Financial Distress of Suppliers: Causes, Management, and Consequences

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Executive Summary

The early identification of supplier default risk and the management of financially distressed suppliers have become important issues for buying firms. Many anecdotes highlight how sudden supplier financial defaults can result in severe losses in sales, production, and reputation and damage relationships with downstream customers. To deal with this specific risk, buying firms need organizational capabilities to correctly detect a supplier running into financial distress, to devise appropriate remedial actions, and to gather such experiences in repositories of organizational knowledge for future actions.

The primary focus of this study was to examine how buying firms deal with existing suppliers that face financial distress. More specifically, we sought to compare buying firms’ behaviors in scanning their supply bases for financially distressed suppliers, interpreting warning signals, reacting to financial defaults, and learning from such experiences. To address these issues, we reviewed the extant literature, developed a conceptual framework of the management of financial distress of suppliers, and interviewed managers from 18 firms in Europe, the Middle East, North America, and Latin America. The participating firms produced and marketed various products and services, including automotive (passenger cars and commercial vehicles), electronics, food, industry goods, and services. The results provide both theoretical and practical contributions.

Key Findings

We found significant differences among firms in terms of how information about distressed suppliers is scanned and interpreted, how responses are devised, and how firms learn. Based on these observed differences, we were able to obtain insights into the factors that determine buying firms’ behaviors.

All of the investigated firms were concerned about the risk of financially distressed suppliers, but the level of concern varied. Some industries, particularly the automotive industry, were more concerned than others. This is certainly not surprising, and underscores that firms learn from negative experiences. Indeed, particularly those buying firms that experienced more severe problems due to distressed suppliers in the past showed more interest in this specific risk than those that had experienced none or only smaller problems in this regard. However, in several cases we also found a significant gap between the willingness and the ability to pursue advanced approaches to the management of distressed suppliers. Several firms confirmed that they want to improve their approach to dealing with distressed suppliers, but that they face organizational barriers (e.g., company culture) or lack resources (in terms of time, expertise, and funds) that limit their abilities to do so.

None of the investigated firms uses a “one-size-fits-all” solution for dealing with the risk of supplier defaults. For example, none of the investigated firms scans all of its suppliers with the same level of scope and intensity. In fact, all of the investigated firms realize that supply chain risk management comes at a cost and, consequently, that there is a trade-off between taking the risk and proactively managing the risk. For this reason, scanning, interpretation, and action are almost always — more or less deliberately — tailored to specific relationships (e.g., criticality of the supplier). Still, we observed some recurring patterns in the risk management process.

With regard to the scanning of suppliers and the interpretation of warning signals, we classified the firms into three categories:
In terms of responses (actions) to distressed suppliers, our analysis revealed three different types of firms:

- **Ignorers**, who have a preference for replacing and substituting suppliers once they run into financial problems
- **Substitutors**, who pursue a selective strategy that supports important suppliers by relaxing payment terms or granting short-term credits but that substitutes non-critical suppliers in financial distress situations
- **Cooperators**, who have established long-term relationships with few suppliers and devised elaborate action plans whereby they would only switch suppliers if it is completely unavoidable

Finally, with regard to learning, we determined four classifications. The first two are applied to firms that actively try to learn from negative experiences with distressed suppliers; the latter two do not.

- **Adaptors** use their past experiences with distressed suppliers to slightly modify existing processes to improve future reactions, i.e., single-loop learning.
- **Evolvers** who are open for more drastic changes of overall rules, norms, strategies, or structures as a consequence of severe negative experiences, i.e., double-loop learning.
- **Lucky ones** are those to whom severe supplier default situations have never occurred.
- **Ignorers** are those who neither draw conclusions from past events nor do they see any possibility to improve.

Findings from our cross-case analysis suggest that particularly **inter-firm trust**, **resource dependence**, **risk orientation** (i.e., a buying firm's general awareness and consciousness of concerns about, and seriousness toward supply chain disruptions), and **salvage power** (i.e., the ability of a buying firm to salvage a specific financially distressed supplier) are the factors that shape a buying firm's behavior and risk management approaches. In contrast to trust and risk orientation, which are arguably rather "soft factors," dependence and salvage power pose hard restrictions to the buying firm's room for maneuvering. In a nutshell, a buying firm's increased trust in a supplier reduces the firm's monitoring efforts and, if responses are elicited, sets its preferences toward more supportive and collaborative actions (bridging). Low levels of trust, however, render the buying firm more suspicious and cautious. **Dependence** also makes a buying firm more cautious in terms of scanning, interpretation, and action. In case of a financial distressed supplier, dependence pushes a buying firm into supporting (bridging) actions. The stronger the buying firm's risk orientation, the more important it attaches to the issue of financially distressed suppliers and the more pronounced its need for stability is. Consequently, this trait makes buying firms more intrusive in their scanning efforts and more responsive in their actions. Finally, **salvage power** is an important rationale buying firms use to determine their actions. If a buying firm disposes of any possibility to salvage a distressed supplier (e.g., due to differentials in firm size — "ant vs. elephant"), the firm is pushed into supplier switching behavior, even in situations where dependence and trust would suggest cooperative and supporting behavior.

**Recommendations**

- Supplier defaults can cause severe supply chain disruptions. Consequently, buying firms are urged to tackle these risks just as vigorously as they tackle financial and other business risks.
- The risk of supplier default can be measured by the probability of default and exposure (resource dependence).
- As in any other risk management setting, there is a trade-off between taking the risk and spending resources on risk management. Consequently, buying firms have to carefully evaluate how much risk and cost they are willing to take or incur for reducing the risk of supplier defaults.
- There is no "one-size-fits-all" solution for dealing with the risk of supplier defaults. It all depends on the probability of default and the individual exposure.
- The number of suppliers to be scanned and the scope and intensity of scanning increase a buying firm's information processing needs. To avoid information overload and ensure economical use of resources, purchasing managers have to carefully determine how much information they need to mitigate their risk of financially distressed suppliers. Specifically, this involves determining the required accuracy of information processing (i.e., "How accurate do we need to be?" "Does it matter if we are using a rule of thumb?" "Is the cost of making an interpretation error so high that
gathering more data is warranted, to avoid such an error?

• Resource dependence not only increases a buying firm’s exposure, but also may force the buying firm into expensive bridging actions to salvage a distressed supplier. Thus, important suppliers (where there is a high level of dependence) should be monitored thoroughly (high scope and high intensity) and action plans prepared in advance.

• Good supplier relationships can have a cost impact, because a high level of trust decreases the uncertainty of the scanning process. For critical suppliers, buying firms should attempt to build relationships based on trust and relational exchange.

• Buying firms might not always possess enough power to support or even salvage a distressed key supplier. In these cases it is particularly important that an action plan be prepared that details solutions to avoid supply chain disruptions.

• Non-critical suppliers should be monitored on a selective base and less frequent level to ensure an efficient use of resources.

• Documentation systems help to translate tacit data into explicit knowledge and can prevent organizations from repeating errors and incurring costs.
Managers around the world have become increasingly concerned with the risk of possible disruptions in their supply chains. In particular, the early identification of supplier default risk and the mitigation and management of financially distressed suppliers have become important issues for buying firms (Carter & Gunipero, 2010; Murphy, Schweinberg, & Pope, 2008). For example, a quick look into current annual reports, for example, from Adidas, Apple, Procter & Gamble, U.S. Steel, and Volkswagen, indicates that supplier defaults (insolvencies or bankruptcies) are considered a major risk in many industries. A large body of literature published has depicted examples and case studies of financially distressed suppliers and of their serious impact on the affected buying firms (e.g., Sheffi, 2005). In addition, several studies have considered the risk of supplier defaults in analytical models to understand how this specific risk affects contracting (Babich, Burnetas, & Ritchken, 2007; Swinney & Netessine, 2009; Wagner, Bode, & Koziol, 2009, 2011). Supplier defaults can result in severe losses in sales, production, and reputation; they can also damage relationships with downstream customers (Grewal, Johnson, & Sarker, 2007). The UK-based automotive OEM (original equipment manufacturer) Land Rover, for example, found itself in serious trouble after UPF-Thompson, the single supplier of chassis frames for its Discovery model, suddenly and unexpectedly filed for bankruptcy in 2001. KPMG, which represented the UPF-Thompson’s receivers, exploited the single source relationship and virtually held Land Rover for ransom demanding £35 million to resume production (Lester, 2002).

The need to manage supplier default risk has been further fueled by the recent economic crisis (Blome & Schoenherr, 2011; Finley, 2009). Liquidity has become a scarce resource nowadays; particularly since 2008, banks and other financial intermediaries tightened their credit and loan policies making it more difficult and more costly for firms to raise the cash needed for the day-to-day operations. For example, in the automotive supplier industry — where constant price pressures from the buying automotive OEMs had eroded suppliers’ financial health — the economic downturn triggered a large number supplier defaults (e.g., Contech in February 2009, Visteon in May 2009). In 2005, Moody’s rated 54 global auto suppliers (from North America, Europe, and Asia) and assigned investment-grade to 33 percent of the suppliers, but speculative-grade to 67 percent. In 2009, however, from a total of 59 global auto suppliers, only 24 percent maintained investment-grade while 76 percent were rated speculative. The outlook was even worse: For 1 percent it was positive, for 34 percent it was stable, and for 65 percent it was negative (Harrod, 2009). Despite the rebound of the world economy in 2010, many automotive suppliers have been facing problems in shifting gears and providing the supplies for the increasing demand. The German automotive supplier Honsel, for example, although busily working in five shifts per day to supply automotive OEMs such as BMW or Volkswagen, had to file for bankruptcy in 2010 because the supplier divested too many assets during the financial crisis. This example highlights that, even in a sound economic market environment, the risk of supplier defaults remains a major issue, and supplier financial risk management remains a topic of enduring importance (Murphy, et al., 2008).

Unlike banks or other types of creditors, buying firms are usually not interested in predicting the likelihood of their suppliers’ default, because they want to preserve the relationships. Therefore, this study focuses on supplier financial distress, a condition which normally precedes supplier default by some period of time (Hertzel, Li, Officer, & Rodgers, 2008). For example, receiving a 12-month early warning of impending...
supplier difficulties can provide buying firms the opportunity to either adapt their sourcing strategies (e.g., from single to multiple sourcing) or to financially support the distressed supplier in order to keep the supply chain going (Milne, 2009). Thus, implementing a risk-oriented supply base management approach might lead to competitive advantage, as buying firms do not only compete on their sales markets for customers, but also on their procurement markets for capable suppliers. The existing literature on supply risks and their management has generated very valuable insights, yet, despite the quite large body of literature, we know remarkably little about how firms can effectively and proactively avoid or manage distressed suppliers. Specifically, there is little theoretical support to explain how buying firms manage financially distressed suppliers. The purpose of this focus study is to help fill this gap. We will not focus on specific tools for proactive supplier financial and operational risk management. For an excellent overview of these specific topics, the interested reader is referred to the 2010 CAPS Research focus study Supplier Financial and Operational Risk Management, by Carter and Giunipero. Our focus lies on the investigation of the causes of financial distress situations, their overall management, and how buying firms learn from experiences with distressed suppliers. To date, we know of no research that has comprehensively addressed these issues in the context of supplier financial distress management.

To this end, we conducted a thorough review of the supply chain risk management literature and developed a conceptual framework that is grounded in several theoretical perspectives, including organizational information processing and learning perspectives. Prior to starting the empirical study, the conceptual framework was discussed with purchasing managers and researchers in the field of supply chain management. The results, obtained from interviews with managers from 18 different firms, provide providing both theoretical and practical contributions.
Chapter 2: Financial Distress of Suppliers

General Terminology

Failure is an intrinsic part of organizational life and has long attracted scholarly attention in economics and organizational research (Anheier, 1996). Many attempts have been made to craft theories that explain why firms fail. A prominent approach is to view failure as a result of a crisis situation. The organizational crisis phenomenon started to receive specific attention in the management literature in the 1960s and 1970s (Fink, S.L., Beak, & Taddeo, 1971; Hermann, 1963; Smart & Vertinsky, 1977; Turner, 1976), although initial interest had begun in the early 1930s when scholars tried to develop managerial implications based on the investigation of failing firms and the underlying causes (e.g., Fleege-Althoff, 1930). Today, the literature on this topic spans the fields of management, economics, organizational behavior, psychology, political science, and sociology. (For a review, see Pearson & Clair, 1998.) As a consequence of this long-standing research tradition, there are now numerous definitions of the term organizational crisis and an abundance of descriptions of its attributes and dimensions (e.g., Hermann, 1963; Kvoor-Misra, Clair, & Bettenhausen, 2001; Mannarelli, Roberts, & Bea, 1996; Milburn, Schuler, & Watman, 1983; Pauchant & Douville, 1993; Pearson & Clair, 1998). Basically, corporate crises constitute unplanned and unintentional processes of limited duration and interference with an ambivalent outcome (Billings, Milburn, & Schaalman, 1980; Hermann, 1963). An organizational crisis endangers the existence of an entire organization through the derogation of certain goals.

