

Supply risk management in a small company perspective

Chris Ellegaard

Copenhagen Business School, Herning, Denmark

Abstract

Purpose – The purpose of the paper is to determine if owners of small manufacturing companies manage supply risk in similar ways and identify the practices constituting this potential joint approach.

Design/methodology/approach – An interpretive case based methodology was applied in this research. Interview data on the supply risk management practices of 11 SCOs (small company owners) were analysed.

Findings – The findings confirm that the 11 studied SCOs apply largely the same supply risk management practices, which can be characterised as defensive. The approach covers risk elimination practices such as knowledge protection and local sourcing as the major practices, combined with relational practices such as fairness, loyalty, and seeking out responsive, dependable, and like-minded suppliers.

Research limitations/implications – The study focuses exclusively on small manufacturing companies. Studies of other types of companies, such as trade or hi-tech companies might reveal other practices.

Practical implications – The SCO supply risk management approach is optimised to simultaneously reduce supply risks and resource and time consumption. Especially the relational practices may be feasible alternatives and valuable to supply chain managers and purchasers. Local sourcing and knowledge protection are effective practices, but tend to work at the expense of supply chain opportunities.

Originality/value – No studies of small company supply risk management exist in the literature, despite the increased focus on supply risk management and small company purchasing/SCM. The study addresses this gap by offering insights into small company supply risk management practices.

Keywords Small enterprises, Supply, Risk management, Case studies

Paper type Research paper

Introduction

Risk constitutes an inevitable part of purchasing and supply chain management. Industrial companies depend on a range of up-stream resources, which lie outside their control sphere. Furthermore, supply chain managers have only various degrees of incomplete information about their sources of supply. Supply risk has become a major construct in purchasing and supply chain management research (Harland *et al.*, 2003; Peck, 2006). Among the investigated supply risk subjects are risk perceptions (Zsidisin, 2003b), risks and organizational learning (Finch, 2004; Hallikas *et al.*, 2005; Smeltzer and Sifert, 1998), e-business risks (Hunter *et al.*, 2004), environmental risks (Cousins *et al.*, 2004), risks and complexity (Choi and Krause, 2006), and outsourcing risks (Lonsdale, 1999). Risk has also been a major variable in supplier segmentation models, for instance the popular Kraljic (1983) matrix.

Buying risk has attracted some attention in marketing research on buying behaviour. Seminal buying behaviour contributions included risk as a key construct that affected buying decisions (Robinson *et al.*, 1967; Sheth, 1973). Furthermore, a series of marketing publications examined purchaser perceptions of buying risk, with the purpose of developing marketing practice that could help customers reduce perceived risks, for instance through improved information sharing capabilities (Bunn and Liu, 1996; Hawes and Barnhouse, 1987; Henthorne *et al.*, 1993).

Risk management has been a salient subject in supply risk research. However, studies of supply risk management in a small company context are lacking, despite the increasing prevalence of small companies in Western economies. Hence, this paper addresses this gap and investigates the supply risk management practices of small company owners. First, the SCM/purchasing literature is reviewed to identify types of supply risk and identify the most prevalent methods of supply risk management. Second, the results of a qualitative case study of supply risk management practices of 11 SCOs are presented. Finally, theoretical implications are discussed.

Types of supply risk

Supply risk signifies a chance of loss to the organisation caused by events originating in the up-stream supply chain (Harland *et al.*, 2003). A few contributions have proposed

The current issue and full text archive of this journal is available at www.emeraldinsight.com/1359-8546.htm



Supply Chain Management: An International Journal
13/6 (2008) 425–434
© Emerald Group Publishing Limited [ISSN 1359-8546]
[DOI 10.1108/13598540810905688]

typologies of the losses associated with supply risks. Yates and Stone (1992) identify six types of loss – financial, performance, physical, social, psychological, and time. Their typology directs attention to the importance of losses to the individual, such as social and psychological losses, rather than focusing strictly on business related losses, such as financial and physical losses. Mitchell (1995) extends this taxonomy and argues that purchasers are faced with the threat of two overall forms of loss:

- 1 losses to the purchaser her/himself; and
- 2 losses to the purchaser's organisation.

Supply chain management research has identified an abundance of supply risk types as well as typologies that classify these (Harland *et al.*, 2003; Spekman and Davis, 2004; Zsidisin, 2003b). The most prevalent type is probably logistics risk, which appear in many supply risk contributions, possibly because most companies experience logistics problems on a recurrent basis. Spekman and Davis (2004, p. 414) argue that “academic interests appear to focus mostly on the risks associated with logistics and its impact on the timely delivery of goods”. They conceptualise logistics risk broadly as the potential disturbances in three flows – goods, information, and money. The two former flows are closely related and cover risks such as those connected to poor quality or supplier capacity constraints, as well as those connected to poor order processing capabilities or the Forrester Effect. Chopra and Sodhi (2004) provide a comprehensive overview of risks that could threaten the three described flows in the supply chain, grouped under headings such as disruptions, delays, systems, receivables, and forecasts. The contributions of Zsidisin and colleagues also provide insights into the characteristics of logistics risk (Zsidisin, 2003b; Zsidisin and Ellram, 2003; Zsidisin *et al.*, 2000).

Spekman and Davis (2004) identify three classes of supply risk, in addition to the potential threat of disturbances in the three logistics flows. The first is information security, meaning the risks associated with sharing information with external agents. This risk class covers losing proprietary knowledge to competitors via the supply chain or external agents obstructing or terrorising company infrastructure. Finch (2004) reports that even companies with large scale IT protection systems suffer from security breaches frequently and in many instances these breaches can be traced to the supply chain. Spekman and Davis' (2004) second type of risk is relational and arises due to the existence of supplier opportunism. Opportunism, which is a key TCE construct, means that suppliers act in their own interest by deliberately withholding or distorting information (Williamson, 1985). Lonsdale (1999) emphasises the danger of dependency, highlighting supply chain managers' potential lack of awareness of how firms become dependent on suppliers and the consequences of asset specificity in buyer-supplier relations.

