (p.7). Thus, “progress toward genuine understandings of physical, social, and psychological phenomena tends to be gradual and probabilistic” (Leedy and Ormrod, 2015: p7). As Leedy and Ormrod (2015) point out “…Postpositivists don’t say, “I’ve just proven such-and-such.” Rather, they’re more likely to say, “This increases the probability that such-and-such is true” (p.8).

Trochim (2002) indicates that Critical Realism.is one of the “most common forms of post-positivism” (p. 52) and “has gained widespread acceptance in the philosophy of science” (Maxwell, 2012: p.43). Critical Realism emanated from the work of Bhaskar in the 1970s and 1980s (Fletcher, 2017). Maxwell (2012) explains that critical realism combines “ontological realism: the belief that there is a real world that exists independently of our perceptions and theories …[with]…epistemological constructivism: Our understanding of this world is inevitably our construction, rather than a purely objective perception of reality, and no such construction can claim absolute truth …” (p 43). So the “post-positivist critical realist recognizes that all observation is fallible and has error and that all theory is revisable…the critical realist is critical of our ability to know reality with certainty… [and]… believes that the goal of science is to hold steadfastly to the goal of getting it right about reality, even though we can never achieve that goal…” (Trochim, 2002: p. 53).

The philosophical paradigm informs the methodological approach. Critical Realism (CR) “functions as a general methodological framework for research but is not associated with any particular set of methods” (Fletcher, 2017: p182). It, thus, accommodates a variety of methodological approaches (qualitative and quantitative) based in diverse philosophical foundations (Zachariadis et al., 2013). Research in the critical realist paradigm usually originates with “particular problem or question, which has been guided by theory…initial theory facilitates a deeper analysis that can support, elaborate, or deny that theory to help build a new and more accurate explanation of reality” (Fletcher, 2017: p184). Fletcher (2017) argues that a “flexible deductive approach…is more consistent with CR ontology and epistemology” (p.182).

In the light of the above, the next section motivates the methodological approach used for this research.

4.2 Methodological Approach

The methodological approach describes the collection of research strategies or designs i.e. inquiry procedures, together with the techniques, specific methods of data collection, analysis and interpretation that together form a particular research approach (Creswell, 2014; Richards and Morse, 2013). The selected research approach will depend on the nature of the research problem or purpose, the research questions and/or hypotheses (Creswell, 2014; Yin, 2009), the type of data to be collected (Leedy and Ormrod, 2015) and, often, but not always, on “an explicit or implicit theoretical framework that carries assumptions about social ‘reality’ and how it is understood” (Richards and Morse, 2013, p. 5).

This research explored the status of SCRM (“the phenomenon”) in manufacturing SMEs in South Africa (“real-life context”), where limited research exists (“the existing body of knowledge is insufficient to permit the posing of causal questions”), and then made some assessments of their risk management capability (RMC). The exploration and assessment were guided by the elaboration of the constructs of the conceptual/theoretical framework developed in chapter 3. Thus, while this study is largely exploratory in nature - a “what” question is posed (Yin, 2009); in probing this question, the study attempts to answer the theoretical questions proposed through the framework (Fig 3.3).

Research approaches may be, in general, qualitative, quantitative or mixed (a combination of these) in nature (Leedy and Ormrod, 2015; Creswell, 2014; Trochim, 2004). While these approaches are not discrete, an inquiry may be weighted more to one approach than the other (Cresswell, 2014). There are different methodological approaches or designs, within the qualitative research genre, that employ varying procedures and research instruments based on the philosophical lens or paradigm of the researcher. These include ethnography, phenomenology, grounded theory, narrative, discourse and content analysis and case study reserach (Leedy and Ormrod, 2015; Miles et al., 2014; Cresswell, 2014; Richards and Morse, 2013; Trochim, 2004).

While ethnography explores phenomena within particular cultural contexts or groups through a primarily participant-observer field-based approach (Richards and Morse, 2013; Trochim, 2006), phenomenology focusses on understanding people's perceptions of a particular lived experience or phenomena through usually lengthy, unstructured interviews with small groups of participants who have experienced the phenomena (Leedy and Ormrod, 2015; Richards and Morse, 2013). Alternatively, grounded theory seeks to develop a theory from data collected based on the knowledge of participants, so as to understand a particular process or situation that often involves some form of change (Leedy and Ormrod, 2015; Charmaz, 2014; Richards and Morse, 2013). Narrative analysis studies the lives of individuals through the stories they tell of their lives (Cresswell, 2013), while, discourse analysis focusses on using language (oral or written) to understand how people socially construct their lives (Richards and Morse, 2013), and content analysis seeks to identify specific characteristics of a collection of verbal, written or visual material (Leedy and Ormrod, 2015).

There are various definitions of case study research. A well-quoted description is provided by Yin (2009), who defines it as "an empirical inquiry that investigates a contemporary phenomenon ["when relevant behaviours cannot be manipulated" (p.11)] within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 18). "The case is a specific, a complex, functioning thing" (Stake, 1995, p. 2). Case research is, thus, suitable when a phenomenon is broad and complex, where the existing body of knowledge is insufficient to permit the posing of causal questions, when a holistic, in-depth investigation is needed, and when a phenomenon cannot be studied outside the context in which it occurs (Leedy and Ormrod, 2015; Yin 2009; Pare, 2001; Feagin et al., 1991). Cases are constrained by context, activity and time (Miles et al, 2014, Cresswell, 2014, Merriam, 1998).

There are different types of case study designs. Stake (2005) proposes three forms of case study. The intrinsic case examines a particular case of interest to simply better understand that specific situation, whereas, the instrumental case seeks to gain insight into a particular issue, phenomenon or theory (Baxter and Jack, 2008). Collective cases are used where comparison between cases is required to identify patterns (Richards and Morse, 2013). Yin (2009) adds to this typology by defining two basic designs, that is, single-case study and multiple-case study. These, each have two variants, namely, holistic (single-unit of analysis) and embedded (multiple units of analysis). The unit of analysis is essentially "the case" and may be an individual, an event, a process or an entity (Yin, 2009). The main rationales for selecting a single-case study design according to Yin (2009) are when the case is a critical case in testing a well formulated theory, is an extreme or unique case, is representative or typical, is revelatory or longitudinal in nature. He, however, notes that a risk to single-case study designs is that the selected case may later, after research has started, be revealed not to fulfil the required criteria. Yin (2009) considers single- and multiple case study designs to be variants within the same methodological approach, and the choice of which, is based on the research design.

The nature of this research is well suited to a primarily qualitative, holistic, multiple or collective case study approach. This is because, the framework centres on the SME owner-manager ("the participant-key informant"), where his/her "subjective risk" assessments, perceptions, values and decisions-making processes have a significant influence, acting as a filter, on how risk is defined ("phenomenon cannot be studied outside the context in which it occurs"), what information and knowledge is used for risk decision-making, the level of risk that is accepted within the enterprise and how it is dealt with in the form of informal business-as-usual practices. Additionally, differences and similarities across companies of different size and in different industries are explored.

The multiple case study approach developed by Yin (2009) was used as a basis for this research. It is argued that his approach has implicit philosophical foundations in post-positivistic realism. Yazan (2015), for instance, maintains that while Yin does not explicitly position his approach in a particular philosophical paradigm, "the way he approaches case study or research in general and the aspects he emphasizes most indicate that his philosophical stance is towards the positivistic tradition" (p 137). Harrison et al. (2017), also, contend that Yin's approach is more post-positivistic as he refers to case study "as a form of empirical inquiry" (Yin, 2014 p.16), "using a "realist perspective" (Yin, 2014: p.17) and focuses on maintaining objectivity in the methodological processes within the design" (Harrison et al., 2017: p.9). The authotrs further observe that Yin's approach exhibits "the hallmarks of a postpositivist approach to research: seeking rival explanations and falsifying hypotheses, the capability for replication with a multiple case study design, the pursuit of generalizations (if required), minimizing levels of subjectivity, and the use of multiple methods of qualitative and quantitative data collection and analysis" (Harrison et al., 2017: p.9). It is apparent that, while striving for positivistic objectivity, Yin recognises "the descriptive and interpretive elements of case study" which is "investigated in context, examined in its "real world setting" (Yin, 2014:p.16).

4.3 Case Study Design for Validity and Reliability

The case study design is intended to develop the logical links between the collected data, the conclusions drawn and the initial research study questions (Yin, 2009). Elements of the design include developing the foundational research questions, propositions and issues regarding the study, defining the unit of analysis and the profiles of the potential cases to be studied, identifying the case study type (single or multiple, holistic or embedded), presenting the logic linking the data to the propositions, hypotheses or research questions, developing the criteria for interpreting the findings and defining the procedures for the maintenance of research quality (Yin, 2009). This aligns with the "flexible deductive approach" suggested by Fletcher (2017) above.

As case study research has evolved over the last few decades, a step-by-step approach (the case study protocol) has developed based on the work of Stake (1995), Miles and Hubermann (1994), Yin (1994) and Eisenhardt (1989), among others (Pare, 2001). The case study protocol addresses the key requirements of the case study design and research quality i.e. validity and reliability in qualitative research (Yin, 2009).

For this research, the case study protocol described below is followed and generally has four sections (Yin, 2009):

i. *An introduction to the case study project* which includes the case study questions, hypotheses, and propositions, the theoretical framework, the purpose of the protocol, any issues and relevant readings regarding the topic.

ii. *The field procedures to be employed* that involves the procedures for data collection, including, credentials for access to data sources, location of those sources ("sites"), ethical considerations, respondent profiles, site procedures.

iii. *The case study questions* that the researcher must keep in mind during data collection where each question serves as a reminder to the researcher of what information is needed, and will, therefore, be accompanied by a set of probable sources of evidence and sample strategies for acquiring that evidence in order to allow for triangulation (Denzin, 1978; Patton, 1999).

iv. *The outline and format of the case study report* that is done for each case indicating data format and presentation of documentation, and biographical information.

There are normally four logical tests that are used in qualitative empirical research to establish quality, namely, construct, internal and external validity and reliability (Yin, 2009; Trochim 2004; Tellis, 1997).

4.3.1 Construct Validity

"Construct validity refers to the degree to which inferences can legitimately be made from the operationalizations in your study to the theoretical constructs on which those operationalizations were based" (Trochim, 2006, n.p.). In other words, ensuring that specific theoretical concepts (related to the original study objectives) have been translated into the correct operational measures (indicators) used in the field (Yin, 2009) or that the instrument used is measuring the characteristic, that cannot be observed but is assumed to exist based on participant behaviour patterns (Leedy and Ormrod, 2015). Various tactics can be used in different phases of the research to address construct validity. These include using multiple sources of evidence (triangulation for protection against researcher bias) and establishing a chain of evidence in the data collection phase, and later, in the case study composition phase, receiving feedback from key informants on the case study report (Yin, 2009; Riege, 2003).

In this research, the specific theoretical concepts (related to the original study objectives) were translated into the correct operational measures (indicators) used in the field (Yin, 2009) for construct validity. This was developed through the theoretical framework where concepts within the framework were related to specific research and sub-research questions (refer to section 3.3). These were translated into the semi-structured interview questions posed to the owner-manager. Operational measures (indicators), that matched the framework concepts, were developed from the literature (refer to Table 3.1 a-e in Appendix 3.1) further addressing construct validity. These indicators were used in the analysis to make inferences from the interview data to the framework concepts. This addressed internal validity in the form of pattern-matching (Yin, 2009; Riege 2003) in the analysis phase. Pattern matching involved a fundamental comparison between the predicted, from the theory, and the actual patterns from the data, and did not involve quantitative or statistical criteria (Yin, 2009).

4.3.2 Internal Validity

Internal validity is only relevant to explanatory or causal studies, where causal relationships are sought to be established, and not for exploratory or descriptive research (Yin, 2009; Trochim 2006) such as this research. But, in case study research, where inferences are made, from interviews or documentary evidence, about events or variables that cannot be directly observed, internal validity becomes a concern. Questions arise regarding the accuracy of the inferences, the completeness of the consideration of all possibilities and explanations as well as the unassailable convergence of evidence. Analytical tactics that may be used to address these concerns are pattern-matching, explanation building, addressing rival explanations and using logic models (Yin, 2009; Riege 2003). Pattern-matching, as explained above, is used in this research.

4.3.3 External Validity

External validity in case study research is concerned with analytical generalisability where a specific result set is generalised to a broader theory (Yin, 2009; Riege 2003). External validity is addressed in the design phase through replication logic using multiple case study designs (Yin, 2009) where a clear definition of the scope and boundaries of the research is required. This is developed through comparison to the extant literature in the analysis phase to ensure generalisations within the scope and boundaries of the research (Riege, 2003). This requires “the development of a rich theoretical framework” where “the framework needs to state the conditions under which a particular phenomenon is likely to be found (a literal replication) as well as the conditions when it is not likely to be found (a theoretical replication)” (Yin, 2009 p.54)

Replication logic is different from sampling logic used in statistical experiments such as surveys. Replication logic operates in the same way as a series of related laboratory experiments, where duplication of the results is sought in order for the findings to be considered robust. Each case study is, thus, a discrete experiment or analytical unit where data is gathered from multiple sources and conclusions are drawn from the analysis of this data (Yin, 2009; Eisenhart and Graebner, 2007; Tellis, 1997). Each case is purposefully selected to either predict similar results (literal replication) or contrasting results (theoretical replication) (Yin, 2009). Yin (2009) suggests that 6-10 cases, within an effectively organised multiple case study design, where the results produced cumulatively, as originally posited, would be persuasive "support for the initial set of propositions" (p. 54).

This research employed a holistic multiple case study (8 cases) design using literal replication. This satisfied the requirements for external validity in case study research that is concerned with analytical generalisability, where a specific result set is generalised to a broader theory (Yin, 2009; Riege 2003).

4.3.4 Reliability

The reliability in case study research is increased by the case study protocol which is an essential tool to guide data collection for each case (Yin, 2009; Eisenhart and Graebner, 2007; Riege, 2003). Other techniques to increase reliability include providing a detailed explanation of the theories and notions for each phase of the research, recording of data digitally via different types of media, such as, voice or video recordings, organising and documenting the data collected in a systematised database, all of which contribute to maintaining a chain of evidence (Yin, 2009; Eisenhart and Graebner, 2007; Riege, 2003). These will be elaborated in the next section.

In this research, the case study protocol created a chain of evidence linking the theory, in the form of case study questions, to the case study report via evidentiary sources in the case study database. This increased the reliability of the case study information (Yin, 2009). For this research this is demonstrated in the case study reports.

This research also used multiple sources of evidence (triangulation for protection against researcher bias) and established a chain of evidence in the data collection phase, and later, in the case study composition phase (Yin, 2009; Riege, 2003; Wengraf, 2001). These supported the construct validity and reliability of the case study evidence (Yin, 2009).

The multiple sources of evidence (Table 4.1 and Fig. 4.1 below), that were used for data and investigator triangulation (Fig. 4.1), aimed at corroborating the same fact or phenomenon.

Table 4.1 Sources of Evidence

Source	Description	Purpose is to ….
Survey	Internet and paper-based questionnaire distributed to potential manufacturing SME respondents	• Gather case selection criteria (see above): company profile, initial owner-manager and company risk profile • Ascertain which respondents would be prepared to do follow-up interviews
Interviews	Face-to-face semi-structured interview with the owner-manager (lasting between 2 and 5 hrs)	• Provide the primary source of evidence for the case study as the perceptions, behaviours and attitudes of the owner-manager are key to the research question (s)
Visual Sense-making	Manual drawing/mapping of the company supply chain during the interview with the owner-manager	• Ascertain the owner-managers knowledge of his suppliers and customers, their relationships • Obtain an idea of the SC structure and complexity • Facilitate conversation regarding SC risks
Direct Observations	Walk-through tour of the manufacturing facility by the owner-manager	• Obtain an indication of the condition of the facilities, machinery and processes being used, safety adherence, worker activity, the owner-managers knowledge of the facility and the workers
Internet	Company websites, Industry information, supplier and customer information	• Obtain ancillary, complementary and corroboratory information w.r.t the company, the industry, suppliers and customers
Documentation	Organograms, Designated industry agreements	• Obtain ancillary, complementary and corroboratory information w.r.t the company

The dark arrows in Fig. 4.1 indicate where data collected by the investigator is used for corroboration.

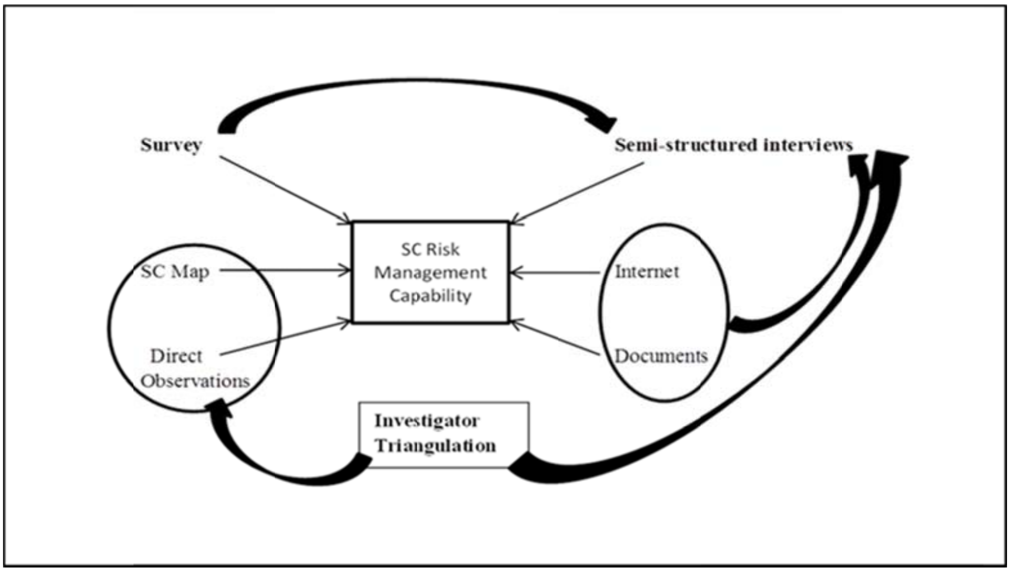


Figure 4.1 Data Triangulation

Investigator triangulation was only done for the pilot case study, as other competent researchers were not available to assist. This was facilitated through an Industrial Engineering 4th year/honours student who was doing her honours research project, and participated in the interview with the owner-manager of the pilot case company and the company tour. This student (Frowein, 2014) was given an initial version of the conceptual framework to guide her literature review and analysis, and the interview (Appendix 4.8) and observation protocol (Appendix 4.11).

She (Frowein, 2014) was expected to transcribe the interviews herself from the recordings, write-up the observation from the company tour, conduct her own analysis of the interview, observation and company website data with respect to the conceptual framework, draw her own version of the company supply chain as she understood it from the notes taken during the interview and write her own research report

The student's report was used, where possible, to corroborate the understanding and mapping of the company supply chain and the identified risks, and capability assessment.

4.4 The Case Study Protocol

The important elements of the case study protocol are elaborated in the next sections.

4.4.1 Introduction to the Case Study Project

The detail of this section, much of which repeats parts of section 3.3, can be seen in Appendix 4.1.

4.4.1.1 Case Study Design

A mixed methods design consisting of multiple case studies within a survey (Fig 4.2) was chosen (Yin, 2009). The design configuration in shown in Table 4.2 where two industries are investigated with two medium and two small companies within each industry. This facilitated comparison between small and medium companies within an industry and across industries, as well as, an overall across industry comparison.

Table 4.2 Multiple case study design configuration

	INDUSTRY			
SIZE	**Industry 1 (I1)**		**Industry 2 (I2)**	
Medium	I1Med 1	I1Med 2	I2Med 1	I2Med 2
Small	I1Smal 1	I1Smal 2	I2Smal 1	I2Smal 2

The purpose of the survey was to obtain initial perceptions of the OMs on risk management, risks and their environment, gather case selection criteria (explained further below) i.e. company profile, and ascertain which respondents would be prepared to do follow-up interviews. The development of the survey is described in section 4.3.2.1.

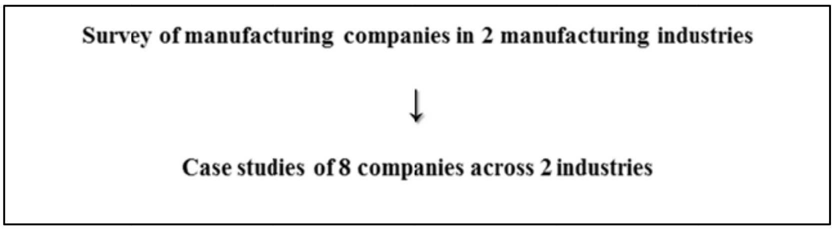


Figure 4.2 Case study within a survey

Depending on the responses from the survey on willingness to participate in the study, eight case study companies were selected. The case studies were deemed to be holistic as only one unit of analysis was considered, that is, the company, with one key informant, the owner-manager, who responded to the survey and was interviewed. Case companies were selected for literal replication, that is, conditions under which the phenomenon is likely to be found within groups of cases. These conditions were the selection criteria below (section 4.3.1.2) in conjunction with the parameters for the data collection. These parameters specified the bounding criteria for the data collected in terms of context, activity and time (Miles et al., 2014, Cresswell, 2014, Merriam, 1994) and are summarised in Table 4.3.

Table 4.3 Case study boundaries

Parameters	**Description (based on Conceptual Framework)**
Phenomenon	Supply Chain Risk Management (a process)
Context	SMEs (an owner-manager perspective) in South Africa Manufacturing Sector (2 industries)
Actors/participants	Owner-managers
Events	Risk events, risks in the supply chain
Time	June – November 2014

4.4.1.2 The rationale for selecting the cases

The project focussed on manufacturing SMEs with the following:

- Independently owned, operated and financed, where one or very few people manage the business without a formalised management structure, and does not form part of a large enterprise,
- Have a relatively small share of the marketplace or relatively little impact on the sector/industry in which it operates.
- Have been in operation for more than 10 years (have survived well past infancy i.e. 3.5 years) as it is assumed that it is more likely to observe the phenomenon in well-established SMEs as they are more operationally mature.
- Are part of the Manufacturing sector in South Africa

- Are Small or Medium in size according to the National Small Business Amendment Act No.29, 2003 (Table 2.1), based firstly, on number of employees and secondly, on total turnover.

4.4.1.3 Ethics Clearance

Ethics clearance from the University of Witwatersrand Human Research Ethics Committee (Non-medical) was obtained prior to the commencement of data collection. The ethics clearance number is H140429. This required the submission to the committee of the ethics application forms accompanied by the research proposal, the survey questionnaire, the semi-structured interview questions, the direct observations protocol, the participant information forms and the participant consent forms (refer to Appendix 4). The ethics clearance approval can be viewed in Appendix 4.2.

4.4.2 Data Collection Procedures

Case study data may be derived from numerous sources including documents, archival records, interviews, direct or participant observations and physical artefacts (Yin, 2009). This research uses interviews in the form of an internet and paper-based survey/questionnaire and face-to-face semi-structured interviews, direct observation and documentation (Table 4.1). The design of the survey and interview instruments and the observation protocol are described in the next sections.

Data collection was executed in two phases, firstly via a survey administered in June 2014 and then through site visits from July to November 2014.

4.4.2.1 The Survey (June 2014)

Survey design involves numerous stages consisting of interconnected steps which include: defining the objectives (section 4.3.1.1 above), selecting a survey frame, determining the sample design, designing the questionnaire, collecting and processing the data, analysing and disseminating the data and documenting the survey (Statistics

Canada, 2010) and that affect the quality of the survey (Hox et al., 2008). These steps were employed in the design of the survey for this research. They are further elaborated upon below.

i. The survey frame and sample design

To identify industries to target with the survey, various industry employer associations within the manufacturing sector (Fig. 4.3 below) were approached.

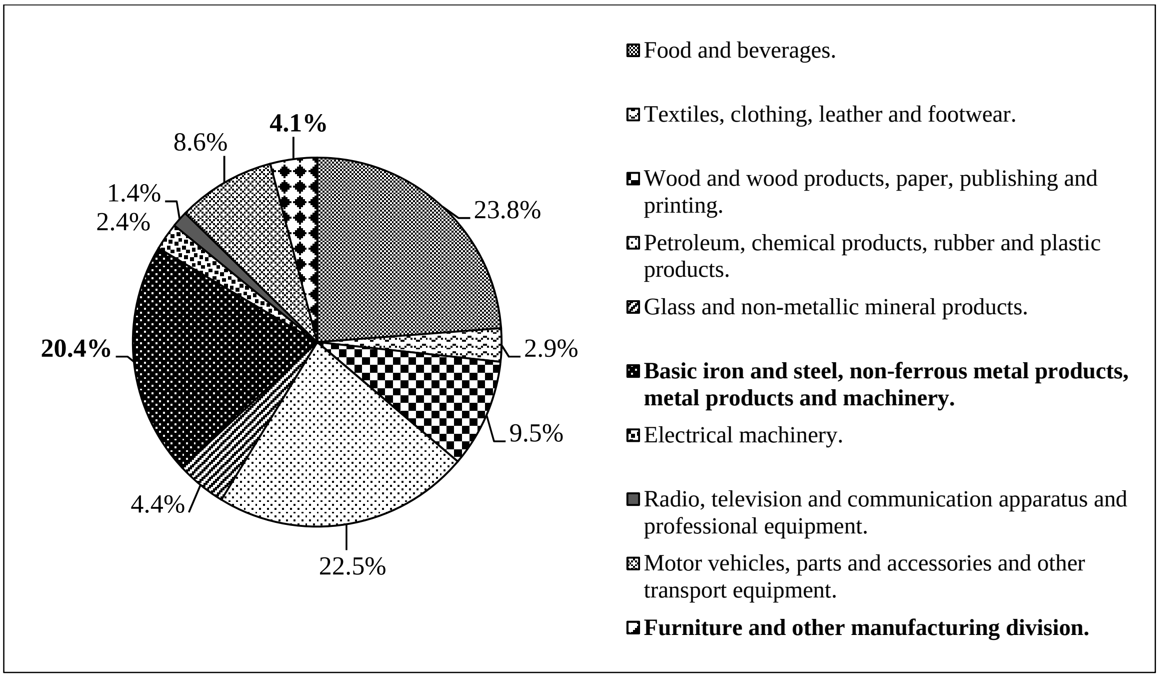


Figure 4.3 The relative importance, based on value added, of each major group within the manufacturing sector (compiled from StatsSA, 2014b)

Because the survey for this research did not require the statistical aggregation of data to make inferences, the sampling used was non-probabilistic convenience sampling. The selection of the two industries was based on the availability and acquiescence of the employer associations to participate in the research, and to make their member databases available for distribution of the survey questionnaire. Two associations agreed to allow the distribution of the questionnaire to their SME members. These were the Steel and Engineering Industries Federation of South Africa (SEIFSA), the largest employer federation that represents companies in the metal and engineering industry (SEIFSA, 2014) and the Furniture, Bedding and Upholstery Manufacturers Association (FBUMA). These two associations, hence, represented one of the largest groupings, basic iron and steel, non-ferrous metal products, metal products and machinery (20.4%) and one of the smallest, furniture and other manufacturing divisions (4.1%) in the manufacturing sector.

ii. *Questionnaire Design*

Following recommendations by Statistics Canada (2010), the design of the questionnaire began with the formulation of the survey objectives and information requirements. According to Statistics Canada (2010), the next steps were to consult with data users and respondents, review previous questionnaires, draft the questionnaire, review and revise questionnaire, test and revise questionnaire and then, finalise questionnaire.

- Consultation with data users and respondents, in the case of the survey for this research, was deemed irrelevant, as the data user was the same person executing the survey and respondents were not yet identified.

- Published results from similar questionnaires (Poutziouris, 2003; Carland et al., 1995) were examined as examples of how to draft questions (wording), what questions to ask and how to construct the questions (format). Questionnaire content was guided by the results of two pilot studies conducted with manufacturing SMEs in the past (Sunjka and Sklar-Chik, 2012; Sunjka and Bindeman, 2011).

- The questionnaire was drafted taking the previous two points into consideration. The following sections were considered to address the survey objectives and information requirements:
    - Company Profile
    - Management Profile
    - Owner-manager Profile

- o Company risk Profile
- o Company risk Assessment
- o Interview follow-up Request

Closed-ended questions were employed, with some opportunity for limited open-ended responses for explanatory purposes.

- The questionnaire was reviewed for wording, terminology, understanding, format and length together with a masters student and revised.

- The survey was then tested using the SurveyMonkey platform with eight people either working in SMEs or involved with SMEs. The link to the test survey was embedded in a an email that requested feedback on accessibility to the survey via the link, whether questions were difficult to read, interpret, understand what is required, the flow of questions and the layout of the survey, the length of the survey and any other feedback (Appendix 4.3).

- The feedback from the test sample was incorporated into the questionnaire design and the questionnaire was finalised (Appendix 4.4).

iii. Data Collection and Processing

The survey was distributed via the internet. SurveyMonkey (https://www.surveymonkey.com/) was used as the platform for the delivery of the survey and the collection of response data. The survey and the response data were password protected to prevent any unauthorised access. The link to the survey was embedded in a participant information letter in an email to potential respondents (Appendix 4.5). SEIFSA distributed the survey themselves via email to their SME members. FBUMA SME members were identified from the website of the association (http://fbuma.co.za/members.php) that lists all members with contact details, including email addresses. The participant information letter with the embedded survey link was emailed to the identified FBUMA SME members. The survey was distributed in June 2014. The survey was open for a period of 1 month with a reminder email sent after 2 weeks to attempt to boost the response rate. Once the survey responses had stopped and the survey was closed, the survey data were downloaded from the SurveyMonkey site in the form of excel spread sheets (Appendix 4.6).

iv. Data Analysis

Once responses had been received from the survey, those that were complete were reviewed to identify respondents who had indicated that they were prepared to participate in follow up interviews. These survey responses were further scrutinised to ensure that the respondent company met the case study selection criteria. Because the response rate for the FBUMA survey was very low (8 complete questionnaires returned), and only 5 companies indicated willingness to participate in follow-up interviews, of which none were small companies only “very small” companies (see Table 2.1), these “very small” companies were selected for interviews. The response rate for the SEIFSA survey was much higher with more respondents prepared to take part in interviews. This provided the opportunity to conduct more interviews to ensure that the best representative case studies could be selected for analysis. It was not possible to determine immediately whether a company was a good representative case study as each interview could not be analysed immediately after the site visits because transcriptions, done by an external service provider, took at least a month to complete. The survey data were analysed per case study to answer RQ1 and aspects of RQ2. This is demonstrated in the pilot case study in chapter 6.

4.4.2.2 Site Visits (July – November 2014)

Emails containing the participant information letters for the semi-structured interviews and direct observations were sent to the identified respondents. Those that responded positively to the emails were then contacted telephonically to set up dates and times for the site visits and interviews. Fourteen site visits and interviews were conducted (Table 4.4 below).

Table 4.4 Site visit companies

	Date (2014)	Company Description *(shaded rows = case companies analysed in this research)*	Group	Size	Location in South Africa	Interviewee (s)
1	15 July	Bespoke High-end Furniture Manufacturer (I1Med1= FURN 1)	Furniture	Medium	Gauteng	50% ownership (2 shareholders- brothers)
2	28 July	Woodworking and Furniture Manufacturing (I1Smal1 = FURN 3)	Furniture	Very Small	Gauteng	Sole owner
3	5 Aug	Bed Manufacturer (I1Smal2 = FURN 4)	Furniture	Very Small	Gauteng	Sole owner
4	7 Aug & 8 Sep	Laboratory Equipment Manufacturer	Steel/ Metal	Medium	Gauteng	<50% (more than 4 shareholders)
5	19 Aug & 2 Sep	Modern Furniture Manufacturer (I1Med2 = FURN 2)	Furniture	Medium	Gauteng	<50% ownership (husband) (2 shareholders -husband and wife)
6	26 Aug	Manufacturer of railway wagon chassis items like brake systems (I2Med1 = METAL 1)	Steel/ Metal	Medium	Gauteng	Sole owner
7	3 Sep	Butterfly Valve Manufacturer (I2Smal1 = METAL 3)	Steel/ Metal	Small	Gauteng	33% ownership (3 shareholders)
8	9 Sep	Hydraulic Pump Manufacturer (I2Smal2 = METAL 4)	Steel/ Metal	Small	Gauteng	Sole owner
9	16 Sep	Control Valve Manufacturer (I2Med2 = METAL 2)	Steel/ Metal	Medium	Gauteng	33% ownership (3 shareholders)
10	31 Oct	Sheet metal fabrication and heavy metal construction	Steel/ Metal	Small	Gauteng	2 sons of the sole owner
11	4 Nov	Electroplating	Steel/ Metal	Medium	Gauteng	Sole owner
12	18 Nov	Aluminium foundry – high pressure and gravity	Steel/ Metal	Medium	Gauteng	50% ownership (2 shareholders)
13	21 Nov	Jobbing foundry	Steel/ Metal	Medium	Gauteng	33% ownership (3 shareholders- 4 siblings)
14	26 Nov	Consulting Engineers	Steel/ Metal	Small	North West Province	75% ownership

The field procedures outlined in Appendix 4.7 were followed for the site visits. Eight companies were selected for analysis. As the pool of furniture companies was limited, all four companies visited were included in the analysis. For the steel industry, the companies were selected based on the quality of the data collected.

The research instruments used for this research are described below.

i. Semi-structured Interview Design (including visual sense-making)

The processes of model-building (theory-construction) and model-testing (theory-verification) are facilitated through semi-structured in-depth interviews (Wengraf, 2001) which were used for this research. In this research where a theoretical framework has been developed from a critical literature review, enough is known "about the domain of enquiry to develop questions about the topic in advance of interviewing but not enough to anticipate the answers" (Richards and Morse, 2013, p. 127), semi structures interviews are appropriate (Richards and Morse (2013). The questions for this study had some level of standardisation, but were designed to have "a certain degree of openness of the response of the interviewer" (Wengraf, 2001, p. 62). This permitted some improvisation by the interviewer within the bounds of the theory. The same questions were posed to all participants while not necessarily following the same sequence, allowing for anticipated and unanticipated probing questions (Richards and Morse, 2013)

The semi-structured interviews for this research were designed using Wengraf's (2001) CRQ-TQ-IQ Pyramid Model, where CRQ is Critical Research Question, TQ is Theory Questions and IQ is Interview Questions. This provides a logical link between the critical research question and the interview questions. It also guides the analysis of the interview material by providing a pathway by which inferences and judgements can be made to answer the theory questions and ultimately the critical research question. A section of the graphical representation of the pyramid model developed for this research is presented in Fig 4.4 below. The CRQ and TQ's are formulated in the theory-language of the particular field of study, that is, the

Theoretical or Conceptual Framework (section 3.3). For the purpose of this research, theory questions are renamed as research questions (RQs). The IQs are developed in the language of the interviewee i.e. in more colloquial language to generate the appropriate information to make inferences with respect to the theory questions (Wengraf, 2001).

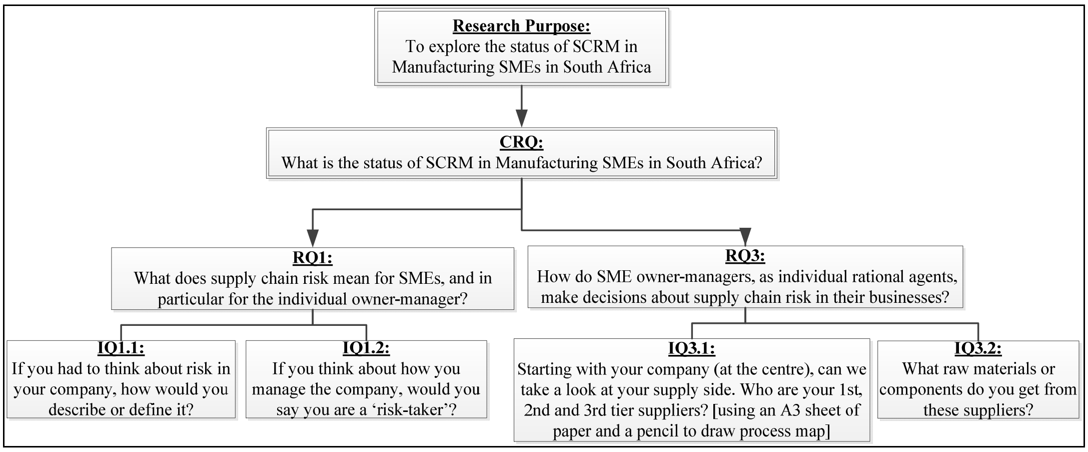


Figure 4.4 CRQ-RQ-IQ: Pyramid Model (based on Wengraf, 2001)

Wengraf (2001) suggests that indirect or non-questions are often more useful in the generation of relevant material to answer the research questions, than insisting on precise replies to precise questions. Thus, the interview questions were used to guide the interview and to ensure coverage of the relevant material in the interview, rather than being rigidly applied. These guidelines for developing effective interview questions were to ensure that the wording is open-ended enough for the respondents to answer in their own terminology, neutral to prevent influencing the respondents answer and colloquial to facilitate understanding (Turner, 2010). Refer to Appendix 4.8 for the full set of interview questions. The participant information letter (Appendix 4.9) and letter of consent (Appendix 4.10) for the interviews were developed concurrently.

ii. Visual Sense-making

The theoretical framework for this research, from which the research questions and interview questions were developed, places the owner-manager as the central figure and source of information (key informant). The perceptions of the owner-manager and his/her cognitive processes in the formulation of information in response to the interview questions are central to the nature of the data. Perception refers to the way in which human beings recognise and interpret sensory information (Ashcraft, 1998). "…[C]ognition is a more comprehensive term that encompasses not only perception, but also the post-perceptual processing, storage, retrieval, and use of information for decision making and to generate other responses and output" (Baker et al., 2009, p. 536).

Sensemaking is a cognitive process that employs different ways of seeking and obtaining information in varying situations and of judging its relevance to develop knowledge for decision-making for actions (Ntuen et al., 2010). Visualization can aid in a sensemaking task by providing some form of situation awareness thus enabling the knowledge discovery process (Ntuen et al., 2010). "Visual SenseMaking is the activity of making sense of ambiguous complex situations, through visual methods and tools including word, images, drawings, diagrams, charts, graphs" (www.humantific.com). This logic is extended for this research in the form of the mapping or drawing, by the interviewer, of the company supply chain during the interview with the owner-manager so as to facilitate sensemaking. An example of this is shown in Fig 4.5.

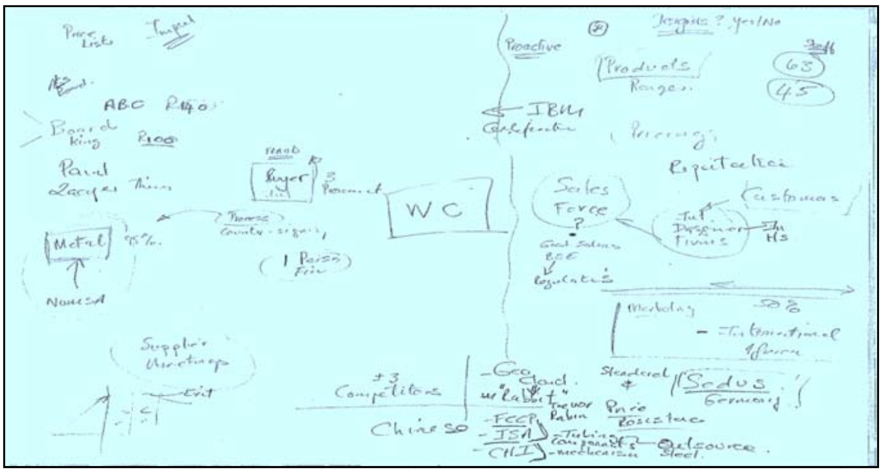


Figure 4.5 Visual sensemaking supply chain map (pilot case)

iii. Direct Observations Protocol

"To the trained eye, even a quick plant tour can reveal a lot about a company" (Goodson, 2002, p.105).

Yin (2009) suggests that case study research is appropriate when the phenomenon (SCRM) cannot be studied outside the context (the SME) in which it occurs. To gain a deeper appreciation for the context a walk-through tour of the manufacturing facility, led by the owner-manager, was considered important. This provided an indication of the condition of the facilities, machinery and processes being used, safety adherence, worker activity, the owner-managers knowledge of the facility and the workers.

The observation protocol for the tour of the SMEs in this research was motivated by and based on the process described by Goodson (2002). Refer to Appendix 4.11 for the detailed protocol. Teams performing the plant tours look for evidence that the plant adheres to best practices by observing all aspects of the plant environment and talking to workers and managers (Goodson, 2002). No notes are taken during the tour as notetaking diminishes the ability to pick up visual cues or impedes communication with shop floor staff. Each team member is assigned responsibility for a few categories of observation during the tour. Team members then meet immediately after the tour to share impressions and complete two worksheets. In this research, the company tours (conducted with honours year students) with the owner-manager were recorded and transcribed to elicit the information required in the observation protocol.

4.4.3 Analytical Strategy

The analytical strategy for this research was based on the replication approach to multiple-case studies recommended by Yin (2009, p. 57) and is shown in Fig. 4.6 (below).

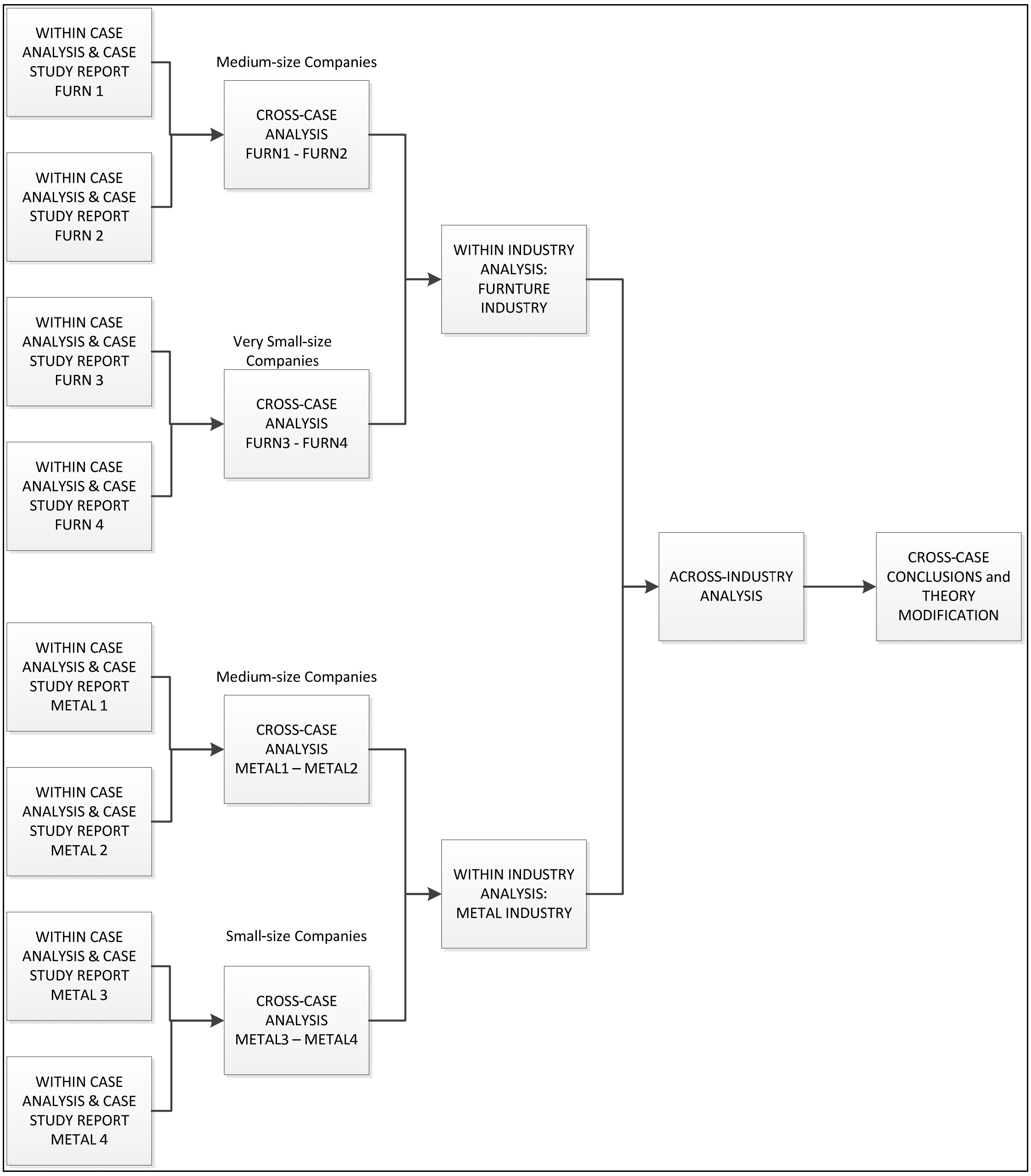


Figure 4.6 Analytical strategy for this research

Each individual case was analysed independently to identify convergent evidence (facts and conclusions), regarding the phenomenon, that may be considered as the requirements for replication in the other individual cases (Yin, 2009). A general analytic strategy was applied to every case that defined the priorities for the data on which to focus and the rationale for this attention (Yin, 2009). Yin (2009) suggests four strategies that may be followed, namely, relying on theoretical propositions, developing a case description, using both qualitative and quantitative data and examining rival explanations. Five potential analytical techniques may be utilised within these four strategies, i.e. pattern-matching, explanation building, time-series analysis, logic models and cross case synthesis. Yin (2009) advocates that to produce high quality analysis, all evidence collected should be considered, evidence should be displayed and presented separately from interpretation and alternative interpretations should be considered.

For the purpose of this research, "relying on theoretical propositions", stated in the form of research questions, is the primary analytical strategy employed. This is motivated by the developed theoretical framework, based in the literature, from which the research questions emanated and which lead to the case study objectives and design. These, in turn, shaped the data collection plan. The research questions, thus, prioritised certain data and assisted in organising the case study. For each individual case, the case report explores each proposition or research question, indicating the method and rationale for drawing corroboratory or contradictory conclusions.

4.4.3.1 Within-case Analysis

The purpose of within-case analysis is "to describe, understand, and explain what has happened in a single, bounded context – the "case" or site" (Miles et al., 2014). The within-case analysis for this research progressed with thematic analysis and data coding of the interview transcripts. Analytical memos were then developed linking the themes via the indicators to the theoretical framework. The data was further analysed and organised into tables and charts to facilitate the answering of the research questions (RQs). The process is described below:

i. Thematic Analysis

Thematic Analysis (TA) was employed as the analytical technique to map the empirical field data to the conceptual framework. TA is a qualitative analytical tool or technique that identifies classifies and reports patterns or themes in sets of data (interview transcripts or any other form of textual data) under investigation (Alhojailan, 2012; Braun and Clarke, 2006). TA is also flexible in its application as it is “independent of theory and epistemology, and can be applied across a range of theoretical and epistemological approaches” (Braun and Clarke, 2006 p 78). The approach relies on complex iterative movement between the data (through description) and the concepts (via interpretation), using either inductive or deductive reasoning (Merriam, 1998). The method is used to analyse data by assigning codes that reflect various categories and properties to units of data by arranging them in groups of similar substance and meaning (Merriam, 1998). Before embarking on the data analysis using TA, Braun and Clarke (2006) advocate that a number of decisions should be explicitly made and stated. For this research, these decisions and their rationale are given in detail Appendix 4.12 and summarised below.

In this research, patterns and their wider interpretations are related to the literature in the form of the research questions. This explicitly relates the motivations, experience, and meaning expressed in the language of the interviewee, in a direct interpretive manner, to the theory. Themes were, thus, identified with respect to their judged importance and relevance in answering the specific research questions, in turn, facilitating a more detailed depth narrative approach.

While the design of the research leading to the interview questions was explicitly deductive i.e. there is a clear pathway from the theory leading to the interview questions, the thematic analysis of the data was less explicitly deductive. This resulted from the informal nature of the interviews with the owner-managers. While the interviews were guided by the mapping of the supply chain and the interview questions, the individual interviews were allowed to evolve conversationally with the thought processes of the respective owner-managers. Probes were used to gain deeper insights and richer data. Data was, thus, not neatly packaged according to the interview questions, and less explicitly deductive approach was found to be a more natural process.

ii. Coding

The process of coding enables data condensation by extracting relevant data, assembling similar portions of data to detect recurring patterns or themes and reducing the bulk of data to a manageable size (Miles et al., 2014). Coding is an exploratory analytical technique that has no prescribed formula to apply, but seeks to link data to ideas or themes (Richards and Morse, 2013). It is also just "the initial step toward an even more rigorous and evocative analysis and interpretation for a report" (Saldana, 2013, p. 8). This is illustrated in Fig. 4.7, where similar codes may clustered into categories that may require further refinement into subcategories. The major categories may then be compared with each other and consolidated in different ways, thus transcending "the 'reality' of [the] data" and progressing "toward the thematic, conceptual, and theoretical" (Saldana, 2013, p.12).

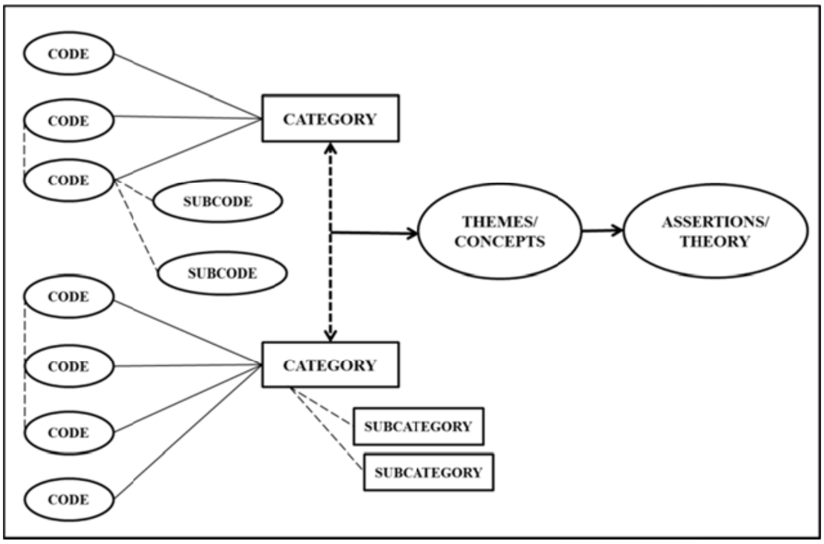


Figure 4.7 Codes-to-theory model for qualitative enquiry (Saldana, 2013)

The coding for this research followed a cyclical process, where Saldana (2013) advocates a two phase approach i.e. first cycle and second cycle coding. There are various coding methods that may be chosen and utilised in each phase (Fig 4.8).

FIRST CYCLE CODING METHODS

Grammatical Methods
Attribute coding
Magnitude coding
Subcoding
Simultaneous coding

Elemental Methods
Structural coding
Descriptive coding
In Vivo coding
Process coding
Initial coding

Affective Methods
Emotion coding
Values coding
Versus coding
Evaluation coding

Literary and Language Methods
Dramaturgical coding
Motif coding
Narrative coding
Verbal Exchange coding

Exploratory Methods
Holistic coding
Provisional coding
Hypothesis coding

Procedural Methods
Protocol coding
OCM (Outline and Cultural
Materials coding
Domain and Taxonomic coding
Causation coding

Themeing the Data

FIRST TO SECOND CYCLE CODING METHOD

Eclectic coding

SECOND CYCLE CODING METHODS

Pattern coding
Focussed coding
Axial coding
Theoretical coding
Elaborative coding
Longitudinal coding

Figure 4.8 First Cycle and Second Cycle coding methods (Saldana, 2013)

a. First Cycle coding

The initial coding of data forms the first cycle. At this stage decisions need to be made as to which coding method(s) are appropriate for the particular study based on its nature and its goals. These considerations for coding choices needed to support the decisions regarding the thematic analysis outlined above. The coding method, thus, was required to align with an essentialist/realist epistemological framework, based on a less explicitly deductive semantic theoretical analytic approach that explicitly relates the motivations, experience, and meaning expressed in the language of the interviewee, in a direct interpretive manner using detailed depth narratives, to the research questions.

The final goal of this research was to make an assessment of the status of SCRM in Manufacturing SMEs in South Africa. A set of theoretical and research questions needed to be answered to achieve this objective which ultimately required the determining of the risk management capability (RMC) of the SMEs. Numerous coding methods (*a priori*: indicator coding, *a posteriori*: descriptive, elemental, process, in vivo, evaluation, values coding) were initially attempted (refer to analytical memo in Appendix 4.13). While coding using the *a posteriori* methods did flow more easily, and provided a "fit" for the conceptual framework, this "fit" did not unify or link the various elements of the framework that would result in the identification of Risk Management Capability i.e. the framework elements remained disparate. This initiated a return to the review of appropriate coding methods in Saldana (2013), as well as, a return to reviewing the literature on Risk Management Capability.

The selected RMC evaluation was based on Lindbom et al. (2015) presented in section 3.3.1. Lindbom et al. (2015) propose that the evaluation of capability may be expressed as the ability to perform a task (T) in such a way as to ensure the most positive outcome (C_T) as a result of a initiating event (A), that, unaddressed will result in undesired consequences. They continue to explain that to assess capability, it needs to be described which requires descriptions of the initiating event (A), the performed task (T), the consequences associated with the performed task (C_T), as well as, the uncertainties concerning these consequences (Q) and the background knowledge (K), which form the basis for these descriptions. Thus, capability can be described using "subjective probabilities to describe the uncertainty regarding the consequences associated with the performed task conditional on the fact that the event occurs and the task is performed" (Lindbom et al., 2015. p. 47). The descriptions of these parameters are essentially what is observed, perceived and interpreted by the person reporting on these factors. In the case of this research, this person is the owner-manager of the SME. Analysis would, thus, need to elicit these factors from the interview transcripts. Causation coding was identified as the most appropriate method to achieve this outcome.

This research extensively uses the causation coding method advocated by Saldana (2013). The next section, therefore, is dedicated to elaborating Saladana's (2013) in some detail and explaining its application in this study.

Causation coding

Causation coding has a basis in Attribution theory as Munton et al. (1999), quoted by Saldana (2013), explains, "Attribution theory concerns the everyday causal explanations that people produce when they encounter novel, important, unusual or potentially threatening behaviour and events. According to attribution theorists, people are motivated to identify the causes of such events, because by doing so they render their environment more predictable and potentially more controllable" (p 31)

For the purpose of this research, "unusual or potentially threatening behaviour and events" may be interpreted as "risks or risk events" identified by the owner-manager, and "identify the causes of such events" to "render their environment more predictable and potentially more controllable" may be taken to be the "risk causes" as identified by the owner-manager.

Saldana (2013) explains that the aim of causation coding is to "locate, extract, and/or infer causal beliefs from qualitative data such as interview transcripts, participant observation field notes, and written survey responses … [thus, attempting] to label the mental models participants use" (p. 163) i.e. the beliefs they develop about events and their causes. An attribution is then "an expression of the way a person thinks about the relationship between a cause and an outcome" and usually involves an event, action, or characteristic (Saldana, 2013; Munton et al., 1999. pp. 5-6). It answers the question "Why?" in numerous possible ways as "beliefs about causality…often…involve multiple causes and multiple outcomes … [where] an outcome in one attribution can become a cause in the next" (Saldana, 2013, p. 164; Munton et al., 1999, p. 9). Thus, when enquiring of participants as to "why they think something is as it is, we obtain their speculations and perspectives on what they believe to be probable or "true" as they construct it" (Saldana, 2013, p. 165).

Saldana (2013) points out that causation coding is “appropriate for discerning motives (by or toward something or someone), belief systems, worldviews, processes, recent histories, interrelationships, and the complexity of influences and affects (my qualitative equivalent for the positivist “cause and effect”) on human actions and phenomena” (p. 165). He advocates that causation coding be viewed as a “heuristic for considering or hypothesizing about plausible causes of particular outcomes and potential outcomes from particular causes” (p.165). He continues, drawing on Miles and Huberman (1994), who advise that analysis should be rooted in the specifics of the experiences and perspectives of the respondents because “causality is ultimately local, linked with specific nearby events in time” (p. 146). Cautious deliberation should be exercised when considering “the nuanced differences between a cause, a reason, and a motive”, as focus should primarily be “on people’s intentions, choices, objectives, values, perspectives, expectations, needs, desires, and agency within their particular context and circumstances” (Saldana, 2013, p.165), as “individuals… do the acting and the causing” (Morrison, 2009, p.116).

The process of causation coding attempts to identify the three elements of attribution, namely, the cause, the outcome and the link between the cause and the outcome (Saldana, 2013; Munton et al., 1999). This leads to a three-part single cause and effect coding sequence (coding triplet):

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [outcome]

Where, > means “leads to”

In the context of risk, this sequence may be used in two ways:

[risk source] > [potential risk event] > [potential risk impact]

or

[identified risk] > [risk response] > [response outcome]

In the case of multiple causes and multiple outcomes, this process may include subsets, for example (Saldana, 2013, p.169),

CODE 1A + CODE 1B > CODE 2 > CODE 3A + CODE 3B + CODE 3C

or

ANTECEDENT VARIABLES > MEDIATING VARIABLES > OUTCOMES

”, “the reason is”, “and that’s why” and so on (Saldana, 2013).

