

Supplier Rating as Basis for an Efficient Supplier Risk Management

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“Master of Business Administration”

supervised by
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Affidavit

I, **FRANZ SCHNEEBERGER**, hereby declare

1. that I am the sole author of the present Master's Thesis, "SUPPLIER RATING AS BASIS FOR AN EFFICIENT SUPPLIER RISK MANAGEMENT", 84 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this Master's Thesis as an examination paper in any form in Austria or abroad.

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List of Abbreviations

COSO	Committee of Sponsoring Organizations of the Treadway Commission
AktG	Aktiengesetz
D&B	Dun & Bradstreet
EBIT	Earnings Before Interest and Taxes
eRFX	electronic Request For [X]
eRFI	electronic Request For Information
eRFP	electronic Request For Proposal
eRFQ	electronic Request For Quotation
eRFT	electronic Request For Tender
ERP	Enterprise Resource Planning
et al.	et aliae (and others)
EUR	Euro
EU	European Union
e.g.	exempli gratia
f.	and the following one
ff.	following pages
GmbH & Co. KG	Gesellschaft mit beschränkter Haftung & Compagnie Kommanditgesellschaft
KonTraG	Gesetz zur Kontrolle und Transparenz im Unternehmensbereich
HGB	Handelsgesetzbuch
ISO	International Organization for Standardization
KPI	Key Performance Indicator
K.O.	Knocked Out
MS	Microsoft
mil.	Million
No.	Number
OEM	Original Equipment Manufacturer
p.	Page
ppm	parts per million
pcs.	Pieces
PublG	Publizitätsgesetz
R&D	Research & Development

SRM	Supplier Risk Management
SCRM	Supply Chain Risk Management
T	Thousand
USD	U.S. dollar

Abstract

Due to close integration of partners along the supply chain and also strong dependencies amongst each other, risks can become a serious danger for a company. Purchasing plays a significant role in managing risks since increased commodity prices, supplier defaults and quality problems of the purchased parts often lead to a company meltdown. Every day companies are faced with potential risks like break down of the IT system, strikes, natural disaster or supplier insolvencies. Such risks do not only affect the companies which are directly involved, but also the companies up- or downstream the supply chain.

A pro-active or anticipatory method to manage supplier default risks is to conduct financial supplier audits on a regular basis. Due to the resources involved, the audits have to be focused on those suppliers first who create the most negative financial impact on a company in case they get into financial difficulties.

The work in hand deals with the development of a customized supplier rating method to sort suppliers according their risk and their possible negative financial impact to a company. Based on the sorting result sequence, the financial supplier audits can be conducted. Furthermore a Supplier-Risk-Portfolio can be drawn which visualizes the relationships amongst the suppliers and gives the buyers a better overview of their supplier base. Based on the position in the Supplier-Risk-Portfolio activities can be derived to handle the supplier risks and to influence the supplier base according to the defined risk strategy.

1. Introduction

1.1. Motivation

For a company it is vital to know if its supplier base is “healthy” and able to deliver as scheduled. While in “normal” economic circumstances it is sufficient to keep a trustful relationship between supplier and customer including sporadic financial and/or quality audits, this is not recommended in times of a financial crisis like we are experiencing it nowadays. Especially those who had a poor financial standing already before the crisis, are very much endangered to go bankrupt. According to an Oliver Wyman study (Oliver Wyman 2009), the year 2010 will bring a lot of insolvencies of small and medium companies in the automotive industry as many companies do not manage the insolvency risk systematically by preventive behavior, but only by reacting to already occurred insolvencies.

A pro-active or anticipatory method to manage supplier default risks is to conduct financial supplier audits on a regular basis. Due to the resources involved, the audits have to be focused on those suppliers first who create the most negative impact on a company in case they get into financial difficulties. The aim of this master thesis is to develop a rating method to sort suppliers according their risk and their possible negative impact on a company. In order to figure out meaningful sorting criteria the main research question to be answered in this master thesis is:

Which criteria are needed for a supplier pre-ranking in order to monitor a supply base of more than 10.000 suppliers worldwide efficiently and effectively?

1.2. Methodical Approach

The thesis will start with a literature review in chapter 2 and 3 in order to provide an overview of supplier risk management and supplier rating & classification. Since supplier rating is the major part of this thesis it will be dealt with in more detail. In a survey (chapter 4), the European purchasing directors and department managers of several MAGNA divisions will evaluate a questionnaire for supplier risk management and supplier rating. The results will be incorporated in a customized supplier rating (chapter 5) method to sort suppliers according their risk and their possible negative

impact for a company. In chapter 6 the results from the previous chapters will be summarized and future improvement potentials will be shown.

Figure 1 shows the structure of this master thesis.

1	Introduction
2	Supplier Risk Management
3	Supplier Rating & Classification in Theory
4	Supplier Rating & Classification in Practice
5	Business Case
6	Conclusion

Figure 1: Structure of Master Thesis

2. Supplier Risk Management

Due to close integration of partners along the supply chain and also strong dependencies amongst each other, risks can become a serious danger for a company. Purchasing plays a significant role in managing risks since increased commodity prices, supplier defaults and quality problems of the purchased parts often lead to a company meltdown. In a survey conducted by Aberdeen Group, 80% of 180 Purchasing Managers stated, that they had serious troubles with the supply chain and that these issues caused a negative impact on their turnover, product launch and reputation (Aberdeen Group 2005). Such developments force quick decisions which are often related with even higher uncertainties and risks (Gabath 2010: p. 30). To get a better understanding about risks, the this chapter will take a closer look on this topic and will explain the different types of risks in a supply chain as well as how they can be managed.

Every day companies are faced with potential risks like break down of the IT system, strikes, natural disaster or supplier insolvencies. Such risks do not only affect the companies which are directly involved, but also the companies which are up- or downstream the supply chain (Kajüter 2007: p. 13).

In order to maintain competitiveness, companies nowadays are highly diversified. They offer a great range of different products or variants, leading into higher vulnerability due to higher complexity (Thun & Hoenig 2009, p. 3). Also global sourcing and lean management approaches resulted in increased risks in the supply chain in the last years. Due to less safety stocks and increasing dependencies amongst companies a systematic risk management in the whole supply chain becomes necessary (Kajüter 2007: p. 13f).

Thun & Hoenig (2009) undertook an empirical analysis of supply chain risk management in the German automotive industry which is based on a survey covering 67 manufacturing plants. As Figure 2 displays, the trend towards globalization of supply chains and the necessity to offer many product variants have the highest average values. Hence, factors increasing the complexity of supply chains must be regarded as key drivers for supply chain risks. But also approaches

aiming at building up a lean supply chain such as outsourcing, reduction of suppliers, or a focus on efficiency are drivers of supply chain risks.

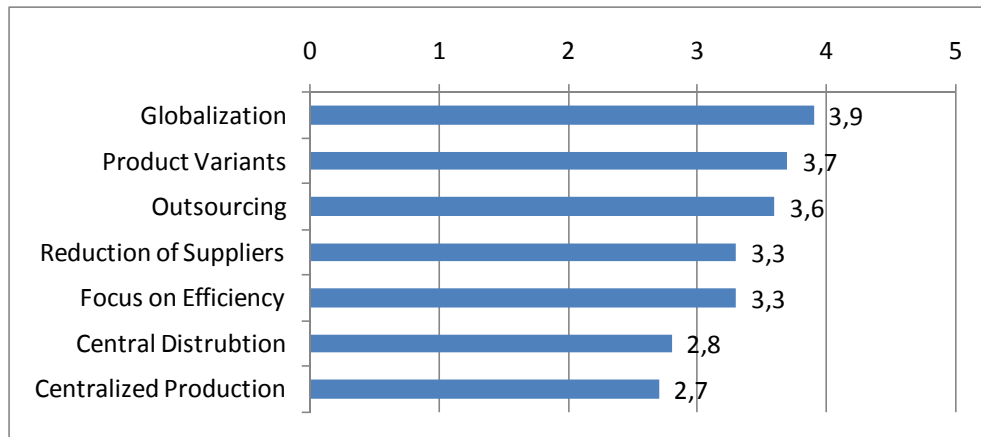


Figure 2: Drivers of Supply Chain Risks (referring to Thun & Hoening 2009: p. 5)

In 1992 the “Committee of Sponsoring Organizations of the Treadway Commission (COSO)” published the so called COSO-Report which became a popular guideline for internal control systems in companies. These control systems structure the internal surveillance of a company in terms of process independent monitoring (= auditing) and process dependent controlling. In Germany the KonTraG (Gesetz zur Kontrolle und Transparenz im Unternehmensbereich) came into force in 1998 (Henke 2009: p. 13). With the implementation of KonTraG on May 1st 1998 the general management task and the due diligence of the Board was emphasized the first time by law for the fields of risk management and monitoring. Therefore the legislature intervened by KonTraG to be included in the Corporate Governance. According to § 91 subparagraph 2 AktG the board is obliged to define measures, in particular to implement a monitoring system which identifies jeopardizing developments for the company.

The above mentioned paragraph requires the following instruments within a company (Jahns 2004):

- Risk Management System
- Internal Monitoring System including Internal Audit Department
- Controlling
- Early Warning System

Whereas risk management for the procurement of raw material is state-of-the art and listed raw parts are hedged against market price fluctuations, the situation of managing other risks in procurement is completely different. Pro active or anticipatory risk management is nearly non-existent, putting companies at risk, when their supplier's go bankrupt. Risk management is seen more as a tool of expensive crisis management, than as an efficient and effective part of a company's strategy (Jahns 2004).

2.1. Risk Definition

The concept of risk is discussed differently in the literature. Most approaches are either cause- or impact-related. Cause-related definitions consider incomplete information as a risk for managerial decisions. The consequences of these managerial decisions and the resulting negative deviations from a target are in the focus of the impact-related approach (Wall 2002: p. 382f). In this context risks can be positive (chances) and negative (danger). But most of the decision makers tend to assign negative aspects to the term risk as an empirical study proved already in 1987 (March & Shapira 1987: p. 1407)

Furthermore, there are so called "pure" risks (e.g. storm damage) which are not a result of business activities. Such a risk is beyond the risk-takers control and therefore a person cannot consciously take on a pure risk. These risks belong to the insurable risks as insurance companies offer to cover such damages, whereas speculative risks, like investments, cannot be insured (Hartmann 2003: p. 7). An overview of risks is depicted in Figure 3.

According to Tang & Nurmaya (2010: p. 2) a definition of a supply chain risk should refer to events with small probability but may occur abruptly and bring substantial negative consequences to the system. They follow the Supply Chain Risk Management (SCRM) definition from Tang (2006): *"the management of supply chain risk through coordination or collaboration among the supply chain partners so as to ensure profitability and continuity"*.

Zsidisin (2003: p. 222) defined a supply risk as *"... the probability of an incident associated with inbound supply from individual supplier failures or the supply market*

occurring, in which its outcomes result in the inability of the purchasing firm to meet customer demand or cause threats to customer life and safety”.

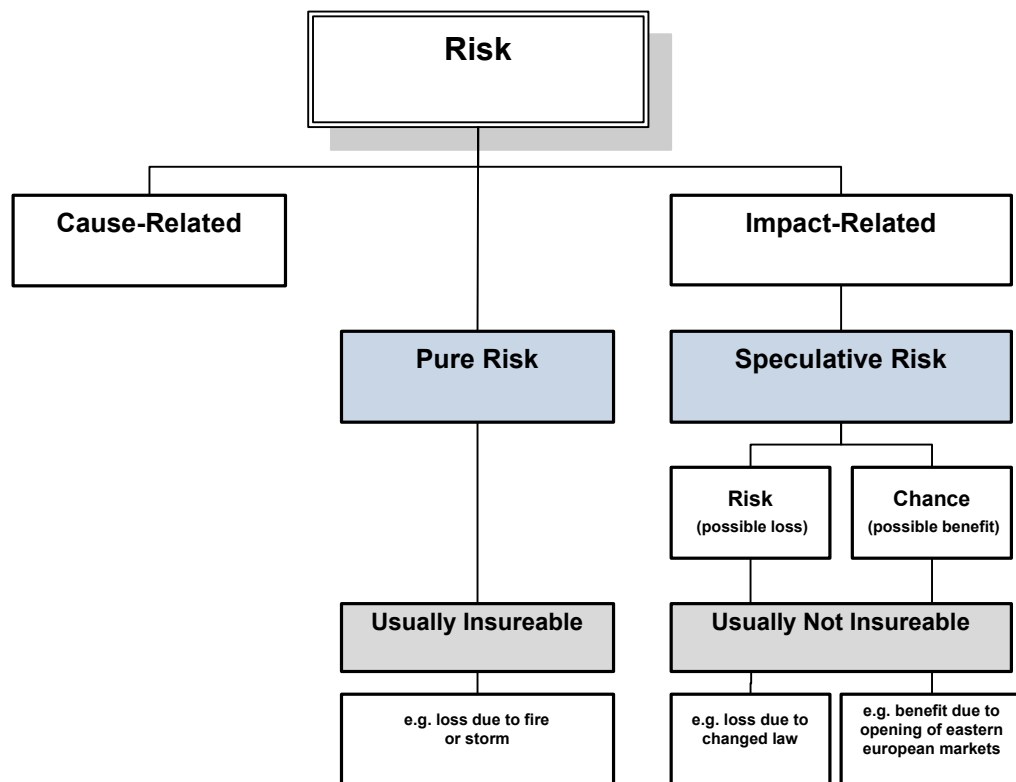


Figure 3: Risks (referring to Seidel 2002: p. 50)

2.1.1. Risk Categories

In order to consider all risks along the supply chain, also other risks beside the company internal risks (e.g. process risks) like supply-, sales- and environmental risks need to be taken into account. Figure 4 shows an abstract of possible risks to be considered, whereas a separation in the following four major sections is visible (Hotwagner 2008: p. 23f):

- Supply Risks
- Company Internal Risks
- Sales Risks
- Environmental Risks

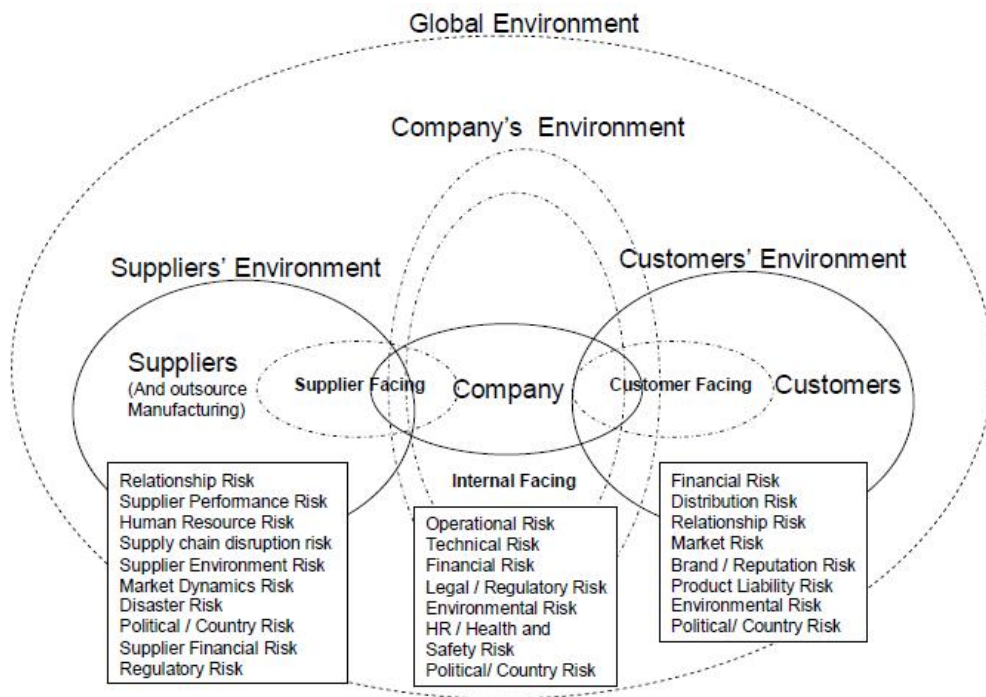


Figure 4: Overview Risk Categories in a Supply Chain (Hotwagner 2008: p. 28)

Supply or procurement risks are related to “upstream” activities in the supply chain. Risks in this area exist in every company, no matter if they are recognized and managed or if they are ignored (Zsidisin & Ellram: 2003: p. 24). Companies are faced with risks related to suppliers like quality problems of delivered parts. Also the financial instability of a supplier can lead to its insolvency and therefore can result in the total loss of a supplier. Technological changes or innovations in terms of product design could overstrain a supplier’s capabilities and therefore lead to disturbances at the supply site (Thun & Hoenig 2009: p. 3).