The final risk class in the Spekman and Davis (2004) typology relates to Corporate Social Responsibility. Companies face risks because suppliers sometimes fail to live up to minimum social and environmental demands. Cousins *et al.* (2004) discuss environmental impact exposure and institutional exposure. The former refers to exposure to events that may harm the physical or biological environment, while the latter refers to exposure caused by the company's interaction with the economic, social, and political environment. Institutional exposure may cause social and psychological losses, appearing as a result of damaged

reputation and good-will, as well as reduced employee morale. Various root causes are connected to the risk classes. The causes range from natural disasters and supplier bankruptcy through supplier flexibility and capacity utilisation to fluctuating exchange rates and industry wide capacity utilisation.

Supply risk management

Risk management has been a popular topic in management research in general (Harland *et al.*, 2003). Recently, the field of purchasing and supply chain management has adopted the risk concept and defined supply risk management as a major SCM responsibility. As boundary spanners, purchasers and supply chain managers are required to make a range of risky business decisions. Hence, supply risk management plays a central role in purchasing and SCM. The notion of “proactive procurement”, which incorporates supply risk management as a key task, has been proposed as an ideal form of purchasing (Carr, 1996; Smeltzer and Sifert, 1998).

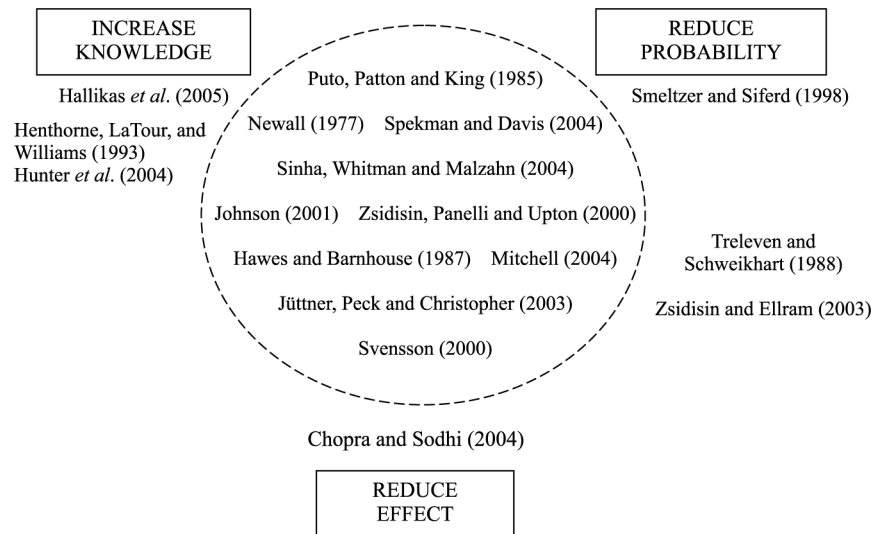
One conceptualisation of risk incorporates three components (Harland *et al.*, 2003; Mitchell, 1995; Zsidisin, 2003a):

- 1 the knowledge of a loss-making event;
- 2 the probability of a loss-making event; and
- 3 the significance (effect) of the event.

Multiplying the two latter components provides a measure of the size of the risk. The knowledge component has no direct influence on the size of the risk, but covers how informed or knowledgeable managers are of the two other components. Risk management initiatives increase knowledge, reduce probability, and/or reduce effect (see Figure 1).

Figure 1 provides an overview of various key contributions on supply risk management grouped according to their main focus on one or more of the three types of risk management. References within the circle cover all three types of supply risk management, while the two references between probability and effect reduction examine both of these. The three types are interconnected since initiatives targeted at one risk component, may have an effect on other components. Companies following an ideal risk management strategy start by increasing knowledge (Zsidisin, 2003a)(upper left corner of Figure 1). When knowledge (information) about potential loss making events has been gathered, companies can strive to reduce the probability of the event (upper right corner), followed by efforts aimed at reducing effect (lower corner). Probability and effect reduction presupposes information about the up-stream events causing the risks. Hence, lack of knowledge impedes probability and effect reduction. Also, zero probability of a specific event makes effect reduction needless.

Risk management initiatives come in a variety of forms and differ in the size of their impact, the resources required to effectuate them, and their reach (e.g. one supplier or the entire supply chain). Some contributors propose overall analytical frameworks or tools that span the entire supply risk management process from identification of risks to implementation of risk management plans (Harland *et al.*, 2003; Sinha *et al.*, 2004). The following three sections review individual supply risk management practices grouped according to the three types.

Figure 1 The three types of supply risk management along with key contributions**Initiatives aimed at increasing knowledge**

As mentioned, supply risk management initiatives aimed at creating knowledge tend to have no overall risk reducing effect. Still, these initiatives are stressed as vital in most contributions (Mitchell, 1995), because knowledge is a necessary precondition to reduce probability and effect. Buyers can approach a number of sources to obtain information about risks (Newall, 1977). These include supplier sales representatives, colleagues, buyers from other companies, social acquaintances, import offices, consultants, industry support organisations etc. (Henthorne *et al.*, 1993; Newall, 1977). Svensson (2000) reported how Volvo had established close contact to authorities and industrial associations to pick up information that could indicate disturbances in the supply chain. Information sources differ in the quality of knowledge, access difficulties, price of knowledge, object of knowledge (e.g. product, supplier or country), biases etc. Purchasers from other companies typically possess high quality information. The equivalent position of these sources means that they will possess information, which is highly valuable to most purchasing organisations (Mitchell, 1995). Meeting supplier sales representatives and visiting supplier facilities is another much used method of gaining knowledge (Hawes and Barnhouse, 1987). Despite the danger of biased information from supplier employees (Mitchell, 1995), supplier visits provide possibilities to access supplier facilities, which could reveal knowledge regarding capacity, machinery, product lines, quality control systems, organisation, competing customers etc.

