SUPPLY CHAIN RISK AND SMALL AND MEDIUM MANUFACTURING ENTERPRISES IN SOUTH AFRICA

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ABSTRACT

Supply Chains are subject to disruptions potentially resulting in financial and/or other non-financial losses (e.g. damage to reputation and SC relationships) to constituent organizations. In the case of Small and Medium Enterprises (SMEs) these disruptions and subsequent impacts can have severe effects which can jeopardize their survival. While larger enterprises may recover from the impacts of certain risks, their smaller counterparts are hampered by a lack of resources and the fiscal constraints when deciding on strategies to address these risks. Evidence shows that Manufacturing SMEs contribute 46 percent towards the total employment and 18 percent towards the manufacturing sectors income, hence, forming critical links in large Supply Chains and performing a vital role in the economy. Therefore, Supply Chain Risk Management (SCRM) is pertinent in enabling SMEs in managing the risk and effects of those risks.

This exploratory investigation looked at 8 SME’s operating in different industries in the Gauteng area in South Africa. Data was collected through semi-structured interviews with company owners.
1 INTRODUCTION

SMEs are perceived as vital to socio-economic growth, including Gross Domestic Product (GDP) growth, and sustainable development in emerging economies for many reasons. These include such aspects as their familiarity with local communities, their perceived capacity to create employment for low-skilled workers due to their labour-intensive nature and their “innovation and sustainable initiatives due to inherent flexibility and risk-taking ability”. [1]

In South Africa, “at least 90% of the manufacturing sector is small and medium, in terms of enterprise size...[These enterprises] contribute about half of the employment; half of the gross domestic product and 1 out of 5 units exported is produced in the small and medium sector in South Africa”[2]. Hence, South African Manufacturing SMEs perform a vital role in the economy and form critical links in large Supply Chains.

Finch [3] posed the question of whether large companies increase their exposure to risk by incorporating small to medium enterprises (SMEs) in “business critical positions” in their supply chains. He concluded that “inter-organizational networking” did elevate risk exposure and this was exacerbated by the presence of SMEs as supply chain partners. This is because risk events impact SMEs more severely due to their “size and limited resources” (human, structural and information). This consequently highlights the importance of understanding risk management and business continuity planning across the whole supply chain.

The importance of SMEs in the supply chains of large companies, including Multi-national Corporations, cannot, however, be under-estimated [4]. Benefits, such as, productivity improvement, greater innovative capacity, increased access to talent and local markets can be derived from partnering with SMEs. This is because smaller businesses have lower overheads, specialised knowledge, innovative products and adaptability to changing conditions [4], [1]. Additionally, SME’s that manage their own risks and assist larger supply chain partners in mitigating their risks are sought after in supply networks [4], thus, increasing the competitiveness and sustainability of SMEs.

Supply chain risk management (SCRM) is a field of escalating importance and is aimed at developing approaches to the identification, assessment, analysis and treatment of areas of vulnerability and risk in supply chains [5].Limited studies examining supply chain risk management in SMEs internationally [3], [6], [7] and in South Africa could be located [8].

This paper, thus, contributes towards addressing this gap through an exploratory pilot study. The investigation attempts to find evidence of the management of supply chains risks in South African Manufacturing SMEs. This is achieved through gathering information on the nature or types of risks faced by South African manufacturing SMEs in their supply chains and if, and how, these are being managed.

The paper, firstly, presents only the outcome of a review of the SCRM literature to identify risk typologies, and methods of SCRM. Next, the results of a qualitative study of SCRM practices in 8 SMEs are presented, and lastly salient results are identified for further investigation.

2 LITERATURE REVIEW

2.1 Risk Management

Risk can be defined as a probability of danger, damage, loss, injury or other unwanted results [9]. Mitchell [10] asserts that risk is related to ‘the probability of that loss and the significance of that loss to the organisation or individual’. According to Valsamakis [11] risk may be defined as the “uncertainty surrounding an event and outcome in a specific situation”. “Risk management is a managerial function aimed at protecting the organization, its people, assets, and profits, against the physical and financial consequences (adverse) of event risk. It involves planning, coordinating and directing the risk control and the risk financing activities of the organization” [11].
2.2 Supply Chain Risk Management

Modern supply chains are complex, with many parallel physical and information flows occurring in order to ensure that products are delivered in the right quantities, to the right place in a cost-effective manner [12]. In the past, when firms manufactured in-house, sourced locally and sold directly to the customer, risk was less diffused and easier to manage. With the advent of increased product/service complexity, outsourcing and supply networks crossing international borders, risk is increasing and the location of risk has shifted through complex changing supply networks [9]. The risk of disruptions caused by both factors within supply chains and outside environmental forces is one of the main concerns of both practitioners and researchers [13].

