A CONCEPTUAL FRAMEWORK FOR THE ANALYSIS OF SUPPLY CHAIN RISK MANAGEMENT IN SMALL AND MEDIUM MANUFACTURING ENTERPRISES IN SOUTH AFRICA

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ABSTRACT

Theory, frameworks, tools and techniques used to analyse Small and Medium Manufacturing Enterprises (SME) have often been designed for application in Large Enterprises. This is predominantly the case when it comes to Supply Chain Management (SCM) and Supply Chain Risk Management (SCRM). SMEs, however, particularly in South Africa, have unique characteristics and challenges, often vastly different from those of large enterprises. This provides the impetus for the development of SME specific frameworks that take these differences into consideration. This paper presents an initial attempt to bridge this theoretical gap through the development of a conceptual framework for the analysis of Supply Chain Risk Management in Small and Medium Manufacturing Enterprises in South Africa.

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1 INTRODUCTION

Supply Chain Risk Management (SCRM) is a relatively recent area of research within the broader field of Supply Chain Management and consequently has deficiencies [10], [20], [17], [7] particularly in the context of small and medium enterprises (SME’s) [2], [3], [4]. Theoretical and Conceptual frameworks and models for the analysis of Supply Chain Risk Management have predominantly been developed within the context of the Large Enterprise and/or the Supply Chain network as a whole [17], [23], [16], [22], [11]. Limited literature on studies on SCRM in the context of Small Enterprises could be located [2], [3], [4], [24]. Similarly, literature on Risk Management in Small Business seems to be limited [25], [26], [27].

Small and large firms are fundamentally different, and small firms may share common characteristics, such as resource scarcity, which set them apart from larger organisations [28]. But, in today’s increasingly globalized economy, small and medium enterprises (SMEs) are now considered to be the major source of dynamism, innovation and flexibility in emerging and developing countries, as well as to the economies of most industrialized nations [29].

Thus, in the context of limited SCRM research in small enterprises and their unique features, the key question is: How do Small Manufacturing Enterprises Manage Risk within their Supply Chains?

Khan and Burnes [10] propose that research in SCRM needs to be grounded in broader risk theory. With this premise in mind, this paper seeks to propose a particular risk theory perspective in which a conceptual framework for the analysis of Supply Chain Risk Management in Small and Medium Manufacturing Enterprises in South Africa may be grounded.

The paper is structured as follows: a review of studies in SCRM in small enterprises is followed by a précis of the extant theories, practices and research concerning risk in a general business environment and then, in small enterprises; a synopsis of the National Small Business Act of South Africa (and amendments) is used to identify key qualitative criteria of particular interest to the development of a conceptual framework for SCRM in Small Manufacturing Enterprises in South Africa; these criteria are then further explored in Risk literature and distilled to provide a grounding for the framework.

2 SCRM AND SMALL ENTERPRISES

Karantana et al [9] define supply chains as “interlinked networks of suppliers, manufacturers, distributors and customers that have been set up to provide a product or service to customers”. Supply Chain Management involves and has evolved from fields such as purchasing and supply, logistics and transportation, operations management, marketing, organizational theory, management information systems, and strategic management [9].

Rao and Goldsby [17] identify a number of different definitions of SCRM in the extant literature, most notably those provided by Christopher and Peck [30], Norman and Lindroth [15], Juttner et al [7], Tang [31] and Manuj and Mentzer [32]. From these definitions, Rao and Goldsby [17] observe that “SCRM is an extension of the within-firm risk management ideology”. Despite small differences in the definitions, what generally emerges is that any approach to SCRM should encompass “understanding and reducing vulnerability to the supply chain as a whole” [17] as opposed to merely at a firm level.

A few studies examining supply chain risk management in SMEs could be located:

Finch [4] uses the information system environment and risk identification framework developed by Bandyopadhyay et al [33] to structure the literature and case study review. He finds that the risk exposure of large companies appears to increase when partnering with SMEs in business critical positions in the supply chain. SMEs also experience elevated
exposure to risk by partnering in a supply chain. The research, thus, adds to the evidence of the need to identify and understand the impact of risk in the supply chain as a whole and on SMEs in particular?