Hunter *et al.* (2004) emphasise e-business as an information gathering device, which is particularly relevant when companies consider new suppliers or products. Accessing on-line portals and e-marketplaces for example, are time and resource saving methods of acquiring information about suppliers, products, and markets. In established supplier relationships, companies may strive to integrate manufacturing and logistics planning systems, thereby reducing the Forrester Effects for instance, and prevent imbalances in supply and demand (Johnson, 2001). Some authors emphasise the importance of learning to risk

management (Hallikas *et al.*, 2005; Spekman *et al.*, 2002). Information gathering is seemingly inadequate. Purchasers must understand the causes of loss and disperse this understanding throughout their organisation in order to enable experience and expertise to develop. Furthermore, learning should not only be initiated at an intraorganisational level. Hallikas *et al.* (2005) discuss collaborative learning as a risk management device. Buyer and supplier should jointly learn about the behaviour and routines of the other party and thereby reduce information asymmetry.

Initiatives aimed at reducing probability

Disasters, natural phenomena, political unrest, and terrorism are outside the influence sphere of supply chain managers. The probabilities of these root cause events cannot be lowered. However, the probability that these events eventually cause a loss to the company can be reduced or indeed eliminated. Almost any specific loss can be completely eliminated by the company, simply by avoiding the root cause. Hence, one side of probability management consists of making supply decisions that eliminate risks. Purchasers may decide to avoid buying from certain suppliers, in certain regions, and avoid certain currencies, products, materials, and technologies (Jüttner *et al.*, 2003).

Probability reduction can also be achieved by influencing the known sources of risk directly. This task is external – it requires boundary spanning effort. Zsidisin and Ellram (2003) refer to such initiatives as behaviour-based risk management techniques. The common denominator of these initiatives is the objective to influence suppliers to adapt and improve processes, thereby reducing the likelihood of supply losses that can be attributed to behaviour in the upstream supply chain. Examples of such initiatives are supplier certification, implementation of quality management programs, target costing, and supplier development (Smeltzer and Sifert, 1998; Spekman and Davis, 2004; Zsidisin and Ellram, 2003). Supplier development, for instance, involves up-grading of suppliers' process capabilities, educating supplier personnel, investing in supplier processes, and placing buying company personnel for extended time periods at supplier facilities. Contracts also

reduce probability by influencing the behaviour of suppliers. Contracts can incorporate performance guarantees and in some instances penalty clauses, that direct behaviour by the sanctions they represent (Mitchell, 1995; Puto *et al.*, 1985; Svensson, 2000). Suppliers have to exhibit behaviour that guarantees performance in order to avoid the penalties.

Reducing the probability of loss can also be achieved through relationship development. A trusting relationship motivates suppliers to develop and partake in the above initiatives (Spekman and Davis, 2004). Trust also ensures effective communication aimed at avoiding losses (Mitchell, 1995). A strong relationship provides an incentive for the supplier to remain committed, rather than resorting to opportunistic behaviour (Smeltzer and Sifert, 1998). Another relational phenomenon that reduces the likelihood of loss is source loyalty (Mitchell, 1995; Puto *et al.*, 1985). Loyalty to existing sources demonstrates commitment and stability, which motivate supplier commitment, resulting in a willingness to adapt and reducing the probability of damaging behaviour.

Initiatives aimed at reducing effect

Companies must have effect-reducing practices in place when loss making events happen (Chopra and Sodhi, 2004). Preparedness involves crafting a supply risk strategy, which contains what these authors term “tailoring the response” (Chopra and Sodhi, 2004, p. 60). To mitigate risk, companies need to build reserves – including inventory, capacity, and funds (Chopra and Sodhi, 2004; Spekman and Davis, 2004; Zsidisin *et al.*, 2000). For example, holding component reserves (inventories) prevents manufacturing interruptions even when poor quality components have entered the factory.

Multisourcing can be perceived of as another reserve strategy (Johnson, 2001; Mitchell, 1995; Puto *et al.*, 1985; Zsidisin and Ellram, 2003). Operating more sources means that the effects of supplier caused risks can be reduced by moving components from one supplier to another. Johnson (2001) notes that toymakers operate suppliers in different countries to counter currency problems or potential shock effects from volatile economies. Companies may also choose to keep alternative sources “on the books” (Treleven and Schweikhart, 1988). These suppliers are not active, but act as reserves and are evaluated periodically. Generally, multisourcing is a highly effective means of countering disruption risks caused by large scale environmental events such as fire, disasters, and political unrest. However, the size of the switching costs associated with such a move of components affects the viability of multisourcing as an effect reducing strategy.

Flexibility and responsiveness by both buyer and suppliers are other means of reducing effect (Chopra and Sodhi, 2004; Jüttner *et al.*, 2003; Svensson, 2000). This may involve flexible and responsive manufacturing, transportation, and logistics capacity. At a more general level, Chopra and Sodhi (2004, p. 59) emphasise “working with a highly responsive supplier”. This way effects connected to quality and delivery, among others, can be reduced. Other types of effect management are loss sharing and dispersion. Signing a contract reduces effect, to the extent that it incorporates passages on sharing or dispersion of potential losses (Hallikas *et al.*, 2005; Sinha *et al.*, 2004; Svensson, 2000).

Summary and research question

According to Spekman and Davis (2004) the most prevalent types of supply risk can be classified as related to logistics, opportunism, information security, and corporate social responsibility. The literature has been reviewed to identify and discuss supply risk management practices aimed at managing each of the three risk components: knowledge, probability, and effect. Initiatives aimed at increasing knowledge cover information gathering from various relevant actors as well as e-business, and joint learning. Probability reduction includes risk elimination, behaviour-based techniques (including contracts), and relationship management. Finally, effect reduction is achieved through holding reserves, multisourcing, flexibility, and contracts.

