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Risk management in SMEs: a systematic review of available evidence

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Structured Abstract

Purpose: The purpose of this paper is to provide a systematic literature review of available research evidence on risk management in SMEs. We aim to reveal ambiguities, gaps and contradictions in the literature, and to sketch avenues for further research.

Design/methodology/approach: We follow the tenets of Tranfield *et al.* (2003) for conducting a systematic literature review. Following a keyword search and an assessment of fit for this review, 27 papers were analyzed with respect to bibliographical information, research design and findings.

Findings: Our review identified various types of risks that may occur in SMEs. In addition, the publication analysis demonstrates the importance of a risk management process in SMEs and that the characteristics of SME owners have a significant impact on their business strategies.

Research implications: Additional empirical research on risk identification, risk analysis, strategy implementation and control in the SME risk management process is needed.

Originality/value: This paper is the first comprehensive review of literature on risk management in SMEs.

Type: Literature Review

Keywords: Risk management, SME, small and medium-sized enterprises

1. Introduction

Small and medium-sized enterprises (SMEs) play an important role in most economies worldwide (Ayyagari *et al.*, 2007; Burgstaller and Wagner, 2015)[1]. For instance, in the European Union, around 99% of the economic activities can be traced back to SMEs, which account for two thirds of all jobs in the private sector (Gama and Geraldes, 2012). Compared to larger firms, SMEs are usually seen as having simpler internal organization and thus as being more flexible and faster at responding and adapting to change (Lavia Lopez and Hiebl, 2014).

At the same time, SMEs are frequently confronted with major challenges. Compared to larger enterprises, SMEs profit less often from economies of scale and fewer have access to a wide resource base (Burgstaller and Wagner, 2015; Lavia Lopez and Hiebl, 2014). Due to the usually low equity ratio of SMEs, they are relatively vulnerable to external events compared to larger enterprises (Altman *et al.*, 2010). This illustrates that not only larger enterprises face various risks, but also SMEs, whose survival is more easily threatened due to their smaller set of – both financial and non-financial – resources.

Risk management may help SME managers to identify significant risks that could jeopardize the success or existence of the company in time to efficiently cope with them (Miller, 1992; Brustbauer, 2014). Misjudging or failing to recognize risks can – in the worst case – have disastrous consequences, ranging from customer loss to damaging liability, environmental damage and possibly even bankruptcy (Hollman and Mohammad-Zadeh, 1984). However, many SMEs do not – or not adequately – apply risk management practices, mostly because they cannot afford to rededicate resources due to their constraints (Marcelino-Sádaba *et al.*, 2014).

Although the volume of literature on the specifics of risk management in SMEs has been increasing in recent years, it is still fragmented, and no systematic review has yet been conducted on the topic[2]. Such a review would be valuable because systematic reviews integrate existing research from various fields (in our case: small business management and finance/risk management) and present a synthesized knowledge base on which future research can build (Tranfield *et al.*, 2003). Thus, the non-existence of a systematic review of risk management in SMEs may be regarded as a gap, which the present paper aims to close. We therefore present an overview of the state of research on risk management in SMEs as well as fruitful avenues for further research.

This paper proceeds as follows: Section 2 describes the methods for the literature review, the results of which are presented in section 3. Section 4 presents conclusions and potential avenues for further research, while section 5 acknowledges the limitations of this paper.

2. Methods

This paper adopts the basic guidelines set out by Tranfield *et al.* (2003) for conducting systematic reviews of literature in the fields of business and management. A systematic literature review is divided into three steps: (1) planning the review, (2) conducting the review and (3) reporting and disseminating the review (Tranfield *et al.*, 2003).

The first step – planning the review – mainly sets out the motivation of the review, which is presented in section 1 in the present literature review. The second step – conducting the review – starts with identifying relevant research. In order to identify relevant journal articles on risk management in SMEs, similar to Hiebl (2013), a broad keyword search of the following seven databases was conducted: *EBSCO Business Source Elite, Elsevier Science Direct, Emerald, SpringerLink, Wiley Online Library, Scopus und ISI Web of Knowledge.* For preliminary inclusion in this review, the title, the keywords, or the abstract of an article had to contain a combination (AND conjunction) of two groups of key words.

The first group of keywords addresses SMEs. Similarly to other review papers focusing on SMEs (e.g., Lavia Lopez and Hiebl, 2014), this was operationalized using the following phrase: ("small business*" OR "small firm*" OR "small enterprise*" OR "small compan*" OR "medium-sized firm*" OR "medium-sized business*" OR "medium-sized enterprise*" OR "medium-sized compan*" OR "small and medium-sized enterprise*" OR "SME*" OR "small and medium-sized compan*" OR "small and medium-sized business*" OR "small and medium-sized firm*").

The second group focuses on the actual management of risk. Hence, our keyword search specified no types of risk[3] or risk-related issues such as information asymmetry, moral hazard or adverse selection. Although they might affect risk management (Miller, 1992; Marshall and Weetman, 2002), they are rather concerned with the sources of risk. Thus, the second group of keywords includes a combination of “risk” and “management” and was implemented with the following search phrase: ("risk management" OR "manage risk*"). The use of asterisks allowed words with a range of different endings to be identified.

All articles that were identified as relevant to the present review and published or available online before November 2014 were included if they fulfilled the following two inclusion criteria. The first criterion was a journal quality threshold: articles were only included in the review if they appeared in journals that had an impact factor in the 2013 journal citation reports by Thomson Reuters or if they were included in the Association of Business Schools’

(ABS) 2010 Academic Journal Quality Guide. Inclusion in the Thomson Reuters citation reports and/or in the ABS Guide is an established sign of journal quality and has been used as a measure thereof in other systematic literature reviews (e.g., Ghadge *et al.*, 2012).