<u>Coding sequence for this study</u>

Thus, to provide a means of inferring characteristics of the risk environment in which the SME operates as perceived by the owner-manager, the first causation coding sequence developed for this study is as follows:

[*cause* of risk event or potential risk event] > [identified risk *event* or potential risk event] > [*outcome*/consequence/impact or potential outcome/consequence/impact of risk event]

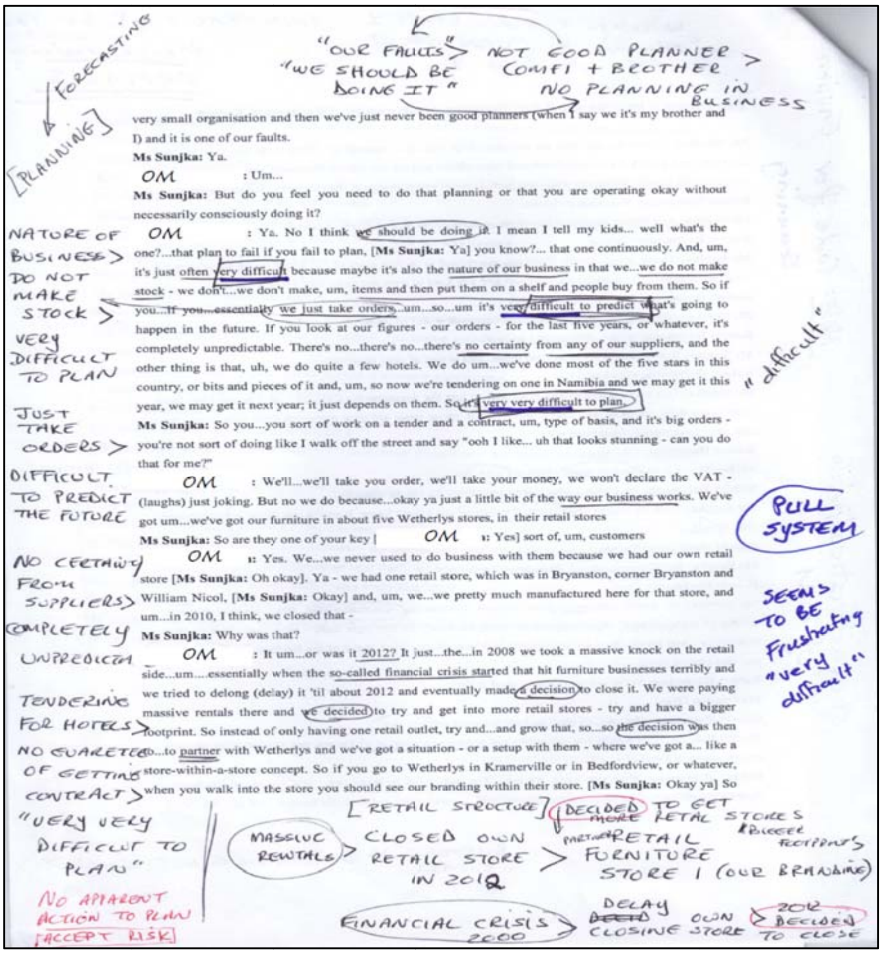
variables, as observed, perceived and interpreted by the person reporting on these factors i.e. the owner-manager, elaborated above, as follows:

[initiating event (A) (*cause*)**]> [the performed task (T)** (*action*)**]> [the consequences associated with the performed task (C_T)** (*outcome*)**]**

The uncertainties concerning these consequences (Q) and the background knowledge (K) were coded separately but in association with the coding sequence for (A), (T) and (CT).

<u>The Coding Process</u>

The exercise of coding may be done manually and/or electronically via computer-assisted qualitative data analysis software (CAQDAS) (Saldana, 2013; Yin, 2009). Both manual and CAQDAS were employed in this research to do the first-cycle coding. Manual coding may be done using a hard-copy printout of the data in the form of a transcript and then coding on the transcript using pen or pencil (done for this research) or using colour post-it notes. Microsoft Word or Excel may also be used in a similar way. This was employed for the literature review in chapter 1, chapter 2 and chapter 3. There are various CAQDAS programs on offer through free-ware or commercially. Saldana (2013) believes that it is unrealistic to prescribe any specific software package for a particular type of qualitative study or researcher. The decision will depend on personal preference, cost, availability and support. NVIVO was chosen for this study for the aforementioned reasons. First-cycle coding, using the causation coding sequence above, was done manually on a paper version of the interview transcript by reading and re-reading, using the word and phrase indicators listed above. Fig 4.9 (next page) provides an example of this from the first (pilot) case study transcript.



very small organisation and then we've just never been good planners (when I say we it's my brother and I) and it is one of our faults.

Ms Sunjka: Ya.

OM : Um...

Ms Sunjka: But do you feel you need to do that planning or that you are operating okay without necessarily consciously doing it?

OM : Ya. No I think we should be doing it. I mean I tell my kids... well what's the one?...that plan to fail if you fail to plan, [**Ms Sunjka:** Ya] you know?... that one continuously. And, um, it's just often very difficult because maybe it's also the nature of our business in that we...we do not make stock - we don't...we don't make, um, items and then put them on a shelf and people buy from them. So if you...~~If you...essentially~~ we just take orders...um...so...um it's very difficult to predict what's going to happen in the future. If you look at our figures - our orders - for the last five years, or whatever, it's completely unpredictable. There's no...there's no...there's no certainty from any of our suppliers, and the other thing is that, uh, we do quite a few hotels. We do um...we've done most of the five stars in this country, or bits and pieces of it and, um, so now we're tendering on one in Namibia and we may get it this year, we may get it next year; it just depends on them. So it's very very difficult to plan.

Ms Sunjka: So you...you sort of work on a tender and a contract, um, type of basis, and it's big orders - you're not sort of doing like I walk off the street and say "ooh I like... uh that looks stunning - can you do that for me?"

OM : We'll...we'll take you order, we'll take your money, we won't declare the VAT - (laughs) just joking. But no we do because...okay ya just a little bit of the way our business works. We've got um...we've got our furniture in about five Wetherlys stores, in their retail stores

Ms Sunjka: So are they one of your key [OM : Yes] sort of, um, customers

OM : Yes. We...we never used to do business with them because we had our own retail store [**Ms Sunjka:** Oh okay]. Ya - we had one retail store, which was in Bryanston, corner Bryanston and William Nicol, [**Ms Sunjka:** Okay] and, um, we...we pretty much manufactured here for that store, and um...in 2010, I think, we closed that -

Ms Sunjka: Why was that?

OM : It um...or was it 2012? It just...the...in 2008 we took a massive knock on the retail side...um....essentially when the so-called financial crisis started that hit furniture businesses terribly and we tried to delong (delay) it 'til about 2012 and eventually made a decision to close it. We were paying massive rentals there and we decided to try and get into more retail stores - try and have a bigger footprint. So instead of only having one retail outlet, try and...and grow that, so...so the decision was then to...to partner with Wetherlys and we've got a situation - or a setup with them - where we've got a... like a store-within-a-store concept. So if you go to Wetherlys in Kramerville or in Bedfordview, or whatever, when you walk into the store you should see our branding within their store. [**Ms Sunjka:** Okay ya] So

Figure 4.9 First Cycle manual coding first (pilot) case study

The next stage of coding was implemented in NVIVO where causation coding sequences were categorised for the first time based on the theoretical framework. Categories and sub-categories were developed based on the risk indicator categories in Appendix 3.1. An extract from the NVIVO node tree for the first (pilot) case study is shown in Fig 4.10

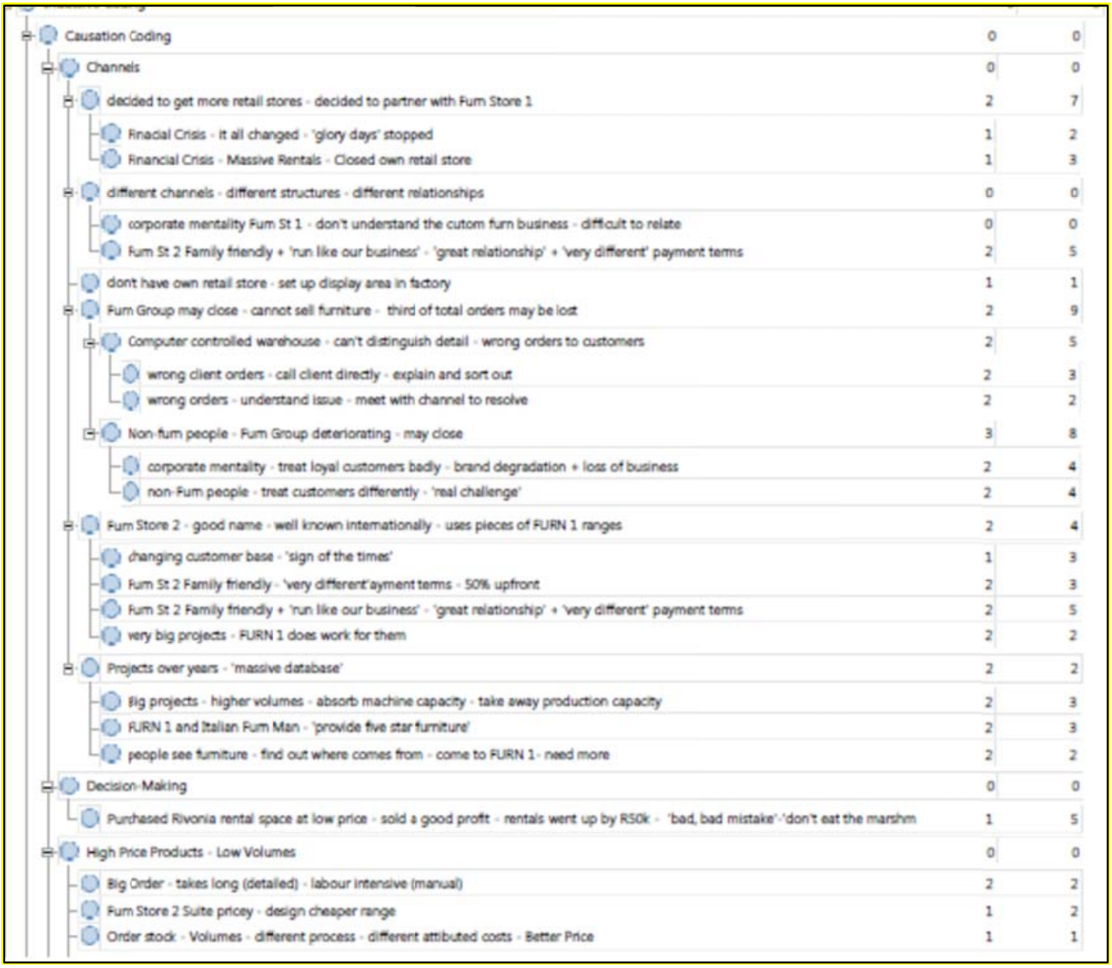


Figure 4.10 Coding tree in NVIVO for first (pilot) case study

The use of NVIVO was abandoned after the pilot case study due to personal preference. It was felt that the coding in NVIVO added an extra step that was not necessary as the manual coding lead more intuitively into the analytical memo where the coding was streamlined and formed part of narrative on the identified risks. The coding sequences were thus reflected in the analytical memos.

To support, reflect upon and document the coding processes and the coding choices, Saldana (2013) and Richards and Morse (2013) advocate the use of analytical or theoretical memos. Coding and analytic memo writing are "concurrent qualitative data analytic activities" (Saldana, 2013, p. 42). Analytic or theoretical memos are comparable to researcher journals (Saldana, 2013), that is, "a running record of insights, hunches, hypotheses, discussions about the implications of codes…" (Strauss, 1987 p110), and about emergent themes and concepts that may lead to the theory (Saldana, 2013; Richards and Morse, 2013). Memos are, thus, data (Richards and Morse, 2013). The main goal is not summarising but reflecting on and clarifying the data (Saldana, 2013).The first step in the analysis was the writing of analytical memos based on the manual coding. This facilitated a further higher-level categorisation of the causation coding sequences, and a means of checking the logic of the attribution sequences, in the context of the interview dialogue, developed from the interview transcript. The analytical memo for the pilot case study can be viewed in Appendix 6 F1.3.

b. Second cycle coding

In second cycle coding the data coded in the first cycle is reorganised and reanalysed, if necessary, and possibly recoded, to develop categories, themes, concepts and theory as depicted in Fig 4.8. The number of codes is reduced and condensed through the application of one or a combination of the methods listed in Fig 4.8 above.

Once the set of data has been coded using the causation coding method, Saldana (2013) suggests that to analyse the collection of attribution sequences, a chronological matrix or flowchart may be developed. This may be used to assess general patterns in the causation sequences, based on respondent and researcher inferences, and to categorise the codes based on similarity. Further categorisation, as shown in Fig 4.8, may be done to develop themes/concepts and assertions. Analytic memos should be used to examine the assessments of the researcher of the attributions that lead to the outcomes (Saldana, 2013). For this research, this was done as follows:

Analytic tables and charts

The first causation coding sequence for this research was developed into a table, called Risk Analysis, in an Excel spreadsheet using the following headings:

Table 4.5 Risk Analysis table headings

This event/action/characteristic requires or initiates a response (A)		**The event/action/characteristic may result in… if not addressed**			**The event/action/characteristic is attributed to …**	
Event/Action/ Characteristic	Risk Category	Consequence	Risk	Risk Category	Cause (why)	Risk Category

For each attribution (the headings in Table 4.5 that from the first coding sequence, a risk category was derived from the risk indicator tables in Appendix 3.1. For the consequences, a risk as a result of the consequences was identified and categorised.

Addressing sRQ3.1 and sRQ 3.2

To answer sRQ3.1 and sRQ3.2, each attribute (column) was further analysed using descriptive statistics in the form of frequencies presented in pie charts. This is demonstrated in the pilot case report in chapter 6.

The prior risk analysis then dovetails with the risk management capability model of Lindbom et al. (2015) which is modified to produce the a Risk Management Capability analysis for this research. A second table (Table 4.6), called Risk Capability Analysis, was developed from the first table to assist in evaluating the risk management capability of the SME that incorporated the second coding sequence for this research with the following headings:

Table 4.6 Risk Management Capability Analysis (RMCA) table headings

This event/action/ characteristic requires or initiates a response (A)		The event/action/ characteristic may result in… if not addressed								The measure describing the uncertainties (Q) is subjective, and is dependent on the assessor's (OM) background knowledge (K).			
Event/Action/ Characteristic	Risk Category	Consequence (UC)	Risk	Risk Category	Survey Risk Assessment	Impact	Constraints (Con)	Constraints Classification	Objectives (T = Task as given))	task as executed) - infer practices	Uncertainty (Q) of the Consequences/ Outcome	Outcome (Consequence = CT)	Risk Response Classification

The column headings in the above table are explained in Table 4.7 below:

Table 4.7 Explanation of headings in RMCA table

Event/Action/ Characteristic (A)	**Description of the initiating event (A), action or characteristic (Saldana, 2013, p163), that, unaddressed will result in undesired consequences (UC) (Lindbom et al, 2015). Refer to Table F1.9 for Pilot case**
Risk Category	Categorising initiating event (A), the initiating event (A), action or characteristic base on Risk Indicator table in Appendix 3.1
Consequence (UC)	Potential undesired consequence (UC) of the risk event action or characteristic (A)
Risk	The risk associated with the UC identified by OM
Risk Category	Categorising the risk associated with the UC based on Risk Indicator table in Appendix 3.1
Survey Risk Assessment	Comparison to the risks indicated by the OM in the survey
Impact	Inferred from closest corresponding survey response
Constraints	As identified by the OM that restrict the response to the type of initiating event
Constraints Classification	Categorising the Constraints based on Risk Indicator table in Appendix 3.1
Objectives (T = Task as given)	Based on the event, the indicated (normative) response
Action (T = task as executed) - infer practices (K)	The actual response to the initiating event by the OM in light of the constraints

Uncertainty (Q) of the Consequences/ Outcome	Inferred
Outcome (Consequence = C_T)	As described/perceived by the OM with an assessment of its success (+ve)
Risk Response Classification	As per tables in Appendix 2.3

Addressing RQ 4

To answer RQ4, the impacts, constraints, uncertainty (Q) and the outcome consequence (C_T) were analysed vertically (per column) using descriptive statistics in the form of frequencies presented in pie charts. This is demonstrated in the pilot case report in chapter 6.The evaluation of capability is, thus, expressed as the ability to perform a task (T) in such a way as to *ensure the most positive outcome* (C_T) as a result of a initiating event (A), that, unaddressed will result in undesired consequences. A numerical assessment/evaluation of capability would then potentially be the number of positive outcomes achieved in relation to the number of tasks performed. The following assessment scale (Table 4.8, next page) is suggested, where lack of risk management may cause:

- VARIABILITY, in profit/sales/supply/demand
- LOSS, of profit/sales/income/customers/suppliers
- DISRUPTION in business continuity

All of these impact on the profitability and survival of the business.

Table 4.8 Risk Management Capability rating scale

% Positive Outcomes	Capability Rating	Description
<50%	Very Low	Business survival is threatened
50-59%	Low	Business is surviving with difficulty
60-75%	Moderate	Business survival is not threatened, but still an ongoing challenge
>75%	High	Business survival is not threatened with manageable challenges

Addressing sRQ3.3 and sRQ3.4

To answer sRQ3.3 and sRQ3.4, the action (T) was categorised as an inferred practices (K) in a new table (Table 4.9), the response column and the inferred practices (K) were then analysed using descriptive statistics in the form of frequencies presented in pie charts. This is demonstrated in the pilot case report in chapter 6.

Table 4.9 Inferred practices (example)

Action (T = task as executed)	Inferred practices (K)
Partner with Furn Group with Brand Name in 5 Furn Store 1 stores	Partner with other enterprises
Communicate with customers personally through phonecalls	Communicate personally using resources

Lastly, to examine whether there is evidence of process elements of the formal risk management process, an assessment was done against the Risk Management process described in section 3.2 as shown in Table 4.10.

Table 4.10 Assessment of evidence of formal risk management process elements

Process Element	Evident	Comment
Risk Management Planning		
Risk Identification		
Risk Analysis		
Risk Response/Handling		
Risk Monitoring and Control		

4.4.3.2 Cross-case analysis

Cross-case synthesis was then employed. Cross-case analysis or synthesis can serve a number of purposes depending on the objectives of the case study research project. It enables the description of the combination of factors that may have contributed to the outcomes of the case (Khan and Van Wynsberghe, 2008). It can contribute to the seeking or construction of explanations as to similarities and/or differences in cases, or making sense of confusing or unique findings. Alternatively, cross-case synthesis can provide a vehicle for further articulation of the concepts, hypotheses, or theories discovered or constructed from the conceptual framework (Khan and Van Wynsberghe, 2008).

The analysis of multiple cases (more than two), either independently conducted by individual researchers or as part of a pre-designed study, is not different from other research synthesis approaches that incorporate quantitative techniques (Yin, 2009). The findings will be more robust with a greater the number of case studies.

There are a number of different approaches to cross-case analyses (Miles et al., 2014). These strategies may be case-orientated, variable-orientated (Khan and Van Wynsberghe, 2008) or mixed (integrating both). Several case orientated strategies are available ranging from the replication strategy proposed by Yin (2009) that uses a theoretical framework as a basis for pattern-matching (see below), to a multiple exemplar approach advocated by Denzin and Lincoln (2001) that uses interpretive synthesis. The latter approach involves the deconstruction of the concepts of a particular phenomenon and then, collection and analysis of instances or cases so that the elements identified in the cases can be reconstructed into the bigger social context (Miles et al., 2014). In variable-orientated strategies themes or variables are identified that transverse the cases, while the case as an individual representations is down-played.

Miles et al. (2014) advocate a combination of these strategies and propose a mixed approach they call stacking comparable cases. This involves writing up “each of a series of cases, using a more or less standard set of variables (with leeway for uniqueness as it merges)” (p. 103). Matrices and other types of visual representations are used to analyse each case. After each case is understood in detail, the case-level displays are stacked in a “meta-matrix” “(which has columns and subcolumns, rows and subrows), which is then further condensed, permitting systematic comparison” (p103).

This research employs the replication strategy proposed by Yin (2009) in combination with the stacking approach described by Miles et al. (2014). As indicated in Fig. 4.6, each case is individually analysed using the within case analytical approach described in the previous section. Case information is then aggregated across companies of the same size in each industry, further aggregated across all companies in the industry, and then across industries. Narratives, tables, meta-matrices and descriptive statistical graphs are used for systematic comparison, to identify similarities and differences across the cases, and to identify emergent themes and patterns. This involved aggregating the results across the series of individual case studies.

The cross-case report indicates the extent of the replication logic, and why the cases were predicted to have certain results (Yin, 2009). This involves pattern-matching (Fig. 4.12) to ascertain the link between the theoretical pattern (theoretical framework) and the observed or operational patterns emerging from the case studies.

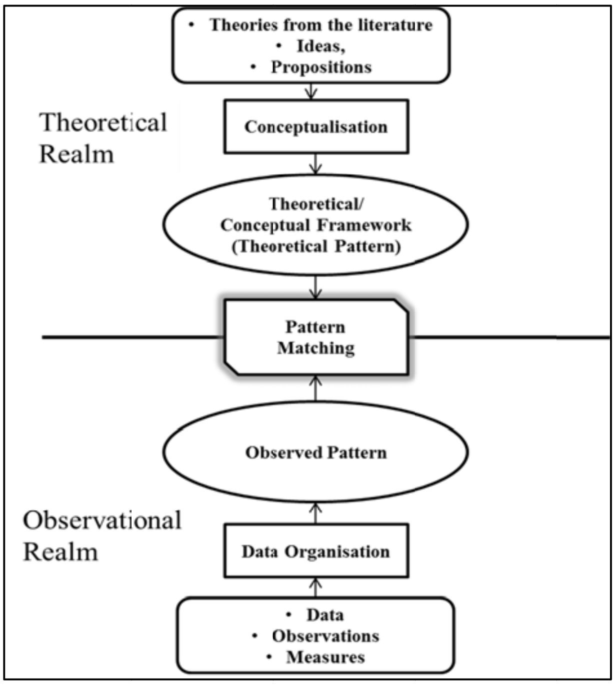


Figure 4.12 Pattern Matching (Trochim, 2006)

In research where the purpose is to examine causal relationships and build explanations, 'full pattern matching' is most suitable where "a very rigorous research design, with as much conceptualisation and operationalisation prior to data collection as possible" is stressed. The collection of the relevant data and its organization (as indicated by the theoretical framework through developed indicators) is the observational pattern. Inferences are utilised to relate, link or match the two patterns. The extent to which the patterns match, permit support for the conclusion that theoretical framework might predict the observed pattern (Trochim, 2006). The more complex and unique the theoretical framework is the easier it is to "demonstrate that there are no plausible alternative theories that account for the observed pattern" (Trochim, 2006 n.p.). When there is a significant mismatch between the theoretical and observed patterns, "the theory may be incorrect or poorly formulated, the observations may be inappropriate or inaccurate, or some combination of both states may exist" (Trochim, 2006 n.p.).

This research, however, is exploratory and seeks to elaborate on concepts in the conceptual framework in Fig 3.3. Sinkovics (2018) explains that 'flexible pattern matching' is most suited for exploratory research designs… [where] …there is an initial definition of research questions, and more basic theoretical patterns…" (p.468-485). This framework then provides some focus and guidance for the exploration. "Propositions and hypotheses emerge from the analysis of the cases, and their validity is ascertained through replication logic. Subsequently, the emerging constructs, concepts, and theories are compared with the existing literature" (Sinkovics, 2018: p.468-485).

4.4.3.3 Macro-environmental Risk Analysis

A review of media and published industry reports is for the year, 2014, in which this research was conducted. This is a contextual analysis of risk in the broader macro-environment in which manufacturing SMEs operate. This environment involves factors external to the company (SME) such as economic, politic, social-economic and technological factors that frequently determine whether an SME is successful or not. These factors impact the organisation generally, and more specifically, the industry in which the SME operates. They may contribute to risk for the SME (Wiesner, et al., 2007).

4.4.4 Case Study Report Format

Each case study report explores each research question and its related sub-research questions, using data from multiple sources (Table 4.1 and Fig, 4.1), in a sequential, logical and structured manner, through the lens of the indicators in Table 3.1 (Appendix 3.1). The layout is as follows:

i. *The Nature of the SME*

   This section explores RQ2 by setting the context of the SME in terms of its adherence to the case selection criteria, its organisation/operational profile (history/background, products, vision and mission, workforce profile, assets, operational environment, regulatory requirements, organisational structure and owner-manager involvement, supply chain, customers and stakeholders on the demand, suppliers and partners on the supply side and outsourced). Data from the survey, the company website and the interviews were analysed for this section.

ii. *Owner-manager Profile – "subjective risk"- Interviewee*

   sRQ1 are investigated in this section. Owner-manager characteristics are compiled and his/her risk profile is discerned, including his/her perceptions of the risk environment and risk in the company. The survey data was largely analysed for this section.

iii. *Risk Analysis*

   Analysis of the interview data is presented to address RQ3 and sRQ3.1 and sRQ3.2. This *involves analysing the company risk profile from the perspective of the owner-manager*. The coding and risk analysis described above to populate the headings for Table 4.5 was used in this section.

iv. *Risk Management Capability Analysis*

Risk management capability is assessed using a modified version of the risk management capability model of Lindbom et al (2015). This addresses RQ4. The RMCA described above to populate the headings for Table 4.6 and the rating scale described in Table 4.10 were used in this section.

v. *Risk Management Practices*

Finally sRQ3.3 and sRQ3.4 are addressed by examining risk handling and risk management practices employed in the company. These are assessed against the formal documented risk management process described in section 3.2.

vi. *Validity – researcher triangulation*

vii. *Summary of key findings for cross-case analysis*

The next chapter presents the macro-environmental analysis. A review of media and published industry reports is done for the year, 2014, to identify the various environmental risks perceived in the public domain during the time of this research. This analysis is used in the research as part of the triangulation process.

CHAPTER 5

MACRO-ENVIRONMENTAL RISK ANALYSIS

This chapter provides contextual analysis of risk the broader macro-environment in which manufacturing SMEs operate. This environment involves factors external to the company (SME) such as economic, politic, social-economic and technological factors that frequently determine whether an SME is successful or not. These factors impact the organisation generally, and more specifically, the industry in which the SME operates. They may contribute to risk for the SME (Wiesner, et al., 2007). In this chapter a review of media and published industry reports is done for the year, 2014, to identify the various environmental risks perceived din the public domain during the time of this research. The information from this chapter is used as part of the data triangulation process.

5.1 The South African Macro-environment

The Institute of Risk Management South Africa (IRMSA) in their South Africa Risks Report (2015) presented a picture of South Africa as being in a state of "political and economic turmoil" in 2014 -2015 (p. 7): "The Association of Mineworkers and Construction Union (AMCU) on 29 July 2014 announced the end of a 5-month platinum sector strike by 80,000 workers which resulted in a fall of nearly 25% in mining production. South Africa's credit rating was downgraded by Standard & Poor's (S&P) and Moody's. The country's outlook was shifted from stable to negative by Fitch Ratings, meaning that the country is a single notch away from junk status. The South African government continued to experience difficulties to meet the expectations of the population in terms of the fight against unemployment, poverty and corruption, potentially giving rise to increased social instability. The International Monetary Fund (IMF) slashed its economic growth forecast for South Africa by 0,3 percentage points to only 1,4% for 2014 and by 0,4 percentage points to 2,3% for 2015, suggesting that the sustainability of the country's economy is under severe pressure." (Institute of Risk Management South Africa, 2015, p. 7)

Table 5.1 shows the prioritisation of the top ten South African risks, which were evaluated in a survey as having the highest, perceived likelihood and potential consequence (Institute of Risk Management South Africa, 2015).

Table 5.1 Top Ten South African risks by likelihood and impact 2014-2015 (derived from Institute of Risk Management South Africa, 2015)

Risk	Likelihood	Impact	Risk Rating
Increasing Corruption	10	10	100
Structurally high unemployment / underemployment	9	8	72
Failure / shortfall of critical infrastructure	8	6	48
Profound political and social instability	7		
Major escalation in organised crime and illicit trade	6		
Escalation in large-scale cyber attacks	5	2	10
Failure of a major financial mechanism or institution	4	4	16
Severe income disparity	3	1	3
Mismanaged urbanisation	2		
Massive incident of data fraud / theft	1		
Governance failure		9	
Breakdown of critical information infrastructure & networks		7	
Fiscal crisis in key economics		5	
Escalation of economic and resource nationalisation		3	

Six risks (highlighted in Table 5.1) appeared on both the likelihood and consequence (impact) top-ten list with the geopolitical risk of increasing corruption heading both risk lists with the highest risk rating. The Institute of Risk Management South Africa (2015) points out that South Africa had been progressively performing worse in Corruption Perceptions Index (CPI) published by Transparency International's which ranks countries/territories based on how corrupt a country's public sector is perceived to be. South Africa was ranked 72nd out of 177 countries surveyed, with a score of 42 out of 100 in the index which could prove reputationally detrimental (Institute of Risk Management South Africa, 2015). The next highest risk rating was structurally high unemployment / underemployment of approximately 25% (Stats SA, 2014), which translated into about 5.2 million unemployed people. When coupled with severe income disparity (South Africa's Gini coefficient ranges from about 0.660 to 0.696, the fourth highest in the world (Chitiga et al., 2014)), this is of particular importance in the South African context.

The risk of the failure / shortfall of critical infrastructure featured high on the priority list as this is a key requirement for economic growth. The impact of this risk is, thus, significant for the country, because South Africa is a developing middle-income country (Institute of Risk Management South Africa, 2015). The fifth highest risk is the failure of a major financial mechanism or institution was witnessed in 2014 through the events impacting African Bank. The credit rating downgrade of the four largest South African banks, has given rise to concerns regarding other lenders (Institute of Risk Management South Africa, 2015). This is closely followed by the risk that “South Africa is becoming increasingly exposed to technological risks, especially the escalation in large-scale cyber-attacks coupled with a breakdown of critical information infrastructure and networks. Aon, one of the leaders in the risk management and insurance broking arena, estimates that over 70% of South African businesses are significantly unprepared for cyber liability risks and are thus considerably underinsured when it comes to managing the financial and legal implications that follow a major cyber breach” (Institute of Risk Management South Africa, 2015 p.9).

5.2 Macro-environmental risks impacting business operations

Against the background of this macro-risk environment, in 2014, impacting South Africa as a country, businesses operating in this context experienced more immediate risks as a result. These may have affected their continuity of operation, and include,

i. Information Technology (IT), Data and Cyber-crime risks

IT and data risk is increasing as the internal IT departments in businesses are failing to keep pace with new developments resulting in “massive use of private mobile devices to access corporate systems and the unplanned use of cloud-based services like Dropbox” (Continuity SA, 2014 n.p.), thus, creating environments that are complex and difficult to manage and protect. Increasing cyber-crime in the form of “[d]enial-of-service attacks can also cause systems to collapse, creating another business continuity risk” (Continuity SA, 2014 n.p.).

ii. Labour-related risks

Labour unrest (in the form of strike action) can paralyse entire industries, where continued protests could disrupt supply chains, and raise costs in the short term (Continuity SA, 2014; Management SA, 2014). This poses an even more significant risk in long supply chains (spanning national and geographic boundaries) which already expose companies to a wider range of risk particularly in combination with the just-in-time mentality (Continuity SA, 2014).

2014 was an election year where electioneering raises the stakes and could make industrial action even more volatile, while marches that get out of hand could disrupt operations. (Continuity SA, 2014).

Labour is one of the biggest micro risks for local businesses who have little control over the large union decisions that affect entire industries. “Huge risks and opportunities face the business owner in his interaction with his staff, ranging from the risk of losing key personnel to competitors or ill health, to grievances that can spin out of control” (Management SA, 2014).

iii. Labour Laws

The World Economic Forum (WEF) Global Competitiveness Index criticises South Africa's labour law for being rigid (Makhubele and Ford, 2015), “ rigid or unclear legislation can result in a number of negative consequences which may never have been intended when such laws were passed. A recent South African example of which is the Labour Law Amendment Act or the “deeming clause” which, due to increasing confusion and lack of transparency, is likely to cause not only job losses but the closure of a number of local temporary employment businesses and the shutting down of projects which require periodic or seasonal labour on a purely temporary basis” (Makhubele and Ford, 2015 p.27). “South African labour laws tend to favour older, skilled, unionised workers do so at the expense of young and inexperienced job-seekers who are arguably the worst effected by unemployment in South Africa" (Makhubele and Ford, 2015 p.27).

iv. Resources risks

South African water resources are limited and becoming more polluted. Acid mine drainage could also present potential risks (Continuity SA, 2014). Electricity load shedding is a macro risk that business owners need to be acutely aware of. (Management SA, 2014)

v. Fiscal volatility

This is in the form of fluctuating exchange rates that affect exporters and importers but also businesses with a local focus whose supplies (raw material) may be impacted from a pricing perspective (Continuity SA, 2014; Management SA, 2014).

vi. Legislative transformation

In a developing country where a young constitution is still transforming long-established laws, new legislation, such as the Consumer Protection Act which impact on virtually every business and every transaction in South Africa, is high up on the list of macro environmental risks (Management SA, 2014).

The next sections explore the macro-environmental risk factors in the manufacturing industry in general and the Steel and Engineering and Furniture industries in particular. Section 5.3.1 draws on the work presented by Sunjka and Emwanu (2015).

5.3 The Manufacturing Industry

The standard industrial classification (SIC) system classifies manufacturing activities within the following subdivisions or categories (Stats SA, 2014a),

- Food and beverages.
- Textiles, clothing, leather and footwear.
- Wood and wood products, paper, publishing and printing.
- Petroleum, chemical products, rubber and plastic products.
- Glass and non-metallic mineral products.

- Basic iron and steel, non-ferrous metal products, metal products and machinery.
- Electrical machinery.
- Radio, television and communication apparatus and professional equipment.
- Motor vehicles, parts and accessories and other transport equipment.
- Furniture and other manufacturing division.

South Africa's manufacturing industry is dominated by three sectors, namely food and beverages, petroleum and chemical products, and metals & machinery, which comprise two thirds of total manufacturing production (StatsSA, 2014). Fig 5.1 shows that the manufacturing sector in South Africa contributed 14% of real value added to the GDP for the year 2012 (the latest figures available for Stats SA).

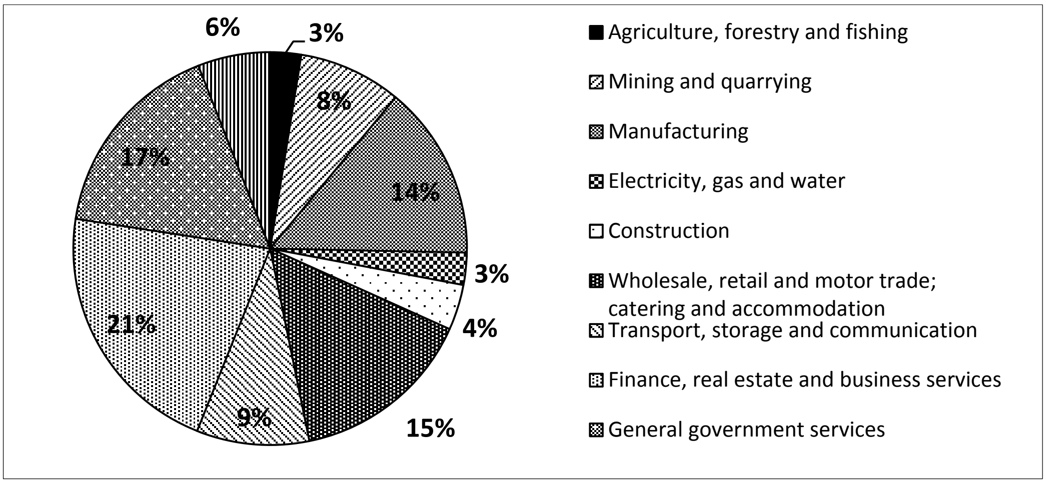


Figure 5.1 The relative size of each industry sector for the year 2013 (compiled from StatsSA, 2014b)

Based on value added, the basic iron and steel, non-ferrous metal products, metal products and machinery group is the third largest (20.4%) in the manufacturing sector (Fig 5.2) with an approximate 3% contribution to GDP. On the other hand, the furniture and other manufacturing divisions group is one of the smallest (4.1%) These groups, located in Gauteng, are the focus of this research.

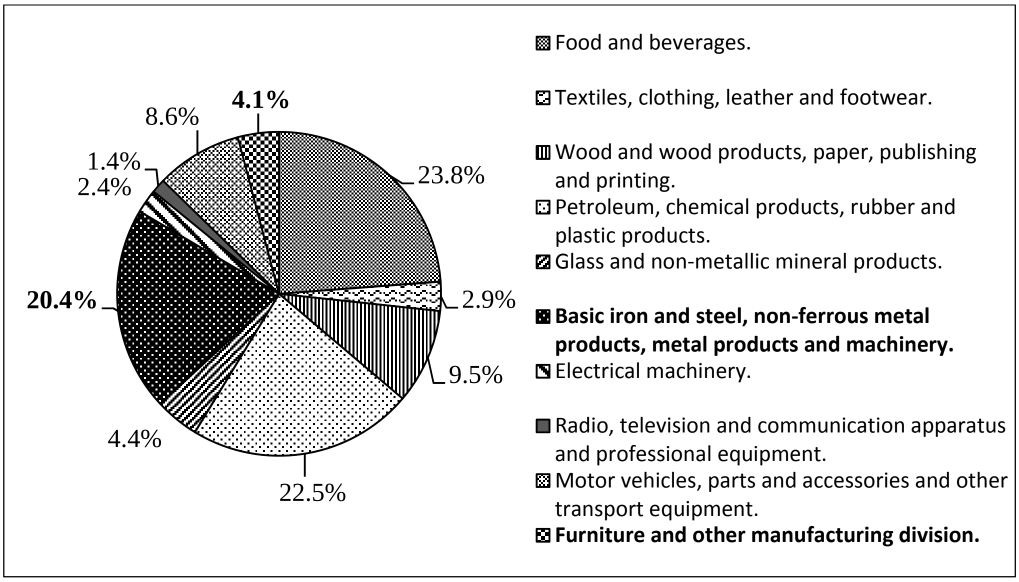


Figure 5.2 The relative importance, based on value added, of each major group within the manufacturing sector (compiled from StatsSA 2014b)

Within the context of South Africa and the business environment as a whole, the manufacturing sector was exposed to more immediate risks specific to the sector. These are explored below.

i. Financial Crisis (2008-2009)

The SA manufacturing sector was severely impacted by the international financial crisis (2008-2009). The sector contracted by 10.4% in 2009, losing almost R31 billion in GDP contributions (measured in 2005 constant prices, or 3% and R10.3 billion at current prices. The manufacturing sector also lost more than 200 000 job opportunities during the crisis (including formal and informal opportunities) (Stats SA, 2014a). According to the GDP figures released by Stats SA (November 2014), economic activity in the manufacturing industry revealed growth of -3.4%, due to lower production in basic iron and steel, non-ferrous metal products, metal products and machinery; petroleum, chemical products, rubber and plastic products; and wood and wood products, paper, publishing and printing divisions (StatsSA, 2014b). "[T]he global economic crisis accelerated this adverse trend, particularly owing to weakened demand in traditional markets, such as Europe, as well as difficult trading conditions domestically" (engineeringnews.co.za, Oct 2014)

ii. Labour Unrest

Although, not stated by the Stats SA (November 2014) report, the labour unrest in the Platinum Mining and Steel and Machinery sectors may well have contributed to the contraction in production outputs. The strike action in the platinum mining sector (January – June 2014) and the steel and engineering manufacturing sector (July 2014) had a significant effect on the South African economy, particularly the metals manufacturing sector (South African History Online, 2014). According to Stats SA (2014a), there was a decrease of 1.3% in manufacturing production in Quarter 3 of 2014 compared Q2 2014. Negative growth rates over this period were reported by five of the ten manufacturing categories. The basic iron and steel, non-ferrous metal products, metal products and machinery category were the most significant contributors to the decrease (-6.1% and contributing -1.2 percentage points) (StatsSA, 2014a). The Platinum sector labour strike lasted 5 months, starting on 23 January 2014 and ending on 24 June 2014 when an agreement was reached between the Association of Mineworkers and Construction Union (AMCU) and the main platinum producers regarding wages and conditions of service (Bohlmann et al, 2014). These producers reported that the strike affected half of the global platinum supply where the loss in revenue was approximately R23 billion by employers and R10.7 billion by employees (Bohlmann et al, 2014).

iii. Other issues

"While many manufacturing subsectors are domestic-market orientated, others rely heavily on export markets. Competitiveness is, thus, critical to their success … [c]onsequently, several factors affect subsector performance over time" (Engineering News, 2014). These factors include (Engineering News, 2014), cost pressures, arising in the areas of wages, inputs and administered prices, input costs and pricing practices (such as import parity pricing), electricity shortages, currency volatility, skills constraints, poor rate of productivity improvement, volatility of the rand, technological upgrading, policy support, infrastructure and logistics, regulatory aspects and tariff protection, and competition issues.

Of particular interest to this research are the macro-environmental risk factors in the Steel and Engineering industry which will be considered next.

5.3.1 Steel and Engineering Industry

The risk factors identified include,

i. Labour Unrest

The month-long strike in the metals and engineering sector by NUMSA (National Union of Metalworkers of South Africa) began on 1 July 2014 and continued until 28 July 2014 (Steyn, 2014) was associated with various violent attacks on businesses and the intimidation of non-striking metal-workers, mainly in Gauteng's industrial areas (Whittles, 2014). As a result, some small businesses in the metal industry were at risk of closing down (Nicolaides and Ngobeni, 2014). Several other industries were also severely impacted by the shortage of raw materials, including industries "upstream and downstream" of the steel industry. The strike cost the industry over R300 million (fin24, 2014).

ii. Electricity Load-shedding

According to Kaiser Nyatsumba, SEIFSA (Steel and Engineering Industries Federation of Southern Africa) Chief Executive Officer, the sector is electricity intensive and was significantly impacted “by electricity outages which disrupt production, lead to under-utilisation of production capacity and higher costs, substitution of locally-manufactured products by imports, the threat of not fulfilling export orders and losing contracts, as well as uncertainty about the viability of fixed investment” (eNCA, 2015)

iii. Depressed markets

Nyatsumba states that “South African metal sector exports were also depressed and could continue to be so for a long time. Research showed that metal price cycles last on average 35 years. The latest cycle started in 1999 and reached its peak in 2007 and the downswing had already lasted seven years. This meant that there could still be another 10 to even 20 years of depressed markets ahead" (eNCA, 2015)

iv. Critical sector linkages

Nyatsumba observes that "[T]he sector was critically linked to the mining, construction and auto sectors, being one another's customers and suppliers, which means that instability affecting one sector inevitably affects the others" (eNCA, 2015)

v. Decline in demand

Nyatsumba continues to explain that "[t]he consequences of the rise of China and India, as well as the structural adjustments taking place in those economies, would be significant. There are massive surpluses generated in those markets, which find their way onto the world market. The current rebalancing taking place will shift their input demand patterns downward permanently. Demand out of Africa could decline in sync, due to its dependence on Chinese demand for its commodities for its own growth" (eNCA, 2015)

Also, of interest to this research are the macro-environmental risk factors within the furniture industry which will be considered next.

5.3.2 Furniture Industry

The risk factors identified include,

i. Decline of levels of competitiveness

Growth of the South African furniture industry has significantly lagged the global furniture trade, consequently losing share of the international furniture manufacturing market, moving from the 34th largest exporter in 2005, to 43rd in 2006 (Fibre Processing& Manufacturing Sectoral Education and Training Authority (FP&M Seta), 2014). This is a result of insufficiency in demand in external and/or domestic markets that has been attributed to an increase in low cost Asian imports, decreasing investment in skills development (the failure to develop a commitment to quality in the labour force) and technological innovation/low levels of automation, and insufficient research and development funding (Engineering News, 2015; South African Department of Trade and Industry, 2008). At local factory level, competitiveness challenges arise due to increasing input costs, skills shortages and inadequate power supply (Industry Development Corporation, 2014a and 2014b).

ii. Access to furniture retail market for small manufacturers

One of the challenges for small manufacturers is the high concentration of the furniture retail sector where four big companies (Ellerines Group, Lewis, JD Group, and Shoprite) dominate the market with a market share of 80%. The rest is shared among independent furniture retailers. “This affords the retail sector huge bargaining power against manufacturers, leading to suppressed producer prices. Access to this market is often difficult for small manufacturers. The problem is the scale at which small manufacturers operate. Due to the size of these retailers and the transaction cost of sourcing from many small manufacturers, retailers often ignore small manufacturers in sourcing their furniture” (South African Department of Trade and Industry, 2008)

iii. Commodity pricing

The materials (cotton, iron, steel and aluminium) used in the furniture manufacturing process affect the prices and profit margins in the furniture sector. Changes in the price of these commodities, thus, have a significant impact on the performance of the furniture industry (FP&M Seta, 2014).

iv. Skills Shortages

The Furniture Strategy and the Industrial Policy Action Plan make reference to the shortage of high-level skills in the furniture industry such as design (South African Department of Trade and Industry, 2008).

v. African Bank/Ellerines

According to Magwaza (2015), “the year 2014 proved to be a turning point for the furniture retail industry due to the collapse of the country’s oldest furniture business, Ellerines" (Magwaza, 2015). Ellerines was placed under business rescue after its parent company, African Bank, went bankrupt. It sold its furniture brands and closed some of its stores which included 63 Bears Furniture stores, Dial-a-Bed, Wetherlys, Geen & Richards and stores outside South Africa. This would result in the contraction of the furniture retail industry (Magwaza, 2015).

Table 5.2 below presents a summary of the above analysis where similar risks identified within the categories of South African in general (SA), business operations in South Africa in general (BUS), the South African manufacturing industry (MAN) in general, and in particular, the Steel and Engineering Industry (STEELIND) and the Furniture Industry (FURNIND), are grouped together.

Table 5.2 Summary of macro-environmental risk for South Africa in 2014

Risk No.	SA General (SA)	Business Operations in General (BUS)	Manufacturing Industry (MAN)	Steel and Engineering Industry (STEELIND)	Furniture Industry (FURNIND)
1	Increasing Corruption				
2	Structurally high unemployment / underemployment				
3	Failure / shortfall of critical infrastructure	Critical resources (water, electricity)	Electricity shortages, infrastructure and logistics	Electricity shortages	
4	Profound political and social instability	Industrial action	Industrial Action	Industrial Action	Industrial Action
5	Major escalation in organised crime and illicit trade				
6	Escalation in large-scale cyber attacks	Information Technology (IT), Data and Cyber-crime risks			
7	Failure of a major - financial mechanism or institution				African Bank/Ellerines
8	Severe income disparity				
9	Mismanaged urbanisation				
10	Massive incident of data fraud / theft	Information Technology (IT), Data and			

		Cyber-crime risks			
11	Governance failure	New legislation	regulatory aspects and tariff protection, policy support		
12	Breakdown of critical information infrastructure & networks	Information Technology (IT), Data and Cyber-crime risks	technological upgrading		
13	Fiscal crisis in key economics	Fluctuating exchange rates	Financial Crisis (2008-2009), currency volatility		
14	Escalation of economic and resource nationalisation				
15		Labour-related risks (unionisation, labour law)	skills constraints, poor rate of productivity improvement		Skills Shortages
16			cost pressures, arising in the areas of wages, inputs and administered prices, input costs and pricing practices (such as import parity pricing)		Commodity pricing
17			competition issues	Depressed markets, decline in demand due to cheap imports	Decline of levels of competitiveness, access to furniture retail market for small manufacturers
18				Instability due to critical sector linkages	

Having considered the context of macro-environmental risks under which the two industries selected operated during this study; the following chapter presents the pilot case study analysis and results.

CHAPTER 6

PILOT CASE: WITHIN CASE ANALYSIS AND RESULTS

This chapter presents the full case report for FURN 1, the pilot case for this research. The owner-manager of FURN 1 was the first available for interviews after the survey was conducted and the metal industry strike had ended, and hence became the pilot case study. The analytical approach is as outlined in section 4.3.3.1 in chapter 4. In brief, the analytical process started, subsequent to the interviews, factory tour and transcription of these interviews, with the first cycle manual coding. This involved a “pen and paper” approach on the interview transcript, where information required to answer the research questions was identified and categorized, and the first causation coding sequences were formulated. Second cycle coding was then done via an analytical memo (see Appendix 6 F1.3). This information was next coded in spreadsheets in the third cycle coding pass. The spreadsheet information was aggregated and represented via descriptive statistics (pie charts). This supported the answering of sRQ 3.1, 3.2, 3.3, 3.4 and sRQ4. The first cycle information categorization, the descriptive statistical analysis of the survey responses for FURN 1 and accessing of the company website contributed to the answering of sRQ 1 and sRQ 2. The case report is presented in the format outlined in section 4.3.4 in chapter 4.

The chapter concludes with a reflection on the research quality of the within case analytical process through triangulation, highlighting learnings from the pilot case analysis that were carried forward into the subsequent within case analyses.

6.1 FURN 1- Pilot Case Report

The within case analysis seeks to elicit information that will contribute to answering the research and sub-research questions posed. RQ 2 and sRQ2 are considered first as they set the background of the company under analysis.

RQ2: How does the nature of the SME (classification, life-cycle phase/maturity, history of survival, standards implemented, products, industrial sector, and supply chain structure) play a role in the supply chain risk management of the SME?

sRQ2: What is the nature of manufacturing SMEs in South Africa?

Using the indicators in Table 3.1c (Appendix 3.1), the following information in Table F1.1 was compiled from three different sources, the Company website, 2016; survey, 2014; interviews (including company walk-through tour), 2014.

Table F1.1 Company Characteristics

Characteristic	FURN 1
Company Age	> 20 years
Legal Entity	Limited Company
Ownership	Family-owned
No. of Owners	2
OMF1 share	50%
Location	Doornfontein, Johannesburg, Gauteng
No. of Employees	68
Products	Bespoke, hand-crafted high-end furniture
Product Change	Range is Stable
Total Turnover	between R5 million and R13 Million
Manufacturing Sector	Furniture
Act Classification	Medium

Data sources: Company website, 2016; survey, 2014; interviews, 2014

The company, thus, satisfies the criteria for selection of the case companies.

Organizational Profile/ Operational Mode

Company Background

FURN 1 is owned and managed by 2 brothers (OMF1 –owner-manager of FURN 1 and OMF1B – brother of owner-manager of FURN 1: see profiles below), the third generation of the family to do this. They purchased the business from their father in 1996 and own equal shares. The FURN 1 factory was founded in 1935 in Doornfontein, South Africa. It is still located in the original premises where the skills in the production of fine, hand crafted furniture continue to be practiced through the selection of timber imported from all over the world. (Company website, 2016).

FURN 1 also offers a turnkey service from inception to ‘white gloved’ delivery. They work closely with interior designers to cater for the specific requirements of the customer. Particular items are also outsourced if considered necessary to meet client’s needs. The furniture manufacturing business is complemented by a Home Fragrance business run by the brother’s wives (Company website, 2016).

Their clients range from hotels, corporates, executive accommodation, governments and private residences (Company website, 2016).

Products

There are a number of product ranges or designs, where customers can chose the timber, the veneer finishes, the materials, and the hardware finishes, as well as, motifs and insignia, making the end products bespoke (Company website, 2016). The range has remained stable over the years.

Figure F1.1 Examples of FURN 1 products (Company website, 2016)

Table F1.2 FURN 1 product list (Company website, 2016)

Bedroom	Dining Room	Executive Offices	Lounge	Occasional Items
Headboard & Beds	Tables	Desks	Tables	Tables
Pedestals	Sideboards	Credenzas	Cabinets & TV Units	Chairs
Desk Dressing Tables	Servers	Cabinets	Chairs	Mirrors
Chest of Drawers	Chairs	Tables	Couches	Other
Stools & Ottomans		Chairs	Ottomans	

Workforce Profile

The company has a multi-racial work-force of 68 people. This consists of craftsman, such as skilled cabinet-makers and carvers, who work with semi- and un-skilled workers who are learning the trade. For example in the carving department, the principal carver, who is from Mauritius, has been working for the company for 41 years. Everything is done by hand. “He carves the most beautiful things and shows a lot of pride in his work” (Observation from company tour). The Production manager started with the company as a cabinetmaker and has progressed to a management position. The production floor has an informal system of department heads in the specialist areas such as Veneering, Machining and Fitting. Job-rotation is constrained because of these job specialisations. (From descriptive coding of Interviews and Walk-through Tour, 2014)

Assets

No monetary value of assets was supplied. The following was observed in the walk-through tour of the facility by OMF1 (Transcription in Appendix 6 F1.1 and Observations in Appendix 6 F1.2).

The building is owned by the company. The area in which it is located has become run-down, and security of the building is an issue. The company occupies all three floors of the building across which the production facilities, parking and employee offices are interspersed. The top floor (a 3^{rd} floor attic-type space) is occupied by the upholsterer.

The ground floor houses the parking, the timber-yard where the various sized timber planks are received, sized cut and joined, the wood-preparation area where boards are laminated (glued) and veneers applied using an old large thermo-mechanical press. There is also a CNC-machine on the ground-floor which they have had for the last 10-15 years which is used for repetitive work. The machine is regularly upgraded. Open areas on the floor are used for temporary storage of finished goods, semi-finished goods and raw materials. Because of the age of most of their machinery, they regularly experience problems with machines and breakdowns.

The first floor is occupied by assembly areas utilized by the cabinet-makers, the bespoke hand-carving area, the varnish/paint spray area, leather fitting area where embossing is also done, and offices (OMF1B's office). The second floor is used for the boardroom (a small room with a table that seats 6 and which is also used as a dining-room), OMF1's office, administrative offices, a showroom in construction and finished good storage space.

They did not own a generator.

Operational Environment

The following was derived from observations on the walk-through tour of the facility by OMF1 (Transcription in Appendix 6 F1.2).

Workers seemed to be busy with work-in-progress evident and focused on their jobs. They were willing to explain their jobs and exhibited a sense of pride in their work.

There was some evidence of visual management i.e. a production planning board was visible on one wall; whiteboards and chalkboards tracked orders, urgent orders, current orders, and colour-coding was used on the timber. No progress or KPI boards were evident.

Observations of evidence of Health and safety revealed that there were many first aid boxes and fire-extinguishers on walls and emergency exit signs. There were, however, no floor demarcations, no handrails on the stairs, unrepaired holes in floors and unleveled floors, and some employees did not have masks/earplugs. There was a sense that health and safety has been considered but is not a top priority.

There was some evidence of management of inventory in certain areas but not in others, as a lot of inventory and work-in progress seemed to be scattered around the shop floor. There was a storage room for tools. There was a lot of expensive scrap (pieces of expensive wood that could not be used for production purposes) and no plan on how to manage it.

Some reworks were being done due to incorrect stains on cabinet and some repairs that came back from customer. Moving furniture between floors and transporting sometimes causes damage and thus requires repair but OMF1's seemed to feel that this was just part of the business of making furniture.

Regulatory Requirements

There did not appear to be any furniture-industry specific regulatory requirements that they were implementing. The company is not ISO 9001 certified but have received numerous industry-specific awards for quality. Labour laws and regulations seem to be the primary regulatory issue for the business.

Organizational Structure and OMF1 involvement

There is no official company organogram and the structure appears to be informal and flat. The 2 brothers and the production manager seem to form the core management team, and they meet regularly in the boardroom to discuss daily operations. OMF1 is involved in the daily operation, planning and decision-making of the business at all levels. They have an accounts administrator and a tea-lady over and above the production floor staff.

FURN 1 Supply Chain

The FURN 1 Supply Chain (SC) was mapped by hand with OMF1 throughout the interview, and presented “constructive working space” or “visual-sense-making” to focus and drive the interview. Fig F1.2 was mapped and corroborated by the honours student who participated in the interview and developed their own SC maps based on the interview information.

The SC map provides an indication of the visibility (through the eyes of OMF1) across the company SC. The greatest visibility seemed to be into the demand-side.

Descriptive Coding and Analytic Memo writing was used to elicit the following information from the interview.

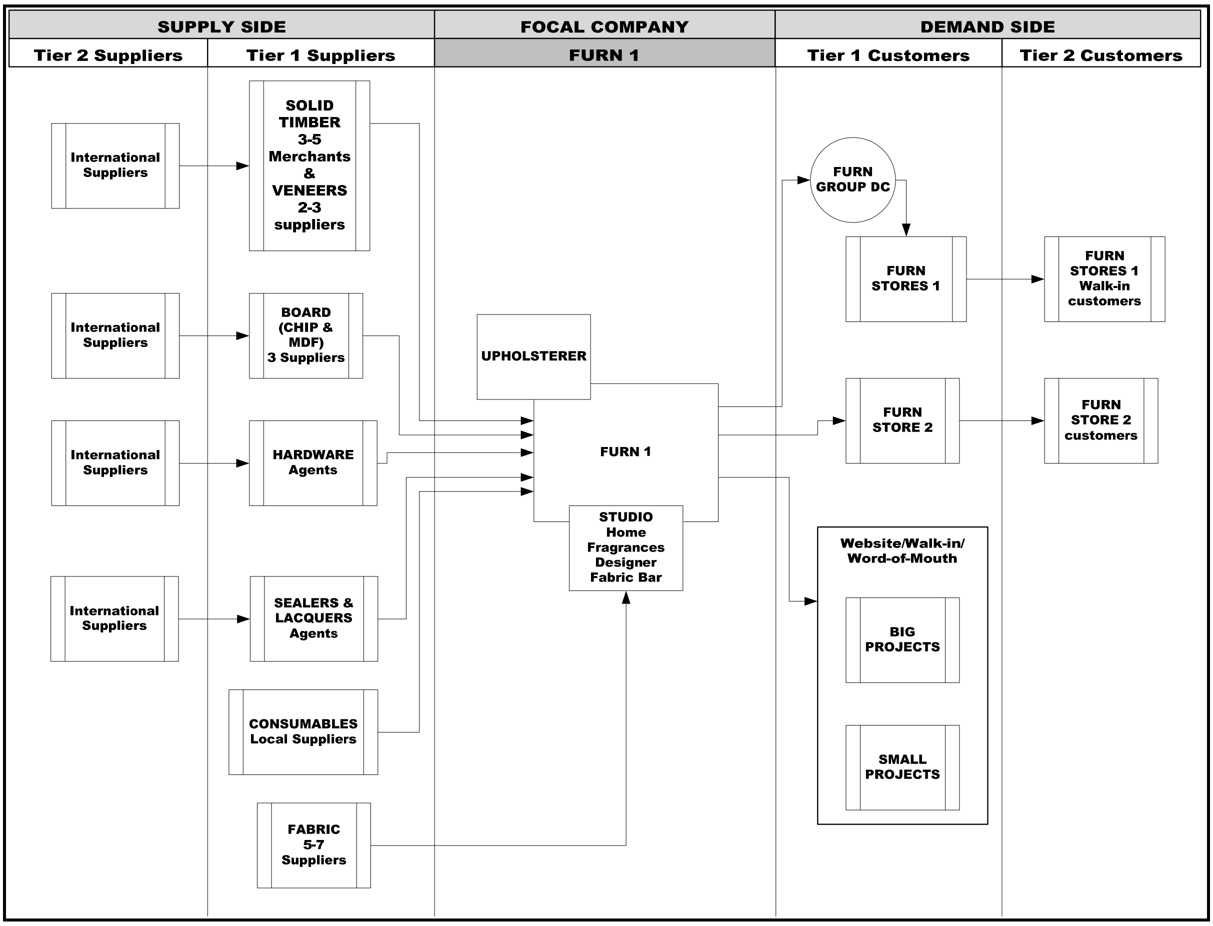


Figure F1.2 FURN 1 Supply Chain Map

<u>Customers and Stakeholders - The Demand Side</u>

The demand side consists of four channels that generate customers and sales, namely, Furn Store 1, Furn Store 2, Projects/Contracts and Walk-in business. Much more time in the interview was directed by the OM (owner-manager) to the demand side. He seemed to focus on and know more about the demand side, as opposed to the supply side. This was most likely because he was most involved in the relationships and negotiations with Tier 1 customers. The thinking seemed to be that without the flow of incoming business and cash, there is no point in being in business. Cashflow is important from at least 1 big customer to cover monthly expenses.