Closely related to an organizational crisis is financial distress, a condition which normally precedes a failure by some period of time. In contrast to a financially healthy firm (that disposes of enough liquidity to cover its obligations), a firm is considered financially distressed when it has problems in collecting (or does not even possess) sufficient cash flow to meet the payments on its debt (i.e., financial obligations) (Ross, Westerfield, & Jaffe, 2010), specifically with regard to “hard” contracts (i.e., those that are enforceable by law). Hence, the distressed firm is on the verge of being forced to breach its debt contracts. Once the firm is at the point it does not repay its debt and other liabilities when they become due for payment, a financial default occurs. Technically, this means only that the firm has suspended or halted some payments. If the firm is truly unable to repay its debt, it enters into an insolvency process, where the goal is to address the collective satisfaction of the outstanding claims against its assets (United Nations Commission on International Trade Law, 2005). This does not mean that the firm is legally bankrupt (i.e., that the market value of its assets is less than its liabilities; the firm has a negative net worth). If a firm files for protection of a bankruptcy act, restructuring actions are likely to be triggered as the firm might lose control rights to the firm’s creditors. The bankruptcy process can be initiated by the owners of the firm, who have their “right to default,” or alternatively by its creditors. Liquidation is reached when the firms sells its assets to the public. Normally it takes place when the financial distress is so acute that reorganization is not feasible, and the assets of the firm are worth more on liquidation than through reorganization.

The central idea of the crisis perspective is that a firm goes through several stages that may or may not ultimately result in financial default — depending on how well the firm is able to manage the crisis situation. In particular, the corporate crisis research emphasizes that crises also brings about opportunities. Indeed, crises often create positive entrepreneurial and learning opportunities (which, from the perspective of the buying firm, we will address in more detail in the next section). For example, Max Frisch, a famous Swiss...
novelist, said with respect to crisis: “Crisis is a status of productivity. You only need to eliminate the taste of a catastrophe.”

There are multiple escalation framework for understanding how organizational crises (e.g., Fink, S., 1986; Meyer, 1982; Turner, 1976) or financial distress (e.g., Lau, 1987) evolves. Although there are many underlying similarities in these models, they tend to use different labels for the stages they describe. Fink (1986), for example, proposed a four-stage process model that begins with (1) the prodromal stage in which early warning signals (e.g., stakeholder issues) might foreshadow a serious financial distress situation. Then, a triggering event (e.g., a bad credit rating) sets off (2) the acute (or emergency) stage that creates loss and often involves uncertainty, stress, limited or fragmented information, and demands swift decision-making (Billings, et al., 1980). If the firm survives, (3) the chronic stage is the phase where the firm recovers from the crisis. Subsequently, the firm might return to normality in (4) the resolution stage when it makes decisions regarding tactical (short- and mid-term) or strategic (long-term) change.

The Buying Firm’s Perspective: the Risk of Supply Chain Disruptions

Of the numerous risks that buying firms are exposed to, supply chain risks arise from the interconnected flows of materials, information, and funds in inter-organizational networks (supply chains). Already in the 1980s, Kraljic (1983) and Treleven and Schweikhart (1988) stressed that global supply chains are inherently susceptible to risky events. However, it was not until recently that the interest in this phenomenon, both from scholars and practitioners, has grown. A large body of literature has depicted examples and case studies of events that disrupted supply chain and transportation operations and of the serious impact on the involved firms (e.g., Sheffi, 2005). Arguable, there are at least two factors that fueled the recent interest: (1) the current business environment is characterized by discontinuity, high velocity of change, and permanent risk for unexpected adverse events, and (2) many modern supply chains have become relatively sensitive to exogenous shocks. Hamel and Valikangas (2003) conjectured that “the world is becoming turbulent faster than organizations are becoming resilient” (p. 52).

Indeed, over the last 15 years, almost all industries have witnessed a remarkable change in their business environments, due to increased competition and the globalization of markets (D’Aveni & Gunther, 1995). At the level of the individual firm, this has resulted in a massive pressure to make intra-firm business processes and inter-firm supply chains either more efficient or more responsive and agile. In an attempt to meet this challenge and to adapt to the changed business environment, many firms decided to outsource or offshore large portions of their manufacturing activities, to source in low-cost countries, to reduce inventories and slack in their intra-firm processes, to streamline their supply bases, or to collaborate more intensively with their supply chain partners (Christopher & Peck, 2004; Fisher, 1997; Hult, Ketchen, & Slater, 2004; Lee, 2002, 2004; Yoshino & Rangan, 1995). Certainly, many of the modern supply chain management initiatives, when properly used, can make supply chain operations either more efficient or more responsive and agile in stable environments — however, this might not hold true in more dynamic or turbulent ones. Therefore, there is a call for caution: Many of these initiatives have not only created more complex supply chains, but also a higher degree of dependence among supply chain entities, which ultimately has increased the vulnerability of supply chains to unforeseen disruptions that can occur anywhere in the supply chain. Interconnections in supply chains may cause and propagate disruptions that influence the performance of one firm to also affect other members of the supply chain (Narasimhan & Talluri, 2009). Research in the field of organizational science has supported this reasoning, finding that due to their complex, tightly coupled, and technology-oriented processes, firms are becoming more prone to accidents and disruptions (Lin, Zhao, Ismail, & Carley, 2006).

For this reason, buying firms are urged to tackle supply chain risks just as vigorously as they tackle financial and other business risks (Christopher & Lee, 2004; Elkins, Handfield, Blackhurst, & Craighead, 2005; Tomlin, 2006). Several recent publications have attempted to advance the conceptual clarity of the terms used in the domain of supply chain risk management (e.g., Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007; Manuj & Mentzer, 2008a, 2008b; Rao & Goldsby, 2009; Ritchie & Brindley, 2007). In the following, we provide a brief overview of this literature.

Supply chain risk

In essence, the phenomenon under investigation in the supply chain risk literature is the negative outcome resulting from adverse events that occur in supply chain operations, but usually two interrelated terms are distinguished: supply chain risk and supply chain disruptions.

Supply chain risk is the predominant theme in the literature and often applied as a catchall concept for a wide range of events, situations, potential threats, or
uncertainties. Risk, however, is a construct with many definitions that vary by application, academic field (e.g., decision theory, finance, insurance, management, marketing, psychology), and situational context (Yates & Stone, 1992). There are many different disciplinary voices, speaking in different languages, to different issues and different audiences. But, because risk is a conceptual abstraction (it does not exist per se), there are no right or wrong definitions — only more or less appropriate ones for a specific context. Having a closer look at the various streams of literature, one can identify two major perceptions of risk: (1) risk as both danger and opportunity and (2) risk as purely danger (Mitchell, 1995). First, risk can be conceived as the fluctuations (variability) around the expected value (mean) of a measure. In other words, risk is equated with variance and therefore has both a downside (loss) and an upside (gain) potential. This is connected to the general economic problem that one has to assume more of this risk if one wants to achieve higher rates of return. Second, and in contrast, most dictionaries describe risk as the threat of injury, damage, or loss (e.g., McKechnie, 1983). The notion that risk has primarily negative consequences seems more consistent with the human perception than with the mean-variance approach. Several studies that have empirically investigated the risk perception and propensity of individuals have found support for this. March and Shapiro (1987), for example, examined the ways in which managers perceive and react to risk, and concluded that the majority tends to exaggerate the downside potential of risk. Likewise, MacCrimmon, Wehrung, and Stanbury (1986) found empirical support that managers do not consider variance to be risk, but that they are rather concerned about the chances of loss.

Against the background of these two general views on risk, several publications have defined the term supply chain risk. Both of these views have been discussed and applied. For example, Juttner, Peck, and Christopher (2003) followed the mean-variance notion and defined supply chain risk as a “variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective value” (p. 200). In contrast, Harland, Brenchley and Walker (2003), after discussing various possible definitions, concluded that supply chain risk is primarily associated with the “chance of danger, damage, loss, injury, or any other undesired consequences” (p. 52). We believe that the latter notion of risk as purely negative resonates best with the business reality of decision makers. Usually, managers consider their goals, such as a certain turnover or production volume, not so much as a target point but as lower limits of half-open ranges, e.g., to achieve at least a certain turnover or to spend less than a certain amount of resources (budget). Hence, a goal deviation only occurs when the defined thresholds are either not met or exceeded. Neither “happy disasters” nor situations in which decision makers intentionally “gamble” are typically part of the scope of supply chain risk management. Risk is conceived as the deviation from the expected value of one (or more) performance measure(s), resulting in negative consequences for the focal firm. Supply chain risk is equated with the detrimental consequences (i.e., negative performance impact) arising from a supply chain disruption. These consequences can be either direct or indirect (i.e., consequential loss), and can affect either major performance objectives (e.g., profit, company value, or company continuity) or minor performance objectives (e.g., reputation or customer satisfaction).

Supply chain disruptions and risk sources
In contrast to risk, a supply chain disruption is a manifested circumstance. It can be viewed as the combination of (1) an unintended and unexpected triggering event that occurs somewhere in the supply chain or the supply chain environment, and (2) a consequential situation that significantly threatens the normal course of business operations of the focal firms. Obviously this is a broad definition that sets the stage for a large, heterogeneous set of issues. Supply chain disruptions can materialize from inside or outside a supply chain and can vary greatly in their magnitude, attributes, and effects. Consequently, their nature can be highly divergent. For instance, a delayed shipment of non-critical material is potentially a much less serious supply chain disruption than is an eight-week labor strike at an important international port. In attempting to differentiate supply chain disruptions from other adverse events in business (e.g., shocks on the financial markets), several studies have proposed classifications of supply chain disruption in the form of typologies and/or taxonomies. The derived categories of supply chain disruptions are usually labeled supply chain risk sources, in terms of being a known source from which supply chain disruptions emerge with a certain probability. Understanding the various supply chain risk sources and their nature is very important because different risk sources demand different sets of risk management activities. For example, Svensson (2000) named two supply chain risk sources (quantitative and qualitative), Juttner (2005) delineated three (supply, demand, and environmental), and Manuj and Mentzer (2008a) proposed eight (supply, operational, demand, security, macro, policy, competitive, and resource).

This large set of supply chain risks also includes the threat of financial instability of suppliers and the consequences of supplier financial distress and default. Financial distress and default of a supplier are common
causes for supply chain disturbances and disruptions, which can have severe consequences for the buying firm, especially if a supplier is going out of business (Blome & Schoenherr, 2011; Finley, 2009; Wagner, et al., 2009). Obviously, such issues may negatively affect the associated supply chains: The defaulting supplier may no longer be able to purchase the required materials, pay its workforce, and deliver goods or services to its customers (Hertzel, et al., 2008). Even if a corporate crisis has the potential for a positive outcome, the avoidance of supply chain disturbances triggered by financially distressed suppliers remains one of the most challenging tasks that supply chain risk management can be confronted with.

Supply chain risk management
Supply chain risk management seeks to identify, assess, and manage the risk of disruptions either in a proactive or reactive fashion. In general enterprise risk management can be defined as the “field of activity seeking to eliminate, reduce, and generally control pure risks” (Waring & Glendon, 1998, p. 3). While the exact terminologies vary from author to author, a systematic risk management process usually comprises the following stages: Risk identification (identification of all relevant risks), risk assessment (analysis of probability and impact for each identified risk), risk treatment (risk management in the narrow sense), and risk monitoring. The overall objective of this process is to determine, implement, and monitor an optimal combination of measures to avoid, defer, reduce, or transfer all relevant risks. The determined mix is considered to be optimal if the remaining amount of risk is in line with the firm’s risk preference and its corporate strategy.

A large body of literature has proposed measures and activities of supply chain risk management (e.g., Chopra & Sodhi, 2004; Christopher & Peck, 2004; Elkins, et al., 2005; Johnson, 2001; Lee & Wolfe, 2003; Manuj & Mentzer, 2008a, 2008b; Martha & Subbakkrushna, 2002; Rice & Camato, 2003; Zsidisin, Melnyk, & Ragatz, 2005). Tang (2006), for example, identified four areas where supply chain risk management activities can take effect: supply management, demand management, product management, and information management. Kleindorfer and van Wassenhove (2004) cited two types of supply chain risk management activities: supply-demand coordination activities and activities for managing disruption risks. Yet another possibility is to distinguish cause-oriented measures from effect-oriented measures. This classification can be explained in analogy to a soccer player. Following cause-oriented risk management, the soccer player can reduce or avoid the possibility of getting seriously injured by avoiding dangerous tackling. Following effect-oriented risk management, the soccer player can use protections (e.g., shin guards) to become more robust or can apply an ice spray to alleviate injuries. Hence, cause-oriented actions focus on eliminating or preventing the causes of supply chain disruptions. In effect-oriented supply chain risk management practices, a firm decides to bear certain risks while attempting to limit or mitigate the negative consequences of supply chain disruption when they occur. Such risk management efforts are effective when operations are sustained or quickly resumed, and organizational and external stakeholder losses minimized. In this context, one often encounters the term “resilience,” i.e., the ability of a supply chain (or a firm in the supply chain) to recover and to bounce back into the original or desired state after being stressed by a supply chain disruption. In practice, however, the distinction between cause-oriented and effect-oriented is not always this simple and clean, due to the fact that a particular initiative can contribute to both categories. Either way, risk management requires prior preparation.