Using these methods, the initial search resulted in 38 articles. As Tranfield *et al.* (2003) suggested, articles were scanned for their fit with the specific topic of the literature review, which thus formed the second inclusion criterion. Consequently, 11 articles were excluded from further analysis, the main reasons being: (i) some articles turned out to be practitioner-oriented and not relying on scientific research methods, and (ii) even though they included some relevant keywords in the title, abstract and keywords, some articles were predominantly concerned with risk management methods for large companies and made no reference to SMEs. The remaining 27 articles were ultimately used to proceed with the second and third steps of the systematic literature review suggested by Tranfield *et al.* (2003) and form the basis for the results presented in the following sections.

3. Review findings

3.1 Characteristics of articles reviewed

Bibliographical information about the 27 articles included in this review can be obtained from Table 1. The 27 articles were published in 25 different journals. Two publications each were found in “International Small Business Journal” and “Managerial Finance”; each of the remaining 23 was published in a different journal. From Table 1 it can be seen that all but two articles were published in 2000 or later, which underpins the topicality of risk management in SMEs.

=== Insert Table 1 about here ===

As can be seen in Table 2, the majority of studies examined SMEs in developed European countries. We identified only two papers (Acar and Göc, 2011; Gao *et al.*, 2013) which empirically studied SMEs in countries that may be considered developing (Hoskissen *et al.*, 2000) – Turkey and China. This fact is somewhat regrettable because SMEs make up a large share of firms in developing countries (Lavia Lopez and Hiebl, 2014), and risk management may be a key factor in increasing their ability to survive, which in turn may also have an important impact on the economies of developing countries. Thus, at this point we can already identify a need for more research into risk management in SMEs in developing countries [4].

Table 2 also presents data on the research designs of the 27 articles reviewed. Ten studies each were classified as qualitative and quantitative empirical studies. Four papers were purely conceptual/theoretical publications. Three papers (Delerue and Perez, 2009; Delerue-Vidot, 2006; Sukumar *et al.*, 2011) used multiple research methods. In all 10 quantitative empirical papers included in this review, data were collected via surveys or archival databases. The 10 qualitative empirical papers relied on case study methods, qualitative interviewing, or both.

=== Insert Table 2 about here ===

3.2 Different types of risks in SMEs

Although our search strategy did not focus on risk types in SMEs (see section 2), the reviewed articles placed significant emphasis on identifying and discussing a variety of typical risks in SMEs, probably because risk identification is usually a necessary prerequisite for later risk management. Therefore, we begin by presenting the most frequently mentioned types of risks in SMEs in the literature to date.

3.2.1 Interest rate risk

SMEs are viewed by the current literature as being highly dependent on external finance, and accordingly, a loan is usually the main source of financing available (Altman *et al.*, 2010; Mutezo, 2013; Gama and Geraldes, 2012). This, however, involves the risk that interest rates on the loans may change (i.e., interest rate risk). Adopting the standpoint of banks, Mutezo (2013) suggested that SMEs might be able to reduce banks' fears concerning information asymmetries and thus banks' perception of SME risk, which might in turn also limit the likelihood of SME interest rates changing. Adopting the SMEs' view, the qualitative study by Bruns and Fletcher (2008) showed that for SMEs whose financial position is weak but whose owners' risk appetite remains high, the probability of credit being offered decreases more than for companies with a strong financial position. The two authors suggested that a strong financial position can, at least partially, compensate for high risk tolerance. In addition, Bruns and Fletcher (2008) found that SMEs with limited collateral are unlikely to be given a loan, regardless of their willingness to take risks, while for companies with high collateral the likelihood of being granted a loan is significantly higher when their willingness to take risk is low. This finding by Bruns and Fletcher (2008) suggests that strong collateral cannot compensate for the negative aspects of high risk-taking

The study by Vickery (2008), which is based on data from 3,248 US firms, found that SMEs are about twice as likely to decide on a fixed-rate (rather than an adjustable-rate) loan as large firms. Vickery (2008) showed that with increasing firm size or age, the probability of taking on fixed-term debt decreases steadily. Further, fixed-term loans are particularly popular among smaller, younger companies with low cash flow or high investment opportunities

(Vickery, 2008). Thus, Vickery (2008) suggested that, given their preference for fixed-rate over adjustable-rate loans (where the latter include interest rate risk), SMEs are more averse to interest rate risk than larger firms. A potential explanation for this finding was provided by Moore *et al.* (2000): as SMEs may be less sophisticated in terms of risk management practices than larger entities, it is particularly important for them to be aware of the fact that variable interest rates come with a significant interest rate risk. This type of SME behavior may, however, vary with SME owner education: based on their survey of more than 4,000 European SMEs, Kim and Vonortas (2014) pointed out that better educated SME owners are more likely to take strategic action in order to mitigate financial risks, such as interest rate risk.

3.2.2 Raw material prices risk

Moore *et al.* (2000) also described raw material risk in their conceptual paper. According to them, due to the deregulation and abolition of subsidies in certain agricultural markets, an increasing number of SMEs are looking for ways to manage the volatility of their raw material costs. Moore *et al.* (2000) also presented evidence that in recent years the volatility of raw material prices in agriculture and on energy markets has confronted SMEs with new challenges. Due to an increasingly competitive market, rising commodity prices could no longer be passed on routinely to customers. It cannot, however, be assumed that all companies are exposed to the same problem. Moore *et al.* (2000) argued that many large companies have invested in technologies, and so for them it is relatively easy to change to cheaper resources when prices are rising. However, in their view, many SMEs cannot afford these investments and are thus more exposed to raw material price risks. As these findings by Moore *et al.* (2000) are conceptual in nature, they need corroboration by future empirical research.