Furn Stores 1 is a small group of high-end furniture stores that are part of a large South African Furniture Group (Furn Group) that is owned by a South African bank (Bank 1). FURN 1 sells under their own brand name (store-in-a-store concept) in 5 stores. This channel makes up 33% of their orders in Rand value. They can handle about R1.5 mill in orders per month. Sales operate on a Made-to-order basis where the client encounters the product in a store and places an order with Furn Stores 1 accompanies by a 50% deposit. This deposit is retained by Furn Group. The client has a week to make changes after which the order takes 4-6 weeks to manufacture. FURN 1 delivers the completed order to the Furn Group Distribution Centre (DC) and Furn Store 1 delivers to the client. FURN 1 is paid by Furn Stores 1 thirty days from the statement.

Furn Store 2 is a large family-owned furniture retailer. FURN 1 manufacturers certain furniture ranges for Furn Store 2. These are sold under the Furn Store 2 brand. FURN 1 makes to order for Furn Store 2 customers and Furn Store 2 also orders stock from FURN 1. Furn Store 2 also works on large projects (such as whole houses or guest houses) and will contract FURN 1 to do some of the manufacturing. FURN 1 receives a 50% deposit when they receive the order from Furn Store 1. They get paid the remaining 50% a week after they have delivered the completed order.

Projects/Contracts and walk-in individual orders are generated through their website and word-of-mouth. They have done numerous projects for hotels, banks and other commercial enterprises and private clients. This is corroborated through their website. For individual walk-in clients, they have a designer located at their studio (not in the factory, from which their wives run a home-fragrances business, and where their fabric bar is located) who then works with the customer. They are in the process of setting up a showroom at the factory because they no longer have their own retail store.

<u>Suppliers and Partners - The Supply Side</u>

FURN 1 has multiple suppliers rather than exclusive suppliers. Relationships on the supply side are largely with the Sales Reps (from large suppliers) who do the sourcing for them. The supply-side seemed to be less of a concern compared to the demand side.

Exotics Woods/Timber is the core raw material. They manufacture in Maple, Mahogany, Beech, Cherry and Walnut which are sourced from across the world by merchants from whom they purchase the woods they require on a made-to-order basis. They use a pool of 3-5 merchants and the price and size/thickness of the timber cuts required determines the merchant they use. Prices are negotiated depending on the availability of the woods. Veneers used to be sourced from 2-3 suppliers who would import the product.

Chipboard and MDF (Medium Density Fibre Board) is purchased from PG Bison and other suppliers who import the board.

Hardware, such as, drawer runners, screws, nails and hinges are high-end, expensive and exclusive. They are almost totally imported through local suppliers.

Fabrics are stored at the Fabric Bar at the Studio (from where their wives run their home fragrances complementary business). Their designer meets clients at the studio to discuss their requirements.

Consumables, such as, glues, are locally manufactured and sourced. Other consumables such as sealers and lacquers are all imported and one of the most expensive items.

Suppliers and Partners - Outsourcing

Upholstery is "outsourced". They have set up their upholsterer, who used to be employed by the company, in his own business located on the FURN 1 premises. He does all their upholstery and sources his own outside business. He uses the air pressure and staple guns owned by FURN 1.

The Home Fragrances business that imports from the USA is run by the brother’s wives from their studio (not in the factory, from which their interior designer operates, and where their fabric bar is located). This business is complementary to the furniture business.

Supply Chain Visibility

Based on the information provided by OMF1 during the interview regarding the supply chain, and the resultant supply chain map (Fig F1.2) developed from this information, it may be concluded that good visibility into tier 1 on both the supply and demand sides is demonstrated. Beyond tier 1 this visibility appears to be significantly lower. This may be due to there being more distanced and very much less communication with tier 2 role-players.

RQ1 and sRQ1 are next considered as they address the risk perceptions of the owner-manager in the context of the company presented above.

RQ1: What does supply chain risk mean for SMEs, and in particular for the individual owner-manager?

sRQ1: How do manufacturing SME owner-managers in South Africa perceive risk in their businesses and in particular in their Supply Chains?

Using the indicators in Table 3.1b (Appendix 3.1), the information on OM characteristics, given in Table F1.3, was compiled from the Company website, 2016; survey, 2014; interviews, 2014.

Table F1.3 OMF1 Characteristics

Characteristic	**OMF1**
Age	45-55 years old
Education/Training	Qualified cabinet maker; Financial degree in Accountancy
Years of entrepreneurial experience in small business management	11 - 15 years
Years as owner/manager of current firm	10 years and above

Data sources: Company website, 2016; survey, 2014

OMF1 is the financial director of FURN 1. He started as an apprentice in the factory in 1983, qualified as a cabinet maker and then completed his financial degree in Accountancy. After gaining commercial experience he joined FURN 1 in 1996. He and his brother bought the company from their father and own equal share. "[A] combination of the understanding of financial production costs allied to the intricacies of manufacture enables [OMF1] to have a holistic understanding of the [FURN 1] product" (Company website, 2016).

OMF1's brother and business partner (OMF1B) studied Furniture Business Management and Design Consulting in Germany from 1982 to1985. On his return, he worked with his father from 1990 until he and OMF1 took over the Company in 1996. OMF1B's "background and experience has enabled him to manage the factory from input on design to orchestrating the manufacturing of each product. Travelling abroad to select beautiful lighting and ornaments has maintained the continuity of in-house elegance. [OMF1B] works closely with top decorators and procurement companies enabling [FURN 1] to be the preferred choice of pinnacle corporate companies to many 5 star hotels around the world" (Company website, 2016).

The risk profile of the owner-manager of FURN 1, given in Table F1.4, was compiled from the survey returned by OMF1.

Table F1.4 OMF1 Risk Profile (Survey Responses by OMF1)

a.	Do you believe that your own judgement based on your experience plays an important role in your decision-making?	Yes
b.	Would you consider yourself to be a risk-taker in business?	No, "I'm the accountant, don't take risks"
c.	Do you use have a FORMAL risk management strategy and/or processes and procedures (Risk Identification, Risk Assessment, Risk Mitigation, Risk Monitoring with regard to e.g. production, supply chain, finance, safety etc) in your company?	No
d.	How would you PRIMARILY define risk in your business environment?	As a disruption in business continuity
e.	Do you believe that risk in the business is well managed?	Not sure
f.	Do you believe that you have the resources (e.g. information, knowledge, technology) you need to make good business decisions regarding risk?	Not sure
g.	Have you heard of Supply Chain Risk Management (SCRM)?	No
h.	What other serious risks do you face that affect your ability to supply your customers with your product?	Lack of skills

While OMF1 believes that his financial accounting background and experience have a significant influence on his managerial role (item a), and that he does not have a high propensity for risk (item b), he does not seem to have developed a formal understanding of risk management (items c, e, f, g). His chosen definition of risk, among the following choices, was (item v):

i. *As UNCERTAINTY, about an event/potential loss/a decision*

ii. *As VARIABILITY, in profit/sales/supply/demand*

iii. *As a potential HAZARDOUS event*

iv. *As LOSS, of profit/sales/income/customers/suppliers*

v. *As a DISRUPTION in business continuity*

It may tenuously be inferred that OMF1 perceives that the "lack of skills" (identified in the macro-environmental analysis of the furniture sector in section 5.3.2 iv and risk FURN 15 in Table 5.2) presents the most significant "disruption in business continuity".

Business Environment (Survey Responses by OMF1)

The perceptions of OMF1 of the business environment in which FURN 1 operates, given in Table F1.5 and Table F1.6, was compiled from the survey returned by OMF1.

Table F1.5 The business environment in which my business operates is:

j.	Safe with little threat to my firm's survival and well-being	Disagree
k.	Moderately risky where achieving business goals may sometimes be affected	Agree
l.	High risk where one false move can result in severe loss	Disagree
m.	Full of investment and marketing opportunities	Disagree
n.	Stressful, hostile and hard to survive in	Strongly Agree

It would seem that, although, OMF1 perceives the business environment in which his company operates as undeniably difficult (item n), he does not appear to link this unequivocally to risk for the business (item k) as the business is still able to operate effectively. These seemingly contradictory perceptions may well be moderated by the sense that OMF1 through his company can influence (control) aspects of the business environment (items p, r).

Table F1.6 My business:

p.	Can control and manage the business environment to its advantage	Agree
q.	Has little or no control over the business environment in which it operates	Disagree
r.	Has some control over the business environment	Agree

<u>Risk (Survey Responses by OMF1)</u>

The ratings by OMF1 of the risks in the FURN 1 business environment, given in Table F1.7 (next page), were compiled from the survey returned by OMF1.

Table F1.7 How would you rate these risks in your business?

s.	External risks, which may affect your organisation such as changes in the environment in which you operate.	High Risk
t.	Setting organisational objectives and ensuring you set the right ones and then meet them.	Low Risk
u.	Operations risks, which arise from the services you deliver or the activities you carry out	Low Risk
v.	Financial risks facing the organisation in terms of internal systems, planning, funding etc	Medium Risk
w.	Risks associated with the employment, management and retention of staff	Medium Risk
x.	Risks associated with legislative framework within which your organisation operates	Medium Risk
y.	Governance - reviewing the risks, which are part of the management of the organisation	Medium Risk

Note: the option of "Not a risk" was provided.

The information in Table F1.7 is compiled into Fig F1.3

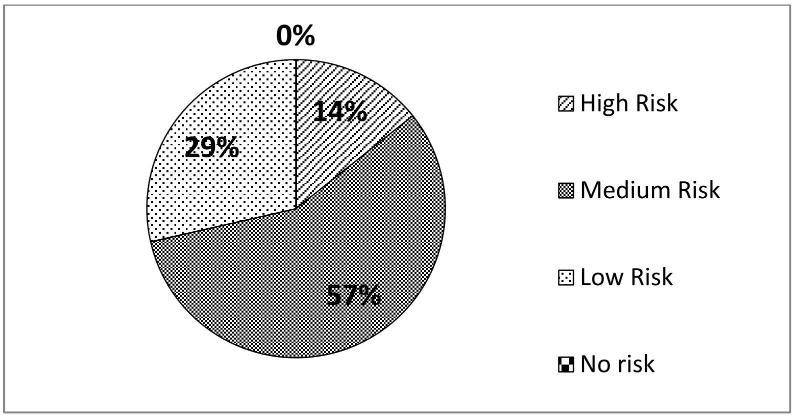


Figure F1.3 Risks in your business

OMF1 rated 57% (4/7) of the listed (7) risks to his business as medium. This is consistent with his assessment of the business environment as "Moderately risky where achieving business goals may sometimes be affected" (item k). These medium risks are noted as

- financial
- human resources
- legislative environment
- risk management

Only "External risks" (item s) were rated as high, 14% (1/7). This also corroborates his belief that the business environment is "Stressful, hostile and hard to survive in". Inconsistencies in answers may be interpreted as, the medium risk rating for (item w) where in his answer (item h) above he cites "lack of skills" as the most serious risk in supplying his customers with product. This, however, may be attributed to "lack of skills" being seen as an external or market related risk (see section 5.3.2 iv) while (item w) is an internal (to the company) risk, and more manageable. Another potential inconsistency may be the medium risk rating for (item y) where (item c) and (item e) above may be interpreted as presenting a high risk to the business. OMF1 may, however, not believe that, a lack of a formal risk management strategy and a lack of awareness of the effectiveness of how risk is managed in the business constitute a high risk to the business, but does recognize that there is a moderate risk. Organisational strategy or goal setting, and operational risks are noted as being rated as low risks.

The ratings by OMF1 of the risks in the FURN 1 supply chain, given in Table F1.8 below, were compiled from the survey returned by OMF1

Table F1.8 Please indicate the impact the following risks have on your business.

A	Unable to Forecast (due to demand variation and no feedback from customers)	High
B	Raw material price volatility	High
C	Accounts not being settled	High
D	Defective parts (from suppliers)	Medium
E	Variability in finished goods produced	Medium
F	Variability in raw materials from suppliers	Medium
G	Inventory Control (too high or too low)	High
H	Manual processes (e.g. stocktaking)	Medium
I	Poor Supplier Service (late deliveries, quality)	Medium
J	Other Natural Disasters (Floods/ Heavy Rains, Earthquakes, Volcanoes, Snow etc.)	Medium
K	Outsourcing certain activities	Medium

Note: the option of "Not a risk" was provided.

The information in Table F1.8 is compiled into Fig F1.4

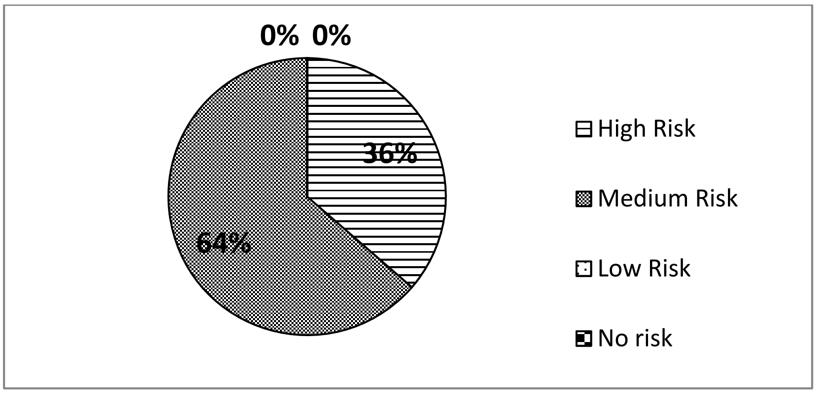


Figure F1.4 Impact of risks on your business

The risks listed above are some of the most common risks associated with supply chains cited in the literature (Arntzen, 2010; SAPICS, 2011). OMF1 rated 64% (7/11 or two-thirds) of the listed (11) risks to his business as medium, and the remaining 36% (4/11 or one-third) as high. None of the supply chain risks were noted as "low" in contrast to 29% (2/7) of business risks being rated as "low". This may indicate that risks associated with the supply chain are important and recognized. Risks rated as high are noted as:

- Unable to Forecast (due to demand variation and no feedback from customers)

- Raw material price volatility (noted in section 4.1 iv)
- Accounts not being settled
- Inventory Control (too high or too low)

RQ3 and the related SRQ3s are considered next.

RQ3: How do SME owner-managers make decisions about supply chain risk in their businesses?   **sRQ3.1: How do owner-managers of manufacturing SMEs in South Africa assess risk in their Supply Chains? (Risk Identification)**   **sRQ3.2: What do owner-managers of manufacturing SMEs in South Africa consider to be the most prevalent risks in their Supply Chains?(Risk Analysis)**   **sRQ3.3: What actions (if any) do owner-managers of manufacturing SMEs in South Africa take when a risk is identified? (Risk Response/Handling)**

Risk Analysis

Causation Coding and Analytic Memo writing (refer to Appendix 6 F1.3) was used to develop causal explanations, from the perspective of OMF1, of risk-related events and their causes (Saldana, 2013, p 163). This causal process is depicted in the Table F1.9 (the Spreadsheet is given in Appendix 6 F1.4 Causal Analysis) where the event/action/characteristic is identified by the OM and requires a response because of the potential consequences if not addressed. The OM attributes the event/action/characteristic to a particular cause. The event/action/characteristic, the consequences and the causes can be designated to a risk category.

Table F1.9 Risk Causal Analysis (Appendix 6 F1.4)

A	This event/action/characteristic requires or initiates a response		The event/action/characteristic may result in... if not addressed			The event/action/characteristic is attributed to ...		
	Event/Action/Charateristic	Risk Category	Consequence	Risk	Risk Category	Cause (why)	Risk Category	Table 4.1
1	Own retail outlet closed (historical)	SC Structure Risk: Points of Sale needed to generate demand	Company Name not visible	Lack of demand	Demand Risk	Global Economic downturn - 2008 finacial crisis - less market expenditure on high-end furniture. Rentals for retail space became very high.	External: Economic	SA13
2	Furn Group lack of CRM	Reptutational Risk: Brand degradation	Disgruntled customers	Loss of customers	Demand Risk	Furn Group (channel) is a large furniture group with many different brands (from mass-market low end to exclusive high-end i.e. Furn Store 1) under its umbrella. The Group is owned by a mass-market bank. There, thus seems to be a mismatch between the corporate, mass-market mentality of the Furn Group management and the high-end brand management required for Furn Store 1.	SC Structure: relationships between each of the organisations	
3	Incorrect orders delivered by Furn Group	Reptutational Risk: Customer disatifaction	Disgruntled customers	Loss of customers	Demand Risk	Furn Group DC which is computer-controlled. The system cannot distinguish the finer details of the order such as different fabrics for chairs or finishes on pedestals.	SC Structure: relationships between each of the organisations	
4	Not receiving payments when needed or expected	Financial Risk: Cashflow slow	Cannot meet financial obligations	Company may not survive	Strategic Risk	Payment Terms of Furn Group have a long cycle time & customers do not pay on time	SC Structure: relationships between each of the organisations	
5	Channel may be closing	SC Structure Risk: Points of Sale needed to generate demand	Company Name not visible	Lack of demand	Demand Risk	Channel main shareholder in financial crisis	External: Economic	SA7, FURNIND7
6	Cannot sell furniture sold in Furn Store 1 anywhere else	Financial Risk: loss of income	Cannot recoop expected profits	Reduction in Profits	Strategic Risk	Channel may be closing	External: Economic	SA7, FURNIND7
7	Payment terms for Furn Store 2 may be changing	Financial Risk: Cashflow	Cannot meet financial obligations	Company may not survive	Strategic Risk	Furn Store 2 appointed a new Financial Manager who is considering changing payment terms	SC Structure: relationships between each of the organisations	
8	Big projects uncertain	Strategic Risk: Lack of or unable to plan	Uncertainty in demand	Cannot predict demand	Demand Risk	Nature of the market	External: Economic	FURNIND17
9	Cannot predict demand	Strategic Risk: Lack of or unable to plan	Cannot forecast	Cannot plan production capacity	Strategic Risk	Nature of the market	External: Economic	FURNIND17
10	Cannot plan production capacity	Strategic Risk: Lack of or unable to plan	Lack of capacity at peak times	Do not have required capacity	Operations	Uncertain of when Big projects will happen	External: Economic	FURNIND17
11	Lack of production capacity	Reptutational Risk: Customer disatifaction	Cannot meet customer expectations on delivery	Loss of customers	Demand Risk	Big Projects absorb capacity	Operations: Production Capacity for peak demand	
12	Cannot get raw materials or stock	Supply Risk: Uncertainty in supply	Cannot meet customer expectations on delivery or specifications	Loss of customers	Demand Risk	lack of raw materials or stock of particular items in the market or supplier out of stock	External: Economic	FURNIND16
13	high prices + raw material imported -> Rand fluctuations lead to pricing variability	Financial Risk: paying more for essential raw materials	To meet customer expectations on pricing, company may need to absorb extra costs	Reduction in Profits	Strategic Risk	raw material scarcity + Designer specified harware that is not widely available in the market and crotch veneer which is not widely used and available in the market + Sealers and Laquers are oil-based, thus more costly and imported	External: Environmental + Economic	FURNIND16
14	Cannot get raw materials or stock	Supply Risk: Uncertainty in supply	Cannot meet customer expectations on delivery or specifications	Loss of customers	Demand Risk	raw material scarcity + Designer specified harware that is not widely available in the market and crotch veneer which is not widely used and available in the market	External: Environmental	FURNIND16
15	Cannot find skilled cabinet-makers to replace aging workforce	Operations Risk: HR and Labour Risk	Cannot make their high-end hand-crafted product	Company may not survive	Strategic Risk	Growing skills shortage (cabinet-makers and machinists)	External: Social	FURNIND15
16	Pay high wages because of long employed and aging workforce	Operations Risk: Legislative and Regulatory Risk	Cannot afford to pay high wages	Company may not survive	Strategic Risk	Labour Regulatory Environment is restrictive and uncertain	External: Legislative	BUS15

Having developed Table F1.9, RQ3.1 and RQ3.2 can be addressed.

RQ3.1: How do owner-managers of manufacturing SMEs in South Africa assess risk in their Supply Chains? (Risk Identification)

Risk frequencies of the event/action/characteristic that requires or initiates a response may be calculated from the information in Table F1.9 (the analysis in shown in Appendix 6 F1.4) and are shown in Fig 1.5.

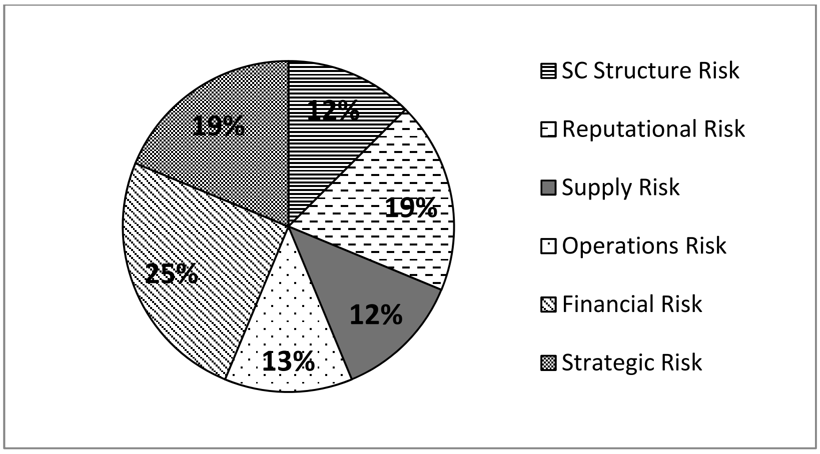


Figure F1.5 Event/action/characteristic requires or initiates a response (Appendix 6 F1.4 Causal Analysis)

These event/action/characteristic risks may be further categorised as company operational risks, supply chain risks and macro-environmental risks, as shown in Fig F1.6

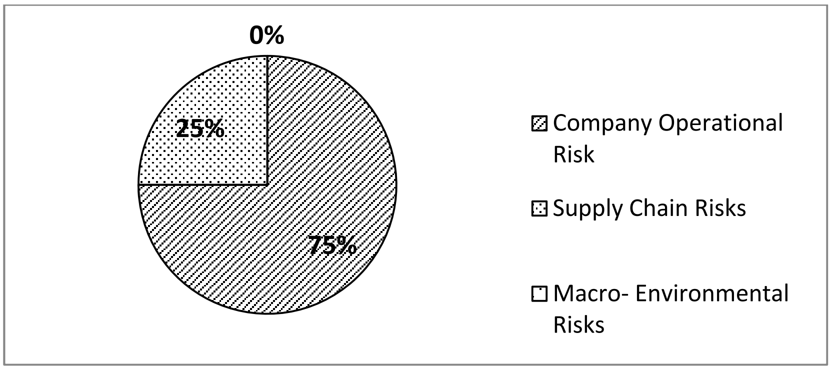


Figure F1.6 Event/action/characteristic classification (Appendix 6 F1.4 Causal Analysis)

This may be interpreted as risk identification by the OM as a result of environmental scanning. The environmental scanning seems to be largely related to the identification of company operational risk (75%) followed by supply chain related risks (25%). These event/action/characteristic related risks may result in the risks shown in Fig F1.7.

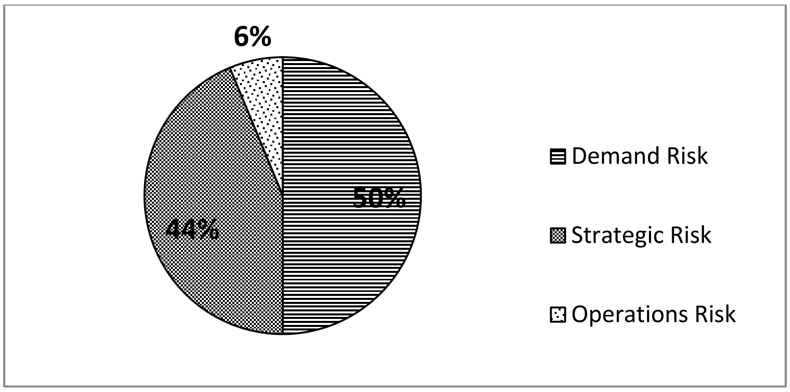


Figure F1.7a Event/action/characteristic may result in (Appendix 6 F1.4 Causal Analysis)

Thus, the event/action/characteristic identified by OMF1 (Fig. F1.5) is perceived to result in either demand risk (loss of customers, lack of demand and unpredictability of demand which leads to lack of production capacity that may lead to loss of customers – supply chain risks) or company operational risk in the form of strategic risk (profitability and survival – company operational risks) and operations risk (Fig.

F1.7a). The resultant demand risks were all perceived to be either medium of high (Fig 1.7b).

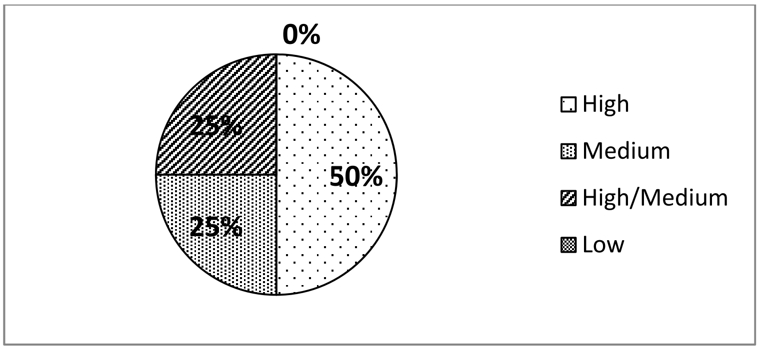


Fig1.7b Impact of Demand Risks (Appendix 6 F1.4 Causal Analysis)

These resultant risks may be further categorised as shown in Fig F1.8.

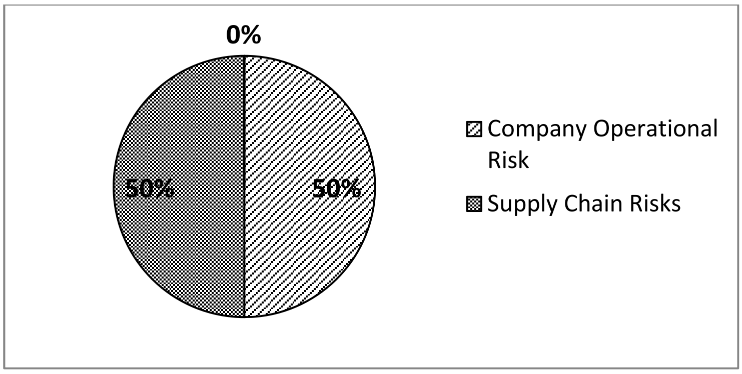


Figure F1.8 Classification of consequences (Appendix 6 F1.4 Causal Analysis)

The consequences of the event/action/characteristics identified by OMF1 are perceived by OMF1 to impact the company operations and the immediate external operations i.e. the supply chain (Fig. F1.8). It may be inferred that a loss of customers and a lack of demand would also ultimately impact on the profitability and survival of the company. It would, thus, seem that any event/action/characteristic that may be perceived by OMF1 to affect the survival of the company is seen to be a risk. This potentially relates to how OMF1 defined risk in the survey as a “disruption in business continuity”.

RQ3.2 is addressed next.

RQ3.2: What do owner-managers of manufacturing SMEs in South Africa consider to be the most prevalent risks in their Supply Chains?(Risk Analysis)

The causes of the event/action/characteristic may be attributed to the risks shown in Fig F1.9.

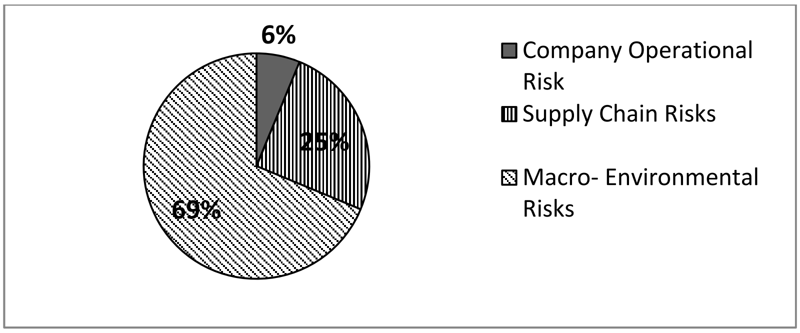


Figure F1.9 Event/action/characteristic is attributed to ….Classification of causes (Appendix 6 F1.4 Causal Analysis)

OMF1 seems to attribute most of the causes of the event/action/characteristic to Macro-environmental risks (69%) (Fig F1.9), of which more than two-thirds (68%) are economic factors (Fig F1.10).

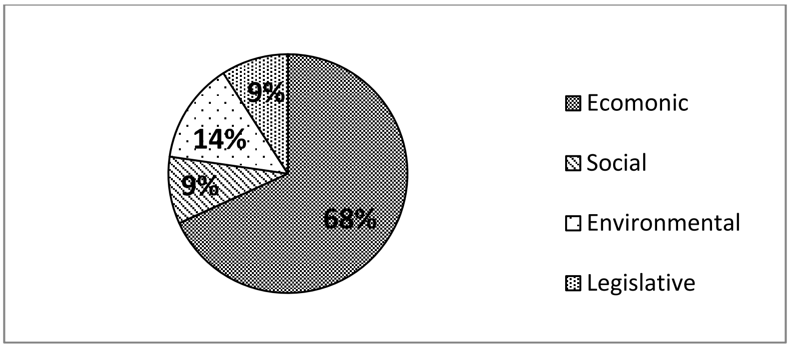


Figure F1.10 Classification of external factors (Appendix 6 F1.4 Causal Analysis)

This correlates with his identification of external risks as high (item s) in the survey (Table F1.7). It would, thus, seem that while the majority of risks identified by OMF1 are visible (identifiable) within the company operational environment (75%) and the immediate supply chain (25%) (Fig F1.6), the perceived impact of the risks is spread equally between the company operational environment and the immediate supply chain (Fig F1.8). Additionally, the primary cause of the risks impacting the company and its supply chain are macro-environmental in nature (Fig F1.9). The supply chain causal factor (25%) was the SC Structure referring to the relationships between each of the organisations.

<u>Analysis of Supply Chain Risks</u>

Supply chain risks are now analysed in more detail. Those risks that involved the supply chain in some way across the full causal process (cause - event/action/characteristics – consequence as presented in Table F1.9) were identified and may be viewed in Appendix 6 F1.4 SC Risks.

Of the 16 event/action/characteristics identified that would require or initiate a response (Table F1.9), almost two-thirds, 62.5% (10/16) involved the supply chain in some way across the full causal process.

80% (8/10) of the event/action/characteristics resulted or may result in demand side risks. The resultant demand side risks were

- loss of customers,
- lack of demand and
- unpredictability of demand which leads to lack production capacity that may lead to loss of customers – supply chain risks)

50% (4/8) event/action/characteristics were supply chain related (25% (4/16) of the overall). These supply chain related risks included, (and were perceived to have been caused by)

- uncertainty in supply resulted in loss of customers (x2) (caused by External: economic and External: environmental factors)
- supply chain structure due to lack of number of points-of-sale/outlets resulted in lack of demand (x2) (caused by External: economic factors)

The remaining 50% (4/8) of the risk response initiating event/action/characteristics included

- Reputational risk
    - customer dissatisfaction (x2) (caused by supply chain structure or production capacity for peak demand issues)
    - brand degradation (x1) (caused by supply chain structure)
- Strategic risk due to lack of planning (caused by External: economic factors)

40% (4/10) of the event/action/characteristics were perceived to be attributed to a supply chain factor which were exclusively, due to supply chain structure: the relationships between FURN 1 and its Group customer

- On 2 occasions this resulted in reputational risk that lead to loss of customers (demand risk)
- On 2 occasion's this lead to cash flow issues (financial risk) that threatened company survival (strategic risk)

Risk Capability Analysis

The prior causal risk analysis then dovetails with the risk management capability model of Lindbom et al (2015) which is modified to produce the Risk Management analysis shown in Fig 1.10 (the Spreadsheet is given in Appendix 6 F1.4 Capability Analysis). This analysis is outlined in Chapter 4 section 4.3.3.1 ii. b. Tables 4.6, 4.7 and 4.8, and addresses RQ4 and sRQ4.

RQ4: How can Risk Management and SCRM Capability be assessed in SMEs?

sRQ4: What is the SCRM capability of manufacturing SMEs in South

Table F1.10 Risk Capability Analysis (Appendix 6 F1.4)

A	This event/action/characteristic requires or initiates a response		The event/action/characteristic may or did result in... if not addressed								*The measure describing the uncertainties (Q) is subjective, and is dependent on the assessor's (OMF1) background knowledge (K).*			
	Event/Action/Charateristic	**Risk Category**	**Consequence (UC)**	**Risk**	**Risk Category**	**Survey Risk Assessment**	**Impact**	**Constraints (Con)**	**Constraints Classification**	**Objectives (T = Task as given))**	**Action (T = task as executed) - infer practices (K)**	**Uncertainty (Q) of the Consequences/ Outcome**	**Outcome (Consequence = CT)**	**Risk Response Classification**
1	Own retail outlet closed (historical)	SC Structure Risk: Points of Sale needed to generate demand	Company Name not visible	Lack of demand	Demand Risk	s	H	Do not have the capital and cashflow to rent premises for their own store	Operational: Financial	Increase company name visibility by increasing footprint and grow through obtaining retail outlets	Partner with Furn Group with Brand Name in 5 Furn Store 1 stores	M M	+ Footprint increased and channel generates one-third of volumes by Rand-value - partnership has created other risks: Cashflow & Reputation	Mitigate impact
2	Furn Group lack of CRM	Reptutational Risk: Brand degradation	Disgruntled customers	Loss of customers	Demand Risk	u	M	Furn Group is owned by a financial institution and has many brands (low-end to high-end). Management approach is mass market.	SC: Structure	To minimize and prevent disgruntled customers	Commuicate with customers personally through phonecalls	L	+ customer receives personal attention and query management	Accept/Tolerate + mitigate consequences
3	Incorrect orders delivered by Furn Group	Reptutational Risk: Customer disatifaction	Disgruntled customers	Loss of customers	Demand Risk	u	M			Manage customer expectations Improve order delivery process	Commuicate with customers personally through phonecalls OM brother met with Furn Group DC management (negotiate). Differentiating SKUs added to system.	L M	+ customer understands what has happened and that it is being dealt with, and when they will receive the correct order + correct orders delivered to customers	Mitigate impact Prevent
4	Not receiving payments when needed or expected	Financial Risk: Cashflow slow	Cannot meet financial obligations	Company may not survive	Strategic Risk	C	H	Furn Group has the same payment terms for all suppliers - will not negotiate - buyer power	SC: Structure + Financial	Manage (increase) Cashflow	Because the payment terms cannot be changed, bookkeeper follows up on accounts not paid in full with Furn Group (use resources+communicate))	L	+ cashflow is increased and managed	Accept/Tolerate + mitigate consequences
5	Furn Group may be closing	SC Structure Risk: Points of Sale needed to generate demand	Company Name not visible	Lack of demand	Demand Risk	s	H	This decision is based on the liquidity (which is precarious at the time of the interview) of the Financial Instiution who owns the Furn Group	SC: Structure	Keep Furn Group channel	Do not believe Furn Group will close - no action required. But they will be creating a display space in their factory where they can bring customers and show their furniture (seek alternatives).	H	-Furn Group did close a few months after the interview when the financial institution went bankrupt = No branded retail outlet	Accept/Tolerate + mitigate consequences
6	Cannot sell furniture sold in Furn Store 1 anywhere else	Financial Risk: loss of income	Cannot recoop expected profits	Reduction in Profits	Strategic Risk		H							Accept
7	Payment terms for Furn Store 2 may be changing	Financial Risk: Cashflow	Cannot meet financial obligations	Company may not survive	Strategic Risk	C	H	New CFO at Furn Store 2 wants the terms changed	SC: Structure + Financial	Payment terms stay the same	Refused to Accept/Tolerate a change in terms and leveraged their exclusivity in terms of being a niche hand-crafted furniture manufacturer. Also have a good relationship. with the owner of Furn Store 2 (personal) - relationships	L	+ Payment terms remain the same	Prevent
8	Big projects uncertain	Strategic Risk: Lack of or unable to plan	Uncertainty in demand	Cannot predict demand	Demand Risk	A	H	Cannot predict	Operational	None	No action			Accept/Tolerate + mitigate consequences
9	Cannot predict demand	Strategic Risk: Lack of or unable to plan	Cannot forecast	Cannot plan production capacity	Strategic Risk	A	H	Cannot plan for or forecast demand because of the uncertainty in demand	Operational	Manage uncertain demand	Do not hold stock and make to order (PULL SYSTEM).	L	-/+continue to manage the business without forecasting or planning	Accept/Tolerate + mitigate consequences
10	Cannot plan production capacity	Strategic Risk: Lack of or unable to plan	Lack of capacity at peak times	Do not have required capacity	Operations	not given as an option	M	Cannot plan capacity in advance because of uncertainty	Operational	Maintain Big Project. Plan as best possible and manage customer expectations	Production Manager will do short-term production planning. Impacted delivery times to customers will be managed through personal commuications with customers - leverage their exclusivity in terms of being a niche hand-crafted furniture manufacturer	M	+manage to do big projects and regular business for channels	Accept/Tolerate + mitigate consequences
11	Lack of production capacity	Reptutational Risk: Customer disatifaction	Cannot meet customer expectations on delivery	Loss of customers	Demand Risk	not given as an option	H	Cannot plan capacity in advance because of uncertainty	Operational	Meet and manage customer orders	Impacted delivery times to customers will be managed through personal commuications with customers - leverage their exclusivity in terms of being a niche hand-crafted furniture manufacturer	L	+manage to meet and manage customer orders	Accept/Tolerate + mitigate consequences
12	Cannot get raw materials or stock	Supply Risk: Uncertainty in supply	Cannot meet customer expectations on delivery or specifications	Loss of customers	Demand Risk	B,F,I	M/H	raw material scarcity + Designer specified harware that is not widely available in the market and crotch veneer which is not widely used and available in the market	SC: Supply	Procure what they need, when they need it	Seek Alternatives:Improvise on the hardware by finding somebody locally who can make something similar. Leverage relationships with other furniture manufacturers (in Germany) to get veneer, and utitlise family for transportation	L	+ procure materials as required, '- impractical, unsustainable + costly, and potentially unsatisfied customer because hardware is not exactly as specified	Avoid, Accept/Tolerate Consequences
13	high prices + raw material imported -> Rand fluctuations lead to pricing variability	Financial Risk: paying more for essential raw materials	To meet customer expectations on pricing, company may need to absord extra costs	Reduction in Profits	Strategic Risk	B	H	raw material scarcity + Designer specified harware that is not widely available in the market and crotch veneer which is not widely used and available in the market + Sealers and Laquers are oil-based, thus more costly and imported	SC: Supply	Procure what they need, when they need it	Seek alternative suppliers with better pricing on board and glass, cannot do anything about sealers and laquers	L	+ procure materials as required, '- costly	Avoid, Accept/Tolerate Consequences
14	Cannot get raw materials or stock	Supply Risk: Uncertainty in supply	Cannot meet customer expectations on delivery or specifications	Loss of customers	Demand Risk	B,F,I	M/H	lack of raw materials or stock of particular items in the market or supplier out of stock	SC: Supply	Procure what they need, when they need it	Seek alternatives: look at multiple suppliers "shop around" to find who has stock	L	+ manage to procure timber as required	Avoid
15	Cannot find skilled cabinet-makers to replace aging workforce	Operations Risk: HR and Labour Risk	Cannot make their high-end hand-crafted product	Company may not survive	Strategic Risk	identified specifically by OM	H	Young people do not want to becomes artisans. Current workforce is aging, and being paid well above the minimum wage	External: Social	Employ skilled labour as required by the business	Seek alternatives: Employ foreigners + Utilise current skills to develop new skilled staff + apply for financial support from SETAs for the learnerships	L	+ Cost dilution + increased productivity + required skills	Avoid
16	Pay high wages because of long employed and aging workforce	Operations Risk: Legislative and Regulatory Risk	Cannot afford to pay high wages	Company may not survive	Strategic Risk	w,x	M	Labour Unrest/strikes, The Labour Laws are seen as 'restrictive' when it is necessary to let-go of staff that are overpaid, and not core to the business, no control in managing the working conditions of and affordable wages for their workforce due to the Bargaining Council (FBUMA) and unionised labour, FBUMA is dominated by 5 large manufacturers who control the bargaining process, and tend to ignore the smaller businesses in the wage negotiations	External: Legal	Control of labour related issues and manage workforce	Seek alternatives: Take back control -> institute their own learnership programme and withdraw barganing council membership to do own wage negotiations with unions	M	+ Regain control of labour issues	Avoid

The following information is derived from Table F1.10:

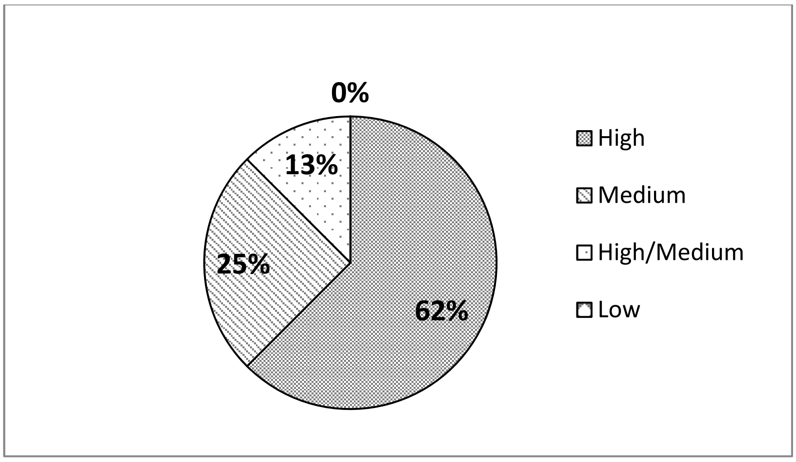


Figure F1.12 Impact of risk identified by OMF1 (Appendix 6 F1.4 Capability Analysis)

The consequences of the risks identified by OMF1 are perceived to have either high or medium impact. These impact assessments correlate to those expressed in the survey (Fig F1.2). All of these risk events/actions/characteristics except one (no. 8 in Table F1.10) have an associated task (T) initiated because of the undesired consequences (UC). The scope and nature of the task (T) is limited by certain constraints (Con). The nature of these constraints is described in Fig F1.13 below. Half (50% = 22%+14%+14%) of the constraints lie within the supply chain, the majority (22%) emanating from the supply side. About a third (36%=29%+7%) of the constraints are attributed to the company operational environment which originate from the lack of management of demand uncertainty which impacts on production capacity planning (refer to arrows in Fig F1.10 depicting the knock-on effects of demand uncertainty – Bullwhip Effect).

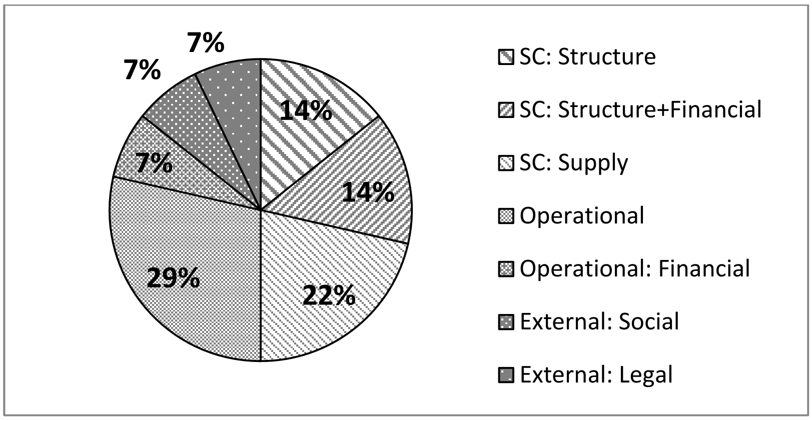


Figure F1.13 Nature of Constraints limiting tasks (T) (Appendix 6 F1.4 Capability Analysis)

Risk Management Capability Assessment

The capability (the degree of success i.e. focus on what can be done) to perform a task is reflected in the uncertainty about and the severity of the consequences of the task or activity given the occurrence of the initiating event. The evaluation of capability is, thus, expressed in the ability to perform a task in such a way as to ensure the most positive outcome as a result of a initiating event, that, unaddressed will result in undesired consequences.

Of the tasks undertaken to address the event/actions/characteristic, the majority (63%) for all risks and half for SC risks were perceived by OMF1 to have a low uncertainty in the anticipated outcome (Fig F1.14a).

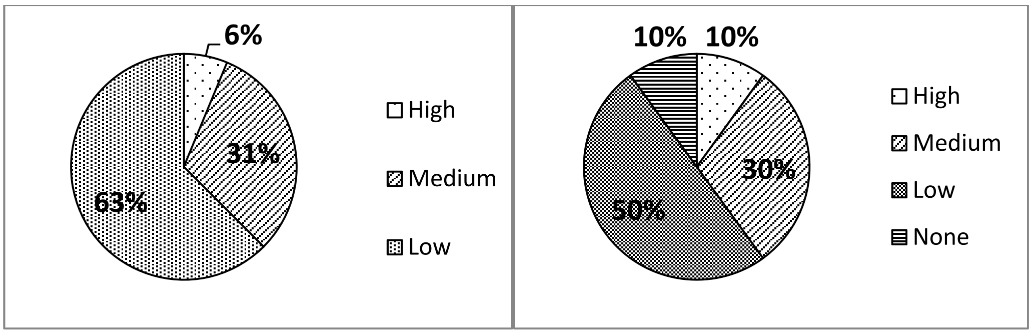
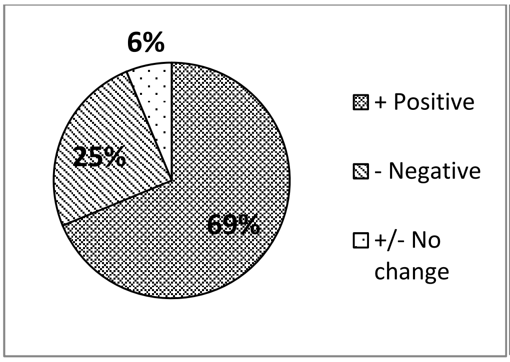


Figure F1.14 Uncertainty (Q) in outcome - All Risks and SC Risks (Appendix 6 F1.4 Capability Analysis)

At least two-thirds (69% for all risks and 70% for SC risks) of the tasks performed had positive outcomes (Fig F1.15).



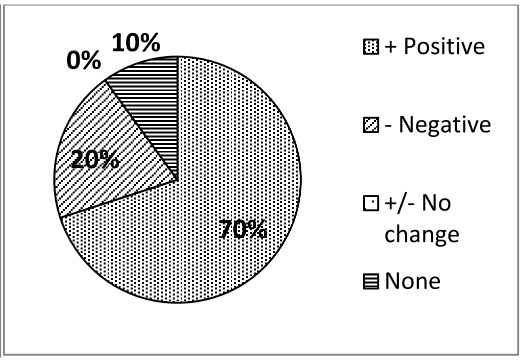


Figure F1.15 Impacts of the outcomes (C_T) of tasks (T) – All Risks and SC Risks (Appendix 6 F1.4 Capability Analysis)

This would suggest that OMF1 has demonstrated a moderate level (Table 4.8) of risk management capability. Business survival is not threatened, although the OM may feel that it is, because of ongoing challenges.

Finally RQ3.3 is addressed, through an analysis of the risk handling practices expressed by OMF1.

RQ3.3: What actions (if any) do owner-managers of manufacturing SMEs in South Africa take when a risk is identified? (Risk Response/Handling)

The risk management practices are inferred from the column headed "Action (T = task as executed) - infer practices (K)" in Table F1.10 and consolidated in Table F1.11 (next page)

The dominant mode of risk handling, derived from the column headed "Risk Response Classification" in Table F1.10 and section 3.2 i-vii, appears to be that of accepting the risk and mitigating the consequences (44%). Half (50%=19%+13%+12%+6%) of the time the risk can either be avoided, prevented or the impact mitigated (Fig F1.16, next page). This implies that action is taken when and to the extent possible in more than 90% of events/actions/characteristics identified which may have undesired consequences for the business.

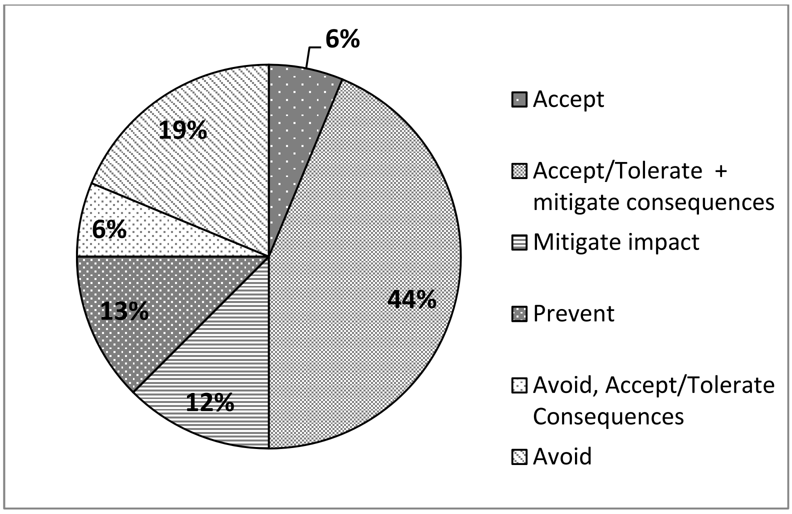


Figure F1.16 Risk Handling (Appendix 6 F1.4 Capability Analysis)

By examining the tasks/actions executed in response to the event/action/characteristic that may result in undesired consequences, recurring or common characteristics may be discerned from which practices may be inferred. Table F1.11 demonstrates this analysis.

Table F1.11 Inferred Practices (Appendix 6 F1.4 Infer Practices)

Action (T = task as executed)	Inferred practices (K)
Partner with Furn Group with Brand Name in 5 Furn Store 1 stores	Partner with other enterprises
Communicate with customers personally through phonecalls	Communicate personally using resources
Commuicate with customers personally through phonecalls	Communicate personally using resources
OM brother met with Furn Group DC management (negotiate). Differentiating SKUs added to system.	Negotiate
Because the payment terms cannot be changed, bookkeeper follows up on accounts not paid in full with Furn Group (use resources + communicate)	Communicate personally using resources
Do not believe Furn Group will close - no action required. But they will be creating a display space in	Seek alternatives by leveraging resources

their factory where they can bring customers and show their furniture (seek alternatives).	
Refused to Accept/Tolerate a change in terms and leveraged their exclusivity in terms of being a niche hand-crafted furniture manufacturer. Also have a good relationship. with the owner of Furn Store 2 (personal) - relationships	Leverage relationship
No action	
Do not hold stock and make to order (PULL SYSTEM).	Do what we can
Production Manager will do short-term production planning. Impacted delivery times to customers will be managed through personal commuications with customers - leverage their exclusivity in terms of being a niche hand-crafted furniture manufacturer	Do what we can + Communicate personally using resources
Impacted delivery times to customers will be managed through personal commuications with customers - leverage their exclusivity in terms of being a niche hand-crafted furniture manufacturer	Communicate personally using resources
Seek Alternatives:Improvise on the hardware by finding somebody locally who can make something similar. Leverage relationships with other furniture manufacturers (in Germany) to get veneer, and utitlise family for transportation	Seek alternatives by improvising + leveraging relationship
Seek alternative suppliers with better pricing on board and glass, cannot do anything about sealers and laquers	Seek alternatives by "shopping around"
Seek alternatives: look at multiple suppliers "shop around" to find who has stock	Seek alternatives by "shopping around"
Seek alternatives: Employ foreigners + Utilise current skills to develop new skilled staff + apply for financial support from SETAs for the learnerships	Seek alternatives by improvising
Seek alternatives: Take back control -> institute their own learnership programme and withdraw bargaining council membership to do own wage negotiations with unions	Seek alternatives by improvising

Information from Table F1.11 may be summarised in Fig F1.17 (next Page)

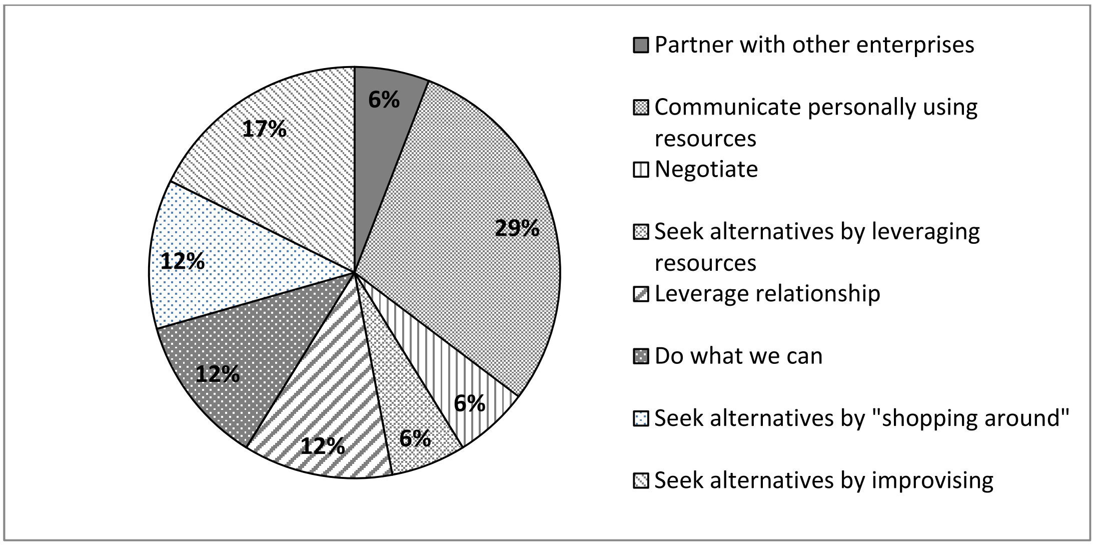


Figure F1.17 Practices (Appendix 6 F1.4 Infer Practices)

Practices largely reflect daily operating activities that leverage internal resources (people, knowledge, skills and relationships).

Table F1.12 below examines whether there is evidence of process elements of the formal risk management process.

Table F1.12 Risk Management Process (PMBOK, 2004; INCOSE, 2000; ISO 31000, 2009) evaluation

Process Element	Evident	Comment
Risk Management Planning	No	OMF1 acknowledges that the company does not have a FORMAL risk management strategy and/or processes and procedures (Risk Identification, Risk Assessment, Risk Mitigation, Risk Monitoring with regard to e.g. production, supply chain, finance, safety etc) - Table F1.4 (c). There is also not evidence of any informal Risk Management Planning
Risk Identification	Yes	This is done informally as demonstrated in the Causal Analysis – refer to Table F1.9 and Figures F1.5 to F1.8
Risk Analysis	Yes	This is done intuitively and is demonstrated by the actions taken (tasks performed) in response to perceived high and medium impact events/actions/characteristics – refer to Table F1.9 and Fig F1.10
Risk Response/ Handling	Yes	This is demonstrated in the tasks performed in response to perceived high and medium impact events/actions/characteristics –refer Table F1.11 and Fig F1.16 and F1.17
Risk Monitoring and Control	No	There is no evidence of any formal or informal Risk Monitoring and Control apart from the ongoing informal environmental scanning by the owner-managers

It would seem that 60% (3 processes out of 5) of the formal risk management process is being practiced informally and intuitively with a moderate level of capability.

The FURN 1 Case Summary can be located in Appendix 6 F1.5

Researcher Triangulation

Investigator triangulation was done for the pilot case study as described in section 4.2.5 iv. A 4th year (honours) Industrial engineering student participated in the interview and factory tour of FURN1. The student independently transcribed and analysed the interviews and the corresponding survey responses for FURN 1. This section summarises her findings and triangulates them against the preceding analysis for the thesis provided in this chapter.

Table F1.13 FURN 1 Student Results

	Appendix 6 F1.6 : Student – FURN 1 (the figures and quote from the student's report with page numbers are provided here) (Frowein, 2014)	**FURN 1 Results (as presented in this chapter)**
Supply Chain Map	Fig 15 p49) (Frowein, 2014)	Fig F1.2 closely resembles the student's SC map
Use of risk management	Table 18 p83) (Frowein, 2014), Rating: 2.5/4 = 62,5%	Table F1.12, Rating: 60%
Owner-Manager's Risk Management	Table 19 p84) (Frowein, 2014), Rating: 3/4 = 75%	Table 3.9, Rating: Moderate (60-75%)
Overall Assessment	"…SME Furniture can be seen to be capable of managing supply chain risks, as it met the minimum standards in risk management practices, risk management capability of the owner-manager and cooperation in the supply chain." (Frowein, 2014, Section 5.2.7, p86)	It would seem that 60% (3 processes out of 5) of the formal risk management process is being practiced informally and intuitively with a moderate level of capability.

6.2 Research Quality - Triangulation

Through the aggregation and analysis of multiple sources of evidence (Table 4.1 in chapter 4) to compose the case study, data triangulation for protection against researcher and respondent bias has been addressed, as well as the corroboration of information in the case study. Together with establishing a chain of evidence in the data collection phase (Yin, 2009; Riege, 2003; Wengraf, 2001), these contribute to ensuring research quality. Construct validity and reliability of the case study evidence (Yin, 2009) are, thus, also supported.