Faisal et al. [3] provide a conceptual framework for quantification and mitigation of information risks. Graph theory is applied for the quantification of the risks. Interpretive structural modeling (ISM) is utilized to gain insight into the interrelationships between information risk mitigation enablers. They identify eleven variables that can impact information risk in the supply chain from a literature review and through discussion with supply chain experts involved with SMEs. Some of these are: a lack of co-ordination across the supply chain, the inability to adjust in a continuously changing, unpredictable business environment [34], a lack of identification and development of contingency plans for the various risks that exist internally and externally to the organization, a lack of sharing of both risks and rewards between the members of the supply chain and a lack of continuous risk assessment.

Ellegard [2] discovers, using an interpretive case study based methodology, that small manufacturing companies predominantly apply similar risk management practices that are defensive. This generally encompasses risk elimination practices, including knowledge protection and local sourcing, in combination with relational practices such as fairness, loyalty, and the seeking of responsive, dependable and like-minded suppliers. The approach is, thus, optimized to simultaneously reduce supply risks, resources and time consumption.

Thun et al [24] examine the differences between SMEs and large-scale companies regarding SCRM through a survey based empirical study of SMEs in the automotive industry in Germany. They find that SMEs regard themselves as slightly more vulnerable to supply chain risk in comparison to larger organisations. They attribute this marginal difference to the high dependence of SMEs on large OEMs leading to higher risk exposure. There is no significant difference between SMEs and large organisations regarding the evaluation of key drivers of supply chain risks where key drivers were identified as developments towards globalisation and lean supply chains. There was a significant difference concerning the suitability of SCRM instruments. They found that SMEs focus on reactive instruments such as safety stocks and overcapacities (redundancies) whereas large enterprises tend to use preventative instruments that decrease the likelihood of incident occurrences such as high quality suppliers or on-time deliveries.

Sunjka and Sklar-Chik [35] found, through an empirical pilot study, that manufacturing SMEs are affected by similar risk issues but that there are indications of industry specific risks emanating from the supply side markets and the demand side markets. The majority of risk sources were of a macro-economic and socio-political nature. SMEs do not exhibit explicit or formalised supply chain risk management practices, but are conversant with the risks throughout their supply chain and manage these within their capability. Corroborating Thun et al [24] it was found that SMEs focussed less on reducing the root cause of events and approaches could be characterised as defensive.

Thus, seminal work with regard to SCRM in SMEs is needed [24]. Khan and Burnes [10] suggest that broader risk theory should provide the fundamental foundation.

3  RISK MANAGEMENT

As proposed by Khan and Burnes [10], future research in SCRM needs to be grounded in broader risk theory. The purpose of this section, therefore, is to gain an understanding of the extant theories, practices and research concerning risk in a business environment.

Rao and Goldsby [17] discover that there are “few clear and concise” definitions of risk. They argue that this is the result of “tension in the academic literature on the nature of risk itself”, that is, risk may have a downside possibility or outcome as well as an upside possibility where “performance may be higher than expected” [17]. They, however, note that most researchers in business studies seem to “use the term risk to refer to some form of
negative change with respect to performance” [17]. They ultimately prefer the Holton (2004) definition that refers to a risk situation as one that “entails exposure to two essential components: exposure to an event and the uncertainty of possible outcome” [17] of that event.

Risk Theory has its origins in the insurance industry. Almer [36] points out that in practice, risk theory can be identified with insurance risk theory or with probability theory applied to insurance risk problems. He concludes that probability theory, thus, provided insurance theory with a powerful instrument for “exact definitions and for risk analysis”. Considerable developments in the use of probability theory for the prediction of expected loss and pure (event) risk in insurance theory have been made by actuaries and insurance theoreticians, mainly in the life insurance industry [18]. According to Valsamakis [18] risk may be defined as the “uncertainty surrounding an event and outcome in a specific situation”.

Lewis [13] indicates that, emerging from a regulatory focus on operational risk management to ensure the sustainability of companies, greater attention has been paid to operational risk quantification, a wide range of statistical methods for measuring, modeling and monitoring operational risk have surfaced that have “proven their worth in real-world business situations”.