3.2.3 E-business and technological risks

The study by Sukumar *et al.* (2011), which is based on 15 qualitative interviews and a quantitative survey of 125 SMEs in the UK, identified online safety as the most dangerous risk in e-business. According to them, SMEs are exposed to a variety of online threats, such as identity theft, credit card fraud, e-mail abuse and cyber-attacks. Installing computer systems may also involve a major risk for SMEs. As Poba-Nzaou *et al.* (2014) showcased, implementing mission-critical software may pose a considerable risk to SMEs because software implementations require higher relative levels of resource commitment in SMEs than in large firms, making the potential impact of implementation failure relatively higher – especially if SMEs opt for open-source software vendors and not for large for-profit software vendors.

In terms of customer-related risks, the SME managers surveyed in the study by Sukumar *et al.* (2011) pointed out that consumer confidence is one of the most important factors in online business. However, Sukumar *et al.* (2011) argued that it is often difficult for SME managers to build such confidence due to their limited company size and number of transactions. They suggested that, ultimately, all gaps in online security have an impact on reputation and customer trust. Therefore, it can be difficult for an SME to rebuild its online reputation after a security-related incident because of its limited resources.

3.2.4 Supply chain risks

The quantitative study by Thun *et al.* (2011) of 67 German SMEs showed that SMEs must offer an increasingly wide range of products to meet their customers' needs. However, this creates higher dependence of the SMEs on their supply chains due to increased complexity. In addition, Thun *et al.* (2011) pointed out that SMEs are often no longer able to concentrate only on local markets, which again leads to increased complexity and higher levels of supply chain risks. Such increased complexity in an SME's supply chain may also result in higher levels of trade debt, which in turn may pose considerable risks to SME survival: Both Altman *et al.* (2010) and Wilson and Altanlar (2013) reported that young SMEs with unsecured debt arrears (mostly trade debts) are significantly more likely to face insolvency than comparable firms without such debts.

SMEs are also often limited to one supplier in the procurement of products. All eleven managers surveyed in the qualitative field study by Ellegaard (2008) stated that they use single sourcing as a procurement strategy. This finding is complemented by the results by Thun *et al.* (2011), who suggest that, as the total purchase volume is not divided between several suppliers, SMEs hope to gain a better bargaining position with their suppliers and thus a price advantage. However, this strategy also entails a strong dependence on single suppliers. Any difficulties with the supplier may lead to production interruptions, which presents another significant supply chain risk for SMEs (Ellegaard, 2008). However, in contrast to Ellegaard's (2008) arguments, Thun *et al.* (2011) showed in their study that SMEs are no more exposed to the consequences of such developments than large companies. Given these differences between Ellegaard's (2008) and Thun *et al.*'s (2011) findings, future research could investigate whether SMEs are in fact more exposed to supply chain risks than larger firms and how SMEs can deal with them efficiently.

3.2.5 Growth risks

In the 40 interviews with British SME managers conducted by Gilmore *et al.* (2004), only a few business leaders expressed a desire for steady growth: The respondents indicated that running a larger company may involve a higher risk of becoming unable to cover growing costs. Whereas firm growth is often considered a strategic goal in many large companies, the findings by Gilmore *et al.* (2004) suggest that some SME leaders think differently and view growth as a risk rather than a strategic goal. Furthermore, Marcelino-Sádaba *et al.* (2014) suggested that SME growth is mainly accomplished through projects, but that these pose major risks because SMEs often do not have the know-how and techniques required to run such growth projects effectively.

Gilmore *et al.* (2004) also reported that their respondents connected the development of a new market with an enormous entrepreneurial risk. They pointed out that entering new markets comes at the cost of considerable research effort for SMEs in order to assess whether the company can be successful in the new market. Thus, in Gilmore *et al.'s* (2004) study, international ventures are viewed as highly speculative and potentially very costly for SMEs. In contrast, the quantitative study by Forlani *et al.* (2008) of 81 small firms in the USA showed that managers of small firms see the least business risk in export. Further, based on a survey of 311 Austrian SMEs, Brustbauer (2014) reported that those with a proactive (rather than passive) approach to risk management show higher propensity to expand to new markets and invest in new production and process technologies. This suggests that proactive risk management may mitigate SME owners' aversion to growth risks.

Given these somewhat contradictory results, there is a need for future research based on larger sample sizes and probably on quantitative methodologies in order to test whether the finding that the majority of SME owners views growth rather as a risk than an opportunity can be generalized to larger populations and whether for such larger populations, the mitigating role of proactive risk management holds, as proposed by Brustbauer (2014). Such research could build on the results by Forlani *et al.* (2008) and Brustbauer (2014) by including various growth strategies to determine whether SME owners' perceptions of the risks associated with these strategies differ. Moreover, it would also be relevant to our knowledge of risk management in SMEs whether and how SMEs cope efficiently with different types of growth risks in different ways (i.e., adopting different risk management techniques for various growth risks).

3.2.6 Management and employees

Knowledge management may also constitute a challenge for SMEs. Accordingly, the 40 British managers interviewed by Gilmore *et al.* (2004) believed that almost every business is exposed to loss of knowledge when experienced employees with valuable information and knowledge and/or contacts leave the organization. Thus, Gilmore *et al.* (2004) concluded that the loss of long-term employees and managers may be especially risky for SMEs because often no other employees or managers in the firm possess similar knowledge. In line with this notion, case study findings by Gao *et al.* (2013) show that knowledge about risk management may be mostly informal in SMEs, which complicates effective building of risk management capacity among SME employees.

Despite these findings, Sukumar *et al.* (2011) showed in their paper that SMEs rarely offer employee development programs and continuing education. Sukumar *et al.* (2011) also showed that accidental damage or non-compliance with instructions can have a considerable impact on the company and may thus involve a significant risk for SMEs. Furthermore, the SME managers surveyed indicated an awareness of the threat of intellectual property rights infringement (copyright, trademark, linking, etc.), but according to Sukumar *et al.* (2011), their lack of knowledge prevents them from properly protecting their intellectual property.