Investigator triangulation (Fig. 4.1 in chapter 4), aimed at corroborating the same fact or phenomenon, was only used for this pilot case study due to availability of adept honours level students. As described in section 4.2.5 iv of chapter 4, this was done through an Industrial Engineering 4th year student who was doing her honours research project, and participated in the interview with OMF1 and the company tour. The student report was used, where possible, to validate the understanding and mapping of the company supply chains and the identified risks, and capability assessments. This is shown in Table F1.13 above, where the construction of the supply chain for FURN 1, the use of formal risk management techniques, the Owner-Manager's risk management capability and an overall assessment results were comparable to those of the student.

6.3 Next Case Reports

Lessons learned from constructing the pilot report primarily revolved around the depth of the analysis in distilling the supply chain risks from the overall risks so as to adequately address the research questions. This process is discussed in more detail in chapter 9. These learnings were carried forward to the remaining seven case reports. These reports and their associated appendices may be located in Appendix 6 F2 for FURN 2, Appendix 6 F3 for FURN 3, Appendix 6 F4 for FURN 4, Appendix 6 M1 for METAL 1, Appendix 6 M2 for METAL 2, Appendix 6 M3 for METAL 3 and Appendix 6 M4 for METAL 4.

In the next chapter the within-industry cross-case analyses are developed and the results of these analyses are presented for the Furniture Industry and the Metal Industry.

CHAPTER 7

WITHIN INDUSTRY CROSS CASE ANALYSIS AND RESULTS

This chapter presents the within-industry cross-case analyses and results for the furniture and metal industries. Fig 7.1 below outlines the case analysis approach, based on Fig 4.6 in chapter 4, and the appendix and section numbers for each analysis. The chapter follows the same format as the single case the preceding chapter where the research questions (RQs) are addressed sequentially. The cases in the furniture industry were first analysed. Summaries of the cases and the full case reports are contained in Appendix 6. The cross-case analysis per industry was performed after the industry related within-case analyses have been completed. There is, thus a cross-case analysis for the furniture industry and one for the steel and machinery industry. The overall industry cross-case analysis and the cross-case conclusions and the theory modification section are accomplished at the end of this chapter.

As described in chapter 4, this research employs the replication strategy proposed by Yin (2009) in combination with the stacking approach described by Miles et al. (2014). Each case is individually analysed using the within case analytical approach described in section 6.1 in chapter 6. Case information is then aggregated across companies of the same size in each industry, further aggregated across all companies in the industry, and then across industries. Narratives, tables, meta-matrices and descriptive statistical graphs are used for systematic comparison, to identify similarities and differences across the cases, and to identify emergent themes and patterns.

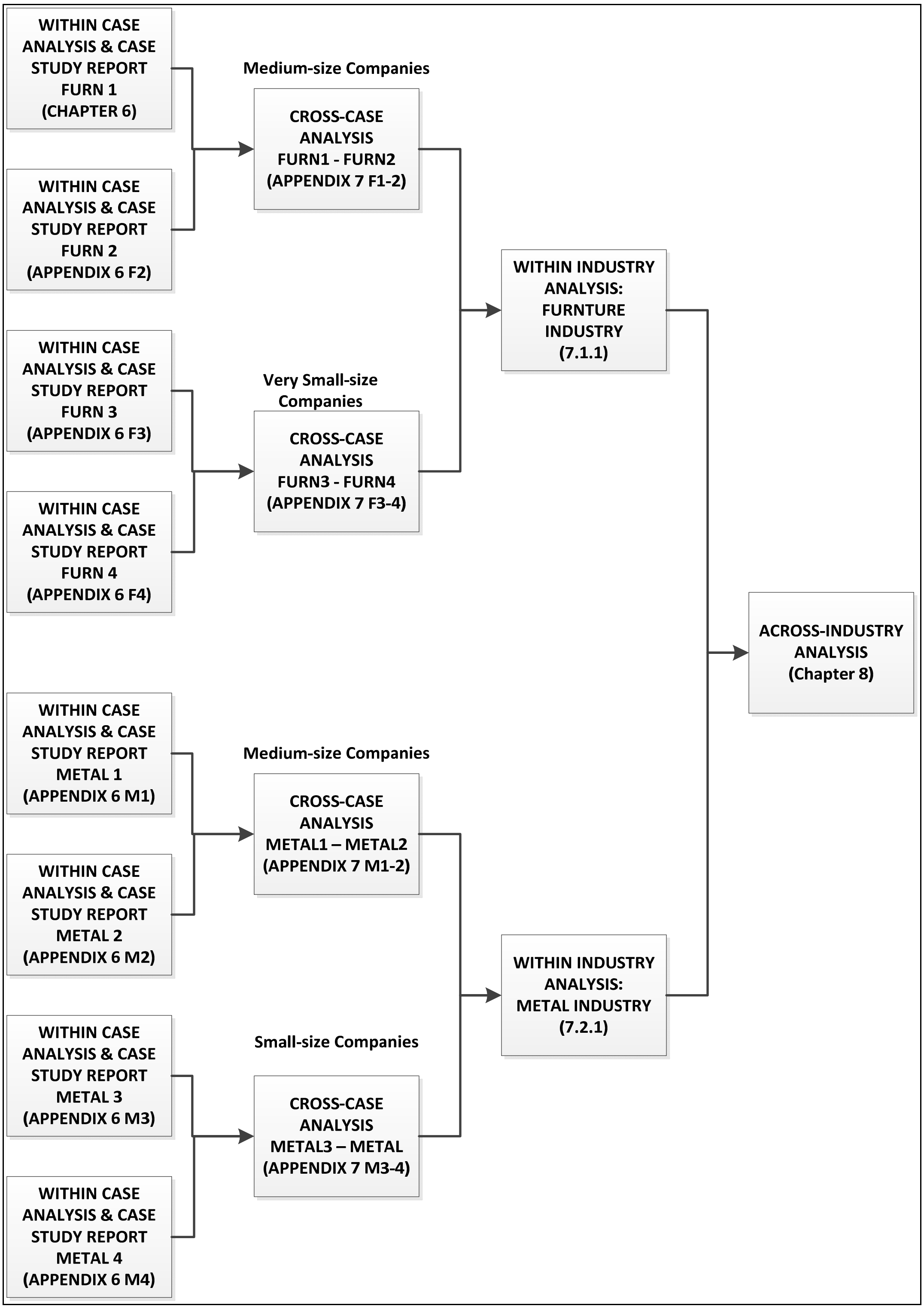


Figure 7.1 Summary of case analysis approach

7.1 The Furniture Industry

The cases analysed for the furniture industry are as shown in Table 7.1.

Table 7.1 Furniture Industry Cases

Date (2014)	**Company Description** (where I1 = Industry 1, Table 4.2)	**Size**	**Location in South Africa**	**Interviewee (s)**
15 July	Bespoke High-end Furniture Manufacturer **(I1Med1= FURN 1)**	Medium	Gauteng	50% ownership (2 shareholders-brothers)
28 July	Woodworking and Furniture Manufacturing **(I1Smal1 = FURN 3)**	Very Small	Gauteng	Sole owner
5 Aug	Bed Manufacturer **(I1Smal2 = FURN 4)**	Very Small	Gauteng	Sole owner
19 Aug and 2 Sep	Modern Furniture Manufacturer **(I1Med2 = FURN 2)**	Medium	Gauteng	<50% ownership (husband) (2 shareholders -husband and wife)

7.1.1 Within Industry (Furniture) Cross-case Analysis and Results

The following presents a comparative cross-case analysis for FURN 1, FURN 2, FURN 3 and FURN 4 based on the cross-case analyses FURN 1- FURN 2 (Appendix 7 F1-2) and FURN 3 – FURN 4 (Appendix 7 F3-4). The analysis will follows the format of sequentially addressing the research questions derived from the conceptual framework for this research. sRQ1 will be addressed first.

sRQ1: How do manufacturing SME owner-managers in South Africa perceive risk in their businesses and in particular in their Supply Chains?

All the OMs are unfamiliar with the term SCRM; there are numerous differences in their experiential backgrounds, their perceptions of risk in their businesses and in their supply chains.

Two of the four OMs had tertiary level qualification (OMF1 and OMF4). All OMs have more than 10 years of business experience, either within SME management (their family business) (FURN 1 and FURN 3) or in a large corporate environment (FURN 2 and FURN 4). All the OMs are over the age of 45 years. Only OMF2 had experience in formal risk management as a risk manager in large corporates.

The personally perceived risk propensity of the OMs differed from being a risk-taker (OMF 2), to being a cautious risk-taker (OMF3 and OMF 4), to not being a risk-taker (OMF1). Their perceptions of what risk to their businesses meant differed, as OMF2 and OMF3 perceived risk "As VARIABILITY, in profit/sales/supply/demand", while OMF1 perceived risk "As a DISRUPTION in business continuity" and OMF4 "As UNCERTAINTY, about an event/potential loss/a decision".

None have formal risk management systems and are "not sure" (OMF1, OMF3, OMF4) or do not believe (OMF2) that risk in his business is well-managed. While OMF1 is not sure whether they have the resources to manage risk, OMF4 ("attempt to mitigate identified and known risks" and OMF2 ("Internal factors are well documented but external factors have the greatest impact") do believe they have the resources and OMF3 does not believe they have the resources to manage risk.

Their assessments of risk impacting the businesses as a whole were all predominantly medium (see Fig FI1). FURN 1 and FURN 2 (medium-sized enterprises) largely rated the remainder of the risk as high, whereas FURN 3 and FURN 4 (very small enterprises) rated the remainder of the risk as largely low.

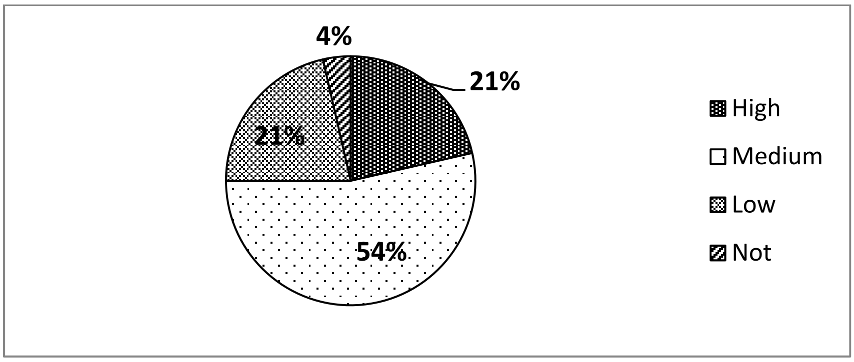


Figure FI1 Furniture Industry OMs rating of risk to the business (Appendix 7 FM Risk to the business)

The only common medium risk impacting the businesses was associated with "the legislative framework within which your organisation operates". This largely concerned BBBEE. Three of the four (3/4 – not FURN 4) regarded the setting of organizational objectives as a low risk, and all rated external risks (relating to the macro-environment - PESTLE) as high.

What each OMF1 and OMF2 (medium-sized enterprises) considered to be the most significant risk to the business varied in detail but essentially regarded the finding of good skilled people (HR risk). On the other hand, for OMF 3 and OMF 4 (very small enterprises), the most significant risk was where somebody will start a business, because they need to earn a living, without the experience or skills required, and sell low quality products at a discounted price (under-cutting established operators to gain clients) (Competitive risk).

<u>The Supply Chain</u>

The supply chain risk ratings differed across the OM's. OMF1 rated all of the listed supply chain risks as either medium or high with the majority being medium (64%), whereas, OMF2 rated all listed risks as either low or not a risk with an even split between the two. OMF3 rated most supply chain risks as low (82%), while OMF4 rated most (73%) of the supply chain risks as either high risk (37%) or medium risk (36%) (Appendices 6 F1, F2, F3, F4). Three of the four (3/4 – not FURN 4) rated the "inability to forecast demand" as high. Three of the four (3/4 – not FURN 2) rated "Raw material price volatility" as a medium risk.

Overall, the Furniture Industry OMs rated supply chain risks generally as low (39%), although there was an even split between high/medium (50%) and low/not a risk (50%) (Fig FI2 below).

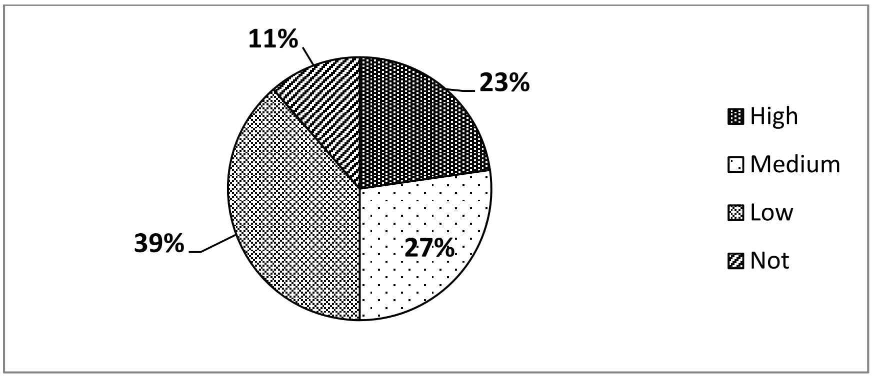


Figure FI2 Furniture Industry OMs rating of Supply Chain risk (Appendix 7 FM SC Risk)

Preliminary observations

There seems to be limited similarity in the way in which SME owner-managers in furniture manufacturing SMEs South Africa perceive risk in their businesses and in particular in their Supply Chains. It appears that their experience in a business environment and their life experience is an important factor in how they perceive risk in their businesses and in particular in their supply chains.

sRQ2 is considered next.

sRQ2: What is the nature of manufacturing SMEs in South Africa?

While both FURN 1 and FURN 2 SMEs met the criteria for selection for this research i.e. medium-sized manufacturing company in South Africa (based on number of employees) and more than 20 years old (selection criteria >10yrs), FURN 3 and FURN 4 did not. Both of these SMEs were "very small" companies selected for interviews, because the response rate for the FBUMA survey was very low and only 5 companies indicated willingness to participate in follow-up interviews, of which none were small companies. While FURN 3 met the company age criteria (> 10 years old), FURN 4 just missed this by only about 18 months.

While all the SMEs were family established and owned, there were differences in the ownership history. FURN 1 was established and managed by the same family for 3 generations, whereas FURN 2 has changed ownership from the establishing family to the current family ownership (just over 10 years). FURN 3 was established and managed by the same OMF3 for more than 20 years. FURN 4 was a manufacturer (established and managed by OMF4) within a franchise before breaking away under sole ownership of OMF4 for the last 3 years.

Both FURN 1 and FURN 2 have dual ownership, with FURN 1 having shared ownership between the two brothers, with an even split of responsibilities in running the company. FURN 2 is majority owned by OMF2's wife, but they evenly split responsibilities for running the company. FURN 3 and FURN 4 are solely owned by the current OM.

All the SMEs have flat informal organizational structures, with only FURN 2 having a documented organogram. The very small enterprises have more informal organisational structures than the medium-sized companies.

All four SMEs manufacture customized products. FURN 1 focusses largely on its establishing principle of manufacturing bespoke hand-crafted furniture at the hands of qualified cabinet-makers in a relatively non-technology (low-tech) based environment. Under the establishing owner, FURN 2 previously manufactured similar furniture in a similar way to FURN 1.When the current owners took over they changed FURN 2 into a manufacturer of modern, customised corporate and hospitality furniture using CNC-machining in a medium technology environment. FURN 3 focusses on largely custom-made kitchens with a secondary product range of customised furniture. FURN 4 manufactures customised mattresses and beds. Equipment and tooling are hand-operated (low-tech) for both very small companies.

All four companies are still located on their original premises. FURN 1, FURN 2 and FURN 3 own the premises and all machinery, while this could not be confirmed for FURN 4.

All four companies have survived significant risk-events. For FURN 1 this was down-sizing due to the economic crises of 2008/9 and for FURN 2 it was internal purchasing fraud. For FURN 3 it was down-sizing and re-invention, while for FURN 4 it was leaving the franchise and going “on Own”.

The supply chains of all four companies have simple two-tier structures. There is greater OM visibility into the first tiers and much less into the 2nd tiers, especially for the very small companies. FURN 1 and FURN 2 (medium-size) largely supply into large companies, and they are positioned as tier 2 suppliers in these supply chains. They have some influence into the large companies. FURN 3 and FURN 4 both deal directly with clients as they do their own retailing. OMM3 deals with large retail suppliers while FURN 4 has a couple of large suppliers but OMF4 has built good relationships with the most important suppliers, and this facilitates his supply of materials. Thus, the medium-sized companies tend to be further upstream in their overall supply chains, as they supply into larger corporates while the very small companies are the tier 1 suppliers in the supply chains.

Preliminary observations

There appears to be some key similarities across all four companies, namely, they are family established and owned, have informal organizational structures and manufacture customised products. All the companies are located in their original premises (and 3 own the premises and all machinery) and all have simple two-tier supply chains with greater OM visibility into the first tiers and much less into the 2nd tiers

sRQ3.1 is addressed next.

sRQ3.1: How do owner-managers of manufacturing SMEs in South Africa assess risk in their Supply Chains? (Risk identification)

The following was assessed to be similar across all four SMEs. Environmental scanning, by the OM, of the related industry and the South African business environment is evident in all companies but is more isolated to the immediate environment for the very small companies. This scanning includes a thorough, detailed and in-depth knowledge and understanding of the company's operations and its employees. The OMs use similar mechanisms for information gathering that involve talking to people, contacts and their networks in the industry.

All OMs identify risk initiating events/actions/characteristics that may result in risks that impact the company as well as the causes (or triggers) of these risk initiating events/actions/characteristics. This is done informally and on an on-going daily basis i.e. as part of business-as-usual.

Supply chain risks are identified within the ambit of the overall environmental scanning, and are not perceived separately from the rest of the company.

The analysis and results for sRQ3.2 follows.

sRQ3.2: What do owner-managers of manufacturing SMEs in South Africa consider to be the most prevalent risks in their Supply Chains? (Risk assessment)

Across all four companies, each company identified between 12 and 18 risk initiating events/actions/characteristics that would require or initiate a response. The medium-sized companies were on the higher end of this range (FURN 1 -16, FURN 2 -18), while the very small companies were on the lower end of the range (FURN 3 -16, and FURN 4 -12), although FURN 1 and FURN 3 identified the same number of risk initiating events/actions/characteristics. There is, thus, not a notable difference between the medium and very small companies with regard to the number of risk initiating events/actions/characteristics identified.

The full causal process (cause - event/action/characteristics – consequence) is now analysed across all four companies to identify the dominant risk category within each element of the process.

<u>Overall Causal Process</u>

The risk initiating events/actions/characteristics will be considered first. For all companies, these were primarily related to the company operational environment (FURN 1 – 75%, FURN 2 - 61 %, FURN 3 – 50% and FURN 4 -59%, Appendix 7 FM Overall Risk Analysis) or 61% on average for all furniture industry companies (Fig FI3a).

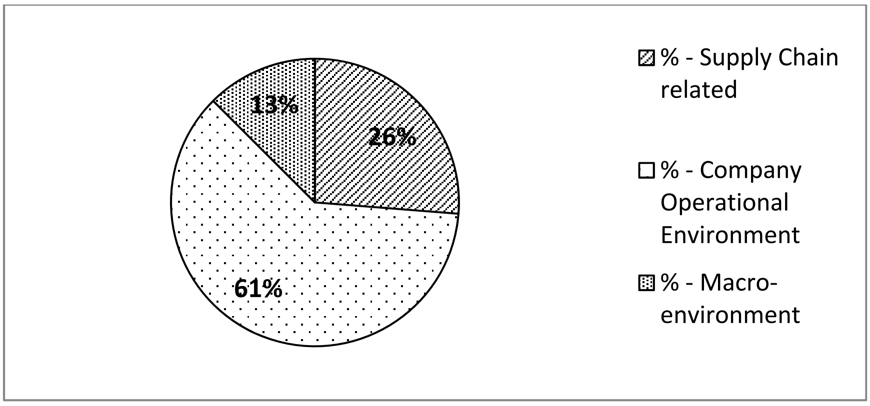


Figure FI3a Risk initiating events/actions/characteristics - Furniture Industry (Appendix 7 FM Overall Risk Analysis)

The only common operational environment risk initiating events/actions/characteristics across all 4 companies was financial risk. For FURN 1 and FURN 2, common operational environment risks were financial risks (the highest for both), followed by operations and strategic risk (Appendix 7 F1-2, Fig F1-2a and b). For FURN 3 and FURN 4, common risk initiating events/actions/characteristics were external risk, governance risk, financial risk and competitive risk (Appendix 7 F3-4, Fig F3-4a and b).

For all four companies operational environment risk was followed by supply chain related risks (FURN 1 - 25%, FURN 2 – 22%, FURN 3 - 25% and FURN 4 -33%, Appendix 7 FM Overall Risk Analysis) or 26% on average (Fig FI3a). Of these supply chain related risk initiating events/actions/characteristics, the majority were supply side related (63%) (Fig FI3b).The balance of these risk initiating events/actions/characteristics were made up of macro-environmental risks, with FURN 3 being the highest.

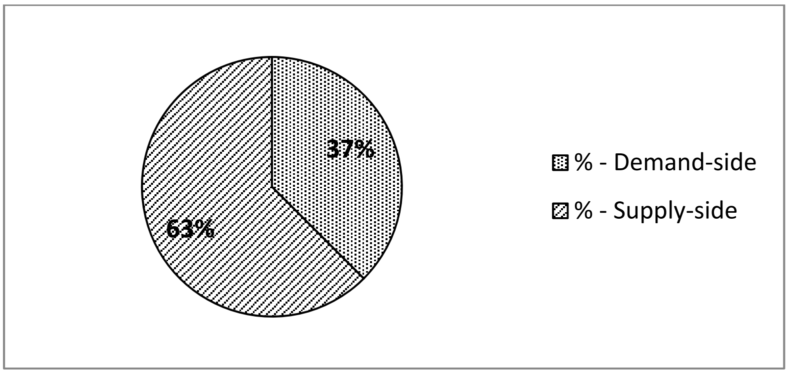


Figure FI3b Risk Initiating events/actions/characteristics (Supply Chain related) - Furniture Industry (Appendix 7 FM Overall Risk Analysis)

Thus, overall for the furniture industry risk initiating events/actions/characteristics may be ranked as

1. Company Operational Environment (Financial factors) (61%)
2. Supply Chain (Supply side factors primarily – 63%) (26%)
3. Macro-environmental factors (nothing specific) (13%)

The consequences of the risk initiating events/actions/characteristics are analysed next.

For both medium-sized companies these events/actions/characteristics may principally result in supply chain risk (FURN 1 – 50% and FURN 2 – 54%, Appendix 7 F1-2, Fig F1-2c), focused on the demand side (FURN 1 – 50% and FURN 2 – 46%) followed by the company operational environment (FURN 1 – 50% and FURN 2 – 46%), as well as, strategic risk (FURN 1 – 44% and FURN 2 – 11%) (Appendix 7 F1-2, Fig F1-2d). In the case of FURN 1 other resultant risks were operations risk (6%), while for FURN 2 additional resultant risks were financial (19%).

For the very small companies this was reversed, where for both companies these risk initiating events/actions/characteristics may primarily impact the operational environment (FURN 3- 79% and FURN 4 – 58%) of the company of which financial risks were the largest contributors (FURN 3 – 42%, FURN 4 – 21%) followed by other common risks, strategic and operations. These were followed by the supply chain (FURN 3- 21% (all demand side) and FURN 4 – 42% (32% on the demand side)) (Fig F3-4d, Appendix 7 F3-4).

For all furniture companies, on average, these events/actions/characteristics may principally result in company operational environment (58%), followed by the supply chain (42%) (Fig FI4a).

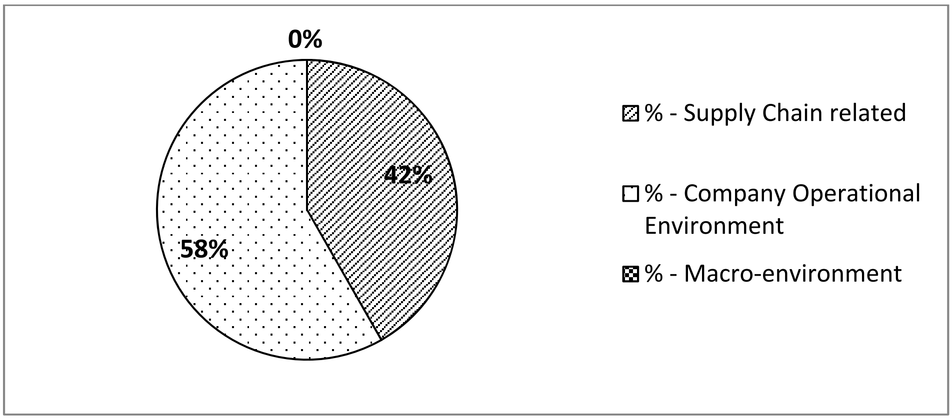


Figure FI4a These events/actions/characteristics may principally result in (consequence) - Furniture Industry (Appendix 7 FM Overall Risk Analysis)

On average, the resultant supply chain risks were primarily demand side related (90%) (Fig FI4b below).

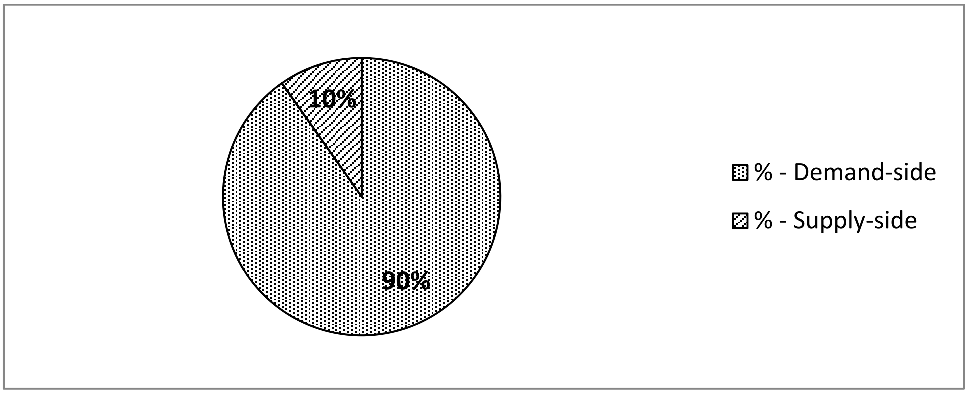


Figure FI4b These events/actions/characteristics may principally result in (Supply Chain related) - Furniture Industry (Appendix 7 FM Overall Risk Analysis)

Thus, overall for the furniture industry risk initiating events/actions/characteristics may result in (consequences) that are be ranked as

1. Company Operational Environment (Financial and Strategic risk) (58%)
2. Supply Chain (Demand side risk dominantly – 90%) (42%)
3. Macro-environmental factors (0%)

The causes of the risk initiating events/actions/characteristics are considered next.

For the companies, these were similar, but with different orders of prevalence. Referring to Appendix F1-2 (Fig F1-2e and f) and Appendix F3-4 (Fig F3-4e and f), external macro-environmental factors were the primary cause for risk initiating events/actions/characteristics for FURN 1 (69%) and FURN 4 (50%), while for FURN 2 these were secondary (31%), and for FURN 3 these were evenly split between company operational (45%) and external macro-environmental (44%) factors (Appendix 7 FM Overall Risk Analysis). Economic conditions were common to all. The company operational environment (53%) was the most predominant cause of risk initiating events/actions/characteristics for FURN 2, secondary for FURN 4 (33%) and the least prevalent for FURN 1 (6%).

On average, the causes of the risk initiating events/actions/characteristics, for the companies, were mostly as a result of external macro-environmental factors (49%), followed by the company operational environment (34%) (Fig FI5a).

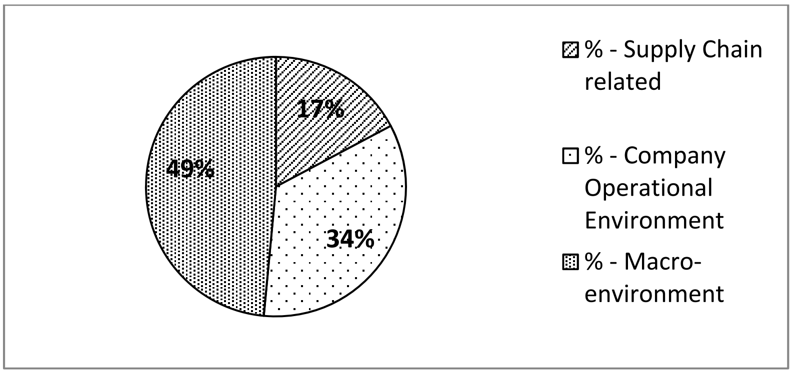


Figure FI5a Causes of the event/action/characteristic – Furniture Industry (Appendix 7 FM Overall Risk Analysis)

Referring to Appendix F1-2 (Fig F1-2e and f) and Appendix F3-4 (Fig F3-4e and f), supply chain related causes were secondary for FURN 1 (25%) emanating from the supply chain structure, while for FURN 2 (16% - the supply side), FURN 3 (11% - supply chain structure) and FURN 4 (17% - the supply side) supply chain related causes were least prevalent. Overall the supply chain related causes were on the supply side (75%) (Fig FI5b).

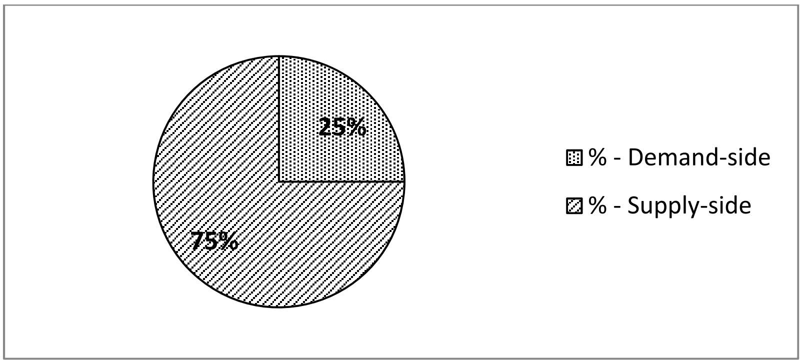


Figure FI5b Causes of the event/action/characteristic (Supply Chain related) - Furniture Industry (Appendix 7 FM Overall Risk Analysis)

Thus, overall for the furniture industry causes of risk initiating events/actions/characteristics may be ranked as

1. Macro-environmental factors (49%)
2. Company operational environment (34%)
3. Supply chain factors (Supply side factors primarily – 75%) (17%)

Assembling all the preceding information, the **full causal process** for the furniture industry, using the following format,

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [consequence]

may thus be represented as, where the most highly ranked risk categories are emboldened and the supply chain category in shaded,

Macro-environmental factors (49%) Company operational environment (34%) Supply chain factors (Supply side factors primarily – 75%) (17%)	**Company Operational Environment (Financial factors) (61%)** Supply Chain (Supply side factors primarily – 63%) (26%) Macro-environmental factors (nothing specific)	**Company Operational Environment (Financial and Strategic risk) (58%)** Supply Chain (Demand side risk dominantly – 90%) (42%) Macro-environmental factors (0%)

Figure FI5c Full causal process - Furniture Industry

In summary, the furniture industry OMs perceived macro-environmental factors (see first block in Fig FI5c) to be the primary cause of risk initiating events/actions/characteristics, which are largely concentrated in the company operational environment, and primarily financial (see second block in Fig FI5c). These risk initiating events/actions/characteristics resulted in company operational risks (financial and strategic risk) closely followed by supply chain risks (demand side dominantly) (see third block in Fig FI5c).

The next section examines the supply chain causal process separately from the overall causal process.

<u>Supply Chain Causal Process</u>

The perceived prevalence of the risk initiating event/action/characteristics, where at **least one element of the causal process involved the supply chain (Fig FI6)**, was over 60% for three of the four (3/4) companies (FURN 1 – 63% (10/16), FURN 2 – 67% (12/18), and FURN 4 – 75% (9/12)).

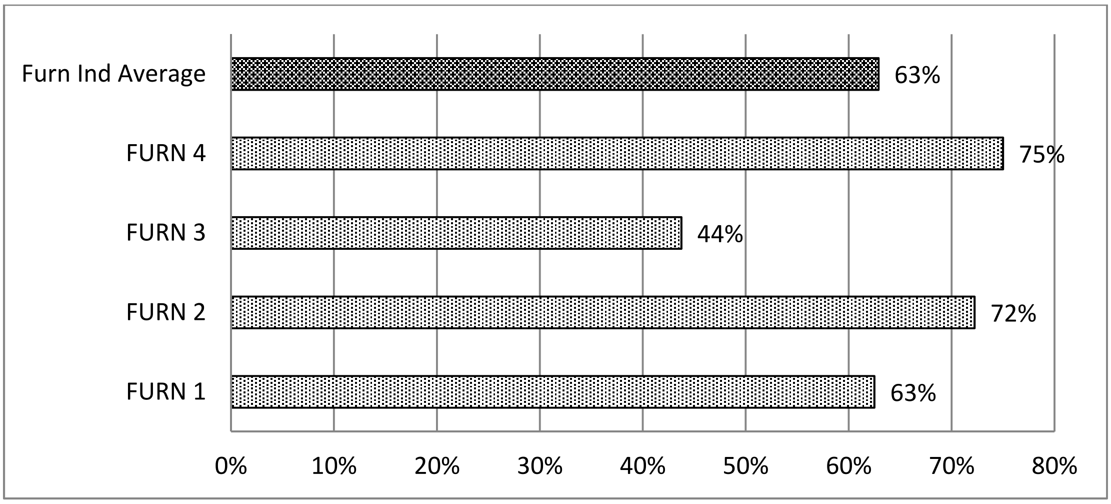


Figure FI6 Percentage Supply Chain related across full causal process - Furniture Industry (Appendix 7 FM Overall Risk Analysis)

In other words, of all the risk initiating events/actions/characteristics identified by the furniture industry OMs, ***63% on average involved the supply chain in some way for the furniture industry companies*** (Fig FI6). Of these risk initiating event/action/characteristics identified that were supply chain related across the full causal process (FURN 1 = 10, FURN 2 = 12, FURN 3 = 7 and FURN 4 = 9), only two in total or 5% involved the Supply Chain across all elements of the causal process**,** shown in Fig FI7a below

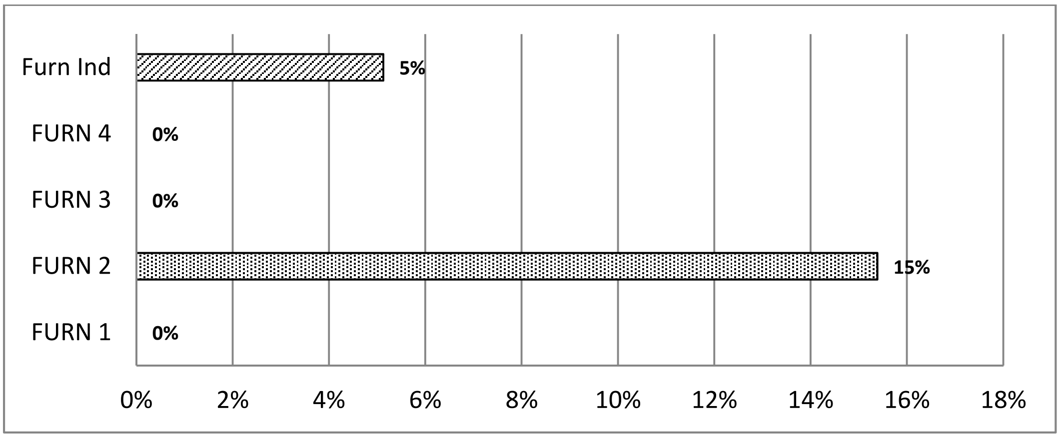


Figure FI7a Number that involved the Supply Chain across all elements of the causal process as a % of number identified Supply Chain related across full causal process - Furniture Industry (Appendix 7 FM SC Risk Analysis)

The majority of all the risk initiating events/actions/characteristics identified by the furniture industry OMs, 80% (8/10) for FURN 1, 100% (13/13) for FURN 2, 57% (4/7) for FURN 3 and 89% (8/9) for FURN 4 or ***85% overall*** (Fig F7b) resulted or may result in supply chain risks,

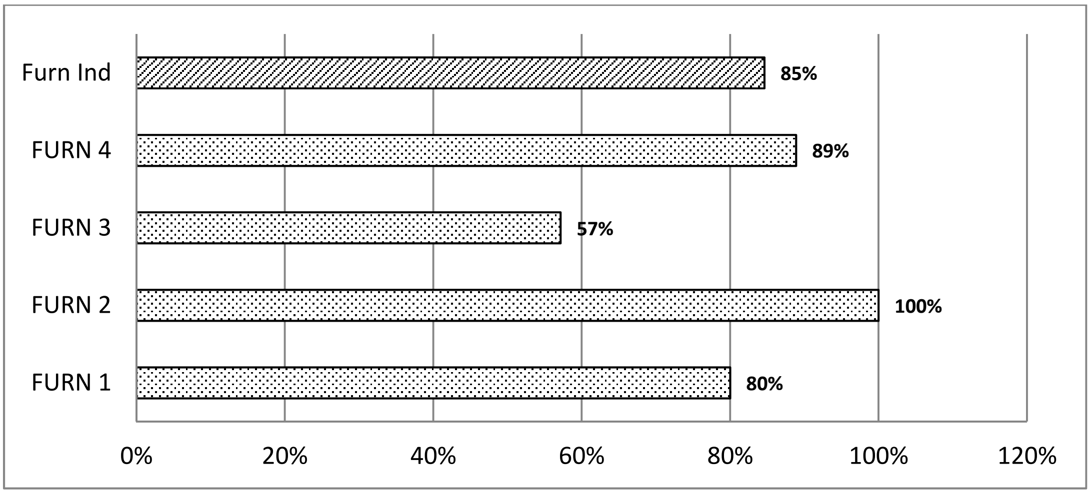


Figure FI7b Supply Chain resultant risks - % of Supply Chain related across full causal process – Furniture Industry (Appendix 7 FM SC Risk Analysis)

These resultant supply chain risks were primarily on the demand side risks (FURN 1 – 8, FURN 2 – 11, FURN 3 - 4 and FURN 4 - 6 = 29) ***or 88% overall*** for the furniture industry (Fig FI8) with some (12%) on the supply side (FURN 1 – 0, FURN 2 – 2, FURN 3 - 0 and FURN 4 -2 = 4).

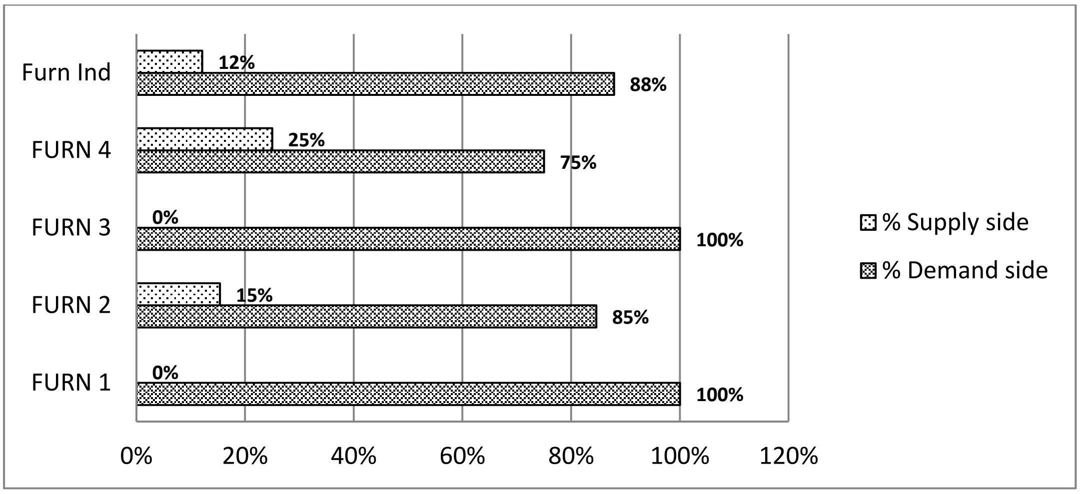


Figure FI8 Supply Chain resultant risks - % Demand side vs % Supply side – Furniture Industry (Appendix 7 FM SC Risk Analysis)

The demand-side resultant risks, extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4) included,

- loss of customers/sales - the loss of potential or existing customers (FURN 1, FURN 2, FURN 4)
- lack of demand - the reduction in demand (FURN 1, FURN 2, FURN 3)
- inability to produce for clients and deliver to clients (FURN 3)

The supply-side resultant risks extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4) included,

- the inability to get sufficient raw materials/components (FURN 4)
- left with one supplier (FURN 4)
- cannot pay supplier (FURN 2)
- admin to vet suppliers (FURN 2)

Of these risk initiating events/actions/characteristics that resulted or may result in supply chain risks, between a quarter and a half (50% (4 / 8) for FURN 1, 31% (4 / 13) for FURN 2, 25% (1/4) for FURN 3 and 25% (2/8) for FURN 4) or less than a quarter of all risk initiating events/actions/characteristics identified by the furniture industry OMs (25% (4/16) overall for FURN 1, 22% (4/18) overall for FURN 2, 6% (1/16) overall for FURN 3 and 17% (2/12) for FURN 4) were supply chain related. In other words, the minority 33% (11/33) of these risk initiating events/actions/characteristics that resulted or may result in supply chain (demand-side) risks were supply chain related (Fig FI9) or only 18% (11/62) of all risk initiating events/actions/characteristics identified by the furniture industry OMs (Fig FI9).

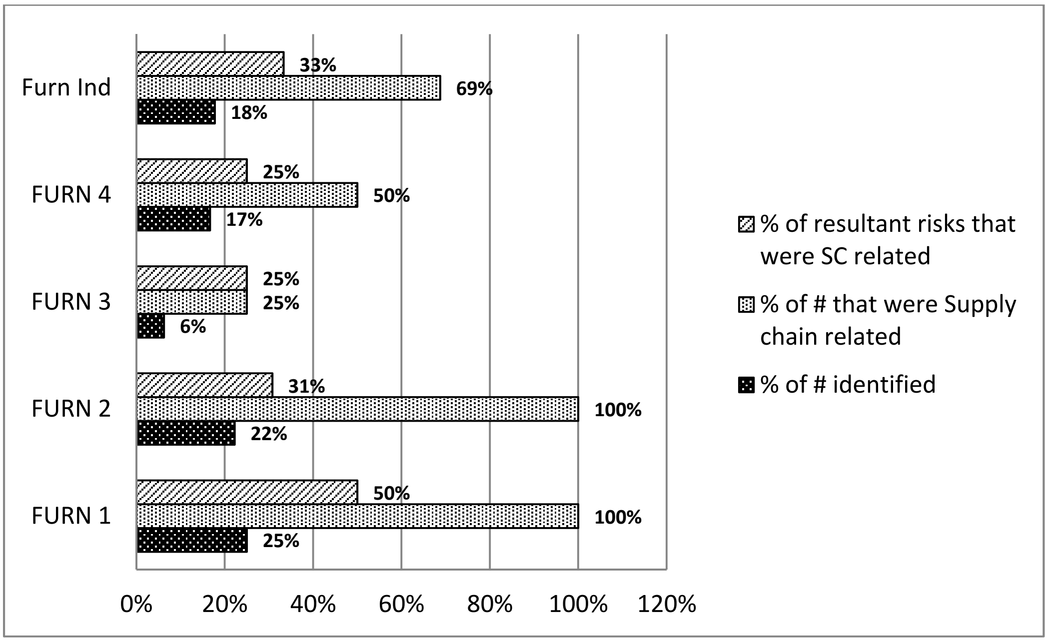


Figure FI9 Risk Initiating events/actions/characteristics that were Supply Chain related that resulted in Supply Chain related risks - Furniture Industry (Appendix 7 FM SC Risk Analysis)

Of this minority, however, the majority, 82% (Fig FI10, below) were supply-side related (and were perceived to have been caused by a variety of factors), extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4),

- uncertainty in supply (of getting materials) (x2) (caused by External: economic and External: environmental factors) (FURN 1)
- lack of number of points-of-sale/outlets (x2) (caused by External: economic factors) (FURN 1)
- a change is supply terms & conditions (caused by supply chain structure: supplier power) (FURN 2)
- a single supplier (caused by supply chain structure: new supplier) (FURN 2)
- single suppliers (caused by regulatory requirements: only one supplier and external: economic factors) (FURN 4)
- uncertainty in delivery of goods (in time) (caused by financial risk: internal cost reduction strategy of supplier) (FURN 2)

- bad supplier quality (caused by supply side: supplier quality) (FURN 2)
- cannot get certain materials (caused by external: economic factors) (FURN 3)

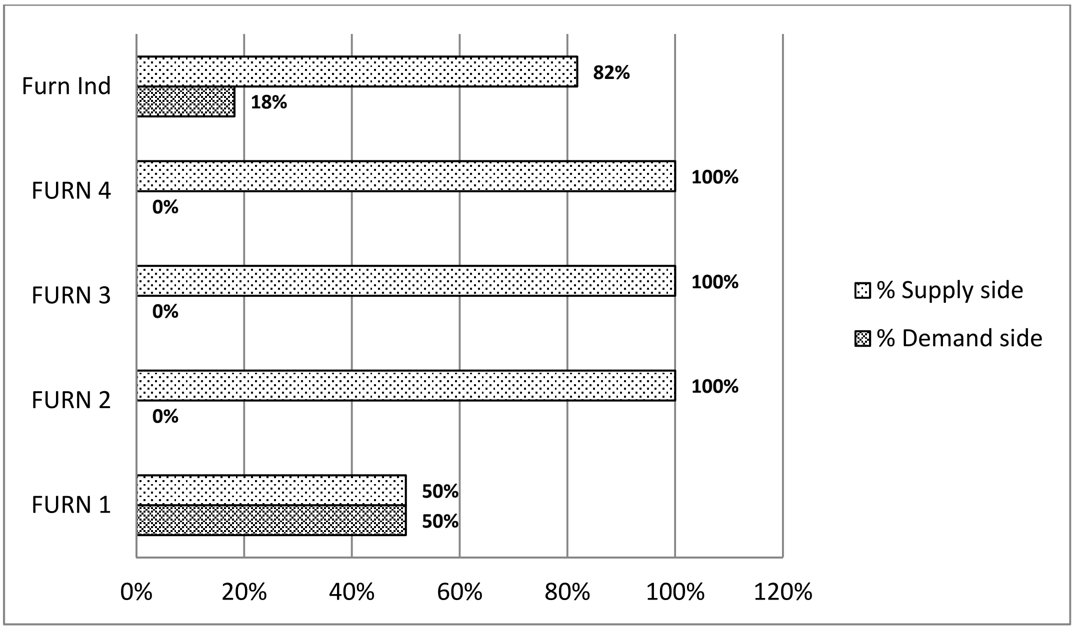


Figure FI10 Risk Initiating events/actions/characteristics that were Supply Chain related that resulted in Supply Chain related risks - % Demand side vs % Supply side - Furniture Industry (Appendix 7 FM SC Risk Analysis)

The remaining non-supply chain related (the majority), ***67%*** (50% (4/8) for FURN 1, 69% (9/13) for FURN 2, 75% (3/4) for FURN 3 and 75% (6/8) for FURN 4) ***of all risk initiating events/actions/characteristics identified by the furniture industry OMs*** (Fig FI11) that resulted or may result in supply chain (demand-side) risks, included a variety of risks. For FURN 1 and FURN 2, most were within the company operational environment with reputational and competitive risk being most prevalent.

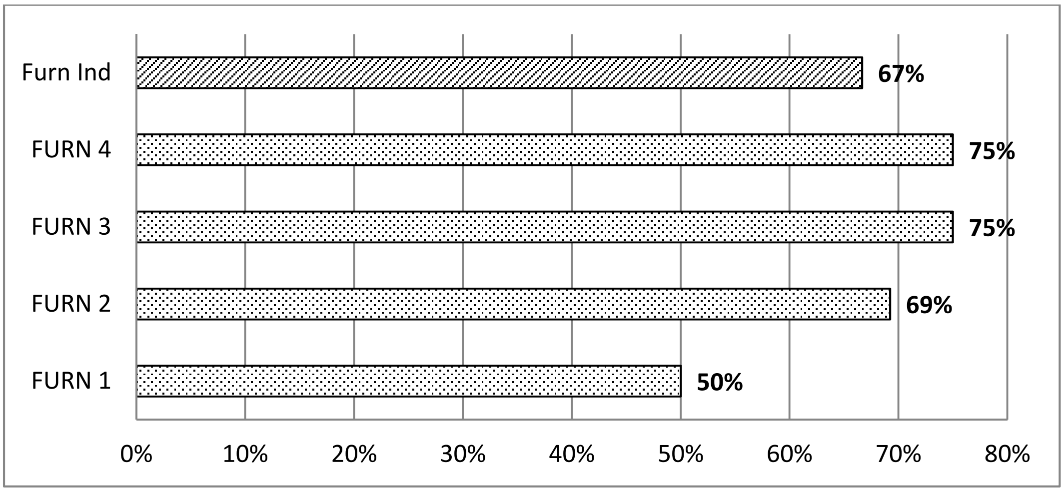


Figure FI11 Number of Non-SC related risk Initiating events/actions/characteristics as a % of resultant risks that were SC related - Furniture Industry (Appendix 7 FM SC Risk Analysis)

Supply Chain related causal factors , for the risk initiating event/action/characteristics identified that involved the supply chain is some way across the full causal process, represented a quarter (26 %) across all four furniture companies) (Fig FI12).

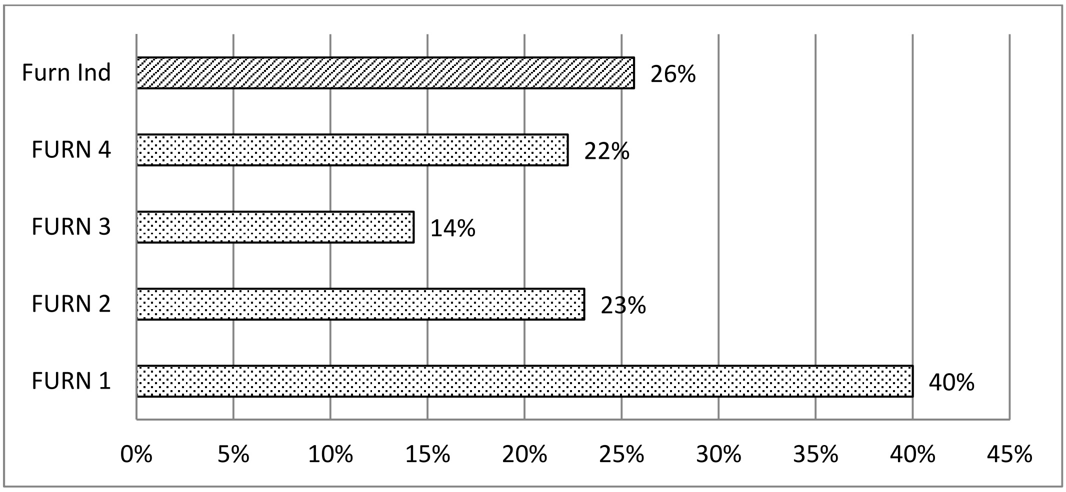


Figure FI12 Number of Supply Chain related causes of the event/action/characteristic - % of Supply Chain related across full causal process - Furniture Industry (Appendix 7 FM SC Risk Analysis)

These supply chain causal factors were equally split between demand and supply side factors overall (Fig FI13).

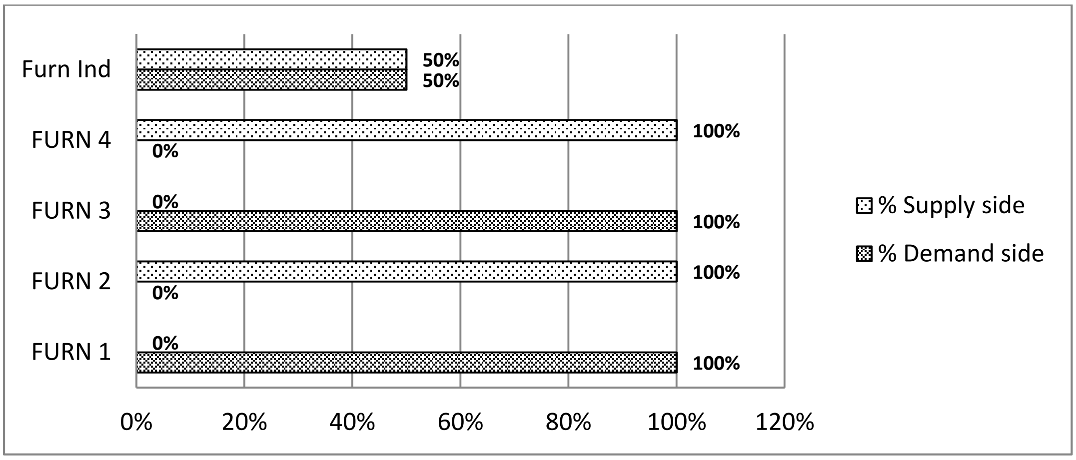


Figure FI13 Supply Chain related causes of the event/action/characteristic - % Demand side vs Supply side - Furniture Industry (Appendix 7 FM SC Risk Analysis)

For all furniture companies the demand side related causal factors, extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4), included,

- SC Structure – location of premises (resulted in demand side risk) (FURN 3)
- SC structure - the relationships between FURN 1 and its Group customer (resulted in demand side risk and strategic risk)

The supply side related causal factors, extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4) included,

- Supply risk – bad quality from supplier (resulted in Reputational and Governance Risk) (FURN 2 and FURN 4)
- Supply side risk – supplier buying power (resulted in supplier change in T&Cs) (FURN 2)
- Supply side risk -new supplier that (lead to a single supplier) (FURN 2)

Only 40% (Fig FI14a), across all four companies, of the supply chain related causal factors caused supply chain related risk events/actions/ characteristics.

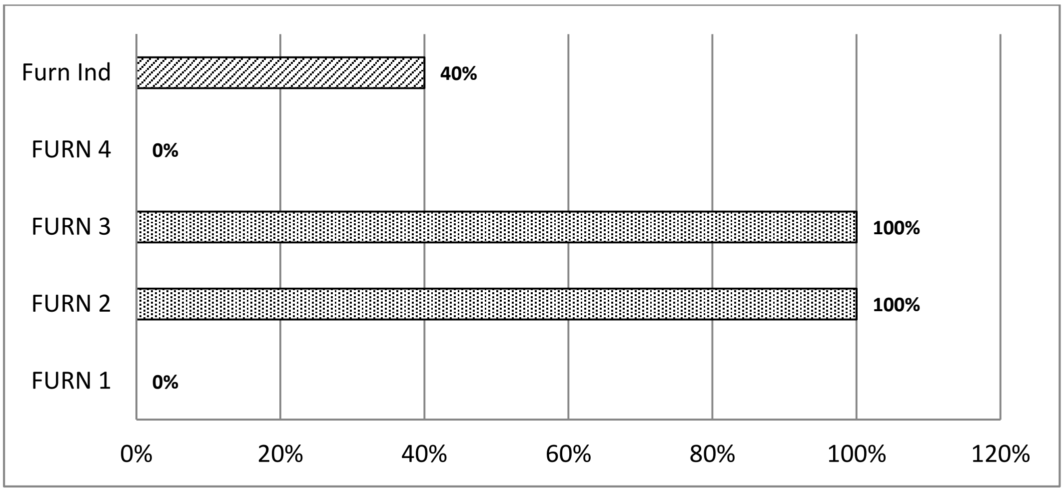


Figure FI14a Supply Chain related causes - % that caused a SC related risk events/actions/ characteristics - Furniture Industry (Appendix 7 FM SC Risk Analysis)

The only SC risk for FURN 1 that was common with Table F1.8 is the inability to forecast (A), and only 2 risks is Table F2.8 (C,I) were common for FURN 2. The only SC risk for FURN 3 that was common with Table F3.8 is the inability to forecast (A), and the supply of bad quality goods (this is the only risk to correspond with Table F4.8, risk I) for FURN 4.

Assembling all the preceding information, the **supply chain causal process** for the furniture industry, using the following format,

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [consequence]

may thus be represented below, where **63% on average** of all risk initiating events /actions/characteristics that would require or initiate a response **involved the supply chain in some way for the furniture industry companies,**

Of this 63%,		Of this 63%,		Of this 63%,
26 % of the causal factors (Fig FI12) involved supply chain (equally split between demand and supply side factors) (Fig FI13)	❯	33 % (Fig FI9) of the risk initiating events /actions/characteristics involved supply chain factors (Supply side factors primarily) (Fig FI10)	❯	85 % (Fig F7b) of the resultant risks involved supply chain factors (Demand side factors primarily) (Fig FI8)

Figure FI14b Supply chain causal process - Furniture Industry

In summary, the furniture industry OMs perceived supply chain related factors to have a relatively low causal influence (see first block of Fig FI14b). Less than half overall of these causal factors caused risk initiating events /actions/characteristics that were supply chain related (Fig FI14b). These risk initiating events /actions/characteristics that involved supply chain factors were primarily supply side related (see second block of Fig FI14b). The biggest impact on the supply chain was in the resultant risks on the demand side (see third block of Fig FI14b).

sRQ3.3 will be addressed next.

sRQ3.3: What actions (if any) do owner-managers of manufacturing SMEs in South Africa take when a risk is identified? (Risk response/handling)

The scope and nature of risk handling activities were limited by certain constraints (Fig FI15 below). FURN 1 (36%), FURN 2 (27%) and FURN 4 (42%) attributed over a third of the constraints to the company operational environment, whereas FURN 3 did not attribute any constraints to the company operational environment. Constraints attributed to the supply chain were perceived to be important for FURN 1 (50%) and FURN 4 (33%) whereas as for FURN 2 (14%) and FURN 3 (13%) these were less significant.