The still biggest risk in supply management and procurement is the “Everyone can do purchasing” - syndrome which is still very popular. As a consequence, risks are often underestimated and not systematically recorded as well as not appropriately analyzed and assessed. A systematic and structured description of risks is the basis to establish proper measures. A lot of different risks can occur in supply management and procurement. Among others the following risk categories can be distinguished (Henke 2009: p. 84):

- Capacity Risks (e.g. quantity, due date)
- Technology and Technique Risks (e.g. development)

- Quality and Service Risks (e.g. specification)
- Financial Risks (e.g. liquidity, currency)
- Location Risks (e.g. off shoring)
- Management Risks (e.g. breach of trust, fraud)
- Contract Risks (e.g. violation of intellectual property)

A full assignment of risks in these categories is not possible due to the variety of occurring risk.

2.1.2. Risk Management

Risk management means to identify risks, to monitor them and to repel them with suitable measures in case they are dangerous for the company's economic situation (Lück 2000: p. 1473f). Risk management can be seen as a process which is based on a defined risk strategy. The risk strategy describes how to analyze risks and how to deal with them. Furthermore risk management deals with planning and implementation of measures (risk controlling) as well as the communication of risks. To ensure an effective and efficient risk management, these activities need to be part of the planning and controlling process (Kajüter 2007: p. 14f).

Risk management also means to identify chances and to boost their realization. Being up to date is essential and therefore risk management needs to be done periodically. Managing risks only sporadically can be existence-threatening. By implementing a permanent Risk Management System, existing and potential risks can be identified, evaluated and accordingly managed. Figure 5 shows the different process steps of a Risk Management System which will be described in more detail in the following chapters (Rosenkranz & Missler-Behr 2005: p. 40f).

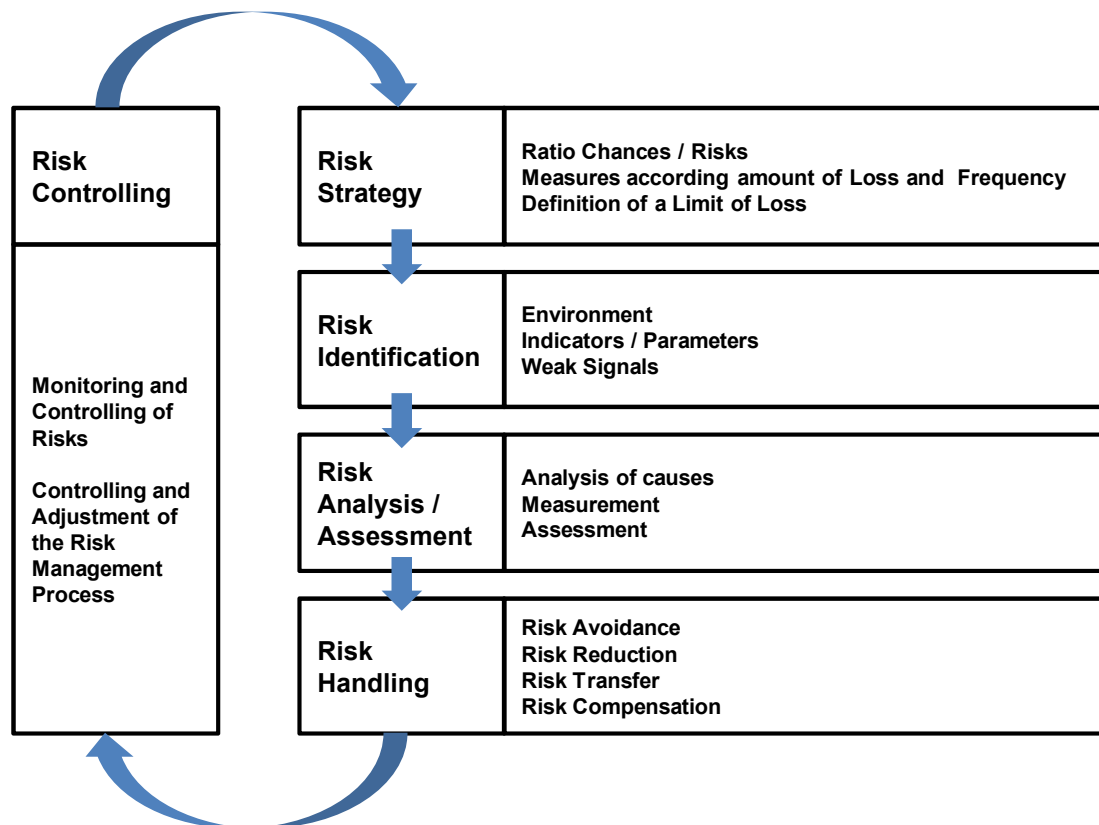


Figure 5: Control Loop of Risk Management (referring to Rosenkranz & Missler-Behr 2005: p. 40)

The ultimate ambition of risk management is to support the corporate management in their efforts to secure the company's continuity and long term competitive advantages and to avoid insolvency. Risk management promotes the conscious and efficient handling of risks in order to avoid situations which are threatening for the company's existence (Kirchner 2002: p. 18).

2.2. Risk Strategy

A risk strategy shall be understood as part of the company's strategy and is concerned with risks and the disposition to risk of the company (Gleißner & Romeike 2005a: p. 35). The formulation and revision of the risk strategy is task of the corporate management and needs to be specified within the scope of the general company strategy (Burger & Buchhart 2002): p. 595). The definition of the risk attitude and the risk philosophy should be done before or at least at the beginning of a risk management process. In this context, a standard for risk handling needs to be developed. A standard defines for example the risk which the company is willing to

take or the limit of loss for individual areas or the whole company (Lück 1998, p. 1926).

Innovative companies which develop new products for new markets need to follow different strategies than companies offering established products in well known markets. If the risk strategy does not match the risks in reality, a company needs to adopt its risk strategy or the risk handling process as well as the control loop of risk management as seen above in Figure 5 (Rosenkranz & Missler-Behr 2005: p. 41).

Some possible fundamentals of a risk strategy could be (Löbl 2008: p. 21):

- **Risk management is task of all employees.**
The know-how of the company needs to be bundled and implemented in a risk management system. All employees should be involved in these activities.
- **Only recognized risks can be controlled.**
Risk identification needs to be done permanently and should therefore be implemented in the workflow.
- **The company is controlling the risks and not the other way around.**
Not all risk are avoidable, sometimes a company needs to take a risk intentionally to realize a chance. Intentionally in this case means, to control the risk.
- **Evidence is necessary.**
Only by good documentation a risk can be monitored permanently and efficiently. Lessons learned for the future can only be generated with documented results, in a positive as well as in a negative sense.

2.3. Risk Identification

Risk identification is both, past and forward oriented and has the task to identify all relevant risks but also the connected chances. The risks are related to entrepreneurial activities and could be risky business, production losses or violations of law which could harm the company (Rosenkranz & Missler-Behr (2005): p. 41f).

Due to a minor fire in the New Mexico plant in March 2000, Philips had to stop the production of micro chips. They communicated a shipment delay of one week to

their main customers. Ericsson did not take this first signal from the supplier seriously enough and had to stop its production some weeks later as well. Also Nokia was hit by the same disruption but the fire's impact on Nokia was completely different. Nokia was very sensitive to changes and reacted immediately. They commandeered all of Philips's spare capacity and re-designed the chip together with Philips. Ericsson waited too long and turned then to other chip makers for parts to maintain production. Without having alternative suppliers available, Ericsson finally lost more than USD400 million. At the end of 2000, Ericsson announced a staggering USD2.34 billion loss in the company's mobile phone division. Within six months after the fire Nokia's year-over-year share of handset market increased from 27 to 30 percent, while Ericsson's share dropped from 12 to 9 percent. (Sheffi 2007: p. 3ff).

Supply risk identification, analysis and assessment are the most important steps in a risk management process because they represent the starting point for the whole procedure. Since all following activities base on this information, the identification of risks can be seen as the most important element in the whole Supply Risk Management System (Gleißner & Romeike 2005b: p. 156ff).



Figure 6: Supply Early Warning System (Jahns et al 2006: p. 197)

As shown in Figure 6, risk identification and risk analysis & assessment build the so called "Supply Early Warning System. The idea behind an early warning system is described hereafter.

Moder (2008: p. 22) refers to Ansoff (1975 and 1976) when he is dealing with the theory of early warning systems for supply risks. Ansoff considers, that developments in companies, including upcoming risks, do not suddenly appear, but arise long time before in form of weak signals. However, weak signals are not clearly defined and therefore not easily to detect for employees in a company. The thoughts behind Ansoff's concept are very easy and become clearer when the three fundamental points behind the generations of early warning systems are explained.

1) First Generation - Key Figures as Basis for Early Warning Systems

Key figures are based on accounting figures or on data of annual financial statements which are highly qualitative, but very late available. For that reason key figures are also called "Late Indicators".

2) Second Generation - Indicators as Basis for Early Warning Systems

The indicator oriented early warning system is not based on solid, mostly financial figures but on a range of information which is connected among each other. Experiences from the past are the basis for the creation of a prognosis. The horizon of an indicator based early warning systems goes beyond the key figures approach since a lot of future analysis can be integrated and therefore this approach is not depending on historical data only.

3) Third Generation - Weak Signals as Basis for Early Warning Systems

The weak signals extend the two above mentioned approaches by an unstructured element. The concept assumes that discontinuity which cannot be identified by indicators happens. A rather undirected search and analysis of information is necessary to identify possible signals of discontinuity. The weak signals approach requires substantial time resources as well as the willingness and capability of the involved employees.

Many risks initially "arise" as weak signals before indicators or key figures can detect them and the risk becomes obvious. The detection of weak signals requires a lot of human employment and is therefore cost intensive. With increasing clarity about risks and their impact, the reaction time and the possibilities to overcome the risks decrease. At the same time the probability of occurrence increases. Figure 7 shows this correlation (Moder 2008: p. 22ff).

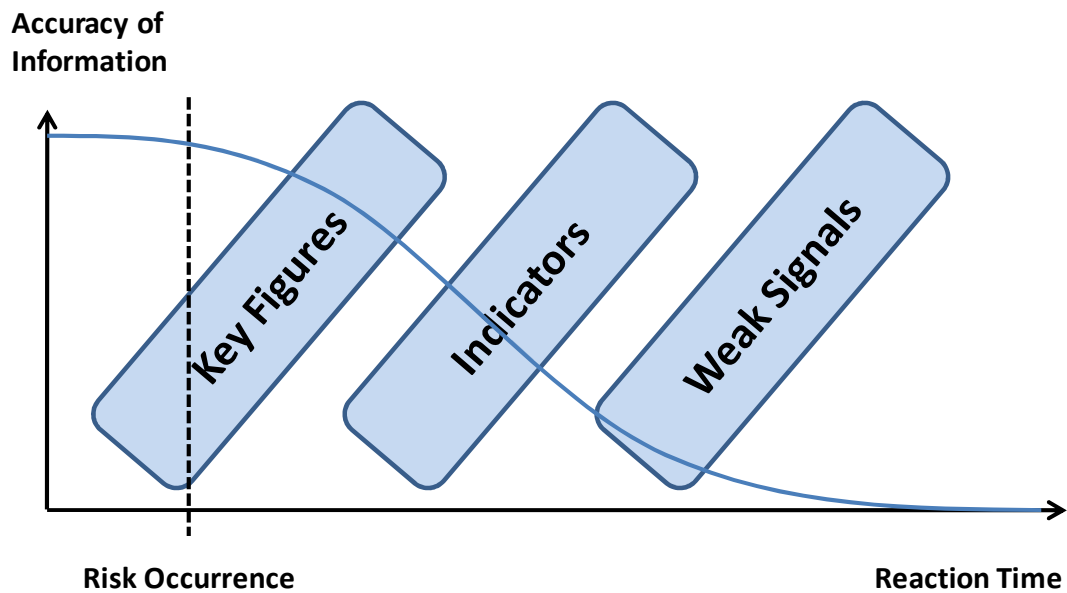


Figure 7: Connection between Accuracy of Information and Reaction Time (referring to Moder 2008: p.24)

2.4. Risk Analysis / Assessment

After careful and full risk identification was done, causal structures and interdependencies of potential risk are made transparent and their impact is quantified (Wolf & Runzenheimer (2009): p. 57). In a first step the question of the root cause of the risk is raised. Thereby it should on the one hand be guaranteed that the real root cause for the identified risk is recognized and not only a symptom. On the other hand, the analysis should make clear which risks can be influenced by the company itself and which risks cannot. This is the first indication for an active or passive handling of risks (Rosenkranz & Missler-Behr 2005: p. 44).