Some studies of small company purchasing/SCM exist in the literature (Dobler, 1965; Quayle, 2002a; Quayle, 2002b). The SCO represents a specific type of purchaser/supply chain manager for various reasons. First, she/he typically has limited purchasing/SCM experience and education (Evans *et al.*, 1990; Möller and Pesonen, 1981). Second, she/he handles a broad range of administrative and managerial tasks in addition to purchasing/SCM (Dollinger and Kolchin, 1986; Presutti, 1988). Third, she/he possesses limited time and resources (Möller and Pesonen, 1981; Wagner *et al.*, 2003). Interestingly, a few studies contend that entrepreneurs are role-models for purchasing organisations (Giunipero *et al.*, 2005; Morris and Calantone, 1991). Particularly, the risk-taking attitude of entrepreneurs is emphasised as a positive characteristic that could be valuable to purchasing professionals. Giunipero *et al.* (2005) surveyed the applicability of entrepreneurial skills to purchasing and found a high level of overlap between the highest rated purchasing skills and entrepreneurial skills. Surveying 268 companies, Morris and Calantone (1991, p. 8) concluded that “purchasing managers appear to recognise entrepreneurship as a salient concept for their operations”.

Only a few authors have provided indications about supply risk in a small company perspective. Company size was argued to have an effect on risk perception (Mitchell, 1995; Newall, 1977; Peters and Venkatesan, 1973). Specifically, these authors agreed that small company owners tended to perceive higher levels of risk compared to large company buyers, especially due to the limited capacity to tolerate financial losses. Peters and Venkatesan (1973) found that the high perceived risk associated with buying a computer led small companies to forgo the purchase. Newall (1977) argued that small company owners are themselves responsible for most buying roles and are therefore more aware of potential supply risks. Apart from these few studies, supply risk has not been studied in the small company perspective. In this light, a study of small company supply risk management appears highly relevant. Hence, the objective of this study was to identify the supply risk management practices of manufacturing SCOs. 11 owners of small manufacturing companies were investigated with the purpose of answering the following research question:

RQ1. How do small company owners manage supply risk?

The study aimed at uncovering to what extent a common, generic approach to supply risk management could be identified among the SCOs. The study used the framework in Figure 1 as a basis.

Methodology

A qualitative case study was deemed appropriate because of the explanatory nature of the study, investigating a how question (Denzin, 1978; Voss *et al.*, 2002; Yin, 1994). As Yin (1994, p. 6) notes: "...such questions deal with operational links needing to be traced over time, rather than mere frequencies or incidence". The investigation aimed at determining if manufacturing SCOs manage supply risk in similar ways. In other words – could a specific manufacturing SCO supply risk management approach be pinpointed? Further, the investigation aimed at identifying the characteristics of this generic approach or in other words the how of manufacturing SCO supply risk management. The study focused on owner-managed (hence the term Small Company Owner) manufacturing companies. Manufacturing refers to the companies' main activities, which are machining and/or assembly operations (see Table I). Other criteria for the sought out SCOs were limited purchasing/SCM experience and education, responsibility for many administrative and managerial tasks, as well as limited time and resources. These three criteria correspond to the characteristics of small companies found in earlier studies of small company purchasing.

Eleven SCOs, employing between 1 and 12 were interviewed (see Table I). 26 in-depth interviews were carried out lasting 90 minutes on average. The interviews were carried out according to a semi structured format. All interviews were taped. In four case companies it was deemed necessary to undertake an extra interview (adding up to three for each of these companies) to ensure that enough data had been collected to answer the research question. Furthermore, two seminars were held for the informants, where the results were presented and discussed with the SCOs. These seminars served to produce additional data, because the respondents were provided with the opportunity to elaborate and add further details and stories about their practices. The seminars also served to validate the findings, because the informants were allowed to judge the plausibility of the interpretations and provide criticism and comments.

Informants rarely used terms such as supply risk, risk management, probability reduction, supply chain or even purchasing. Instead they spoke of potential loss making events in the up-stream supply chain and their efforts to manage

these. Therefore, the research design followed an interpretive methodology (Denzin, 1978; 2002). Instead of forcing risk management terminology upon informants, possibly provoking misunderstandings and incomplete accounts, the idea was to let the SCOs provide rich accounts of their purchasing and SCM practices in layman's terms. In the dialogue information was sought out that allowed plausible interpretations of supply risk management practices.

The inquiry aimed at identifying the reasons for the chosen methods in order to establish that these were indeed driven by perceptions of risk. Hence, informants were motivated to tell why they approached purchasing/SCM the way they did. Specifically, the SCOs' lines of reasoning (Figure 2) were sought out to establish if specific purchasing decisions were driven by risk considerations. A primitive interview protocol was used, which contained only notes on the line of reasoning as well as notes directed at uncovering more general purchasing practices.

For example, when talking about global sourcing possibilities, informants would claim that they were uncomfortable with the differences in language and culture, the geographical distances etc. (risk causes), which could result in deliveries of components that did not meet specifications (risk event), which could hurt their own delivery capability and reduce sales (resulting loss), which had led them to decide on local sourcing (risk management practice). It was essential to establish this line-of-reasoning for each mentioned risk in the interviews to rule out other explanations for the chosen management approach. For example, local sourcing could be chosen for a number of reasons, risk reduction being just one. Local sourcing would not qualify as a supply risk management practice, if this behaviour was caused by a wish to support local economies, for example.

