Process-Oriented Supply Risk Management: An Analysis of What Constitutes Excellence in Supply Risk Management

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Abstract. Supply risk management (SRM) is on the rise as firms face increased risks due to outsourcing and an increasingly dynamic and complex business environment. Besides, supply chain risks and resulting disruptions are not only related to temporarily enhanced cost, but may endanger the existence of a firm. Many firms from different industries intensified their efforts in SRM during the economic crises. But so far – also because of the difficulty to assess the success of risk management approaches – a process standard for SRM has not yet been defined. Hence, different approaches for SRM in terms of scope, resource intensity and formalization exist, bringing different maturity levels of SRM systems to the light.
In this paper, we contribute to prior research by deriving a supply risk management capability maturity model (SRM-CMM). We derive the model based on established literature. The four core SRM processes to be assessed for maturity are risk identification, risk assessment, risk treatment and risk monitoring. Based on this model we explore the status-quo of maturity in SRM and determine best practices across different industries. Based on insights from multiple case studies we elaborate in detail on the best practices in SRM processes and the SRM maturity firms. Providing an overview over the significant spread of SRM processes proficiency we offer guidance to purchasing executives who seek to develop their SRM towards greater maturity.

1. Introduction. In turbulent times of financial crisis not only capital markets are affected, but also supply markets. Therefore, risk management plays an ever more important role in purchasing and supply management (PSM). Supply management professionals find themselves in a challenging environment. They must contribute to corporate performance through cost savings, working capital effects, and additional key performance dimensions such as quality, flexibility, and security of supply, while they are confronted with increasing supply chain risk and resulting disruptions. The consequences do not simply include direct financial losses, but also reputational damage and loss of goodwill with customers due to interruptions of operations from supply shortages as well as reduction in product quality. In many cases the impact of supply chain risks is much higher than that of internal operational risks (Tang, 2006).
As a result of the outlined circumstances and in particular its linking role between external supply markets and the internal customers, the PSM function must take actions to actively manage such organizational risk exposure. In particular, global enterprises which source from a global supply base face these challenges in a notable extent (Wagner and Bode, 2006). Within this context we rely on the definition of Zsidisin et al. (2004) who defined inbound supply risk as “the potential occurrence of an incident associated with inbound supply from individual supplier failures or the supply market, in which its outcomes result in the inability of the purchasing firm to meet customer demand or cause threats to customer life and safety”.
In fact, legal regulations such as the COSO report in the USA, the Turnbull Report in the UK and the German legislation of the KonTraG require firms to identify, communicate, and monitor functional risks (Pausenberger and Nassauer, 2000), yet these legislations overlook inter-firm risks (Lam, 2003). Therefore, these approaches only assure compliance with government legislation, but do not necessarily embrace the growing need to actively manage risks in the supply network. Still the COSO

framework and other European initiatives such as the KontraG are instrumental in transforming the discipline from a finance and engineering paradigm to a more company-wide and inter-company paradigm embracing every function (MacGillivray et al., 2007).

To this point in time there is no standard for supply risk management (SRM) established neither in research nor in practice. Across industries and even within one industry, there is a strong variance in SRM process maturity. Establishing and controlling SRM processes is difficult, thus, PSM executives require guidance how to master the strategic challenges they are facing when developing risk management processes for their global supply management organization.

Therefore, we developed a model that allows comparing SRM processes across companies of different industries in order to sharpen the conception of what distinguishes initial, basic, moderate, capable and superior SRM processes. The two specific research questions to be addressed in this paper read as follows:

1. What constitutes best practices in supply risk management across industries?
2. What is the variance of maturity in supply risk management processes across firms from different industries?

By addressing these research questions, we contribute to the gradual build up and diffusion of knowledge concerning SRM processes and standards. In the model we break down SRM into four subsequent processes (see Figure 1) namely 1. Supply risk identification, 2. Supply risk assessment, 3. Supply risk treatment/ response and 4. Supply risk monitoring.

The model allows exploration of the status-quo in SRM processes across firms of different industries displaying commonalities and differences between them. Based on the results of eight case studies from different industries we seek to provide guidance to purchasing executives who seek to develop their SRM process to enhanced maturity and effectiveness. The findings are valuable to a broad audience since we offer an overview of best practices in SRM across industries providing purchasing executives with a process benchmarking opportunity leading to the disclosure of paths for further improvement of their functions risk management capabilities.