The risk analysis differentiates the risks which were detected during the risk identification, in top priority risks and risks which can be left unattended. To assess these risks two main questions need to be answered (Harland et al. 2003: p. 53):

- How likely (probable) is it that an event will occur?
- What is the significance of the consequences and losses?

After answering these questions the probability and the consequences can be put into a two-dimensional matrix also called risk-portfolio. With such a risk-portfolio the

risks become transparent and can be compared with other risks. Furthermore the matrix gives a standardized strategy how to handle the different risks involved (see Figure 8).

Probability of Occurrence						
Very Likely	Demand for Action					
Likely						
Possible	Perhaps Demand for Action					
Unlikely	No Demand for Action					
Not Possible						
		Insignificant	Minor	Middle	Serious	Existence Threatening
		Effects				

Figure 8: Risk Matrix (referring to Wolf & Runzheimer 2003: p. 67)

2.5. Risk Handling

Risk handling basically deals with adequate treatment of an identified, analyzed and assessed risk. Starting point for risk measures is the importance of the risk class, the level of damage and the frequency of damage respectively the probability of occurrence (Rosenkranz & Missler-Behr 2005: p. 45). The consequences of risks are not easy to handle. Critical incidents may influence others and distort their perception of a company or brand. Nestle for example suffered heavily from the boycott of its products arising from the suspected inappropriate promotion of formula milk as a substitute for breast milk in underdeveloped countries. This boycott officially lasted 10 years but is still being enforced by many individuals to this day (Harland et al. 2003: p. 54)

Based on the knowledge about the relevance of the single risk and the total volume of a threat the demand for action to risk accomplishment can be established. Prior target of risk accomplishment is to reduce the risks for purchasing. As measures for risk handling there are generally four possibilities available (Gabath 2010: p. 41f):

- Risk avoidance (abandonment of risky transactions)
- Risk reduction (reduction of the expected loss of assets by using actions to reduce the probability of occurrence)
- Risk transfer (transfer of the risk to partners, mostly insurance companies)
- Risk compensation (absorption of the risk in the own company)

2.6. Risk Controlling

Risk controlling is an associated process and has two main tasks (Burger & Buchhart 2002: p. 53ff:

- Monitoring and controlling of single risks and
- Controlling and adjustment of the risk management process.

Completing the control loop of risk management, the occurred risk needs to be compared with the defined risk strategy and the maximum lost limit set. On basis of the target-performance comparison, risk controlling needs to identify the potential for optimization and presents recommendations for improvement (Moder 2008: p. 21).

In order to rate a supplier in terms of related risks, the next chapter will deal with supplier rating and classification from a theoretical point of view.

3. Supplier Rating & Classification in Theory

The problem of supplier rating is nothing new. Purchasers were always anxious to find the best suppliers. But the selection of the supplier was generally unsystematic and driven by subjective impressions of the buyer. Unattended were information like the economic, the ecologic or the technical capability of a potential supplier. The developed procedures to quote comparisons were not able to do so and there was no focus on strategic aspects. (Hartmann et al. 2008: p.15)

The reduced vertical range of manufacture, the shortened innovation cycles, the integration of international supply markets and just-in-time delivery moved purchasing, as an interface to the global market, to the center stage of corporate transactions. Purchasing became a strategic important factor in the company strategy. A new partnership-oriented supplier policy is part of this company strategy. To form such a trustful partnership it is essential to know the requirements and the capability of the supplier (Hartmann et al. 2008: p.15).

3.1. Definition of Supplier Rating

Kindermann & Hirschel (2000: p. 123) consider supplier rating as basis for supplier management. According to Simpson et al. (2002, p. 39ff) a proper supplier rating is crucial for the future of a company. The importance of supplier rating is indicated by the fact that the results are the basis for supplier selection, supplier controlling and for managing the supplier relationship (Janker 2008: p. 77).

Hoffmann & Lumbe (2000: p. 92) concluded a benchmarking study with automakers and figured out, that a detailed rating of all important suppliers is "the essential cornerstone" in all evaluated companies. With the trend to market oriented and strategic purchasing the instrument of supplier rating needs to be considered from two points of view (Hartmann et al. 2008: p.17):

1. As rating system to select a supplier. The purpose is to enable a selection of suppliers with consideration of their past but also their future capabilities.
2. As rating system to monitor a supplier. Purpose is to monitor the deliveries during a certain period of time and to detect changes at an early stage.

Supplier rating is a decision guidance for the supplier selection process. For one thing suppliers can be compared with each other, for another thing the progress of a supplier can be monitored (Harting 1994: p. 10). Supplier rating is not a snapshot but much more a permanent process of measuring and improving the quality. Thus improvement potentials can be identified and visualized (Orths 2009: p. 45).

Disselkamp & Schüller (2004: p. 16) consider supplier rating as objective assessment and classification which includes a grading at the end. It is a steady, structured, transparent and detailed analysis of potential and existing suppliers in terms of achievement potential and capabilities according to predefined rating criteria. Not only in the ISO 9000:2000, but already in the ISO 9004, a systematic supplier rating was compulsory. Hence all companies certified according to ISO 9001-9003 must have a supplier rating system in place. ISO does not give a recommendation how it should be done but the adherence of the quality requirements and other defined criteria in terms of delivery performance should be checked by regular audits or other rating instruments (Orths 1998: p. 566).

The result of a supplier rating is a ranking of potential suppliers which fits best to the objective target of the evaluator. Hence it is a priority list of suppliers (Harting 1994: p. 10). Interested in a supplier rating are generally all business areas which are in direct contact with suppliers: the management, the responsible buyer and the end user (quality assurance, production). Production has a huge interest in careful supplier ratings and selections since they are mostly affected by delivery problems (Dreyer 2000: p. 4).

By careful supplier rating only the best suppliers are integrated in a fair and partner like cooperation which leads to a reduced supply risk (e.g. delivery problems in terms of quantity or quality) as well as reduced quantity of suppliers (Janker 2008: p. 78). A comprehensive supplier rating is not only an advantage for the customer. Also the supplier benefits since he gains information about his capabilities and weaknesses compared to his competitors (Harting 1994: p. 63). In case a supplier gets an award due to his good rating results, he can use this for marketing purposes by showing his other customers reference projects and solutions which is a unique selling point especially in project orientated industries (Wagner 2001: p. 249).

The implementation of a systematic supplier rating does not only create benefits but also costs for a company. Benefits and costs should always be considered in relation to each other. The effort for data collection and system handling always needs to be in a reasonable relation to the advantage (Knapp et al. 2000: p. 44).

3.1.1. Target of Supplier Rating

The main target of each supplier rating is to have transparency of the past, of today's and of the future performance of a supplier. This is done by collection, selection, preparation and evaluation of available supplier information (Knapp et al. 2000: p. 42 and Eschenbach 1990, p. 175).

Hartman et al. (2008: p.20) consider cost reduction and securing of supply as targets of supplier rating. It helps to reduce the supply risks (e.g. delivery problems in terms of quantity or quality), the caused part shortage and storage costs as well as the inspection effort for both, the ware income and the quality inspection effort. Within the process of the supplier rating the weaknesses of the suppliers become transparent and can be removed or at least improved within the frame of supplier development actions. The main focus is on production and quality and leads at the end to an improved competitiveness of both, supplier and customer.

The targets of the supplier rating can be summarized as follows:

- Objective and best possible supplier selection
- Govern the supplier relationship
- Maintenance and development of supplier relationship
- Continuous improvement of supplier quality
- Optimization of existing supplier portfolio in terms of qualified suppliers
- Creating awareness of the problems (weaknesses) of the supplier
- Maintenance and strengthening of own competitiveness

Arnold (1997: p. 176f) considers the targets of supplier rating according to the purchasing situation. Depending on the novelty level of the part and the awareness of the supplier there are four possible different situations:

- Experienced procurement (product and supplier is well known)
- Change of supplier (product is known, supplier is new)
- Product range enlargement (product is new, supplier is known)

- New product launch (product and supplier is new)

Muschinski (1998a: p. 82) considers the following targets:

- Selection of the best supplier as well as the continuous improvement of the supplier structure and quantity
- Controlling of the supplier performance through permanent monitoring of the delivery performance
- Maintenance and developing of the supplier relationship to keep respectively increase the supplier performance
- Creation of objective and transparent decision processes
- Maintenance and strengthening of the competitiveness of the customer
- Securing the supply

Supplier rating shall be seen as instrument for protection respectively increasing of corporate earnings. The supplier rating helps to identify unqualified suppliers which need to be dismissed. Besides, it also helps to improve the supplier's performance by communicating the result of the supplier and his competitors with the aim that the supplier wants to improve his "ranking" (Harting 1994: p. 63). According to an empirical study undertaken at German industrial companies (see Figure 9), 75% see quality assurance as the most important target of supplier rating. Second with 52% are reliable suppliers and third with 38% are low prices (Janker 2008: p. 163).

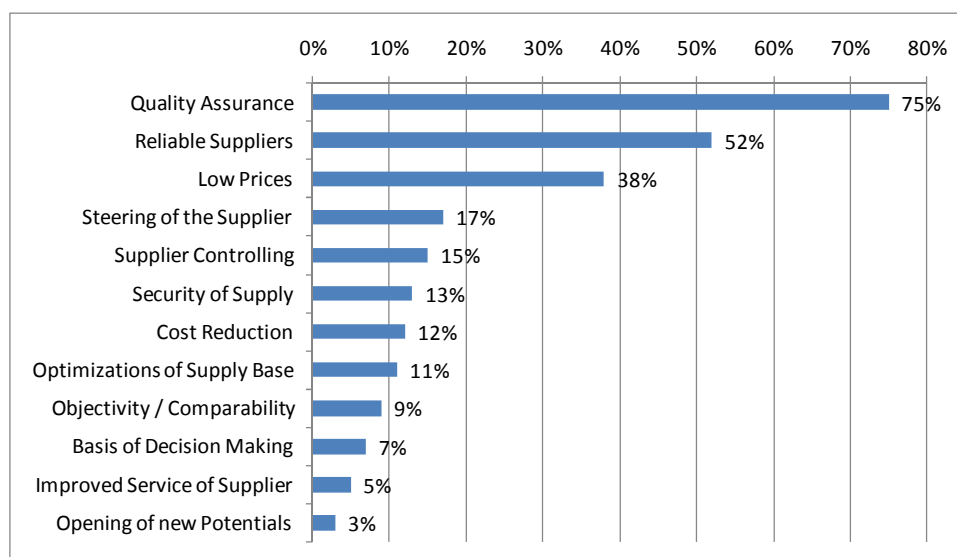


Figure 9: Target of Supplier Rating (referring to Janker 2008: p. 163)

A very good interaction between customer and supplier can lead to improvements and cost reductions in the whole supply chain (Harting 1994: p. 63). The targets for the supplier rating need to be generated from the procurement targets and they again need to follow the superior company aims. In case a company wants to become “best in class” as far as quality is concerned, quality assurance needs to be the highest target (Janker 2008: p. 80)

3.1.2. Requirements to the Supplier Rating

Dreyer (2000: p. 95) considers transparency, replicability and predictability as requirements of a supplier rating. An operationalisation of these requirements can be reached by standardization, acceptance, feasibility, objectivity, reliability and validity of the supplier rating method. The rating criteria must be supplier independent and should be known and accepted by the suppliers. Furthermore the results must be verifiable and the rating should be done by professional staff. Only when this is given suppliers are willing to change in case they received a bad rating result (Muschinski 1998a: p. 122).

Janker (2008: p. 84) differs between quantitative and qualitative characteristics which need to be considered in a rating system. Hence a rating should not only focus on quantitative characteristics like the price but also on qualitative ones like quality or flexibility. For the success of a supplier rating result a holistic rating system is of great significance (Huck & Köpke 1996: p 1171). The effort of administrating a rating system should be as low as possible. Some quantitative criteria like adherence to schedules or quality figures (ppm-rates = parts per million) can be provided from an ERP system. If a balanced cost-benefit ratio is not feasible, the rating criteria should be reduced to an adequate level. This applies especially to suppliers which deliver parts of secondary importance (Janker 2008: p. 84).

Based on the rating results a classification of the suppliers should be possible. This categorization should show on the one hand the performance of the supplier and on the other hand it should be an incentive for the supplier to increase his performance. In addition supplier strategies (e.g. to prefer a supplier for future business, to keep a supplier on the same level or to reduce business with supplier) can be derived from the classification result (Janker 2008: p. 85)

3.1.3. Benefit of Supplier Rating

The benefit of a procurement program which considers the results of a supplier rating is hardly to quantify. But there can be significant advantages for the buyer and the seller which finally strengthen the competitiveness of both (Hartmann et al. 2008: p. 25f.). Furthermore the results of each supplier rating are the basis for a professional supplier development. Every rating result must be connected with consequences for the supplier which could be an improvement of the production processes, training for the staff or some other improvements to fulfill the requirements of the customer. Consequences could also occur in a positive way e.g. the supplier receives an award for outstanding performance or the supplier becomes a preferred supplier for future business. Table 1 lists some advantages for customers and suppliers (Hartmann 2010: p. 58).

Benefit for Customer	Benefit for Supplier
Reduction of Storage Reduction of Safety Stock	Cost Reduction due to Failure Prevention
Streamlining / Reduction of Ware Income Inspection	Increasing of Order Volume (due to Supplier Reduction)
Direct Delivery of Parts to Production	Securing of Sales Volume due to Long Term Agreements
Reduction of Suppliers	Cost Reduction due to Long Term Personal- and Production Planning
Reduction of Logistical Effort	Improved Procurement Planning due to Long Term Contracts
Reduction of Risks	Know How Exchange

Table 1: Benefit of Supplier Rating (referring to Hartmann 2008: p. 25f)

3.2. Supplier Rating Criteria

The criteria used for supplier rating serve to show the characteristics and the performance of a supplier. They are the basis for supplier selection or supplier monitoring decisions (Wildemann 1998: p. 133ff). Therefore a comprehensive evaluation of the supplier performance depends on the definition of the rating criteria (Janker 2008: p. 86). Single criteria comparisons can be used for single cases where time and costs are limited and a quick decision is needed. For complex cases a multiple criteria comparison and a supplier profile needs to be defined to rate the

capability of the competing suppliers (Janker 2008: p. 86). Hartman (2008: p. 34) refers to a survey of Muschinski (1998b: p. 50) in which more than 800 German companies identified five to six main criteria like quality, price or delivery reliability as practice-oriented. Nevertheless it must be mentioned, that there is free choice for the composition of the criteria. An overview of the different criteria possible is shown in Table 2.