In summary, the findings on management and employee risks suggest that SME owners are well aware of the importance of employees' (tacit) knowledge and the risk associated with losing such knowledge. However, at the same time, SME owners seem to be somewhat reluctant to invest in knowledge-building activities which might help to mitigate such knowledge risks. Thus, we identify a need for future research into how SMEs might successfully manage the risk of knowledge loss (e.g., on risk management) due to leaving or disgruntled management personnel or employees.

3.3 Risk management process in SMEs

A stringent risk management process may enable SMEs to cope with the risks presented in the previous section (Hollman and Mohammad-Zadeh, 1984). Once risks have been identified, a number of techniques and actions can be selected to address them. According to the conceptual paper by Hollman and Mohammad-Zadeh (1984), the risk management process comprises five major steps (identify risks, analyze risks, select techniques, implement strategy, control). On the basis of the SME-specific findings from the articles reviewed for this paper, these five steps are now described in more detail in the following sub-sections. Especially case-study-based research (Gao *et al.*, 2013; Poba-Nzaou *et al.*, 2014) suggests that risk management practices in SMEs may be very informal, which in turn inhibits their being shared and thus also building risk management capacity in SMEs. However, Brustbauer (2014) found numerous examples of SMEs that take a very proactive approach to risk management. Thus, in the published literature there are incidences both of rather informal risk management and of more formalized and proactive approaches in SMEs.

3.3.1 Risk identification

According to Hollman and Mohammad-Zadeh (1984), the first step in the risk management process – which should be carried out continuously and systematically – is identifying possible sources of loss and thus risks. They list three different methods SME managers can use to identify risks of loss: (i) systematic reviews of all data on business assets, activities and staff, (2) using financial statements to identify the sources of potential financial losses and (3) using flow charts to analyze all operations or activities of the enterprise.

Marcelino-Sádaba *et al.* (2014) showed that risk identification may also be decisive in SME project management. Based on a multiple case study of 72 Spanish SMEs, they proposed that strategic project risks that may jeopardize the entire project or the survival of the SME should be removed completely, and that more operational risks should be carefully identified and analyzed. However, as the case study by Gao *et al.* (2013) highlights, efficient risk identification in SMEs may be hindered by SME employees' limited knowledge of risk management. Thus, a precondition of effective and comprehensive risk identification in SMEs may be building risk management capacity in their employees. In line with this notion, several of the papers reviewed (Moore *et al.*, 2000; Ellegaard, 2008; Bruns and Fletcher, 2008; Sukumar *et al.*, 2011) pinpointed the usually limited financial and human resources in SMEs and their partial inability to effectively manage all risks at the same time. It might therefore be advisable for SMEs to identify all potential risks, but then – after risk analysis (see below) – focus only on the most important risks and train their employees to manage these risks effectively. Nonetheless, given the lack of detail in empirical studies of the actual process of how SMEs identify risks, research is needed to shed more light on this issue.

3.3.2 Risk analysis

The second step in the risk management process as suggested by Hollman and Mohammad-Zadeh (1984) is risk analysis, which involves measuring or estimating the potential frequency of losses and the potential impact of a risk on the company's operation. Subsequently, the risks can be ranked according to importance for the company. Hollman and Mohammad-Zadeh (1984) argued that this helps to establish risk management priorities and provides a starting point for selecting appropriate risk management techniques for each risk. However, while proper risk analysis may also be highly important in SME project management (Marcelino-Sádaba *et al.*, 2014), poor employee education may – like poor risk identification – hinder proper risk analysis in SMEs (Gao *et al.*, 2013). To cope with this limitation, Marcelino-Sádaba *et al.* (2014) suggest a simplified process to analyze risks in SMEs which consists of two variables only (probability measured as "highly unlikely", "unlikely", "likely" or "highly likely"; gravity measured as "negligible", "significant", "major" or "catastrophic").

3.3.3 Selection of techniques

Hollman and Mohammad-Zadeh (1984) suggested that once the risks have been identified and analyzed, they may be handled differently. Our review reveals that several tools and methods are available for risk handling in SMEs, which are explained in more detail in the following paragraphs.

Insurance. Three publications deal with insurance in the risk management process in SMEs. The qualitative study by Cioccio and Michael (2007) of eleven small businesses in Australia showed that for most of the respondents insurance is the primary tool for risk management. However, Cioccio and Michael (2007) described the SMEs in their study as being aware that insurance is sometimes associated with considerable cost and that insurance basically covers unexpected events. Delivering more details on events covered by insurance in SMEs, Sparrow (1999) showed on the basis of 24 qualitative interviews in the UK that SMEs usually obtain insurance against fire, flooding, property damage and personal injury. Hollman and Mohammad-Zadeh (1984) added that, aside from providing protection against financial losses from such events, insurance may also cover other services for SMEs, even if the insured SME does not suffer any loss. Examples they mentioned are downside risk analysis, compliance assistance with statutory requirements and management services. These services are especially important for SME owners because they are usually not experts in these areas

(Hollman and Mohammad-Zadeh, 1984). Thus, even if the event against which SMEs have insured does not materialize, arranging insurance may be advantageous because they are forced to systemically examine their risks.

Weather derivatives. As Leggio (2007) pointed out in her study of two small US firms, extreme weather conditions have prompted many SMEs to hedge their exposures to catastrophes such as floods, tornados and droughts with the help of weather derivatives. These financial instruments enable SMEs to transfer the weather risk to a third party. She also showed that, as with insurance, the company owner enters into a contract with the contractor and may exercise the option later if weather conditions are unfavorable. Thus, Leggio (2007) reasoned that by using weather derivatives, the financial pressure on the SME owner and the variability of sales in SMEs can often be reduced by more than 80%.