The article is structured as follows: Firstly, the supply risk management literature will be shortly reviewed to develop the scoring grid for the SRM process capability assessment. We shortly elaborate on the multiple case study method enabling us to rate the SRM process maturity of firms along the four dimensions displayed in Figure 1. Afterwards, we will present the results of this investigation focusing on the best practices across firms. After condensing our findings the paper provides implications for management practice.

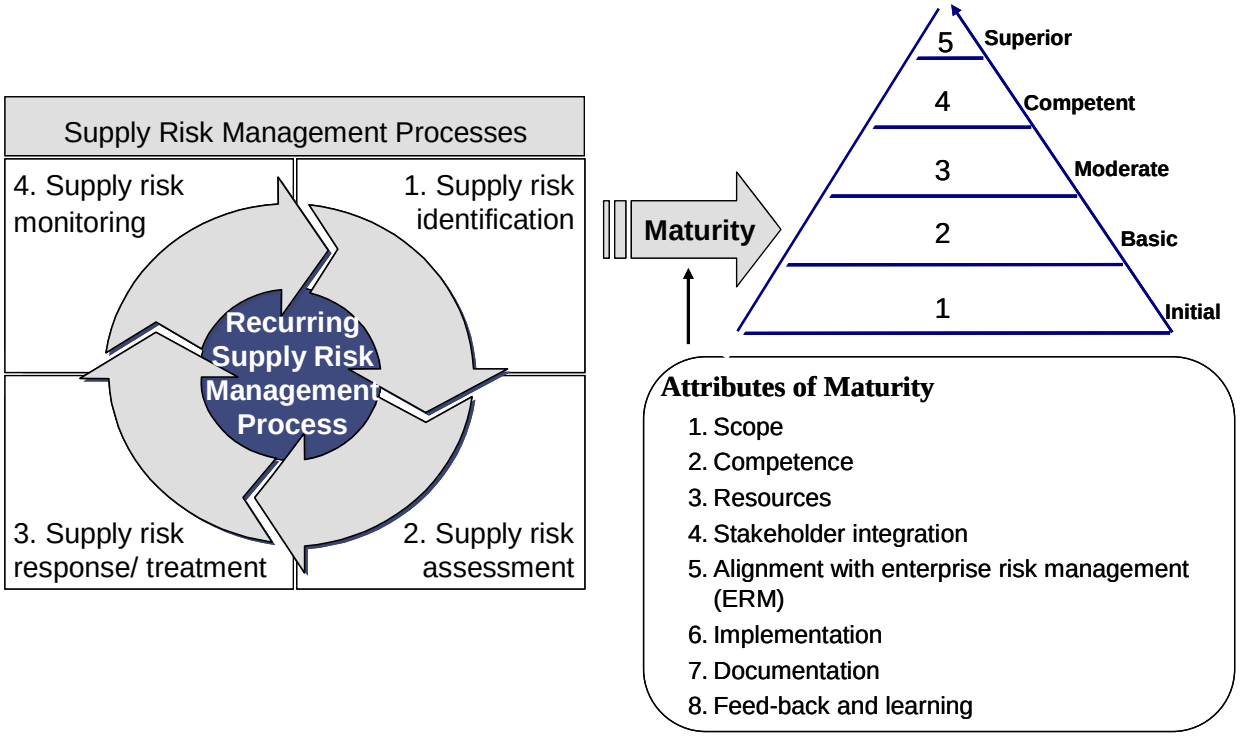
2. A Review of Supply Risk Management Literature. Risk management in supply chains is of growing importance. Essentially, scholars agree on the trends for this development: supply chain risk has grown (Jüttner et al., 2003), not only due to environmental uncertainty (Wagner and Bode, 2006), but also due to increased reliance on supplier production as part of firms' value adding processes (Harland et al., 2003; Christopher and Lee, 2004). However, the separate research stream and discussion on SRM has emerged only recently (Zsidisin and Smith, 2005; Zsidisin and Ellram, 2003;