What Causes the Financial Distress of Suppliers?

Despite the large body of literature, there is still a lack of a coherent theoretical underpinning for failures and the causes thereof. Anheier (1996, p. 956), for example, concluded that “the phenomenon of failure in organizations is too multifaceted” to support a “grand theory of organizational failures.” The crisis of a firm may be the result of a mix of many different causes ranging from ineffective management to competition. Anheier (1996) arranged the causes in two groups. The first group consists of internal (or endogenous) factors. From this viewpoint many crises are caused, for example, by poor corporate decisions, mismanagement, disputes and in-fighting, and lack of organizational slack. The second group consists of the external (or exogenous) factors. This group includes the external causes of failures such as decline in available resources and organizational carrying capacity, increased competition, changes in niche dimensions the firm operates in, economic downturns, and events such as natural catastrophes.

Among the large set of external causes are also issues that pertain to the behavior and conduct of the customers and buying firms. Buying firms are important stakeholders that affect the success of a supplier firm. Behaviors, decisions, and sourcing strategies of buying firms can be important sources of supplier financial distress. For this reason, buying firms should pay attention to how they contribute to their suppliers’ financial distress. Although supplier bankruptcy is an important topic, especially in light of the recent
economic downturn, there is limited literature to explain the causes of financial distress of suppliers. Existing studies point out three main causes:

- Creation of competition among unqualified suppliers
- Power influences
- Opportunistic behavior

Creation of competition among unqualified suppliers
Procurement costs account for a large share of an industrial firm’s total costs (up to 70 percent). Therefore, cost savings in purchasing increases a firm’s overall profitability. For this reason, in today’s market, squeezing suppliers is a major focus of the buying firm. In order to decrease supplier margins and achieve the lowest prices, purchasing managers play suppliers off against each other. However, if a firm includes unqualified suppliers into the bidding process, the qualified suppliers will be forced to drop their prices. The suppliers that are already locked in to the buying firm may decrease prices even below the profitability level and, thereby, risk the suppliers’ financial health. In the worst case, this price-pushing strategy can result in supplier bankruptcies. For example, in the early 1990s, the purchasing head of General Motors (GM) generated significant savings for GM by starting price wars among unqualified suppliers. However, that resulted in two negative long-term consequences for GM. One consequence was that the financial health of suppliers dramatically worsened, and the other consequence was that some of the GM suppliers started selling their best ideas to GM competitors (Laseter & Sharma, 2010; Maloni & Benton, 2000).

Power influences
Power distribution among members of the supply chain is an important factor in determining actions of supply chain members. Following Emerson (1976), power is the ability of one firm to influence the intentions and actions of another firm. A firm that is more powerful than another firm can contribute to the less powerful firm’s bankruptcy or financial distress. For example, this is the case if the more powerful firm pressures the less powerful firm to take actions that are beneficial to the more powerful firm, but at the time harm the less powerful firm’s financial health. In the scope of this research, the power differential between buyer (source) and supplier (target) and its effects on suppliers are investigated.

A study of Maloni and Benton (2000) provides a thorough view of power influences on supply chains and their consequences. They focus on the U.S. automobile industry, where the number of buyers is relatively low compared to number of suppliers. Therefore, the buyers are much more powerful than suppliers. In order to explain power influences in supply chains, i.e., how a supply chain member exercises power over another supply chain member, six types of power bases are introduced: reward, coercive, expert, referent, legitimate, and legal legitimate.

Reward and coercive, also known as carrot and stick respectively, are well-known types of power bases. They represent the capability of buyers to reward the supplier (e.g., increasing business volume or sharing the benefits from cost reductions) or penalize the supplier (e.g., decreasing business volume or not sharing the benefits from cost reductions).

Another type of power base is expert power, which is the recognition by suppliers of buyers as information and expertise holders. In that case, buyers take the lead in products and processes.

Referent power refers to a supplier’s desire to be recognized in association with a particular buyer. For example, Chrysler approached its suppliers in a more relational way by the Extended Enterprise program and offered mutually beneficial cost reductions (Dyer, 1996).

Legitimate power refers to a situation in which the supplier believes that the buyer retains the natural right to influence. Hence, the buyer exercises power over the supplier without legal legitimization, for example, constituted by a formal contract.

The last power base, legal legitimate power, implies that the supplier is under control of the buyer by a formal contract.

Maloni and Benton (2000) divide power bases into two groups: mediated and non-mediated power bases. Mediated power refers to the efforts or threats to control and manipulate the target by using reward, coercive, and legal legitimate power bases. Non-mediated powers are not specifically aimed to directly manipulate the target and include expert, referent, and legitimate power bases. Studies about the use of power in channel relationships point out that usage of different power bases leads to diverse and contrasting results in buyer-supplier relationships. For example, Brown, Lusch, and Nicholson (1995) showed that when a buying firm uses mediated powers, it lowers the commitment from the supplier; conversely, the use of non-mediated power raises commitment. In the same vein, other empirical studies suggest that the use of non-mediated power bases has a significant positive impact on commitment, trust, and cooperation levels in buyer-supplier relationships.
relationships (Hunt, Mentzer, & Danes, 1987; Maloni & Benton, 2000). In addition, these studies found that there is a positive relationship between the strength of buyer-supplier relationships and performance of all members of the supply chain. Conversely, the received results suggest that the use of mediated power bases harms the relationship between buyers and suppliers. In sum, prior studies of power usage in buyer-supplier relationships suggest that the use of coercive, reward, and legal legitimate power may hurt the relationship and decrease the cooperation between buyer and supplier. Poor relationships with buyers and lack of cooperation harm the performance of the supplier and worsen its financial health accordingly.

**Opportunistic behavior**

Opportunism refers to a behavior (e.g., the behavior of a buying firm) of taking advantage of opportunities and circumstances regardless of potential negative consequences for other parties involved (e.g., the supplier). When a party is in a relationship with another party and it invests in relationship-specific assets that have less or no value outside the relationship, the investing party becomes weaker against opportunistic behavior of the other party (Rindfleisch & Heide, 1997). In the context of this focus study, we investigate how opportunistic buyer behavior can potentially contribute to supplier financial distress.

Buvik and Grønhaug (2000) state that asset specificity increases the dependence of a supplier on the buyer. Specific investments made by the supplier lock it in to the relationship. If the buyer acts opportunistically by pushing prices down or negotiating higher service performance, the supplier will be under high pressure to accept the demands of the buyer because the supplier’s specific assets cannot be utilized for other customers. Consequently, opportunistic behavior by buying firms leads to financial difficulties for suppliers and potential supplier bankruptcies.
In this chapter, we develop a conceptual framework (shown in Figure 1) that explains how buying firms manage the financial distress of suppliers; this framework guides our subsequent empirical study. We focus on ongoing buyer-supplier relationships and not on the initial supplier selection situation.

Our framework is rooted in the open systems perspective (Katz & Kahn, 1978). We draw on literature that views firms as information-processing systems (Galbraith, 1974; Hult, et al., 2004; Thompson, 1967; Tushman & Nadler, 1978), on resource dependence theory (Pfeffer & Salancik, 1978), and on the organizational learning literature (Argyris & Schon, 1978, 1996; Huber, 1991). The information-processing literature suggests that organizational responses to environmental events are shaped by subsequent information-processing activities (Barr, 1998; Dutton, Fahey, & Narayanan, 1983; Isabella, 1990). Thus, considering the theory from this literature will enable an improved understanding of the processes that are at work during the management of distressed suppliers and how they motivate the formation of an action. Specifically, the information-processing literature suggests that a buying firm manages distressed suppliers according to an information-processing process that consists of four subsequent stages: Scanning, interpretation, action, and learning. In turn, resource dependence theory will be used to help gain an understanding of the content of the response. Finally, the organizational learning perspective provides a lens to understand how buying firms learn from experiences with distressed suppliers.

![Figure 1: Conceptual Framework](image-url)
Scanning

The scanning stage is concerned with the collection of information about the suppliers' financial health. Usually, suppliers send out a train of warning signals before they enter financial distress or the default process (Altman, 1968; Platt & Platt, 2002, 2009). If these signals are properly picked up (timely detection) and acted upon (correct interpretation), many problems can be contained or even averted. For this reason, scanning is an extremely important element of any successful risk management process.

As shown in Figure 2, we suggest to distinguish between the content of the scanning effort (i.e., what information a buying firm collects) and the process of the scanning effort (i.e., how a buying firm collects information).

Content of scanning

According to the credit risk literature there are two aspects that determine the supplier default risk that a buying firm faces: (1) the supplier's probability of default, a measure of financial health, and (2) the buying firm's exposure (more precisely exposure-at-default). Each component can be evaluated via qualitative and quantitative approaches (Carter & Giunipero, 2010). In addition to these two parameters, newer literature also suggests that there is a third issue to consider, namely (3) supplier default dependencies (Wagner, et al., 2009, 2011). Buying firms may attempt to obtain information for these three measures during the scanning process.

(1) Probability of default

The probability of default refers to the probability that a default of suppliers will occur within a fixed time span, usually one year. Various sources and approaches can be used to derive indicators for the probability of supplier default:

- Financial statement analysis. A starting point for quantitative analyses is publicly available accounting and financial statement data (corporate disclosures). Specific financial statements allow for simple assessment of a supplier's liquidity, activity, debt, and profitability using financial metrics and credit risk scores. Starting with the seminal works of Beaver (1966) and Altman (1968), numerous accounting-based bankruptcy prediction models were developed. Altman's Z-score, a linear combination of balance sheet ratios, for example, can be calculated based on a small number of financial ratios, such as the liquidity ratio and the leverage ratio (calculated on the basis of balance sheet and P&L statements). Due to their ease of use, accounting-based credit scores still enjoy widespread application. However, because they depend on the numbers found on balance sheets, updates occur rather infrequently (i.e., they take a “rear-window view”) and some are known to have a bias (Shumway, 2001). Also, while these scores might be proxies for a supplier's probability of default, they are not probabilities in a technical sense.

- Analyses based on credit and market data. Beyond the relatively simple scoring methods, the credit risk literature offers more advanced structural and reduced-form credit risk models that provide a sophisticated way to estimate a firm's probability of default. In structural models, the asset pricing model by Merton (1974) is used as a theoretical foundation to link a firm's probability of default to the variability in the firm's asset value. The probability of default is modeled as the likelihood that the asset value of the firm drops below a certain critical threshold (within a
fixed time horizon) (Lando, 2004). For example, the well-known KMV structural model (originally developed by Kealhofer, McQuown, and Vasicek, now owned and offered by Moody’s) defines the probability of default in the context of such an asset value process. In contrast, reduced-form models utilize bond prices or credit spreads as inputs. Under the assumption that markets are efficient in pricing debt, the price of a bond should be equal to the risk-adjusted present value of the cash flows that are expected to occur in the future. Jarrow and Turnbull (1995), for example, proposed an intensity-based model based on corporate zero-coupon bond prices.

- **Use of third-party reports and ratings.** A buying firm can also use the services of ratings from rating agencies such as Fitch, Moody’s, Standard & Poor’s, or Dun & Bradstreet. Rating agencies measure the credit worthiness of a firm and assign a credit rating expressed in a letter system (e.g., Aaa or B-). These letter ratings can be easily translated into a probability of default by using historic default frequencies (Bluhm, Overbeck, & Wagner, 2002). Appendix C presents a procedure for this simple calibration. Obviously, one advantage of alternative is that it requires less effort with regard to data collection and analysis. Previous research also suggests that credit ratings provide relatively good approximations for firms’ probabilities of default (Wang, 2004). A major disadvantage of ratings, however, is that rating agencies usually consider only larger firms. Many firms are deemed too small to be rated by the big agencies and smaller rating agencies often use ambiguous rating methods. Ratings face the downside of infrequent updating, too. Furthermore, another disadvantage of ratings is that they are not transparent, because the details of the underlying methodology are often private. The recent financial crisis has also highlighted that credit ratings may not always be reliable.