The following information is extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4). For FURN 1 supply chain related constraints were as a result of the supply chain structure and the supply side, and for FURN 4, the constraints were primarily on the supply side (3/4). For FURN 3 the only constraint was supply chain structure and for FURN 2, the supply chain constraints were related to demand risk and supply chain structure risk

Overall company operational environment and supply chain constraints were equally weighted (29%) (Fig FI15 below). External factors outside of the company operational environment (macro-environmental factors) were perceived to be key contributors of constraints for FURN 2 (59%), FURN 3 (87%) and overall (42%), whereas for FURN 1 (14%) and FURN 4 (25%) these were the smallest constraining factors. The only macro-environmental factor that dominated was economics factors and this was only for FURN 3. The preceding information is extracted from the F1-2 and F3-4 cross case analyses (Appendix 7 F1-2 and Appendix 7 F3-4).

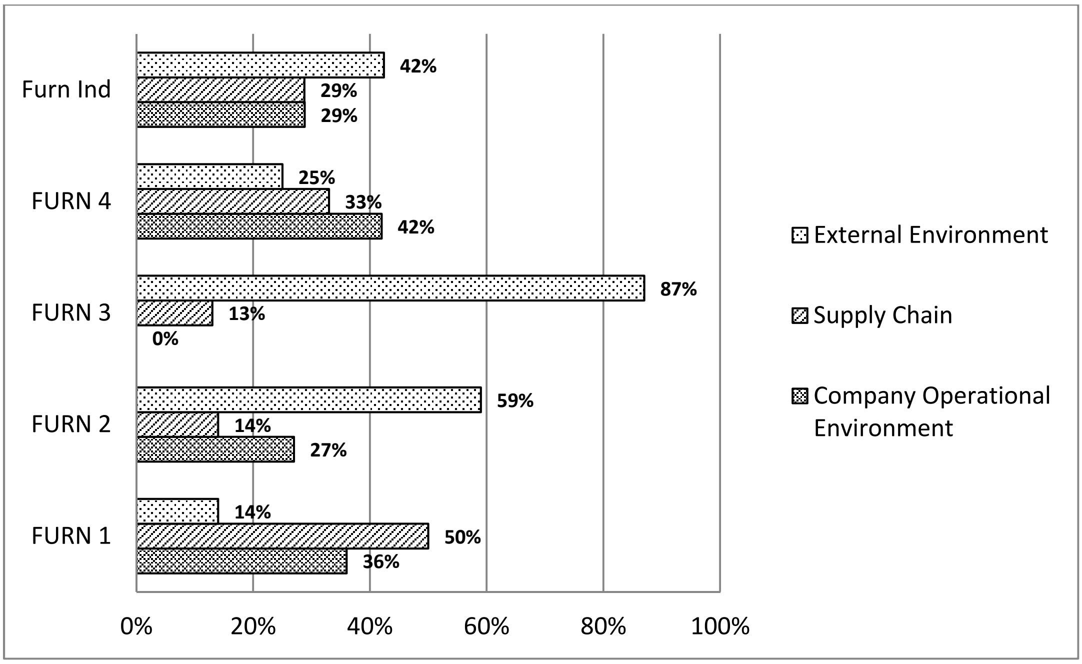


Figure FI15 Constraints – Furniture Industry (Appendix 7 FM Constraints)

The risk handling modes were fairly similar across the companies (Fig FI16 below). FURN 1 (44%), FURN 3 (54%) and FURN 4 (40%) seemed to predominantly accept the risk and mitigate the consequences, while FURN 2 (43%) mostly mitigated the consequences. Half of the time the risk could either be avoided, prevented or the impact mitigated in the case of FURN 1, while for FURN 2 and FURN 4, the risk could be prevented a third of the time.

This implied that action was taken (the risk is avoided, prevented or mitigated) when and to the extent possible by the OMs, in more than 90% (FURN 1), in all (FURN 2), in more than 85% (FURN 3) and in more than 89% (FURN 4) of events/actions/characteristics identified which may have undesired consequences for the business (the preceding percentages are a sum of the percentages in Fig FI16 excluding the “Avoid” risk handling mode).

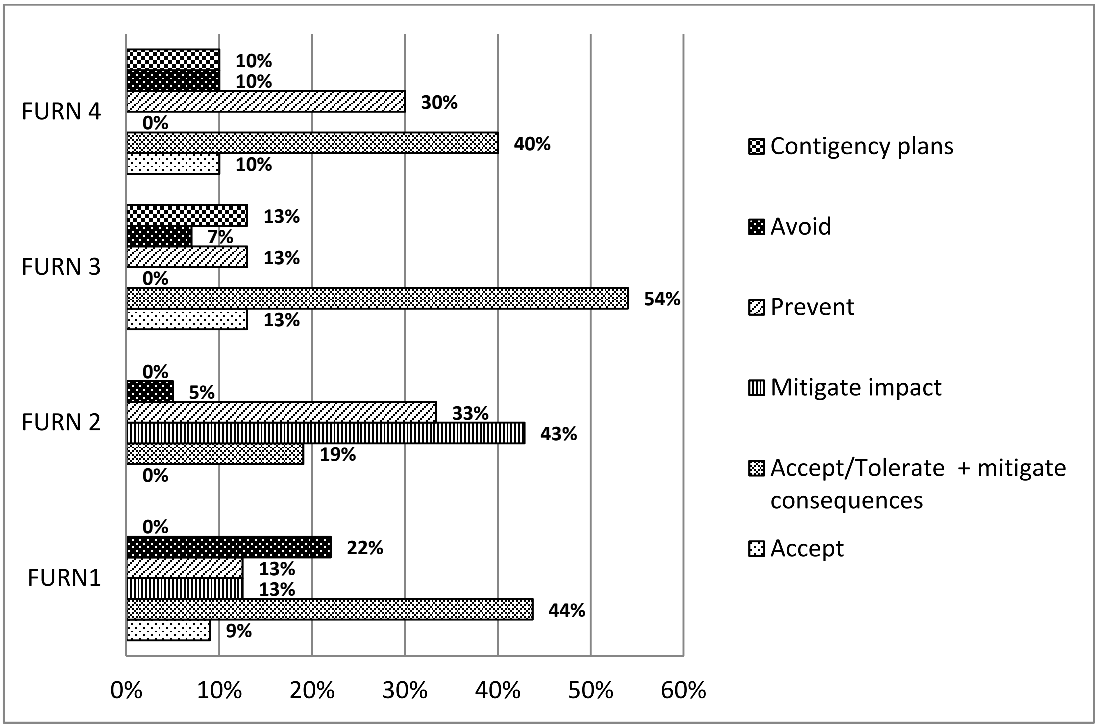


Figure FI16 Risk Handling Modes - Furniture Industry (Appendix 7 FM Risk Handling)

Seventy three (Appendix 7 FM Infer Practices) risk handling practices across all four companies were identified (Fig FI17 below). These largely reflected the daily operating activities that leverage internal resources (people, knowledge, skills and relationships) and differed across companies. FURN 1 primarily sought alternative ways of doing things, by improvising, shopping around, leveraging resources, negotiation, and leveraging relationships and partnering with other SMEs This was followed by communicating personally with customers and suppliers to resolve issues. FURN 2 primarily took the necessary actions using internal resources 50% of the time, followed by leveraging and building relationships (with customers, suppliers and staff). Both FURN 3 and FURN 4 (very small companies) primarily took the necessary actions using internal resources about 33% of the time.

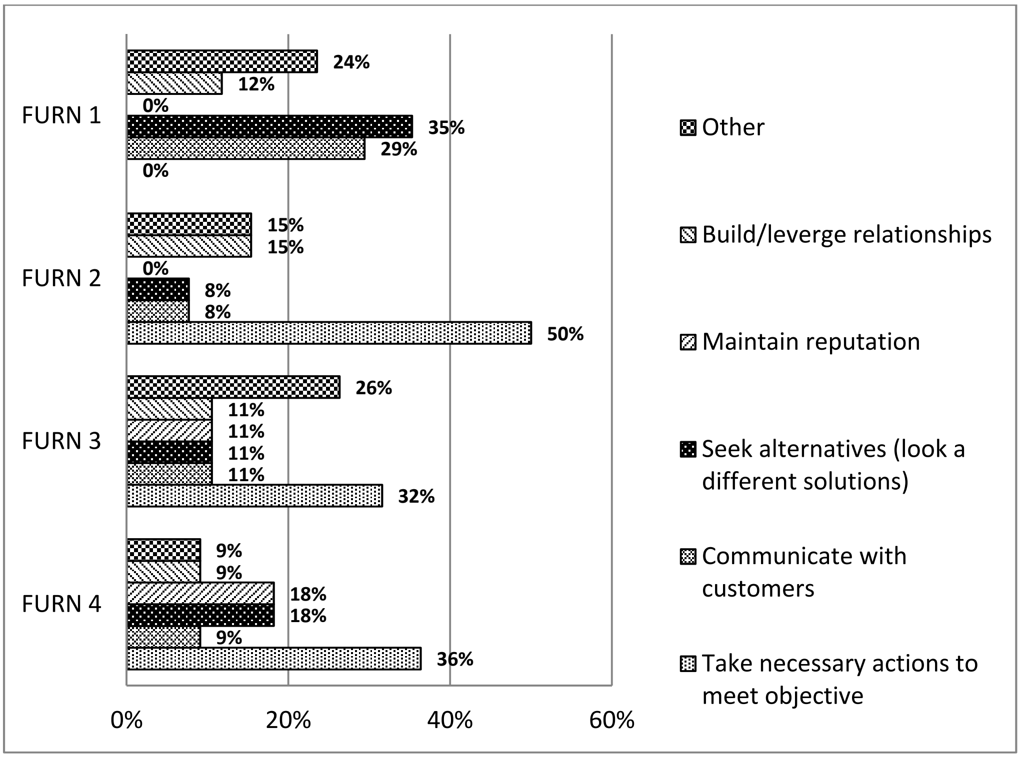


Figure FI17 Inferred Practices Categories - Furniture Industry (Appendix 7 FM Infer Practices)

In summary, the scope and nature of risk handling activities was limited by certain constraints which were perceived differently across the companies, although risk handling modes were fairly similar across the companies. Risk handling practices, that largely reflected the daily operating activities that leverage internal resources (people, knowledge, skills and relationships), differed across companies.

Lastly, sRQ4 is considered.

sRQ4: What is the SCRM capability of manufacturing SMEs in South Africa?

The capability (the degree of success i.e. focus on what can be done) to perform a task is reflected in the uncertainty about and the severity of the consequences of the task or activity given the occurrence of the initiating event. The evaluation of capability is thus expressed in the ability to perform a task in such a way as to ensure the most positive outcome as a result of an initiating event, that, unaddressed will result in undesired consequences.

All the OMs were assessed as being capable in managing risk in their companies. This is motivated by the analysis below

In three of the four cases, of the tasks undertaken to address the event/actions/characteristic, the majority were perceived to have a low uncertainty in the anticipated outcome (Fig FI18 below and Fig FI19 below).

- FURN 1 - 63% of all risks and 56% for SC risks
- FURN 2 - 64% for all risks and 62% for SC risks
- FURN 3 - 69% for all risks and 50% for SC risks,

whereas this was not the case for FURN 4 - 10% for all risks and 50% for SC risks

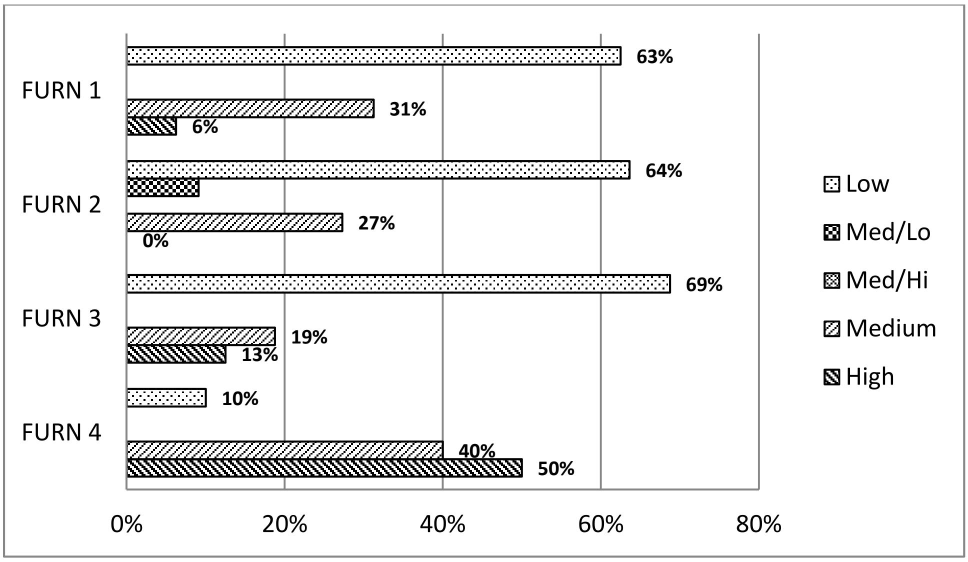


Figure FI18 Uncertainty (Q) in outcome (All risks) - Furniture Industry (Appendix 7 FM RM Capability)

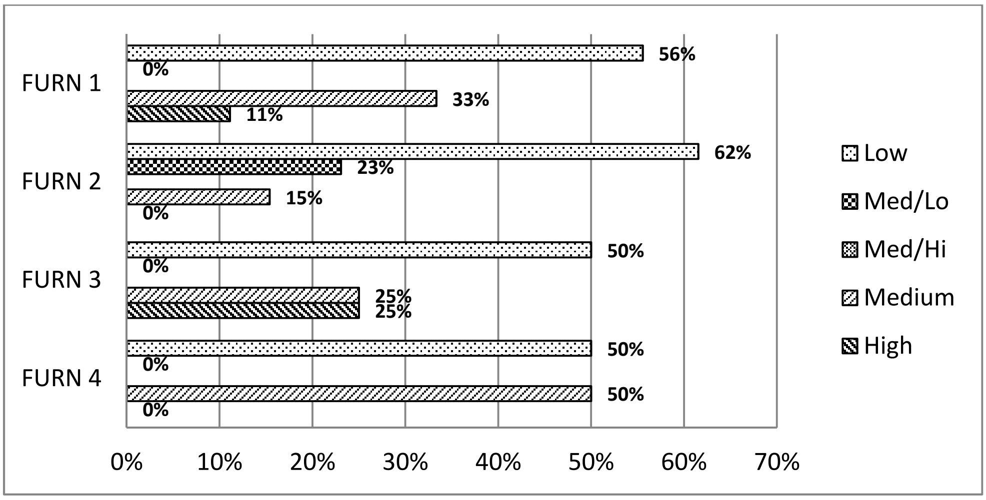


Figure FI19 Uncertainty (Q) in outcome (Supply chain risks) - Furniture Industry (Appendix 7 FM RM Capability)

In all of the cases, most of the tasks performed had positive outcomes (Fig FI20 below and Fig FI21 below).

- FURN 1 - 69% for all risks and 78% for SC risks
- FURN 2 - 88% for all risks and 92% for SC risks
- FURN 3 - 93% for all risks and 88% for SC risks
- FURN 4 - 70% for all risks and 100% for supply chain risks

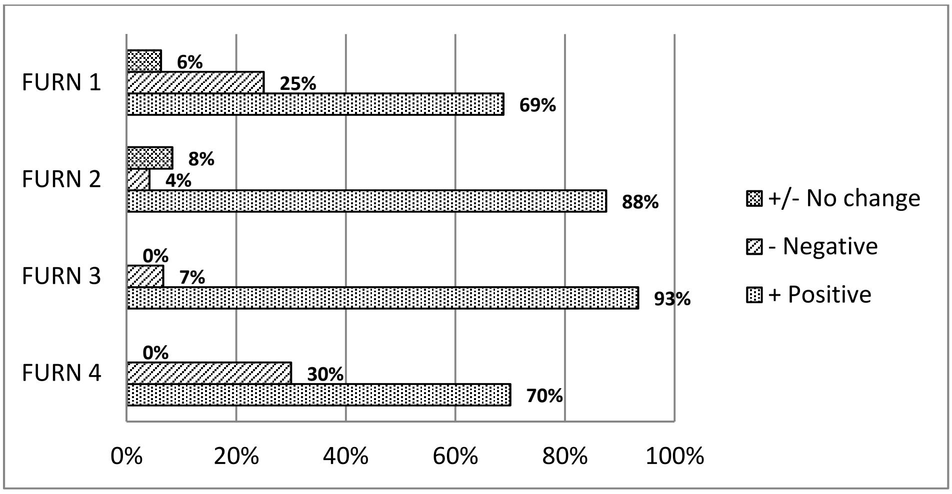


Figure FI120 Impacts of the outcomes (CT) of tasks (T) (All risks) - Furniture Industry (Appendix 7 FM RM Capability)

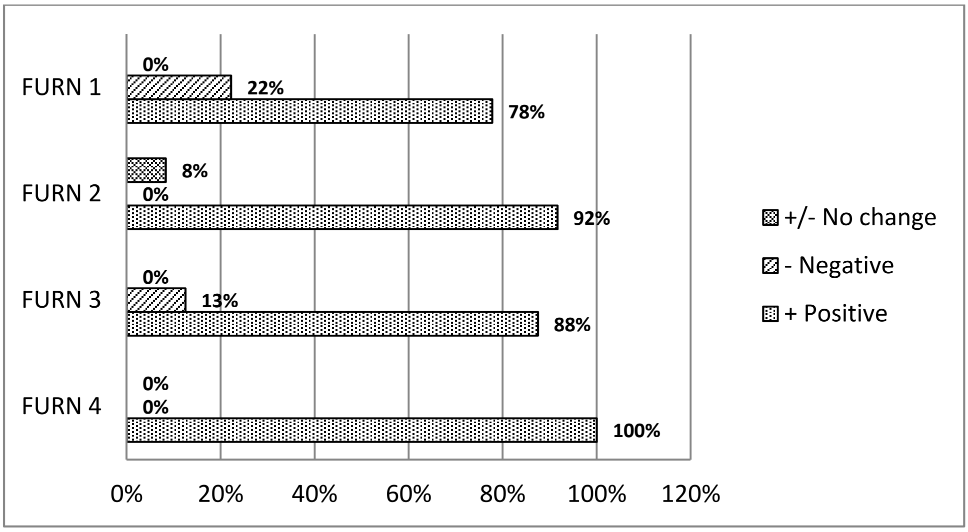


Figure FI21 Impacts of the outcomes (CT) of tasks (T) (Supply chain risks) - Furniture Industry (Appendix 7 FM RM Capability)

Risk Management Capability (RMC) and Supply Chain Risk Management Capability (SCRMC) are rated as between moderate and high in all cases (based on Table 3.9 Risk Management Capability rating scale in chapter 3):

- Moderate for FURN 1
- High for FURN 2
- High for FURN 3
- Moderate for FURN 4

In all cases, risk identification, risk analysis/assessment and risk response/handling are demonstrated (see above) and done informally and intuitively

In all cases, there is evidence that all companies (60% - FURN 1, FURN 4 and FURN 3 and at least 60% - FURN 2) the formal risk management processes are performed informally and intuitively (Table FI1 below).

Table FI1 Assessment of formal risk management processes performed informally and intuitively (Appendix 7 FM RM Processes)

Company	FURN 4	FURN 3	FURN 2	FURN 1
Process Element	**Evidence**			
Risk Management Planning	No	No	Some evidence	No
Risk Identification	Yes	Yes	Yes	Yes
Risk Analysis	Yes	Yes	Yes	Yes
Risk Response/Handling	Yes	Yes	Yes	Yes
Risk Monitoring and Control	No	No	No	No
Proportion of formal processes evident in informal operations	**60%**	**60%**	**more than 60%**	**60%**

In summary, for all of the cases, most of the tasks performed had positive outcomes. Risk identification, risk analysis/assessment and risk response/handling are done informally and intuitively. There is evidence that the formal risk management processes are performed informally and intuitively. Risk Management Capability (RMC) and Supply Chain Risk Management Capability (SCRMC) are rated as between moderate and high.

The next section presents the within industry cross-case analysis and results for the metal industry cases.

7.2 The Metal Industry

The cases analysed for the metal industry are as shown in Table 7.2 below.

Table 7.2 Metal Industry Cases

Date (2014)	**Company Description** (where I2 = Industry 2, Table 4.2)	**Size**	**Location in South Africa**	**Interviewee (s)**
26 Aug	Manufacturer of railway wagon chassis items like brake systems (I2Med1 = METAL 1)	Medium	Gauteng	Sole owner
3 Sep	Butterfly Valve Manufacturer (I2Smal1 = METAL 3)	Small	Gauteng	33% ownership (3 shareholders)
9 Sep	Hydraulic Pump Manufacturer (I2Smal2 = METAL 4)	Small	Gauteng	Sole owner
16 Sep	Control Valve Manufacturer (I2Med2 = METAL 2)	Medium	Gauteng	33% ownership (3 shareholders)

7.2.1 Within Industry (Metal) Cross-case Analysis and Results

The following presents a comparative cross-case analysis for METAL 1, METAL 2, METAL 3 and METAL 4 based on the cross-case METAL 1- METAL 2 (Appendix 7 M1-2) and METAL 3- METAL 4 (Appendix 7 M3-4). The analysis will follows the format of sequentially addressing the research questions derived from the conceptual framework for this research. sRQ1 will be addressed first.

sRQ1: How do manufacturing SME owner-managers in South Africa perceive risk in their businesses and in particular in their Supply Chains?

Two of the OMs have heard of SCRM (OMM1 and OMM3), OMM4 might have heard of SCRM and OMM2 has not.

All four OMs have tertiary level qualifications. Three of the OMs have BSc Eng qualifications, while OMM4 has a Legal and Marketing qualification. All four OMs have some work experience in a large company before deciding to work in/own their current businesses, and have more than 10 years' experience is small business management. All the OMs are over the age of 45 years.

The personally perceived risk propensity of the OMs differed slightly. Three of the OMs considered themselves to be risk-takers (OMM1, OMM2 and OMM3), while OMM4 does not. There were three different definitions of risk between the 4 OMs. OMM1 perceived risk "As UNCERTAINTY, about an event/potential loss/a decision", and OMM2 and OMM4 as "As LOSS, of profit/sales/income/customers/suppliers" and OMM3 perceived risk "As VARIABILITY, in profit/sales/supply/demand".

OMM2 and OMM4 (valve manufacturers) believe that risk in their businesses is well-managed through various formal systems i.e. SHEQ, ISO9001, ISO14001 and through having the required resources. OMM1 and OMM3 do not have formal risk management systems and do not believe that risk in his business is well-managed. While OMM3 is not sure whether they have the resources to manage risk, OMM1 does believe they have the resources to manage the controllable risk "but not the risk arising out of the broader socio-economic environment".

Their assessments of risk impacting their businesses as a whole varied, but with most of the risks rated as low overall (43%) (Fig MI1 below). While OMM1 rated most of risks to the business as medium or high, with most being high, OMM2 evaluated the majority of risks to his business as, equally split, between medium and low. Both OMM3 and OMM4 rated the majority of the risks to their businesses as low or not a risk. While OMM3 rated the remainder of the risk as high, OMM2 evaluated the remaining risk as high and moderate respectively.

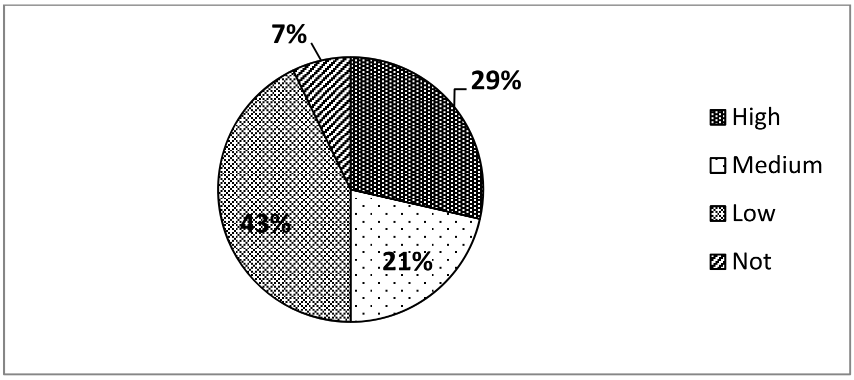


Figure MI1 Metal Industry OMs rating of risk to the business (Appendix 7 FM Risk to the business)

Three of the OMs (OMM1, OMM3, OMM4) rated external risks as high, while OMM2 rated it as medium. Both OMM1 and OMM2 regarded financial risks and operations risk arising from the services delivered or the business activities as medium impact risks, while financial risk was high for OMM4 and OMM3 rated human resources and legislative risks as high. Both OMM1 and OMM2 believe that one of the most serious risks they face is uncertainty around various labour issues. For OMM1 this refers to the "…ever-changing are the increasing BEE requirements and hence the uncertainty of work for white owned factories", while for OMM2, "our biggest risk, the labour and then not being able to supply". For OMM3 this is reinforced by his response to "other serious risks do you face that affect your ability to supply your customers with your product" which was organised labour demands with violence & intimidation and lack of skilled labour (Interview, 2014).

The Supply Chain

The supply chain risk ratings were similar for three of the OMs (OMM1, OMM3, OMM4). OMM1 rated most of the listed supply chain risks as either low (46%) or not-a-risk (36%), and the remainder as medium. OMM3 rated most (82%) of the supply chain risks as either "Not a risk" (46%) or a low risk (36%), while OMM4 rated most as "Not a risk" (64%) or a low risk (9%). On the other hand, OMM2 rated the majority of these supply chain risks (91%) as medium or low (Appendices 6 M1, M2, M3, M4). The inability to forecast was the only common risk for all companies, rated as either high (2) or medium (2).

Overall, the Metal Industry OMs (68%), rated the supply chain risks listed as low (32%) or "Not a risk" (36%) (Fig MI2 below).

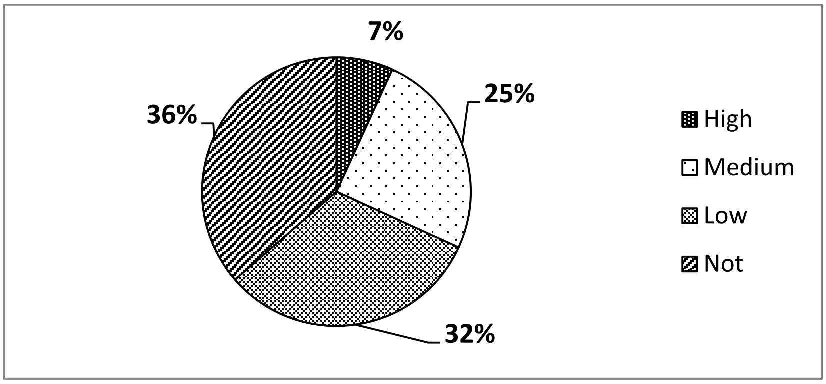


Figure MI2 Metal Industry OMs rating of Supply Chain risk (Appendix 7 FM SC Risk)

<u>Preliminary observations</u>

There are some common themes that emerge in how OMs of manufacturing SMEs in South Africa perceive risk in their businesses and in particular in their Supply Chains. While their overall ratings of risk to their businesses varied, common high/medium risks were external risks, financial risks and human resources/labour risk. Supply chain risks were generally perceived as low risk, but with the inability to forecast emerging as high/medium. The majority of the OMs considered themselves to be risk-takers but had different perceptions of what risk meant and how it was being managed in their businesses. All OMs had tertiary qualifications with the majority being in engineering, and all had had experience in a large enterprise environment.

sRQ2 is considered next.

sRQ2: What is the nature of manufacturing SMEs in South Africa?

METAL 1 and METAL 2 met the criteria for a medium-sized and METAL 3 and METAL 4 met the criteria for small manufacturing companies in South Africa (based on number of employees) and are all more than 20 years old (selection criteria >10yrs). Three of the businesses (METAL 1, METAL 3 and METAL 4) are considered by the OMs interviewed to be family-owned. While METAL 1 and METAL 3 are solely owned by OMM1 and OMM3 respectively, METAL 2 has three owners, with OMM2 owning less than 50%, and METAL 4 has 3 owners, with OMM4's father owning about 40%. METAL 1 has a flat, informal organizational structure, while METAL 2, METAL 3 and METAL 4 have documented organograms. All the companies manufacture specialized products for engineering applications. METAL 1, METAL 3 and METAL 4 all own all their machinery and the premises on which they are located, while METAL 2 does not own their premises. METAL 1, METAL 2 and METAL 3 have high-tech CNC machining capabilities while METAL 4 still relies on hand operated old machines.

All four companies have survived significant risk events in their recent history i.e. the closing down of METAL 1's foundry; the sale of METAL 2 where the company was about to be closed and was then rescued by the repurchase by OMM2 and his partners; the sudden loss/death of original family management for METAL 3 and the almost annihilation of the export market due to 2008 Financial crisis for METAL 4.

The supply chains of all companies have simple two-tier structures with strong OM visibility into the first tiers and much less into the 2nd tiers. The focus of both OMs is predominantly on the demand side. All four companies are tier 1 suppliers into large, primarily, state-owned enterprises. All (except METAL 1) sources material locally.

Preliminary observations

There appears to be some key similarities across all four companies. They all meet the selection criteria, are family established and owned (3 out of the 4) and have informal organizational structures (3 have documented organograms). All four manufacture customized products for engineering applications, are located in their original premises (and 3 own the premises and all machinery) and have survived significant risk events in their recent history. They all have simple two-tier supply chains with greater OM visibility into the first tiers and much less into the 2nd tiers.

sRQ3.1 is addressed next.

sRQ3.1: How do owner-managers of manufacturing SMEs in South Africa assess risk in their Supply Chains? (Risk identification)

The following was assessed to be similar across all four SMEs. Environmental scanning, by the OM, of the related industry and the South African business environment is evident in all companies but is more isolated to the immediate environment for the very small companies. This scanning includes a thorough, detailed and in-depth knowledge and understanding of the company's operations and its employees.

OMM1 and OMM3 seemed to use more personal, direct mechanisms for information gathering such as talking to people in the industry personally and through the media, while OMM2 and OMM4, both in the valve industry both used their industry cluster and other less direct mechanisms such as the sales agents or industry organisations and events.

All OMs identify risk initiating events/actions/characteristics that may result in risks that impact the company as well as the causes (or triggers) of these risk initiating events/actions/characteristics. This is done informally and on an on-going daily basis i.e. as part of business-as-usual.

Supply chain risks are identified within the ambit of the overall environmental scanning, and are not perceived separately from the rest of the company.

The analysis and results for RQ3.2 follows.

sRQ3.2: What do owner-managers of manufacturing SMEs in South Africa consider to be the most prevalent risks in their Supply Chains? (Risk assessment)

Across all four companies, each company identified between 11 and 26 risk initiating events/actions/characteristics that would require or initiate a response The small companies were on the higher end of this range (METAL 3 -26 and METAL 4 - 17) with a total of 43, while the medium-sized companies were on the lower end of the range (METAL 1 -14 and METAL 2 -11), totaling 25, equaling METAL 3. There is, thus, is a notable difference between the medium and small companies with regard to the number of risk initiating events/actions/characteristics identified.

The full causal process (cause - event/action/characteristics – consequence) is now analysed across all four companies to identify the dominant risk category within each element of the process.

Overall Causal Process

These risk initiating events/actions/characteristics will be considered first. For 3 of the 4 companies these were primarily related to the company operational environment (METAL 2 – 46%, METAL 3 - 69 % and METAL 4 - 35%, Appendix 7 FM Overall Risk Analysis) or 44% on average for all metal industry companies (Fig MI3a). For METAL 1 these were largely related to the identification of macro-environmental risk with operational risks being the lowest.

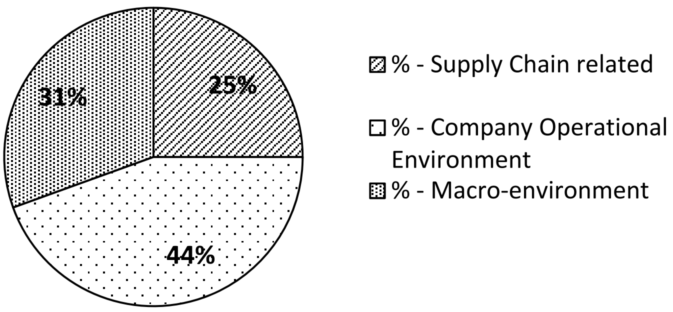


Figure MI3a Risk Initiating events/actions/characteristics - Metal Industry (Appendix 7 FM Overall Risk Analysis)

Common operational environment risk initiating events/actions/characteristics to all companies were operations risk. For METAL 1 and METAL 2 common operational environment risk initiating events/actions/characteristics were operations and strategic risks (Appendix 7 M1-2, Fig M1-2b). For METAL 3 and METAL 4 common of company operational risk initiating events/actions/characteristics were financial, operations and HR and labour (Appendix 7 M3-4, Fig M3-4b).

Macro-environmental related risk initiating events/actions/characteristics were also of primary impact for METAL 4 (35%) and secondary for METAL 2 (36%) (Appendix 7 FM Overall Risk Analysis). The macro-environmental risk initiating events/actions/characteristics were related to labour and the general economic-social and political environment. Supply chain related risks were secondary for METAL 1 (29%), METAL 3 (23%) and METAL 4 (30%) (Appendix 7 FM Overall Risk Analysis), but least prevalent overall (25%) (Fig MI3a). Of these supply chain related risk initiating events/actions/characteristics, the majority were demand side related (60%) (Fig MI3b).

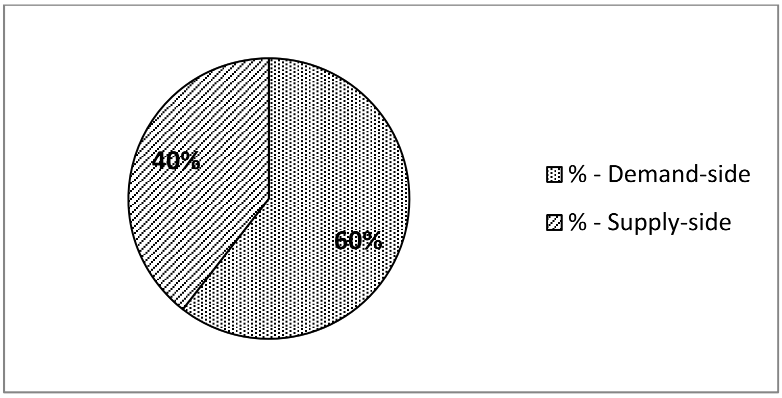


Figure MI3b Risk Initiating events/actions/characteristics (Supply Chain related) - Metal Industry (Appendix 7 FM Overall Risk Analysis)

Thus, overall for the metal industry risk initiating events/actions/characteristics may be ranked as

1. Company Operational Environment (Operations factors) (44%)
2. Macro-environmental factors (labour and the general economic-social and political environment) (31%)
3. Supply Chain (Demand side factors primarily – 60%) (25%)

The consequences of the risk initiating events/actions/characteristics are now analysed.

For three of the companies these events/actions/characteristics may principally result in company operational risk (METAL 1 – 70%, METAL 3 – 83%, METAL 4 – 74%, Appendix 7 FM Overall Risk Analysis) and 68% overall for all metal industry companies (Fig MI4a below), of which the most dominant was financial risks (METAL 1 – 28%, METAL 3 – 40%, METAL 4 – 50%). Common consequences (all companies) in the company operational environment were financial, strategic and operations. Common consequences (METAL 1 and METAL 2) in the company operational environment were financial, strategic, operations and legal risk (Fig M1-2d Appendix 7 M1-2). Common consequences (METAL 3 and METAL 4) in the company operational environment are financial, strategic, operations and reputational risk (Fig M3-4d, Appendix 7 M3-4).

<u>The Supply Chain</u>

Overall supply chain resultant risks were secondary (31%) (FigMI4a).

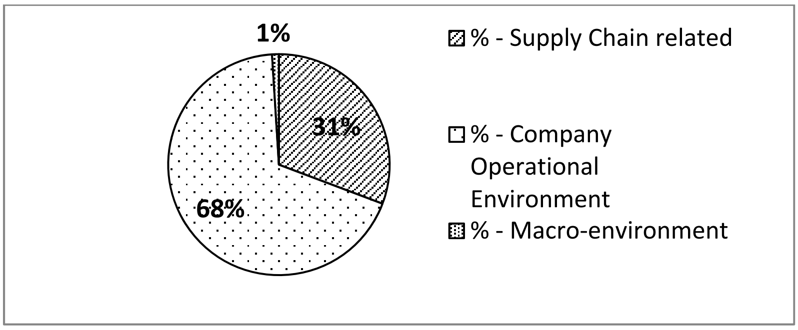


Figure MI4a These events/actions/characteristics may principally result in - Metal Industry (Appendix 7 FM Overall Risk Analysis)

The resultant supply chain risks were primarily demand side related (82%) (Fig MI4b below) for all companies.

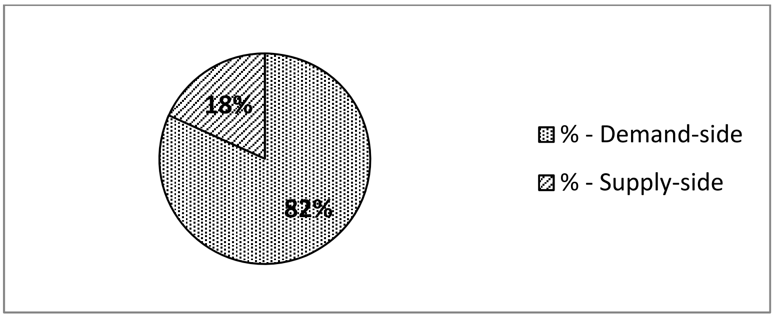


Figure MI4b These events/actions/characteristics may principally result in (Supply Chain related) - Metal Industry (Appendix 7 FM Overall Risk Analysis)

Thus, overall for the metal industry risk initiating events/actions/characteristics may result in (consequences) that are be ranked as

1. Company Operational Environment (financial, strategic and operations) (68%)
2. Supply Chain (Demand side risk dominantly – 82%) (31%)
3. Macro-environmental factors (0%)

The causes of the risk initiating events/actions/characteristics are considered next.

Significant causes of the risk initiating events/actions/characteristics for all companies were macro-environmental risks (METAL 1 – 57%, METAL 2 - 45%, METAL 3 – 48% and METAL 4 - 66%, Appendix 7 FM Overall Risk Analysis), and 54% on average.(FigMI5a). Economic factors were common to all. Supply chain factors were the least prevalent causes on average (17%) (Fig MI5a).For METAL 1 supply chain factors (29%) were the next cause of risk initiating events/actions/characteristics (Appendix 7 FM Overall Risk Analysis). These were are on the demand side and relate to uncertainty around their key customer (SOE). For METAL 2 the company operational environment (46%) was an equal contributor to the causes of risk initiating events/actions/characteristics of which 60% related the competitive environment. For METAL 3 supply chain factors (4%) were an insignificant cause of risk initiating events/actions/characteristics. For METAL 4 supply chain factors (27%) were the next significant cause (Appendix 7 FM Overall Risk Analysis).

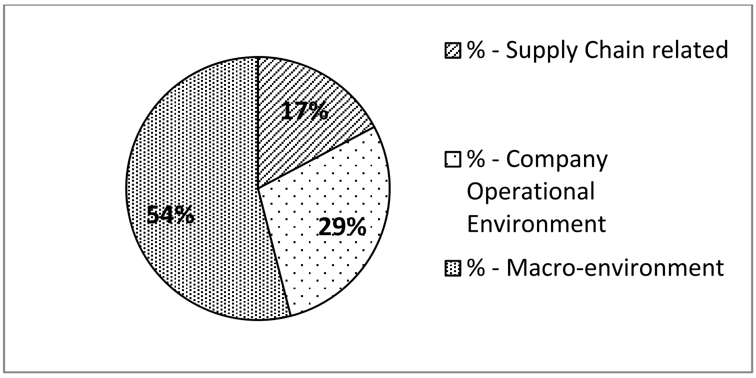


Figure MI5a Causes of the event/action/characteristic - Metal Industry (Appendix 7 FM Overall Risk Analysis)

On average, the largest proportion (69%) of the supply chain related factors were on the demand side (Fig MI5b).

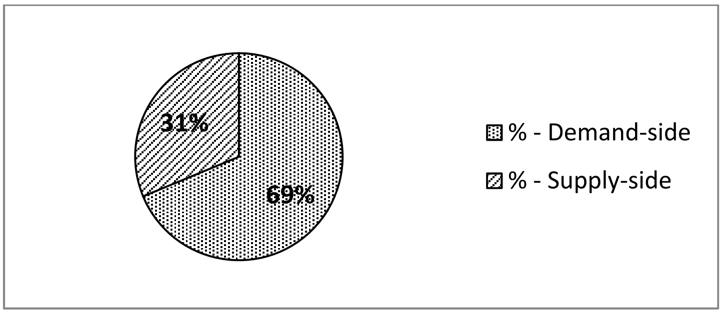


Figure MI5b Causes of the event/action/characteristic (Supply Chain related) - Metal Industry (Appendix 7 FM Overall Risk Analysis)

Thus, overall for the metal industry causes of risk initiating events/actions/characteristics may be ranked as

1. Macro-environmental factors (Economic factors) (54%)
2. Company operational environment (29%)
3. Supply chain factors (Demand side factors primarily – 69%) (17%)

Assembling all the preceding information, the **full causal process** for the furniture industry, using the following format,

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [consequence]

may thus be represented as, where the most highly ranked risk categories are emboldened and the supply chain category in shaded,

Macro-environmental factors (Economic factors) (54%) Company operational environment (29%) Supply chain factors (Demand side factors primarily – 69%) (17%)	**Company Operational Environment (Operations factors) (44%)** Macro-environmental factors (labour and the general economic-social and political environment) (31%) Supply Chain (Demand side factors primarily – 60%) (25%)	**Company Operational Environment (financial, strategic and operations) (68%)** Supply Chain (Demand side risk dominantly – 82%) (31%) Macro-environmental factors (0%)

Figure MI5c Full causal process - Metal Industry

In summary, the metal industry OMs perceived macro-environmental factors (see first block in Fig FI5c) to be the primary cause of risk initiating events/actions/characteristics, largely concentrated in the company operational environment, and primarily operations factors (see second block in Fig MI5c). These risk initiating events/actions/characteristics resulted in company operational risks (financial, operations and strategic risk) followed by supply chain risks (demand side dominantly) (see third block in Fig MI5c).

The next section examines the supply chain causal process separately from the overall causal process.

<u>Supply Chain Causal Process</u>

The perceived prevalence of the risk initiating event/action/characteristics, **where at least one element of the causal process involved the supply chain** (Fig MI6), over 50% for three of the four (3/4) companies (METAL 1 – 50% (7/14), METAL 2 – 64% (7/11) and METAL 4 – 71% (12/17)).

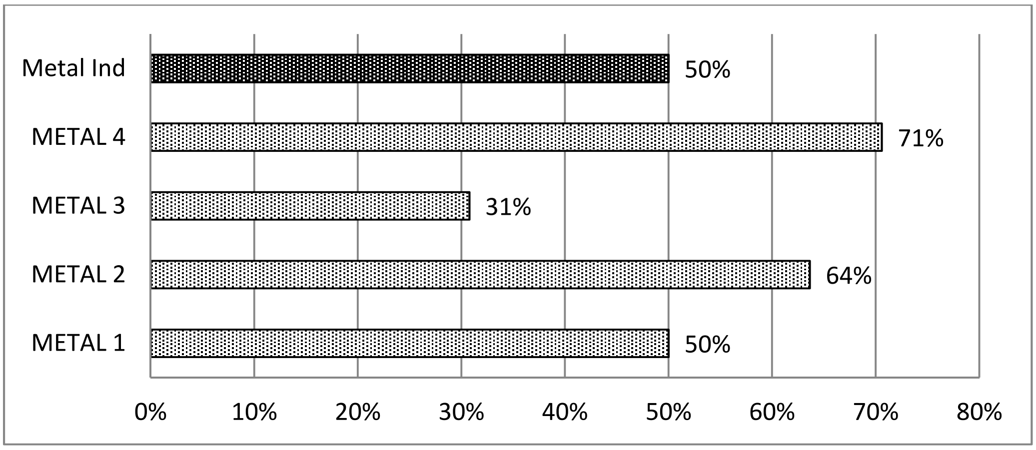


Figure MI6 Percentage Supply Chain related across full causal process - Metal Industry (Appendix 7 FM Overall Risk Analysis)

In other words, of the risk initiating events/actions/characteristics identified by the metal industry OMs, ***50% on average involved the supply chain in some way for the metal industry companies*** (Fig MI6). Of these risk initiating event/action/characteristics identified that were supply chain related across the full causal process (METAL 1 = 7, METAL 2 = 7, METAL 3 = 8 and METAL 4 =

12), only three in total or 9% involved the Supply Chain across all elements of the causal process, shown in MI7a below.

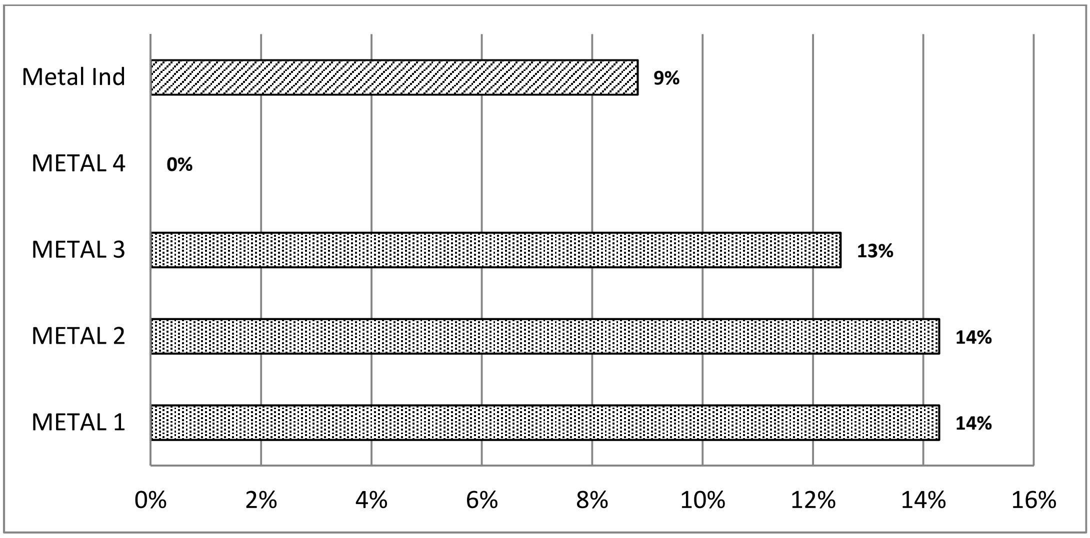


Figure MI7a Number that involved the Supply Chain across all elements of the causal process as a % of number identified Supply Chain related across full causal process - Metal Industry (Appendix 7 FM SC Risk Analysis)

The majority, of all the risk initiating events/actions/characteristics identified by the metal industry OMs, (86% (6/7) for METAL 1, 100% (7/7) for METAL 2, 62.5% (5/8) for METAL 3 and 50% (6/12) for METAL 4) or ***71 % overall*** (Fig MI7b) resulted or may result in supply chain risks

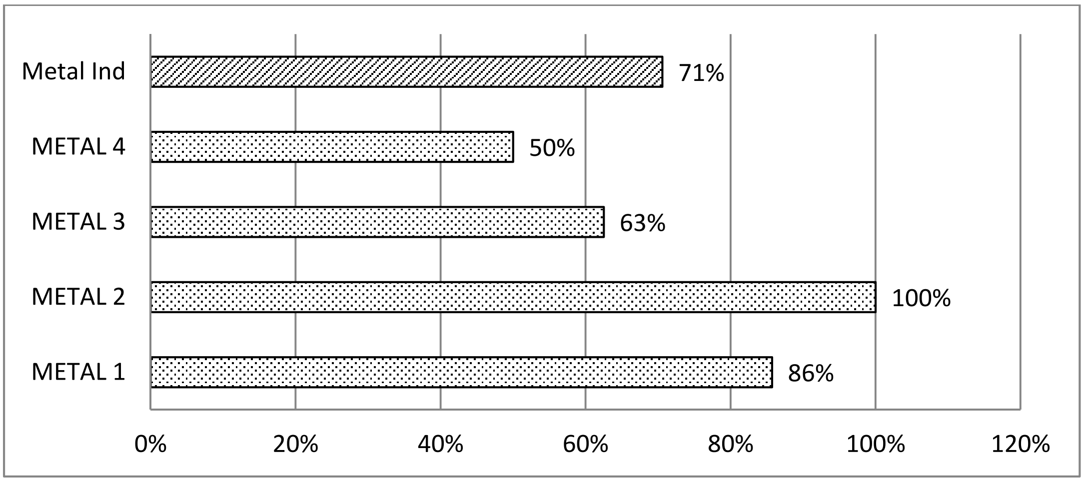


Figure MI7b Supply Chain resultant risks - % of Supply Chain related across full causal process - Metal Industry (Appendix 7 FM SC Risk Analysis)

These resultant supply chain risks were predominantly on the demand side (METAL 1 – 4, METAL 2 – 4, METAL 3 – 5 and METAL 4 – 5 = 18) or ***75% overall*** for the metal industry (Fig MI8) with some on the supply sides (METAL 1 – 2, METAL 2 – 3, METAL 3 – 0 and METAL 4 – 1 = 6).

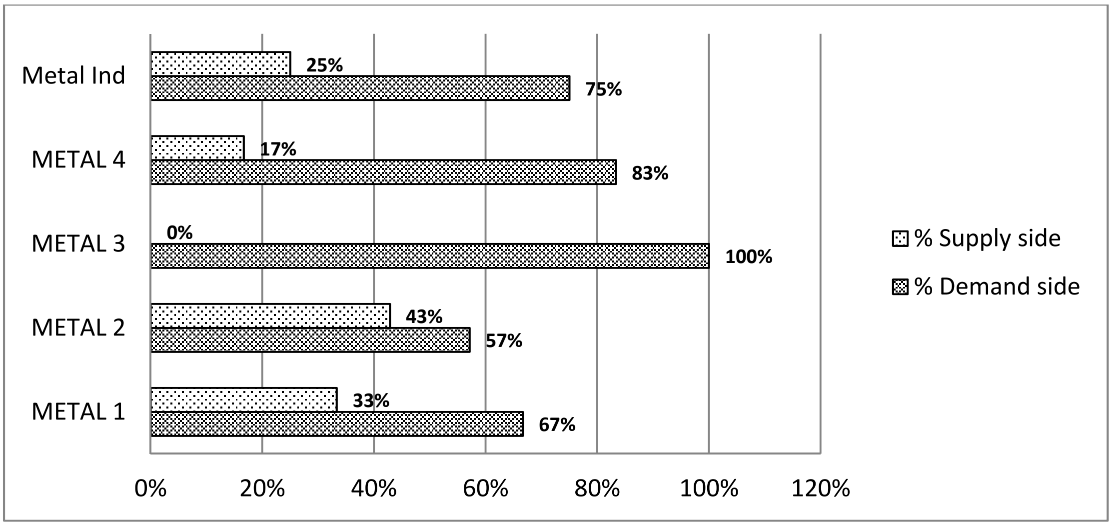


Figure MI8 Supply Chain resultant risks - % Demand side vs % Supply side - Metal Industry (Appendix 7 FM SC Risk Analysis)

The demand-side resultant risks, extracted from the M1-2 and M3-4 cross case analyses (Appendix 7 M1-2 and Appendix 7 M3-4) included

- the potential loss of major client(s) (demand-side) (METAL 1, METAL 2, METAL 4 (4))
- negative impacts of the strike on clients and the ability to deliver products (demand-side) (METAL 1 and METAL 2)
- uncertainty in demand (demand-side) (METAL 1)
- loss of market share (demand-side) (METAL 2)
- low quality in products (inferred) (demand-side) (METAL 1)
- Orders delayed/delivery deadlines impacted (3) (METAL 3)
- How to get business from big customer (2) (METAL 3 and METAL 4)
- “you don't know what you getting” when customer buyers change (METAL 3)

The supply-side resultant risks extracted from the M1-2 and M3-4 cross case analyses (Appendix 7 M1-2 and Appendix 7 M3-4) included, cannot get steel (supply-side) (METAL 1)

- lead-time uncertainty on supply (supply-side) (METAL 1)
- not having a supplier for key components (supply-side) (METAL 2)
- not getting components on time from a supplier (supply-side) (METAL 2)
- losing a single supplier (supply-side) (METAL 2)
- supply cost uncertainty (METAL 4)

Of these risk initiating events/actions/characteristics that resulted or may result in supply chain risks, between (60% (3/ 5) for METAL 3, 33% (2/ 6) for METAL 1, 29% (2/ 7) for METAL 2 and 17% (1/ 6) for METAL) or less than a fifth of all risk initiating events/actions/characteristics identified by the metal industry OMs (14% (2/14) for METAL1, 18% (2/11) for METAL 2, 12% (3/26) for METAL 3 and 6% (1/17) for METAL 4) were supply chain related. In other words, the minority 33% (8/24) of these risk initiating events/actions/characteristics that resulted or may result in supply chain (demand-side) risks were supply chain related (Fig MI9) or only 12% (8/68) of all risk initiating events/actions/characteristics identified by the furniture industry OMs (Fig MI9).

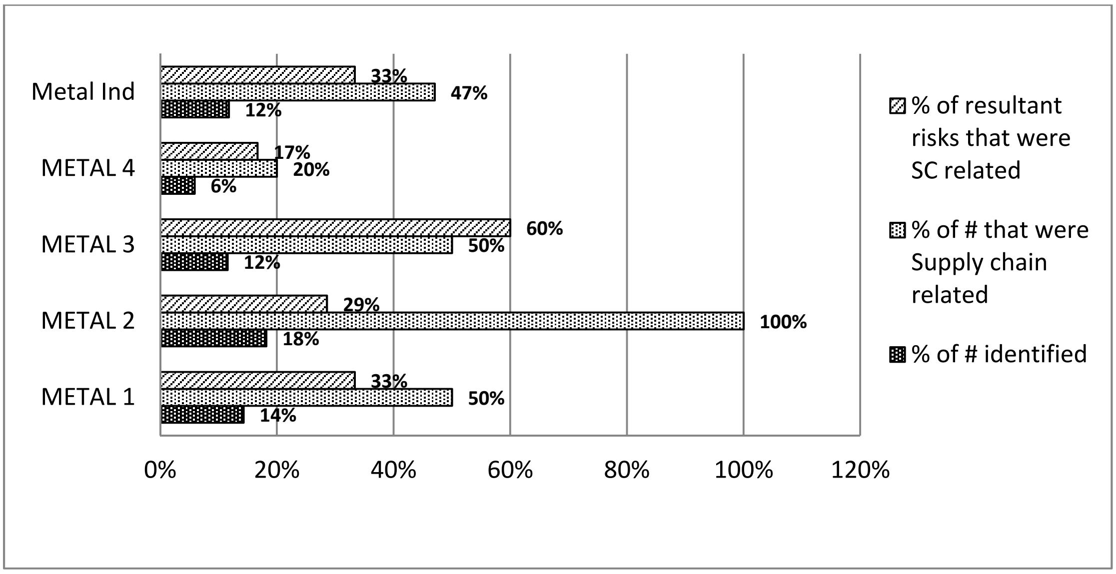


Figure MI9 Risk Initiating events/actions/characteristics that were Supply Chain related that resulted in Supply Chain related risks - Metal Industry (Appendix 7 FM SC Risk Analysis)

Of this minority, these were equally supply and demand side related (and were perceived to have been caused by a variety of factors) (Fig MI10), extracted from the M1-2 and M3-4 cross case analyses (Appendix 7 M1-2 and Appendix 7 M3-4),

- No response to tenders submitted to SOE – demand side (METAL 1) (Lack of communication from key customer – SOE - Demand Risk)
- Bad quality from supplier – supply side (METAL 1) (Ineffective QA in company - Operations risk)
- Play the supplier market for lower prices – supply side (METAL 2) (Price competition in market – Competitive)
- Something happens to supplier – supply side (METAL 2) (Single supplier - Supply)
- Big potential customer do not want products – demand side (METAL 3) (Big supplier preferred by Big customer- Competitive risk)
- Buyer changes at Customer C – demand side (METAL 3) (Buyer changes at Customer C - Demand risk)
- unpredictable international environment - demand side (METAL 4) (Political instability in international markets - Political risk)

- Theft of parts – supply side (METAL 3) (Poverty in SA and unemployment - Socio-economic)

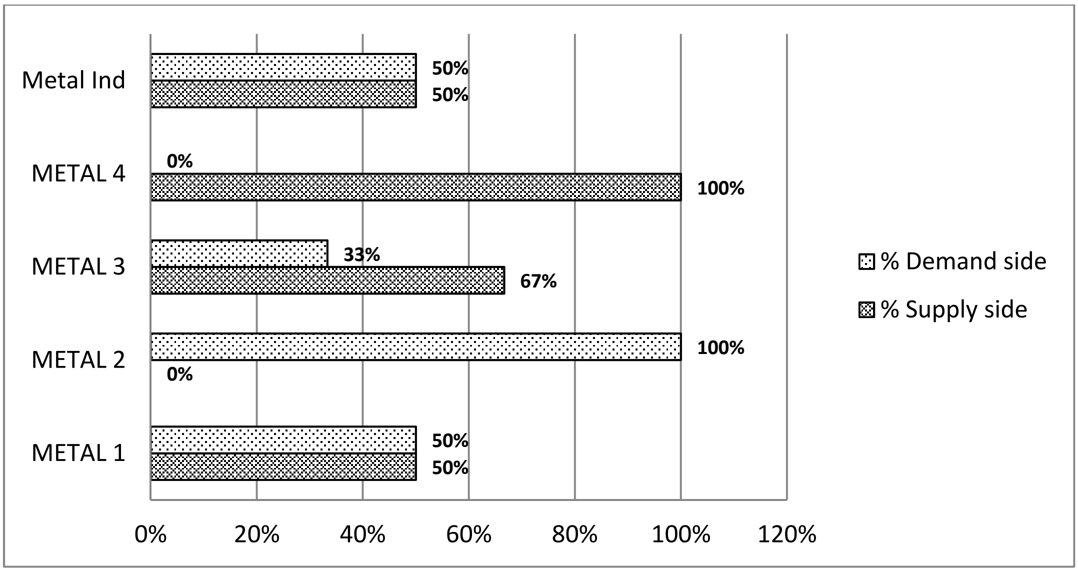


Figure MI10 Risk Initiating events/actions/characteristics that were Supply Chain related that resulted in Supply Chain related risks - % Demand side vs % Supply side - Metal Industry (Appendix 7 FM SC Risk Analysis)

The remaining non-supply chain related (the majority), ***67%*** (67% (4/6) for METAL 1, 71% (5/7) for METAL 2, 40% (2/5) for METAL 3 and 83% (5/6) for METAL 4) ***of all risk initiating events/actions/characteristics identified by the metal industry OMs*** (Fig MI11 below) that resulted or may result in supply chain risks included a variety of risks such as competitive and operations risk which were common to both METAL 1 and METAL 2, and financial risk most frequent for METAL 4.