The analysis was inspired by methodologies developed by Denzin (1978, 2002) and Miles and Huberman (1994). First, the interview data were analysed in an interpretive first order coding procedure, where text strings describing risk causes,

Figure 2 Supply risk management line of reasoning

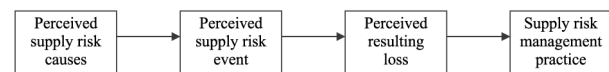


Table I The 11 case companies

Company	Interviews	Employees	Manufactured products	Main supplies
1	2	8	Die-cast aluminium components	Aluminium, machining equipment
2	2	10	Plastic advertising signs and stands	Plastic plates, fibre cloth
3	3	2	Steel tube road tunnels	Rolled steel plates
4	2	7	Small excavation vehicles, steel manufacturing machines	Steel plates, pipes, frames, electronic controls
5	2	7	Logistics equipment, staircase frames, machines	Steel plates, pipes, frames, electronic controls, rubber
6	2	6	Vessel power installations	Controls, cables, electronic components
7	2	6	Wood staircases	Wood plates and logs, paint, steel components
8	3	12	Electronic control boards	Electronic components, steel housings
9	3	1	Plastic components	Raw plastic, dies
10	3	2	Furniture	Wood plates and components, steel components and frames, textile
11	2	11	Steel and aluminium equipment (for factory logistics/transport)	Steel plates, pipes, frames, aluminium profiles, wheels

risk events, resulting losses, and risk management practices were identified (Figure 2). The result of this first order coding was an extended text. The second phase focussed specifically on assigning labels (local sourcing for instance) to the identified supply risk management practices, which also involved some degree of interpretation. The analysis was deliberately kept open in order to explore the data for potential practices that had not been identified in the literature review. Third, cross case analysis was carried out to identify the distribution of the practices across the SCOs. The labels describing each of the practices of each SCO were compared to establish how many of the SCOs performed the practices. Finally, the identified risk management practices were assigned to one (or more) of the three risk components – knowledge increase, probability reduction, and effect reduction arriving at Table II.

The supply risk management approach of the small company owners

The data strongly support the existence of a common, generic supply risk management approach among the 11 studied SCOs (see Table II).

The literature review revealed a number of supply risk management practices aimed at managing each of the three supply risk components. The data showed that the studied SCOs did not manage each of the components to an equal extent, but rather focused the majority of efforts on reducing the probability of loss, followed by effect reduction, and knowledge creation, which received the least attention. The following sections describe the SCO supply risk management practices connected to each of the three supply risk management types.

Knowledge

Knowledge increasing practices were infrequent among the studied SCOs. They spent limited time and resources actively acquiring knowledge about suppliers and supply markets and therefore possessed limited information about supply markets and suppliers. They would occasionally receive knowledge from their personal network, but not as part of any planned, conscious approach. They would stumble across information about the supply base from friends, family, or old colleagues. 4 of 11 SCOs explained that they attended industry fairs, but only infrequently – typically once every 3–4 years.

Only one SCO interacted with suppliers often. The remaining 10 SCOs described that years could pass without visiting supplier facilities. Generally, the frequency of

interaction with supplier representatives was low. As SCO 7 explained (interview 1):

We never visit suppliers. Except sometimes we are forced to visit the smaller suppliers, when we have to explain about a new difficult product. Sometimes they visit us when they are on their route to see if we need something. But these are very short visits. Otherwise it is only when we have supply problems we talk to them. Then we give them instructions about what we need and they make it. They don't provide inputs – we provide the inputs. We have had 10 of these visits since the initiation of the company – they lasted maybe 30 minutes each.

The preferred method of handling the limited interaction was phone calls. Saving time and resources was a main reason for limiting interaction frequency. Resources and time were generally perceived insufficient to pursue knowledge increasing practices. Information exchange seemed to take place in a reactive fashion only when strictly needed and not to actively create knowledge of supply markets and the associated risks. Alternative information sources such as import offices and agents were rarely considered.

E-business practices were largely absent in the studied companies. Lack of time, resources, and expertise excluded the use of on-line portals and e-marketplaces. Internet activities consisted of occasionally browsing the yellow pages when a new component was needed. Otherwise, SCO knowledge of supply markets relied on the active approaches of potential suppliers either directly, through advertising or through e-mails. Sharing of process information and joint learning with suppliers was very rare in these companies.

Clearly, the SCOs got by with only limited information retrieval efforts. Their probability and effect reduction practices relied mainly on:

- The experience of interacting with existing suppliers. This experience provided information on the likelihood of loss making events in their supply chain.
- Assumptions regarding potential loss making events – for instancing regarding the dangers of global sourcing.

The assumptions served as a substitute for actual information and provided an additional basis for probability reduction.

Probability reduction

Probability reduction had the highest priority in these companies. Elimination of severe risks formed the backbone of SCO practices. Not all risks could be eliminated, but those with less critical effects could more effectively be handled by the simple risk management practices of the SCOs. In order to eliminate certain severe risks, the SCOs sourced locally, exhibited source loyalty, and were careful not to reveal proprietary product knowledge to suppliers. Sourcing mainly on the local market eliminated a range of risks such as natural

Table II Supply risk management practices of the 11 manufacturing SCOs

	Knowledge increase	Probability reduction	Effect reduction
SCO supply risk management practices	Unplanned, coincidental information from personal network (11/11) Infrequent fair participation (4/11) Frequent supplier visits (1/11)	Local sourcing (9/11) Source loyalty (11/11) Protecting proprietary knowledge (11/11) Exchange fairness (11/11) Relaxed and personal interaction with suppliers (11/11) Seeking out suppliers with similar interaction attitude (11/11)	Local sourcing (9/11) Seeking out dependable and responsive suppliers (10/11) Financial reserves (3/11)

disasters, political unrest, customs/currency issues, and risks connected to cultural differences. 10 of 11 SCOs indicated that they sourced locally to avoid common global sourcing risks caused by communication and coordination difficulties, leading to losses caused by bad quality or late delivery for example. As SCO 4 noted (interview 2):

I don't buy in China or anywhere else abroad. Maybe sometimes a little through wholesalers – then they absorb the risk. I am not big enough to do that. And I don't want to be vulnerable and hassle with foreign suppliers about delivery performance.

The SCOs wanted suppliers speaking the same language, with a similar mentality and business attitude and believed that these suppliers were best found close by.

All SCOs showed a high level of loyalty towards suppliers. This way they eliminated risks associated with adopting new sources. Also, existing sources had proven their ability to perform and provide service, which minimized operational risks. SCO 2 (interview 1) explained:

We are very loyal to our suppliers. I have never replaced a supplier. If they have proved customer minded, provide the necessary service, and treat me right – then I will stay. I would rather pay more and have such a supplier.