Selection of suppliers. The study by Ellegaard (2008) showed that SMEs can enter into contracts with individual suppliers to influence supplier behavior, which in turn can mitigate risks. These contracts can be some kind of performance guarantee that requires constant quality of the products supplied to an SME and may incorporate penalties. Moreover, ten out of eleven managers interviewed by Ellegaard (2008) reported that they focus on procuring products in local markets because this is especially advantageous for Western industrial companies, since a number of risks such as political unrest, customer and currency problems, and risks associated with cultural differences can be avoided. An SME manager from the qualitative study by Poba-Nzaou and Raymond (2011) of four SMEs in France and Canada also confirmed Ellegaard’s (2008) results by reporting that his company was working only with suppliers they already knew and who had a similar mentality. As a result, risks associated with new suppliers were avoided.

In addition to the risks already mentioned, another risk with foreign suppliers may be knowledge loss: All SME managers in the study by Ellegaard (2008) declared that they were reluctant to pass on product information to suppliers, which reduces the risk of knowledge loss to external parties. However, both Ellegaard (2008) and Poba-Nzaou and Raymond (2011) relied on relatively small sample sizes, and thus their finding that SMEs prefer using local suppliers as a risk handling technique must be treated with caution. We therefore need corroboration of their results to determine whether SME managers from other regions and different contexts also consider this method viable despite the price advantages provided, for instance, by emerging market suppliers and global sourcing.

Overcapacity in production. The results by Thun *et al.* (2011) showed that safety stocks, excess capacity in production and excess capacity in the warehouse, which can prevent interruptions in production or delivery problems, are more often present in SMEs than in large companies. In contrast, in the study by Ellegaard (2008), only three of the eleven small businesses surveyed were found to have considerable reserves, which consisted mainly of limited private financial resources and a small stock. However, as a limitation it must be noted that the study of Thun *et al.* (2011) analyzed only manufacturing companies that operated within the German automotive industry. Hence, their results may be specific to this particular industry or to the country investigated. Therefore, additional international research and data from other industries could provide further insights into the extent to which safety stocks would be an effective risk handling technique for SMEs.

Emergency plan. Cioccio and Michael (2007) argued that in cases of natural disasters or terrorist attacks, it may be important for companies to have established a continuity plan or contingency plan. Such plans include, for example, whether and how the staff must evacuate the building and/or whether and how temporary relocation of the company is to be arranged.

The study by Cioccio and Michael (2007), however, found that SMEs are more likely to lack such a plan than larger firms.

Networking/cooperative relations. The results of the study by Gilmore *et al.* (2004) showed that SME managers frequently use their personal networks to manage risky situations. Therefore, close relationships with key suppliers may be regarded as another technique to manage risks successfully. Gilmore *et al.* (2004) showed that, in addition to personal networks, SMEs often maintain similarly close relationships with existing clients in the hope of gaining more repeat business. Furthermore, their study found that SME networks were used to attract new customers. Likewise, networking with competitors was found to help prevent risky transactions because sharing information with competitors results in more information about the creditworthiness of prospective customers (Gilmore *et al.*, 2004). Similarly, the studies by Delerue and Perez (2009) and by Delerue-Vidot (2006), which are both based on 20 qualitative interviews and 344 survey responses, also showed that SME managers tend to enter into a cooperative relationship when they perceive a high level of relational risk or when they hope to gain a future competitive advantage over the competitor. In line with the studies above, the large-scale study by Kim and Vonortas (2014) also found that networking is a frequently used risk-mitigation strategy in SMEs – according to their results, mostly for coping with technology, financial and market risks.

Despite the above-discussed risks of knowledge losses, all 40 SME managers surveyed in the study by Gilmore *et al.* (2004) recognized the need to entrust senior staff with responsibility. They were aware that employees leaving the company involves risk, but that a company cannot fully realize its potential without delegating responsibility. According to the SME managers interviewed by Gilmore *et al.* (2004), the risk arises with the selection and management of employees to whom responsibility is transferred. The SME managers in this study indicated that they therefore tried to learn about the personal qualities, skills and ambitions of employees by internal networking, which helped them to select suitable candidates who are unlikely to leave the company, and thus to avoid negative consequences (Gilmore *et al.*, 2004).

Asset securitization. In his conceptual paper, Jobst (2006) showed that securitization is a means of risk management sometimes applied in SMEs. He argued that it allows the issuer to transfer different types of risk (credit, interest rate, and liquidity risk) to investors in the capital market at a fair market price. Moreover, since it is usually difficult for SMEs to gain access to capital due to their small size, Jobst (2006) suggested that asset securitization may be an interesting alternative to the traditional channels of external financing. Furthermore, he argued that especially for SMEs it may help efficient securitization markets to limit differences in the availability and cost of credit in the primary credit markets. However, as these arguments are based only on conceptual considerations, analyzing and testing their applicability to business practice is left to future research.

3.3.4 Strategy implementation

After the risks have been identified and analyzed and a decision made as to which method is to be used to avoid or deal with the risks, the fourth step in the risk management process according to Hollman and Mohammad-Zadeh (1984) consists of implementing the chosen methods. In addition, they suggested that all affected employees are to be informed of the risk management objectives of the company. However, no empirical findings concerning the implementation of risk management strategies were identified in the reviewed papers, which may therefore be regarded as a fruitful field for future research.

3.3.5 Control

The final step in the risk management process according to Hollman and Mohammad-Zadeh

(1984) is to regularly review the introduced techniques and measures to ensure that they meet the current requirements. Hollman and Mohammad-Zadeh (1984) advised that SME define performance standards or criteria to monitor the risk management process effectively and continuously. Again, aside from the conceptual recommendations by Hollman and Mohammad-Zadeh (1984), no empirical evidence on the control of risk management processes in SMEs could be identified in the reviewed papers and needs further research in the future.