Janker (2008: p. 95f) developed a criteria catalog based on Glantschnig (1994: p. 54 ff) which includes the essential capability range a supplier should cover. The catalog is divided into main and sub criteria which allow to rate a supplier with a less number of criteria (only main) without losing the overall character of the rating. The following overview contains only the most important criteria. It is always the responsibility of each company to identify the most adequate criteria for their needs themselves.

Quantity Performance	Service Performance
Minimum Quantity Delivered	Product Warranty
Quantity Flexibility	Goodwill Manner
Big Lot Size	Customer Service
Consistency of Quantity	
Quality Performance	Information & Communication Performance
Product Quality	Cooperation Willingness
Experience of Supplier	Communication Willingness
Qualification of Employees	Know-How Transfer
Technology Level	Application Consulting
Certificates	Internet Technologies
Consistency of Performance	www-Presence
Assignment Variability	Data Security
Competitors of Supplier	
Quality Policy	
Logistic Performance	Innovation Performance
Time Performance	Technological Competence
Short Delivery Time	Development Capability
Measures to Reduce Throughput Time	R&D-Capacity
Deadline Reliability	
Deadline Flexibility	
Location Performance	Payment Performance
Distance to Customer	Price Quoted
Warehouse Accessibility	Arrangement of Terms
Transport Connection	Payment Target
Point of Delivery Flexibility	Cost Analysis
Delivery Performance	Cost Reduction Activities
Delivery Reliability	
Exclusive Delivery	Environmental Performance
Processing Conform Delivery	Environmental Compatibleness
Packaging and Transport Protection	Recycling Willingness

Table 2: Main and Sub Criteria (referring to Janker 2009: p. 96)

For every main criterion the same number of sub-criteria should be defined in order to impact equally the rating (five sub-criteria = 1/5 of weight, six sub-criteria = 1/6 of weight in the rating). Furthermore it can be useful to cover risks like supply or insolvency / financial risks isolated from the supplier rating (Hartmann et al. 2008: p. 34f).

Observing practice and also well-established literature there are only few companies or service provider (Science, Consultant) which use an active and professional supplier rating with clear defined criteria (Disselkamp & Schüller 2004: p. 65).

3.3. Supplier Rating Instruments

To inquire the information for the criteria mentioned in the previous chapter, different instruments can be used. Dryer (2000: p. 116f) refers to Wildemann (1997: p. 314f) when he is mentioning the following instruments:

- Ware Income Inspection
- Certificates
- Quality Awards
- Auditing
- Concept Contest
- Benchmarking
- Balance Sheet Analysis
- Supplier Talks and Survey
- Value Analyses
- Supplier Days

According to the size and the industry of a company as well as the qualification of the responsible buyer the instruments used differ in their complexity. Disselkamp & Schüller (2004: p. 40) differentiate in the following three categories:

- Simple instruments like interviews or company visit
- Classical instruments like ABC or Portfolio analysis
- Modern instruments like Balanced Score Card or Rating Matrix

The extent depends on the status of the supplier. For a potential new supplier the work starts from scratch and contains the collection of information to create a picture of the current capability of the supplier. For an existing supplier an update of the information and an analysis of the experience with this supplier in the past needs to be done (Büsch 2007: p. 65).

3.4. Supplier Rating Methods

After identifying the rating criteria and gathering the information accordingly by using rating instruments, the information needs to be analyzed. The most common methods from literature will be described in this chapter.

Glantschnig (1994: p. 23) distinguishes between quantitative and qualitative methods. A clear assignment to one of the both methods is not always possible since some methods contain quantitative as well as qualitative aspects. In such a border case the decision depends whether the core of the method is more quantitative or qualitative.

3.4.1. Quantitative Methods

Quantitative methods work with metric information which can be linked using an equation system. The advantage of this method is that it results in an “optimal” solution. On the other hand qualitative methods cover also general influencing variables or subjective estimations and opinions. (Adam 1996: p. 81f).

1) Balance Sheet Analysis

The task of a balance sheet analysis is to identify a trend for future chances and risk potentials using available business performance figures from the past. Experience shows, that it is not enough to analyze a balance sheet once (Janker 2008: p. 113). Only a multi-periodic comparison of balance sheets can give rough indications about a company. It can cover profitability, liquidity, cost structure and development of turnover (Koppelman 2004: p. 260). It is useful to get information about the operative-strategic supplier performance as well as to identify - as early as possible - risks in particular insolvency risks of a supplier (Hartmann 2007: p. 111). A balance

sheet analysis is especially recommended for suppliers, when a long term relation is aimed (Janker 2008: 113).

Since a balance sheet analyses is focusing on financial figures, it is only reasonable for one part of the supplier's performance. For a comprehensive rating additional information like delivered quality or delivery reliability is necessary. Therefore a supplier selection decision based on a balance sheet analyses only is not useful (Glantschnig 1994: p. 25).

Table 3 shows exemplary parameters for different questions which can be relevant for different situations. All factors base on data from an annual financial statement or a company report and can only answer questions which are somehow related to financial figures (Harting 1994: p. 59):

Question of Purchasing	Situation in Annual Financial Statement and Annual Report	Analysis Instruments, Key Figure
Is the supplier a solid partner? Is the supplier capable to follow our growth?	- Liquidity - Creditworthiness - Financial Standing - Capital Structure - Investments - Provision for the Future - Growth Prospection	- Liquidity Ratio - Working Capital - Cash Flow - Equity Ratio - Growth of Investments - Orders on Hand - Ownership Structure
How good or bad are the earnings of the supplier?	- Result Formation - Result Usage - Profitability Ratio	- Result Splitting - Operating Income - Financial Income - Investments - Stocks - Financial Transactions - Balance Sheet Measures - Reserve Assets - Balance Sheet Profit
How is the negotiation power of the customer?	- Turnover - Result - Prepayments - Orders on Hand	- Own Orders - Prepayments - Result Splitting

Table 3: Questions for a Balance Sheet Analyses (referring to Harting 1994: p. 59)

Referring to Disselkamp & Schüller (2004, p. 178) the following four criteria can be used for a financial supplier rating:

- Financial position
- Profit situation

- Financial standing
- Liquidity

These four criteria are divided into sub-criteria which are listed in Table 4:

Criteria	Sub-Criteria
1) Financial Position	- Cash Flow - Payable Duration - Dynamic Operating Result
2) Profit Situation	- EBIT - Annual Surplus - Operating Profit Margin - Return on Equity - Return on Assets - Interest Coverage Ratio - Rental Coverage Ratio
3) Financial Standing	- Equity Ratio - Asset Coverage Ratio - Stock Ratio - Duration of Storage
4) Liquidity	- Current Ratio - Capital Lockup

Table 4: Financial Rating Criteria (referring to Disselkamp & Schüller 2004: p. 178)

The collection of the data is only possible by communicating openly with the supplier and / or by using other sources than an annual financial statement. The annual financial statement with its legally defined content enables a detailed analysis of the economic and financial status of a company. According to the code of commercial law corporate enterprises (§ 242 HGB) and some business partnerships (e.g. GmbH & Co. KG according to § 1 PubLG) certain types of companies are obliged to issue an annual financial statement and to publish it in the commercial register (§ 325 HGB) for all interested parties (Disselkamp & Schüller 2004: p. 178ff). As not every company is obliged to do so, the field of applying a balance sheet analysis is limited. (Harting 1994: p. 58)

2) Price and Cost Decision Analysis

The price decision analysis distinguishes three methods: price structure analysis, price monitoring and price comparison (within the frame of quote comparison). They refer to the examination object, the examination target and the main field of

application. The following table shows, how the three methods differ (Arnolds et al. 2010: p. 70f):

	Price Structure Analysis	Price Monitoring	Price Comparison
Examination Object	Price composition consisting of elements of cost and earnings	Change of a product price in a certain time	Prices of different suppliers respectively different qualities
Examination Target	Review of suitability of a price as basis for price negotiations	Prognosis of the future price development as basis for disposition of parts and contract policy	Selection of product quality and supplier (within the scope of a quote comparison)
Main Field of Application	Products where the buyer can influence the price	Products which show a high price variability	Products which can be sourced for different prices and different quality from different suppliers

Table 5: Price Decision Method's (Arnolds et al. 2010: p.71)

Within the cost decision analysis each single cost element of a supplier, as well as the consequential costs, are reviewed. Generally, the cheapest quote is used as target, and the others as auxiliary, function (Koppelman 2004: p. 262).

3) Optimization Method and Key Figures Method

Out of a defined criteria pool, the most important criteria is selected. This could be the shortest delivery time, the best price or any other criteria. All other criteria are auxiliary conditions where minimum and/or maximum requirements are defined. Firstly the suppliers are checked by using a K.O. screening, if they fulfill the auxiliary conditions. After that, all positively rated suppliers are ranked according to the before defined most important criteria. Since the decision is based mainly on one criterion only, this method does not always lead to the best result (Janker 2008: p.108).

The aim of all key figure methods is to show at a glance and in a compact way an objective rating of the defined main indicators. This could be for example a logistic key figure or a quality key figure. (Hartmann et al. 2008: p. 66). Beyond that, key

figures have to fulfill within the scope of a supplier rating the following different functions (Janker 2008: p. 109):

- **Control function**
By comparing the actual and the targeted performance of the supplier, deviations can be recognized and counter-measures taken.
- **Incentive function**
Within the scope of objective arrangement key figures motivate the employees.
- **Control function**
Key figures control and coordinate the operational and strategic decision making.

3.4.2. Qualitative Methods

Qualitative methods are common for strategic planning activities and to go through general line of thoughts. They enable by arguing to develop useful statements about behavior (Adam 1996: p. 82).

1) Numerical Method

Numerical methods work with numbers, but they are only a result of subjective evaluation (Koppelman 2004: p. 264). They include the grade system, score method, matrix approach and the value benefit analysis which are explained in the following.

a) Grade Systems

Due to their transparency and easiness, rating methods based on grades are well established. The explanation effort in the implementation phase is low since every user and supplier knows that grade “1” is very good. (Hartmann et al. 2008: p. 56f). Grade systems go without individual weighting of the criteria and occur in different versions. The used criteria are usually not quantifiable. The most common are (Janker 2008: p. 116f):

- **Three-Grade-System**
This simple system is using grades like in school: good = 1, average = 2, poor = 3

- **Qualified Grade System**

To enable a more detailed rating of the supplier the grades are additionally staged: good = 1 - 3, average = 4 - 6, poor = 7 - 9

b) Score Method

Reacting to the deficit of the grade system of a shortcoming weighting possibility of the criteria, in practice mostly score methods are in use. The major methodical difference to grade systems is that the criteria are weighted and that a defined maximum of scores is the best grade to reach. Furthermore the scaling can be chosen randomly (Hartmann et al. 2008: p. 61).

Firstly the criteria are weighted according to their importance. Afterwards the suppliers are rated with regard to their degree of fulfillment whereas the best rating correlates with the highest score. The so called Scoring-Index is determined by adding the result of weighting factor times rating number. The supplier with the highest Scoring-Index is the best supplier (Janker 2008: p. 120).

The criteria weighting is not easy, especially with a higher number of criteria. Therefore the weighting should be a method-supported procedure like the method of singular comparison (Large 2009: p. 184). Thereby all criteria are compared with a before defined criterion and consequential the weight of each criterion is determined. Usually the most important criterion for a company is used as reference. Another method is the pair-wise comparison where always two criteria are compared with each other and out of this comparison the weighted values are calculated (Sarkis & Talluri 2002: p. 19).

In the example of a score method, shown in Table 6, the main and the sub-criteria are both weighted separately. The 0,550 from the main criteria one results from adding the weighted values of the sub-criteria and then multiplying the sum with the weight of the main criteria. Following the calculation:

Weighted sub-criteria = $(25\% \times 10) + (25\% \times 10) + (25\% \times 10) + (25\% \times 14) = 11$

Weighted main criterion = $5\% \times 11 = 0,550$

The total weighted value of 11,935 is the sum of all weighted main criteria:

Total = $0,550 + 3,200 + 2,300 + 1,538 + 1,390 + 1,350 + 1,125 + 0,200 = 11,653$

Main Criteria	Weight	Supplier 1		Supplier 2	
Sub-Criteria		Scores	Weighted Scores	Scores	Weighted Scores
1. Quantity Performance	5%				
Minimum Quantity Delivered	25%	10	2,50	11	2,75
Quantity Flexibility	25%	10	2,50	11	2,75
Consistency of Quantity	25%	10	2,50	11	2,75
Big Lot Size	25%	14	3,50	6	1,50
Weighted Scores	100%		11,00		9,75
Total Weighted Scores			0,550		0,488
2. Quality	25%				
Experience of Supplier	30%	12	3,60	14	4,20
Consistency of Performance	30%	14	4,20	8	2,40
Product Quality	30%	13	3,90	11	3,30
Qualification of Employees	10%	11	1,10	15	1,50
Weighted Scores	100%		12,80		11,40
Total Weighted Scores			3,200		2,850
3. Logistic Performance	20%				
Delivery Reliability	15%	13	1,95	6	0,90
Deadline Flexibility	15%	14	2,10	11	1,65
Point of Delivery Flexibility	20%	9	1,80	9	1,80
Deadline Reliability	20%	15	3,00	11	2,20
Short Delivery Time	5%	14	0,70	11	0,55
Distance to Customer	10%	9	0,90	5	0,50
Packaging	15%	7	1,05	13	1,95
Weighted Scores	100%		11,50		9,55
Total Weighted Scores			2,300		1,910
4. Payment Performance	15%				
Price Quoted	40%	8	3,20	11	4,40
Arrangement of Terms	30%	14	4,20	13	3,90
Payment Target	15%	9	1,35	5	0,75
Cost Reduction Activities	15%	10	1,50	6	0,90
Weighted Scores	100%		10,25		9,95
Total Weighted Scores			1,538		1,493
5. Service Performance	10%				
Product Warranty	30%	14	4,20	10	3,00
After Sales Service	20%	14	2,80	7	1,40
Goodwill Manner	20%	12	2,40	8	1,60
Customer Service	30%	15	4,50	8	2,40
Weighted Scores	100%		13,90		8,40
Total Weighted Scores			1,390		0,840
6. Information Performance	10%				
Communication Willingness	70%	15	10,50	11	7,70
Know-How Transfer	30%	10	3,00	11	3,30
Weighted Scores	100%		13,50		11,00
Total Weighted Scores			1,350		1,100
7. Innovation Performance	10%				
Technological Competence	50%	10	5,00	13	6,50
Development Capability	25%	13	3,25	14	3,50
R&D-Capacity	25%	12	3,00	15	3,75
Weighted Scores	100%		11,25		13,75
Total Weighted Scores			1,125		1,375
8. Environmental Performance	5%				
Environmental Compatibleness	60%	4	2,40	15	9,00
Recycling Willingness	40%	4	1,60	14	5,60
Weighted Scores	100%		4,00		14,60
Total Weighted Scores			0,200		0,730
TOTAL	100%		11,653		10,785

Table 6: Scoring Method (referring to Janker 2009: p. 121)

c) Matrix Approach

The matrix approach (see Table 7) is similar to the scoring method. In contrast several decision makers from different departments are included in order to reduce subjective influences. A material team is formed including people from production, engineering, quality assurance and purchasing (Glantschnig 1994: p. 46f).