- **Active tracking of supplier performance.** Many indicators can only be obtained via direct inquiries or interactions with the supplier (Carter & Giunipero, 2010). Depending on their power in the relationship, buying firms may be able to persuade suppliers to disclose information (e.g., via supplier surveys) on their current and forward-looking financial health, such as sales expectations, days payables outstanding, fluctuations in headcount, changes in the top management team, product recalls, or major technology changes. These data can be used to develop a qualitative proxy for a supplier’s probability of default, but historical performance data is required to spot significant changes. However, a supplier will not necessarily disclose all information about its financial health. Thus, obtaining additional information is crucial. Local, regional, and/or national trade associations often serve as clearinghouses for credit information that is supplied and made available to member firms. It is also sometimes possible for a buying firm’s bank to obtain credit information from the supplier’s bank. Some firms also use monitoring services (e.g., Dun & Bradstreet) that provide information about the health of firms. Finally, information can be obtained from market rumors or media reports.

2) **Exposure/resource dependence**

In the finance industry, exposure measures the extent to which a creditor may be exposed to a counterparty in the event of default. This notion can be directly transferred to a buying firm. A buying firm’s exposure results from the need to safeguard its supply. In the event of a supplier default, a buying firm must act to remain operative, which involves monetary costs. Thus, exposure is directly related to the buying firm’s dependence on the corresponding supplier. Dependence is a core property of any exchange relationship and is determined by the importance of the exchanged resource, the discretion over the resource allocation, and the extent to which there are alternatives for the resource (Emerson, 1962; Pfeffer & Salancik, 1978). Being highly dependent on the exchange partner suggests that the focal firm needs to maintain the relationship in order to achieve its desired goals and that it would incur high switching costs if it had to replace the relationship (El-Ansary & Stern, 1972; Frazier, 1983b).

Exposure is usually difficult to estimate in quantitative, i.e., monetary, terms. There are only a few situations where the exposure can be estimated explicitly by switching costs. For some commodities, for example, spot markets may exist so that a buying firm can switch from a contracted supplier to the spot market to satisfy its demand (Haksöz & Kadam, 2009). In such a setting, the exposure is the difference between the spot market unit price and the contract unit price multiplied by the volume of the contract. However, purchased items are often customer-specific, and the underlying manufacturing and
logistics processes are the result of intensive collaboration between the buying firm and the supplier; as such, alternative spot markets with price information do not exist. A more general, albeit non-monetary, approach is to identify determinants of exposure (such as complexity of the purchased items, availability of alternative suppliers, ease of supplier switching) and to derive a quantitative measure for exposure (on a scale other than monetary value).

(3) Supplier default dependence
Usually, one observes positive default dependence between two firms, which means that if one firm defaults, the other firm may have a higher probability of defaulting. Empirical research indicates that this is a common phenomenon and by no means negligible (Zhou, 2001). Wagner, et al. (2009) reported from the German automotive industry that default dependency among suppliers often exists and can result in significant detrimental consequences for the buying OEMs. There are specific reasons to assume positive default dependence in supplier portfolios. First, it has been observed that — from the buying firm's perspective — some suppliers maintain relationships with other suppliers in the buying firm's supplier portfolios (Choi, Wu, Ellram, & Koka, 2002; Wu & Choi, 2005). Suppliers may work together closely, exchange ideas, and even engage in joint venture projects in cooperative supplier-supplier relationships. Being linked so closely may result in comparable strategic and operative actions and behaviors of the supplier firms. Second, suppliers often face similar challenges. In the automotive supplier industry, for example, almost all suppliers are exposed to powerful customers. Suppliers are not only pressed by the automotive OEMs to constantly cut costs, but also to invest heavily in innovation and to support OEMs in their new product development activities. The latter causes increased production and R&D costs. In addition, automotive suppliers are faced with volatile prices of raw materials that may have a high impact on their profitability (West, Frey, & Hendker, 2005). These are specific automotive-supplier-industry examples of common or correlated risk factors that are often mentioned in the finance literature (Chava & Jarrow, 2004). These factors suggest that buying firms should also consider default dependencies when scanning their suppliers.

Process of scanning
The scanning process itself can differ significantly based on the type of buying firm and the type of the relationship under investigation. Specifically, the scanning may vary in scope and intensity.

(1) Scope. Scope refers to the breadth and depth of the information and indicators that a buying firm scans to obtain information about a supplier's financial health.
• Breadth defines the set of different indicators the buying firm is interested in. If the scanning process is broad, the buying firm investigates a large set of different default measures and warning signals, e.g., ownership structure, profitability, operational changes (e.g., fluctuations of staff), and technology position.
• Depth refers to the amount of data that the buying firm collects to inform the set of indicators. For each indicator the scanning buying firm may choose different levels of analytic depth. For example, to obtain information about a supplier's technology position, the buying firm might use both qualitative to quantitative indicators from e.g., third-party ratings/reports, financial statements, news articles, and rumors

(2) Intensity. Intensity refers to the frequency and intrusiveness of the scanning process. Buying firms may use many instruments to collect data. Surveys, observations through personal contacts, agents, balance sheets, or income statements are some of the instruments that a buyer can use to aggregate information. Frequency of data collection also varies between firms.
• Frequency: Buying firms can review their suppliers' financial position on a monthly, quarterly, semi-annually, or annually basis — or only if needed, i.e., after a triggering event such as a change in ownership status, a new contract, new information about risk factors. As the frequency of information collection increases, the intensity also increases.
• Intrusiveness: Buying firms vary largely between intrusive and non-intrusive behavior (Daft & Weick, 1984). Intrusive firms are vigilant toward the environment, behave proactively and assertively, and strive to learn from their experiences. They act upon, rather than react to, environmental events. In contrast, non-intrusive firms accept the environment as a given, interpret the environment within narrow limits, are reluctant to engage in active information-search processes and are slow to respond to environmental events. Thus, intrusiveness is an active, forceful behavior where the buying firm actively searches the environment for information. For example, an intrusive
behavior would be plant visits or using intelligence or monitoring services to actively obtain indicators for a supplier’s health. In contract, non-intrusiveness refers to a passive behavior where the buying firms use only “receptors to sense whatever data happen to flow by the organization” (Daft & Weick, 1984, p. 288).

Information-processing needs
Obviously, scope and intensity of the scanning process affect a firm’s information processing needs. As the scope and intensity of monitoring increase, the information processing needs of the firm increases: \( f(\text{scope}, \text{intensity}) = \text{information} \).

As shown in Figure 3, if the scope and the intensiveness are too high, the information interpretation process will then be overloaded. Even the most risk-conscientious buying firm cannot scan all suppliers with great scope and great intensity. Firms must therefore weigh the amount of information needed versus the time and expense required. To this end, buying firms usually use portfolio approaches to prioritize suppliers and to allocate their information processing capabilities. A supplier portfolio perspective can help firms classify suppliers and derive groups of suppliers, which can be subjected to similar scanning approaches.

Interpretation
In the second stage, interpretation of the gathered information takes place, because the raw data received during the scanning process will not directly make sense. The main issue in the interpretation process is the determination of the risk and the decision of whether or not actions are necessary.

As discussed in the previous section, the key measure for the financial health of a supplier is the probability of default. From a technical perspective, however, this probability of default represents a random variable that follows a certain distribution, e.g., a normal distribution. So, practically speaking, there is an expected value for the probability that a supplier will default within a certain finite time horizon and some uncertainty (variance). The central problem for the buying firm is now to assess the overall risk based on the expected probability of default, the involved uncertainty, and its exposure. The assessment of uncertainty is closely related to the urgency suggested by the scrutinized indicators and the reliability of the sources.

(1) Urgency
The organizational crisis perspective suggests that suppliers start to send out signals from the beginning of their crisis — even way before the occurrence of a financial distress situation or even default. Obviously, these warning signals are not equal in the urgency they convey. Early warning signals such as change in ownership might be good indicators to signal financial distress, but the time until default and, thus, the buying firm’s reaction time and room to maneuver are still large. In addition, early warning signals are usually associated with more “noise” and, thus, more uncertainty. For this reason, a firm that receives an early warning signal might decide to wait until the signal becomes clearer.

(2) Reliability of the sources/quality of the data
Different sources may have different reliabilities. A market rumor that a supplier faces some difficulties is a less trustworthy signal than a supplier asking for changes in the payment policy.

Figure 3
Amount of Information as a Function of Scanning Scope and Intensity
Based on the assessed information, the buying firm constructs or modifies its beliefs about the risk involved in the current situation and decides how to proceed. The interpretation process may lead to insights that delegitimize a state that had previously been considered to be acceptable (Greening & Gray, 1994; Meyer, 1982). The information processing perspective suggests that a firm only responds if the interpreted information exceeds a certain response-justifying threshold (Cyert & March, 1963; Huber & Daft, 1987). More specifically, the buying firm compares its updated beliefs about the inherent risk in the supplier relationship with its risk appetite and goals. The latter can be viewed as a threshold of action. If the firm concludes that there is a discrepancy, it will be motivated to bring its resource provision back in line with its expectations. If the risk is believed to be below the threshold, the buying firm does not act and accepts the current situation.

**Action**

Based on the results of the interpretation process, the focal firm determines its response to the distressed supplier. We use resource dependence theory to understand the basic types of responses.

Resource dependence theory has two major tenets: (1) a firm's essential need for scarce external resources creates a dependence on its exchange partners, which results in potential sources of adversity and vulnerability for the firm, and that (2) firms strive to minimize this dependence, which is tantamount to maximizing their power (Pfeffer, 1981). A clear mandate for decision-makers derives from the second statement, but there is some managerial discretion over how to achieve the goal of reduced dependence (Oliver, 1991; Pfeffer & Salancik, 1978). Given that the focal firm strives to determine ways to reduce its risk with respect to the exchange relationship, resource dependence theory suggests two viable response strategies: buffering and bridging (Cook, Shortell, Conrad, & Morrissey, 1983; Fennell & Alexander, 1987; Meznar & Nigh, 1995; Scott & Davis, 2007; Thompson, 1967). As long as resource dependencies exist, buffering and bridging may be pursued irrespective of specific industry constraints. Collectively, the two strategies exhaust the set of possible active responses. Neither buffering nor bridging strategies are “good” or “bad” per se. Either of the two may be effective, depending on the specific context. While buffering and bridging are independent concepts, they are not mutually exclusive and may act as complements to each other. For example, the firm might decide to start searching for an alternative source, while simultaneously attempting to support the distressed supplier with financial subsidies.

**Buffering**

The response of buffering aims to reduce or eliminate the firm’s external resource dependencies in order to achieve higher levels of autonomy for the firm (Galbraith, 1973; Thompson, 1967). Its direction is external to the current exchange relationship, because the firm explores new alternatives to reduce the importance of, and its exposure to, the current exchange relationship. In general, buffers are any means that serve both to insulate the firm from its exchange partner and to mitigate the detrimental consequences of disturbances that the relationship may confer. A typical buffering approach is to terminate the relationship with the distressed supplier and to switch to an adequate alternative source, which is associated with switching costs. Switching costs may include expenses for search and development of an appropriate supplier, additional purchasing costs, as well as possible losses due to the intermittent disruption of supply. Another method of buffering is to design modularized or componentized products that may help increase tolerance of the exchange partner (Tang, 2006).

**Bridging**

The response of bridging aims to manage the external resource dependencies by reinforcing the collaborative ties with the exchange partner or by enlarging the control and influence over it (Aldrich, 1979; Katz & Kahn, 1978). For distressed suppliers, this will usually mean salvaging the supplier (at least for a transition period), which is associated with financial subsidies. By employing a mix of coercive (“Do this or else!”) and non-coercive (rewards) influence strategies, the firm may modify or manipulate the relationship more or less formally (Frazier, 1983a). This modification can result in forming relationships with influential individuals in the other firm, cooptation (Selznick, 1949), or vertical integration (Ulrich & Barney, 1984). Collaborative structures or initiatives with the exchange partner, such as a joint risk management system, also assist in improving the cohesiveness. In addition, bridging may be associated with more or less intrusive scanning approaches such as monitoring or intensifying information exchanges (Pfeffer & Salancik, 1978; Scott & Davis, 2007).