3.4 Risk behavior of SME owners

In the papers reviewed, there is multiple evidence that the individual characteristics of SME owners and SME ownership structure have a significant impact on the business direction of an organization and also on risk management practices (Newby, 2005; Acar and Göc, 2011; Brustbauer, 2014; Gao *et al.*, 2013; Georgousopoulou *et al.*, 2014; Kim and Vonortas, 2014). For instance, the quantitative study by Acar and Göc (2011) based on 32 survey responses from Turkey showed that the perception of risk is associated negatively with the risk appetite in health and finance, while the risk is positively linked with organizational size. Owners of SMEs emerge from this study as tending to have a higher perception of risks (Acar and Göc, 2011).

Furthermore, the study by Acar and Göç (2011) showed that an enterprise's budget for risk management increases with size and that the decision-makers in smaller companies have a lower risk tolerance. In accordance with the findings by Gilmore *et al.* (2004), they showed that – due to their financial constraints – SMEs focus on business strategies that have lower risks rather than on growth-oriented business strategies. However, Acar and Göc (2011) also showed that the characteristics of the industry are very important because unstable demand or rapid technological change can influence the individual risk perception. Another key point in their study is that, compared to managers from developing countries, Western managers take more risks. Thus, risk appetite seems to vary with individual culture (Acar and Göc, 2011). Furthermore, the study by Watson and Newby (2005) of 673 SMEs in West Australia reported that male SME owners appear to show a greater risk appetite than female SME owners. In addition to gender, age also seems to affect the risk-taking behavior of SME owners: Acar and Göc (2011) presented evidence that younger SME managers have higher risk appetites than older ones. A possible explanation for the relationship between age and risk appetite was given by Gilmore *et al.* (2004). In their study, SME managers with deeper knowledge (which may be related to their greater age) perceived risky situations more critically, took more informed decisions, and could be regarded overall as more risk-averse. In addition to age and gender, owner education also seems to play a role in SME risk management. As Kim and Vonortas (2014) showed, higher SME owner education is positively related to adopting risk mitigation strategies, such as networking, and strategic actions to mitigate technological financial and operational risks.

4. Conclusions and further research avenues

This paper aimed to provide a systematic review of the existing literature on risk management in SMEs. From this analysis of the literature, three clusters of research emerged. These three clusters along with the main results in the current literature can be found in Table 3, which summarizes this review's main findings.

=== Insert Table 3 about here ===

Aside from the future research needs already identified in the previous sections, Table 4 presents a summary of additional research avenues which emerge from our analysis of the published literature on risk management in SMEs. As shown above (section 3.3 and Table 3), for some steps of the risk management process only conceptual research is available. Additional empirical research particularly on the implementation and control of risk management processes in SMEs is therefore needed in order to shed more light on the difficulties SME experience in this context and to identify useful practical strategies for these steps.

However, also the steps of risk identification and risk analysis in SMEs offer ample opportunity for further research, which is not only useful for academia but also for SME practice. For instance, from the extant literature it is not known at what time interval (frequency) risk identification is carried out or how exactly risk analysis is performed effectively in SMEs. Furthermore, it is not yet clear who contributes to risk identification and analysis in SMEs; is it only the SME owners/managers, or do they also seek outside advice – and if so, what is the impact of external advice on the risk management practices in SMEs?

=== Insert Table 4 about here ===

Another research direction addresses the characteristics of SME owners/managers. As mentioned in the previous chapter, the characteristics of owners play a significant role in SME risk management. For instance, it is not yet clear from the literature how the career path of an SME owner affects risk management practices. Further research could therefore investigate whether SME owners already held a leadership position in another company before founding their own and how this affects their behavior with respect to risk management. Another research avenue could examine SME owners' risk perceptions in different industries, as the study by Acar and Göc (2011) identified a connection, but no explicit mention was made of which sectors exhibit higher or lower risk perception.

From a more holistic standpoint, this review has revealed some evidence (Vickery, 2008; Acar and Göç, 2011) which suggests that the sophistication of risk management may increase and/or the risk-taking attitude of SME owners may change with growing firm size. This may indicate that risk management systems in SMEs are not stable over time, but contingent to certain developments. Thus, another fruitful avenue for future research could be to relate the risk management practices of SMEs to their life-cycle stage or to major events in an SME's life cycle (e.g., generational succession in family SMEs or buyout to non-family owners).

We hope that our review and suggestions for further research will stimulate more research on the important topic of risk management in SMEs. Only then will academia be able to give more precise advice to SME business practice, which might increase the chances of SME survival and consequently have a positive effect on many economies worldwide.

5. Limitations

Like any piece of research, this review paper has limitations, which are to be acknowledged. First, the findings of any systematic literature review are contingent to the selection and inclusion criteria set out. We deliberately focused our keyword search on the actual management of risk and on a small set of related keywords. In our keyword search, we thus excluded types of risks and risk-related issues such as moral hazard, information asymmetry or adverse selection. This comes with the limitation that including keywords on these issues might have resulted in a broader set of literature on risks in SMEs, but probably at the price that many articles found would not deal with the actual management thereof. Other or additional keywords might have led to different review results. The same applies to defining a quality threshold for papers to be included in our review (see section 2). Obviously, without such a threshold, a larger number of papers would have been included in this review, but with the potential downside that the results reported in these papers might not have undergone similarly strict quality controls and might therefore be less reliable than those in the papers we analyzed. In addition, our article selection process also focused exclusively on journal articles and thus excluded other types of literature such as books, book chapters and grey literature. While these other literature types may also contain interesting findings, we confined our review to journal articles because these are the usual means of communicating novel scientific findings and are more easily accessible in keyword-based database searches.