Supply chain management includes links upstream (e.g. supply and manufacturing) and downstream (e.g. logistics and distribution) value chain entities [15]. Successful supply chain management requires the integration of these value chain entities to create cooperative and collaborative environments that facilitate information exchanges, materials and cash flows [16]. Slack and Lewis [24] expand this definition to that of a Supply Network and explain that,

“Supply network strategy is the strategic direction of an organisation’s relationships with suppliers, customers, suppliers’ suppliers, customers’ customers, etc... it includes ... ensuring that the organisation has an understanding of its supply networks, determining appropriate supply network relationships for its various activities, understanding supply network behaviour, in particular, how the dynamics of a supply network will affect the organisation and how networks can be managed (or at least influenced) for the long-term benefit of the organization” [24]

They continue to outline the three levels of the supply network as follows:

- The internal supply network is the interconnected network of ‘micro operations’ within a company. These may be departments, sites or whole divisions, depending on how the ‘company’ is defined [24].
- The immediate supply network incorporates the suppliers and customers (and co-operators) with which the company has direct contact [24].
- The total supply network combines the network of Tier 1 suppliers and customers, Tier 2 suppliers and customers and so on. In practice this concept is often limited to one or two Tiers from the focal company [24].

Therefore, any approach to managing risks from a supply chain perspective must have a broader scope than that of a single organisation and provide insights regarding how the key processes have to be performed across at least three organisations (supplier, operations, customer) [12]. Supply chain risk management (SCRM) includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long-term performance of the individual firms and the supply chain as a whole in a cohesive and high-performing business model [17]. SCRM is most often a formal process that involves identifying potential losses, understanding the likelihood of potential losses, and assigning significance to these losses [14].

2.3 The Nature or Types of Supply Chain Risks

Risks are often classified in terms of the resultant loss associated with the risk [7], such as financial loss, performance loss, physical loss, physiological loss, social loss and time loss [20]. On the other hand, the source of the risk also provides a means of classifying the risk, providing a schema for typifying the risk [7]. The identification of sources of risk plays a fundamental role within supply chain risk management. Supply chain risk sources are any variables which cannot be predicted with certainty and from which disruptions can emerge [12]. Mason-Jones and Towill (1998) identify five types of overlapping risk sources [18]: Environmental, Demand, Supply, Process and Control.
Environmental risk sources comprise any external uncertainties arising from the supply chain such as disruption caused by political (e.g. fuel crisis) natural (e.g. foot and mouth outbreak, fire, earthquake) or social (e.g. terrorist attacks) uncertainties [12]. Demand risk sources arise from the uncertainties associated with user demand of products and the fluctuation of markets according to consumer demand, that is, any risk associated with outbound logistics flows and product demand [19]. Supply risk sources are the uncertainties associated with suppliers, which include physical delivery (or non-delivery) as well as the relationship between the supplier and operator, or, any risk associated with inbound logistics and product (or raw material) supply [19]. Processes and internal controls can either amplify or absorb the effect of risks in the supply chain and refer to the design and implementation of processes within and between the entities in the supply chain [12]. Further risks can still be identified in broad categories that do not include the supply and demand risks, but rather the operational environment that firms exist in. These include: strategic risk, operations risk, asset impairment risk, reputation, competitive, financial, fiscal, regulatory and legal risk [9].

For the purpose of this exploratory study, the Mason-Jones and Towill (1998) risk classification is utilized and modified using the Slack and Lewis [24] supply network definition to incorporate all aspects of the supply network (refer to section 3).