Evaluation Factors	Max. Scores (Weighted Total)	Supplier 1	Supplier 2
1. Proposal Responsiveness			
A. Problem Understanding	5	3	2
B. Terms & Conditions	5	4	4
C. Timelines	5	5	1
D. Weighted Total	(15)	$12 \times 100 / 15 = 80$	$7 \times 100 / 15 = 46$
2. Technical			
A. Design Approach	10	8	9
B. Related Experience	5	4	3
C. Production Risk	5	5	2
D. ST/STD Approach	5	4	2
E. Weighted Total	(25)	$21 \times 100 / 25 = 84$	$16 \times 100 / 25 = 64$
3. Quality / Reliability			
A. MIL: Experience	5	5	5
B. Performance History	10	-	8
C. Data	3	2	1
D. Survey Score	7	6	7
E. Weighted Total	(25)	$13 \times 100 / 25 = 52$	$21 \times 100 / 25 = 84$
4. Cost			
A. Development	3	2	0
B. Qualification	2	2	2
C. ST/STE	3	3	2
D. Recurring Eng.	2	1	1
E. LAT/IAT	4	4	3
F. Unit Price	7	6	4
G. Price Curve	4	3	3
H. Weighted Total	(25)	$21 \times 100 / 25 = 84$	$15 \times 100 / 25 = 60$
5. General			
A. Past Delivery History	4	3	2
B. Mgt. Organization	1	1	1
C. Personnel Qualifications	2	2	2
D. Facilities	2	2	2
E. Payment Provisions	1	1	1
F. Weighted Total	(10)	$9 \times 100 / 10 = 90$	$8 \times 100 / 10 = 80$
6. Summary			
A. Proposal Responsiveness	2	$2 \times 80 = 160$	$2 \times 46 = 92$
B. Technical	3	$3 \times 84 = 252$	$3 \times 64 = 192$
C. Quality / Reliability	5	$5 \times 52 = 260$	$5 \times 84 = 420$
D. Cost	4	$4 \times 84 = 336$	$4 \times 60 = 240$
E. General	1	$1 \times 90 = 90$	$1 \times 80 = 80$
F. Weighted Total	(15)	$\Sigma 1098$	$\Sigma 1024$
G. Composite Score		$1098 / 15 = 73,2$	$1024 / 15 = 68$
Judgement Points			
A. Small/Minority Business	0 - 4	-	4
B.	0 - 3	-	-
TOTAL		73,2	72,0

Table 7: Matrix Approach (referring to Gregory 1986, p. 26)

Referring to Gregory (1986: p. 25ff) the approach is described as following:

- Definition of five main criteria and definition of sub-criteria to each main criterion. After that the sub-criteria are weighted (= maximum score for rating) and the weight is summarized to the weighted total.
- The real scores of the sub-criteria are summarized and then divided by the total weight of the main criteria.
- In a subsequent step the results of the main criteria are weighted again to consider different requirements like production or cost oriented targets.
- At the end there are so called "Judgment Points" which are added or subtracted from the total result.

d) Value Benefit Analyses

The value benefit analysis is a method for a systematic decision preparation in case of complex alternatives. Therefore it is also useful for a complex supplier rating process (Harting 1994: p. 23).

Referring to Dennstedt (1978: p. 77ff) Janker (2008: p. 125f) structured the value benefit analyses in the following steps:

- Define decision criteria
- Weight criteria
- Gather actual value from supplier and compare with target value
- Transform single values to uniform dimensions (target value matrix)
- Multiply target value with weight to part-value-benefit and add all part values
- The supplier with the highest value is the optimal one and should be chosen

Table 8 shows an example for a value benefit analysis.

Decision Criteria	Rating based on	Weight [%]	Specified Value	Actual Value		Transformation Formula	Target Value		Weighted Target Value	
				Suppl. 1	Suppl. 2		Suppl. 1	Suppl. 2	Suppl. 1	Suppl. 2
a	b	c	d	e		f = f(d,e)	g = f(f)		h = c x g	
Capacity of the Supplier	Capacity Class CapC	5		2	1	0,2 x CapC	0,4	0,2	2	1
Quantity Reliability	Delivered Quantity	10	5%	10%	1%	2 - (act/spec)	0,0	1,8	0,0	18,0
Low Minimum Delivery Quantity	Share of deliveries where an min. delivery qty. exists	5	60%	10%	50%	2 - (act/spec)	1,8	1,2	9,2	5,8
Quality Level	Quality Class QC	10		1	2	0,2 x QC	0,2	0,4	2,0	4,0
Product Quality	Complaint Rate	10	3%	0,20%	0,60%	2 - (act/spec)	1,9	1,8	19,3	18,0
Short Delivery Time	Delivery Time	10	4 days	3 days	5 days	2 - (act/spec)	1,3	0,8	12,5	7,5
Delivery Reliability	Delivery Time	10	2 days	1 day	2 days	2 - (act/spec)	1,5	1,0	15,0	10,0
Material Costs	Material Costs per Unit	4	3	3	2,5	2 - (act/spec)	1,0	1,2	4,0	4,7
Procurement Costs	Procurement Costs per Unit	3	2	2,5	1,5	2 - (act/spec)	0,8	1,3	2,3	3,8
Storage Costs	Storage Costs per Unit	3	1	0,3	3	2 - (act/spec)	1,7	0,0	5,1	0,0
Shortfall Costs	Shortfall Costs per Unit	6	0,03	0,06	0,01	2 - (act/spec)	0,0	1,7	0,0	10,0
Price Constancy	Price Development	4	6%	5%	6%	2 - (act/spec)	1,2	1,0	4,7	4,0
Technical Know How	Know How Class KHC	20		3	1	0,2 x KHC	0,6	0,2	12,0	4,0
TOTAL									88,0	90,8

Table 8: Value Benefit Analysis (referring to Janker 2008: p. 127)

2) Verbal Method

Verbal methods like checklists or portfolio analysis work with a description of a supplier.

a) Checklist Method

When using the checklist method all relevant criteria are listed by using “yes” or “no” questions. The rating criteria are distinguished in K.O. criteria and remissible characteristics. The supplier who is fulfilling all K.O. criteria and who possesses the most remissible characteristics will be chosen. Checklists are the basis for profile analysis and the numerical method (Janker 2008: p128).

b) Portfolio Analyses

Deriving from the finance theory, the portfolio analysis is also used in different forms for supplier ratings. The aim of a portfolio analysis is, on the one hand, to gather risks of the procurement market, and on the other hand, the disclosure of strategic market chances. Depending on the market environment and the company situation, strategies should be developed and corresponding actions should be initiated (Janker 2008: p. 128ff). In order to measure the indicators of a portfolio, the score method linking all criteria with each other, is useful. The next step is the graphical presentation in a so called portfolio matrix (Hartmann 2002: p. 185f). According to the position in the matrix norm or standard strategies can be derived indicating a rough guidance and rules of conduct.

In the following the most important portfolio concepts are explained:

- **Market Power Portfolio**
Considers the balance of power between customer and supplier.
- **Risk Portfolio**
Considers the risk of internal supply disturbances and the risk of market caused supply disturbances.
- **Supply Risk-ABC Portfolio (see Table 9)**
Considers supply risks and purchasing volume.
- **Supplier Portfolio**
Considers the market relevance of a supplier.

		ABC-Characteristic	
		A-Part	C-Part
Supply Risk	High	Strategic Products	Bottleneck Products
	Low	Leverage Products	Noncritical Products

Table 9: Supply Risk-ABC-Analysis (referring to Muschinski 1998a: p. 95)

An ABC-analysis is used to identify and separate supply parts according their purchasing volume. The term ABC indicates, that there are three classes. A consists of purchased parts with a high purchasing volume, B consists of purchased parts with a middle purchasing volume and C consists of parts with a low purchasing volume (Large 2009: p. 76f). The same method can also be used for suppliers. Table 10 shows a possible turnover share distribution of suppliers. In this case, only 5% of the suppliers are responsible for 75% of the total turnover whereas the majority of the suppliers (75%) are responsible for only a small portion (5%) of the total turnover. These few A-suppliers need special attention e.g. one of the following activities (Disselkamp & Schüller 2004: p. 45f):

- Reduction of storage costs. Many customers request from their A-suppliers just in time delivery.
- Efficient handling of scheduling, ware income and invoice verification.
- Preferred application of supplier rating. Every single A-supplier needs to be checked in terms of his complete capability, his risks and his potentials.

	Turnover Share	Supplier Share
A-Suppliers	75%	5%
B-Suppliers	20%	20%
C-Suppliers	5%	75%

Table 10: Supplier Classes and their possible Turnover Share (referring Vollmuth 2004: p. 21)

3) Graphic Method

The most important graphic methods are the profile analysis and the supplier gap analysis. Both enable a presentation of several characteristics of a supplier in a chart. The graphic method allows on the one hand to display so called “runaways” and on the other hand to compare a supplier with other suppliers (Janker 2008: p. 140).

a) Profile Analysis

There are two kinds of profile analysis, the performance profile analysis and the requirements profile analysis. To create a performance profile selected criteria are rated with a grade and afterwards connected with lines. These lines show the actual profile of a supplier which can be compared with competitors (see Figure 10). When creating a requirement profile, the buyer defines the target state which reflects the demands to a supplier. Afterwards the performance and the requirements can be compared in order to find out the supplier with the best compliance. (Scharnweber 2005: p 32f).

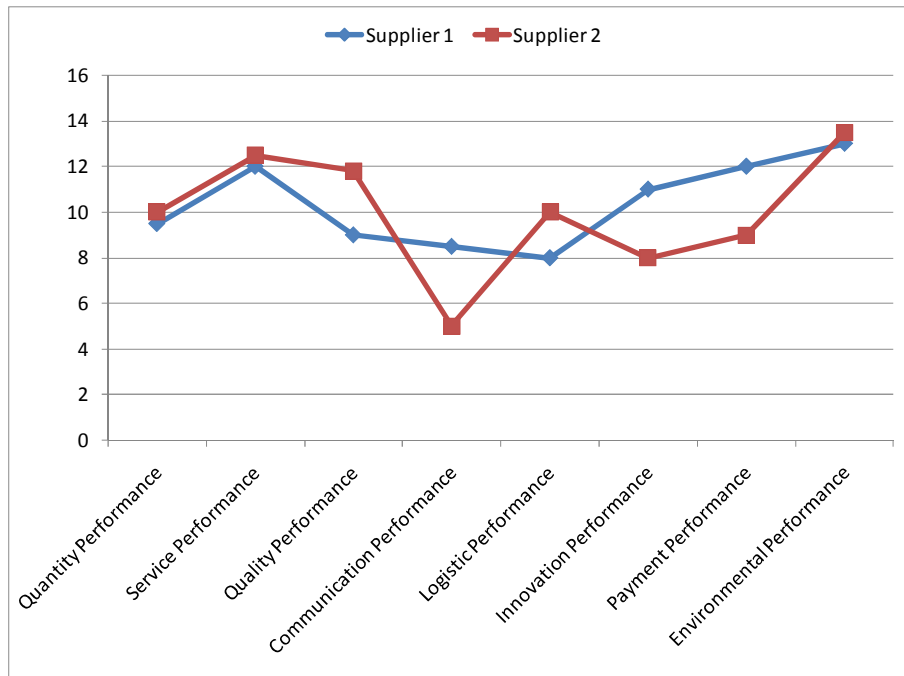


Figure 10: Profile Analysis (referring to Janker 2008: p. 141)

b) Supplier Gap Analysis

To visualize the performance level of a supplier, the supplier gap analysis compares the current with the required performance. The gap between the two shows the so called “performance gap” of a supplier (see Figure 11). The smaller the gap, the better the supplier fulfills the requirements (Glantschnig 1994: p. 186ff).

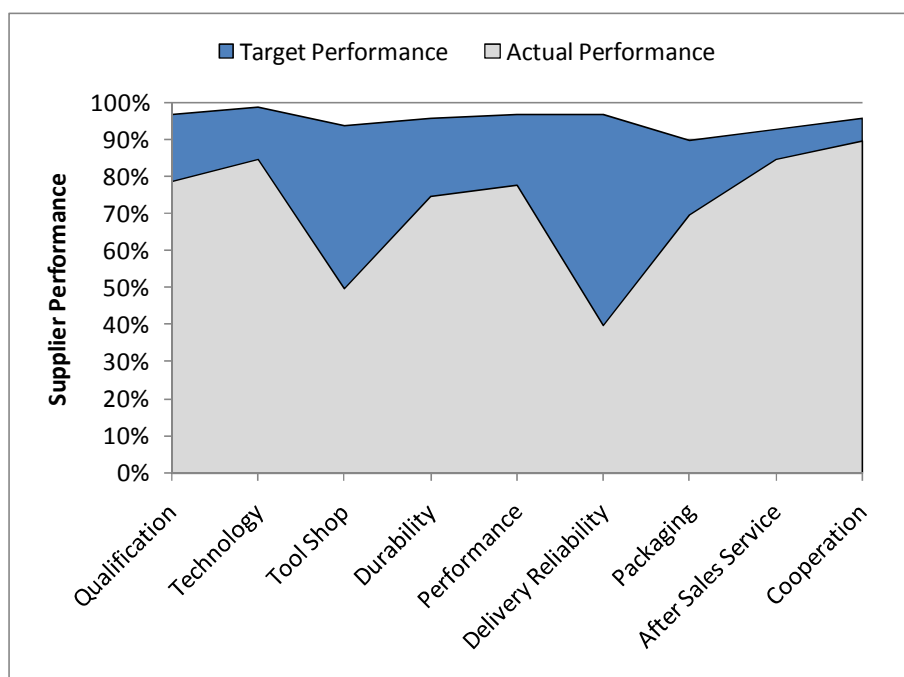


Figure 11: Supplier Gap Analysis (referring to Glantschnig 1994: p. 187)

3.4.3. Rating Method Selection

After explaining the available methods in the previous chapter, an appropriate rating method needs to be selected. The selection process is driven by the following criteria (Scharnweber 2005, p.20f):

- Purpose of the supplier rating (rating of existing or new supplier)
- Amount of purchasing volume
- Cost-benefit ratio
- Demand on information and available data pool
- Urgency of procurement process
- Amount of supply risk

The execution of a supplier rating is time consuming and therefore expensive. Thus companies must set priorities for the accomplishment of the supplier ratings. It is recommended to rank the suppliers according to the answers of the following questions (Disselkamp & Schüller 2004, p. 207):

- For which product/product group is a rating of the suppliers very important?
- Which suppliers will be rated?
- How extensive is the rating?
- How often should the rating be done?
- Who is doing the rating?