Notes

[1] SMEs are usually defined as companies that do not exceed threshold values for the number of employees, annual sales turnover or total assets. For instance, according to the definition of the European Commission (2003), SMEs are firms which employ fewer than 250 employees and have an annual turnover of less than 50 million Euros and/or total assets of less than 43 million Euros.

[2] Further, the papers identified as relevant for this review paper did not contain a comprehensive overview of risk management in SMEs in their literature review sections.

[3] Although risk types were not included in our keyword search for the above-stated reasons, a considerable proportion of the reviewed papers' findings on risk management also

concerned common risk types in SMEs, and so we devoted one sub-section of the review findings to risk types (section 3.2).

[4] However, there may be research available on risk management in SMEs in emerging countries which has not been published in English, but in the official languages of the respective emerging countries. Although such research may contain interesting findings on risk management in SMEs, most researchers and SME owners/managers from other parts of the world can assess and use research findings only if they are published in English.

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Table 1 - Bibliographical sources of the articles included in the literature review

	Year of publication															
Primary Field of Journal, Journal Title	**1984**	**1999**	**2000**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**	**2014**	**Total**	**Two-year impact factor 2013**	**ABS ranking**
Business Ethics and Governance																
Corporate Ownership and Control												**1**		**1**		Grade 1
Entrepreneurship and Small Business Management																
International Journal of Entrepreneurial Behaviour and Research					**1**									**1**		Grade 2
International Small Business Journal												**1**	**1**	**2**	**1.397**	Grade 3
Journal of Small Business Management	**1**													**1**	**1.361**	Grade 3
Journal of Small Business and Enterprise Development													**1**	**1**		Grade 2
Venture Capital								**1**						**1**		Grade 2
Word Review of Entrepreneurship, Management and Sustainable Development											**1**			**1**		Grade 1
Finance																
Journal of Applied Corporate Finance			**1**											**1**		Grade 2
Journal of Financial Economics								**1**						**1**	**3.769**	Grade 4
Journal of Credit Risk										**1**				**1**	**0.265**	
Managerial Finance						**1**	**1**							**2**		Grade 1
General Management																
Management Decision						**1**								**1**		Grade 1
Information Management																
Journal of Information Technology											**1**			**1**	**3.789**	Grade 3
Management Development																
Journal of Management Development									**1**					**1**		Grade 1
Marketing																
International Marketing Review								**1**						**1**	**1.778**	Grade 3
Marketing Intelligence & Planning				**1**										**1**		Grade 1
Qualitative Market Research: An International Journal		**1**												**1**		Grade 1
Operations, Technology and Management																
International Journal of Operations & Production Management													**1**	**1**	**1.518**	Grade 3
International Journal of Production Research											**1**			**1**	**1.323**	Grade 3
International Journal of Project Management													**1**	**1**	**1.758**	Grade 2
Journal of the Operational Research Society													**1**	**1**	**0.911**	Grade 3
Supply Chain Management: An International Journal								**1**						**1**	**2.916**	Grade 3
Technovation													**1**	**1**	**2.704**	Grade 3
Sector Studies																
Construction Management and Economics											**1**			**1**		Grade 2
Tourism and Hospitality Management																
Tourism Management							**1**							**1**	**2.377**	Grade 4
Total	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**4**	**1**	**1**	**4**	**2**	**6**	**27**		

Table 2 - Research designs of the articles included in the literature review

Author(s) (year)	Article type: Empirical quantitative	Article type: Empirical qualitative	Article type: Conceptual/ theoretical	Data collection: Survey	Data collection: Database	Data collection: Interviews	Data collection: Case study methods	Sample size (number of firms)	Size of sample firms*	Country of research
Acar and Göc (2011)	x			x				32	8 M 14 S 10 MS	Turkey
Altman *et al.* (2010)	x				x			5,816,021	SME	UK
Bruns and Fletcher (2008)		x					x	114	3-100 employees	Sweden
Brustbauer (2014)	x			x				311	SME	Austria
Cioccio and Michael (2007)		x				x		11	S	Australia
Delerue-Vidot (2006)	x	x		x		x	x	20 interviews 344 survey responses	SME	Europe
Delerue and Perez (2009)	x	x		x		x		20 interviews 344 survey responses	SME	Multiple**
Ellegaard (2008)		x				x		11	1-12 employees	
Forlani *et al.* (2008)	x			x				81	S	USA
Gao *et al.* (2013)		x					x	1	SME	China
Georgousopoulou *et al.* (2014)	x			x				150	SME	Greece
Gilmore *et al.* (2004)		x				x		40	11-250 employees	UK
Hollman and Mohammad-Zadeh (1984)			x							
Jobst (2006)			x							
Kim and Vonortas (2014)	x			x	x			4,004	SME	Multiple***
Leggio (2007)		x					x	2	S	USA
Marcelino-Sádaba *et al.* (2014)		x					x	72	SME	Spain
Moore *et al.* (2000)			x							
Mutezo (2013)			x							
Poba-Nzaou and Raymond (2011)		x					x	4	SME	3 in France 1 in Canada
Poba-Nzaou *et al.* (2014)		x					x	1	S	Canada
Sparrow (1999)		x				x		24	<200 employees	UK
Sukumar *et al.* (2011)	x	x	x	x		x		15 interviews 125 survey responses	SME	UK
Thun *et al.* (2011)	x			x				67	SME	Germany
Vickery (2008)	x			x				3,248	<500 employees	USA
Watson and Newby (2005)	x			x				673	SME	West Australia
Wilson and Altanlar (2014)	x				x			4,427,896	SME	UK
Total	**13**	**13**	**5**	**11**	**3**	**7**	**7**			

* MS = medium-sized; S = small; M = micro
** France, UK, Austria, Germany, Belgium, Switzerland, Spain, Italy, Denmark, Hungary, Finland, Netherlands, Sweden
*** Croatia, Czech Republic, Denmark, France, Germany, Greece, Italy, Portugal, Sweden, UK