2.4 Supply Chain Risk Management In South Africa

The MIT Centre for Transportation and Logistics Global Risk Survey provides a broad view of Supply Chain Risk Management across South African companies. The survey targeted people in several industrial groups (manufacturing, distribution, and retail companies) whose job function was related to supply chain management, general business management or financial management. Almost 80% of the respondents were from South Africa, about 50% were manufacturing companies and overall about 20% were SMEs.

Survey findings find that Supply Chain Risks in South Africa emulate developed economies but certain risks are on average much higher and resemble the risk profiles of developing countries [22].

“In South Africa, protracted labour disputes feature as one of the major risks to supply chains, being 2.5 times higher than the world average ... Comparatively, the local survey finds that extended loss of electricity is a risk that is 5 times higher than the world average. Employee theft/executive misdeeds come in 4 times higher and disease/infestation, 2.3 times higher. Seven types of risk were identified by the survey, including ‘internal operations disruptions’, ‘people not available’ and ‘cannot ship or deliver products’, all of which have a bearing within labour disputes.” [22]

The survey presented the ratings of South African companies of supply chain risks in order of importance (Table 1, A). The survey further listed the efforts of companies to mitigate/manage risk along the supply chain (Table 1, B) [21].

The mitigation procedures were not related to any particular risk. Also noted is that in South African supply chains, companies tend to work more with customers than suppliers in addressing risk management [26]. In terms of risk mitigation perceptions, South African companies believe in a local response over a central risk response action. This falls in between the North American and European approaches, as identified by the global survey findings [21].

These survey findings provide a basis for comparison of the results for this investigation.
Table 1: Supply Chain Risks and Mitigation Procedures

<table>
<thead>
<tr>
<th>A. Supply Chain Risks</th>
<th>B. Risk Mitigation Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Raw material supplier failure</td>
<td>• Analyze incidents, identify process improvements</td>
</tr>
<tr>
<td>• Transportation carrier failure</td>
<td>• Have business continuity plan</td>
</tr>
<tr>
<td>• Finished goods manufacturing failure</td>
<td>• Actively work on SCRM</td>
</tr>
<tr>
<td>• Product quality failure</td>
<td>• Have a “risk” manager or group</td>
</tr>
<tr>
<td>• Economic recession or market collapse</td>
<td>• Monitor world events for incidents that may affect the supply chain</td>
</tr>
<tr>
<td>• Failure of major software systems</td>
<td>• Have a formal security strategy</td>
</tr>
<tr>
<td>• Spike in raw materials cost</td>
<td>• Work with suppliers on SCRM</td>
</tr>
<tr>
<td>• Extended loss of electricity (&gt;1 day)</td>
<td>• Work with law enforcement/emergency management on SCRM</td>
</tr>
<tr>
<td>• Inventory write-off due to new design change</td>
<td>• Work with customers on SCRM</td>
</tr>
<tr>
<td>• Cash crisis due to customer delayed payment</td>
<td>• Risk manager goes beyond just buying insurance</td>
</tr>
<tr>
<td></td>
<td>• Have business continuity manager/group</td>
</tr>
<tr>
<td></td>
<td>• Have emergency operations center</td>
</tr>
<tr>
<td></td>
<td>• Simulate different supply chain risks and disruptions</td>
</tr>
</tbody>
</table>

2.5 SCRM Research in SMEs

As has been mentioned, limited studies examining supply chain risk management in SMEs internationally [3], [6], [7] and in South Africa could be located [8]:

- Finch (2004) uses the information system environment and risk identification framework developed by Bandyopadhyay et al (1999) to structure the literature and case study review [3].
- Faisal et al. (2006) 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 in India [6].
- Ellegard (2008) discovers, using an interpretive case study based methodology, focusing on the supply side, that small manufacturing companies (in Denmark) predominantly apply similar risk management practices favouring probability reduction over effect reduction and information retrieval [7].

Whether any, or all of these apply in SA cannot be stated as no literature addressing SCRM in SMEs in the context of the South African environment can be located, except for:

- Sunjka and Bindemen (2011) who test the application of a system-oriented SCRM model in an SME in South Africa [8].