**Learning**

Norrmann and Jansson (2004) describe how the Swedish telecommunications equipment provider Ericsson, in the wake of a supply chain disruption (Latour, 2001), reassessed and radically changed its supply chain risk management processes and organizational culture. Today, Ericsson is considered to have a world-class supply chain risk management system (Norrmann &
inertia can be overcome (Meyer, 1982). The case of Ericsson suggests that supply chain disruptions can be viewed as an experience-based learning process (Levitt & March, 1988) that can expose the latent flaws and vulnerabilities of internal and external structures, processes, and systems (Meyer, 1982; Turner, 1976), thus helping the affected firms to understand the problems and improve their strategies for the future (Milburn, et al., 1983; Nathan & Kovoor-Misra, 2002). The lean management philosophy, for example, deliberately uses this learning effect in a preemptive manner by systematically reducing operational slack with the intention of revealing and eliminating inefficient processes (Womack, Jones, & Roos, 1990). Supplier defaults are usually considered as negative events. However, this view overlooks the positive learning potential in these experiences. For example, after the subprime crisis, banks were forced to revisit and adapt their risk management processes. In a similar vein, buying firms can learn from prior experiences with distressed suppliers and improve their scanning, interpretation, and action processes.

Organizational adaptation and learning have been examined from a wide variety of theoretical perspectives (for a review, see Argote, 1999), one of them being the experience-based learning perspective, which holds that organizational learning is a process of gathering experience and drawing inferences from this historical experience in repositories of organizational knowledge for future actions (Cyert & March, 1963; Levitt & March, 1988). At its most basic level, learning creates the potential for behavioral change (Huber, 1991). This implies that learning is not necessarily connected with change but merely the potential to change. Much of the literature on organizational learning recognizes that infrequent, hazardous experiences, such as supplier defaults, can be a valuable source of organizational learning and, as a consequence, the source of competitive advantage (e.g., Nathan & Kovoor-Misra, 2002; Sitkin, 1992). Sitkin (1992) emphasizes the “transformational nature” of failure and unanticipated external challenges. Particularly higher-level learning (i.e., more drastic changes of overall rules, norms, strategies, or structures with a long-term impact) often needs an extreme external stimulus (Fiol & Lyles, 1985). This stems from the idea that sudden hazardous environmental events force an organization to question existing schemes and structures and to unlearn habitual behaviors (Hedberg, 1981; Nystrom & Starbuck, 1984). Moreover, such events seem to open a window of opportunity during which organizational inertia can be overcome (Meyer, 1982). Organizational learning is a social process, as many individuals are involved in the learning and share certain knowledge together through interaction. This is the primary distinction between organizational and individual learning. Organizations make use of shared knowledge through the codification of the knowledge into a social system (Sinkula, 1994). For example, an organization translates its learning and behaviors into process standards, mission statements, or organizational routines. This ensures that each individual in an organization has access to the knowledge and behaves in the given and defined way. Consequently, an organization can only learn if it codifies its learning and translates it into procedures. According to Levitt and March (1988), if a learned experience is not transferred to other persons directly, “the lessons of history are likely to be lost through turnover of personnel” (p. 328).

In literature, the simplest form of learning is referred to as single-loop learning (Argyris & Schon, 1978). This form of learning involves low risk because only incremental changes in behavior are added to an already used routine. Thus, the aim of single-loop learning is to improve upon the initial situation without drastically changing it. The more complex form of learning is double-loop learning, which contributes (in contrast to single-loop learning) to long-term organizational changes. The first step toward double-loop learning is described as unlearning. An unlearning organization eliminates old logic in order to make room for new ideas, logics, or solutions. This first step occurs on an individual level (individual learning) before it reaches an organizational level. Unlearning takes a first important role as it helps and supports a firm in its efforts to reorient norms, values, or behaviors through the consistent change of individual cognitive structures. Thus, unlearning is a prerequisite on the way to double-loop learning (Klein, 1989). The second step after unlearning is substituting. If an organization unlearns the present way of doing something and substitutes it with a new way or form of doing it, the organization moves on the double-loop learning route. It’s important to note that only the combination of (1) unlearning and (2) substitution can create a long-term learning success (Sinkula, 1994).
Based on the proposed framework, we investigated several firms to understand how they dealt with suppliers in financial distress. In the interest of generating theory, the data collection followed a theoretical sampling strategy and was based on in-depth, semi-structured interviews with specialists in the areas of procurement, supply, and supply chain management. The regions chosen for this study were: Europe, the Middle East, North America, and Latin America. In some cases, the respondents were not responsible for the entire firm’s purchasing/supply areas but rather a specific business unit. However, these business units had their own P&L responsibilities and own purchasing organizations. The profile of the respondents ranged from mid-management (e.g., managers or specialists), to senior and top management (e.g., head of purchasing, COO). Our main focus was on large manufacturing firms. However, in order to get an extended review we included some wholesale and service provider firms. In sum, a total of 18 firms were interviewed. Table 1 shows the overall demographic information. More details on the employed methodology are provided in Appendix B of this report.

Table 1
List of Interviewed Firms

<table>
<thead>
<tr>
<th>Firm (Alias)</th>
<th>Industry</th>
<th>Headquarters</th>
<th>Interview location</th>
<th>Total Employees</th>
<th>Revenues¹ (million US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AntennaCo</td>
<td>Electrical equipment</td>
<td>USA</td>
<td>Mexico</td>
<td>11,500</td>
<td>$1,800</td>
</tr>
<tr>
<td>AutomotiveCo</td>
<td>Automotive OEM</td>
<td>Germany</td>
<td>Germany</td>
<td>260,000</td>
<td>$130,000</td>
</tr>
<tr>
<td>BeverageCo</td>
<td>Food and beverages</td>
<td>Greece</td>
<td>Switzerland</td>
<td>42,000</td>
<td>$8,800</td>
</tr>
<tr>
<td>BreweryCo</td>
<td>Food and beverages</td>
<td>England</td>
<td>Switzerland</td>
<td>70,000</td>
<td>$27,000</td>
</tr>
<tr>
<td>BusCo</td>
<td>Automotive OEM</td>
<td>Turkey</td>
<td>Turkey</td>
<td>1,200</td>
<td>$340</td>
</tr>
<tr>
<td>CementCo</td>
<td>Construction material</td>
<td>Turkey</td>
<td>Turkey</td>
<td>1,000</td>
<td>$540</td>
</tr>
<tr>
<td>DefenseCo</td>
<td>Defense</td>
<td>Germany</td>
<td>Mexico</td>
<td>21,093</td>
<td>$7,000</td>
</tr>
<tr>
<td>ElectronicsCo</td>
<td>Electrical equipment</td>
<td>Germany</td>
<td>Switzerland</td>
<td>335,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>FashionCo</td>
<td>Fashion</td>
<td>Italy</td>
<td>Italy</td>
<td>7,000</td>
<td>$1,300</td>
</tr>
<tr>
<td>HealthcareCo</td>
<td>Pharmaceuticals</td>
<td>USA</td>
<td>Mexico</td>
<td>116,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>LogisticsCo</td>
<td>Logistics services</td>
<td>USA</td>
<td>USA</td>
<td>3,000</td>
<td>$2,000</td>
</tr>
<tr>
<td>PowerCo</td>
<td>Electrical equipment</td>
<td>Switzerland</td>
<td>Switzerland</td>
<td>130,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>RadiatorCo</td>
<td>Automotive supplier</td>
<td>Turkey</td>
<td>Turkey</td>
<td>700</td>
<td>N/A</td>
</tr>
<tr>
<td>RetailerCo</td>
<td>Industrial Retailing</td>
<td>The Netherlands</td>
<td>Colombia</td>
<td>280</td>
<td>$20</td>
</tr>
<tr>
<td>SustEnergyCo</td>
<td>Industrial services</td>
<td>Japan</td>
<td>Switzerland</td>
<td>8,000</td>
<td>$3,500</td>
</tr>
<tr>
<td>TurbinesCo</td>
<td>Electrical equipment</td>
<td>France</td>
<td>France</td>
<td>93,500</td>
<td>$27,000</td>
</tr>
<tr>
<td>VanCo</td>
<td>Automotive OEM</td>
<td>Turkey</td>
<td>Turkey</td>
<td>10,000</td>
<td>$4,900</td>
</tr>
<tr>
<td>WirelessCo</td>
<td>Wholesale</td>
<td>Mexico</td>
<td>Mexico</td>
<td>80</td>
<td>$3</td>
</tr>
</tbody>
</table>

¹Based on exchange rates as of Dec. 31st, 2011.
Below is a summary of the findings from the cross-case analysis. First, our findings about different scanning and interpretation techniques are presented, followed by findings related to the different actions taken, and finally findings of how organizational learning takes place after situations of supplier financial distress. As most firms do not distinguish between the scanning process (where selected data are collected) and the interpretation process (consisting of sense- and decision-making based on the collected information), we combine the discussion of the two first steps.

**Scanning and Interpretation**

The firms’ scanning and interpretation efforts can be clustered around three characteristic behaviors, which leads to three types of firms labeled as *reactors*, *observers*, and *guards*. Figure 4 provides an overview of the identified types.

The distribution among them is uneven. We found 39 percent of responding forms belonging to the *reactors* group, 22 percent to the *observers*, and 39 percent to the *guards*. The *reactors* consist solely of subsidies representing all sectors except automotive, construction, and food processing.

All of the interviewed firms use qualitative indicators to monitor their active suppliers’ financial situation. Likewise, all firms track the operational performance of their suppliers, as they consider minor operational problems such as *order delays*, *order cancellations*, or *quality issues* as possible signals of financial distress. BeverageCo, for example, argues that “deviation in quality can be interpreted as a direct consequence of financial problems, as the supplier might reduce the quality of their materials to decrease its costs.” Particularly, requests for *changing payment terms* and *explicit support request* by the suppliers are commonly conceived as strong signals of a more acute financial
distress situation. Reactors are those firms that rely on only such relatively late signals. Many of the firms that fit to this classification are overseas subsidiaries. One of the representatives stated: “Evaluating suppliers in more complex ways is a headquarters task.”

Some firms go beyond these late signals of escalation, without implementing sophisticated monitoring systems. For example, AntennaCo and ElectronicsCo track market rumors and attempt to forecast possible supplier defaults based on this information. BeverageCo and RadiatorCo rely on their “strict accreditation process,” which RadiatorCo supports by regular supplier site visits, while ElectronicsCo employs additional third-party rating agencies. We label firms applying these measures observers.

Finally, guards have implemented sophisticated monitoring systems, which include several of the following: accreditations, financial analysis, and the collection of in-depth qualitative data through regular audits. Many representatives agreed to the following: “Our staff regularly visits our suppliers and thus receives formal and informal information.” Also these firms might employ some external agencies to evaluate their suppliers’ financial strength. PowerCo and TurbinesCo follow the headcount and staffing policy of their suppliers and consider layoffs as an important indicator for financial problems. Furthermore, they are well aware of the utilization rates of their core suppliers, as they “know the monthly capacity [of our suppliers] and how it is booked,” as one of the respondents explained. Nevertheless, for the sake of saving costs, even the guards do not apply such sophisticated and resource-demanding monitoring to non-critical suppliers. Some also refrain from monitoring global firms acting in monopolistic or oligopolistic markets, where bridging and buffering strategies would not be possible. As CementCo explained: “As there are only a couple of huge firms that control fuel supply globally, we do not monitor our fuel suppliers, although they represent 45 percent of our purchasing volume.”

Figure 5 shows the preferred scanning behavior of the firms classified as guards. Just as the level of scanning varies among the firms, the interpretation techniques to deal with the variance of the signals, and action thresholds also vary. The guards define explicit triggers that will initiate actions even in cases where the risk for a supplier’s default is still low. For strategic and critical suppliers, the trigger might be as seemingly mundane as the loss of a key employee, as CementCo explained. Further triggers might be the exceeding of a certain threshold in financial ratios or ratings. Initial actions in such situations can focus on a more accurate monitoring of the respective supplier. One interviewed supply manager stated that after recognizing an acute default threat of a critical supplier, the management board of the firm evaluates the risk and decides the future proceedings. Other firms with less sophisticated scanning and interpretation processes recognize the risk of a default by late signals, such as delivery delays, and will react late (maybe too late), which might lead to a severe supply chain disruption and cause high expenses.

Figure 6 shows the differences with regard to scanning intensity and scanning scope among the groups. All automotive OEMs were classified as guards. In total we allocated seven firms to this category, which also
includes firms from the construction, industrial, and food processing sectors. The observers category contains only four firms, one automotive supplier, one from food processing, and two from the electronics sector. The reactors consist of the seven remaining firms — predominantly from the service sector, among them the smallest of our sample. Although it might be assumed that firm size dictates scanning efforts, our research shows that scanning intensity has a stronger correlation to business sector.

**Action**

After a situation of (potential or current) supplier financial distress is recognized, different actions can be carried out to reduce the probability of default and/or the exposure to disruptions. We observed that the alternatives chosen are more dependent upon the business sector of a firm rather than its size. We identified three characteristic action patterns. We categorized 38 percent of our sample firms as substitutors; we categorized 28 percent as cooperators; and we categorized 33 percent as partners. Figure 7 gives an overview of the three identified action types.