Kull and Closs, 2008). Following the pioneering contributions of Ritchie and Brindley (2000) and Zsidisin et al. (2000), scholars delivered conceptual frameworks on SRM (e.g. Jüttner et al., 2003; Ritchie and Brindley, 2007).
Recent contributions highlight that firms must enlarge the scope of SRM beyond the risk inherent in direct or first-tier supplier relationships to the risk inherent in the entire supplier network (Hallikas et al., 2004). Despite these valuable contributions, knowledge about best-in class SRM is not well developed for two eminent reasons: (1) Several scholars only discuss specific SRM practices of the recurring SRM process, which provide a valuable, yet scattered and less process-oriented picture of SRM. E.g. Khan et al. (2008) discuss product design as risk mitigation strategy for supply chains. Other contributions focus solitarily on supply risk assessment techniques (Zsidisin et al., 2004), early supplier involvement and risk (Zsidisin and Smith, 2005) or supplier development as a supply risk mitigation strategy (Matook et al., 2009). (2) Only limited qualitative research on SRM emerged presenting detailed cases on how leading companies design their SRM processes. An exception is the contribution of Norrman and Jansson (2004) which elaborated on the whole SRM of the firm Ericsson. Also, Zsidisin, Melnyk and Ragatz (2005) focused on the whole process of business continuity planning with high commonalities to a risk management process.
We recognized that an approach allowing an integrated analysis of SRM core processes prevalent in companies across multiple industrial sectors is missing. To close this research gap we build on the supply chain risk management processes established by Ritchie and Brindley (2007), when defining the SRM processes as displayed in Figure 1. Moreover, we combine insights from the above mentioned contributions and beyond when developing the supply risk management capability maturity model (SRM-CMM).
The concept of maturity or proficiency suggests that organizations follow an identical sequence of changes towards greater maturity, consecutively integrating the achievements of earlier stages. As they pass through these stages, functions and organizations ultimately reach maturity, which is expected to result in enhanced performance effects of the respective processes (Keough, 1993; Rozemeijer, 2008). We relate our work to MacGillivray et al. (2007) who developed a comprehensive benchmarking of enterprise risk management (ERM) capabilities in the water utility industry. It is designed to help managers assess their process maturity, their weaknesses and strengths compared to their peers, identify improvement potential and set priorities to achieve higher maturity (Jokela et al., 2006). Based on the literature review we tailored their approach to the field of PSM as presented in the following section.

3. Development of the Supply Risk Management Capability Maturity Model. In our approach we adopt the notion that a firm which invests in strategies for managing supply risks will do better than firms that do not implement strategies and processes that enable active management of supply risks. While it is important to establish organizational structures and processes, one also needs to specify how core tasks and activities are controlled as a process. Thus, our assessment distils SRM in a process-based framework which enables a firm to establish their current level of maturity and to identify the necessary steps to progress to a higher maturity level. Hence, the

assessment according to our model provides guidance to PSM managers how to better identify and assess supply risks, which lead to more a more informed decision-making which will result in selection of successful risk response strategies and effective monitoring of supply risks across the supplier portfolio. The attributes of the four sub-processes of effective SRM are listed below. We based the attributes of maturity and the maturity stages on the prior works of MacGillivray et al. (2007).

Figure 2: The Supply Risk Management Capability Maturity Model (SRM-CMM)



3.1. Core Supply Risk Management Processes.

3.2.1. Supply Risk Identification. In the supply risk identification process firms work with risk checklists in category management to recurrently identify risks to be assessed closer in the subsequent process. In addition risk identification processes provide staff with the required tools and techniques such as scenario analysis or brainstorming creating awareness for formerly uncovered risks. This process requires stakeholder involvement from functions such as R&D and manufacturing at different stages of the sourcing and procurement process. For instance, in the sourcing of materials and services required to develop a new product purchasing should identify risks in cooperation with R&D whereas in the recurring procurement of components for regular process or serial production it is more important to involve manufacturing in risk identification. The identified risks are documented and disseminated to the respective functions involved in handling supply risk.

3.2.2. Supply Risk Assessment. After identifying supply risks, the next step is to conduct a detailed supply risk assessment. PSM should analyze the assessment process and techniques across purchasing category management and determine responsibilities. Depending on the specific type of supply risk the assessment may require input from other functions in order to determine a valid ranking of supply risks considering tolerability thresholds. This assessment tends to be based on the likelihood of occurrence and the impact of occurrence to determine the damage indicator in a supply risk matrix. The integration in IT tools such as supplier evaluation or supplier relationship management enables the timely assessment, documentation and reporting of supply risks - a success factor for timely development of response strategies

3.2.3. Supply risk response/ treatment. Having derived the supply risk profile, firms must consider ways of responding to the respective risks and their damage potential. Supply risk treatment options are typically tools and techniques from regular supplier and purchasing category management processes, but may also require the involvement of internal clients such as R&D, manufacturing or marketing. Based on the variety of treatment options as well as cost and benefit analysis, PSM management and/ or top management must decide upon a strategy and derive and document an implementation plan that is to be monitored in the subsequent step.