2.6 Small And Medium Enterprises In South Africa

The National Small Business Act of South Africa of 1996, as amended in 2003, classifies an SME as “a separate and distinct entity including cooperative enterprises and non-governmental organizations managed by one owner or more, including its branches or subsidiaries if any is predominantly carried out in any sector or sub-sector of the economy mentioned in the schedule of size standards and can be classified as a SME by satisfying the criteria mentioned in the schedule of size standards” [23]. Table 2 provides a summary of the schedule standards utilized to define SME according to the manufacturing industry.
Table 2 SMME* Definition According to the National Small Business Amendment Act of 2003

<table>
<thead>
<tr>
<th>Industrial Classification</th>
<th>Size of Class</th>
<th>Total Full-time Paid Employees Less than</th>
<th>Total Turnover (Millions) Less than</th>
<th>Total Gross Asset value (Millions) Less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>Medium</td>
<td>200</td>
<td>R51.00m</td>
<td>R19.00m</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>50</td>
<td>R13.00m</td>
<td>R5.0m</td>
</tr>
<tr>
<td></td>
<td>Very small</td>
<td>20</td>
<td>R52.00m</td>
<td>R2.0m</td>
</tr>
<tr>
<td></td>
<td>Micro</td>
<td>5</td>
<td>R0.2 m</td>
<td>R0.10 m</td>
</tr>
</tbody>
</table>

*Small, Medium, Micro Enterprises

The Institute of Risk Management South Africa (IRSA) (2009) has found that 60% of SMEs business start-ups shut within three years [28]. The objective of the research was to indicate how risk management can help aid the survival potential of SMEs. Olawale and Garwe (2010) quote a failure rate as high as 75%, one of the highest in the world [27]. Sheers (2011) shows a progressive failure rate: 40% fail in their first year, 60% in their second year and 90% in their first 10 years of existence [29]. An established SME is defined as having been in existence for more than 3.5 years [34].

SMEs in South Africa face a multiplicity of factors such as; legal and regulatory environment, access to markets, access to finance and affordable business premises, the acquisition of skills and managerial expertise, access to appropriate technology, the tax burden, crime and corruption, unstable electricity supplies, and access to quality business structure in poverty nodes [25]. SMEs are vulnerable during expansion phases and are less likely to have in-house capabilities for sound asset and risk management [26]. The main problem with many SMEs is that they usually considered risk management as a large business solution [28].

3 RESEARCH METHODOLOGY

This study was conducted blind of the MIT survey, and hence, provides an unbiased means of comparison between the results. Because of the exploratory nature of this study, that is, the proposition of “what” and “how” questions, a qualitative approach was ascertained to be appropriate [30]. Qualitative research involves analysis of data such as themes (e.g., from interviews), pictures (e.g., video), or objects (e.g., an artifact) while quantitative research analyses numerical data [31].

Based on the literature on supply chain risk management, a semi-structured interview questionnaire was developed that took into account the various risks that an SME might face along its entire supply chain. The categories of risk were defined as five distinct elements and analysed according to these broad themes (Figure 1):

- Supply side risk - Risks directly associated with the supplier (immediate supply network)
- Demand side risk - Risks directly associated with the customer (immediate supply network)
- Internal Risk - Risks faced by the business in its own operational capacity (includes process and control), that is the internal supply network.
- External Risk - Risks faced by the business along the supply chain beyond the immediate supply network (the total supply network), for example, second tier suppliers and customers, competitors (company C in Figure 1)
- Environmental Risk - Risks faced by the business that are outside of the total supply network, for example, natural disasters, political unrest, market changes, economic recession, social conditions, industry conditions

The questionnaire distinguished between the five elements. Questions also sought to elicit any risk management practices, and mitigating actions that were being employed by the SMEs. Through the flexible, semi-structuring of the interviews, it was desired that the respondent was afforded the ‘freedom to talk about what is of interest or importance to them’, thus, allowing the conversation to flow more naturally and in potentially unexpected directions [32]. Interviews were conducted with senior members or managers of the SMEs.
identified as willing to participate in the research. Interviews lasted 30-90mins depending on the time and availability of the interviewees.