In general it should be noted, that multi-factor comparisons (e.g. quality, logistics, price ...) are more and more used by companies since single-factor (e.g. price only) comparisons are an expression of an administrative procurement which is not considering the competitiveness of the company. Usually at least three (quantifiable) criteria are considered. However, a profound rating of economical, ecological and technical capabilities of a supplier requires - above all - also non-quantifiable criteria (Hartmann et al. 2008: p. 56).

3.5. Supplier Rating Structure

As shown in Figure 12, supplier rating should cover both, the performance of a supplier in the past and the future performance potential. The performance potential

results from the expected performance capability and the expected performance risks (Harting 1994: 51ff).

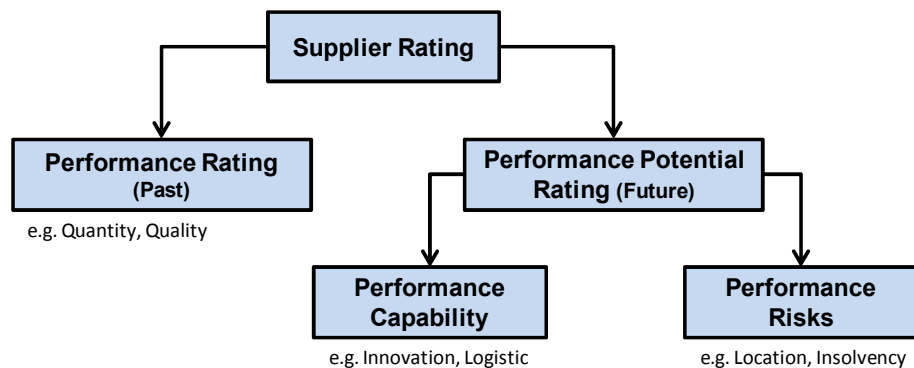


Figure 12: Supplier Rating Structure (referring to Heß 2008: p. 263)

3.5.1. Performance Rating

The performance rating covers the performance of the supplier in the past period. Hoffmann & Lumbe (2000: p. 96) describe the Siemens AG (see Figure 13) approach where the first level is divided into:

- Purchasing
- Quality
- Logistic
- Technology

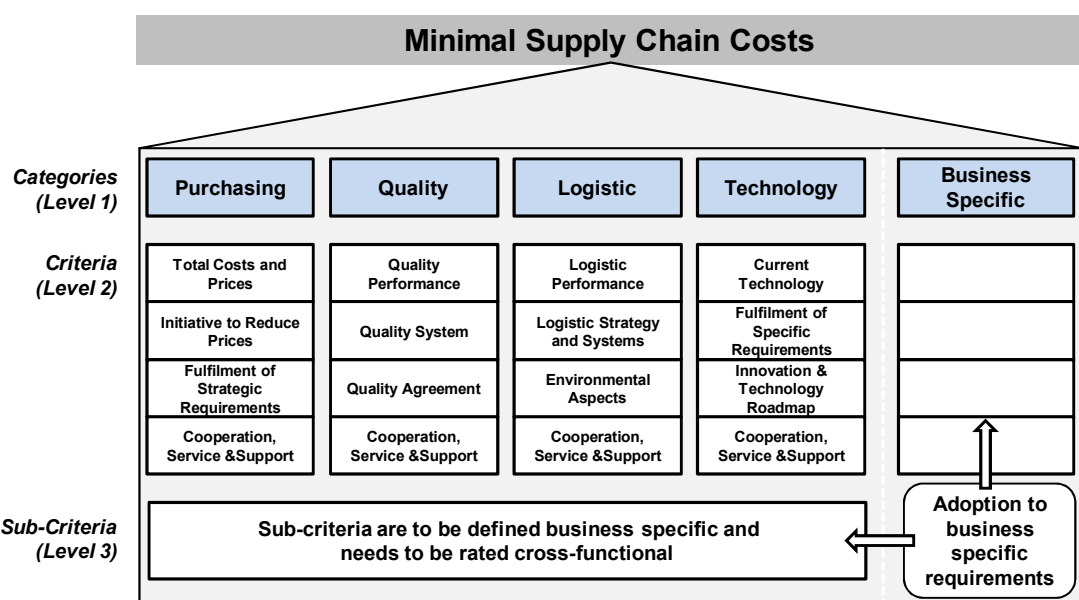


Figure 13: The Siemens Criteria Set - 16 Criteria in 4 Categories (referring to Hoffmann & Lumbe 2000: p. 96)

The sections correlate with the functions respectively with the departments in the company and enable to define a clear separation of responsibility in the rating and strategy development process.

3.5.2. Performance Potential

For the development of a supplier strategy the performance potential is more interesting than the past one. Since supplier strategies target the development of suppliers, it is vital to know the performance ability of a supplier in order to invest in the right one. Since management is essential for future developments, it is added to the above mentioned classification (Heß 2008: p. 266f):

- Management
- Purchasing
- Quality
- Logistic
- Technology

Besides the performance potential ability also the expected performance risks need to be considered. Heß (2008: p. 269f) differs between 3 categories of risks:

- **Exogenous risks** which affect the performance of the supplier and which cannot be (fully) controlled by the supplier: location risk, supply chain risks and know how protection.
- **Risk from the management system of the supplier** which cannot be (fully) controlled by the supply management: financial risks, contractual coverage, ethic risks and risks from company group.
- **Risk due to lack of delivery readiness** means that the supplier reduces his interest in cooperation or at least his commitment: supplier power, corporate policy decisions.

3.6. Supplier Classification

A summary of the individual rating criteria (e.g. quality, price, logistics ...) to a total number gives the supplier classification. For the calculation of the total number the rule needs to be considered, that a bad result in one domain cannot be

compensated by a very good result in another one. For example poor adherence to schedules cannot be compensated by very good quality (Muschinski 1998a: p. 124). The supplier classification should lead to a selection of suppliers who are reliable, efficient and innovative. That means, that suppliers which do not fulfill the classification criteria should be replaced by more efficient ones. A supplier classification should always include the possibility of imposing sanctions. Although the priority should be on encouraging existing suppliers to good respectively better performance, a supplier change should always be possible too (Riffner & Weidelich 2001: p. 66).

Large (2009: p. 117ff) considers detailed knowledge of the own supplier structure as essential for the configuration of a holistic supplier-customer relationship. Generally speaking the supplier structure describes the distribution of all actual suppliers (supply base) to homogeneous supplier groups (supplier classes). The necessity of supplier-classes results primarily from too high numbers of suppliers. By defining supplier-classes an increasing transparency is targeted. Before suppliers can be classified into certain supplier-classes, the classification characteristics need to be defined. Figure 14 displays important classification characteristics distinguishing between supplier characteristics and relationship characteristics:

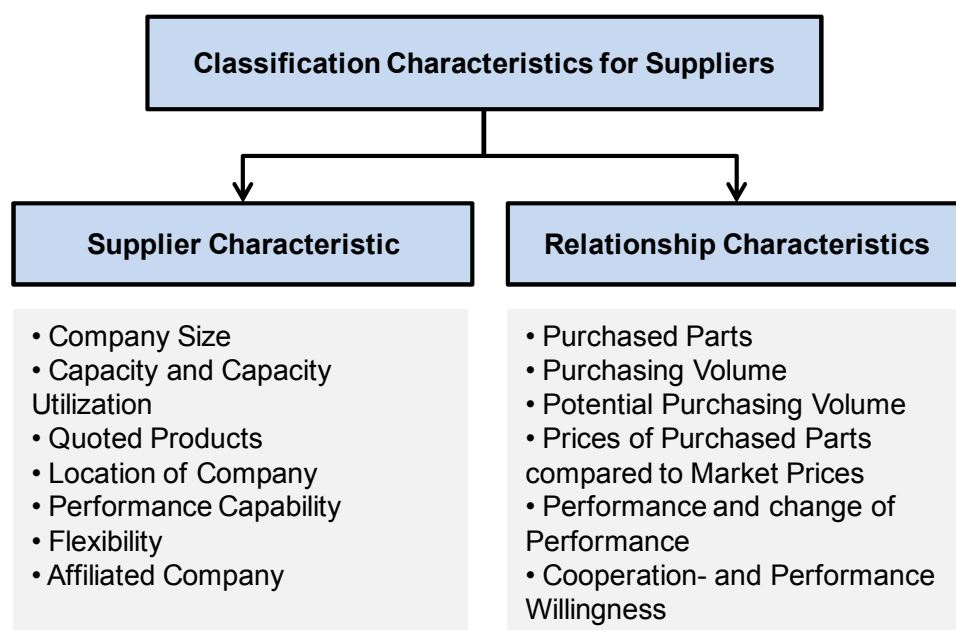


Figure 14: Characteristics for Supplier Classification (referring to Large 2009: p. 120)

The classification of the supply base is a fundamental method to solve, or even better, to avoid problems in the supplier management. After classification, supplier strategies for the entire supply base are developed. Therefore, classification is the starting point for derivation of strategies and activities for the different supplier-classes of the supply base. Wagner (2003: p. 695f) mentioned the following possibilities to classify suppliers:

- Classification according to the purchasing volume
→ one-dimensional: ABC-analysis
- Classification according to the importance of the product and complexity of the procurement market
→ multi-dimensional: portfolio analysis
- Classification according to the supplier relationship (internal and external)
→ multi-dimensional: portfolio analysis

Dreyer (2000: p. 29ff) developed a standardized supplier rating method which classifies suppliers in four different types. The classification is done already before the suppliers are rated. The rating complexity and extent depends on the classification of the supplier which can be one of the following:

- Contract manufacturer (parts)
- Production suppliers (parts, components)
- Logistic integrated suppliers (components, modules) and
- Know-how integrated suppliers (modules, systems).

Heß (2008: p. 276ff) developed an approach to identify preferred and potential suppliers. Firstly the suppliers are classified according to their performance potential. Therefore a portfolio with the dimensions “performance capability” and “performance risks” is compiled (see Figure 15).

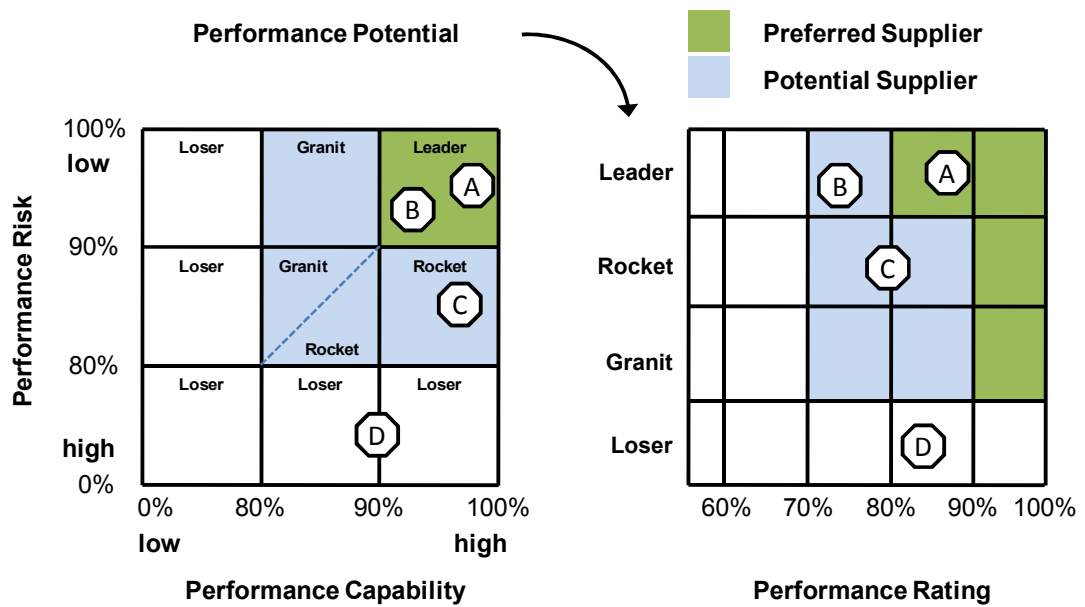


Figure 15: Identification of Preferred and Potential Suppliers (referring to Heß 2008: p. 277)

Suppliers with low performance risk and high performance capability are so called “leaders” (see supplier A and B). Those with lower performance risk but also lower performance capability are called “granit”. Compared to that, rockets have also low performance risk but high performance capability potential (see supplier C). All the other suppliers are called “loser” (see supplier D).

On the right side of the figure the results of the performance potential are combined with the results of the performance rating. It is evident that preferred suppliers have a high potential performance and a high performance rating (supplier A), whereas potential suppliers show a lower performance rating (supplier B and C). Before the classification to a preferred or potential supplier is undertaken, the calculated position should be evaluated in its entirety.

Beyond preferred and potential supplier, there are more classifications available. The following table gives an overview of proven classifications and selected consequences (Heß 2008: p. 277ff).

Class	Description	Consequences
Preferred Supplier	Supplier with excellent delivery performance and excellent potential performance. Target is to work very close with this supplier.	<ul style="list-style-type: none"> - Is included in all RFQ's - Preferred supplier for cooperation's - Intensive communication - Intensive supplier rating and active supplier development
Potential Supplier	Supplier shall be developed to a preferred supplier. He has a high potential performance. It is either a new supplier or a current supplier which is not performing satisfying	<ul style="list-style-type: none"> - Analogue to preferred supplier but with special monitoring - Tentative involvement in partnership projects - Total placing of orders is done carefully
Specialist	Supplier has special competencies concerning a technology resp. a location. Apart from that he should have at least the qualifications of a potential supplier.	- Analogue to preferred supplier resp. Potential supplier, but related to the special know how.
Basic Supplier	All suppliers which cannot be assigned to a class. In the mid-term it needs to be checked, to what extent such suppliers are needed.	<ul style="list-style-type: none"> - Occasionally RFQ's - No partnership projects - Reduced communication - Simple supplier rating - No or less supplier development
Supplier Without new Business		Supplier shall be dropped out passively and shall not receive new business. Current business will be continued.
Active Drop Out of Supplier		Supplier shall be dropped out actively. That means, current products should be re-sourced to another supplier.
New Business Hold		Due to issues the suppliers is on new business hold.