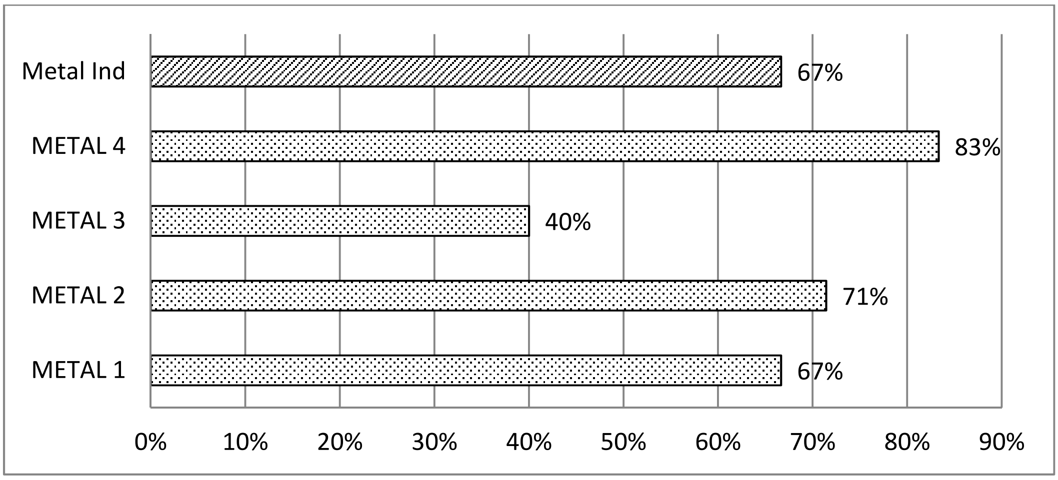


Figure MI11 Number of Non-SC related risk Initiating events/actions/characteristics as a % of resultant risks that were SC related - Metal Industry (Appendix 7 FM SC Risk Analysis)

Supply Chain related causal factors , for the risk initiating event/action/characteristics identified that involved the supply chain is some way across the full causal process (29 % overall) (Fig MI12 below).

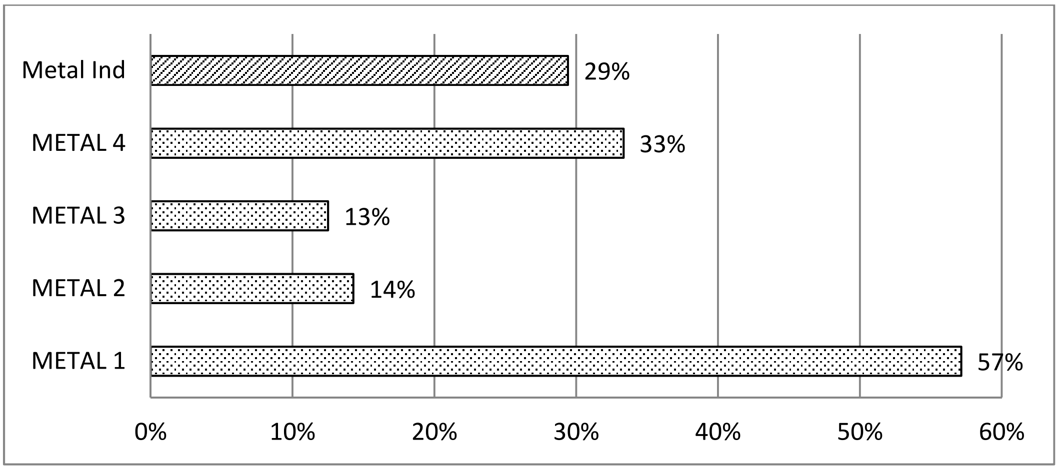


Figure MI12 Number of Supply Chain related causes of the event/action/characteristic - % of Supply Chain related across full causal process - Metal Industry (Appendix 7 FM SC Risk Analysis)

These were primarily demand side related or 80% overall (Fig MI13 below).

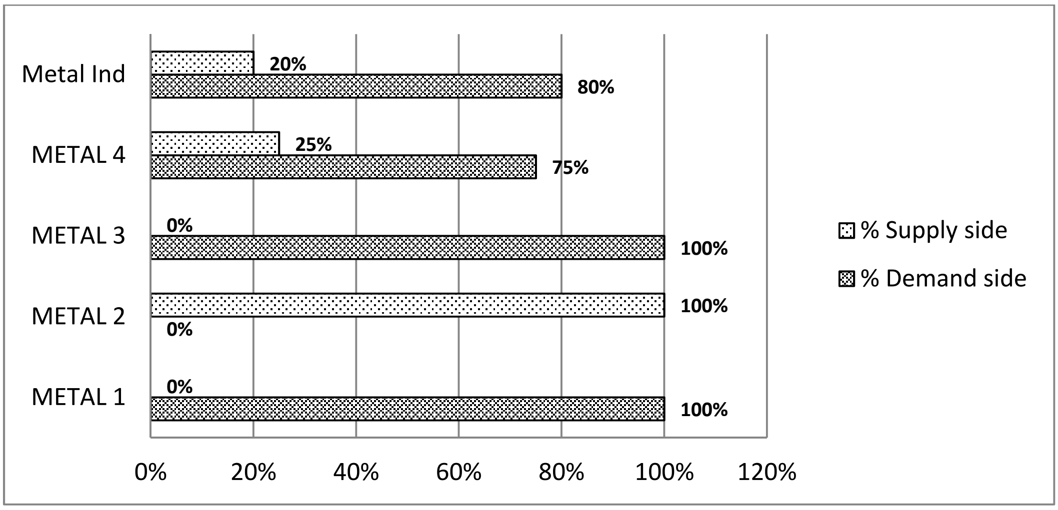


Figure MI13 Supply Chain related causes of the event/action/characteristic - % Demand side vs Supply side - Metal Industry (Appendix 7 FM SC Risk Analysis)

For all metal companies the demand side related causal factors, extracted from the M1-2 and M3-4 cross case analyses (Appendix 7 M1-2 and Appendix 7 M3-4), included,

- Contracts with key customer term ending (METAL 1)
- Lack of communication from key customer – SOE (METAL 1)
- Main customer (SOE) “stalled” (METAL 1)
- SOE customer started implementing a policy of insourcing (METAL 1)
- New buyer appointed by customer (METAL 3)
- Protected industry reliant on local customers – SOEs (METAL 4)
- SOEs take very long to adjudicate a tenders (METAL 4)
- Designs require customer input (METAL 4)

The supply side related causal factors, extracted from the M1-2 and M3-4 cross case analyses (Appendix 7 M1-2 and Appendix 7 M3-4) included,

- having a single supplier (METAL 2)
- raw material pricing due to exchange rates (METAL 4)

50% (Fig MI14a), across all four companies, of the supply chain related causal factors caused supply chain related risk events/actions/ characteristics.

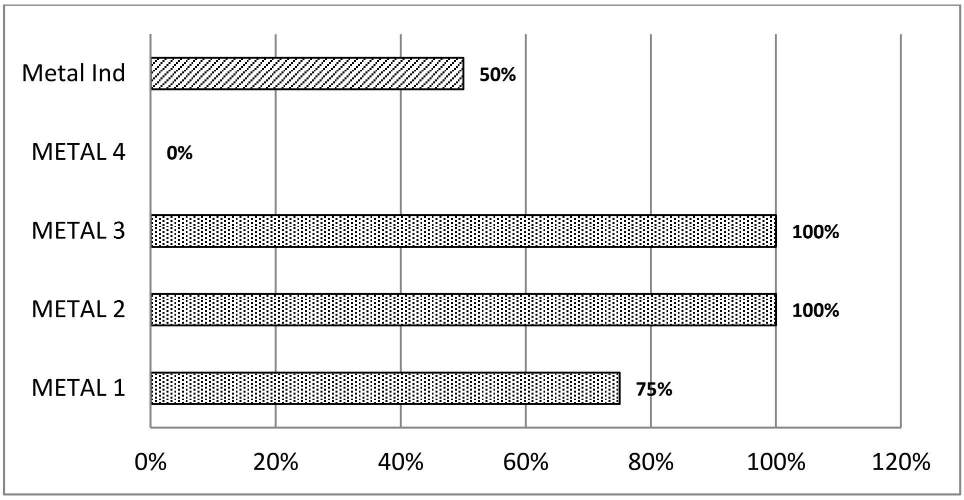


Figure MI14a Supply Chain related causes - % that caused a SC related risk events/actions/ characteristics - Metal Industry (Appendix 7 FM SC Risk Analysis)

Supply chain risks that were common with Tables Mx.8 is the inability to forecast (A), variability in finished goods produced (E) and poor supplier service (late deliveries, quality) (I), and 2 risks in Table M2.8 (C,I) were common for METAL 2 i.e. poor supplier service (late deliveries, quality) (I) and outsourcing certain activities (K). For METAL 3, 3 supply chain risks that were common with Table M3.8 is the inability to forecast (A), raw material price volatility (B), poor supplier service (late deliveries, quality) (I) and 2 risks in Table M4.8 were common for METAL 4 i.e. the inability to forecast (A), raw material price volatility (B).

Assembling all the preceding information, **the supply chain causal process** for the metal industry, using the following format,

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [consequence]

may thus be represented below, where **50% on average** of all risk initiating events /actions/characteristics that would require or initiate a response **involved the supply chain in some way for the metal industry companies,**

Of this 50%, 29 % of the causal factors involved supply chain (Demand side factors primarily)	Of this 50%, 33 % of the risk initiating events /actions/characteristics involved supply chain factors (equal demand and supply side)	Of this 50 %, 71 % of the resultant risks involved supply chain factors (Demand side factors primarily)

Figure MI4b Supply chain causal process - Metal Industry

In summary, the metal industry OMs perceived supply chain related factors to have a relatively low causal influence (see first block of Fig MI14b). Half (50%) overall of the causal factors were perceived to have caused a supply chain related risk initiating event/action/characteristics (Fig MI14b). These were equally split between the supply can the demand side (see second block of Fig MI14b). The biggest impact on the supply chain was in the resultant risks on the demand side (see third block of Fig MI14b.

sRQ3.3 will be addressed next.

sRQ3.3: What actions (if any) do owner-managers of manufacturing SMEs in South Africa take when a risk is identified? (Risk response/handling)

The scope and nature of risk handling activities was limited by certain constraints which differed across the companies (Fig MI15 below). Three of the OMs (OMM1 - 76%, OMM3 – 54% and OMM4 – 67%) perceived the largest proportion of constraints to be macro-environmental factors (58% overall for the industry) which varied across the companies. In contrast OMM2 believed that company operational factors were the largest proportion of constraints (45%), with 30% of the constraints were ascribed to the macro-environment. Company operational factors were secondary for OMM1 (16%) and OMM3 (38%), while these were not constraints for OMM4.

Supply chain factors were secondary for OMM4 (33%) and were the least proportion for (OMM3 – 8%, OMM2 – 25%). The supply chain factors presented the least constraints overall (17%).

Supply chain related constraints were largely demand side related and included, extracted from the M1-2 and M3-4 cross case analyses (Appendix 7 M1-2 and Appendix 7 M3-4).

- one key customer (supply chain structure – demand side)
- customer buying power and change in customer purchasing personnel (demand side)
- no influence over the State Owned Enterprises (SOEs) (demand side)
- finding good suppliers, having a single supplier and suppliers being on strike (supply side)

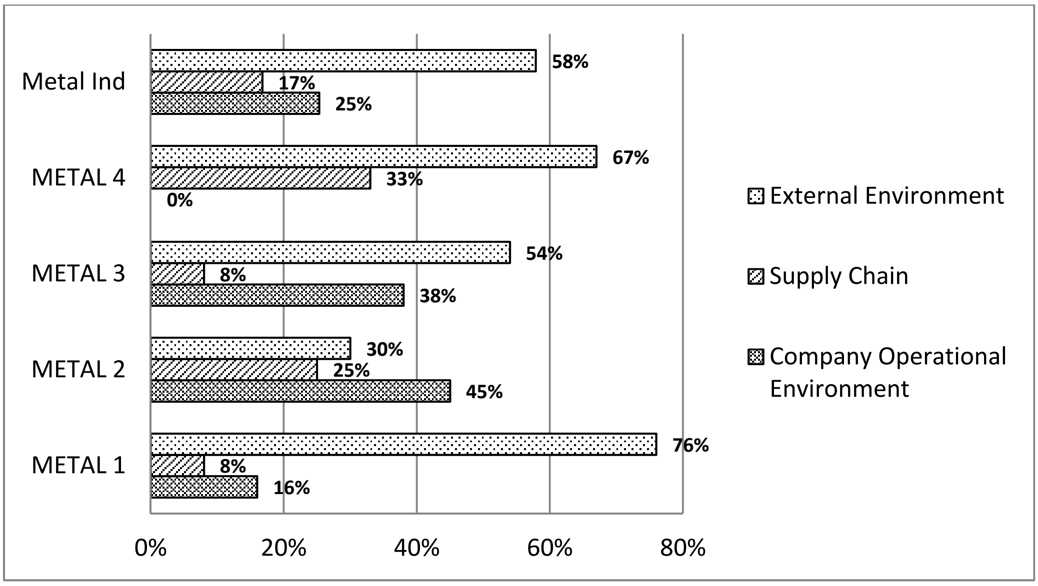


Figure MI15 Constraints - Metal Industry (Appendix 7 FM Constraints)

The risk handling modes differed across the companies (Fig MI16 below). While METAL 1 (47%) and METAL 3 (45%) preferred prevention, METAL 2 did not appear to have a dominant mode of risk handling with an equal concentration on risk acceptance and mitigation and risk prevention and METAL 4 seemed to favour acceptance (61%).
This implied that action (the risk is avoided, prevented or mitigated) is taken in the majority of cases (METAL 1 - 87%, METAL 2-77% and METAL 3 - 77%) when and to the extent possible, by the owner-manager(s), in all events/actions/characteristics identified which may have undesired consequences for the business (the preceding percentages are a sum of the percentages in Fig

FI16 excluding the “Avoid” risk handling mode).. This, however, was not the case for METAL 4 who only took action in the minority of cases (39%).

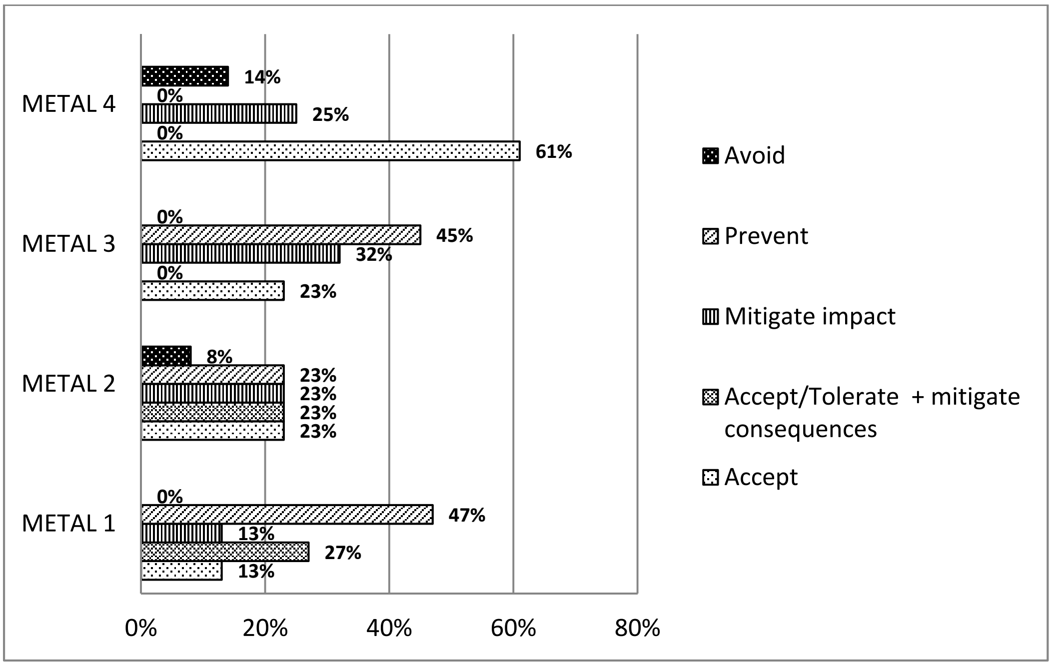


Figure MI16 Risk Handling Modes - Metal Industry (Appendix 7 FM Risk Handling)

Sixty-five (Appendix 7 FM Infer Practices) risk handling practices across all four companies were identified. These largely reflected the daily operating activities and leverage internal resources (people, knowledge, skills and relationships) and were similar across the companies (Fig MI17 below). Taking the necessary actions to meet objectives (METAL 1 - 79%, METAL 2 - 42% METAL 3 - 52%) and seeking alternatives (looking at different solutions) were dominant practices for three of the companies, whereas for METAL 4 this was not the case, where deciding first when to act or not to act was dominant (Fig MI17 below).

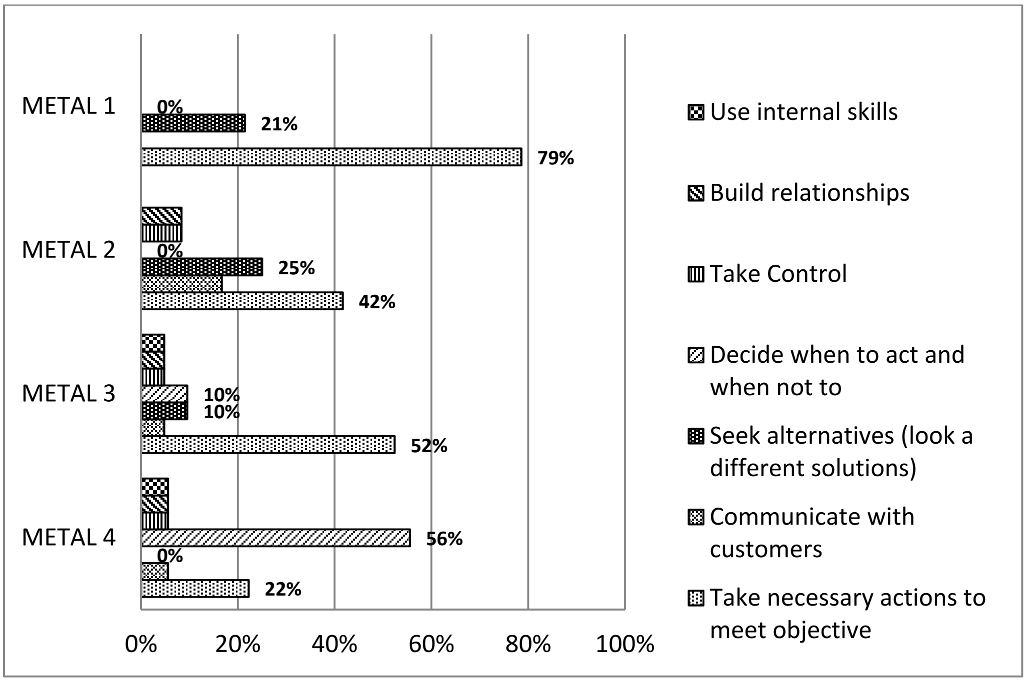


Figure MI17 Inferred Practices Categories - Metal Industry (Appendix 7 FM Infer Practices)

In summary, the scope and nature of risk handling activities was limited by certain constraints. Three of the OMs perceived the largest proportion of constraints to be macro-environmental factors which varied across the companies. Supply chain related constraints were less of a factor and were largely demand side related. The risk handling modes were fairly similar across three of the companies i.e. primarily prevention, while risk handling practices, that largely reflected the daily operating activities that leverage internal resources (people, knowledge, skills and relationships), differed across companies.

Lastly, sRQ4 is considered.

sRQ4: What is the SCRM capability of manufacturing SMEs in South Africa?

The capability (the degree of success i.e. focus on what can be done) to perform a task is reflected in the uncertainty about and the severity of the consequences of the task or activity given the occurrence of the initiating event. The evaluation of capability is thus expressed in the ability to perform a task in such a way as to ensure the most positive outcome as a result of a initiating event, that, unaddressed will result in undesired consequences.

Three of the OMs were assessed as being capable in managing risk in their companies. This is motivated by the analysis below.

In 2 of the 4 cases, of the tasks undertaken to address the event/actions/characteristic, the majority were perceived to have a low uncertainty in the anticipated outcome (Fig MI18 and Fig MI19 below).

- METAL 2 - 73% for all risks and 64% for SC risks
- METAL 3 - 81% for all risks and 100% for SC risks

For METAL 1, the minority (21% for all risks and 33% for SC risks) were perceived to have a low uncertainty in the anticipated outcome, whereas for METAL 4, the majority (67% for all risks and 100% for SC risks) were perceived to have a medium uncertainty in the anticipated outcome

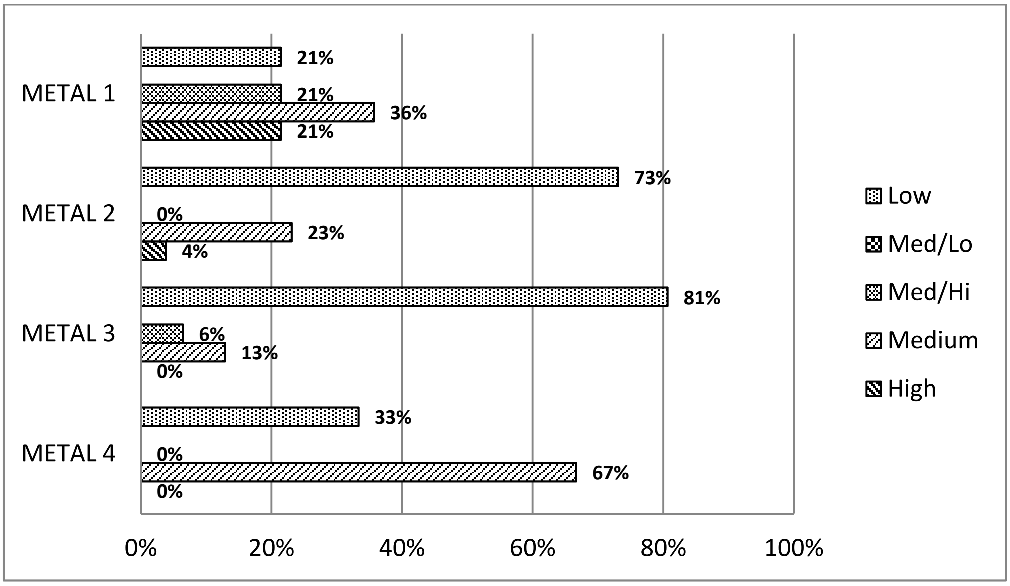


Figure MI18 Uncertainty (Q) in outcome (All risks) - Metal Industry (Appendix 7 FM RM Capability)

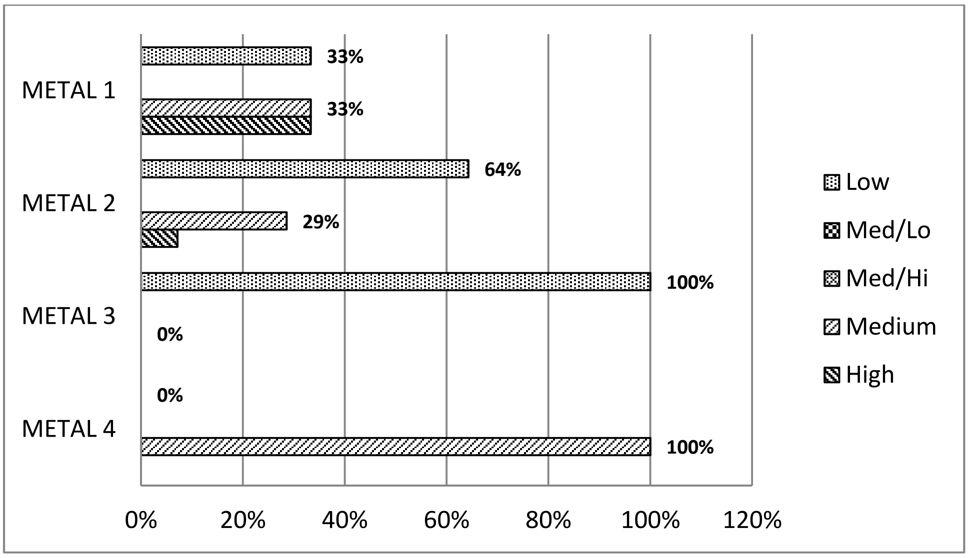


Figure MI19 Uncertainty (Q) in outcome (Supply chain risks) - Metal Industry (Appendix 7 FM RM Capability)

In three of the four cases, most of the tasks performed had positive outcomes (Fig MI20 and Fig MI21 below).

- METAL 1 - 69% for all risks and 100% for SC risks
- METAL 2 - 77% for all risks and 72% for SC risks
- METAL 3 - 74% for all risks and 80% for SC risks

Whereas for METAL 4 for most of the tasks performed no resulting change (61% for all risks and 80% for SC risks)

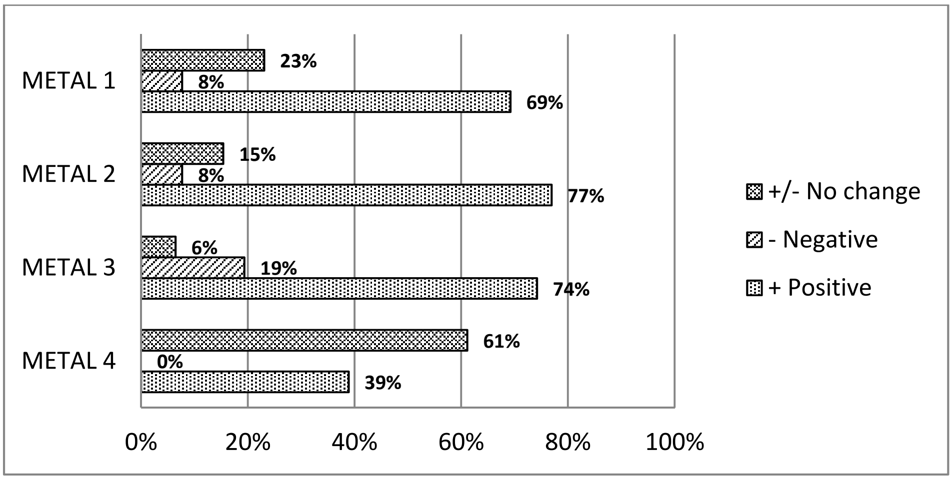


Figure MI20 Impacts of the outcomes (CT) of tasks (T) (All risks) - Metal Industry (Appendix 7 FM RM Capability)

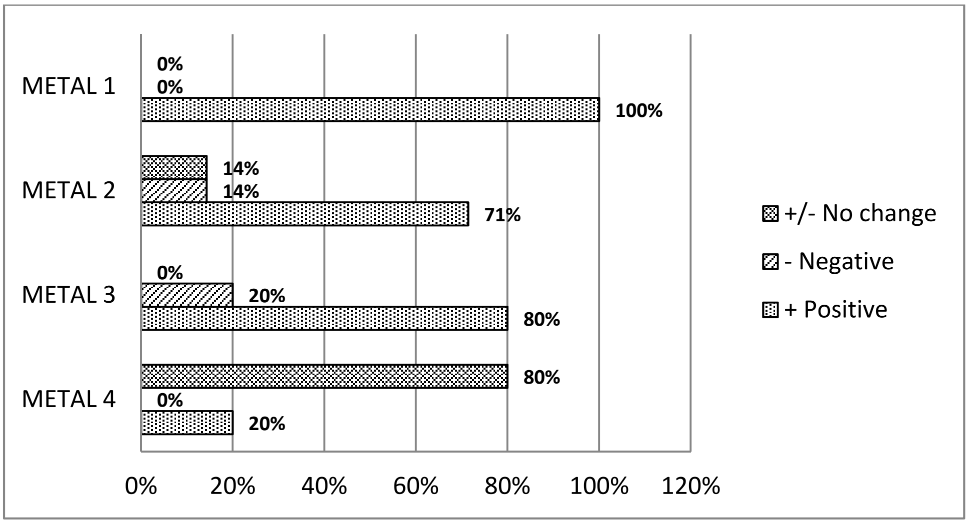


Figure MI21 Impacts of the outcomes (CT) of tasks (T) (Supply chain risks) - Metal Industry (Appendix 7 FM RM Capability)

Risk Management Capability (RMC) and Supply Chain Risk Management Capability (SCRMC) is assessed as follows (based on Table 3.9 Risk Management Capability rating scale in chapter 3):

- Moderate for METAL 1
- Moderate to High for METAL 2
- Moderate to High for METAL 3
- Low for METAL 4

In all cases, risk identification, risk analysis/assessment and risk response/handling are demonstrated (as demonstrated above) and done informally and intuitively

In all cases, there is evidence that (60% - METAL 1 and METAL 3 and at least 60% - METAL 2 and less than 40% - METAL 3) the formal risk management processes are performed informally and intuitively (Table MI1 below).

Table MI1 Assessment of formal risk management processes performed informally and intuitively

Company	METAL 4	METAL 3	METAL 2	METAL 1
Process Element	Evidence			
Risk Management Planning	No	No	Yes	No
Risk Identification	Yes	Yes	Yes	Yes
Risk Analysis	Some evidence	Yes	Yes	Yes
Risk Response/Handling	Some evidence	Yes	Yes	Yes
Risk Monitoring and Control	No	No	Some evidence	No
Proportion of formal processes evident in informal operations	**less than 40%**	**60%**	**more than 60%**	**60%**

In summary, in three cases most of the tasks performed had positive outcomes. Risk identification, risk analysis/assessment and risk response/handling are done informally and intuitively. There is some evidence that the formal risk management processes are performed informally and intuitively. Risk Management Capability (RMC) and Supply Chain Risk Management Capability (SCRMC) is rated as between low and high.

The next chapter presents the across-industry analysis and results.

CHAPTER 8

ACROSS INDUSTRY ANALYSIS AND RESULTS

This chapter presents the across-industry analyses and results. A comparative cross-case analysis is done which is the culmination of the analyses (see Fig 7.1) for the Furniture Industry (FURN 1, FURN 2, FURN 3 and FURN 4) and the Metal Industry (METAL 1, METAL 2, METAL 3 and METAL 4) based on the within industry analyses in sections 7.1 and 7.2. This chapter follows the same format as the single case and cross-case analyses done in the preceding chapters where the research questions (RQs) are addressed sequentially.

sRQ1 is addressed first as follows.

sRQ1: How do manufacturing SME owner-managers in South Africa perceive risk in their businesses and in particular in their Supply Chains?

The information analysed to answer sRQ1 is derived from the survey responses of the owner-managers (OMs)

75% (6/8) of the OMs were unfamiliar with the term SCRM. Two of the OMs had heard of SCRM, namely, OMM1 (medium) and OMM3 (small), both in the metal industry. Thus, SCRM is not a familiar term among the OMs (mainly in the furniture industry).

75% (6/8) of the OMs have tertiary level qualifications. Two of the OMs, namely, OMF2 (medium) and OMF3 (small), both in the furniture industry, do not.

75% (6/8) of the OMs have some work experience in a large company before deciding to work in/own their current businesses. The exceptions are OMF1 (medium) and OMF3 (small), both in the furniture industry, who have worked in their family business only.

All OMs have more than 10 years' experience is small business management and are over the age of 45 years.

Therefore, most of the OMs (all of metal industry) have tertiary qualifications, have had working experience in large companies and have more than 10 years of small business experience.

Four or 50% of the OMs considered themselves to be risk-takers (OMM1 - medium, OMM2 - medium, OMM3 - small, OMF2 - medium), two (2) consider themselves to be cautious risk-takers (OMF3 and OMF 4 – both very small) and two (2) do not believe they are risk-takers (OMM4 - small, OMF1 -medium).

Hence, the metal industry OMs seem to have a higher risk propensity than the furniture industry OMs, and the medium sized company OMs seem to have a higher risk propensity than the smaller sized company OMs.

There were four different definitions of risk between the eight OMs i.e. there was no consistency across industry or company size:

OMM1 and OMF4 - “As UNCERTAINTY, about an event/potential loss/a decision” (two OMs)

OMM2 and OMM4 - “As LOSS, of profit/sales/income/customers/suppliers” (two OMs)

OMM3, OMF2 and OMF3 - “As VARIABILITY, in profit/sales/supply/demand” (three OMs)

OMF1 - “As a DISRUPTION in business continuity” (one OM)

75% (6/8) of the OMs do not believe they have formal risk management systems (all furniture companies, OMM1 and OMM3, and equally split across company size).

Three of the OMs are “not sure” (OMF1, OMF3, OMF4) and three do not believe (OMF2, OMM1 and OMM3) that risk in their businesses is well-managed (all furniture companies, OMM1 and OMM3 and equally split across company size).

OMM2 and OMM4 (both metal industry, medium and small sized) believe that risk in their businesses is well-managed through various formal systems, namely, SHEQ, ISO9001, ISO14001.

OMF4, OMF2, OMM2 and OMM4 believe they have the resources to manage risk. OMM1 does believe they have the resources to manage the controllable risk "but not the risk arising out of the broader socio-economic environment". OMM3 and OMF1 are not sure and OMF3 does not believe they have the resources to manage risk.

So, while most of the OMs do not have a formal risk management system and do not believe that risk in their businesses is well-managed (mainly furniture industry), more than half believe they have the internal resources to manage risk. *This is important to note because when the practices are examined, it appears that OMs rely on these resources in a variety of ways to manage risk.*

The Metal Industry OMs rated most of the risks as low overall (43%) (Fig MI1), while the Furniture industry OMs rated the risk impacting the business as predominantly medium (54%) (Fig FI1)

The medium sized company OMs rated more of the risks as medium overall (43%) (Fig FM1 below) while the small sized company OMs rated the risk impacting the business as predominantly low (36%) or medium (32%) (Fig FM1 below).

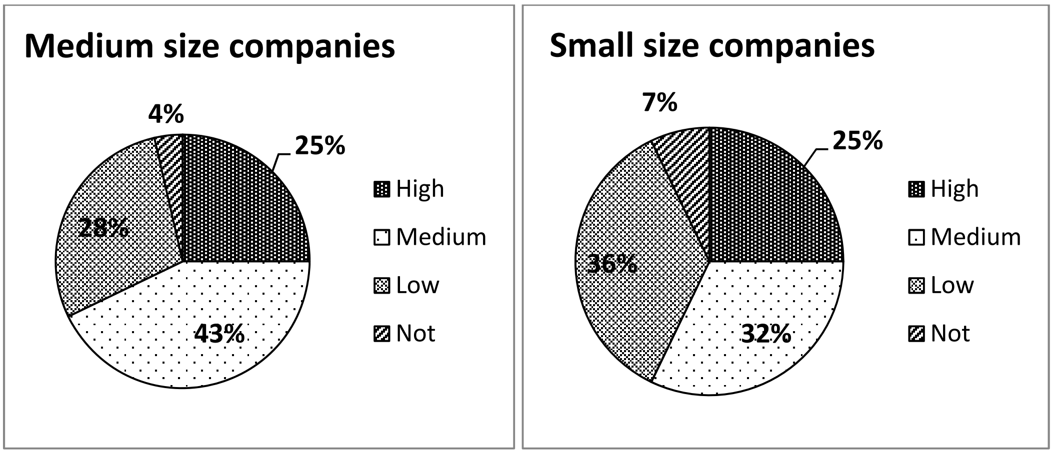


Figure FM1 OMs rating of risk to the business - Medium sized and Small sized companies (Appendix 7 FM Risk to the business)

Overall, risk to the business were rated as mostly medium, closely followed by low and then high in impact (Fig FM2).

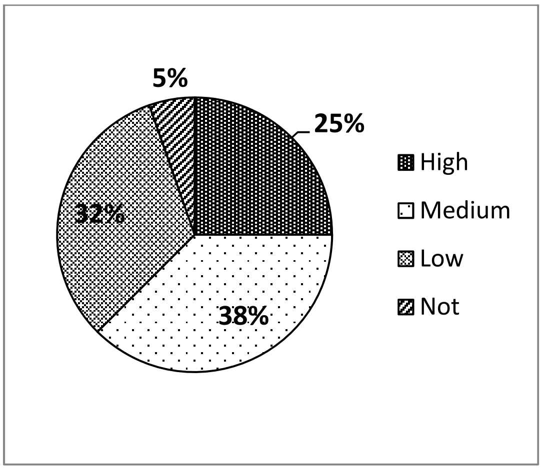


Figure FM2 OMs rating of risk to the business – Overall (Appendix 7 FM Risk to the business)

External risks had the highest impact overall, with Operations, Financial and Legislative risks having largely medium impact, while HR/staffing and Setting of organizational objectives were generally rated as low impact, and governance risk as medium/low impact (Fig FM3).

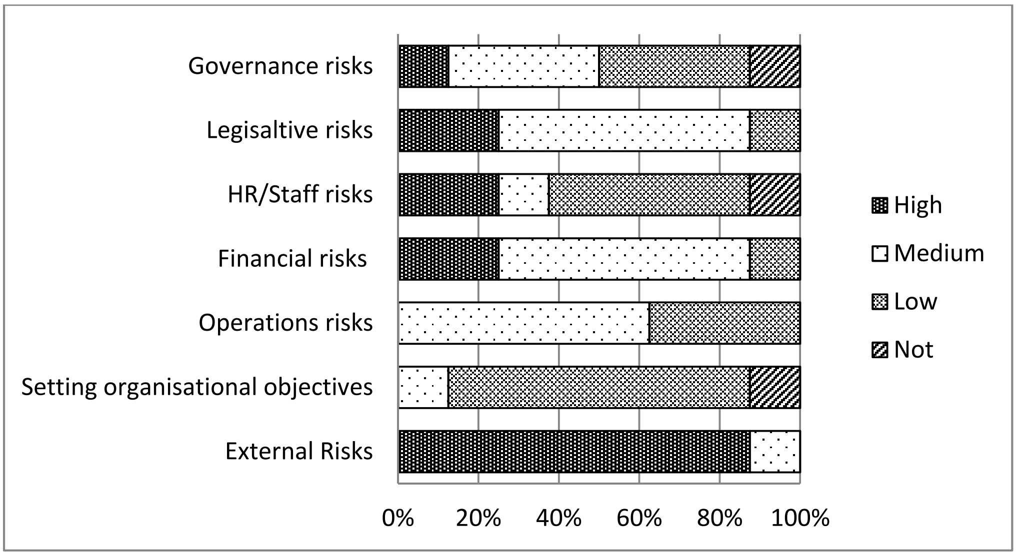


Figure FM3 OMs rating of individual risks to the business (Appendix 7 FM Risk to the business)

Labour issues and skills shortages featured in five of the eight OM's "most significant risks to the business" responses. These are potentially perceived to be external risks.

Both OMM1 and OMM2 (medium-sized) believe that one of the most serious risks they face is uncertainty around various labour issues. For OMM1 this refers to "…ever-changing are the increasing BEE requirements and hence the uncertainty of work for white owned factories", while for OMM2, "our biggest risk, the labour and then not being able to supply". For OMM3 this is reinforced by his response to "what other serious risks do you face that affect your ability to supply your customers with your product" to which his reponse was, organised labour demands with violence and intimidation and lack of skilled labour (Interview, 2014). Both OMF1 and OMF2 (medium-sized enterprises) considered the finding of good skilled people (HR risk) to be the most significant risk to the business although this varied in detail.

<u>Supply Chain</u>

Overall, the Metal Industry OMs (68%), rated the supply chain risks listed as low (32%) or "Not a risk" (36%) (Fig MI2), while the Furniture Industry OMs overall also rated supply chain risks generally as low (39%), although there was an even split between high/medium (50%) and low/not a risk (50%) (Fig FI2).

The Medium sized company OMs rated more of the listed supply chain risks as medium/low overall (66%) (Fig FM4) while the Small sized company OMs rated the listed supply chain risks as predominantly low (39%) or “Not a risk” (27%) (Fig FM4)

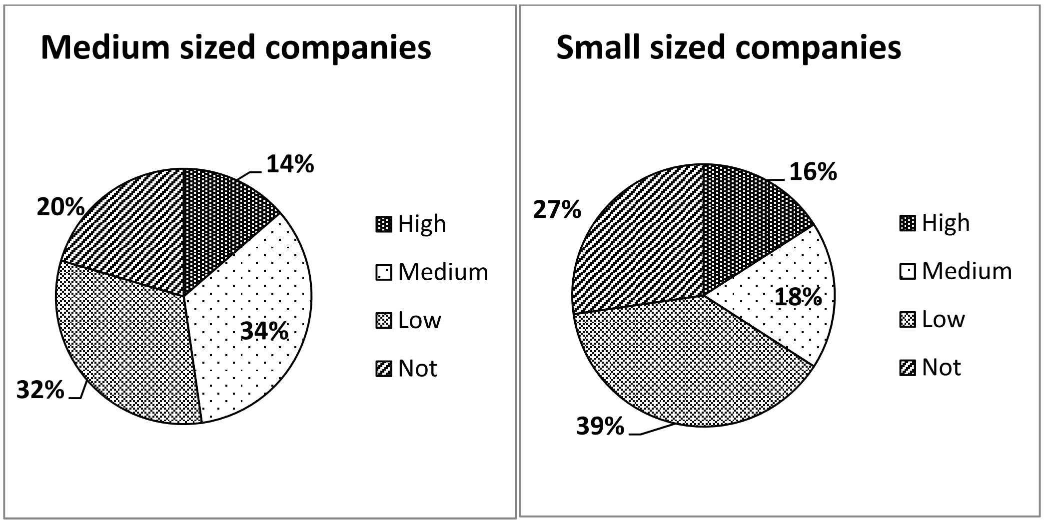


Figure FM4 OMs rating of supply chain risks - Medium sized and Small sized companies (Appendix 7 FM SC Risk)

Overall, supply chain risks were rated as mostly low (35%) or “Not a risk” (24%), closely followed by medium in impact (Fig FM5 below).

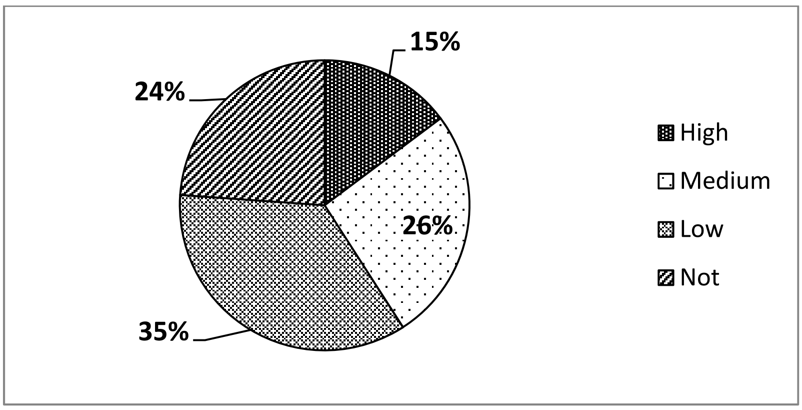


Figure FM5 OMs rating of supply chain risks – Overall (Appendix 7 FM SC Risk)

The “inability to forecast demand” (demand-side) was rated as either high (5/6) or medium (2/2), followed by “Raw material price volatility” (supply-side) as a medium risk (Fig FM6). *This may be attributed to most of the listed risks not being relevant to the OMs.*

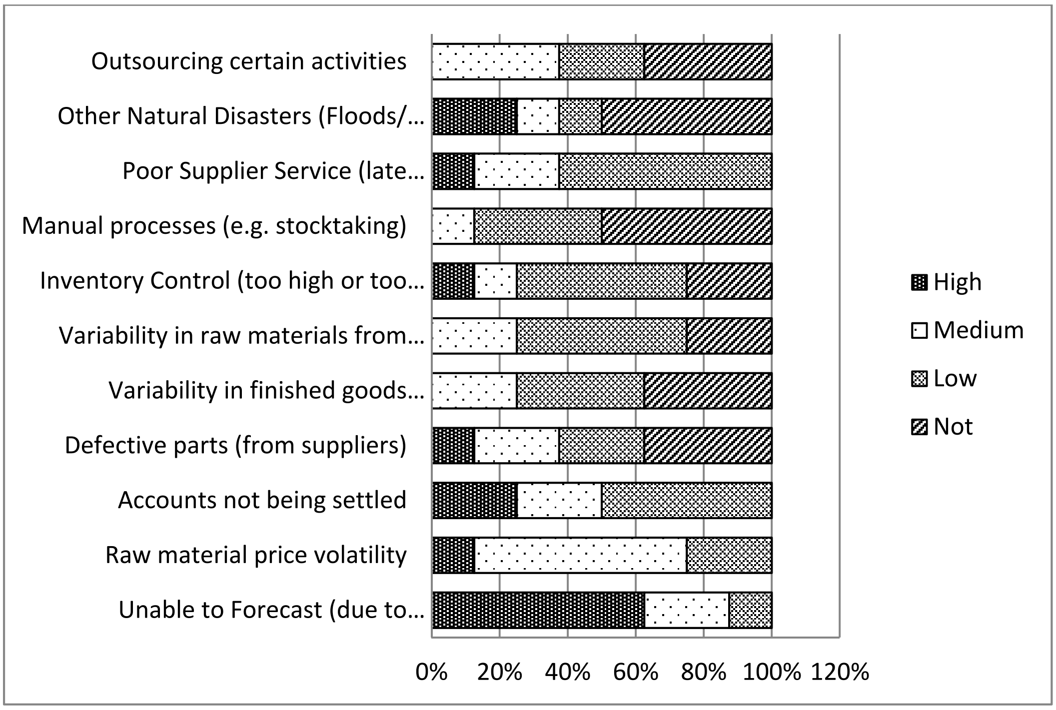


Figure FM6 OMs rating of individual Supply Chain risks (Appendix 7 FM SC Risk)

sRQ2 is considered next.

sRQ2: What is the nature of manufacturing SMEs in South Africa?

METAL 1, METAL 2, FURN 1 and FURN 2 met the criteria for a medium-sized and METAL 3 and METAL 4 met the criteria for small manufacturing companies in South Africa (based on number of employees) and are all more than 20 years old (selection criteria >10 years). FURN 3 and FURN 4 did not fully meet the case selection criteria. Both of these SMEs, classified as very small” companies, were selected for interviews because the response rate for the FBUMA survey was very low and only five companies indicated willingness to participate in follow-up interviews, of which none were small companies. While FURN 3 met the company age criteria (> 10 years old), FURN 4 just missed this by about 18 months.

Seven of the eight businesses (METAL 1, METAL 3, METAL 4, all FURN companies) are considered by the OMs interviewed to be family-owned, although the histories of the ownerships differ.

The percentage ownership by the OMs varies across the companies (Table FM1), with 50% (4/8) fully owned by the OM and 50% (4/8) with 50% or less ownership by the OM.

Table FM1 Ownership characteristics of companies

	Size	Family-Owned	# Owners	OM %	Comments
METAL 1	Medium	Yes	1	100%	
METAL 2	Medium	No	3	<50%	
METAL 3	Small	Yes	1	100%	
METAL 4	Small	Yes	3	<40%	Father's share
FURN 1	Medium	Yes	2	50%	
FURN 2	Medium	Yes	2	<50%	Majority owned by wife
FURN 3	Very small	Yes	1	100%	
FURN 4	Very small	Yes	1	100%	

All the SMEs have flat informal organisational structures.

METAL 2, METAL 3, METAL 4 and FURN 2 have documented organograms. The very small enterprises have more informal organisational structures than the medium-sized companies.

All the companies manufacture specialized/customised products.

All companies own their own machinery. Six of the eight (METAL 1, METAL 3, METAL 4, FURN 1, FURN 2 and FURN 3) own the premises on which they are located, while METAL 2 (Medium) does not own their premises, and this could not be confirmed for FURN 4 (Small). *This high level of asset/equity ownership by the owner-managers, may suggest a low debt/equity ratio or low gearing*.

METAL 1, METAL 2 and METAL 3 have high-tech CNC machining capabilities while METAL 4 still relies on hand operated old machines. This was the opposite for the Furniture companies as three of the four still rely on hand-crafted products with only FURN 2 having high-tech CNC machining capabilities.

All eight companies have survived significant risk events in their recent history.

These encompassed the closing down of METAL 1's foundry; the sale of METAL 2 where the company was about to be closed and was then rescued by the repurchase by OMM2 and his partners; the sudden loss/death of original family management for METAL 3 and the almost annihilation of the export market due to 2008 Financial crisis for METAL 4. For FURN 1 this was down-sizing due to the economic crises of 2008/9 and for FURN 2 it was internal purchasing fraud. For FURN 3 this was down-sizing and re-invention and for FURN 4 it was leaving the franchise and going "on Own". *This may be an indication of resilience.*

The supply chains of all companies have simple two-tier structures. There is greater OM visibility into the first tiers and much less into the 2nd tiers, especially for the very small companies. The two medium-sized furniture industry companies were primarily tier 2 suppliers in the larger supply chains as they did not deal directly with the client buying their furniture. The other six companies were tier 1 suppliers in their larger supply chains. The two very small companies, dealt directly with the client or individual customer, while the four metal industry companies dealt with various people in the large organisations that they supplied into.

sRQ3.1 is addressed next.

sRQ3.1: How do owner-managers of manufacturing SMEs in South Africa assess risk in their Supply Chains? (Risk identification)

The following was assessed to be similar across all SMEs. Environmental scanning, by the OM, of the related industry and the South African business environment is evident in all companies but is limited to the immediate environment for the very small companies. This scanning includes a thorough, detailed and in-depth knowledge and understanding of the company's operations, the immediate supply chain i.e. 1st tier and its employees. The OMs use similar mechanisms for information gathering involving talking to people, contacts and their networks in the industry. Some OMs use the media, television, newspaper and the radio to stay abreast of relevant developments in their industry and the country.

All OMs identify risk initiating events/actions/characteristics that may result in risks that impact the company as well as the causes (or triggers) of these risk initiating events/actions/characteristics. This is done informally and on an on-going daily basis i.e. as part of business-as-usual. Supply chain risks are identified within the ambit of the overall environmental scanning, and are not perceived separately from the rest of the company. This is evidenced in the risk analyses done for each company based on the OM interviews.

sRQ3.2 is addressed next.

sRQ3.2: What do owner-managers of manufacturing SMEs in South Africa consider to be the most prevalent risks in their Supply Chains? (Risk assessment)

Across all companies, each owner-manager identified between 11 and 26 risk initiating events/actions/characteristics that would require or initiate a response. This is an average 16 per company with 68 in the metal industry and 62 in the furniture industry and 130 overall (Fig FM7 below).

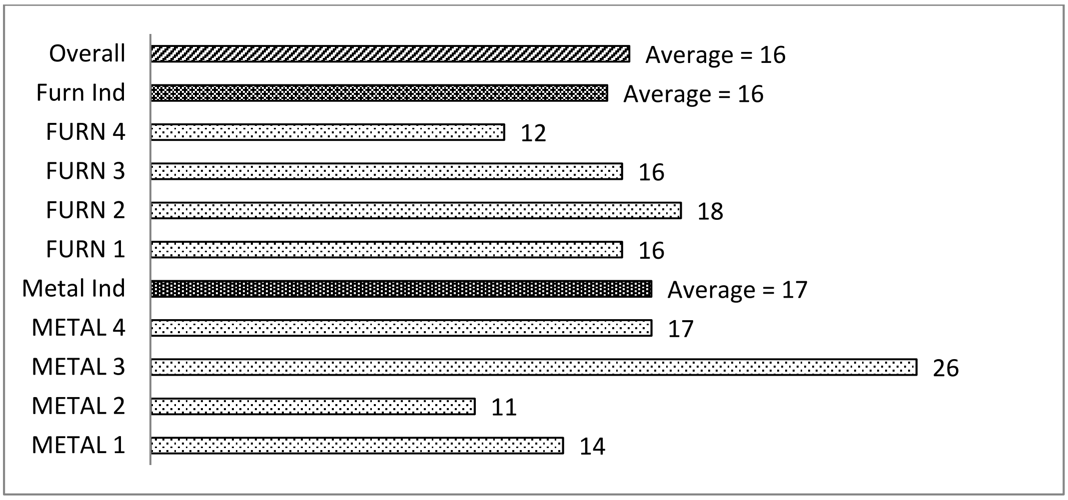


Figure FM7 Number of risk initiating events/actions/characteristics identified (Appendix 7 FM Overall Risk Analysis)

The full causal process (cause - event/action/characteristics – consequence) is now analysed across all eight companies to identify the dominant risk category within each element of the process.

<u>Overall Causal Process</u>

These risk initiating events/actions/characteristics for 7 of the 8 companies (except METAL 1) were primarily related to the company operational environment related risks or 53% on average (Fig FM8 below). *This may be expected as the focus of the OM would be largely on the internal environment of the company.*

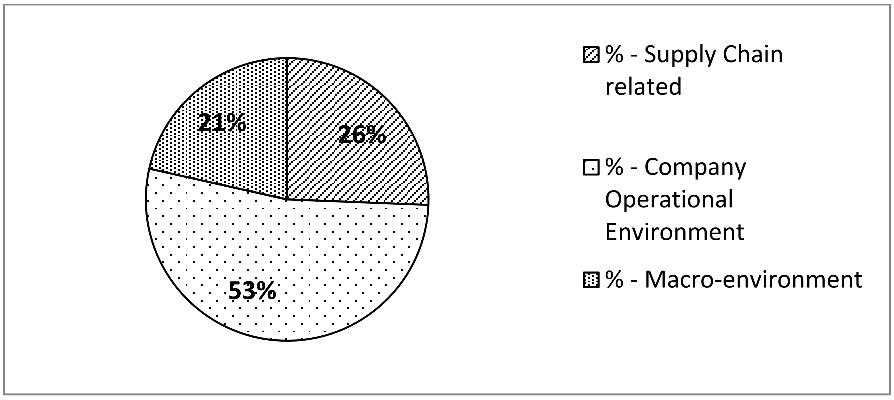


Figure FM8 Risk Initiating events/actions/characteristics – Overall (Appendix 7 FM Overall Risk Analysis)

For the furniture industry companies, financial risk was common to all and for the metal industry companies, operations risk was common to all (refer to within industry analyses). For the 7 of the 8 companies (except METAL 2), supply chain related risk initiating events/actions/characteristics were secondary (Fig FM9).

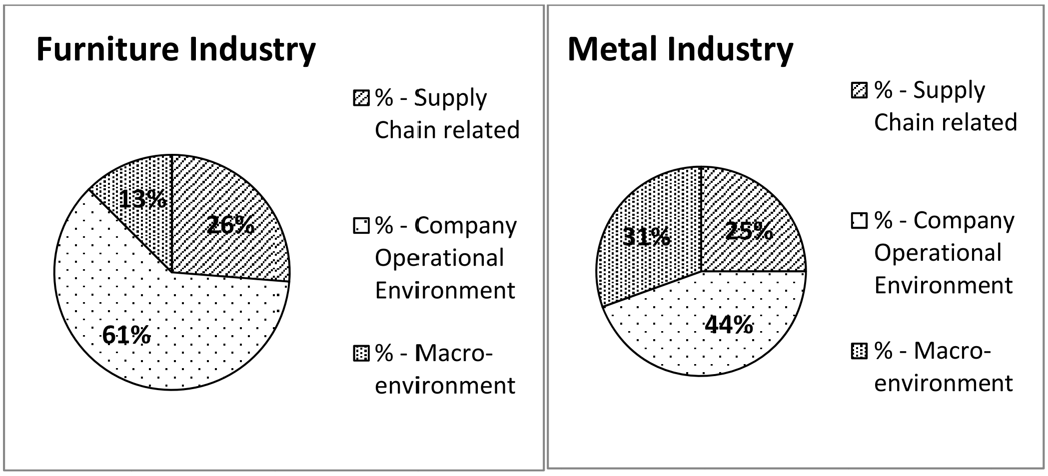


Figure FM9 Risk Initiating events/actions/characteristics – Furniture vs Metal Industries (Appendix 7 FM Overall Risk Analysis)

These were predominantly on the supply side for the furniture industry companies and were predominantly demand side for the metal industry companies (Fig FM10 below).