3.2.4. Supply risk monitoring. The PSM function is required to monitor the effectiveness of its responses to assessed supply risks, but also to monitor and trend the developments over time. The response to severe supply risks tend to be managed in a project structure also including project monitoring. Supply risks are to be closely monitored by category management, but may also be part of reporting to the Chief procurement officer or the risk and corporate board, depending on the damage potential analyzed in proceeding steps. Moreover, the greater the damage potential, the closer this particular supply risk must be monitored at the supplier level. Implementation of monitoring is supported by IT integration which enables timely information about the effectiveness of supply risk treatment strategies and the development of supply risk exposure over time.

3.3. Maturity Levels. We differentiate 5 maturity levels, which are applied to determine the maturity of each of the eight SRM processes.

Initial (1). Unstructured and ad-hoc approach of SRM. Limited knowledge prevents processes implementation, thus the process depends strongly upon individuals.

Basic (2). An essential understanding of the risk concept and the necessity of active risk management is established at PSM top-management. Still, basic processes with a narrow scope are in place which are not fully defined and not yet embedded in organizational culture. These processes are repeatable which lead to the possibility of further improvement and provide opportunities to further enhance the system as a whole.

Moderate (3). SRM processes are specific and clear responsibilities are assigned to employees to get actively involved. Clear policies and procedures are available to all staff (also from other functions) promoting controllability of processes. Supply risks are identified, assessed, responded to and monitored, yet the quality of individual processes is still variable. The implementation is verified by defined reporting. At present, continuous improvement is constraint by the enhanced focus on the execution of the relatively young processes. Risk management training and tools are available for designated employees. Verification and feed-back mechanisms are not yet well established.

Competent (4). A structured approach for all relevant SRM processes assures the effective and coherent implementation across category management. SRM processes reaches across functional units if required and involve experts from functional such as R&D and marketing at different stages of the sourcing and procurement processes. Advanced IT integration of SRM fosters the implementation of SRM in regular supplier evaluation processes. Soft factors are grasped in terms of training for SRM which further creates sensibility for supply risks and partial improvements of existing process strategies.

Superior (5). Firm's having attained the final maturity level in the SRM-CMM, are characterized by their ability to simultaneously focus on execution excellence of all SRM processes and the adaptability of these processes to changing conditions such as the financial crisis. The PSM function learns from past experience and adapts their SRM processes accordingly. Processes reach across organizational hierarchy and across functional units throughout the different stages of the sourcing and procurement processes. IT governance enables effective SRM and monitoring of supply risks at supplier level. Continuous improvement also includes the adaptation of incentive structures for employees in order to optimise risk management capabilities. There is a strong risk management culture due to long term investments made into the processes and the staff development to effectively execute these processes.

4. Research Method. A multiple case study approach was selected in order to explore the maturity of SRM processes across firms. The cases were selected to attain insights into SRM practices of firms from different industries. Ultimately, the purchasing executives of 15 European MNCs were approached via email and follow-up telephone calls to ask for their cooperation in the project (Dul and Hak, 2008). Out of these 15 firms 8 agreed to participate in our study and provided access to purchasing executives and archival data on condition of anonymity. With the PSM function as the unit of analysis, this approach enabled us to assess the applicability of the SRM-CMM to a broad range of firms. The profile of the participating companies is provided in Table 1.
We relied on on-site visits, semi-structured interviews with purchasing executives and archival data which allows for within case triangulation and cross case coding. The approach appeared to be most suitable to the purpose of this study, since research on how SRM processes are structured in organizations is still in an exploratory stage. Moreover, SRM involves the coordination of complex organizational processes which sometimes required clarification and follow-up questions. Thus, content validity was

best assured in the course of the personal interviews which proceed between August and November 2009. The interviews with at least one high level purchasing executive responsible for SRM lasted between 1.5 and 2 hours and were conducted by the same author. Notes of answers and on presented documents, such as risk management guidelines, supplier scorecards, were taken during the interviews. Right after the interviews, the notes were written up and rated according to the scoring grid for our SRM-CMM. The authors independently rated the maturity of the respective processes for each company. These observations were compared by the team of authors to assure inter-rater reliability. To further assure reliability a case database was set up in order to store all retrieved information (Gibbert et al., 2008; Yin, 2009).