Table 11: Consequences (Heß 2008: p. 277ff).

In this chapter the methods for rating and classifying a supplier were explained from a theoretical point of view. In the next chapter the results of the questionnaire sent to 83 managers of MAGNA are presented and compared with the theoretical approaches.

4. Supplier Rating & Classification in Practice

The way a company can define and undertake Supplier Risk Management and Supplier Rating was described in the previous chapter. The approaches presented base on the theory of established literature. The aim of a survey conducted amongst several divisions of MAGNA Europe was to evaluate, how the theoretical approaches are used in the real business world. One part of the survey covered questions concerning instruments for Supplier Risk Management and their usefulness. Another part covered questions about Supplier Rating and the methods used in the companies. The questionnaire was sent to 83 employees from whom 35 participated. The results of the survey will be shown and interpreted in the next chapters. In chapter 5 a new supplier rating tool will be developed which will sort suppliers according to their need for a financial risk rating.

4.1. Structure of the Questionnaire

For the survey a special questionnaire was developed which systematically covers the topics Supplier Risk Management and Supplier Rating. This survey is a primary survey conducted for this master thesis only. The questionnaire consists of closed questions on three pages. The first page deals with personal and company data, the second page with Supplier Risk Management and the third one with Supplier Rating. The closed questions were primarily assigned to a 5-Point-Likert-Scale (Schnell et al. 2005: p. 187ff). The questionnaire was designed to be filled in within 15 minutes in order to reach a high return rate. It was sent out through the responsible Supplier Risk Manager on October 5th 2010 with a due date of 1 week followed by a reminder sent out with another week time for delivery. The return rate of the survey is 42%, as 34 participants returned the questionnaire within the delivery due date and an additional one was sent on November 2nd.

4.2. Results of the Survey

The results of the survey are descriptive meaning that all questions are evaluated without any coherence. The evaluation was done anonymously whereby every questionnaire was assigned a number. The survey data was processed with Microsoft Excel 2007.

4.2.1. Personal Details

The study participants are composed as follows (see Figure 16 to Figure 18):

- 94% of the participants have more than 5 years work experience while 57% have more than 10 years.
- 89% of the participants have worked already more than 5 years in the Automotive Industry whereas 43% have more than 10 years.
- 49% of the participants have less than 5 years and 40% of the participants have between 5 and 10 years of work experience in their current company.



Figure 16: Years of Work Experience

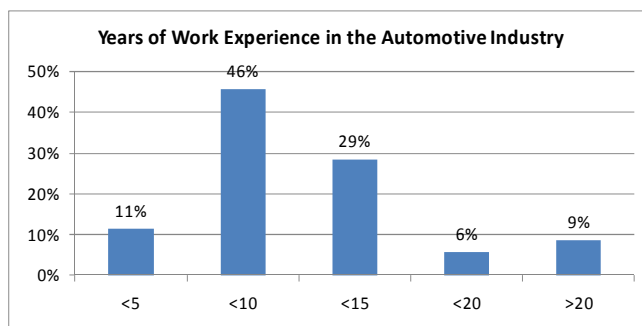


Figure 17: Years of Work Experience in the Automotive Industry

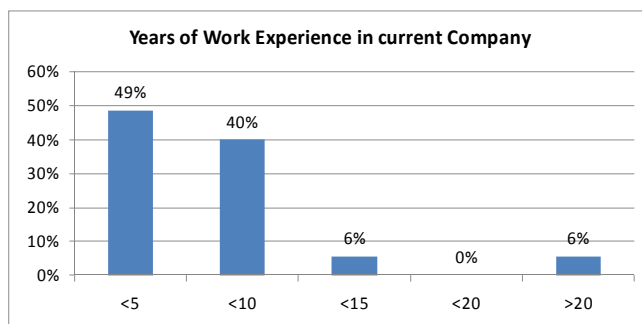


Figure 18: Years of Work Experience in current Company

4.2.2.Details to Business Unit

63% of the answers are related to a MAGNA plant, the remaining 37% are associated with a MAGNA Division (see Figure 19). That means, that 63% of the participants are responsible for their plant only while 37% are in charge of a Division and therefore for more plants.

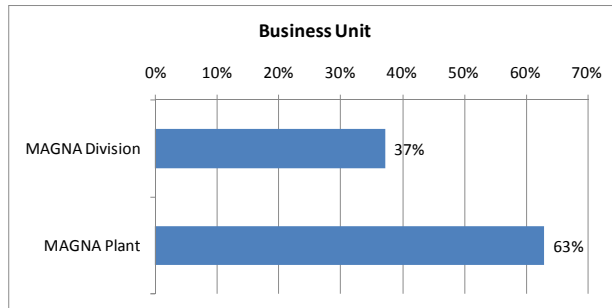


Figure 19: Business Unit

For the success of a company it is crucial to have access to a healthy and powerful supply base. To ensure this, the buyers need to have up-to-date information about every single supplier available. As shown in Figure 20, 80% of the participants have more than 100 approved suppliers for quotation in their business unit. The majority (43%) has between 100 and 200 approved suppliers. That means purchasing needs to review all of these suppliers on a regular base to ensure that they fulfill the expectations of the purchasing department. This indicates already the basic idea of this master thesis. How is it possible to figure out those companies, where a financial risk audit should be done? As already mentioned in chapter 1.1, the audits have to be focused on those suppliers first who would create the most negative impact on a company in case they get into financial difficulties.

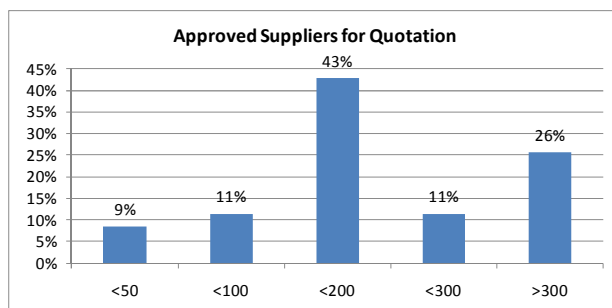


Figure 20: Approved Suppliers for Quotation

Figure 21 illustrates, that 62% of the participating managers have more than 500 employees; 12% have more than 5.000 staff in total. In the purchasing departments 24% have up to 5 employees and 38% have between 5 and 15 employees (see Figure 22). 27% have between 15 and 60 employees and the rest of 12% has more than 60 employees in the purchasing department.

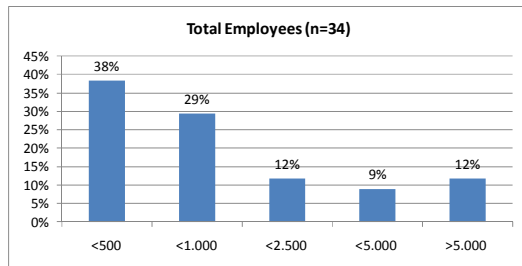


Figure 21: Total Employees

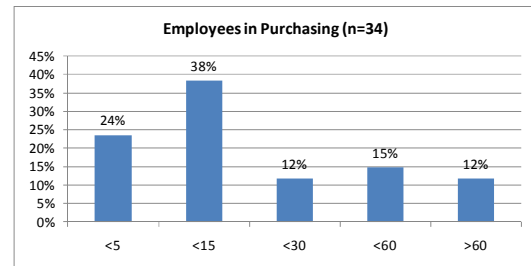


Figure 22: Employees in Purchasing

Figure 23 evidences that 39% of the participants work in business units with a turnover of less than €100 million; whereas 10% have between €100 mil. and €200 mil. However, the majority (51%) has to handle a turnover of more than €200 mil. Figure 24 shows that 50% of the participants dispose a purchasing volume of more than €100 mil.; 9% have to deal with a volume of more than €500 million.

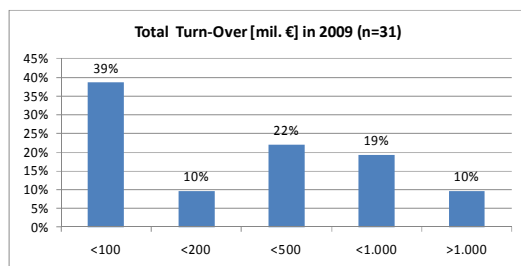


Figure 23: Total Turn-Over

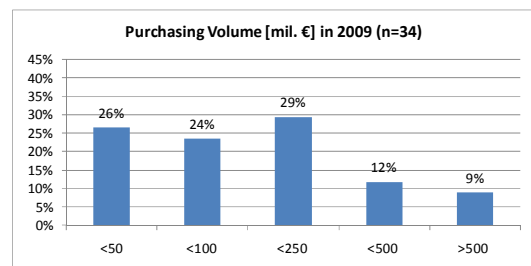


Figure 24: Purchasing Volume

In order to find out the geographical area where the products are purchased, the purchasing volume is used which is a common term in procurement management. The purchasing volume is calculated by multiplying the piece price of a product times the purchased quantity in a certain period of time. As shown in Figure 25, 74% of the purchasing volume is sourced in Europe, whereas 10% each is purchased in Asia/Pacific and North America. Of no significance for sourcing are Africa (3%) and South America (2%). The values in Figure 25 are weighted ones since the participants indicated a %-range and not an exact number. The detailed distribution is shown in the following from Figure 26 to Figure 30.

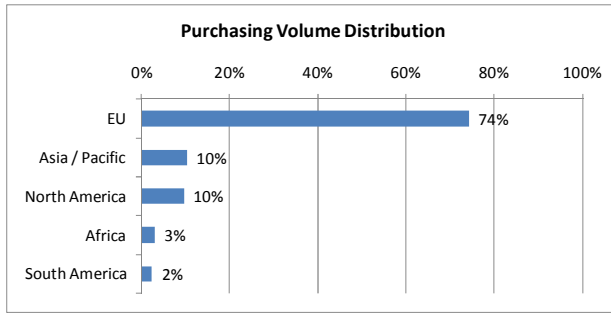


Figure 25: Purchasing Volume Distribution

Figure 26 displays that the majority (77%) of the buyers purchases more than 60% within the EU, whereas 17% buy between 40% and 60% within Europe. Figure 27 to Figure 30 are to interpret in the same way.

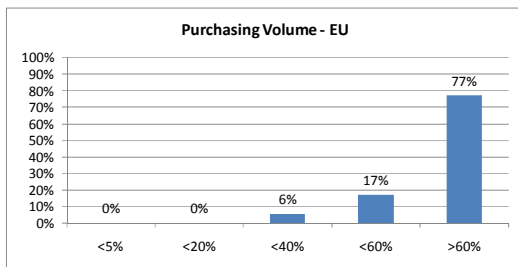


Figure 26: Purchasing Volume - EU

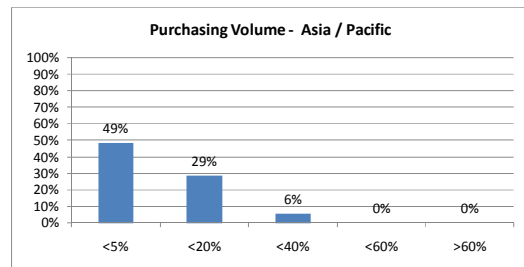


Figure 27: Purchasing Volume - Asia / Pacific

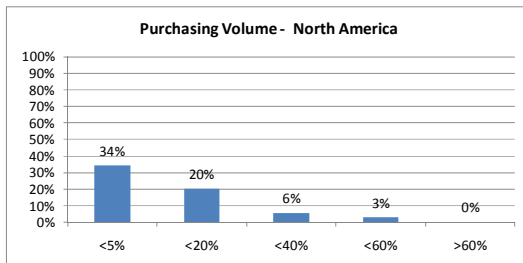


Figure 28: Purchasing Volume - North America

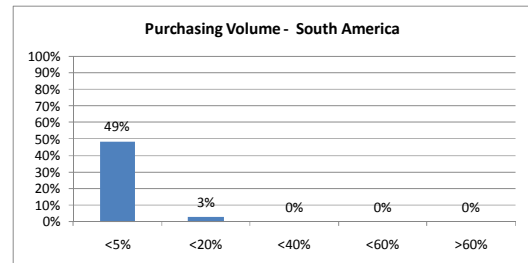


Figure 29: Purchasing Volume - South America

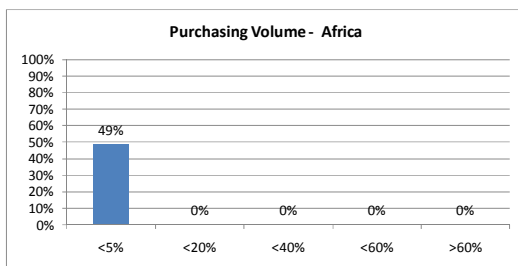


Figure 30: Purchasing Volume - Africa

4.2.3. Supplier Risk Management

83% of the participants declare to practice preventive supplier risk management (see Figure 31). This is confirmed by Figure 32 which shows, that 86% of the participant's have guidelines or rules for dealing with financial critical suppliers available. 97% have implemented different escalation levels for handling financial critical suppliers (see Figure 33). The term “escalation” is a common term in economic life and is used to describe rules for escalating a certain decision a hierarchy level higher in case a conflict cannot be solved on the lower decision level.

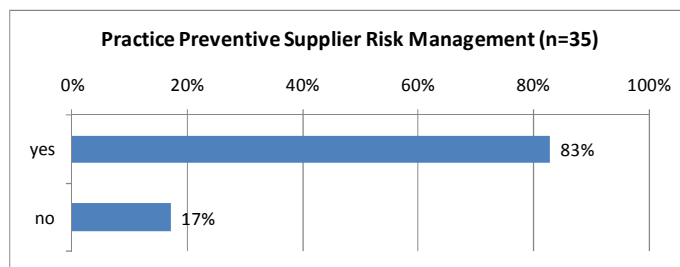


Figure 31: Preventive Supplier Risk Management

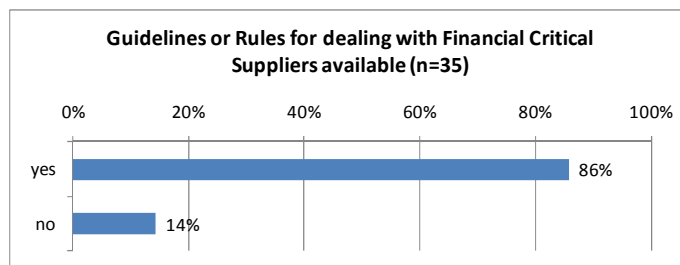


Figure 32: Guideline or Rules for Financial Critical Suppliers available

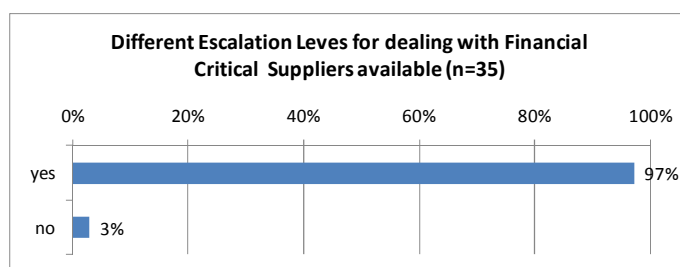


Figure 33: Escalation Level for Financial Critical Suppliers available

Nearly all managers asked (97%) had to deal with supplier insolvencies in the last two years. 68% had up to 5 insolvencies to handle, whereas 26% dealt with 5 to 10 insolvencies (see Figure 34).