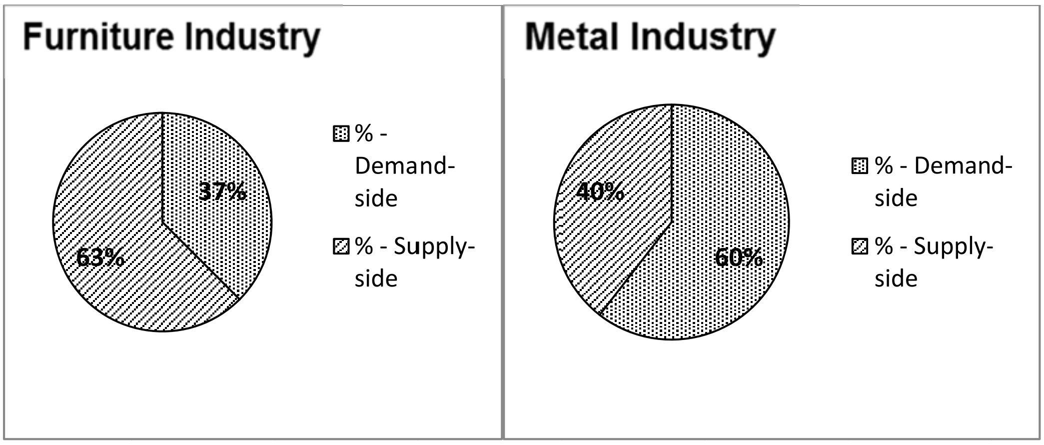


Figure FM10 Risk Initiating events/actions/characteristics (Supply chain related) – Furniture vs Metal Industries (Appendix 7 FM Overall Risk Analysis)

These, supply chain related risk initiating events/actions/characteristics, were evenly split overall (Fig FM11)

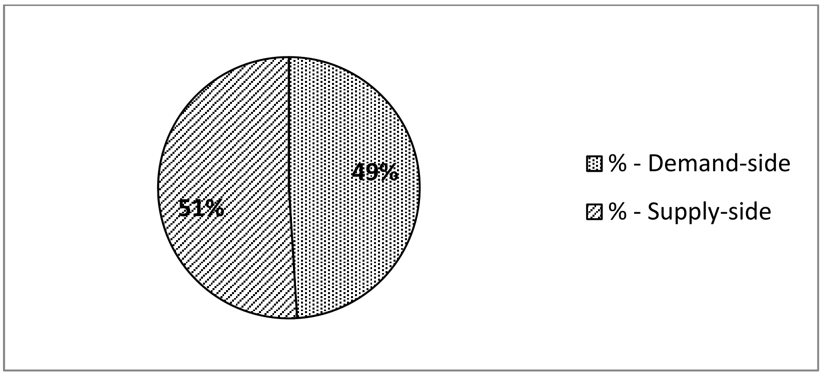


Figure FM11 Risk Initiating events/actions/characteristics (Supply chain related) – Overall (Appendix 7 FM Overall Risk Analysis)

Macro-environmental risk initiating events/actions/characteristics were least prevalent overall, but more significant for the metal industry companies. These macro-environmental risk initiating events/actions/characteristics were related to labour and the general economic-social and political environment (refer to within metal industry analysis, section 7.2). *This may suggest wider environmental scanning by the metal industry OMs coupled with, or because of the labour unrest at the time of the interviews*.

For five of the eight companies these risk initiating events/actions/characteristics may principally result in company operational risk (METAL 1 and the small/very small companies) (Fig FM12 below) of which the most dominant was financial risks,

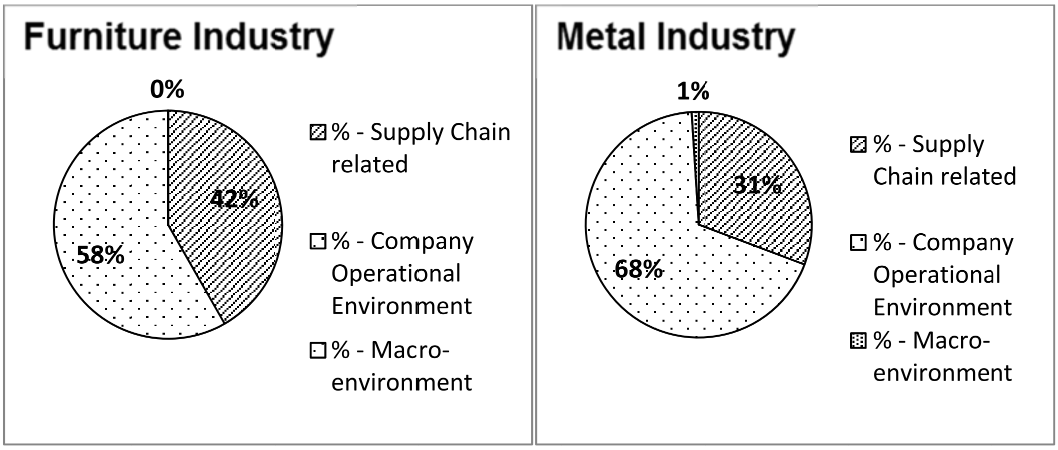


Figure FM12 These events/actions/characteristics may principally result in - Furniture vs Metal Industry (Appendix 7 FM Overall Risk Analysis)

63% overall of risk initiating events/actions/characteristics may principally result in company operational risk (Fig FM13). Common consequences (all companies) in the company operational environment were financial, strategic and operations risks.

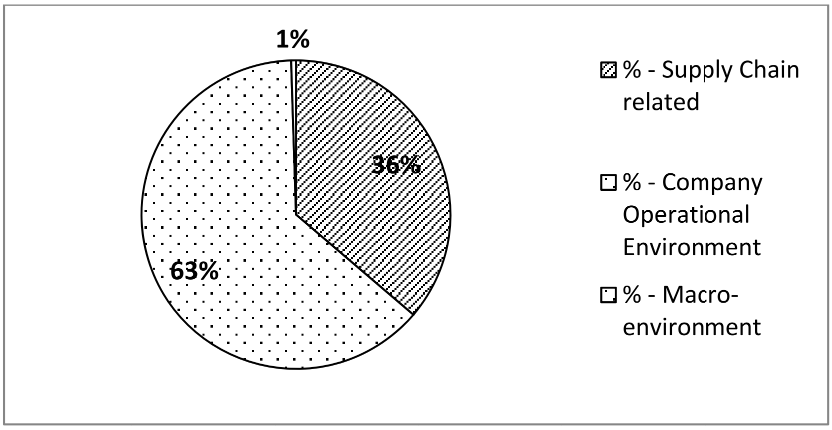


Figure FM13 These events/actions/characteristics may principally result in – Overall (Appendix 7 FM Overall Risk Analysis)

For the remaining three companies (METAL 2, FURN 1 and FURN 2 - all medium sized), the resultant risks were primarily supply chain risks (Fig FM12) focused on the demand side (Fig FM14 below).

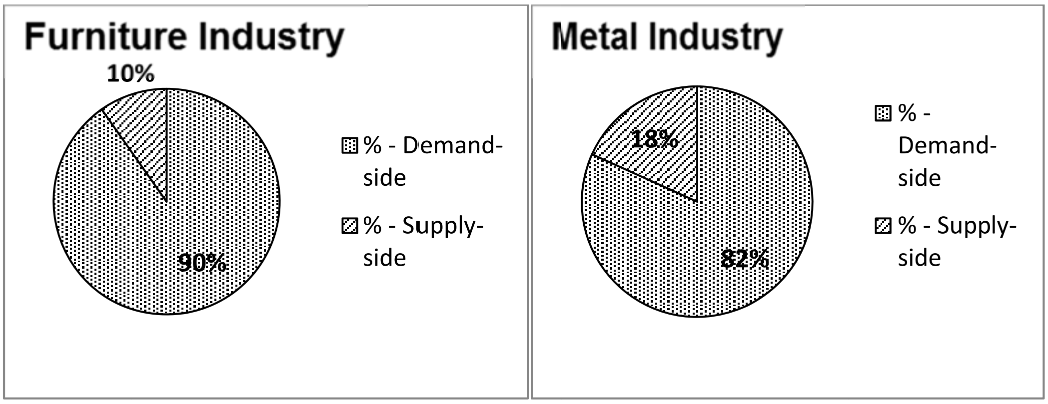


Figure FM14 These events/actions/characteristics may principally result in (Supply Chain related) - Furniture vs Metal Industry (Appendix 7 FM Overall Risk Analysis)

Overall supply chain resultant risks were secondary (36%) (Fig FM12) and mainly focused on the demand side (Fig FM15). Macro-environmental resultant risks were almost negligible in all cases.

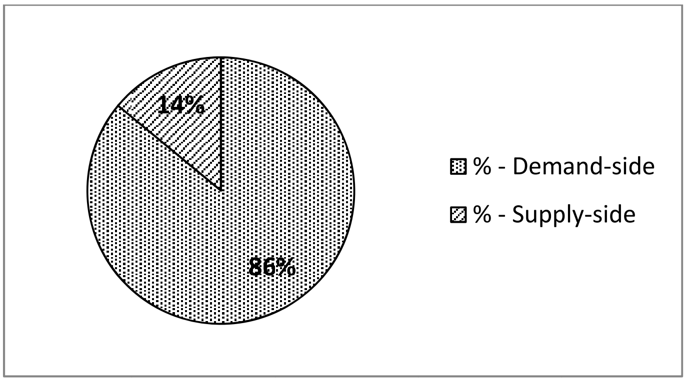


Figure FM15 These events/actions/characteristics may principally result in (Supply Chain related) – Overall (Appendix 7 FM Overall Risk Analysis)

For six of the eight companies significant causes of the risk initiating events/actions/characteristics for all companies were macro-environmental risks (all Metal, FURN 1 and FURN 4), and 51% overall (FM16 below). Economic conditions were common to all.

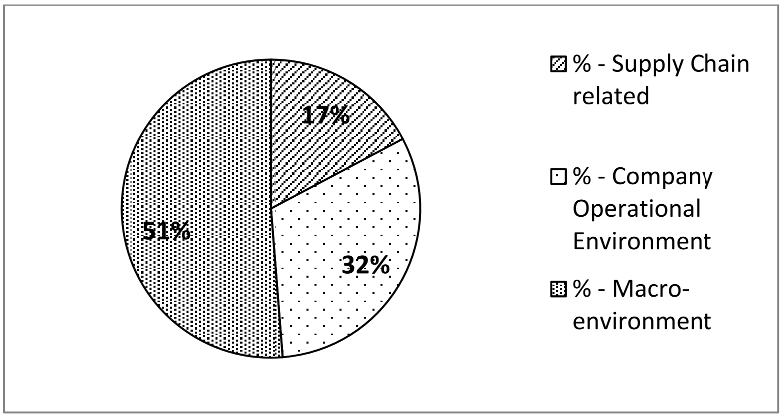
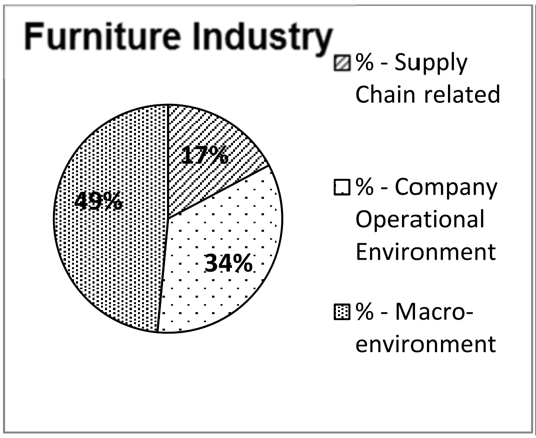


Figure FM16 Causes of the event/action/characteristic – Overall (Appendix 7 FM Overall Risk Analysis)

The company operational environment was the second most prevalent cause of risk initiating events/actions/characteristics overall (Fig FM16).

Supply chain factors were the least prevalent causes overall (Fig MI16 and Fig FM17).



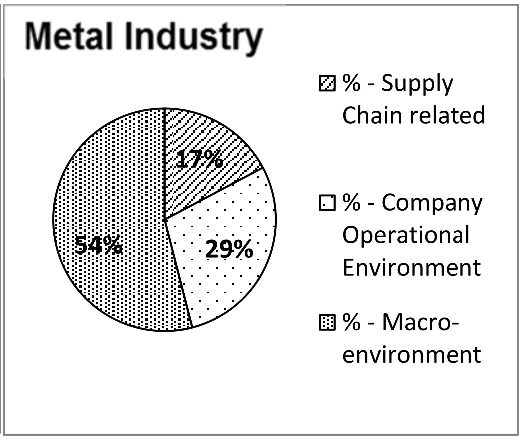


Figure FM17 Causes of the event/action/characteristic – Furniture vs Metal Industry (Appendix 7 FM Overall Risk Analysis)

For the metal industry, these were focused on the demand side, whereas for the furniture industry these were supply side related (Fig FM18 below).

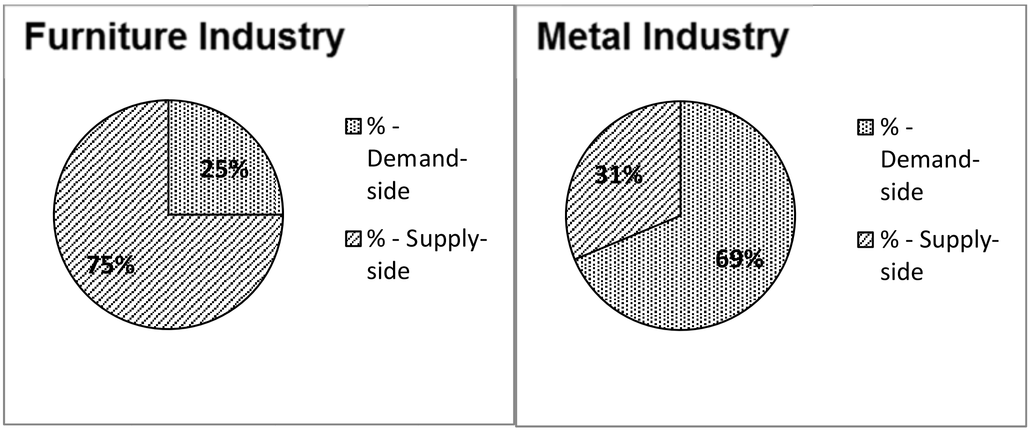


Figure FM18a Causes of the event/action/characteristic (Supply Chain related) – Furniture vs Metal Industry (Appendix 7 FM Overall Risk Analysis)

There was a slight favouring of the demand side overall (Fig 18b)**.**

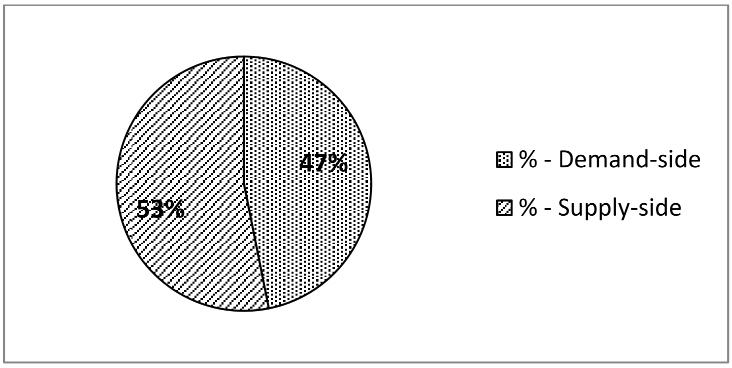


Figure FM18b Causes of the event/action/characteristic (Supply Chain related) – Overall (Appendix 7 FM Overall Risk Analysis)

Assembling all the preceding information, the **full causal process** for the furniture and the metal industries, using the following format,

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [consequence]

may thus be represented below as, where the most highly ranked risk categories are emboldened and the supply chain category in shaded,

Furniture

Macro-environmental factors (49%) Company operational environment (34%) Supply chain factors (Supply side factors primarily – 75%) (17%)	**Company Operational Environment (Financial factors) (61%)** Supply Chain (Supply side factors primarily – 63%) (26%) Macro-environmental factors (nothing specific) (13%)	**Company Operational Environment (Financial and Strategic risk) (58%)** Supply Chain (Demand side risk dominantly – 90%) (42%) Macro-environmental factors (0%)

Metal

Macro-environmental factors (Economic factors) (54%) Company operational environment (29%) Supply chain factors (Demand side factors primarily – 69%) (17%)	**Company Operational Environment (Operations factors) (44%)** Macro-environmental factors (labour and the general economic-social and political environment) (31%) Supply Chain (Demand side factors primarily – 60%) (25%)	**Company Operational Environment (Financial, Strategic and Operations) (68%)** Supply Chain (Demand side risk dominantly – 82%) (31%) Macro-environmental factors (0%)

Figure FM19 Full causal process – Furniture vs Metal Industry

In summary, both industries considered macro-environmental factors to be the most prevalent cause of risk initiating event/action/characteristics, while supply chain factors were considered to be the least prevalent cause (First blocks of Fig FM19). While both industries rated the company operational environment to be the most dominant of risk initiating event/action/characteristics, the supply chain was rated differently, namely, more important for the furniture industry (Second blocks of Fig FM19). Both industries rated the risks in the company operational environment to be the primary result of risk initiating event/action/characteristics, with the supply chain as secondary (Third blocks of Fig FM19).

The next section examines the supply chain causal process separately from the overall causal process.

<u>Supply Chain Causal Process</u>

The perceived prevalence of the risk initiating event/action/characteristics, where at **least one element of the causal process involved the supply chain,** was more than half for six of the eight companies (all medium sized companies, METAL 4 and FURN 4) or (50% on average for the metal industry and 63% on average for the furniture industry) (Fig FM20 below). In other words, of all the risk initiating events/actions/characteristics identified by the OMs, 56% on average involved the supply chain in some way for the furniture industry companies (Fig FM20).

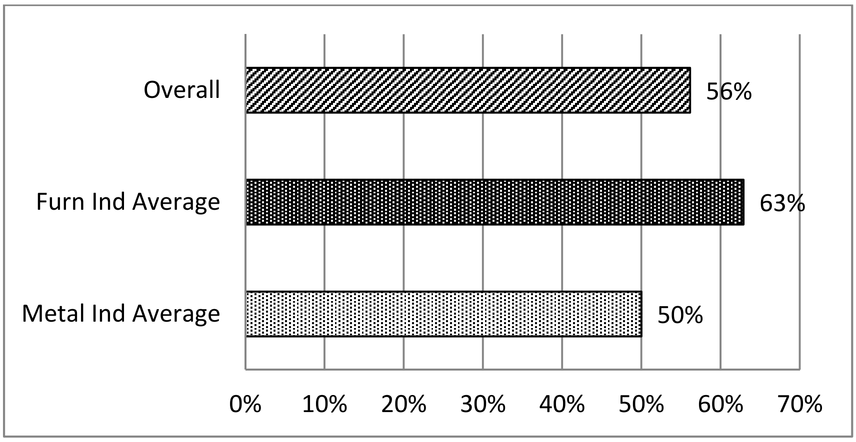


Figure FM20 Percentage Supply Chain related across full causal process – Overall (Appendix 7 FM Overall Risk Analysis)

Of these risk initiating event/action/characteristics identified that were supply chain related across the full causal process (73 in total or 73/130 = 56% of all identified risk initiating event/action/characteristics), only five out of seventy-three in total or 7% involved the Supply Chain across all elements of the causal process (Fig FM21)

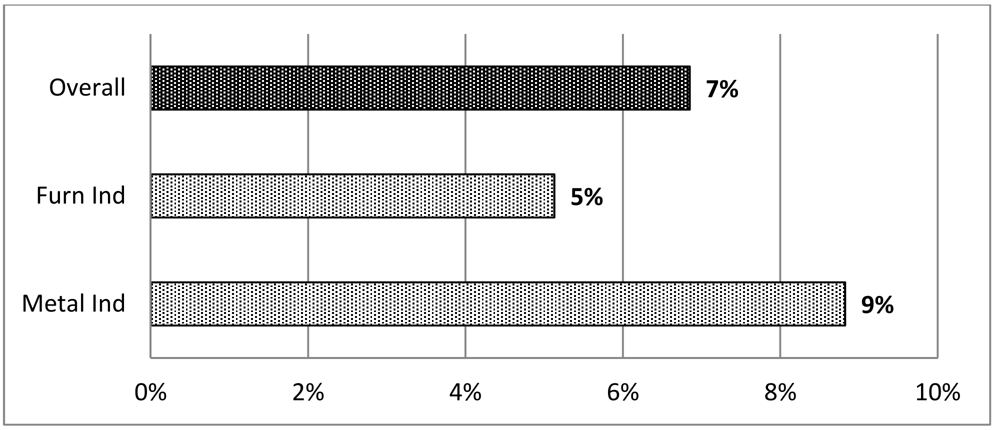


Figure FM21 Number that involved the Supply Chain across all elements of the causal process as a % of number identified Supply Chain related across full causal process – Overall (Appendix 7 FM SC Risk Analysis)

The majority of all the risk initiating events/actions/characteristics identified by the OMs, 78% overall, and 85% and 71% for the furniture and metal industries respectively) (Fig FM22 below) resulted or may result in supply chain risks.

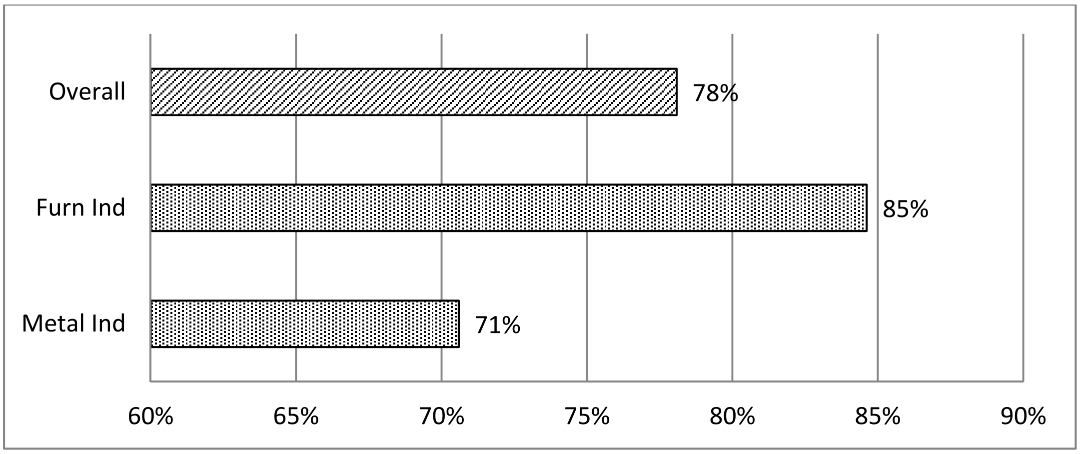


Figure FM22 Supply Chain resultant risks - % of Supply Chain related across full causal process – Overall (Appendix 7 FM SC Risk Analysis)

These resultant supply chain risks were predominantly on the demand side (82% overall, and 88% and 75% for the furniture and metal industries respectively) with about 20% overall on the supply side (Fig FM23 below)

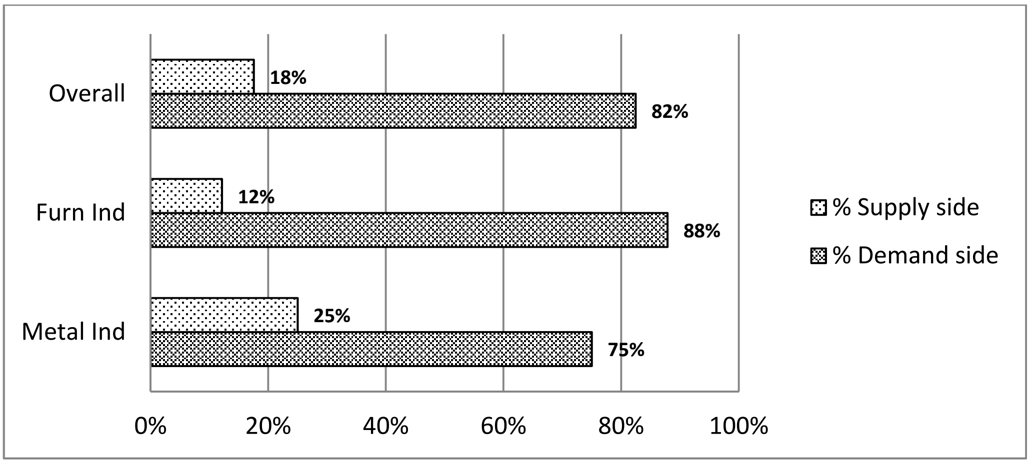


Figure FM23 Supply Chain resultant risks - % Demand side vs % Supply side –Overall (Appendix 7 FM SC Risk Analysis)

The demand side related resultant risks are given and categorised in Table FM2 below. The categories are emergent themes from the overall cross-case analyses.

Table FM2 Supply chain related resultant risks (demand side)

Demand side	Category
the potential loss of major client(s) (METAL 1, METAL 2, METAL 4 (4))	Loss of customers
negative impacts of the strike on clients and the ability to deliver products (METAL 1 and METAL 2)	Customer service reduced
uncertainty in demand (METAL 1)	Demand uncertainty
loss of market share (METAL 2)	Loss of customers
low quality in products (inferred) (METAL 1)	Customer service reduced
orders delayed/delivery deadlines impacted (3) (METAL 3)	Customer service reduced
how to get business from big customer (2) (METAL 3 and METAL 4)	Demand uncertainty
"you don't know what you getting" when customer buyers change (METAL 3)	Demand uncertainty
loss of customers/sales - the loss of potential or existing customers (FURN 1, FURN 2, FURN 4)	Loss of customers
lack of demand - the reduction in demand (FURN 1, FURN 2, FURN 3)	Demand uncertainty
inability to produce for clients and deliver to clients (FURN 3)	Customer service reduced

Thus, demand side resultant risks may generally be categorised as (i) demand uncertainty, (ii) loss of customers, and (iii) reduced customer service.

Similarly, the supply side related resultant risks are given and categorised in Table FM3 below.

Table FM3 Supply chain related resultant risks (supply side)

Supply side	Category
cannot get steel (METAL 1)	Raw material unavailability
lead-time uncertainty on supply (METAL 1)	Poor Supplier Service (late deliveries, quality)
not having a supplier for key components (METAL 2)	No supplier
not getting components on time from a supplier (METAL 2)	Poor Supplier Service (late deliveries, quality)
losing a single supplier (METAL 2)	Loss of supplier
supply cost uncertainty (METAL 4)	Raw material price volatility
the inability to get sufficient raw materials/components (FURN 4)	Poor Supplier Service (late deliveries, quality)
left with one supplier (FURN 4)	Single supplier
cannot pay supplier (FURN 2)	Supplier relationships
admin to vet suppliers (FURN 2)	Supplier relationships

Hence, the supply side resultant risks may be categorised as (i) raw material unavailability, (ii) poor Supplier Service (late deliveries, quality), (iii) supplier availability, and (iv) supplier relationships

Of these risk initiating events/actions/characteristics that resulted or may result in supply chain risks, between a third, the minority, (33% overall and for each industry) or less than a fifth (15% overall and 18% and 12% for the furniture and metal industries respectively) of all risk initiating events/actions/characteristics identified by the OMs were supply chain related (Fig FM24). 58% overall (with more in the Furniture industry, 69%) of these risk initiating events/actions/characteristics that resulted in supply chain risks were supply chain related (Fig FM24).

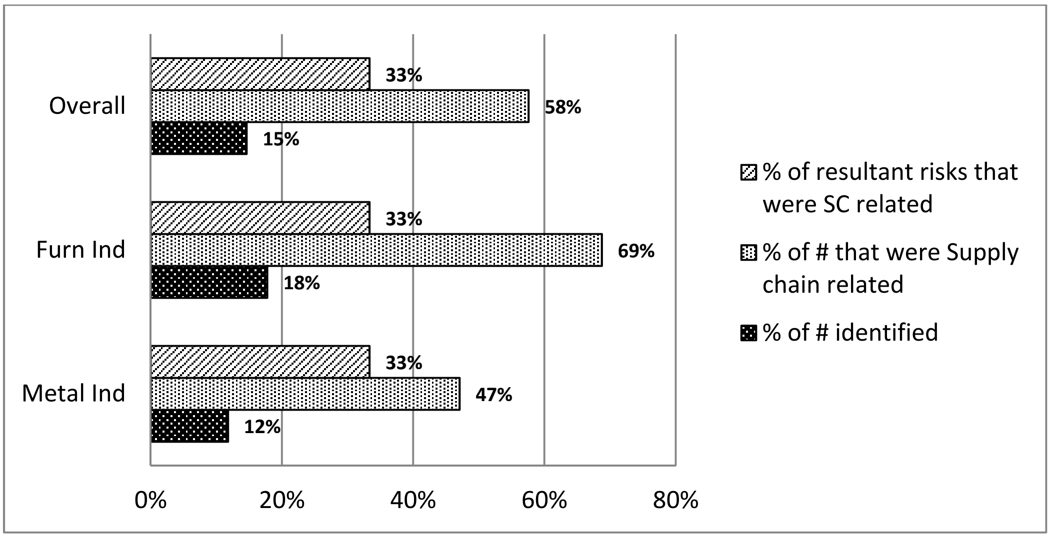


Figure FM24 Risk Initiating events/actions/characteristics that were Supply Chain related that resulted in Supply Chain related risks – Overall (Appendix 7 FM SC Risk Analysis)

Of this minority, however, the majority, 68% (Fig FM25, below) were supply-side related (and were perceived to have been caused by a variety of factors), largely influenced by the furniture industry where more than 80% were supply-side related.

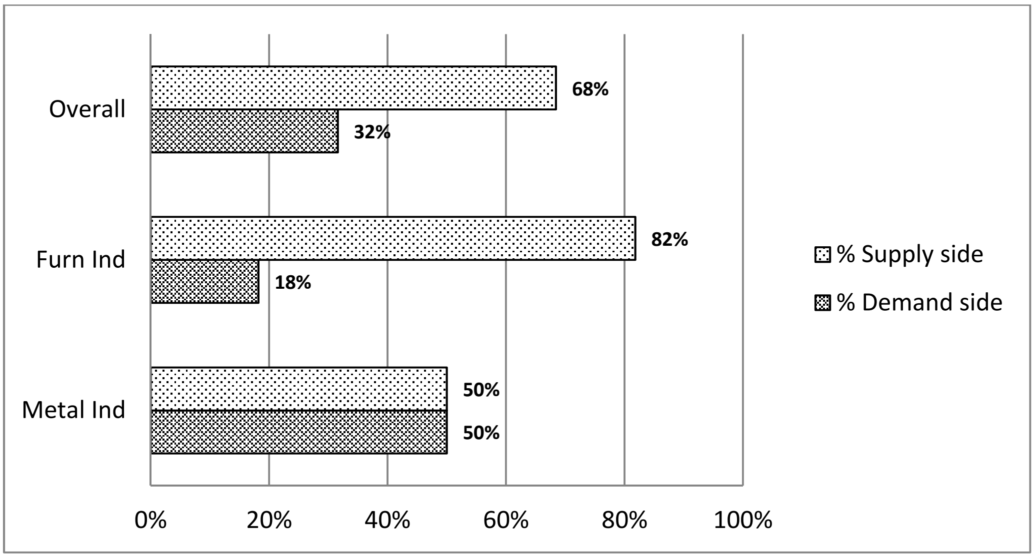


Figure FM25 Risk Initiating events/actions/characteristics that were Supply Chain related that resulted in Supply Chain related risks - % Demand side vs % Supply side – Overall (Appendix 7 FM SC Risk Analysis)

These supply chain related risk initiating event/action/characteristics included (and were perceived to have been caused by a variety of factors). The demand side supply chain related risk initiating event/action/characteristics are listed in Table FM4 below. The same (Table FM2 above) demand side resultant risk categories emerge, namely, (i) demand uncertainty, (ii) loss of customers, (iii) reduced customer service, with the additional category of, (iv) supply chain structure.

Table FM4 Supply chain related risk initiating event/action/characteristic (demand side)

Demand side (Risk initiating event/action/characteristic)	Category	Causal factor
Long term contracts from key customer ending soon (METAL 1)	Loss of customers	nature of the contract
No response to tenders submitted to SOE (METAL 1)	Demand uncertainty	Lack of communication from key customer – SOE
Drop of in demand for products (METAL 1)	Demand uncertainty	Main customer (SOE) "stalled"
Cannot sell to mines > limit potential customers (Inferred)(METAL 3)	Demand uncertainty	BEE legislative requirements
Big potential customer do not want METAL 3 products (METAL 3)	Loss of customers	Big supplier preferred by Big customer
Buyer changes at Customer C (METAL 3)	Demand uncertainty	new buyer appointed by customer
High reliance on one customer (METAL 3)	Demand uncertainty	Limited market opportunities
Significant reduction in exports and international market (METAL 4)	Loss of customers	Financial Crisis in 2008
Unpredictable international market (METAL 4)	Demand uncertainty	Political instability in international markets
No business or work coming in (METAL 4)	Demand uncertainty	Economic climate in SA
Industry stagnated > not buying (METAL 4)	Demand uncertainty	Platinum industry strike
Do not speak to client at design stage (METAL 4)	Customer service reduced	Designs require customer input
Lack of number of points-of-sale/outlets (x2) (FURN 1)	SC structure	External: economic factors

The supply side supply chain related risk initiating event/action/characteristics are listed in Table FM5 below. Similar (Table FM 3) supply side resultant risk categories emerge (i) raw material unavailability, (ii) poor Supplier Service (late deliveries, quality), (iii) supplier availability, and (iv) supplier relationships

Table FM5 Supply chain related risk initiating event/action/characteristic (supply side)

Supply side (Risk intiating event/action/charateristic)	Category	Causal Factor
Bad quality from supplier (METAL 1)	Poor Supplier Service (late deliveries, quality)	Ineffective QA in company
Playing the supplier market for lower prices (METAL 2)	Raw material price volatility	price competition in market
Something happens to supplier (METAL 2)	Loss of supplier	Single supplier
High value of parts + fluctuations in material prices (METAL 3)	Raw material price volatility	Exchange rate fluctuations
Theft of parts (METAL 3)	Raw material unavailability	Poverty in SA and unemployment
uncertainty in supply (of getting materials) (x2) (FURN 1)	Raw material unavailability	External: economic and External: environmental factors
a change is supply terms & conditions (FURN 2)	Poor Supplier Service (late deliveries, quality)	supplier power
a single supplier (FURN 2)	Single supplier	new supplier
single suppliers (FURN 4)	Single supplier	regulatory requirements: only one supplier and external: economic factors
uncertainty in delivery of goods (in time) (FURN 2)	Poor Supplier Service (late deliveries, quality)	internal cost reduction strategy of supplier
bad supplier quality (FURN 2)	Poor Supplier Service (late deliveries, quality)	supplier quality
cannot get certain materials (FURN 3)	Raw material unavailability	external: economic factors

The remaining non-supply chain related (the majority), 67% overall (Fig FM26 below), of all risk initiating events/actions/characteristics identified by the OMs that resulted or may result in supply chain risks, included a variety of risks. For FURN 1 and FURN 2, most were within the company operational environment with reputational and competitive risk being most prevalent, while competitive and operations risk which were common to both METAL 1 and METAL 2, and financial risk most frequent for METAL 4.

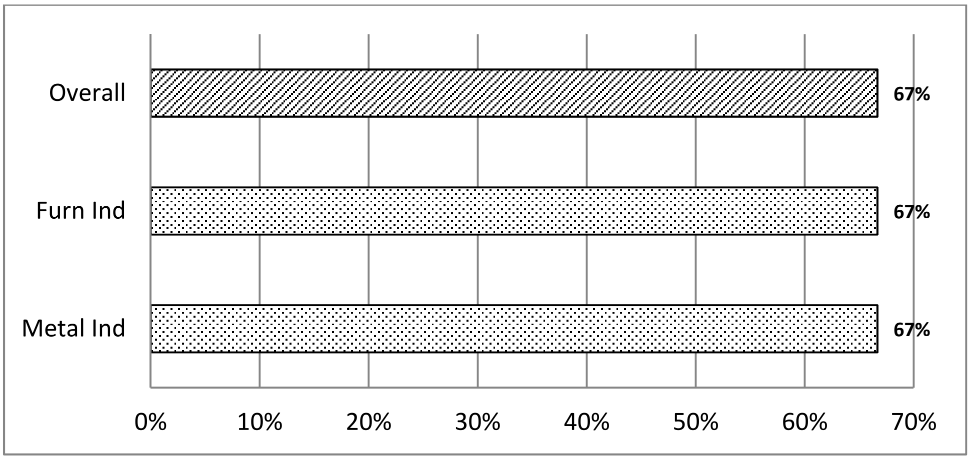


Figure FM26 Number of Non-SC related risk Initiating events/actions/characteristics as a % of resultant risks that were SC related – Overall (Appendix 7 FM SC Risk Analysis)

Supply Chain related causes of risk initiating event/action/characteristics identified by the OMs accounted for 27 % overall of those that involved the supply chain in some way across the full causal process (Fig FM27).

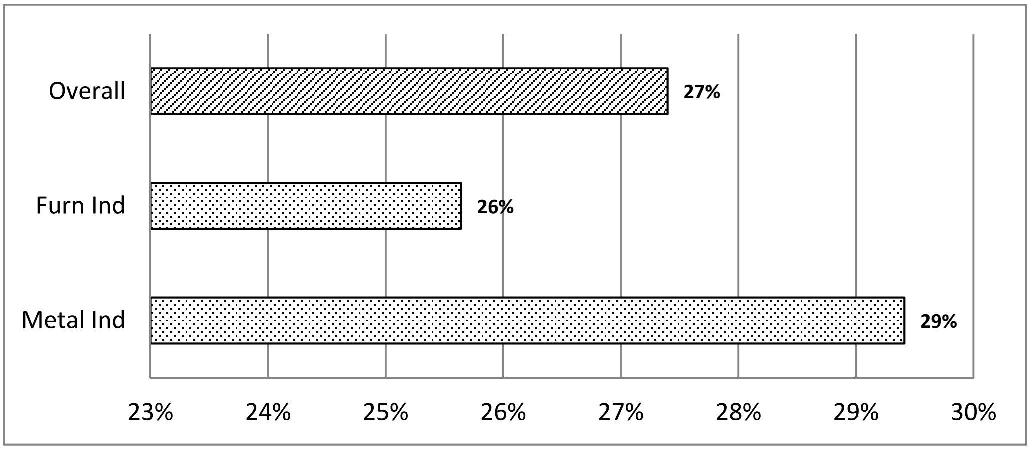


Figure FM27 Number of Supply Chain related causes of the event/action/characteristic - % of Supply Chain related across full causal process – Overall (Appendix 7 FM SC Risk Analysis)

These were primarily demand side related, 65% overall, with the metal industry being the most significant contributor (80%) (Fig FM28 below).

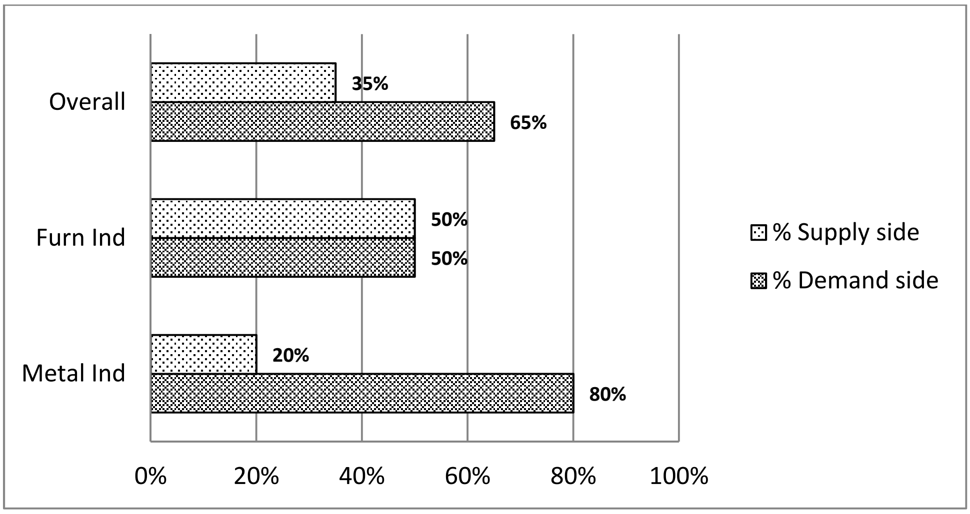


Figure FM28 Supply Chain related causes of the event/action/characteristic - % Demand side vs Supply side – Overall (Appendix 7 FM SC Risk Analysis)

Less than half, 45%) overall, of these supply chain related causal factors were perceived to have caused a supply chain related risk initiating event/action/characteristics (Fig FM29a, Tables FM4 and FM5).

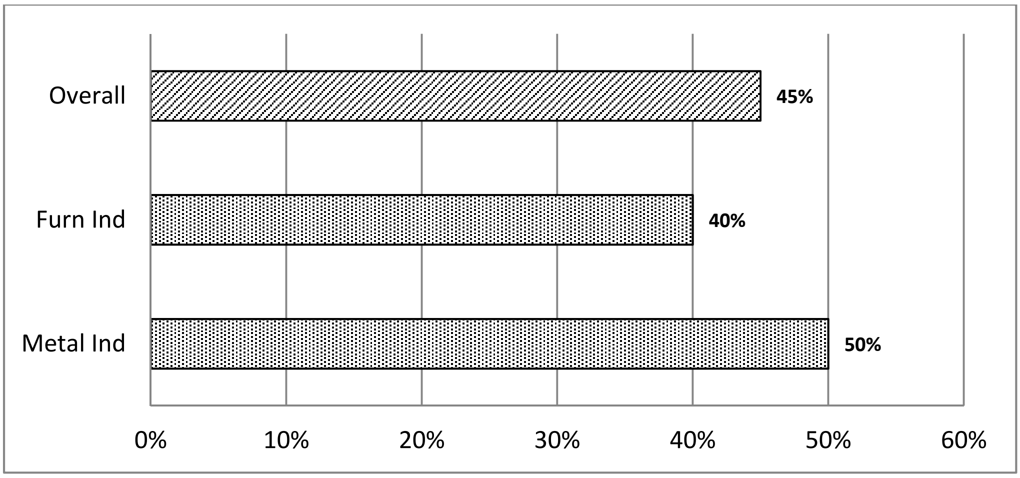


Figure FM29a Supply Chain related causes - % that caused a SC related risk events/actions/ characteristics – Overall (Appendix 7 FM SC Risk Analysis)

The demand side related causal factors are listed in Table FM6 below and show the same emergent categories as in Table FM4 above, namely, (i) demand uncertainty, (ii) reduced customer service and (iii) supply chain structure.

Table FM6 Supply chain related causal factors (demand side)

Demand side (causal Factors)	Category
Contracts with key customer term ending	Demand uncertainty
Lack of communication from key customer – SOE	Demand uncertainty
Main customer (SOE) “stalled”	Demand uncertainty
SOE customer started implementing a policy of insourcing	Demand uncertainty
New buyer appointed by customer	Demand uncertainty
Protected industry reliant on local customers – SOEs	Demand uncertainty
SOEs take very long to adjudicate a tenders	Demand uncertainty
Designs require customer input	Customer service
Location of premises	SC Structure
Relationships between FURN 1 and its Group customer	Customer service

The supply side related causal factors are listed in Table FM7 below and show the same emergent categories as in Table FM5 above, namely, (i) poor Supplier Service (late deliveries, quality), (ii) supplier availability, and (iii) supplier relationships

Table FM7 Supply chain related causal factors (supply side)

Supply side (causal factors)	Category
Having a single supplier.	Single supplier
Raw material pricing due to exchange rates	Raw material price volatility
Bad quality from supplier	Poor Supplier Service (late deliveries, quality)
Supplier buying power	Supplier relationships
New supplier	Supplier relationships

Supply chain risks that were common with Tables Mx.8 overall is the were (i) inability to forecast (A), (ii) raw material price volatility (B), and (iii) poor supplier service (late deliveries, quality) (I)

Assembling all the preceding information, the **supply chain causal process** for the furniture and metal industries, using the following format,

CODE 1[cause] > CODE 2 [event, action, or characteristic] > CODE 3 [consequence]

may thus be represented below as, where the most highly ranked risk categories are emboldened and the supply chain category in shaded,

For the furniture industry, 61% overall, and for the metal, 50% overall, of risk initiating events /actions/characteristics that would require or initiate a response, involved the supply chain in some way for the furniture industry companies

Furniture Industry

Of this 61%, 26 % of the causal factors involved supply chain (equally split between demand and supply side factors)	Of this 61%, 33 % of the risk initiating events /actions/characteristics involved supply chain factors (Supply side factors primarily)	Of this 61%, 80 % of the resultant risks involved supply chain factors (Demand side factors primarily)

Metal Industry

Of this 50%, 29 % of the causal factors involved supply chain (Demand side factors primarily)	Of this 50%, 33 % of the risk initiating events /actions/characteristics involved supply chain factors (equal demand and supply side)	Of this 50 %, 71 % of the resultant risks involved supply chain factors (Demand side factors primarily)

Figure FM29b Supply chain causal process – Furniture vs Metal Industry

In summary, both industries considered supply chain related factors to be in the minority of causes of risk initiating event/action/characteristics, with demand side factors considered to be the most prevalent causes (First blocks of Fig FM29b). Both industries rated the supply chain related factors to be minority of risk initiating event/action/characteristics, with supply side factors being more prevalent (Second blocks of Fig FM29b). Both industries rated supply chain risks to be the primary result of risk initiating event/action/characteristics, with the the demand side dominating (Third blocks of Fig FM29b).

The next section examines sRQ3.3.

sRQ3.3: What actions (if any) do owner-managers of manufacturing SMEs in South Africa take when a risk is identified? (Risk response/handling)

The scope and nature of risk handling activities was limited by certain constraints which differed across the companies. Overall, factors associated with the external environment were perceived to present the greatest constraints (51%) to the implementation of risk handling measures (Fig FM30). These were more prevalent in the metal industry (58%) in comparison to the furniture industry (42%). Supply chain factors presented the least constraints overall and within the industries (22%) (Fig FM30). These were mostly demand side factors with the most prevalent being supply chain structure issues (Appendix 7 F1-2, Appendix 7 F3-4, Appendix 7 M1-2, Appendix 7 M3-4).

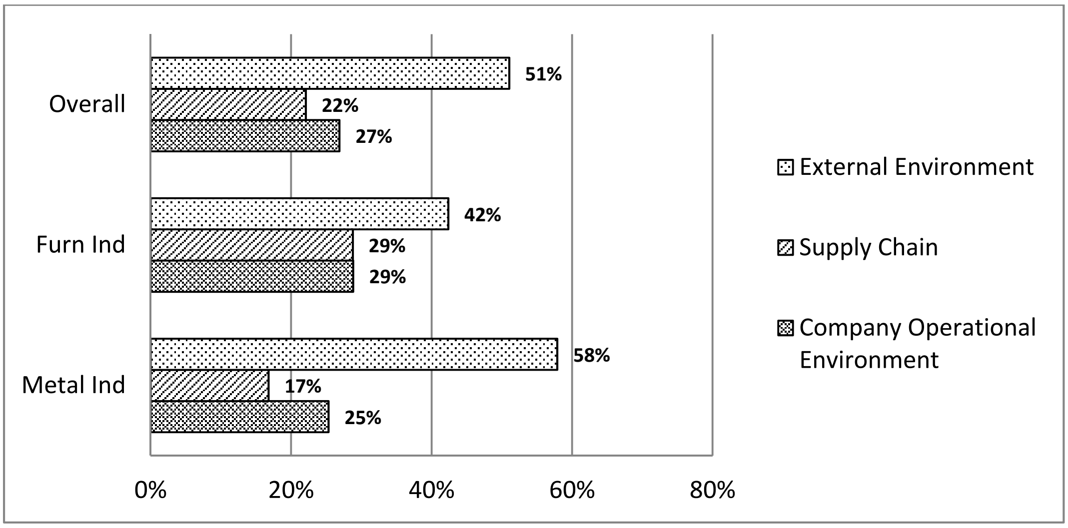


Figure FM30 Constraints – Overall (Appendix 7 FM Constraints)

The risk handling modes differed across the companies (Fig FM31 below). Three of the eight companies (41%) (FURN 1, FURN 3 and FURN 4) seemed to predominantly accept the risk and mitigate the consequences. Two (28%) of the companies (METAL 1 and METAL 3) preferred prevention. METAL 2 did not appear to have a dominant mode of risk handling with an equal concentration on risk acceptance and mitigation and risk prevention. METAL 4 seemed to favour acceptance, while FURN 2 mostly mitigated the consequences.

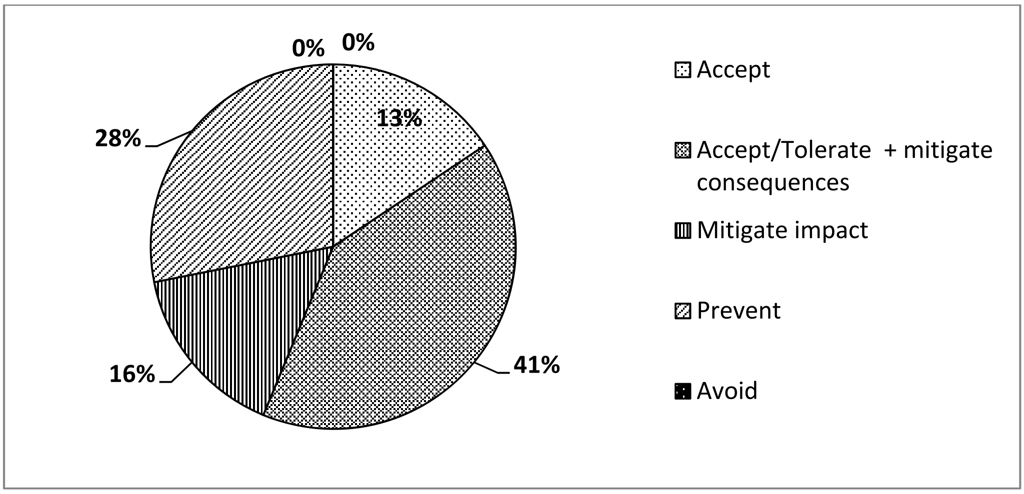


Figure FM31 Risk Handling Modes - Overall % of companies (Appendix 7 FM Risk Handling)

This implied that action was taken in the majority of cases (87% (7/8)), when and to the extent possible, by the owner-manager(s), in all events/actions/characteristics identified which may have undesired consequences for the business. This, however, was not the case for METAL 4 who only took action in the minority of cases (39%).

A total of one hundred and thirty eight different risk handling practices across all eight companies were identified. Risk handling practices that largely reflected the daily operating activities and leverage internal resources (people, knowledge, skills and relationships) were similar across the companies. Common categories of risk handling practices across both industries were (in order of frequency):

- Take necessary actions to meet objective (for six of the eight companies this was the dominant mode of operation and took a wide variety of forms)
- Communicate with customers
- Seek alternatives (look for different solutions)
- Build/leverage relationships

Lastly, sRQ4 is considered.

sRQ4: What is the SCRM capability of manufacturing SMEs in South Africa?

The capability (the degree of success i.e. focus on what can be done) to perform a task is reflected in the uncertainty about and the severity of the consequences of the task or activity given the occurrence of the initiating event. The evaluation of capability is thus expressed in the ability to perform a task in such a way as to ensure the most positive outcome as a result of a initiating event, that, unaddressed will result in undesired consequences.

Seven of the eight OMs were assessed as being more than capable in managing risk in their companies.

Of the tasks undertaken to address the event/actions/characteristic, the majority for all risks and supply chain risks, were perceived to have a low uncertainty in the anticipated outcome, as follows (Fig FM32 and Fig FM33 below).

- METAL 2 - 73% for all risks and 64% for SC risks
- METAL 3 - 81% for all risks and 100% for SC risks
- FURN 1 - 63% of all risks and 56% for SC risks
- FURN 2 - 64% for all risks and 62% for SC risks
- FURN 3 - 69% for all risks and 50% for SC risks,

For METAL 4, however, the majority, for all risks and supply chain risks, were perceived to have a medium uncertainty in the anticipated outcome,

- METAL 4 - (67% for all risks and 100% for SC risks)

whereas the minority, for all risks and supply chain risks, were perceived to have a low uncertainty in the anticipated outcome for the two companies below,

- FURN 4 - 10% for all risks and 50% for SC risks
- METAL 1 - 21% for all risks and 33% for SC risks

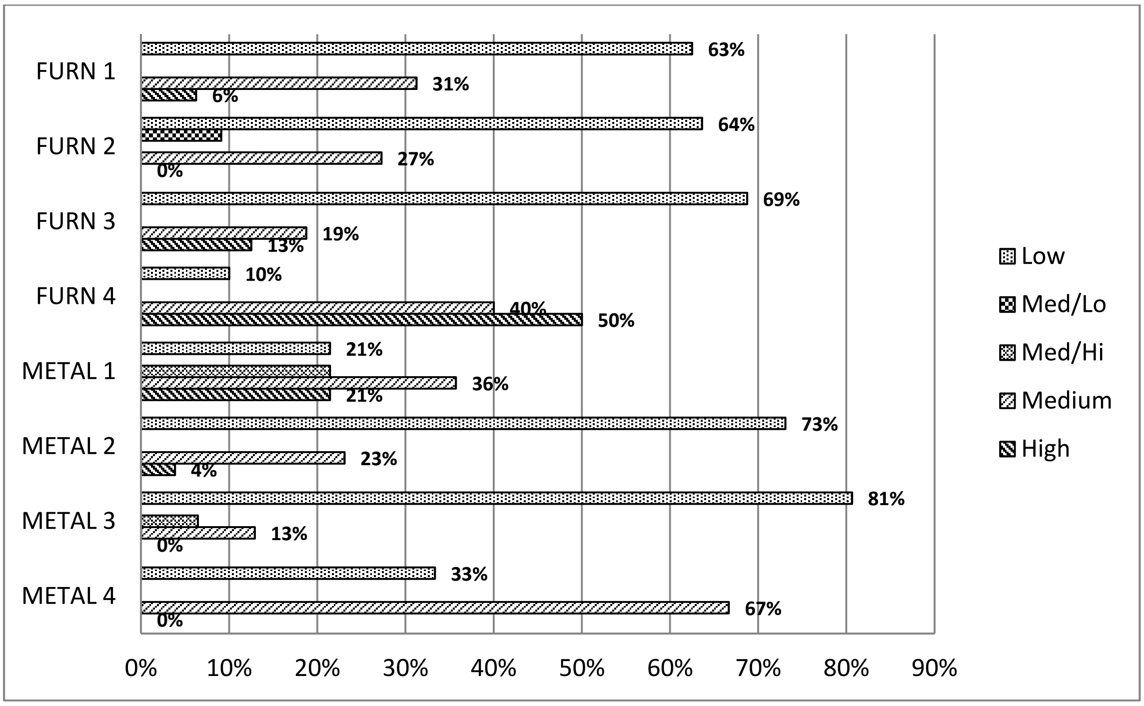


Figure FM32 Uncertainty (Q) in outcome (All risks) – Overall (Appendix 7 FM RM Capability)

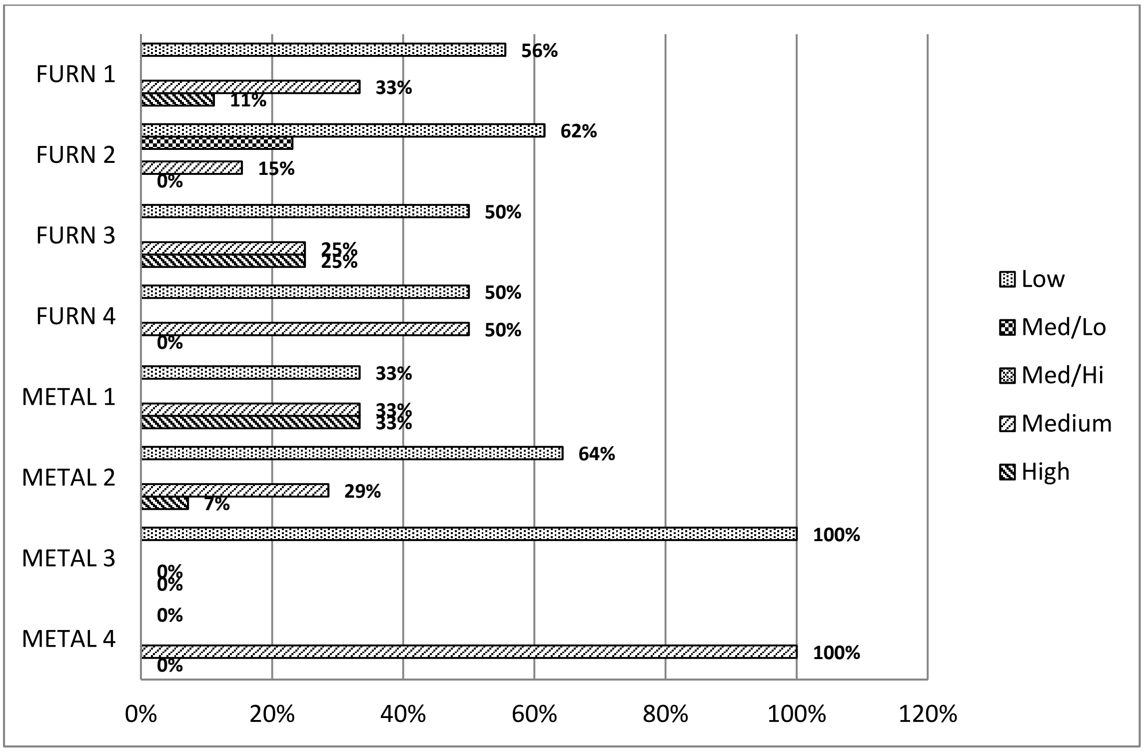


Figure FM33 Uncertainty (Q) in outcome (Supply chain risks) – Overall (Appendix 7 FM RM Capability)

In seven of the eight cases, most of the tasks performed had positive outcomes (Fig FM34 and Fig FM35 below), as shown below,

- METAL 1 - 69% for all risks and 100% for SC risks
- METAL 2 - 77% for all risks and 72% for SC risks
- METAL 3 - 74% for all risks and 80% for SC risks
- FURN 1 - 69% for all risks and 78% for SC risks
- FURN 2 - 88% for all risks and 92% for SC risks
- FURN 3 - 93% for all risks and 88% for SC risks
- FURN 4 - 70% for all risks and 100% for supply chain risks

For METAL 4 for most of the tasks performed there was no resulting change

- METAL 4 - 61% for all risks and 80% for SC risks

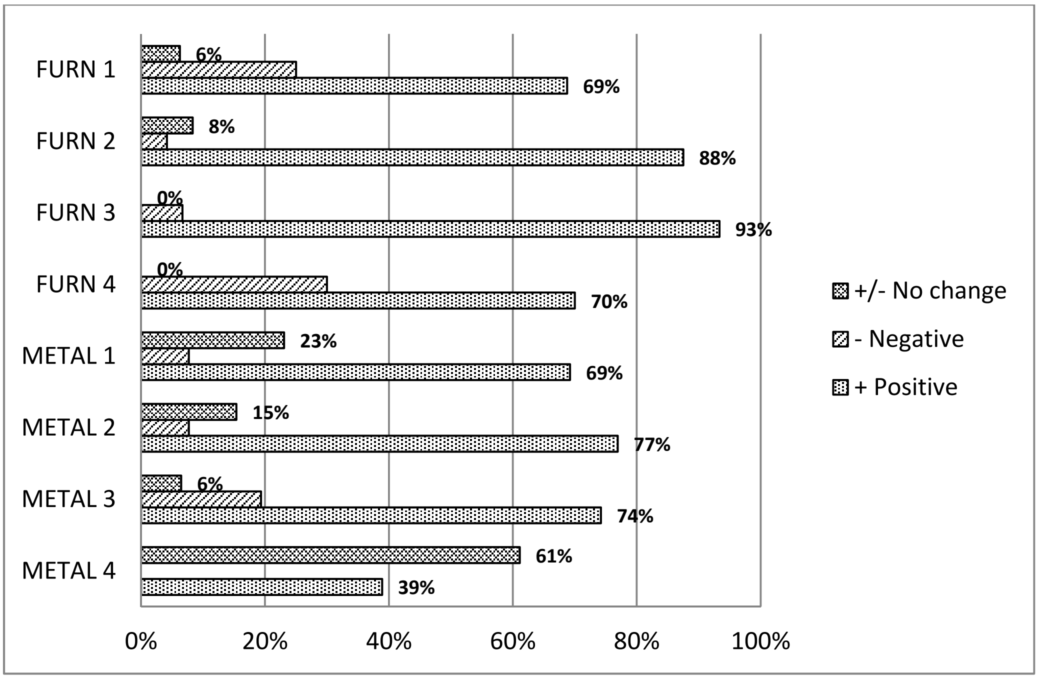


Figure FM34 Impacts of the outcomes (CT) of tasks (T) (All risks) – Overall (Appendix 7 FM RM Capability)

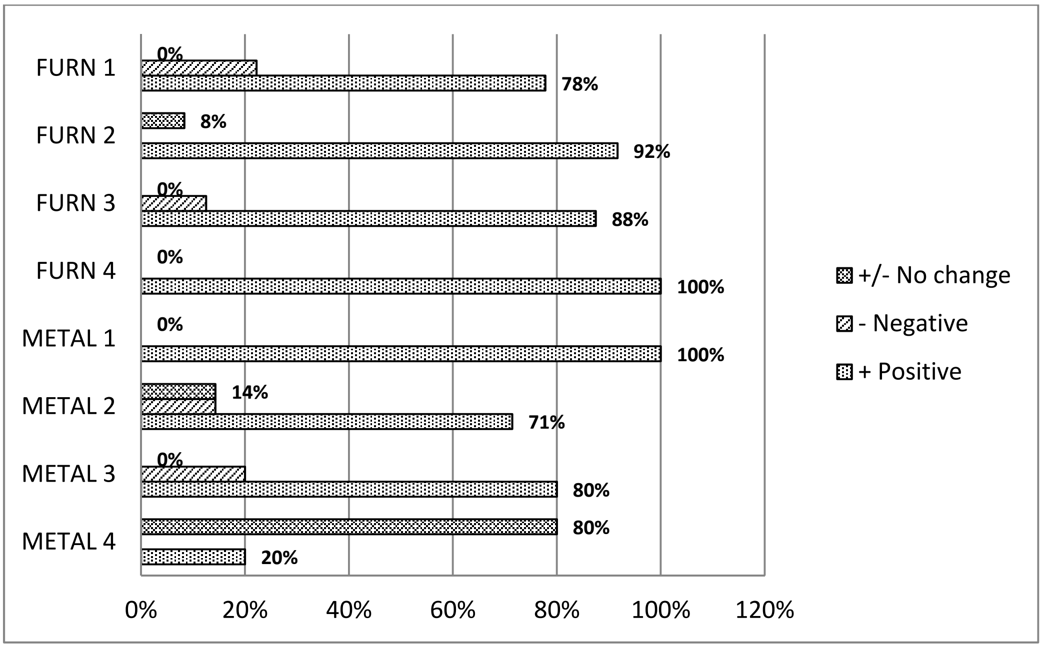


Figure FM34 Impacts of the outcomes (CT) of tasks (T) (Supply chain risks) – Overall (Appendix 7 FM RM Capability)

Risk Management Capability (RMC) and Supply Chain Risk Management Capability (SCRMC) are rated (based on Table 3.9 Risk Management Capability rating scale in chapter 3) as between moderate and high in seven of the eight cases:

- Moderate for METAL 1
- Moderate to High for METAL 2
- Moderate to High for METAL 3
- Moderate for FURN 1
- High for FURN 2
- High for FURN 3
- Moderate for FURN 4

METAL 4 is however an exception,

- Low for METAL 4

In all cases, risk identification, risk analysis/assessment and risk response/handling are demonstrated to some extent (see above) and done informally and intuitively

In all cases, there is evidence, to different degrees, that the formal risk management processes are performed informally and intuitively (Table FM8 below).