All SCOs stated that they were reluctant to share product information with suppliers. Most product development activities were carried out in-house, which meant that the risks of knowledge loss could be avoided.

Behaviour based probability reduction initiatives such as supplier development, quality management programs, and target costing were undertaken by none of the 11 companies. Contracting appeared in a few instances where grave quality problems with particular suppliers led two SCOs to make simple quality specification agreements. The low frequency of interaction did not mean that the SCOs lacked relational focus. On the contrary, all SCOs practiced what could be termed relationship maintenance. The owner of company 2 (interview 1) argued:

I have close personal relationships with the supplier people I talk to. I feel this is best. If you can create these bonds then you want to solve the assignments and problems when they appear.

SCO 10 (interview 3) stated:

It is best if we are at the same level and talk together well and can make a little fun.

SCOs interacted with suppliers in a relaxed and personal manner and sought out suppliers that mirrored their interaction approach. By matching supplier attitudes to their own relational stance, they ensured good chemistry and furthermore reduced suppliers' tendencies towards opportunism.

Moreover, mutual fairness characterised the relationships. SCO 1 (interview 1) argued:

A sales rep signed a deal with us about 25 tonnes of raw material and then called us afterwards to say that he had made a mistake – the price on the document was too low and he had not noticed the error. I could hear this was a serious problem for him and did not want to act unfair so we changed the price. Another supplier once demanded more money than agreed without explaining and discussing this with us. He just sent us extra bills. This is not fair behaviour. We have some general rules – for example we do not direct unfair critique at suppliers and pay on time. We want to be treated fairly and we want to treat them fairly.

Maintaining a fair supply base meant that risk caused by unfair actions by suppliers were kept to a minimum.

Effect reduction

Only three SCOs held reserves, consisting mainly of limited personal funds and small inventories. SCO 9 (interview 3) stated:

My wife has a little money and we can use the bank to some extent too. So we have a little cash to buy raw material and invest in dies, which makes it easier to attract customers.

None of the SCOs held reserve capacity and practiced mainly single sourcing, with the aim of tying up as few resources as possible. The very limited reserves left the SCOs quite vulnerable to certain types of risks. Any specific events with the potential to obstruct delivery capabilities of suppliers, such as fire, take-over, bankruptcy, up-stream material shortages etc. could bring SCO production to a halt. Contracts, which could have served to limit these losses, were employed by none of the studied companies. However, the SCOs practiced a few effect reducing practices.

Local purchasing (9 of 11) allowed them to solve problems on their own account, especially when quality or delivery performance was under threat. One SCO (Company 2, Interview 2) stated that:

getting in the car to drive to supplier facilities for new components.

when supplier quality or delivery failed, made him feel secure and had often served to reduce losses in these situations. Moreover, the focus on dependable and responsive suppliers (10 of 11 SCOs) ensured fast and effective problem solving, reducing the effects of these types of problems. SCO 1 (interview 1) provided an example, explaining the value of dependable, responsive, and problem-solving suppliers:

"We only once received something bad from this specific supplier and they immediately solved the problem. Suddenly there were holes in the components produced by our machines. We went through the process and found no irregularities or problems. It had to be the supplied raw material. They sent a laboratory technician, who took samples and answered quickly with the results, confirming the bad quality of the delivered raw material. They informed us that they had made a production mistake. They immediately sent us new material. I am satisfied with this supplier of raw material and I stick with them.

Flexibility was a key word to the SCOs.

Theoretical implications

The study shows that supply risk is a major concern to small company owners, which fits well with the reviewed findings by Mitchell (1995), Newall (1977), and Peters and Venkatesan (1973). The accounts of the SCOs reveal much concern for losses caused by up-stream events and decisions are clearly affected by these concerns. The limited purchasing resources, expertise, and knowledge are instrumental to this supply risk concern. They feel vulnerable and they are incapable of engaging in many of the supply risk management practices mentioned in the literature review. The study demonstrates that supply risk mitigation methods such as market intelligence, e-business, supplier development, contracting, holding reserves, and multisourcing are simply too resource and time consuming for the small company owner. Below, SCO practices are compared to the literature review on each of the three types of supply risk management.

Knowledge

The reviewed contributions point to extensive, planned information retrieval practices to create a knowledge base

for supply risk management. These practices require boundary spanning effort to build and maintain knowledge sources, as well as technological interfaces and expertise to scan the internet for codified knowledge. The SCOs demonstrated completely different practices, where knowledge was only to a small degree created through boundary spanning and the internet. Experience with suppliers constituted the majority of SCO knowledge, which was complemented by general assumptions regarding the supply risks and thereby formed the basis for supply risk reduction practices. The cases demonstrate that it is possible to manage supply risk without resource and expertise demanding information retrieval practices, especially in companies where these practices are often unavailable, such as small companies.

Probability reduction

The literature review revealed a focus on active, boundary spanning practices to reduce supply risk probabilities. Supplier development, contracting, and relationship development demand that the company spend resources interacting with up-stream supply chain companies. SCOs, on the other hand, are mainly focussed on avoiding supply risks. It could be argued that the SCOs are supply risk averse. The finding of Peters and Venkatesan (1973) where small companies decided not to make the risky purchase of high tech PC equipment seems to characterise the SCOs in this study. Hence, the SCOs forego purchasing opportunities for high rewards, but thereby achieve low levels of supply risk. In addition, they emphasise stability in the supply base, maintained through loyalty, fairness, finding like-minded suppliers, and maintaining relationships with these. Relationship maintenance is a less active, less boundary spanning practice compared to relationship development described in the review, which requires high interaction frequencies, expansion of activities etc. Essentially, the SCOs reduce probability by avoiding exposure to unnecessary supply risk sources and events, which also means that resource consumption can be kept at a minimum.