First, the substitutors represent firms, which, due to different reasons, have predominantly arm’s length supplier relationships that involve little dependence (Dyer & Singh, 1998). Due to the lack of relational elements and low switching barriers, they would rather substitute a supplier than support it. Usually they source standard products in competitive markets, particularly spot markets. In our sample, all representatives of this group belong to the service industries and the food processing sector. “We have a low resource dependence on our suppliers. Thus, we will terminate our business relationship and blacklist a supplier when it caused high-impact disruptions,” said BreweryCo. There are some exceptions to this approach for well-performing suppliers, such as adapting payment terms to assist them, as LogisticsCo and others affirmed. Generally, this conduct can be considered buffering (Bode, Wagner, Petersen, & Ellram, 2011). Some of the firms would cancel open orders and transfer them to another supplier, but (possibly) return to the supplier once the financial situation was stabilized.

Second and in contrast to the substitutors, the cooperators rely on strong relationships with portions of their supplier base. These relationships are characterized by a higher level of dependency and trust. Due to the relational exchange, the cooperators firms freely agree to adapt payment terms to assist their preferred suppliers. AntennaCo gives a good example of this approach: “Though we pay special attention on having a highly diversified supplier base, we want to offer an equal win-win relationship to all of our business partners — even for small businesses.” Furthermore, ElectronicsCo is willing to provide short-term credits to their strategic suppliers. Nevertheless, if a supplier is non-critical or it is not expected to
overcome the financial crisis, the cooperators would rather substitute with a healthy supplier. As CementCo explained: “Although we did not expect a supplier to overcome its financial crisis, we supported it by paying wages in order to keep our production running. As soon as an alternative supplier was found, we stopped the support for the distressed one.” Thus, cooperators pursue a selective strategy. We observed manufacturing firms from different sectors and sizes in this category.

Third, some firms — which we call partners — possess sophisticated contingency or action plans that they activate if they face a supplier in financial distress. All automotive firms belong to this classification, as well as HealthcareCo and PowerCo. These firms established long-term relationships with relatively few, accredited suppliers, which they demand to be “honest and transparent, if they are facing any problems,” as HealthcareCo explained. Both the level of trust and the level of dependence are high. In case of a financial distress situation, they would adapt payment terms, provide credits, and also support with knowledge transfer (e.g., through their in-house consulting departments).

To safeguard themselves, some of these firms are using modular products, which enable them to be flexible with regard to suppliers. To avoid supply chain disruptions, a firm would buy the raw materials necessary to process its orders, relieving the supplier from upfront investments. An interviewee stated: “Though we support our suppliers afterward, we cannot always avoid a default. Even if the production will be continued, usually operations will be fully stopped for 48 hours. If we expect the worst case — an insolvency — we extend our stock of items sourced from the struggling supplier, in order to keep our production lines running without interruptions.”

Although these firms are following a bridging strategy to avoid supplier defaults, they admit that sometimes they would substitute even a critical supplier: “One of our suppliers has been going through financial problems for several years. Several times a consortium of OEMs saved it from bankruptcy. When we learned about an additional shareholders conflict, we decided to develop an alternative supplier. One year later this company filed insolvency due to the conflict and other OEMs suffered seriously, while we could continue our production.”

Figure 8 illustrates the strategy preferences for cooperators and partners.

**Learning**

Our cross-case analyses revealed four different types of learning in terms of gaining experiences with distressed suppliers. The observed learning forms can be categorized into single- or double-loop learning, discussed above. Furthermore, we identified two categories where no learning took place. Our findings about the different learning behaviors are summarized in Figure 9. We consider 11 percent of our sample firms as lucky ones, 28 percent as ignorers, 22 percent as adaptors, and 39 percent as evolvers.

Two of the interviewees — the lucky ones — stated that their firms had not yet faced a supplier default. Nevertheless, these firms have established scanning processes. RadiatorCo states that it has developed an action plan and would rather try to avoid the default of a supplier than develop a new one, while BreweryCo
would distinguish according to the importance of the supplier.

The second group, where no learning took place, are the ignorers. These firms did not change their behaviors after negative experiences with distressed suppliers, nor did they implement knowledge management systems to collect and store acquired knowledge. Stated inhibitors to learning are firm culture, lack of knowledge management systems, or the lack of time outside the everyday routine. “We are so busy with our daily business that we do not have time for reporting procedures,” the RetailCo representative complained. All five firms that belong to this group also neglect their scanning process and are considered by us to be reactors.

Figure 8
Preferred Action Strategies

Figure 9
Learning Types

<table>
<thead>
<tr>
<th>Learning Types</th>
<th>Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucky Ones</td>
<td>Did not have any experience with the financial distress of suppliers.</td>
</tr>
<tr>
<td>Ignorers</td>
<td>Either drew no conclusions from past events or saw no possibility to improve.</td>
</tr>
<tr>
<td></td>
<td>The sole action performed has been to blacklist suppliers, which causes severe</td>
</tr>
<tr>
<td></td>
<td>disruption.</td>
</tr>
<tr>
<td>Adaptors</td>
<td>Performs single-loop learning as they use their experience to slightly modify</td>
</tr>
<tr>
<td></td>
<td>existing processes to improve future reactions.</td>
</tr>
<tr>
<td>Evolvers</td>
<td>Are prepared for double-loop learning. They process experiences thoroughly. Cases</td>
</tr>
<tr>
<td></td>
<td>of business disruption are discussed at senior management level. Based on the</td>
</tr>
<tr>
<td></td>
<td>resulting decision, structural changes could be or were applied.</td>
</tr>
</tbody>
</table>
Third, *adaptors* have implemented a knowledge management system and use their experiences to adjust their procedures (e.g., improving *contract terms, supplier selection profiles, scanning, and interpretation procedures*) either event-based or periodically. All four firms in this group also established sophisticated scanning processes and belong to the *guards* with respect to scanning. BusCo stated an example of incremental learning: “We improved our scanning process by adding or refining indicators.” This adaptive learning process can be classified as single-loop learning according (Argyris & Schön, 1978).

Lastly, *evolvers* can be found among all scanning and action types. These firms run a formalized knowledge management system, spreading the experiences among their employees to prevent errors from recurring. After they face a serious problem with a supplier, they perform in-depth analyses (e.g., *top management business case discussions*). “We have an internal online database to share experiences about disruptions leading to small consequences. However, if a supplier’s financial distress leads to a severe impact, a detailed business case is prepared and discussed by the management board,” explained AutomotiveCo. By carrying out such introspective techniques they are prepared to apply major changes. This involves the unlearning of accepted routines and the implementation of new behaviors, meeting the definition of double-loop learning (Argyris & Schön, 1978).

### Summary

In our cross-case analyses we were able to derive several types of behavior for each of the three stages. When the results are summarized, as illustrated in Table 2, a few overarching patterns can be explored.

In particular, the first stage (scanning/interpretation) and the last stage (learning) of our information-processing framework seem to be significantly correlated (Spearman $\rho = 0.54$, Kendall’s $\tau = 0.49$). In other words, certain behaviors in the scanning/interpretation stage co-occur with certain behaviors in the learning stage. Specifically, firms that act as *guards* during the scanning/interpretation stage tend to act as *adaptors* during the learning stage. This seems quite plausible because *guards*, i.e., firms that use already sophisticated monitoring processes during scanning/interpretation, might only want to incrementally improve their well-established risk management systems (*adaptor*). Interestingly, however, firms that take a more passive *observer* position during the scanning/interpretation stage seem to be willing to radically *evolve* their risk management procedures in the learning stage, when they see the necessity. Finally, firms that behave as *reactors* during the scanning/interpretation stage also show little interest in learning (*ignorers*) from negative experiences.

### Table 2

**Summary of Cross-Case Analyses**

<table>
<thead>
<tr>
<th>Firm (Alias)</th>
<th>Industry</th>
<th>Scanning &amp; Interpretation</th>
<th>Action</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AntennaCo</td>
<td>Electrical equipment</td>
<td>Observer</td>
<td>Cooperator</td>
<td>Evolver</td>
</tr>
<tr>
<td>AutomotiveCo</td>
<td>Automotive OEM</td>
<td>Guard</td>
<td>Partner</td>
<td>Adaptor</td>
</tr>
<tr>
<td>BeverageCo</td>
<td>Food and beverages</td>
<td>Observer</td>
<td>Substitutor</td>
<td>Evolver</td>
</tr>
<tr>
<td>BreweryCo</td>
<td>Food and beverages</td>
<td>Guard</td>
<td>Substitutor</td>
<td>Luck one</td>
</tr>
<tr>
<td>BusCo</td>
<td>Automotive OEM</td>
<td>Guard</td>
<td>Partner</td>
<td>Adaptor</td>
</tr>
<tr>
<td>CementCo</td>
<td>Construction material</td>
<td>Guard</td>
<td>Cooperator</td>
<td>Adaptor</td>
</tr>
<tr>
<td>DefenseCo</td>
<td>Defense</td>
<td>Reactor</td>
<td>Cooperator</td>
<td>Ignorer</td>
</tr>
<tr>
<td>ElectronicsCo</td>
<td>Electrical equipment</td>
<td>Observer</td>
<td>Cooperator</td>
<td>Evolver</td>
</tr>
<tr>
<td>FashionCo</td>
<td>Fashion</td>
<td>Reactor</td>
<td>Substitutor</td>
<td>Ignorer</td>
</tr>
<tr>
<td>HealthcareCo</td>
<td>Pharmaceuticals</td>
<td>Reactor</td>
<td>Partner</td>
<td>Evolver</td>
</tr>
<tr>
<td>LogisticsCo</td>
<td>Logistics services</td>
<td>Reactor</td>
<td>Substitutor</td>
<td>Evolver</td>
</tr>
<tr>
<td>PowerCo</td>
<td>Electrical equipment</td>
<td>Guard</td>
<td>Partner</td>
<td>Evolver</td>
</tr>
<tr>
<td>RadiatorCo</td>
<td>Automotive supplier</td>
<td>Observer</td>
<td>Partner</td>
<td>Luck one</td>
</tr>
<tr>
<td>RetailerCo</td>
<td>Industrial Retailing</td>
<td>Reactor</td>
<td>Substitutor</td>
<td>Ignorer</td>
</tr>
<tr>
<td>SustEnergyCo</td>
<td>Industrial services</td>
<td>Reactor</td>
<td>Substitutor</td>
<td>Ignorer</td>
</tr>
<tr>
<td>TurbinesCo</td>
<td>Electrical equipment</td>
<td>Guard</td>
<td>Cooperator</td>
<td>Evolver</td>
</tr>
<tr>
<td>VanCo</td>
<td>Automotive OEM</td>
<td>Guard</td>
<td>Partner</td>
<td>Adaptor</td>
</tr>
<tr>
<td>WirelessCo</td>
<td>Wholesale</td>
<td>Reactor</td>
<td>Substitutor</td>
<td>Ignorer</td>
</tr>
</tbody>
</table>
The middle stage (action) seems to be somewhat less correlated with the other stages. Still, when adding this stage into the analysis and using cluster analysis techniques (for categorical data), three different overarching groups of firms can be identified: (1) Guard – Partner – Adaptor; (2) Observer – Cooperator – Evolver; and (3) Reactor – Substitutor – Ignorer. Figure 10 illustrates this finding. The first group is formed by the three automotive firms in our sample (AutomotiveCo, BusCo, VanCo), the second consists of AntennaCo and ElectronicsCo, our representatives of the electronics industries, and the third group is formed by FashionCo, RetailerCo, SustEnergyCo, and WirelessCo.
Our qualitative research revealed that four factors have a particularly strong influence over a buying firm's scanning, interpretation, and action behaviors: **Trust**, risk orientation, resource dependence, and salvage power. In this chapter, we present these four factors. They can be distinguished into soft or hard factors. Whereas soft factors determine the firm's attitude, hard factors have rather exogenous constraints. Subsequently, we show how and whether they come into play in the different stages of the information-processing process.

**Soft Factors: Trust and Risk Orientation**

We found that buying firms are not unbiased information processors. In fact, they differ significantly in their modes of interpretation, i.e., the manner in which they process, manipulate, and ultimately utilize information gathered from the environment. **Trust** in the exchange partner and the buying firm's **risk orientation** with regard to the risk of supplier defaults are two major factors that affect the buying firm's information-processing behavior and preferences during the management of distressed suppliers.

(1) **Trust**

Trust in an exchange partner can be described as an expectation or a belief that the exchange partner will honor its commitments (is credible) and will behave with good intentions (is benevolent) (Doney & Cannon, 1997; Ganesan, 1994). Trust is considered to be central to explaining a firm's interpretation of and behavior toward its exchange relationships. Low levels of trust imply that, during a relationship's tenure, the buying firm has not (yet) experienced positive effects from the exchange partner's conduct.