Risk management has classically fallen within the ambit of financial management and has been described in financial literature as “being concerned with identifying and managing a firm’s exposure to financial risk where financial risk is defined as the variability in cash flows and market values caused by unpredictable changes in commodity prices, interest rates and exchange rates” [8]. J.P.Morgan et al [6], however, propose that the principles of risk management of derivatives are equally applicable to the management of “other risks”. It is, however, the responsibility of the management of each organization “to develop a risk management process that is appropriate to its specific business”.

Valsamakis et al [18] perceive risk management, in its modern conception, to be a “systematic and holistic business discipline”. They identify risk control and risk financing as two principle techniques, whose relationship modern risk management seeks to optimize. Valsamakis et al [18] stress that there is a “lack of an integrated approach to risk management”, that is, risk management needs to be assimilated with the other managerial activities while the risk financing and risk control functions should be amalgamated. These deficiencies seem to be the result of a discrete, piecemeal approach to risk management which has been embedded in the insurance industry, where the issues of risk identification and quantification have been ignored. While there has been development of risk management models, Valsamakis et al [18], state that these concentrate on “specific interests rather than the more fundamental issues” as outlined above.

Klimczak [12] conducted an empirical investigation into major corporate risk management theories, namely, financial theory, agency theory, stakeholder theory and new institutional economics, with the aim of verifying the theories in practice. The results of the research indicate that there is little supporting evidence for financial economics and agency theory hypotheses, while stakeholder and new institutional economics may offer new insights into the determinants of risk management.

The rise in prominence of Corporate Governance and Risk Management over the last three decades can be attributed to some extent to the publication of the Cadbury Report (1992), the Turnbull Report (1999) in the United Kingdom and the King Reports (1994, 2002, 2009) in South Africa [37]. Although, voluntary, these corporate governance codes have emphasized that “boards of directors have an explicit responsibility to ensure that all potential threats to the business enterprise have been systematically identified, carefully evaluated and effectively controlled” [37]. This, New Institutional Economics provides a different perspective on risk management in that the focus is shifted to governance processes and
No empirical studies on this risk management approach had been carried out at the time of the research.

Hutter and Power [5] point out that the ‘risk society’ thesis proposed by Beck (1992) encapsulates a paradox where “the risks we face today are largely ‘manufactured’, potentially fatal by-products of an industrial machine which demands a new politics to control it” [5]. Organizations are thus, “critical agents of any ... risk society” because “organizations are both centres for processing and handling risks and potential producers and exporters of risk” [5]. The “organizational networks” created to manage risks, themselves promote new consequences and risk, that is, “the risk of risk management” or “disasters and accidents are in a very important sense organized” [5].

Nocco and Stulz [14] explain that over the last decade corporate risk management has developed beyond the insurance and financial exposures hedging to comprise many other categories of risk, most prominently, operational risk, reputational risk and strategic risk. The function of risk management within companies has risen in prominence to a senior executive level in the form of a chief risk officer and the board of directors has the responsibility of monitoring and controlling risk indicators. There are essentially two approaches to risk management. Firstly, the traditional approach is siloed in nature, that is, different risks are delegated to various specialized people in the organization who use different instruments to manage the designated risks. Integrated Risk Management (IRM) or Enterprise Risk Management (ERM), however, calls for a co-ordinated, strategic framework or a “portfolio view” in the management of risk.

Nocco and Stultz ([14] propose that companies apply the ERM approach gain “long-run competitive advantage” over those using “the one risk at a time” approaches. They believe that although the principles underlying the ERM theory are well-founded, the implementation of ERM lends scope for further research. In particular, “a more complete understanding of firm value is required”; further assistance is required in the estimation of correlation between the various risk types that is critical to the measurement of risk across the whole firm; and, more research is required on the quantification, assessment and understanding of reputational and strategic risks.

More recent research by Voinea and Anton [19] spurred by the recent global financial crisis suggests that certain weaknesses in risk management. They point to a number of studies that stress the requirement for improved Integrated Risk Management or ERM.

Finally, Corvellec [1] in contrast, claims that the practice of risk management should be disengaged from the risk management theories and that “risk management practices do not need to be explicit but can be embedded in the management tactics that characterise the organizations operational mode” [1]. He continues to suggest that formal established risk management models present a “very specific view about uncertainty and how it should be dealt with ...[They] are “likely to destabilize and disrupt existing practices of risk management ...[and] may even increase the risks that the organization is exposed to” [1]. Consequently, “redefinition of the boundaries and nature of risk management theory and practice” [1] is required. This may be particularly relevant to Small Business Enterprises where a lack of resources, among other things, could preclude formal risk management practices.