Table 1: Profile of Respondents' Organization

Company name[a]	Bank-ingCo	Insur-anceCo	Fash-ionCo	Energy Co	Logistics Co	Elec-tronicsCo	Health CareCo	Auto-motiveCo
Number of employees at group level	> 50,000	>10,000	<10,000	>50,000	>200,000	>100,000	>50,000	>200,000
Annual sales revenue in 2007 in €	>20bn	>5bn	>1bn	>5bn	>50bn	>10bn	>10bn	>10bn
Total headcount in PSM	>50	<50	>100	>500	>2,000	>100	>100	>2,000
Purchasing volume in €	>1bn	<1bn	<1bn	>5bn	>10bn	>5bn	>5bn	>10bn

[a] Original company name is disguised. The chosen company name is based on each firm's industry classification.

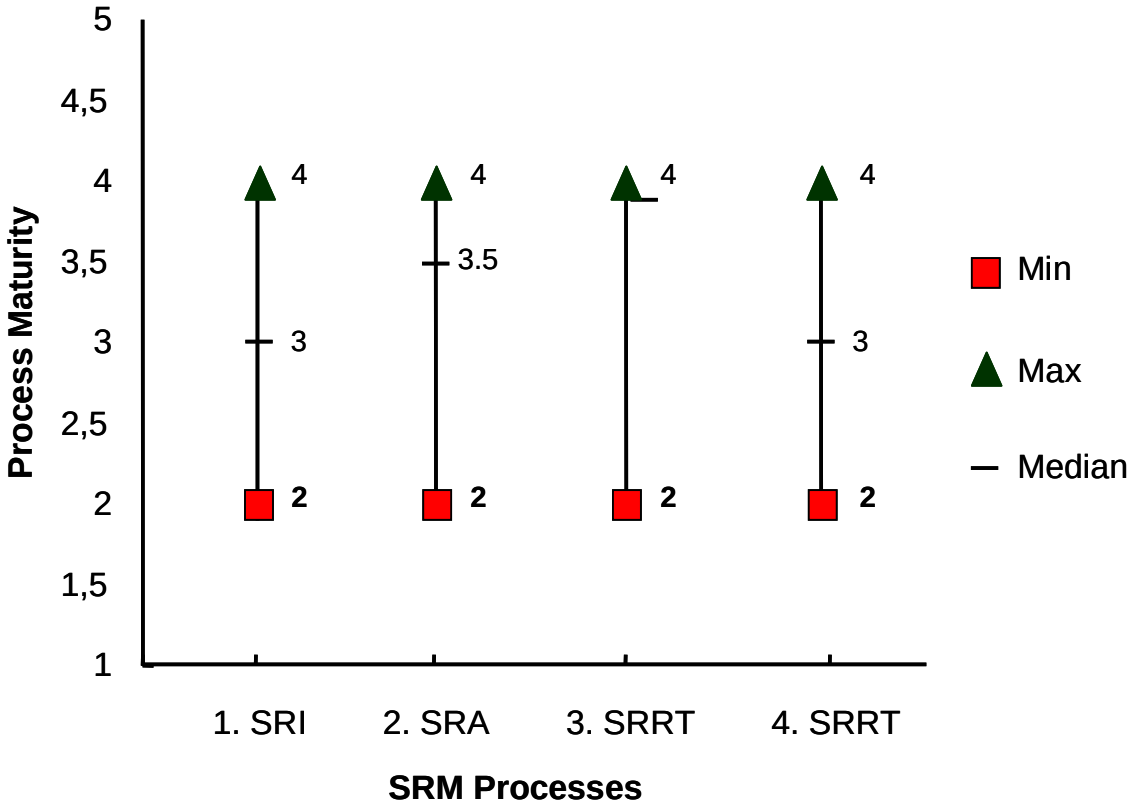
Table 2: Maturity Attributes for Supply Risk Assessment