Figure 1 Supply Chain Risk Framework (adapted from Slack and Lewis (2011))

Companies in Gauteng were selected on the basis that they satisfied the criteria of being classified in terms of the National Small Business Act 1996 (2003) of South Africa as a SME in the Manufacturing sector. The SME should be established, that is, have been in existence for more than 3.5 years. The SME should form part of the Supply Chain, on the supply side, of a large enterprise. This resulted in a total sample of 8 enterprises (Table 3):

Table 3 Companies Interviewed

<table>
<thead>
<tr>
<th>Company*</th>
<th>Interviewee(s)</th>
<th>Classification</th>
<th>Age of Co.</th>
<th>Type of Work</th>
<th>Product Type</th>
<th>Key Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet Metal Co.</td>
<td>Owner</td>
<td>Small</td>
<td>45 yrs</td>
<td>Customised Batch Manufacturing</td>
<td>Sheet metal products and steel construction</td>
<td>Large Building Contractors and Large Co.s e.g. Parastatals</td>
</tr>
<tr>
<td>Tooling Co.</td>
<td>General manager</td>
<td>Small</td>
<td>30 yrs</td>
<td>Standard and Customised Tooling Manufacturing</td>
<td>Specialised tooling for bending and cutting sheet metal</td>
<td>Local and International End Users</td>
</tr>
<tr>
<td>Valve Co.</td>
<td>General manager</td>
<td>Small</td>
<td>7 yrs</td>
<td>Casting</td>
<td>4 standard valve types and customised items</td>
<td>Large Co.s e.g. Parastatals and mining co.s</td>
</tr>
<tr>
<td>Air Co.</td>
<td>Operations Manager &amp; Sales Engineer</td>
<td>Small</td>
<td>+4 yrs</td>
<td>Manufacturing and Services</td>
<td>Filters for all types of HVAC and Industrial Filtration Systems</td>
<td>Large Co.s E.g. Hospitals, Mines, Shopping Malls</td>
</tr>
<tr>
<td>Comp Co.</td>
<td>Owner</td>
<td>Small</td>
<td>23 yrs</td>
<td>Specialised design and manufacturing</td>
<td>Composite materials products</td>
<td>Large Commercial and military Co.s</td>
</tr>
<tr>
<td>Auto Co.</td>
<td>Facilities, Equipment, H&amp;S Manager &amp; Factory Floor Supervisor</td>
<td>Medium</td>
<td>36 yrs</td>
<td>Manufacturing of automotive trim components</td>
<td>Trim components, spoilers, car consoles, inner liners and others</td>
<td>Large Automotive OEMs</td>
</tr>
<tr>
<td>Uni Co.</td>
<td>Head of production (part-owner)</td>
<td>Medium</td>
<td>+30 yrs</td>
<td>Manufacturing</td>
<td>Hose clamps, metal clips &amp; springs, specialised metal pressings</td>
<td>Local and international distributors</td>
</tr>
<tr>
<td>Fast Co.</td>
<td>Production Manager and Warehouse Manager</td>
<td>Medium</td>
<td>30 yrs</td>
<td>Manufacturing</td>
<td>Fasteners, rivets, bolts</td>
<td>Automotive OEMs and international co.s</td>
</tr>
</tbody>
</table>

* Company names are not the real names
Because interviewees were largely unfamiliar with the nature of Supply Chain Risk Management and the associated terminology, the analysis was largely interpretive [43]. To distil data relevant to the research, a vertical analysis [33] was done for each interview transcription. This involved summarising and paraphrasing information into the risk categories and sub-categories, identified above. These were then consolidated and tabulated (Table 5).

4 RESULTS AND DISCUSSION

The analysis of the interviews was interpretive and the classification of the risks into the 5 categories of the Supply Chain Risk Framework was at the discretion of the researchers based on the definitions of the categories (see section 3). An example of the analysis of the risks is shown in Table 4 below:

Table 4 Example of Risk Analysis

<table>
<thead>
<tr>
<th>Risk Classification</th>
<th>Risk Source</th>
<th>Risk Description</th>
<th>Risk Effect</th>
<th>Mitigating actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply side</td>
<td>Supply side</td>
<td>Disruption in Raw materials and fuel supply</td>
<td>Place advance orders for raw materials and fuel</td>
<td></td>
</tr>
<tr>
<td>Demand side</td>
<td>Demand side</td>
<td>Penalties for late delivery</td>
<td>Liaise/communicate with customers</td>
<td></td>
</tr>
<tr>
<td>Internal</td>
<td>Internal</td>
<td>Disruptions to production</td>
<td>Store fuel and raw materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Manufacture safety stock for strike period</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shut down factory and work from a remote location</td>
<td></td>
</tr>
<tr>
<td>External</td>
<td>Environment</td>
<td>Labour Strikes</td>
<td>Receive advance notification of strike form unions</td>
<td></td>
</tr>
</tbody>
</table>