Thus, there are a number of different notions and theories on risk, risk management and its practice. What emerges most significantly, however, is that there is a need for more research in the field of modern risk management to enhance understanding of the expanding scope and provide guidance for its practice.

4 RISK MANAGEMENT IN SMALL ENTERPRISES

The following studies on risk management in small enterprises could be located.
Leopoulos et al [25] examine the possibilities of computer-aided quantitative risk analysis tools in a project environment and suggest that these would benefit SMEs “since due to their size they cannot afford project cost overruns”. They primarily focus on an analysis of the analytical tools and suggest that “research efforts ... should be put towards the implementation of risk management techniques in SMEs”.

Blanc Alquier and Lagasse Tignol [26] present the PRIMA (Project Risk Management) method and tools. The method is based on a decision support system for the bidding process, “considered in project management as the most important phase in terms of rewards”. The benefits to SMEs of this method are the rapid building of more accurate and competitive bids, and the identification of the most opportune bids.

These two studies provide little or no insight in terms of understanding the “how” of risk management in small business, focusing more on possible tools to assist SMEs manage risk in a project environment.

Gilmore et al [27] investigate the risk perceptions and risk management approaches, based on the cognitive-orientated approach to entrepreneurial risk, of 40 entrepreneur/owner-managers of small firms (more than 10 and less than 250 employees) across a number of different industries (including manufacturing) in a regional economy in the United Kingdom. They showed that the dominant areas in which risk was experienced were in activities and decisions relating to cash flow, company size i.e. growth, entering a new market or new business area, and delegation of responsibilities to staff. Their study further revealed that the owner managers employed various strategies to manage and minimize the risk associated with these activities. The two key risk management strategies were the use of networking (with contacts to elicit their advice and/or information) and the drawing on their managerial competencies (experiential knowledge built over time).

The Gilmore et al [27] study provides relevant insights into the way in which the investigation of how risk is managed in small enterprises can be approached. Because the owner-manager is the primary decision-maker within the small business, it is important to understand his personal perceptions of risk and how he/she decides to manage these risks. The study does not address the supply chain in particular, nor does it uncover anything explicitly relevant to risk in the supply chain. As the owner-manager and entrepreneur are in many instances synonymous [38] more insight on the profile of the owner-manager is sought from the theory of entrepreneurship [39], [40], [41].

5 SMALL ENTERPRISE AND ENTREPRENEURSHIP

Small enterprise and entrepreneurship have often been perceived as synonymous [38]. While the Theory of Entrepreneurship provides a number of different conceptions of the entrepreneur and entrepreneurship, what emerge are the following important aspects [45]:

- the entrepreneur and entrepreneurship are involved with,
- Identifying real business opportunities,
- Innovation and creativity in discovering something new and different,
- Obtaining resources in the form of capital, labour and operating equipment,
- Creating or growing a new or existing business,
- Taking on risk of a personal and financial nature,
- Receiving reward in the form of profit and/or an increase in business value,
- Business management in the form of planning, organising, leading and controlling business functions.

These features may relate to an independent business owner or to someone within a large corporation who has the freedom to build a business area in their own way with profit.
motives [38]. Because of the heterogeneous nature of small business [39], [42], this paper postulates that the likelihood of all these aspects or only some relating to all small business owners will depend on the inherent characteristics and behaviour of the entrepreneur or owner/manager; and these may be determined by the inherent size and stage of development of the enterprise [43]. This may be evidenced by certain well-documented characteristics of small businesses that include limited resources (such as finance, time, marketing knowledge); lack of specialist expertise (owner-managers tend to be generalists rather than specialists); and limited impact in the marketplace [43].