Effect reduction

The review stressed reserves, multisourcing, flexibility, and contracting as effect reducing practices. Multisourcing, contracting, and holding reserves were rarely practiced, again due to resource and expertise restrictions. Flexibility, however, was a key word characterising the few practices aimed at reducing effect. Sourcing locally and maintaining dependable and responsive suppliers created flexibility and allowed the SCOs to actively solve problems with suppliers when the risk had materialised.

Conclusion

The studied manufacturing SCOs employed the same overall supply risk management approach, which favoured probability reduction over effect reduction and knowledge retrieval. Local sourcing, source loyalty, knowledge protection, and focus on fair, dependable, similar, and responsive suppliers formed the essence of these companies' supply risk management approach. Prioritising the elimination of risks over supply chain opportunities portrayed a risk averse supply chain manager – an interesting finding, given the dominant perception of

entrepreneurs as risk takers. An important limitation of this study is the focus on manufacturers. Research addressing supply risk management in other types of companies such as bio-tech or trading could reveal other findings. Indeed, the case study initially incorporated a trade company, which showed supply risk management practices that were remarkably different from the manufacturers, including extensive global sourcing, information gathering, and knowledge sharing.

Despite the autodidact and informal purchasing practices of the studied SCOs, there may be much to learn from these practices, even for state-of-the-art purchasing/SCM departments. The SCOs specialised in a few supply risk management practices that seemed to complement each other well. The study suggests that effective supply risk management is not only about adopting a wide range of sophisticated risk reduction practices. The challenge may be more connected to finding the right mix of practices, which fits the available resources and is sufficient to secure against supply risks. Supply chain managers should realise that:

- different supply risk management practices require different levels of expertise and resources;
- only a limited number of potential supply risk management practices may be necessary; and
- supply risk management means adopting the exact mix of practices that provides security.

Future research may contribute by investigating the supply risk management performance of SCOs and compare to the performance of large companies. Opportunities could be counted in to provide a full picture of performance. The investigation left the impression that the SCOs were successful supply risk managers. This may seem surprising, because the practices could appear reactive and excluded many of the reviewed methods of supply risk management. Still the frequency of losses caused by logistics disturbances appeared low, for instance. Moreover, given the limited resources required for the described methods of supply risk management, large companies could have something to learn. Large company supply chain managers could learn from SCOs' proposed ability to balance opportunities and risks and limit purchasing resource consumption. It may be that SCM opportunities such as those connected to global sourcing would seem slightly less appealing, when losses are counted in along with opportunities. However, these are only propositions resulting from this research and should be investigated in future studies.

References

- Bunn, M.D. and Liu, B.S. (1996), "Situational risk in organizational buying: A basis for adaptive selling", *Industrial Marketing Management*, Vol. 25 No. 5, pp. 439-52.
- Carr, A.S. (1996), "Influencing factors of strategic purchasing and its impact on buyer-supplier relationships", PhD dissertation, Arizona State University, Tempe, AZ.
- Choi, T.Y. and Krause, D.R. (2006), "The supply base and its complexity: Implications for transaction costs, risks, responsiveness, and innovation", *Journal of Operations Management*, Vol. 24, pp. 637-52.
- Chopra, S. and Sodhi, M.S. (2004), "Managing risk to avoid supply-chain breakdown", *Sloan Management Review*, Fall, pp. 53-61.

- Cousins, P.D., Lamming, R.C. and Bowen, F. (2004), "The role of risk in environment-related supplier initiatives", *International Journal of Operations & Production Management*, Vol. 24 No. 6, pp. 554-65.
- Denzin, N.K. (1978), *Sociological Methods: A Source Book*, 2nd ed., McGraw-Hill, New York, NY.
- Denzin, N.K. (2002), "The interpretive process", in Huberman, M.A. and Miles, M.B. (Eds), *The Qualitative Researchers Companion*, Sage Publications, Thousand Oaks, CA, pp. 349-66.
- Dobler, D.W. (1965), "The challenge of proficiency in small company purchasing", *Journal of Purchasing*, Vol. 1 No. 1, pp. 53-61.
- Dollinger, M.J. and Kolchin, M.G. (1986), "Purchasing and the small firm", *American Journal of Small Business*, Vol. 10 No. 3, pp. 33-45.
- Evans, K.R., Feldman, H.D. and Foster, J. (1990), "Purchasing motor carrier services: an investigation of the criteria used by small manufacturing firms", *Journal of Small Business Management*, Vol. 28 No. 1, pp. 39-47.
- Finch, P. (2004), "Supply chain risk management", *Supply Chain Management: An International Journal*, Vol. 9 No. 2, pp. 183-96.
- Giunipero, L.C., Denslow, D. and Eltantawy, R. (2005), "Purchasing/supply chain management flexibility: moving to an entrepreneurial skill set", *Industrial Marketing Management*, Vol. 34 No. 6, pp. 602-13.
- Hallikas, J., Puumalainen, K., Vesterinen, T. and Virolainen, V.-M. (2005), "Risk-based classification of supplier relationships", *Journal of Purchasing and Supply Management*, Vol. 11 Nos 2/3, pp. 72-82.
- Harland, C., Brenchley, R. and Walker, H. (2003), "Risk in supply networks", *Journal of Purchasing and Supply Management*, Vol. 9 No. 2, pp. 51-62.
- Hawes, J.M. and Barnhouse, S.H. (1987), "How purchasing agents handle personal risk", *Industrial Marketing Management*, Vol. 16 No. 4, pp. 287-93.
- Henthorne, T.L., LaTour, M.S. and Williams, A.J. (1993), "How organizational buyers reduce risk", *Industrial Marketing Management*, Vol. 22 No. 1, pp. 41-8.
- Hunter, L.M., Kasouf, C.J., Celuch, K.G. and Curry, K.A. (2004), "A classification of business-to-business buying decisions: risk importance and probability as a framework for e-business benefits", *Industrial Marketing Management*, Vol. 33 No. 2, pp. 145-54.
- Johnson, M.E. (2001), "Learning from toys: lessons in managing supply chain risk from the toy industry", *California Management Review*, Vol. 40 No. 3, pp. 106-24.
- Jüttner, U., Peck, H. and Christopher, M. (2003), "Supply chain risk management: outlining an agenda for future research", *International Journal of Logistics: Research and Applications*, Vol. 6 No. 4, pp. 197-210.
- Kraljic, P.M. (1983), "Purchasing must become supply management", *Harvard Business Review*, September-October, pp. 109-17.
- Lonsdale, C. (1999), "Effectively managing vertical supply relationships: a risk management model for outsourcing", *Supply Chain Management: An International Journal*, Vol. 4 No. 4, pp. 176-83.
- Miles, M.B. and Huberman, M.A. (1994), *Qualitative Data Analysis*, 2nd ed., Sage Publications, Thousand Oaks, CA.