(2) **Risk orientation**

Firms show different levels of concern regarding the risk of supplier defaults. One might conceptualize this as a continuum with one end representing firms that are very concerned about this risk and the other end representing firms neglecting risks. In particular, prior experiences with supplier defaults have a strong effect on this factor.

**Hard Factors: Resource Dependence and Salvage Power**

In contrast to the soft factors trust and risk orientation, the hard factors of resource dependence and salvage power will restrict a buying firm's action alternatives to a certain set of options, even if it prefers another solution.

(1) **Resource dependence**

Resource dependence of a firm is the “vulnerability in a firm's external resource provisions.” If a firm depends extensively on the resources of its suppliers, and the amount of suppliers they can source from is small, then this firm is considered to have high resource dependence, and vice versa.

(2) **Salvage power**

The size and financial strength of a buying firm place hard structural constraints on its options to salvage a distressed supplier and may exclude some specific capital-intensive actions.

In the following section, we are going to discuss how these factors influence a buying firm's conduct. This happens on the level of a single buyer-supplier relationship, whereas the classifications we provided...
during the foregoing case discussion describe the general conduct of the firms.

Scanning

First, we found that risk orientation and salvage power will determine the general willingness and possibilities of a firm to conduct a scanning process, i.e., firms that realize they cannot salvage a specific supplier (salvage power) or firms that show rather little interest in supplier default risk per se (risk orientation) have little incentive to monitor the supplier’s financial health. Secondly, given the boundaries set by these two factors, trust and dependence will substantially affect the scanning processes applied for specific suppliers. As shown in Figure 11, based on the level of trust and resource dependence four typical scanning behaviors can be observed.

In general, firms choose a wider scope and a higher scanning frequency when they are dependent on a specific supplier. For example, we found that firms allocate more resources to scan sole suppliers, whose default might have severe consequences, than they do to other suppliers. At the same time, trust affects the buying firm’s intrusiveness. In cases with high trust, buying firms have experience-based confidence that the supplier will provide accurate information.

(1) Minimal scanning (low dependence, high trust): Due to the low level of dependence and the strong belief that the corresponding suppliers are benevolent, firms reduce their scanning efforts to a minimum (i.e., low scope and low intensity).

(2) Suspicious scanning (low dependence, low trust): Given low trust in and low dependence on the supplier, the scanning firm’s behavior will be principally governed by its belief that the exchange partner is not reliable. Buying firms try to minimize their scanning efforts, but focus on data sources other than the supplier itself. They might also show more intrusiveness.

(3) Trust-but-verify scanning (high dependence, high trust): When a firm is highly dependent on a supplier, even with a high level of trust, information obtained only by the supplier might be insufficient. Although the firm has a good

Figure 11
Scanning Behaviors

<table>
<thead>
<tr>
<th>TRUST</th>
<th>DEPENDENCE</th>
<th>Suspicious</th>
<th>Vigorous</th>
<th>Minimal</th>
<th>Trust-but-verify</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>low</td>
<td>Scope:</td>
<td>Scope:</td>
<td>Scope:</td>
<td>Scope:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intensity:</td>
<td>Intensity:</td>
<td>Intensity:</td>
<td>Intensity:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Frequency: low</td>
<td>– Frequency: high</td>
<td>– Frequency: low</td>
<td>– Frequency: high</td>
</tr>
<tr>
<td>high</td>
<td>high</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
relationship with the supplier, it wants to ensure that the supplier is healthy and employs “trust-but-verify” strategies.

(4) Vigorous scanning (high dependence, low trust): The most resources are spent for scanning if the supplier is important but not considered trustworthy. The belief that the supplier will not act in a benevolent way and, thus, will not provide accurate information about its financial health, requires the use of alternative sources and a more intrusive scanning behavior.

**Interpretation**

Basically, the interpretation stage can be understood as a dynamic hypothesis test in a changing environment. Based on steadily updating information, the buying firms periodically reassess the situation. Meanwhile, during the escalation of supplier distress, the set of applicable alternatives diminishes. The signals received in this environment are stochastic and represent the expected probability of supplier default. A high trust level within a relationship increases the clearness of the signals, what is tantamount to a lower deviation of the stochastic variable of the signal. The threshold for taking action is determined by the dependence on a specific supplier and the general risk orientation of the firm. The threshold is higher for less important suppliers and lower for critical suppliers: A buying firm will react rather proactively for important suppliers whose default could cause a severe supply chain disruption. Furthermore, a highly risk-orientated firm will prefer to act proactively in order to ensure smooth operations. The closer a supplier gets to the point of defaulting (increasing urgency), the clearer the signals become and the easier it gets for the buying firm to understand these signals. Once the confidence interval of the signal crosses the threshold, action is triggered to cope with the potential default. This is illustrated in Figure 12. Summing up, in the interpretation stage, buying firms have to determine whether or not the received information suggests that a supplier will enter the financial distress stage or not and if any actions shall be taken. Causes and effects are often ambiguous and difficult to understand; thus, interpreting the signals of supplier distress is complex.

![Figure 12](image)

**Figure 12**

**Triggering Action**
Due to this complexity, the interpretation stage is prone to two errors, as shown in Figure 13. (1) The firm can falsely reject a signal as irrelevant (similar to Type I error: reject the null hypothesis when the null hypothesis is actually true); or (2) falsely overreact to a signal that points to a financial problem that doesn’t exist (similar to Type II error: fail to reject the null hypothesis when the null hypothesis is actually false). Hence, in determining its response, the firm faces a dilemma between being overcautious (reduction of Type I error) and inattentive (reduction of Type II error).

Firms that are more risk-oriented tend to be more precautionary. This might be the result from of the firm’s own experiences. Previously experienced supplier defaults and the severity of their consequences play an important role for risk orientation. For example, a bankruptcy of a sole supplier in the past leads a buying firm to behave more proactively to avoid impending hypothetical supplier defaults. Nevertheless, several of the interviewed managers confirmed that in cases of doubt, they always seek additional information to improve the state of knowledge and avoid Type II error. Upon receiving weak signals that a supplier might be in difficulties, these firms first act is to gain a better understanding of the problem and to identify the underlying root causes.

Figure 14 provides an overview of the warning signals that were named by the interviewed managers. The warning signals are sorted according to the type of crisis that they could foreshadow. The crises are sorted according to their urgency.

**Action**

Once a firm decides to act, it can basically choose between the two alternatives buffering and bridging. We found that the four factors — trust, risk orientation, dependence, and salvage power — will jointly determine the way a firm will act, as shown in Figure 15. Highly risk-oriented firms prepare action plans and execute those, while unprepared firms will have to react ad-hoc in a distress situation. Nevertheless, the risk orientation will not affect the action strategy that will be applied. The motivation to act will be channeled into buffering and bridging by the factors trust and resource dependence on the supplier. More specifically, resource dependence pushes the buying firm to pursue a bridging strategy. Particularly when a supplier is the sole supplier of a certain good of high importance to the buying firm, the buying firm will tend to support the supplier in order to sustain its operations. In contrast, if a good is broadly available in the market and searching costs are low, the buying firm will more likely apply a buffering strategy and substitute the supplier. Analogous, a firm will consider it rather worthy to continue a strong (long-term) relationship, implying a high level of trust and commitment by both partners. In
Learning

Unlike the previous stages, learning is less affected by the four aforementioned factors, but more so by company culture and prior experiences. Some firms develop working environments favoring organizational learning, where experience is shared among many individuals through different interactions. Nevertheless, without relevant prior experiences, buying firms face difficulties in making sense of signals and in determining the form and the strength of a response. It seems that prior experience acts as an information filter that suppresses the irrelevant information and enhances the relevant information. Having encountered supplier defaults, buying firms may have developed dedicated rules and routines for dealing with distressed suppliers. Moreover, experienced firms may have more complete information on the set of options available to stabilize a supplier and should have confidence in using the entire response repertoire, because it has a better understanding of the response-outcome relationship. If the focal firm is familiar with the interpretation of signals from distressed suppliers, the interpretation and the responses become increasingly effective. In contrast, firms that have been exposed to fewer supply chain disruptions lack relevant knowledge and are unfamiliar with interpreting these events. Hence, these firms face difficulties in determining adequate responses. A lack of
knowledge leads to the application of simple “rules of thumb,” which leads to a risk of overreacting or “underreacting.”

Based on prior experiences, some firms have developed and established monitoring systems that they review and adjust regularly. Thus, we conclude that a firm’s culture fostering knowledge management will lead to better monitoring, interpretation, and action techniques.

**Financial Consequences**

The discussed risk management process affects a firm’s cost base and thus also has profit impact. Having said that, it is in a firm’s best interest to minimize the total cost of risk management activities, which can be described by the sum of costs caused by (possible) disruptions and costs spent to prevent these. These two factors, obviously, imply a trade-off. The costs caused by a supplier default cannot be predicted precisely, as they are prone to too many factors and have to be modeled as a random variable. In contrast, the risk management costs, including expenditures on monitoring, interpreting, actions, and learning processes can be assumed as deterministic. By increasing the costs of risk management, more disruptions can be avoided, and thus the total cost of disruptions will decrease. Nevertheless, the risk management costs face decreasing economies of scale. A total minimum of risk management costs can be determined, as illustrated in Figure 16.

In order to achieve an optimal alignment, a firm must balance the expenditure on the four stages of the risk management process. For the scanning stage, a periodical categorization of the supplier portfolio ensures an optimal allocation of resources to the critical suppliers, without creating waste by monitoring non-critical suppliers. During the interpretation stage, higher trust increases the clearness of the distress signal and thus reduces the probability of an error. This is beneficial to the cost basis due to two reasons. First, the threshold to act can be set higher and thus expenditure of unnecessary costs avoided; second, the probability of the case of an unpredicted supplier default reduces. Finally, when action is taken the strategy applied must fit the importance and credibility of the supplier. If a buying firm can substitute suppliers on the spot market, disruption costs will be quite low and correspondingly bridging activities shall be limited. Contrary, when the buying firm will face a heavy impact from a supplier default it is advisable to be prepared in the event of a possible disruption. If a firm cannot salvage a supplier, it shall prepare alternative suppliers to activate in case of the default of the preferred supplier.

The cross-case analysis revealed that some of the buying firms did consider the financial impact of the risk management activities, while other did not. We observed different permutations of buying firm conduct during risk management stages. Nevertheless, two characteristic patterns emerged, which also form two extremes of the conduct continuum. First, all automotive OEMs are guards, partners, and adaptors. This implies that they successfully identify their
dependence on their suppliers and are aware of their situation and adapt to it. The other end of the continuum is formed by the buying firms we classify as reactors, substitutors, and igniners. All representatives of this group belong to service industries and have a low resource dependence on their suppliers. Additionally, some of the firms are the smallest of our sample; it can be concluded that their salvage power is accordingly low. Thus this conduct can also be considered as strategically aligned. Within the continuum some firms also achieve strategic fit, while others do not.
The default of a supplier can lead to a severe negative impact on the individual buying firm and the supply chain. Procurement managers should pay heightened attention to the overall situation of their suppliers; because of the current critical economic situation, financial distress is very common and can affect any firm. The signals can be particularly subtle and scarce. Thus, it is of great importance for firms to monitor their suppliers using both qualitative and quantitative mechanisms, as that is the best approach for managing suppliers risk management. This allows firms to protect their supply chains from the risks of defaulting suppliers by applying different measures. In the first place, equitable supplier relationships enable the suppliers to maintain financial health. Also, buying firms should 1) avoid creating an overly high level of competition, particularly between its unqualified suppliers, 2) use their power in a prudent way, and 3) avoid opportunistic behavior with its locked-in suppliers.

Nevertheless, even following these measures, the financial distress of a supplier is not avoidable in every case. Our research shows how firms prepare themselves for such cases. The monitoring of financial data and qualitative signals, such as losses of key employees or quality issues, allows firms to anticipate future developments with regard to their suppliers. When a supplier's default is expected different actions are carried out by the buying firms. Sometimes it is advantageous to substitute a supplier, particularly if the supplier is non-critical or the buying firm does not possess sufficient salvaging power to stabilize the supplier. If a supplier is critical for a firm, the preferred response to a financially distressed supplier will be to support it by adapting payment terms or through provision of credits. In addition, a firm also might transfer knowledge and help its suppliers to operate profitable.

After the experience of a supplier default, the majority of buying firms will use the gained knowledge to adapt their purchasing and supplier monitoring processes.