Union strike action can lead to disruptions in the supply of raw materials and fuel, and stoppages in production which in turn impact the ability to deliver the product to the customer on-time potentially invoking service level agreement penalty clauses or loss of the customer. A number of mitigating actions across the supply chain are implemented.

The following sections describe the risks faced by the SMEs within each category and the associated management practices or mitigation actions implemented by the SMEs.

4.1 Supply Side

On the supply side, the company’s had common and different risk issues. Risks and risk effects common to most companies (>50%) interviewed were:

- Raw material price volatility due to changes in the market demand for the raw material resulting in variability in costs and product prices
- Lack of availability of the raw material due to changes in the market demand for the raw material causing delays in production and finished product delivery
- Variability in the quality of the raw materials causing variability in product quality
- Loss of electricity supply causing production disruptions and work-in-progress scrap

Varying mitigation factors used to counter these risks included generic risk responses like maintaining strong relationships with the supplier and service level agreements, to building delays into the lead time and having suppliers very close to the business. The loss of electricity supply was usually mitigated through the use of generators. All companies
identified a strong relationship with a few of their suppliers as being critical to overcoming a large amount of risk along the supply side of the supply chain.

Industry specific supply risks were exposed. For example, Sheet Metal Co. operates in the steel industry and Fast Co. operates in the automotive industry. The major raw material required by Sheet Metal Co. and Fast Co. is steel. Problems experienced by Sheet Metal Co. and Fast Co. with the supplier are: unstable steel prices, extended material lead times in some instances, and BBBEEE. Recently, the ArcelorMittal plant in Newcastle shut down which affected the supply and prices of steel. Market monopolies by steel suppliers also contribute to steel price volatility. The 2010 FIFA world cup and earlier Beijing Olympics affected the supply of steel as major quantities of steel were being used for stadia construction. These events resulted in market shortages of steel and particularly for SMEs in the steel industry. Other issues affecting the steel supply side are fuel hikes and inflation. Any disturbance in the supply of steel to Sheet Metal Co. and Fast Co. affects production and increases product lead times.

4.2 Demand Side

The primary risk identified by the companies on the demand side was:
- Customer defaulting on payments owed to the business. This was usually the smaller size customers. Large corporations tended to pay on time.
- Outbound logistics service provider failure to deliver finished products

Examples of how some of these risks materialize and measures taken by the SME to manage the risks are presented.

Fast Co. outsources transport for products which are transported outside Gauteng. The third party transporters usually run out of space to pack Fast Co. product boxes, and end up double stacking these boxes. Double stacking of boxes result to boxes tearing and customers reject products delivered. In some instances, Fast Co. customers place emergency orders. This requires additional resources or resources on standby to be utilized. Fast Co. always has drivers on standby to attend to emergency deliveries. Financial penalties for late delivery are applied by customers to Fast Co. and Sheet Metal Co. The automotive industry deducts points and the end result can be losing the customer. OEMs in the automotive industry, also, place pressure on component manufacturers to keep reducing prices by a certain percentage annually despite the economic conditions which affect prices.

Comp Co. aviation products are highly specialized and must be insured. When delivering products to the customer there is a high risk of products being damaged or being lost. Insuring products forms a huge part of expenses at Comp Co.

4.3 Internal

Internal risks identified included:
- Ageing machinery and equipment resulting in frequent breakdowns disrupting product for repair and maintenance
- Specialised production activities not catered for in-house due to high specificity of skills and equipment and high costs
- Outsourced functions can lead to poor quality and goods damaged in-transit
- Failure on MRP/ERP systems causing loss of information

Machinery breakdowns were dealt with by planning and keeping maintenance schedules, rotating machinery usage, holding extra machinery on-site as well as bringing in sub-contracted maintenance crews to perform maintenance of the businesses machinery. Specialised production activities are outsourced and strong relationships are built with the
outsourced supplier. Examples of how some of these risks materialize and measures taken by the SME to manage the risks are presented.