- Mitchell, V. (1995), "Organizational risk perception and reduction: a literature review", *British Journal of Management*, Vol. 6, pp. 115-33.
- Möller, K. and Pesonen, P. (1981), "Small business purchasing of capital equipment", *Industrial Marketing Management*, Vol. 10 No. 4, pp. 265-71.
- Morris, M.H. and Calantone, R.J. (1991), "Redefining the purchasing function: an entrepreneurial perspective", *International Journal of Purchasing and Materials Management*, Vol. 27 No. 4, pp. 2-9.
- Newall, J. (1977), "Industrial buyer behaviour", *European Journal of Marketing*, Vol. 11 No. 3, pp. 166-211.
- Peck, H. (2006), "Reconciling supply chain vulnerability, risk and supply chain management", *International Journal of Logistics: Research and Applications*, Vol. 9 No. 2, pp. 127-42.
- Peters, M.P. and Venkatesan, M. (1973), "Exploration of variables inherent in adopting an industrial product", *Journal of Marketing Research*, Vol. 10 No. 3, pp. 312-5.
- Presutti, W.D. (1988), "Purchasing management practices of small manufacturers", *Journal of Purchasing and Materials Management*, Vol. 24 No. 4, pp. 26-31.
- Puto, C.P., Patton, W.E. and King, R.H. (1985), "Risk handling strategies in industrial vendor selection decisions", *Journal of Marketing*, Vol. 49, pp. 89-98.
- Quayle, M. (2002a), "Purchasing in small firms", *European Journal of Purchasing and Supply Management*, Vol. 8 No. 3, pp. 151-9.
- Quayle, M. (2002b), "Supplier development and supply chain management in small and medium size enterprises", *International Journal of Technology Management*, Vol. 23 Nos 1/2/3, pp. 172-88.
- Robinson, P.J., Farris, C.W. and Wind, Y. (1967), *Industrial Buying and Creative Marketing*, Allyn & Bacon, Boston, MA.
- Sheth, J.N. (1973), "A model of industrial buyer behaviour", *Journal of Marketing*, Vol. 37, pp. 50-6.
- Sinha, P.R., Whitman, L.E. and Malzahn, D. (2004), "Methodology to mitigate supplier risk in an aerospace supply chain", *Supply Chain Management: An International Journal*, Vol. 9 No. 2, pp. 154-68.
- Smeltzer, L. and Sifert, S. (1998), "Proactive supply management – the management of risk", *Journal of Supply Chain Management*, Vol. 34 No. 1, pp. 38-45.
- Spekman, R.E. and Davis, E.W. (2004), "Risky business: expanding the discussion on risk and the extended enterprise", *International Journal of Physical Distribution and Logistics Management*, Vol. 34 No. 5, pp. 414-33.
- Spekman, R.E., Spear, J. and Kamauff, J. (2002), "Supply chain competency: learning as a key component", *Supply Chain Management: An International Journal*, Vol. 7 No. 1, pp. 41-55.
- Svensson, G. (2000), "A conceptual framework for the analysis of vulnerability in supply chains", *International Journal of Physical Distribution and Logistics Management*, Vol. 30 No. 9, pp. 731-49.
- Treleven, M. and Schweikhart, S.B. (1988), "A risk/benefit analysis of sourcing strategies: single vs. multiple sourcing", *Journal of Operations Management*, Vol. 7 No. 4, pp. 93-114.
- Voss, C., Tsikriktsis, N. and Frolich, M. (2002), "Case research in operations management", *International Journal of Operations & Production Management*, Vol. 22 No. 2, pp. 195-219.

- Wagner, B., Fillis, I. and Johansson, U. (2003), "and e-supply strategy in small and medium sized businesses (SMEs)", *Supply Chain Management: An International Journal*, Vol. 8 No. 4, pp. 343-54.
- Williamson, O.E. (1985), *The Economic Institutions of Capitalism*, The Free Press, New York, NY.
- Yates, J.F. and Stone, E.R. (1992), "The risk construct", in Yates, J.F. (Ed.), *Risk-taking Behaviour*, Wiley, Chichester, pp. 3-25.
- Yin, R.K. (1994), *Case Study Research*, 2nd ed., Sage Publications, Thousand Oaks, CA.
- Zsidisin, G.A. (2003a), "A grounded definition of supply risk", *Journal of Purchasing and Supply Management*, Vol. 9 Nos 5/6, pp. 217-24.

- Zsidisin, G.A. (2003b), "Managerial perceptions of supply risk", *Journal of Supply Chain Management*, Vol. 39 No. 1, pp. 14-26.
- Zsidisin, G.A. and Ellram, L.M. (2003), "An agency theory investigation of supply risk management", *Journal of Supply Chain Management*, Vol. 39 No. 3, pp. 15-27.
- Zsidisin, G.A., Panelli, A. and Upton, R. (2000), "Purchasing organization involvement in risk assessments, contingency plans, and risk management: an exploratory study", *Supply Chain Management: An International Journal*, Vol. 5 No. 4, pp. 187-97.

Corresponding author

Chris Ellegaard can be contacted at: ce.marktg@cbs.dk

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.