	Maturity attributes for supply risk assessment				
Attribute	**1. Initial**	**2. Basic**	**3. Moderate**	**4. Competent**	**5. Superior**
Scope	▪ No supply risks to be assessed recurrently defined	▪ Supply risks assessment processes are defined across a limited scope of purchasing categories	▪ Supply risk assessment processes are defined across all purchasing categories	▪ Supply risk assessment processes are implemented in category management and supplier evaluation processes	▪ Controlled supply risk assessment process is initiated automatically as part of periodic supplier assessment across all purchasing categories
Competence	▪ Supply risk assessment is unknown to purchasing employees	▪ Limited knowledge of supply risk assessment methods within purchasing	▪ Knowledge of supply risk assessment methods resides within the purchasing function	▪ Solid knowledge of the selected supply risk assessment methods of all employees involved in risk assessment	▪ Solid knowledge of the selected supply risk assessment methods of all employees involved in risk assessment also beyond purchasing (e.g. production and R&D)
Resources	▪ No resources available for supply risk assessment	▪ Limited resources results in unstructured individual risk assessment by category management	▪ Adequate resources available for the assessment of supply risks	▪ Adequate resources available for the IT based supply risk assessment across categories with interface to other supplier evaluation systems	▪ IT integration with further supplier analytics for supply risk assessment also provides opportunities for the improvement of the supply risk assessment techniques
Alignment with ERM	▪ No alignment with ERM assessment methods	▪ ERM provides risk tolerability thresholds, but lack of compatibility of formal assessment process	▪ Alignment process defines the supply risk tolerability thresholds in line with ERM risk assessment methods	▪ Alignment process defines the tolerability threshold, the escalation hierarchy of supply risks. ERM provides support in risk assessment if required	▪ Aligned and compatible methods for risk assessment allow the transparent communication of risk indicators and thresholds with ERM. Clearly defined escalation hierarchy

Attribute	1. Initial	2. Basic	3. Moderate	4. Competent	5. Superior
Stake-holder integration	▪ No integration with internal stakeholders	▪ Supply risks are assessed by internal clients, but independent of purchasing	▪ Supply risk assessment in purchasing partially demands supply risk assessment from internal clients	▪ Other functions such as R&D and production are actively integrated in the assessment of supply risks	▪ Fully implemented supply risk assessment process involves R&D, internal client and other experts at defined stages of the sourcing process
Implemen-tation	▪ No defined verification of risk assessment process	▪ Irregular verification of supply risk assessment across purchasing	▪ Central control mechanisms to verify the assessment of supply risks	▪ Verification of supply risk assessment is implemented in IT structures	▪ IT governance enables verification of supply risk assessment per supplier relationship
Documen-tation	▪ Individual document-ation	▪ Risk assessments are de-centrally stored	▪ Documentation of supply risk assessment resides within the purchasing function	▪ Centralized storage and dissemination of assessed supply risks to internal clients (e.g. R&D) and ERM	▪ Central storage and dissemination to everyone involved in later processes enable by a formal IT based governing processes
Feed-back and learning	▪ No focus on continuous improvement	▪ Limited receptivity to changing conditions	▪ Learning is partially constraint by focus on execution excellence of existing processes	▪ Supply risk assessment is recurrently questioned and adapted if necessary	▪ Strong risk culture fosters long-term investment into the optimization of assessment techniques and processes

5. Discussion of Firm Cases Based on their Assessment in the SRM-CMM. We assessed each SRM process along the eight maturity attributes described in section 3.2.2 on a discrete integer scale from 1 to 5 described in section 3.2.3. We derived the maturity score for each SRM process based on the modal value of the eight attribute scores per SRM process. In Figure 3, the minimum, the maximum and the median score per SRM process are depicted.

Figure 2: Boxplot of Supply Risk Management Process Maturity



Our preliminary analysis provides evidence that our sample profiles are relatively mature in the strategic, core and enabling processes. The maturity scores range from maturity level (ML) 2 to 4. Thus, all companies have achieved SRM processes beyond the initial maturity level, yet none of these PSM functions has achieved superior SRM processes. For more profound insights at individual case level we discuss the results along the four SRM dimensions in the subsequent sections.

5.1. Core Processes.

5.1.1. Supply risk identification. Here three firms were evaluated at ML2, two firms where evaluated at ML3 and three at ML4. The process of identifying risks is often considered as a basic step in SRM, however competent or superior approaches in risk identification can make the difference. Here it is important to integrate the relevant and not only the most obvious risks in SRM.