Sheet Metal Co. had outsourced the powder coating for one of its products, but has eventually decided to invest the capital to install their own powder coating facility because of ‘over R100 000 per month, defects (poor quality) were arising not only from damage of goods in transit but also mistakes and delays occurred due to batching (large lots of colours were done in one batch)’.

Products at Fast Co. were packaged by an external company outside their premises. There have been cases where wrong products are packed in wrong boxes and delivered to the customer. Currently the packaging company has been moved into the warehouse to avoid such cases from occurring. Whether this has fully mitigated the problem is unclear.

4.4 External

Risks external to the company, but along the supply chain

- Changing demand market conditions
  - Due to an influx of cheap, low quality Chinese products causing demand variability and redundant finished good stocks.
  - Due to the contract based nature of demand
- Lower priced local competitors
- Low demand of products

The main mitigation against demand variability was making changes to the products or the storing of raw material and inventory. Examples of how some of these risks materialize and measures taken by the SME to manage the risks are presented below.

Sheet Metal Co. has experienced this with their fire-extinguisher brackets and cabinets. They have managed to compete with the Chinese products as theirs are perceived to be of a higher quality and meet with South African Standards Body’s requirements.

Auto Co. competes with all other small businesses that manufacture the same products, sometimes at a cheaper price. Thus, Auto Co. ensures that quality of the products is to OEMs standards and delivered at the right times to prevent losing the OEM as a customer.

Low demand for products manufactured by SMEs is another challenge [36]. Sheet Metal Co. has experienced a decline in product demand due to customers closing down because of aggressive market environment. This has forced the company to diversify its product range and enter new markets.

4.5 Environment

Environmental risks appear to be the most prevalent based on the interviews. These include:

- Labour strike action cause disruptions in production due to staff stay-aways and the failure in raw material and fuel deliveries
- Crime/Theft from external sources such as break-in costs money
- Scarce skills result in trained staff being head-hunted and leaving the company resulting in skill shortages and protracted training periods
- The Global economic recession (2009) resulted in decreases in demand, large amounts of finished goods in storage and cash flow problems
- Currency fluctuations for companies who import specialised raw materials and export resulting increased costs and lower profits
- Global fuel hikes affecting delivery of raw materials and as a result raw material suppliers increase purchasing prices.
- Changing technologies requiring capital expenditure on keeping abreast with the market requirements
Various risk mitigation strategies were employed by companies. Sheet Metal Co. and Fast Co. were affected by the steel industry strike which started on the 5th July until 15th of July 2011. The strikes resulted in disturbance of product delivery to the customer and the invoking of penalty clauses due to disruptions in production. These SMEs affected planned ahead based on notification from unions of an impending strike. Inventory would then be built up to cover the weeks of non-production, during the strike the company would close down and work from a remote location or work on skeleton staff.

Theft mitigation actions included the use of security guards, security cameras, street committee meetings and constructive interactions with the police to mitigate against theft of materials and finished product.

Head hunting of skilled workers is seen as a risk to some companies, and measures to keep staff include tying them into contracts. Cross training of skilled staff as well as balancing of different business lines is also seen a preventive measure against the loss of skilled staff.

4.5 Summary of Results

Table 5 Supply Chain Risks and Mitigation procedures

<table>
<thead>
<tr>
<th>Risk Source Classification</th>
<th>C. Supply Chain Risks</th>
<th>D. Risk Mitigation Procedures</th>
</tr>
</thead>
</table>
| Supply side                | • Raw material price volatility  
   • Lack of availability of the raw material  
   • Variability in the quality of the raw materials  
   • Loss of electricity supply                  | • building and maintaining strong relationships with the supplier  
   • service level agreements  
   • building delays into the lead time  
   • keep suppliers very close to the business. |
| Demand side                | • Customer defaulting on payments  
   • Outbound logistics service provider failure | • drivers on standby  
   • insurance of goods |
| Internal                   | • Ageing machinery and equipment resulting  
   • Specialised production activities not catered for in-house  
   • Outsourced functions failure  
   • Failure on MRP/ERP systems                  | • planning and maintaining maintenance schedules, rotating machinery, holding extra machinery on-site  
   • outsource specialised production activities |
| External                   | • Changing demand market conditions  
   • Due to an influx of cheap, low quality Chinese  
   • Due to the contract based nature of demand  
   • Lower priced local competitors  
   • Low demand of products                      | • making changes to the products  
   • the storing of raw material and inventory   |
Environment