Table FM8 Assessment of formal risk management processes performed informally and intuitively

Company	**METAL 4**	**METAL 3**	**METAL 2**	**METAL 1**	**FURN 4**	**FURN 3**	**FURN 2**	**FURN 1**
Process Element	**Evidence**				**Evidence**			
Risk Management Planning	No	No	Yes	No	No	No	Some	No
Risk Identification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Risk Analysis	Some	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Risk Response/Handling	Some	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Risk Monitoring and Control	No	No	Some	No	No	No	No	No
Proportion of formal RM processes evident in informal operations	**less than 40%**	**60%**	**more than 60%**	**60%**	**60%**	**60%**	**more than 60%**	**60%**

The discussion follows in the next chapter

CHAPTER 9

DISCUSSION

This chapter critically examines the findings of this research. The first section discusses the development and elaboration of the constructs of the conceptual framework, addressing the first two objectives of this study. This is accomplished through the consideration of the research questions associated with the components of the conceptual framework and takes the form of flexible pattern-matching described in chapter 4 (sections 9.1.1 to 9.1.4). Emergent themes are identified within the research question discussions and evaluated in terms of their relevance to the conceptual framework (section 9.1.5). The second section (9.2) critiques research quality in the context of the methodological approach (validity and reliability). In the last section, learnings from the within case and cross-case analyses are elaborated.

9.1 Elaborating the Conceptual Framework

Flexible pattern-matching (Fig. 4.12) was employed to ascertain the link between the theoretical pattern (theoretical framework) and the observed or operational patterns emerging from the case studies. The observational patterns are the collection of the relevant data and its organization in the cross-case analyses. Inferences were utilised to relate, link or match the two patterns (Trochim, 2004), and "…the emerging constructs, concepts, and theories are compared with the existing literature" (Sinkovics, 2018: p.468-485).

The Supply Chain Risk Management (SCRM) conceptual framework developed in chapter 3 sought to lay the foundation for the investigation and understanding of supply chain risk management in SMEs. The development of the framework drew on themes identified in the extant literature on SCRM, risk and risk management in SMEs as a point of departure for the exploration of the theory of risk and associated constructs that resonate with the nature of SMEs. These conceptual ideas or theoretical constructs were then depicted graphically as a conceptual framework (figure 3.3), showing how they interact and interplay with each other. Research and sub-research questions (RQ) were developed for the theoretical or conceptual constructs of the framework (Wengraf, 2001). Research questions (RQ) were formulated in the broader-language of SCRM, while the sub-research questions are specific to the context of the particular research study, that is, South African manufacturing SMEs.

Cross-case synthesis was then employed which involved the aggregating or 'stacking' of the results across the series of individual case studies. The cross-case reports indicate the extent of the replication logic (Yin, 2009).

Each research question associated with a particular construct of the conceptual framework is now discussed and evaluated. This discourse references the results from the within-industry (chapter 7) and across-industry cross case (chapter 8) analyses.

9.1.1 Research Question 1 (RQ1): the "Owner-manager" construct in the framework

RQ1: What does supply chain risk mean for SMEs, and in particular for the individual owner-manager?

While it has been established that owner-managers are pivotal to the operations and decision-making in the SME (Simmons et al., 2008; Watson and Robinson, 2003; Nunes et al. 2012), there is, however, not a clear or coherent understanding of the nature of the influence of the owner-manager to risk management and supply chain risk management in the SME. This presents a gap in the research on risk management and supply chain risk management in SMEs which this research attempts to address through RQ1.

The awareness of the selected owner-managers of supply chain risk management was surveyed first. The results indicate that the owner-managers were generally not explicitly aware of supply chain risk or supply chain risk management (SCRM). This implies that the SME similarly lacks awareness of supply chain risk and SCRM, as SMEs show little separation between the entrepreneur's strategic thinking and decision making, and firm's formal planning system (Wiesner et al., 2007; Lyles et al. 1993).

The owner-manager and his/her characteristics and risk perceptions were further explored as "…the individual characteristics of SME owners and SME ownership structure have a significant impact on the business direction of an organization as well as on risk management practices" (Falkner and Heibl, 2015, p 136). All the OMs from the selected SMEs are over 45 years of age, where most of them (all of metal industry) have tertiary qualifications, have had working experience in large companies and have more than 10 years of small business experience. Kim and Vonortas (2014) have indicate that "…higher SME owner education is positively related to adopting risk mitigation strategies, such as networking, and strategic actions to mitigate technological financial and operational risks" (Falkner and Heibl, 2015, p 136). This is supported generally in the literature where studies have shown that higher levels of these attributes in owner-managers have a positive impact on the capabilities and performance of the organisation (Kasseeah, 2012; Van Der Sluis et al., 2007; Gray, 2006). This suggests that the group of OMs in this study ought to have a greater propensity to take action when encountering risk initiating events/actions/characteristics. The results of this study later in the risk management capability assessment of the SMEs in RQ4 support these assertions and confirm that the selected OMs do take action when and if possible.

Some research has been conducted on risk perceptions of entrepreneurs (treated synonymously with owner-manager in this research) regarding new business ventures (Palich and Bagby, 1995; Forlani and Mullins, 2000), however, these studies do not address risk in the daily operations of the SME (Gilmore et al. 2004). This research addresses these shortcomings through the interviewing and gathering of owner-manager perceptions of risk in their day-to-day operations. Gilmore et al. (2004) suggest that "…SME managers with deeper knowledge (which may be related to their greater age) perceived risky situations more critically, took more informed decisions and could be regarded overall as more risk-averse" (Falkner and Heibl, 2015, p 137). In this study, when the selected OMs were asked if they considered themselves to be risk-takers, it emerged that the metal industry OMs seem to have a higher risk propensity than the furniture industry OMs, and the medium sized company OMs appear to have a higher risk propensity than the smaller sized company OMs. It is not immediately apparent whether this differentiation in the risk taking propensity characteristic agrees with the literature and would, therefore, need to be further researched in terms of its influence on risk management and SCRM in SMEs. This differentiation, however, does not seem to have an influence on the risk management capability assessment of the SMEs as later demonstrate in RQ4.

Interestingly, there did not seem to be any consensus among the selected OMs when presented with five different definitions of risk. This corroborates the findings in the literature review (section 2.2.2i) that there is no singular notion of risk associated with SMEs. The OMs definition of risk, however, does not appear to have an influence on the risk management capability assessment of the SMEs in RQ4. This characteristic would require further research to establish whether this has a significant influence in risk management and SCRM in SMEs.

When considering the limited resources of SMEs (Sullivan-Taylor and Branicki, 2006; Gunasekaran et al., 2011), it does not seem feasible that formal specialized risk management processes would be utilized by SMEs. From the results of this study, most of the selected OMs do not have a formal risk management system and do not believe that risk in their businesses is well-managed (mainly the furniture industry), more than half believe they have the internal resources to manage risk. This is important to note because when the practices are examined in RQ3 it appears that OMs rely on these resources in a variety of ways to manage risk.

To gain a more detailed view of the risk perceptions of the selected OMs, lists of possible risks to the business (survey questions 21 and 23) and supply chain (survey questions 30 and 31) were given to the OMs in the survey to rate.

External risks that may affect the organization, such as changes in the environment in which the company operates, were perceived to have the highest impact overall. Operations risks (arising from the services the company delivers or the activities carried out), Financial risks (to the organisation in terms of internal systems, planning, funding) and Legislative risks (associated with legislative framework within which the organisation operates) were rated as medium impact, while Risks associated with the employment, management and retention of staff and the setting of organizational objectives (and ensuring the right ones are set and then meeting them) were generally rated as low impact. Governance risk (that is, reviewing the risks, which are part of the management of the organization) was seen as medium to low impact. On the other hand, labour issues and skills shortages featured in the majority of the OM's "most significant risks to the business" responses. These labour-related risks are potentially associated with external risks. External risks are later (in RQ3) confirmed to be perceived as key causal factors of risk initiating events/actions/characteristics.

The risks listed as some of the most common risks associated with in supply chains cited in the literature (Arntzen, 2010; SAPICS, 2011) were generally rated as mostly low (35%) or "Not a risk" (24%). This may be attributed to most of the listed supply chain risks in the literature not being relevant to the selected OMs. This is confirmed in later analysis for RQ3.

The "inability to forecast demand" (demand-side) was rated as either high or medium, followed by "Raw material price volatility" (supply-side) as a medium risk. Raw material prices risk is cited by Falkner and Heibl (2015) as one of the most frequently mentioned types of risks in SMEs in the literature. These risks are later (RQ3) confirmed to be perceived as key supply chain related consequences of risk initiating events/actions/characteristics.

Thus, in answer to RQ1, supply chain risks and supply chain risk management are not explicitly recognized by the selected SME owner-managers and by extension, their SMEs. Demand forecasting risk and the volatility in raw material pricing risk, however, resonate with selected manufacturing SME owner-managers.

9.1.2 Research Question 2 (RQ2): the "Nature of the Company" construct in the framework

RQ2: How does the nature of the SME (classification, life-cycle phase, history of survival, standards implemented, products, industrial sector, and supply chain structure) play a role in the supply chain risk management of the SME?

Perception of supply chain risk, while dependent on the owner-manager is also influenced by the position of the company in the supply chain (Lavastre et al., 2014) with regard to activity sector and markets (regional, nation, global). Specific company characteristics such as size (turn over, number of employees), age, internal structure, as well as qualitative characteristics, like flexibility, maturity, level of power and relation to the focal firm in the supply chain influence SCRM in an organization (Lavastre et al. 2014). Some of these characteristics were explored in this research as part of RQ2.

It is assumed in this research that it is more likely to observe the phenomenon of SCRM in well-established SMEs. This project, hence, focused on manufacturing SMEs (furniture and metal industry companies) in the Gauteng province of South Africa that had been in operation for more than 10 years (have survived well past infancy i.e. 3.5 years). These are independently owned, operated and financed, where one or very few people manage the business without a formalised management structure, and does not form part of a large enterprise, have a relatively small share of the marketplace or relatively little impact on the sector/industry in which it operates.

The majority of the selected OMs considered their companies to be family-owned. Half the companies had only one shareholder (the OM), while the remainder had two or three OMs with equal share. All the selected SMEs have flat informal organisational structures with half (irrespective of size) having documented organograms (ISO 9001 compliant). The very small enterprises had more informal organisational structures than the medium-sized companies.

All the selected companies manufacture specialized/customised products. Some of the companies (mainly metal industry) were ISO 9001 compliant, and some companies had implemented other ISO standards. Whether the implementation of these standards has any influence on risk management could not be discerned, although OMM2 did consider their "SHEQ Management System" to be a formal risks management process.

The selected metal industry companies (irrespective of size) had more high-tech CNC machining capabilities than the furniture industry companies, and all companies owned their own machinery. Six of the eight (irrespective of size) owned the premises on which they are located. This high level of asset/equity ownership by the key shareholders, may suggest low debt/equity ratio or low gearing or risk: "…my business it's not highly geared at all…" (OMM3). "Gearing represents a company's leverage, meaning how much of the business funding comes from creditors (debt holders) versus company owners (stockholders). Investors sometimes use these types of ratios to assess how well a company can survive an economic downturn" (Peavler, 2018, n.p.). Peavler (2018) continues to point out that by determining "the degree to which a company uses financial leverage, or growing its business with borrowed funds, provides a … way of assessing the company's financial risk" (n.p.). The low gearing of these well-established companies in this research may suggest that they have a higher resilience to risk initiating events/actions/characteristics. This is supported by the fact that all of the companies in this study have survived significant risk events in their recent histories. This is a significant finding in this research, as research on the determinants of capital structure has only begun to include SMEs in recent years (Zhang, 2010). Further research is, therefore, required to understand the relationship between financial gearing and risk in SMEs. This may be particularly pertinent to the management of cashflow risk, using cash reserves (as done by OMF2 in FURN 2) or bank overdrafts (as indicated by OMM3 in METAL 3), which ultimately impact the payment of suppliers.

The supply chains of all the companies in this research had simple two-tier structures. There is greater owner-manager visibility into the first tiers and much less into the 2nd tiers, especially for the very small companies. All the companies were either tier 1 or tier 2 suppliers in the supply chain of the larger organisations they supply into, and often have direct contact into these large organisations through various channels. The two medium-sized furniture industry companies were primarily tier 2 suppliers in the larger supply chains as they do not deal directly with the client buying their furniture (this is done through interior designers). The other six companies were tier 1 suppliers in their larger supply chains. For the two very small companies, they dealt directly with the client or individual customer. The four metal industry companies dealt with various people in the large organisations that they supplied into. This may imply that although the SMEs are small in comparison to the large organisations in the supply chains, they are significant in that they supply important products (niche) into the large organisations. They, hence, hold some influence and leverage in the supply chains.

In a separate exploratory study of SMEs in the steel and metal industry (that match the criteria for this study) conducted by Zayed and Sunjka (2017), the influence of supply chain structure on supply chain risk was investigated. The findings suggest that supply chain structure has an influence on risk in SMEs. It was found that SMEs appear to rely on supplier relationships to manage risk, "with downstream (customer) relationships deemed to be important only in respect of information flow and reputation risk" (p 132). Further findings suggest that facilities exert a "strong but mixed influence on risk. Investment in new machinery and plant space might offer the ability to service new clients and meet greater demand, thus decreasing reputation risk, [but]… such investment poses a technological and operational threat if under-used" (p 132). The link between supply chain structure and risk in SMEs, however, requires further research.

Addressing RQ2, it appears that classification (very small, small or medium sized SME), life-cycle phase (more than 10 years old), history of survival (have survived significant risk events in the history of the company), products (largely niche), industrial sector (furniture vs metal), supply chain structure (relationships and information sharing, and facilities and equipment), and financial gearing have some form of influence on supply chain risk management in the selected SMEs.

9.1.3 Research Question 3 (RQ3): the "Environmental Scanning" and "Risk Management Practices" constructs in the framework

RQ3: How do SME owner-managers make decisions about supply chain risk in their businesses?

According to the literature, SMEs, "when compared to large enterprises, appear to manage risk by following a reactive, informal or apparently unstructured, intuitive and incremental approach …rather than there being one 'ideal' risk management profile…" (Poba-Nzaou and Raymond, 2011: p185). This is corroborated by Murray and Barajas (2014), Norlaile and Aby Bakar (2015), Thun et al. (2011) and Ellegaard (2008) with respect to supply chain risk management as outlined in section 1.1 of chapter 1. Verbano and Venturini (2013) find that about one-third of the papers they reviewed focused on the whole risk management process, with risk evaluation and risk identification being the next focal areas. Risk treatment received the least focus where only four possible handling techniques were suggested (i.e., retention, avoidance, sharing and reduction). When considering the limited resources of SMEs (Sullivan-Taylor and Branicki, 2006; Gunasekaran et al., 2011), it does not seem feasible that formal specialized risk management processes would be utilized by SMEs. It is apparent that a gap in the way in which risk management in general and by extension supply chain risk management is explored in SMEs that takes into account the practice of managers in risky situations.

RQ3 explores this gap through three sub-questions that interrogate the risk management process in SMEs, namely, (i) how SME owner-managers identify risks in their supply chains, (ii) their perceptions of the most prevalent risks in their supply chains (risk analysis), and (iii) the actions (if any) taken by owner-managers when a risk is identified (risk response/handling).

i. Risk Identification

The results of this research indicate that the selected owner-managers use environmental scanning in different forms and to different degrees to identify risk in their supply chain environments. The scanning is largely related to the industry and the South African business environment but is more isolated to the immediate environment for the very small companies. This scanning includes a thorough, detailed and in-depth knowledge and understanding of the company's operational environment, the immediate supply chain i.e. 1st tier and the company employees. The selected OMs use similar mechanisms for information gathering involving talking to people, contacts and their networks in the industry. Some OMs use the media, television, newspaper and the radio to stay abreast of relevant developments in their industry and the country.

All the selected OMs identify risk initiating events/actions/characteristics (on average, 16 per company) that may result in risks that impact the company as well as the causes (or triggers) of these risk initiating events/actions/characteristics. This is done informally and on an on-going daily basis i.e. as part of business-as-usual. Supply chain risks are identified within the ambit of the overall environmental scanning, and are not perceived separately from the rest of the company. This is evidenced in the risk analyses done for each company based on the OM interviews.

ii. Risk Analysis

The Overall Causal Process is examined first.

<u>The Overall Causal Process</u>

From the results, these risk initiating events/actions/characteristics for the companies were primarily related to the company operational environment. This may be expected as the focus of the OM would be largely on the internal environment of the company. For the selected furniture industry companies, financial risk was common to all and for the metal industry companies, operations risk was common to all. Supply chain related risk initiating events/actions/characteristics were largely secondary and were predominantly on the supply side for the furniture industry companies, while these were predominantly on the demand side for the metal industry companies and evenly split overall. Macro-environmental risk initiating events/actions/characteristics were least prevalent overall, but more significant for the metal industry companies. These macro-environmental risk initiating events/actions/characteristics were related to labour and the general economic-social and political environment. This may suggest wider environmental scanning by the metal industry OMs influenced by the labour unrest at the time of the interviews.

For the majority of the selected companies these risk initiating events/actions/characteristics may principally result in company operational risk (irrespective of size, but more of the smaller companies). Common consequences (all companies) in the company operational environment were financial, strategic and operations risks. For the most of the medium sized companies, the resultant risks were primarily supply chain risks focused on the demand side. Overall supply chain resultant risks were secondary and mainly focused on the demand side. Macro-environmental resultant risks were almost negligible in all cases. There, thus, appear to be a possible differentiation between medium sized and smaller companies with regard to the emphasis of the consequences of risk initiating events/actions/characteristics.

Macro-environmental Factors

For the majority of the selected companies (irrespective of size) significant causes of the risk initiating events/actions/characteristics were macro-environmental risks. Economic conditions were common to all. This is supported by the macro-environmental risk analysis in chapter 5. For the metal industry significant economic factors in 2014 included depressed markets, “South African metal sector exports were also depressed and could continue to be so for a long time”. (Nyatsumba, 2015 n.p.), and a decline in demand, “The consequences of the rise of China and India, as well as the structural adjustments taking place in those economies, would be significant. There are massive surpluses generated in those markets, which find their way onto the world market. The current rebalancing taking place will shift their input demand patterns downward permanently. Demand out of Africa could decline in sync, due to its dependence on Chinese demand for its commodities for its own growth” (Nyatsumba, 2015 n.p.). This was exacerbated by labour unrest, where the month-long strike in the metals and engineering sector by NUMSA (national Union of Mine Workers) began on 1 July 2014 and continued until 28 July 2014 (Steyn, 2014) was associated with various violent attacks on businesses and the intimidation of non-striking metal-workers, mainly in Gauteng's industrial areas (Whittles, 2014). As a result, some small businesses in the metal industry were at risk of closing down (Nicolaides and

Ngobeni, 2014). Several other industries were also severely impacted by the shortage of raw materials, including industries "upstream and downstream" of the steel industry. The strike cost the industry over R300 million (fin24, 2014).

The furniture industry experienced their own economic challenges in 2014. These included a decline of levels of competitiveness. Growth of the South African furniture industry has significantly lagged the global furniture trade, consequently losing share of the international furniture manufacturing market, moving from the 34th largest exporter in 2005, to 43rd in 2006 (FP&M Seta, 2014). This is a result of insufficiency in demand in external and/or domestic markets that has been attributed to an increase in low cost Asian imports, decreasing investment in skills development (the failure to develop a commitment to quality in the labour force) and technological innovation/low levels of automation, and insufficient research and development funding (Makhubele and Ford, 2015; DTI, 2008). At local factory level, competitiveness challenges arise due to increasing input costs, skills shortages and inadequate power supply (IDC, 2014). This was coupled with lack of access to furniture retail market for small manufacturers. One of the challenges for small manufacturers is the high concentration of the furniture retail sector where four big companies (Ellerines Group, Lewis, JD Group, and Shoprite) dominate the market with a market share of 80%. The rest is shared among independent furniture retailers. “This affords the retail sector huge bargaining power against manufacturers, leading to suppressed producer prices. Access to this market is often difficult for small manufacturers. The problem is the scale at which small manufacturers operate. Due to the size of these retailers and the transaction cost of sourcing from many small manufacturers, retailers often ignore small manufacturers in sourcing their furniture” (DTI, 2008). Commodity pricing also presented a challenge. The materials (cotton, iron, steel and aluminium) used in the furniture manufacturing process affect the prices and profit margins in the furniture sector. Changes in the price of these commodities, therefore, have a significant impact on the performance of the furniture industry (FP&M Seta, 2014).

The company operational environment was the second most prevalent cause of risk initiating events/actions/characteristics overall among the selected SMEs. Supply chain factors were the least prevalent causes overall, with a slight emphasis on the demand side: for the metal industry, these were focused on the demand side, whereas for the furniture industry these were supply side related.

In conclusion, and with reference to Fig MI19b in chapter 6, the perceived full causal process across the selected SMEs in both industries is similar but with different emphases. The causal factors for the selected SMEs in both industries are comparable and similar, although for the furniture industry supply side factors are dominant whereas demand side factors hold sway in the metal industry. The risk initiating event/actions/characteristics differ in emphasis and in ranking. The company operational factors are dominant risk initiating event/actions/characteristics for the selected furniture industry OMs whereas for the selected metal industry OMs macro-environmental factors play a greater role in conjunction with the company operational factors. Supply chain factors contribute similarly for both industries, although relative rankings differ. Once again supply side factors are prevalent in the furniture industry, whereas for the metal industry supply and demand factors are equally split. With regard to the resultant risks or consequences for the selected SMEs in both industries these are similar but with slightly different emphases. It is notable that for both industries demand side resultant factors are dominant. This supply chain factors may differ in emphases across industries.

The Supply Chain Causal Process

When examining the perceived supply chain causal process in more detail, the perceived prevalence of the risk initiating event/action/characteristics that involved the supply chain across the full causal process was more than half for the majority of the selected companies (all of the medium sized companies). Of these risk initiating events/actions/characteristics identified that were supply chain related across the full causal process, less than 10% involved the Supply Chain across all elements of the causal process. Thus, supply chain factors are perceived with the selected SMEs to very seldom have end-to-end supply chain related knock-on effects. The majority of these risk initiating events/actions/characteristics identified that were supply chain related across the full causal process, however, resulted or may result in supply chain risks, predominantly (more than 75%) on the demand side. These demand side resultant risks were generally categorised as demand uncertainty (the inability to forecast), the potential loss of customers, and reduced customer service. On the other hand, the supply side resultant risks may be generally categorized as raw material unavailability, poor supplier service (late deliveries, quality), supplier relationships and supplier availability.

More than half of these risk initiating events/actions/characteristics that resulted in supply chain risks were supply chain related, that is, a supply chain risk initiating events/actions/characteristics resulted in a supply chain risk. These supply chain related risk initiating event/action/characteristics across the selected companies were different but predominantly supply-side related. The supply side supply chain related risk initiating event/action/characteristics are similar to the supply side resultant risk categories i.e. raw material unavailability, raw material price volatility, poor supplier service (late deliveries, quality) and supplier availability. The demand side supply chain related risk initiating event/action/characteristic are also similar to the resultant risks i.e. demand uncertainty, loss of customers and reduced customer service, with the additional category of supply chain structure. This may suggest that there is little differentiation in the perceptions of the selected owner-managers with regard to a risk initiating events/actions/characteristics and a resultant risk. The remaining non-supply chain related (the majority) of the risk initiating event/action/characteristics that resulted or may result in supply chain risks included a variety of risks across all of the companies.

Supply Chain related causal factors, of risk initiating event/action/characteristics identified, that involved the supply chain is some way across the full causal process, were primarily demand side related, with the metal industry being the most significant contributor. Less than half overall of these supply chain related causal factors were perceived to have caused a supply chain related risk initiating event/action/characteristics. The demand side related causal factors, with the same emergent categories as above, are demand uncertainty, customer service and supply chain structure. The supply side related causal factors are the same emergent categories as above, i.e. raw material price volatility, poor supplier service (late deliveries, quality), supplier availability and supplier relationships.

In conclusion, and with reference to Fig MI29b in chapter 6, the selected OMs from both industries perceived supply chain related factors to have a relatively low causal influence. For the selected SMEs in the furniture industry these were equally split between supply and demand side factors whereas for the metal industry these were predominantly demand side factors. Risk initiating events /actions/characteristics involved supply chain factors were similarly weighted across both industries. For the selected SMEs in the metal industry, however, these were equally split between supply and demand side factors whereas for the furniture industry these were predominantly supply side factors. Supply side risk factors overall across the full causal process are raw material price volatility, poor supplier service (late deliveries, quality), supplier availability and supplier relationships. The biggest impact on the supply chain was in the resultant risks on the demand side for both industries. These were demand uncertainty (inability to forecast), customer service, loss of customers and supply chain structure.

The implication of these results is an important finding. The demand side focus of the selected owner-managers in this study, has not been identified or examined in the extant literature on supply chain risk in SMEs (refer to chapter 1 literature review), and thus, is a significant finding in this research. This may be attributed to the macro-environmental factors, particularly economic, identified above that create demand uncertainty, potential loss of customers and challenges in servicing customers.

These findings confirm the results in RQ1 (survey findings) that the “inability to forecast demand” (demand-side) was rated as either high or medium, followed by “Raw material price volatility” (supply-side) as a medium risk. Raw material prices risk is cited by Falkner and Heibl (2015) as one of the most frequently mentioned types of risks in SMEs in the literature. The only supply chain risks identified in this research that were shared with the list of most common risks associated with in supply chains cited in the literature (Arntzen, 2010; SAPICS, 2011) are inability to forecast , raw material price volatility and poor supplier service (late deliveries, quality). As suggested in RQ1 (through the survey findings) this low correlation may be attributed to most of the listed supply chain risks not being relevant to the OMs in the selected SMEs in South Africa.

iii. Risk response/handling

The scope and nature of risk handling activities was limited by certain constraints which differed across the companies. Overall, factors associated with the external environment were perceived to present the greatest constraints to the implementation of risk handling measures. These were more prevalent in the selected SMEs in the metal industry in comparison to the furniture industry. Supply chain factors presented the least constraints overall and within the industries. These were mostly demand side factors with the most prevalent being supply chain structure issues.

The risk handling modes differed across the selected companies. The furniture companies seemed to predominantly accept the risk and mitigate the consequences. Two of the four metal industry companies (medium and small) preferred prevention. The other medium sized metal industry company did not appear to have a dominant mode of risk handling with an equal preference for risk acceptance and mitigation and risk prevention, while the other small company seemed to favour acceptance. This implied that action was taken in the majority of cases, when and to the extent possible, by the owner-manager(s), in all events/actions/characteristics identified which may have undesired consequences for the business. This, however, was not the case for METAL 4 who only took action in the minority of cases. The finding that some SME's employ preventative measures in handling risk challenges the notion that SME's employ defensive or reactive approaches to supply chain risk management (Ghadge et al., 2012; Thun et al. 2011; Ellegaard, 2008).

Risk handling practices that largely reflected the daily operating activities and leverage internal resources (people, knowledge, skills and relationships) were similar across the selected companies. Common categories of risk handling practices across both industries were (in order of frequency) to (i) take necessary actions to meet objective (for the majority of companies this was the dominant mode of operation and took a wide variety of forms), (ii) communicate with customers, (iii) seek alternatives (look for different solutions) and, (iv) build/leverage relationships

While communication with customers and the building of relationships are known risk management practices of SMEs (Lavastre et al., 2014; Faisal et al., 2006), the notions that SME owner managers will “take the necessary actions” or effectively “do what it takes” to prevent or mitigate risks and/or “seek alternatives” or explore different solutions are not explicitly mentioned in the literature. These risk handling practices largely reflect the daily operating activities of the company and the owner-manager. This is supported by Corvellec (2009) who explains that the management of risk unfolds within the tactics of everyday management and evolves incrementally. These practices are employed in the prevention and mitigation risk handling modes and allude to the experience; knowledge and intuition of selected owner-managers as demonstrated in RQ1.They also leverage internal resources (people, knowledge, skills and relationships). This aligns with Lindbom et al.’s (2015) belief that the capability to respond is not only related to available resources but to the nature of the event and the way in which resources are utilized in response to the particular event. They continue to explain that capability is associated with an agent (an organization, a person, a technical system or anything, for which capability is described) and the agent’s ability to perform a task in response to a particular type of event i.e. risk-related event.

In all the cases in this research, risk identification, risk analysis/assessment and risk response/handling are demonstrated to some extent and done informally and intuitively in support of the findings in the existing literature (Niemann et al., 2018; Ellegard, 2008).

With reference to RQ3, the discussion above confirms the same findings in the existing literature. Owner-managers make the important decisions within an SME and these are based more on intuition and experience, and less on quantitative information (Murray and Barajas, 2014). As Niemann et al. (2018) point out, SME owner-managers make supply chain decisions based on a variety of inputs (from environmental scanning), or sometimes exclusively based on intuition. Perception of supply chain risk does not, however, necessarily depend on the owner-manager and the position of the company in the supply chain as indicated by Lavastre et al. (2014) as there seems to be general consensus found within this study (irrespective of size or owner-manager) regarding the prevalence and nature of supply chain risks.

This process of decision-making among the selected OMs then supports the notion of Dual Process Theory (DPT) (Tversky and Kahneman 1974) where decisions are made using System 1 which is intuitive, perceptive, automatic, emotional and unconscious, and leads to quick heuristic judgements to reduce complexity and effort. Similarly, the Recognition-Primed Decision (RPD) model that falls within the Naturalistic Decision-Making (NDM) paradigm (Klein, 2008) can be used to describe the owner-manager decision-making process. Klein (2008) explains that people make decisions in real-world contexts, particularly under challenging conditions such as limited time, uncertainty, high risk, ambiguous objectives, and instability by a combination of intuition (pattern matching) and analysis (conscious, deliberate mental simulation). People, thus, use their experience in the form of a repertoire of patterns to make rapid decisions. This would most likely be exhibited more profoundly by experienced owner-managers of well-established SMEs, such as those in this study. Further research is required to draw meaningful conclusions.

9.1.4 Research Question 4 (RQ4): the “Supply Chain Risk Management Capability” construct in the framework

RQ4: How can Risk Management and SCRM Capability be assessed in SMEs?

In the absence of appropriate models to assess risk management capability, the framework, developed by Lindbom et al. (2015), was broadly adapted (as described in Chapter 3) to determine the RMC of the SME/OM. Capability is defined as the degree of success in performing a task and is reflected in the uncertainty about and the severity of the consequences of the task or activity given the occurrence of the initiating event. The evaluation of capability is, thus, expressed in the ability to perform a task in such a way as to ensure the most positive outcome as a result of a initiating event, that, unaddressed will result in undesired consequences. Capability is described using a number of variables i.e. the initiating event (A), the performed task (T), the consequences associated with the performed task (CT), as well as, the uncertainties concerning these consequences (Q) and the background knowledge (K), which form the basis for these descriptions. These variables were represented in a table and coded from the interviews primarily with support from the survey responses (e.g. Table F1.9 in chapter 6). Descriptive statistics were then employed to summarise the variables that would collectively assist in assessing the risk management capability and supply chain risk management capability of the OM/SME. These results are discussed further below after some commentary on research bias.

Researcher Bias

A precaution in using this capability model is that the measure describing uncertainties is subjective (knowledge-based, judgmental, Bayesian), and is dependent on the assessor's background knowledge. This, thus, exposes the assessment to researcher bias. This bias was tested against the results generated by an Industrial Engineering 4th year student report (Frowein, 2014), where possible, to validate the understanding and mapping of the company supply chains and the identified risks, and capability assessments. From the comparison of results, the construction of the supply chain for FURN 1, the use of formal risk management techniques, the owner-Manager's risk management capability and an overall assessment of the results of this research were comparable to those of the student. Triangulation with the macro-environmental risk analysis in Chapter 5 was also used.

Of the tasks undertaken to address the event/actions/characteristic, for the majority of selected companies, these were perceived to have a low uncertainty in the anticipated outcome. For METAL 4, the majority, however, were perceived to have a medium uncertainty in the anticipated outcome, whereas, the minority of tasks were perceived to have a low uncertainty in the anticipated outcome for FURN 4 and METAL 1. For, FURN 4, METAL 1 and METAL 4, this may suggest a lower degree of supply chain risk/risk management capability as suggested by the definition of capability above. For all the companies, except METAL 4, most of the tasks performed had positive outcome, while for METAL 4 most of the tasks performed resulted in no change.

For all the selected companies, based on the assessments above, supply chain risk/risk management capability were rated as between moderate to high (irrespective of size or industry), except for METAL 4 which was rated as low. Thus, while METAL 4 met all the criteria for case selection and exhibited similar characteristics (RQ2) as the other companies in the study, their risk management capability appeared to be lacking. This may be explained based on a number of factors, including medium uncertainty in the anticipated outcomes. For METAL 4 acceptance appeared to be a dominant mode of risk handling, followed by risk mitigation and risk avoidance. There was no evidence of risk prevention. This implied that action was taken in the minority of cases for METAL 4 when and to the extent possible, by the owner-manager(s), in all events/actions/characteristics identified which may have undesired consequences for the business. The primary risk handling practices for METAL 4 was deciding what to do when all factors are considered including environmental constraints. This implied a more reactive and passive approach which often resulted in no change to the risk situation, stated above. METAL 4 is, therefore, an outlier in the overall results and may require further investigation to determine if there are other disparate variables that contribute to this finding.

The results of this research have, thus, laid a foundation for challenging the notion that SMEs lack risk management capability which is attributed to deficiency of infrastructure, RM skills, human capital and adequate management knowledge and training (Blanc Alquier and Lagasse Tignol, 2006; Gao et al., 2011). This research offers support for Poba-Nzaou and Raymond (2011)'s proposition that , "when compared to large enterprises, [SMEs] appear to manage risk by following a reactive, informal or apparently unstructured, intuitive and incremental approach …rather than there being one 'ideal' risk management profile, different internally-consistent configurations of principles, policies and practices can be equally effective in minimizing … risk " (p185). This statement can be extrapolated, in the light of this research, that while SMEs may exhibit "informal or apparently unstructured, intuitive and incremental approach[es]' to risk management, there is evidence of the implicit practice of the formal risk management processes (Table FM8).

These implicit formal risk management processes make use of environmental scanning for ongoing risk identification, risk analysis and risk handling is exhibited in the selected owner-manager's conversations and actions regarding risk to and in the business. Risk management capability is demonstrated through the capability of the selected OM to leverage resources and use them effectively in preventing and/or mitigating risk.

Hence, in response to RQ4, a method for assessing supply chain risk/risk management capability has been proposed and tested with plausible results.

9.1.5 Evaluation of the Conceptual Framework

In light of the disparate research on SCRM, risk management in SMEs, and the lack of a formal benchmark model for the assessment of risk management capability in SMEs, this research sought to provide a foundation, in the form of a Supply Chain Risk Management Framework, for the investigation and understanding of supply chain risk management is SMEs. The development of the framework drew on themes identified in the extant literature on SCRM, risk and risk management in SMEs as a point of departure for the exploration of the theory of risk and associated constructs that resonate with the nature of SMEs. These conceptual ideas or theoretical constructs were then depicted graphically as a conceptual framework (figure 3.3), showing how they interact and interplay with each other.

The main theoretical constructs of the conceptual framework are linked through the owner-manager who is the primary pursuer, collector and filter of information about events and relationships (risks) in the company's environment (external, supply chain and internal). The owner-manager is also the primary processor (decision-maker) of this information based on his knowledge, experience, perceptions, values and beliefs. This study could not confirm the “values and beliefs” factors but could confirm knowledge, experience, perceptions as important factors. It is proposed that the education of the owner-manager be included based on the discussion in RQ1.

Where there are no formal risk management processes, it is expected that inherent practices, that address risk in the company environment, will become evident. These will have evolved over time and through the management and leadership of the owner-manager. This is supported by the answer to RQ1. This construct, however, may be expanded to include the notion that these practices form part of the daily operations of the company and leverage the company resources to prevent and mitigate risk. This is achieved in a variety of ways depending on the resources and the owner-manager but are characterised by “take the necessary actions” or effectively “do what it takes” to prevent or mitigate risks and/or “seek alternatives”. This links in to Lindbom et al (2015)’s definition of the capability to respond not only being related to available resources but to the nature of the event and the way in which resources are utilized in response to the particular event, utilised in RQ4.

As concluded in RQ2, the nature of the firm, that is, classification (very small, small or medium sized SME), life-cycle phase (more than 10 years old), history of survival (have survived significant risk events in the history of the company), products (largely niche), industrial sector (furniture vs metal), supply chain structure (relationships and information sharing, and facilities and equipment), and financial gearing have some form of influence on supply chain risk management in SMEs. This links to the resources available to the owner-manager to manage risk in the company and ultimately determines supply chain risk/risk management capability through Lindbom et al.'s (2015) definition. These risk management practices in the form of informal principles, policies and procedures, therefore, may be interpreted as Risk Management Capability.

9.2 Methodological Approach and Reflections the Case Analytical Process

As indicated in chapter 1, section 1.3, there is a broad and continuing call for more rigorous empirically grounded research in SCRM (Kilubi 2016, Tukamuhabw et al. 2015, Ho et al. 2015, Sohdi et al. 2012, Singhal et al. 2011, Khan and Burnes 2007, Jüttner et al. 2003) based on case studies (Ho et al. 2015, Sohdi et al. 2012, Khan and Burnes 2007), as well as mixed methods (Kilubi 2016) founded in solid conceptual frameworks (Tukamuhabw et al. 2015, Sohdi et al. 2012) and literature reviews (Singhal et al. 2011). This research has attempted to address this gap through a qualitative, empirical, mixed-methods, multiple case study design that applied a conceptual framework developed from the literature review. Through the analytical phase of the research some learnings were gained. The following two sections reflect on the learnings from the within case and cross case analyses used in this approach.

9.2.1 Within case analytical process

The case study protocol, developed based on the work of Stake (1995), Miles and Hubermann (1994), Yin (1994) and Eisenhardt (1989), among others (Pare, 2001) was followed. The analytical approach is as outlined in section 4.3.3.1 in chapter 4. In brief, the analytical process started, subsequent to the interviews, factory tour and transcription of these interviews, with the first cycle manual coding. This involved a "pen and paper" approach on the interview transcript, where information required to answer the research questions was identified and categorized, and the first causation coding sequences were formulated. As mentioned in chapter 4, second cycle coding was attempted using NVIVO CAQDAS software (see Fig. 4.10 in chapter 4). This was abandoned during the pilot case study due to personal preference. It was felt that the coding in NVIVO added an extra step that was not necessary as the manual coding leads more intuitively into the analytical memo where the coding was streamlined and formed part of narrative on the identified risks. The coding sequences were consequently reflected in the analytical memos written in Word (Appendix 6 F1.3)

The development of the causation coding sequences became was more detailed and considered through each of the coding passes. This in some way was designed as the coding formats were more structured with each cycle. More comprehensive thinking was required in each coding cycle with the bigger picture of the case study information and other information sources, allowing for inferences to be made. This increasingly broader view of the case information was facilitated by changing the sequence of writing the case report.

Once the first cycle manual coding was completed, the information for the RQ2 and RQ1 sections of the case report was analysed and the sections were written. This involved accessing the company website, drawing on the relevant categorised data from the interview and company tour, and through analyzing the survey responses. The aggregation of evidence from these multiple data sources allowed for corroboration of information provided by the OM in the interviews and the building of a more holistic view of the company, the owner-manager and the supply chain.

After this analysis and parts of the case report was written, the second cycle coding in the analytical memo was done. With the broader picture in mind, risk categories were developed as part of a narrative risk analysis for the company. The causation coding sequences were then further developed and contextualised within these categories using the risk indicators in Table 2.2 in Appendix 2.2. Risk responses and risk handling initiatives applied by the OM were hence also identified.

The first step of the third cycle coding into a causal sequencing spreadsheet was thus facilitated (Table F1.9 Risk Causal Analysis above). Further consideration and refinement of the causal sequences and the risk categorizations of the Causes, Event/Action/Characteristic, and the Consequences was achieved. The supply chain risk sequences could be identified for separate analysis. The generation of the pie charts to present a quick graphical view of the coding results allowed for an increasingly objective representation of the coding results. This analysis could then be written up in the case report to address RQ3.1 and 3.2.

The second step of the third cycle coding was required to address RQ3.3, 3.4 and RQ4. The development and population of Table F1.10 Risk Capability Analysis was the product of this second step. Once again, this required further consideration and refinement of the causal sequences and the risk categorizations of the Causes and Event/Action/Characteristics. Cross-referencing to Tables F1.7 and F1.8, and comparisons to Table 5.2 (in chapter 5) was done. The impacts of the risk were also assessed based on these tables and on inferences from the preceding analyses. Risk responses and risk handing initiatives from the analytical memo were translated into the table, and risk response handling categories were assigned. The outcomes (positive vs negative) of the risk handling practices were assessed based on the interview data and inferences drawn from the preceding analyses. The table data also allowed for the risk handing practices to be extracted and analysed (categorized) separately. The risk management and supply chain risk management capability could then be assessed. The generation of the descriptive statistics (pie charts) representing the coded data was done, once again moving toward a more objective presentation. The remainder of the case report was then written.

To facilitate cross-case analysis, a case summary was generated (Table F1.14 in Appendix 6 F1.5).

9.2.2 Cross-case Analytic Process

The cross-case analytical process proved to be iterative. These cross-case analyses were an aggregation or stacking of the case information while examining similarities and differences in the data. The overall industry cross-case analysis was done in the same way as the two company size cross case analyses. These were written in a similar narrative style as the case reports. The same process was followed for the metal industry cross-case analyses. At this stage there had been no further meta-analysis of the data as recommended by Miles et al. (2014).

The need to revisit the cross-case analyses was discovered once the Across Industry (all eight cases) was embarked upon. At this stage it was realised that not enough analysis had been done to demonstrate and display the cross-case emergent patterns. This prompted the development of a meta-analysis spreadsheet (Appendix 6.MI.xx). The descriptive statistical data from each individual case study was compiled into various sheets to holistically address the research questions (RQs) in the cross-case analyses. This resulted in more graphical displays, better presentation of the comparative data, and more detailed and supported conclusions could be drawn. In the final Across-industry analyses, this facilitated more distilled categorisation across the survey responses and the interview data analysed in the individual case studies. The causal process, as perceived generally by the OMs within industries and across industries, could be better defined based on data similarities.

A second iteration, incorporating the graphical displays of the meta-analyses and the more detailed and supported conclusions, was done for the entire cross case analyses, building up or stacking to the final Across industry analysis.

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes this research by firstly, reviewing the objectives and the critical research question. This is followed by the contribution of this research to the body of knowledge on supply chain risk management. Limitations of the research are then outlined and finally recommendations on further research directions are made.

10.1 Objectives and Critical Research Question

The first objective sought to develop a conceptual framework from the literature. This was successfully achieved. The framework that was developed was grounded in the extant literature on supply chain risk management (SCRM) and risk management in SMEs and in risk theory. Four interconnected constructs, namely, the owner-manager, SME risk environment, SME risk management practices and supply chain risk management capability, formed the basis of the framework centered on the owner-manager as the primary collector, filter and processor of information regarding supply chain risk in the overall context of the organization. This risk information is translated intuitively by the owner-manager, via his/her education, experience, knowledge and perceptions, into informal risk management practices. These risk management practices reflect the effective utilization of company resources, and may be interpreted as supply chain risk/risk management capability. For each of these four constructs associated theory and research questions were developed and investigated.

The second objective sought to elaborate the theoretical constructs of the conceptual framework in an empirical context i.e. selected manufacturing SMEs in South Africa. The framework constructs were elaborated through the design and execution of a mixed-method multiple case study approach which involved eight SMEs from two industries (furniture and metal) across two different company sizes (small and medium) in South Africa. The design of the case study protocol and analytical approach ensured research quality. Data were gathered through an exploratory survey, interviews with the selected company owner-managers, a tour of the company facilities, the company websites and other documentation. A qualitative thematic analysis approach was utilised together with cross-case analyses to identify similarities and differences and emergent themes. This process facilitated the operationalization of the framework by connecting, via the use of indicators, the concepts in the framework to observable characteristics of supply chain risk management in the eight selected manufacturing SMEs in South Africa. The second objective was, therefore, effectively accomplished.

As part of the process of elaborating the constructs of the framework, the third objective of assessing the SCRM risk management capability (RMC) of selected manufacturing SMEs in South Africa was completed. To assess supply chain RMC, Lindbom et al.'s (2015) definition and description of capability was adapted and developed using attribution theory and causation coding. The interview data collected in this research was then analysed using this specifically developed adaptation. The selected SMEs were mostly assessed as having moderate to high supply chain risk/risk management capability. It was also established that while the selected SME owner-managers do not implement formal risk management processes, they do informally follow the risk identification, risk analysis and risk handling aspects of the formal process.

Flexible pattern-matching was employed to match the empirical data to the conceptual framework. Through this process of pattern-matching the fourth objective of assessing the validity of the developed conceptual framework was accomplished. The empirical patterns that emerged from the research findings largely corresponded with the proposed patterns and links of the conceptual framework. It can, thus, be concluded that the developed conceptual framework presented a valid representation of the supply chain risk/risk management process in selected established SMEs in the Gauteng region of South Africa.

The critical research question enquired the status of Supply Chain Risk Management (SCRM) in manufacturing Small and Medium Enterprises (SME) in South Africa. In answer to this question, it is concluded that while supply chain risks and supply chain risk management are not explicitly recognised by the selected SME owner-managers in South Africa, it is implicit in the daily operations of the company. Owner-managers in the eight SMEs investigated in this research are inherently aware of the risks particularly associated with their company operational environment, their supply chains and the macro-environment in which the companies operate. Supply chain risks are not the most dominant category of risk for these OMs, but demand side risk receives greater focus than the supply side risks. There is evidence of the informal practice of the risk identification, risk analysis and risk handling aspects of the formal process, and ultimately supply chain risk/risk management capability.

10.2 Contributions to Knowledge

This research makes a significant contribution to the body of knowledge surrounding supply chain risk management in SMEs through addressing a number of research gaps outlined in chapter 1 and chapter 2, section 2.2.3.

10.2.1 Significant Contributions to Knowledge

The gaps in the literature in the context of supply chain risk management in SMEs addressed by this research are the risk management practices, risk management capability and the risk environment.

A significant finding of this research is that while the selected SME owner-managers do not have formal risk management procedures like their counterparts in large organisations, they informally follow risk management processes advocated in the literature, namely, the risk identification, risk analysis and risk handling aspects of the formal process. This finding, supported by the empirical evidence, is significant as the literature has been ambivalent. Hence, this research is ground-breaking as it provides for a strong position on this debate. These implicit processes, used by the selected SME owner-managers, make use of environmental scanning, which is exhibited in the owner-manager's conversations and actions regarding risk to and in the business, for ongoing risk identification, risk analysis and risk handling. This research also found that the selected SME owner managers will "take the necessary actions" or effectively "do what it takes" to prevent or mitigate risks and/or "seek alternatives" or explore different solutions are not explicitly mentioned in the literature. These risk handling practices largely reflect the daily operating activities of the company and the owner-manager. The findings, thus, support Corvellec (2009) who explains that the management of risk unfolds within the tactics of everyday management and evolves incrementally.

This research contributes through another important finding in that the selected SMEs possess risk management capabilities. These results of this research challenge the notion that SMEs lack risk management capability where the literature attribute this to deficiency of infrastructure, RM skills, human capital and adequate management knowledge and training in SMEs (Blanc Alquier and Lagasse Tignol, 2006; Gao et al., 2011). The findings of this reseach, however, support Poba-Nzaou and Raymond (2011)'s proposition that, "when compared to large enterprises, [SMEs] appear to manage risk by following a reactive, informal or apparently unstructured, intuitive and incremental approach …rather than there being one 'ideal' risk management profile, different internally-consistent configurations of principles, policies and practices can be equally effective in minimizing … risk " (p185). This statement is extrapolated, based on the results of this research, that while SMEs may exhibit "informal or apparently unstructured, intuitive and incremental approach[es]' to risk management, they do informally follow a risk management process recognised by the literature.

This research found that the practices are employed in the prevention and mitigation risk handling modes and are based on the experience; knowledge and intuition of owner-managers as demonstrated in RQ1.They also leverage internal resources (people, knowledge, skills and relationships). This aligns with Lindbom et al (2015)'s belief that the capability to respond is not only related to available resources but to the nature of the event and the way in which resources are utilized in response to the particular event. They continue to explain that capability is associated with an agent (an organization, a person, a technical system or anything, for which capability is described) and the agent's ability to perform a task in response to a particular type of event i.e. risk-related event. Risk management capability is demonstrated by the selected OMs in this research through their capability to leverage resources and use them effectively in preventing and/or mitigating risk. This research, hence, augments Lindbom et al.'s (2015) theoretical proposition of risk management capability by providing empirical evidence that tests and supports the proposition.

A key finding in the context of the risk environment and supply chain risk management in selected SMEs is that the results of this research indicate that supply chain risks are not the most prevalent risks in the selected manufacturing SMEs in South Africa. Risks within the company operational environment, such as, financial, strategic and operations risks, take precedence. Supply chain risks on the demand side receive more focus than those on the supply side. This may be because of the macro-environmental factors that impact the demand side are perceived to be the primary cause of risk initiating events/actions/characteristics and these macro environmental factors have the greatest impact of the company operational environment. Demand side risks were commonly found to be demand uncertainty (this confirms the literature), loss of customers, inability to deliver customer service and supply chain structure. Supply side risk were commonly raw material price volatility (this confirms the literature), poor supplier service (late deliveries, quality), supplier availability and supplier relationships.

10.2.2 Contribution to Theory Gaps

As outlined in section 1.2, current conceptual frameworks on risk management in SMEs cover certain risk and risk management concepts and address some theoretical gaps in the research on SCRM in SMEs, but they fail to develop and present a holistic approach to better understand how supply chain risk is managed in SMEs.

Khan and Burnes (2007) suggest that there is a lack of understanding of risk in the SCRM research community, and propose that research into supply chain risk must be located within the broader study of risk, that is, risk theory and risk management (p210). This research addresses this gap through the development and testing of a conceptual framework based in risk theory, applying a subjective lens (the owner-manager) to the understanding of risk in the supply chain. The developed conceptual framework was assessed to present a valid representation of the supply chain risk/risk management process in established SMEs

10.2.3 Contribution to Methodological Gaps

As indicated in chapter 1, section 1.3, there is a broad and continuing call for more rigorous empirically grounded research in SCRM (Kilubi 2016, Tukamuhabw et al. 2015, Ho et al. 2015, Sohdi et al. 2012, Singhal et al. 2011, Khan and Burnes 2007, Jüttner et al. 2003) based on case studies (Ho et al. 2015, Sohdi et al. 2012, Khan and Burnes 2007), as well as mixed methods (Kilubi 2016) founded in solid conceptual frameworks (Tukamuhabw et al. 2015, Sohdi et al. 2012) and literature reviews (Singhal et al. 2011). This research further contributed to the gaps in qualitative research by using an empirically based multiple case study method grounded in a conceptual framework founded in risk theory.

10.2.4 Contribution to Context Gaps

Where very little research has been done on SCRM in SMEs in developing countries (Tukamuhabw et al., 2015), outlined in section 1.4, this research investigated SCRM in manufacturing SMEs in a developing country, South Africa.

10.3 Limitations

The multiple in-depth case study approach, while presenting a rich picture of the individual SMEs relies to a large extent on the aggregation of results which means that the more subtle nuances in the individual case studies may be overlooked and lost. This approach also limits the generalisability of the findings to the broader context of manufacturing SMEs in South Africa and globally.

The research involves an elaboration of theory in a specific empirical context. The results are thus limited to offering possible propositions regarding the developed framework that would require testing in different empirical contexts.

The limitations of this research study are also contained in the criteria of selection of the SMEs. Firstly, the SMEs were selected based on responses to a survey that only two employer associations were prepared to distribute to their member companies, thus limiting the spread of industries investigated. Secondly, the response rates to the surveys were very low, particularly in the furniture industry, and only a small number of respondents indicated their willingness to participate in follow-up interviews. In the furniture industry respondent pool, there were small sized company respondents, and very small companies were, thus, included in the case studies selected. In the metal industry respondent pool of owner-managers who were prepared to do follow-up interviews, some companies had to be excluded because they were owned by investment companies and not independently owned. The case study companies were then selected based on the criteria for the case study design, and convenience (i.e. location in Gauteng province). Thirdly, the criterion of “well-established (over 10 years old)” excludes younger companies at earlier stage in their life-cycle and thus does not address supply chain risk/risk management in these size classifications. This reduces the generalisability of the study to all manufacturing SMEs.

The data gathered for this investigation was limited to a specific six month period between June 2014 and November 2014. This was during and in the aftermath of labour unrest and strike action in the Steel and Engineering sector, and, thus, limits the study in terms of time and context.

10.4 Recommendations for Further Research

Within the ambit of the research gaps identified for this research, a myriad of potential research avenues still exist that have only been partially addressed by this study.

- The supply chain risk management processes, practices identified and the risk management capability assessment need to be further investigated and corroborated as part of more focused independent studies. These studies should include variables such as different industries, sizes of companies, a broader cross-section of life-cycle phases, types of ownership, history of survival (have survived significant risk events in the history of the company), products (largely niche), industrial sector (furniture vs metal), supply chain structure (relationships and information sharing, and facilities and equipment).

- Further research is required to understand the relationship between financial gearing and risk in SMEs. This may be particularly pertinent to the management of cashflow risk, using cash reserves, bank overdrafts or other mechanisms that ultimately impact the payment of suppliers.

- The link between supply chain structure and risk in SMEs requires further research.

- The demand side focus of the owner-managers discovered in this research, has not been identified or examined in the extant literature on supply chain risk in SMEs (refer to chapter 1 literature review). This may be attributed to the macro-environmental factors, particularly economic, identified above that create demand uncertainty, potential loss of customers and challenges in servicing customers. This requires further investigation to establish the veracity of these findings.

- Further testing and corroboration of the conceptual framework is required.
- More research on supply chain risk management in developing countries is required.

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