AutomotiveCo, the best practice firm, uses a future, present and past oriented supply risk KPI system. Based on this scorecard of 15 risk KPIs, supply risks are recurrently identified. The combination of recurrently assessed early warning indicators with brainstorming workshops beyond the pre-defined risk dimensions enables a truly proactive identification of potentially harmful incidences to the procurement function and the organization as a whole. The strong reliance on just-in-time and just-in-sequence production are drivers of this approach to supply risk identification. At AutomotiveCo, category management allocates time quarterly or even monthly to identify potential threats in supply markets and at specific suppliers. The data are centrally registered and disseminated to all involved parties in the procurement process. Moreover, the risk identification process is cross-functional. In the forward sourcing process procurement is closely cooperating with R&D, whereas in the later global sourcing process just befre the start of serial production, procurement tends to integrate closer with logistics and manufacturing.
A further noteworthy process is established at BankingCo which attained close alignment of supply risk identification with ERM procedures. This is also due to the legal obligations by banks to systematically and recurrently identify risks (Basel II). The identified risks are then centrally stored and must be closely monitored, whereas identified risks with a high operational impact must be actively managed in subsequent processes. So far, the firms of lower ML are mainly characterized by limited documentation and dissemination of identified risks. Basic ML are characterized by a high degree of decentralization and a missing link to ERM or even central supply management.

5.1.2. Supply risk assessment. In the process of supply risk assessment we observed two firms at ML2, two firms at ML3 and four firms at ML4. As we can see from the grading several firms offer interesting approaches, namely LogisticsCo, HealthCareCo, and FashionCo.
At LogisticsCo different parties are involved in the assessment of risks at different stages of the sourcing process. The cross-functional assessment allows a sound assessment as some risks might not appear to procurement professionals, but to internal clients.
A very important question is how firms assess or quantify risks. Most of the investigated firms assess risk or potential damage by the multiplication of probability of occurrence with the potential financial damage caused by the adverse event. The financial impact caused by an adverse event is quantified (or approximated) by the purchasing volume affected by the event. The probability of occurrence of the adverse event is usually rated on an interval scale from one to five or from one to seven. This assessment is usually conducted by the above mentioned experts from the involved departments and functions.
LogisticsCo operates a slightly more sophisticated system that further develops the probability times impact assessment logic by a third measure: the ‘mean-time to repair’ which can be considered as a derivative from the failure-mode-and-effect analysis. It considers how long it will take to reinstall the state prior the adverse event.
Moreover, some of our benchmarking partners also started to look deeper into the bankruptcy probabilities of their suppliers as a result of the financial. In order to detect these insolvencies as early as possible best practice firms rely on a combination of

external data such as the Z-Score, Dun&Bradstreet data as well as bank credit ratings and and internal KPI rating. Especially, FashionCo, ElectronicsCo and AutomotiveCo emphasize the assessment of liquidity and financial strength of their suppliers..
Firms tend to allocate more and more resources to the assessment, because they are aware that risk assessment is necessary to detect the most critical suppliers. Therefore, the assessment covers the entire risk checklist and beyond if new risks are identified or new suppliers are qualified. The firms with high maturity levels demonstrate that the risk assessment has to be integrated in supplier relationship management and evaluation in order to work effectively. At the best-practice firms the risk assessment is integrated in the IT tool for supplier evaluations, such as scorecard or supplier relationship management software. Thus, risk management and in particular assessment becomes part of routine software and processes which fosters acceptance and also improves handability in terms of workload.

5.1.3. Supply risk response/ treatment. Here, we evaluated two firms at ML2, two firms at ML3 and four firms at ML4, thus half the assessed firms show competent level in supply risk treatment of which we would like to highlight the firms AutomotiveCo and ElectronicsCo with ML4. The supply risk response decides whether a risk will be reduced or not. Identified and assessed risks need to be actively managed. It is important to find the right fit of value at risk in case the negative event occurs and the arising costs from the implementation of ex-ante risk treatment strategies, e.g. risk prevention risk minimization or risk transfer).
Both AutomotiveCo and ElectronicsCo rely on pre-defined response and treatment strategies. Even though the detailed measures are decided upon by decentral units, strategies are pre-defined according to the potential damage and the dependence on the supplier. E.g. AutomotiveCo strongly focuses on supplier development in case a high risk crops up. Supplier development may be costly, yet it is a favored strategy due to the difficulties and barriers to switching suppliers once they manufacture for serial production. If financial support in times of supplier financial distress is necessary to keep up production, AutomotiveCo provides help for strategic suppliers. But whenever possible, AutomotiveCo switches to establish back-up suppliers. HealthCareCo desist from providing direct financial support to their suppliers. They prefer to pay the short-term debt of the 1st tier supplier directly to to the 2nd tier in order to keep up the flow of material. Also, ElectronicsCo makes use of a wide range of risk management strategies after engaging in a cost-benefit analysis of the wide range of possible risk management strategies from currency hedging to direct financial support.