- Labour strike action
- Crime/Theft from external sources
- Scarce skills result in trained staff being head-hunted
- The Global economic recession (2009)
- Currency fluctuations
- Global fuel hikes
- Changing technologies
- notification of an impending strike
- Inventory built up
- the company would close down
- use of security guards, street committee meetings, constructive interactions with the police
- tying staff into contracts
- cross training of skilled staff
- balancing of different business lines

5 DISCUSSION

Although the SMEs investigated were from different industries in the manufacturing sector, they are affected by similar risk issues in all categories. There are, however, indications of industry specific risks emanating from the supply side markets (price fluctuations and lack of availability of raw materials, particularly in the steel industry) and the demand side markets (lower priced competition).

Risks covered a broad spectrum encompassing all five (5) categories of the framework; see Table 5, with the majority of risk sources falling in the environment category. When combined with the external risks, there is evidence that the most of risks have root causes beyond the control of the company, and are largely of a macro-economic and socio political nature.

The results of this study compare favourably with those of the MIT survey in Table 1 A. All identified supply and demand side risks corresponded while one external and one environmental risk matched up. Additional risks are identified in the internal, external and environmental categories that may indicate a specificity of risks related to SMEs. This may be because these risks impact SMEs more than larger companies due to the resource and capacity constraints faced by SMEs. While the MIT survey indicated that “Employee theft/executive misdeeds come in 4 times higher and disease/infestation, 2.3 times higher” [27] in South African companies, these issues were not raised by the SMEs interviewed. This may indicate an absence of these issues or a reluctance to talk about sensitive matters.

There was no evidence to indicate that the SMEs have risk management plans or tools to assist in the management of the risks as documented in the literature. In the event of a risk occurring, they do whatever possible to counter the problem. Countering the problems is part of risk analysis although the concept is not used. The concept of Supply Chain Risk Management is not known. Generally, approaches focused on reducing the effect or impact of risk events. Most risk events had some form of mitigating procedure in place. The SMEs focussed less on reducing the root cause of events possibly because these are beyond their control. Approaches can be, thus, be characterised as reactive. Evidence of correspondence to the MIT survey mitigation efforts (Table 1 B) is low: four out of the thirteen identified procedures i.e. monitor world events for incidents that may affect the supply chain, work with suppliers on SCRM, work with law enforcement/emergency management on SCRM, and work with customers on SCRM

The study, although limited to only 8 SMEs, strongly supports the notion that manufacturing SMEs do not exhibit explicit or formalised supply chain risk management practices. They are, however, conversant with the risks throughout their supply chain and manage these within their capability.
6 CONCLUSION

This exploratory pilot study sought to find evidence of the management of supply chain risks in South African Manufacturing SMEs. This was achieved through the development of a supply chain risk framework that facilitated the gathering of information on the nature or types of risks faced by manufacturing SMEs in their supply chains. Information of risk mitigating procedures was also collected.

Results indicated that SMEs are affected by similar risk issues in all categories. There are also 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, that is, risk root causes beyond the control of the company.

The results of this study compare favourably with those of the MIT survey for supply chain risks but less favourably when considering mitigation procedures.

Although the theoretical concepts of Risk Management and Supply Chain Risk Management are not explicitly understood, the mere practice of business survival and sustainability implicitly requires the management of risk on a daily basis by SMEs. This presents an encouraging picture for large companies partnering with SMEs in their supply chains.

This study requires extension to a significant sample of manufacturing SMEs to explore the finding in more detail.

7 REFERENCES


[33] Van Zyl, S. 2009, Guidelines for Preliminary Processing of Qualitative Data, *Workshop Notes*, University of the Witwaterrand