We found that the factors trust, risk orientation, dependence, and salvage power influence buying firms' approaches to managing financially distressed suppliers. Thus, several managerial implications and recommendations can be deduced from our research:

- Supplier defaults can cause severe supply chain disruptions. Consequently, buying firms are urged to tackle these risks just as vigorously as they tackle financial and other business risks.
- The risk of supplier default can be measured by the probability of default and exposure (resource dependence).
- As in any other risk management setting, there is a trade-off between taking the risk and spending resources on risk management. Consequently, buying firms have to carefully evaluate how much risk and costs they are willing to take or spend for reducing the risk of supplier defaults.
- There is no “one-size-fits-all” solution for dealing with the risk of supplier defaults. It all depends on the probability of default and the individual exposure.
- The number of suppliers to be scanned and the scope and intensity of scanning increase a buying firm's information processing needs. To avoid information overload and ensure economical use of resources, purchasing managers have to carefully determine how much information they need in order to mitigate their risk of financially distressed suppliers. Specifically, this involves determining the required accuracy of information processing (i.e., “How accurate do we need to be?” “Does it matter if we are using a rule of thumb?” “Is the cost of making an interpretation
error so high that gathering more data is warranted, to avoid such an error?)

• Resource dependence not only increases a buying firm’s exposure, but also may force the buying firm into expensive bridging actions to salvage a distressed supplier. Thus, important suppliers (where there is a high level of dependence) shall be monitored thoroughly (high scope and high intensity) and action plans be prepared in advance.

• Good supplier relationships can have a cost impact, because a high level of trust decreases the uncertainty of the scanning process. For critical suppliers, buying firms should attempt to build relationships based on trust and relational exchange.

• Buying firms might not always possess enough power to salvage or even support a distressed key supplier. Especially for these cases, an action plan should be prepared that points out solutions of how such supply chain disruption can be avoided.

• Non-critical suppliers should be monitored on a selective basis and on a less frequent level to ensure an efficient use of resources.

• Documentations systems help to transfer tacit into explicit knowledge and can prevent organizations from repeating errors and incurring costs.

While conducting this research, we presented reasonable and appropriate answers to the causes of suppliers’ financial distress and how firms can cope with these events. We believe that if firms align their supply chain risk management activities according to the recommendations they can successfully decrease their risk exposure and operate on an efficient cost level.


Interviewed Firms

**AntennaCo (Electrical equipment)**
This firm is a multinational telecommunications corporation headquartered in the United States, with US$1.8 billion annual revenues. It has operations in the Americas, Europe, and Asia Pacific, employing 11,500 people globally. The business unit interviewed is the one that manufactures carrier wireless and broadband solutions located in Mexico. The interviewee was an international buyer.

**AutomotiveCo (Automotive OEM)**
This firm, headquartered in Germany, is among the 10 largest automotive OEMs with annual revenues of US$130 billion, is stock-listed, and employs 260,000 people worldwide. The group operates with a global centralized procurement organization and has approximately 2,000 suppliers. In light of the current critical economic situation, its large size, and the diversity of its supplier base, AutomotiveCo created a special functional department within its headquarters to manage risks to its supplier base. The interview was conducted with a senior risk and restructuring manager from this department.

**BeverageCo (Food and beverages)**
This firm is one of the leading anchor bottlers of soft drinks in Europe, with annual revenues of US$8.8 billion, is headquartered in Greece, operates in 28 countries, and employs 42,000 people. It has a centralized procurement department located in Austria. The interview was conducted with the Head of Logistics of a business unit in Switzerland that interacts with 350 suppliers.

**BreweryCo (Food and beverages)**
This firm is one of the top brewing and bottling firms in the world, is headquartered in London, is stock-listed, has US$27 billion annual revenues, and has 70,000 employees in 75 countries, covering all the continents. Recently, it created a brand new enterprise to manage all the global procurement activities of the firm. This business unit is located in Switzerland, where the interview was conducted with one of its Global Procurement Specialists.

**BusCo (Automotive OEM)**
BusCo is one of the major automotive manufacturers in Turkey. Since 1963, BusCo has been providing solutions to its customers both in commercial and military capacities. BusCo operates with its nearly 1,200 employees in a 552,000-square meter plant in Turkey and generates US$340 million revenues. Currently, BusCo is one of the main exporters of the Turkish defense industry with its small buses, trailers, and semitrailers. The interview was conducted with the Chief Purchasing Manager of BusCo.

**CementCo (Construction material)**
CementCo is a leading cement producer in Turkey and a joint venture of two conglomerates. It has operations in the Marmara, Aegean, and Black Sea regions of Turkey. Ten percent of Turkey’s cement needs is met by CementCo, with global standards, environmentally friendly facilities, and an emphasis on service quality. It utilizes state-of-the-art technology to meet customer standards. CementCo’s total domestic cement and clinker sales amounted to 4.6 million tons in 2010. The firm’s domestic and clinker exports reached 7.4 million tons, with clinker and cement exports of 2.8 million tons. Total revenue was US$540 million in 2010. The Head of Purchasing, who is responsible for supplier management, was interviewed.

**DefenseCo (Defense)**
This firm is the second largest business unit of a global aerospace and defense corporation. The business unit operates in the defense communication systems industry and is headquartered in Germany. In 2010 it achieved US$7 billion annual revenues, with a global footprint of more than 21,000 employees in more than 20 countries.
in the Americas, Europe, and Asia Pacific. We interviewed the supply chain manager responsible for the Latin American region headquartered in Mexico City.

**ElectronicsCo (Electrical equipment)**
This firm is a large multinational conglomerate that is active in many industrial segments, particularly electronic and electrical equipment. It has four divisions distributed among 190 countries, employs approximately 335,000 people worldwide, is headquartered in Germany, and has annual revenues of US$100 billion. The business unit interviewed is located Switzerland, where the international headquarters of the Building Technologies is located.

**FashionCo (Fashion)**
This firm is one of the leading Italian fashion firms that manufacture shoes, suits, and male accessories, with annual revenues of US$1.3 billion, and is headquartered in Italy. It has 560 boutiques worldwide and 15 manufacturing plants within Spain, Switzerland, Mexico, and Turkey; approximately 7,000 people are employed worldwide. We conducted our interview with one of the senior operations and logistics managers.

**HealthcareCo (Pharmaceuticals)**
This is a Fortune 500, multinational firm that manufactures healthcare and pharmaceutical products, which are sold in more than 175 countries; it is headquartered in the United States. The corporation is structured in 250 subsidiary companies in 57 countries that, together, produce annual revenues of US$60 billion and employ 116,000 persons worldwide. We interviewed one of the firm’s operations directors responsible for the Mexican market.

**LogisticsCo (Logistics services)**
This is an American multinational logistics service provider that offers services in transportation, trade, warehousing, and export and import logistics. They are headquartered in Philadelphia, have annual revenues of US$2 billion, and operations in 120 countries, where they employ 3,000 people worldwide. We interviewed a senior supply chain manager in the United States.

**PowerCo (Electrical equipment)**
This firm is headquartered in Switzerland and mainly operates in the industrial power and automation industry. It has annual revenues of US$30 billion, is stock-listed, and has a presence in approximately 100 countries operating with 130,000 employees globally. It manages its corporate procurement in a centralized fashion, directly from Switzerland, with a global supply base of 135,000. The interview was conducted with the Head of Supply Chain Management at the headquarters offices in Switzerland.

**RadiatorCo (Automotive)**
RadiatorCo is a leading manufacturer of engine cooling radiators, heater cores, condensers, cooling modules, and HVAC systems for motor vehicles. RadiatorCo offers an extensive range of products and supplies to a wide variety of OEM customers, such as passenger car manufacturers, light- and heavy-duty commercial vehicle manufacturers, agricultural machinery, and industrial machinery. The firm was founded in 1966 in Istanbul. Today it has 700 employees and operates in two plants. RadiatorCo is positioned to serve the Turkish automotive industry for both local and export markets. Our interviewee was the purchasing manager of RadiatorCo.

**RetailerCo (Industrial retailing)**
This firm is part of a Dutch holding company that owns approximately 50 firms specialized in trading, transport, retail, oil, financial services, and cash-and-carry wholesale. The annual revenues of the holding firm are US$20 million; headquarters are in the Netherlands. The firm interviewed is part of the cash-and-carry wholesale activities in South America. The business unit is located in Colombia, where one of the senior buyers was interviewed.

**SustEnergyCo (Industrial services)**
This Swiss firm is part of a Japanese holding firm that owns approximately 35 firms specialized in environmental systems, industrial plants, infrastructure, precision machinery, and process equipment. The annual revenues of the holding firm are US$3.5 billion with headquarters in Osaka, Japan. The firm interviewed is part of the Environmental Business Group and is a sustainable energy solutions provider and contractor. Its offices are located in Switzerland, where the Chief Procurement Manager was interviewed.

**TurbinesCo (Electrical equipment)**
This firm is a large multinational conglomerate in the industrial electrical equipment industry (particularly power and energy). It is headquartered in France, has yearly revenues of US$27 billion, is stock-listed, and has a global footprint of more than 70 countries, employing 93,500 persons globally. It has a global central supply chain department, where procurement manages 22,000 suppliers on a global scale. The interview was conducted with one of the firm’s category managers.

**VanCo (Automotive OEM)**
VanCo is a Turkish automotive production firm, which is a joint venture between a large global automotive OEM and Turkey’s largest conglomerate. It started production in 1965. VanCo employs more than 10,000 employees at four plants in Marmara region of Turkey.
and generates a turnover of US$4.9 billion. It is the leading commercial vehicle manufacturer in Turkey and has a total cumulated export worth of more than US$19.8 billion. The interview was conducted with a senior purchasing manager.

WirelessCo (Wholesale)
This is a mid-sized Mexican wholesale firm in the telecommunications and wireless technology industry, which, with only 90 employees, produces annual revenues of US$3 million. It operates its procurement directly from Mexico where it has business relations with approximately 120 suppliers from Europe, the United States, Mexico, and Latin America. The person interviewed is the CEO and Founder.
Approach
Because our research intention is to extend, develop, and build theory (Eisenhardt, 1989) and the focus is on the real-world context in which the phenomena at hand are nested in (Yin, 2009), we opted for an inductive case study research design based on semi-structured interviews. Case study research focuses on understanding the dynamics present within single settings.

Data Collection
For the purpose of confidentiality, we refer to the investigated firm using generic aliases (e.g., AutomotiveCo). Initial contact to the firms was established via email. With the email was an attachment that introduced this study, described the overall aim, and explained the goals and dynamics of the interviews. All interviews were conducted between June 2011 and October 2011. To guide the interview, we developed a semi-structured instrument that consisted of two parts: (1) One part focused on the management of financial distress in suppliers and the consequences in case of disruption, aiming to explore different financial distress cases, their development, their impact on buying firms’ supply chains, and buying firms’ response actions. (2) The second part of the instrument focused on exploring the learned experiences of the buying firms after the financial distress in their suppliers, how these experiences were documented and shared within organizations, and suggestions for converting tacit knowledge to explicit knowledge.

Data Analysis
To analyze the different cases’ similarities and differences, the data generated through the interviews was subject to first-level and pattern coding for first summarizing, examining, and comparing segments of data and later grouping the phenomenon into categories for developing insights (Miles & Huberman, 1994). Later we performed a within-case analysis and, in a second step, cross-case analysis. Within-case analyses aim at improving the familiarity of researcher with each case and tries to generate patterns from cases. Instead of building an external pattern and looking for it in cases, within-case analysis allows generating patterns from cases. In this thesis, within-case analysis is applied by analyzing each case in categories. Investigating the data in categories increases the speed of the second step of data analysis, cross-case analysis. Eisenhardt (1989) discussed several tactics that one can use to do a cross-case analysis. For the purpose of this study, we employ one of them by dividing cases into categories and finding out similarities or differences between categories. After identification of patterns across the categories, propositions are suggested.
For the best rating classes (e.g., Aaa) defaults have not been observed. To obtain a value for the probability of default (PD) for these ratings and to smooth out sampling errors from the historically observed data, a three-step calibration method is usually performed (Bluhm, et al., 2002).

1. For each letter rating class, compute the over-year mean value of the default frequencies and the standard deviation based on the yearly bond default data, such as Moody’s historical corporate default data from 1920 to 2009 (available from Emery & Ou, 2010).
2. Plot the mean value of the default frequencies of each class against the numbered rating classes for instance 1 (Aaa) to 7 (Caa-C). Because there is empirical evidence that default frequencies grow exponentially with decreasing creditworthiness, a logarithmic link is usually chosen to estimate the regression function.
3. Assign a PD using the estimates obtained from the regression analysis in step 2.

Using Moody’s historical default data from 1920 to 2009, we obtained:

\[
\ln(\mu) = 1.12x - 10.05 \quad (R^2 = 0.98)
\]

\[
\ln(\sigma) = 0.92x - 8.57 \quad (R^2 = 0.96)
\]

for the default probabilities and their volatilities (x denotes the rating class with Aaa \(\rightarrow 1\), …, Caa-C \(\rightarrow 7\)). Figure 17 graphs the result.
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