6 SMALL ENTERPRISE IN SOUTH AFRICA

There is no universally accepted definition for a Small Enterprise [21], but consensus in the literature reveals the following common criteria ([21], [46] as cited by Niemen [38]): a small business is

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

The National Small Business Amendment Act [44] aligns with these criteria by providing both qualitative and quantitative criteria in defining a ‘small enterprise’. This definition is of particular importance as it is the one used by policy makers to identify this form of business entity. Key qualitative criteria are:

“‘small enterprise’ means a separate and distinct business entity, together with its branches or subsidiaries, if any, including co-operative enterprises, managed by one owner or more predominantly carried on in any sector or subsector of the economy mentioned in column 1 of the Schedule and classified as a micro-, a very small, a small or a medium enterprise by satisfying the criteria mentioned in columns 3, 4 and 5 of the Schedule” [44]

The Schedule provides the quantitative criteria. An extract for the sector of interest for this paper i.e. manufacturing is shown below:

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector or sub-sector in accordance with the Standard Industrial Classification</td>
<td>Size of Class</td>
<td>Total Full-time Equivalent (FTE) of paid employees Less than</td>
<td>Total Turnover Less than</td>
<td>Total Gross Asset Value (fixed property excluded) Less than</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Medium</td>
<td>200</td>
<td>R51 mill</td>
<td>R19 mill</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>50</td>
<td>R13 mill</td>
<td>R5 mill</td>
</tr>
<tr>
<td></td>
<td>Very Small</td>
<td>20</td>
<td>R5 mill</td>
<td>R2 mill</td>
</tr>
<tr>
<td></td>
<td>Micro-</td>
<td>5</td>
<td>R0.2 mill</td>
<td>R0.1 mill</td>
</tr>
</tbody>
</table>

Niemen [38] points out that these quantitative criteria have been subject to criticism for a number of reasons. Firstly, 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. Secondly, comparative analysis over time is
difficult based on the monetary criteria, as indices need to be developed to account for price changes (inflation).

For the purpose of this paper Small Enterprise will incorporate the Medium and Small Classes in the manufacturing sector in the Schedule. Of particular interest for this paper is the notion of a single (or very few people) manager/owner where the business is without a formalised management structure.

7 CONCLUSION

The preceding discourse, thus, presents the following arguments:

- Small Enterprises are fundamentally differently from Large Organisations, and this should be recognised in the formulation of theory, tools and techniques for SMEs.
- There are limited studies on SCRM and RM in Small and Medium Enterprises, thus more research in this area is required.
- “risk management practices do not need to be explicit but can be embedded in the management tactics that characterise the organizations operational mode” [1] which may be particularly relevant to SMEs.
- The owner-manager is the primary decision-maker within the small business, hence it is important to understand his/her personal perceptions of risk and how he/she decides to manage these risks i.e. his/her risk behaviour/profile.
- The Theory of Entrepreneurship may provide some insights into the profile of the owner/manager.

8 THE BASIS FOR THE FRAMEWORK

Therefore, to understand how small enterprises manage risk in their supply chains, it is pertinent to appreciate that within the context of the small business that risk management practices may not be explicit and may well be embedded within the management tactics that are inherent to the operational mode of the firm, as suggested by Corvellec [1]. Additionally, because small businesses are owner managed without formalised management structures [38], it would seem that the operational mode of the firm would be highly dependent on the decision-making behaviour of the owner/manager. Hence, developing the risk profile of the owner/manager i.e. the individual decision-maker would provide a basis for understanding how risk would be managed within the supply chain of the SME.

A risk profile may be constructed using behavioural interviewing techniques where the interviewee is asked to recount a series of specific Supply Chain relevant risk situations, then describe his/her personal actions taken in these situations, and the perceived success of the result of his/her actions on the situations [48],[49]. The risk behaviour of the owner/manager, and consequently the small business, in particular supply chain risk situations, may then be classified more formally as follows [50],

- Risk Avoidance - Do something to remove it. Use another supplier for example.
- Risk Transference - Make someone else responsible. Perhaps a Vendor can be made responsible for a particularly risky part of the project.
- Risk Mitigation - Take actions to lessen the impact or chance of the risk occurring. If the risk relates to availability of resources, draw up an agreement and get sign-off for the resource to be available.
- Risk Acceptance - The risk might be so small the effort to do anything is not worthwhile.

The theoretical and conceptual basis for this premise and, hence, for the framework, is illustrated in Figure 1 below. All of the concepts in the framework require further research and development, as pointed out in the literature.
9 REFERENCES