5.1.4. Supply risk monitoring. For supply risk monitoring we evaluated two firms at ML2, three firms at ML3 and three firms at ML4. Supply risk monitoring is the final core process guaranteeing that the SRM process is a continuous system. It is necessary to find adequate monitoring cycles in order to have a continuous system in place.
The mature firms show that supply risk monitoring must integrate all relevant categories and all relevant supply risks. Only if a regular check of all risks across purchasing categories is established, the SRM can function as an early warning system, increasing the reaction time in cases of short-term changes in the supply risk portfolio of the firm.
All firms show that the monitoring cycles should be related to the damage potentials. The general monitoring cycle of BankingCo is twice a year, ElectronicsCo and

AutomotiveCo monitors quarterly and AutomotiveCo monthly. In case of high risks the assessments cycles are shorter. In case of BankingCo this is required by regulations (Basel II). AutomotiveCo and BankingCo use traffic light principles in order to make the monitoring intuitive for the users. As in the risk assessment process it is important to integrate internal clients. HealthCareCo has integrated the monitoring and reporting in its supplier evaluation tool. Once a high risk is detected the degree of implementation of the risk response milestones can be a monitored and reported within the IT-tool. In addition to this project-based monitoring a recurrent trending of the supply risks over time is in place. It compares the risk assessments at individual supplier level over time which enables a longitudinal risk performance picture of the supplier

6. Conclusion and Implications for Management Practice. From the investigation it has become clear that SRM decides especially in turbulent times about the ability of the PSM department to consistently contribute to firm performance. We have seen in eight cases from different industries that processes and capabilities vary in terms of proficiency and execution, but that there is a common denominator across industries in terms of SRM that practitioners and researchers should build on.

From prior research we derived the first supply risk management capability maturity model. The SRM-CMM is a detailed reference framework for practitioners to benchmark their own SRM against other firms. Additionally, firms can self-assess their SRM and learn from the richness of the CMM how to attain higher maturity levels in each of the four core risk management processes.

In order to provide the opportunity for practitioners to compare their SRM proficiency to the best-in class we listed best-practices for SRM processes throughout the paper.

In the core processes it is important to recurrently assess suppliers along the different supply risk dimensions that might negatively affect the company. In addition to this recurring process firms should set-up a circle or a committee that seeks to identify potential threats to the company which have not been in the scope of the recurrent risk analysis. It is crucial that the outcome of the preferably cross-functionally conducted risk analysis is disseminated and made available to the entire organization. An it based-governance of risk enables such broad dissemination and links this information to the individual supplier scorecards. This integration further enable the joint involvement of ERM, top-management, and internal client in the risk treatment decision and the in the monitoring of the implementation of the chosen risk treatment strategy. Moreover it is important to trend risk management KPIs available at supplier level to use them as an early warning system of potential risk to the company. It is suggested to look into the past, present and future when managing supply risks.

Since SRM is basically not a tool, but a complex capability, it has to react to changing environments. We've seen that the financial crisis is a major external stimulus forcing firms to rethink their approaches in SRM. Firms can use (our study) the SRM-CMM to think about their own proficiency in SRM and to develop paths for further maturity evolution.

As change is constant, so is risk. Thus, the way to proactively manage supply risks is to have a good understanding about the own firms capability in SRM. This benchmarking enables firms to rate their processes relative to their industry peers and to firms from other industries. From this point managers can set targets to improve or adjust risk

management processes. With the SRM-CMM we provide guidance for practitioners to do so. Moreover, believe that this cross-industry picture of SRM processes supports beginners in the field to in setting-up stable SRM processes, which are receptive to change and are able to effectively detect and manage risk before next crisis strikes.

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