Table 3 - Main findings of the papers reviewed

Clusters of findings	Sub-clusters	Main findings
Different types of risks in SMEs	**Interest rate risk**	- Reducing information asymmetries with banks may lower interest rate risks for SMEs (Mutezo, 2013) - A strong financial position compensates for high risk tolerance in SMEs (Bruns and Fletcher, 2008) - SMEs are about twice as likely to decide on a fixed-rate loan as large firms (Vickery, 2008) - SMEs cannot benefit from fixed-rate loans in the forms of lower financing costs when interest rates fall, which leads to a reduction in profits (Moore *et al.*, 2000)
	Raw material prices risk	- No empirical findings available - Rising commodity prices can no longer be passed on routinely to customers (Moore *et al.*, 2000) - An increase in price can lead to a significant decline in demand (Moore *et al.*, 2000)
	E-Business and technological risks	- SMEs are exposed to a variety of online threats (identity theft, credit card fraud, email abuse, attacks by viruses, etc.) (Sukumar *et al.*, 2011) - Rapid technological changes and implementation of mission-critical software pose significant risks to SMEs that can undermine the success of their businesses (Sukumar *et al.*, 2011; Poba-Nzaou *et al.*, 2014) - It is difficult for an SME to rebuild its online reputation after a security-related incident because of its limited resources (Sukumar *et al.*, 2011)
	Supply chain risks	- Many SMEs are no longer able to concentrate only on local markets, which leads to increased complexity and higher levels of supply chain risks (Thun *et al.*, 2011) - SMEs with considerable trade debts are more likely to face insolvency (Altman *et al.*, 2010; Wilson and Altanlar, 2013) - SMEs are often limited to one supplier in the procurement of products, and any difficulties with the supplier can lead to production interruptions (Ellegaard, 2008)
	Growth risks	- Among internationalization strategies, SME managers see the least business risk in export (Forlani *et al.*, 2008) - SME managers often connect the development of a new market and associated projects with an enormous entrepreneurial risk (Gilmore *et al.*, 2004; Marcelino-Sádaba *et al.*, 2014) - In general, business growth can be regarded as a risk relevant to SMEs (Gilmore *et al.*, 2004) - SMEs with a proactive risk management approach show higher propensity to expand to new markets and invest in new technologies (Brustbauer, 2014)
	Management and employees	- Losing long-term employees and managers is especially risky to SMEs due to knowledge loss (Gilmore *et al.*, 2004) - Informal knowledge on risk management hinders risk management capability building in SMEs (Gao *et al.*, 2013) - It is necessary for SMEs to protect knowledge by all means (Gilmore *et al.*, 2004) - SMEs rarely offer employee development programs (Sukumar *et al.*, 2011)
Risk management process	**Risk identification**	- The identification of possible risks should be carried out continuously and systematically (Hollman and Mohammad-Zadeh, 1984) - The management can use different methods or tools to facilitate the identification of risks of loss (checklists, financial statements, ...) (Hollman and Mohammad-Zadeh, 1984) - Strategic project risks in SMEs should be avoided, while operational project risks should be identified and managed (Marcelino-Sádaba *et al.*, 2014) - Risk identification in SMEs may be hindered by employees' limited risk management knowledge (Gao *et al.*, 2013)
	Risk analysis	- The risk analysis step in SMEs may result in a comprehensive list of risks, of which - due to limited resources - only those with the highest likelihood and/or the highest potential impact are handled in the risk management process (Hollman and Mohammad-Zadeh, 1984) - Poor employee education may hinder proper risk analysis in SMEs (Gao *et al.*, 2013) - Simplified process to analyze risk in SMEs may be useful (Marcelino-Sádaba *et al.*, 2014)
	Selection of techniques	- Several tools and methods for handling risks (insurance, weather derivatives, selection of supplier, overcapacity in production, emergency plan, networking/cooperative relations, asset securitization) are described in the literature
	Strategy implementation	- No empirical findings available - All affected employees are to be informed of the risk management objectives of the company (Hollman and Mohammad-Zadeh, 1984)
	Control	- No empirical findings available - SMEs should define performance standards or criteria to monitor the risk management process (Hollman and Mohammad-Zadeh, 1984)
Risk behavior of SME owners		- Decision-makers in smaller companies have a lower risk tolerance (Gilmore *et al.*, 2004; Acar and Göc, 2011) - Male SME owners show a greater risk appetite than female SME owners (Watson and Newby, 2005) - Younger SME managers have higher risk appetites than older ones (Gilmore *et al.*, 2004) - Better educated SME owners show higher adoption of risk mitigation strategies (Kim and Vonortas, 2014)

Table 4 - Further research avenues

Cluster	Further Research	Potential research questions
Risk management process	Risk identification	- At what time interval and how is risk identification carried out in SMEs? - What are risk identification strategies which do not overstrain SMEs' limited resources?
	Risk analysis	- How may risk analysis be performed effectively in SMEs? - What are risk analysis strategies which do not overstrain SMEs' limited resources?
	Strategy implementation	- How is risk management strategy implemented effectively in SMEs?
	Control	- At what time intervals are risk controls operated in SMEs? - How may SME owners and managers overcome problems of self-control in risk management?
Risk behavior of SME owners	Career of the company owner	- How does the behavior of SME managers affect risk management when they have held a leadership position in another company before founding their own? - How can effective risk management techniques mitigate effectively overly high risk aversion of SME owners?
	Industrial sector	- In which industries has the management of SMEs a higher/lower risk perception? - In which industries do SMEs already have a well-developed risk management?
Risk management systems over SME life cycle		- How does an SME's risk management system change over time? - How does an SME owner's attitude towards risk change over time?