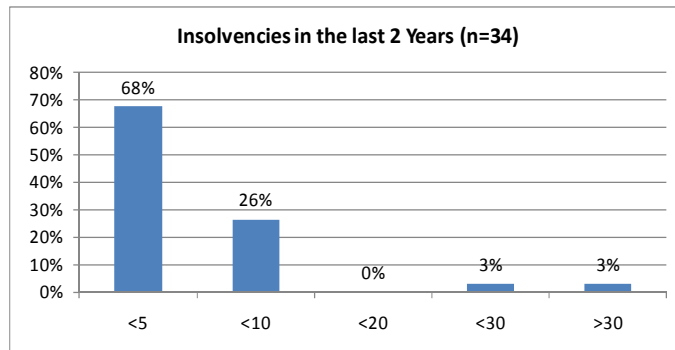


Figure 34: Insolvencies in the last 2 Years

In the following the observed behavior before the insolvencies occurred will be analyzed. Figure 35 shows, that “rumors about financial problems” (4.74) was by far the strongest indicator participants recognized before their supplier insolvencies. As a qualitative or soft fact, this cannot be measured. Another interesting fact is that two of the top three (“rumors about financial problems” & “supplier did not pay his suppliers”) behaviors are not identifiable at the customer side. They can only be known when an open communication and exchange of views within business partners and industry colleagues exist. All factors gathered in Figure 35 are part of an early warning system and support the concept of Ansoff presented in chapter 2.3. that “... developments in companies, including upcoming risks, not suddenly appear but in form of weak signals arise long time before something happens”.

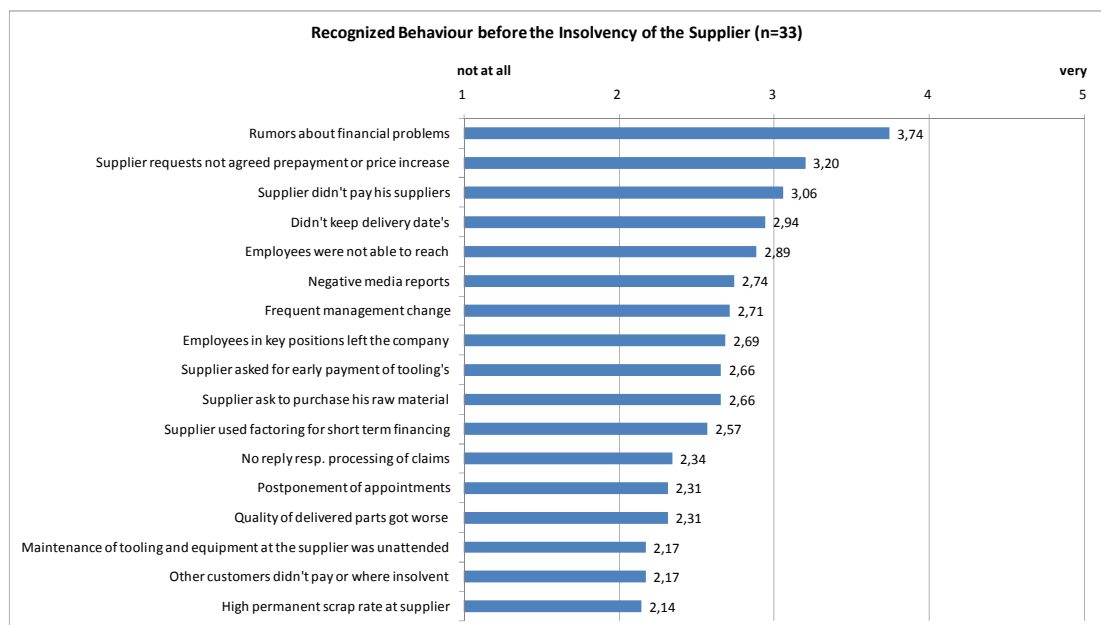


Figure 35: Recognized Behavior before Supplier Insolvency

To be one step ahead and to identify a supplier with potential financial troubles as soon as possible should be the aim of every purchasing manager. Figure 36 shows how useful certain activities are evaluated by the survey participants. “Analysis of financial figures / KPI’s” (4.06) and regular audits (4.03) are seen as the most important activities; followed by regular talks with suppliers (3.86).

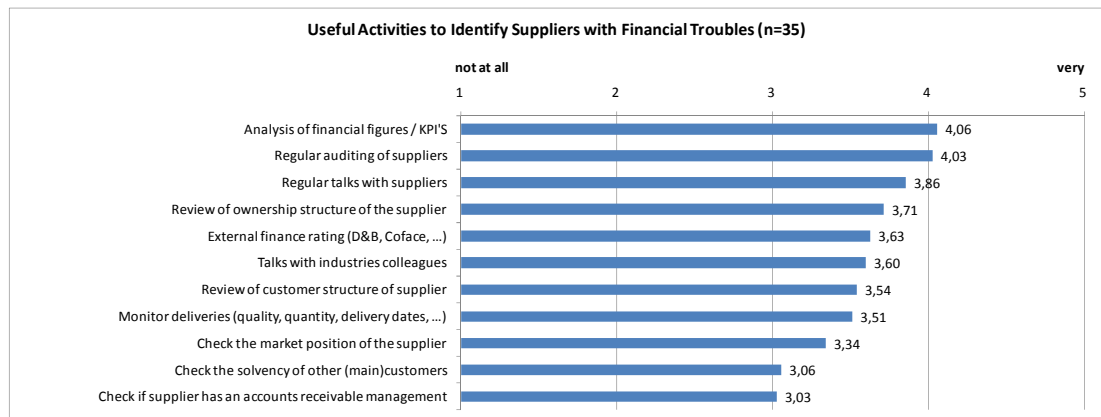


Figure 36: Useful Activities to identify Suppliers with financial troubles

Top priority of a supplier should always be to secure the supply for the customer. The survey result in Figure 37 gives an indication which actions are useful for a company dealing with suppliers in financial troubles. A “more detailed monitoring” (4.54) is seen as the most important action followed by “tight coordination with the supplier” (4.09) and “place no new business to the supplier” (3.94). To support the supplier by means of financial investments (1.91) or by agreement of higher prices (2.09) is not seen as beneficial.

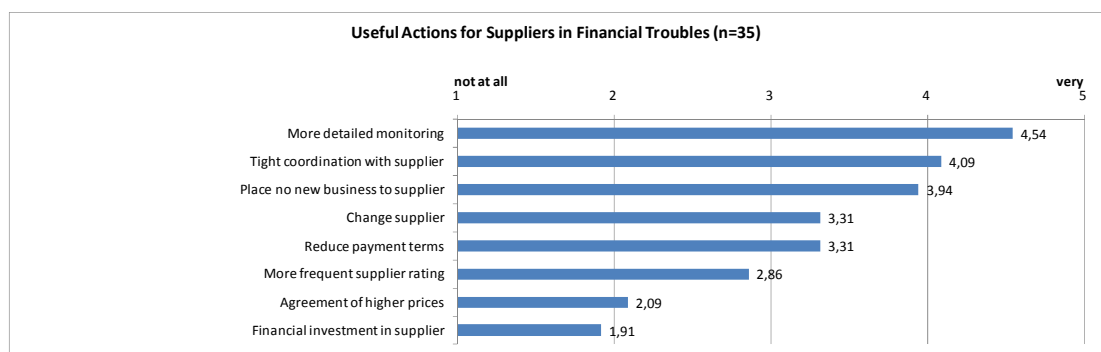


Figure 37: Useful Actions for Suppliers in Financial Troubles

In order to gather input for the main research question of this master thesis the managers were furthermore asked to identify factors which should be within the scope of a supplier risk management system. Noticeable, this question has the highest mean values of all questions posed. That supports the assumption, that these factors should be part of a new supplier rating method within MAGNA. As shown in Figure 38, the most important factor reaching a grade of 4.37 is the number of alternative suppliers with production capability available. If there is no such alternative source available and the supplier runs into problems, the supplier needs to be supported which also could mean monetary support. The necessity of a new development in case of a supplier change (4.20) has the second highest grade. A new development would lead to additional costs and probably to delayed delivery since the new development needs a certain time as well. The share of the total turnover at the supplier (4.17) has the third highest grade. This factor reflects the dependency of a supplier from its customer or in other words the power of a customer towards the supplier. The fourth highest grade has the turnover's share of the supplied projects from the total turnover (4.11). It gives an indication, to which level the turnover and the earnings are affected in case of a supplier default.



Figure 38: Factors for Supplier Risk Management

4.2.4. Supplier Rating

The first question posed within the supplier rating section aimed to figure out if supplier risks of any kind are considered when rating and selecting supplier's. The answers given are as follows:

- 57% of the participants consider risks for supplier rating and for supplier selection with a grade of 4.05.
- 26% of the participants consider risks for supplier rating and for supplier selection with a grade of 2.78. They also answered that it should be considered with a grade of 4.22.
- 14% of the participants do not consider risks for supplier rating and for supplier selection. They also answered that it should be considered with a grade of 2.80.
- 3% of the participants did not answer the question.

The following Figure 39 shows the criteria used for supplier rating. With a grade of 4.69 the “quality of the delivered parts” is seen as the most important criteria, followed by “price / costs” with a grade of 4.49. This result is probably the most popular one, since there is no way around quality and customer satisfaction. The “financial strength” of a supplier is found in the midfield with a grade of 3.34.

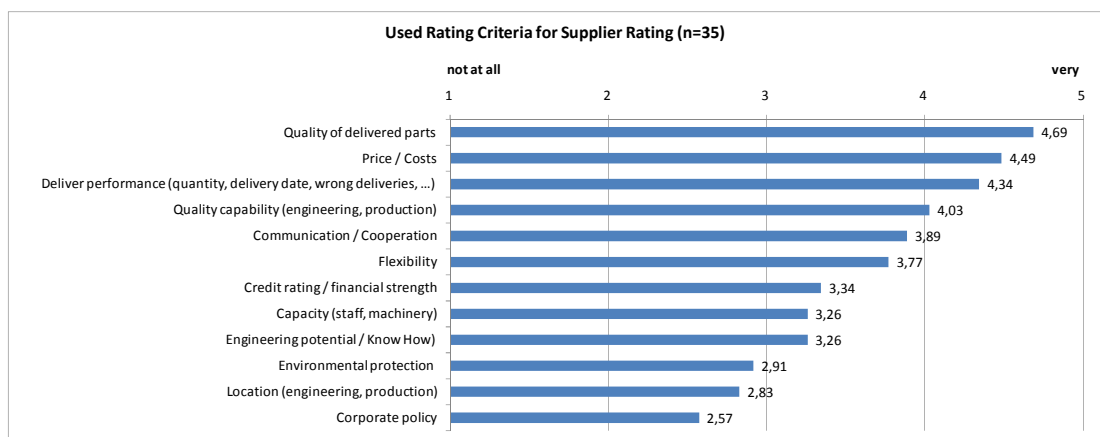


Figure 39: Used Criteria for Supplier Rating

The importance of a cross-company rating, meaning to share the rating results across different plants and divisions, is seen as very important (4.43 out of 5). This is beneficial for all plants as it helps to lower the rating costs, since not every plant needs to do a separate rating.

As shown in Figure 40, the responsible departments for supplier ratings - reaching 97% each - are “Purchasing” and “Quality”. In 88% the Logistic department is involved. These findings correlate with the results of a survey undertaken by Janker (2008: p. 161). The departments “Engineering” (31%) and “Risk Management” (26%) are less involved in the supplier ratings.

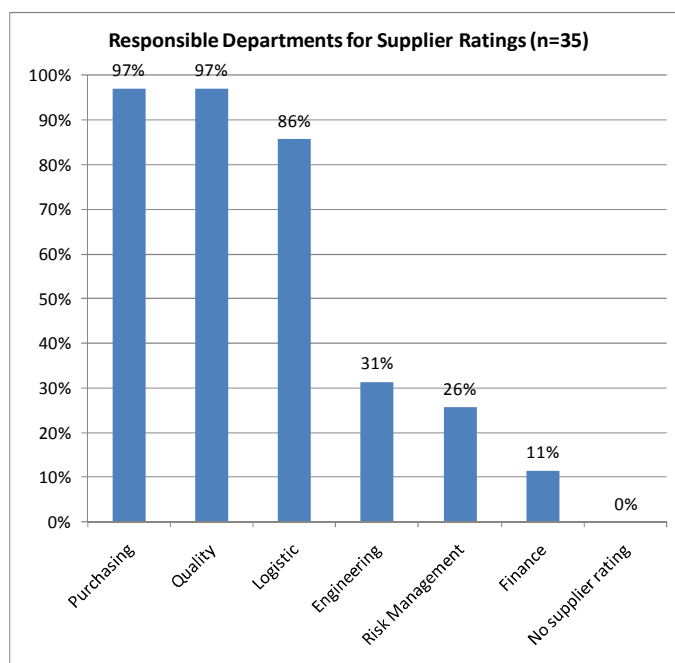


Figure 40: Responsible Departments for Supplier Rating

57% of the participants indicate, that the departments cooperate for the ratings as interdisciplinary working- or project- group. The remaining 43% work independently from each other. Almost three quarter (74%) produce a combined rating result in form of a portfolio diagram or a key-figure. 26% have an individual result (approved/not approved) available.

Figure 41 shows the used criteria for supplier classification. With 89% “delivery performance” is used as most common criterion for supplier classification. Close behind is “kind of relationship” (potential/approved/blocked supplier) with 83% and on third place is “kind of purchased parts” (standard parts, turning parts ...) with 77%. The “supplier status” (system supplier, part supplier ...) is for 71% the criterion which they use for supplier classification. The purchasing volume is with 54% in the midfield.

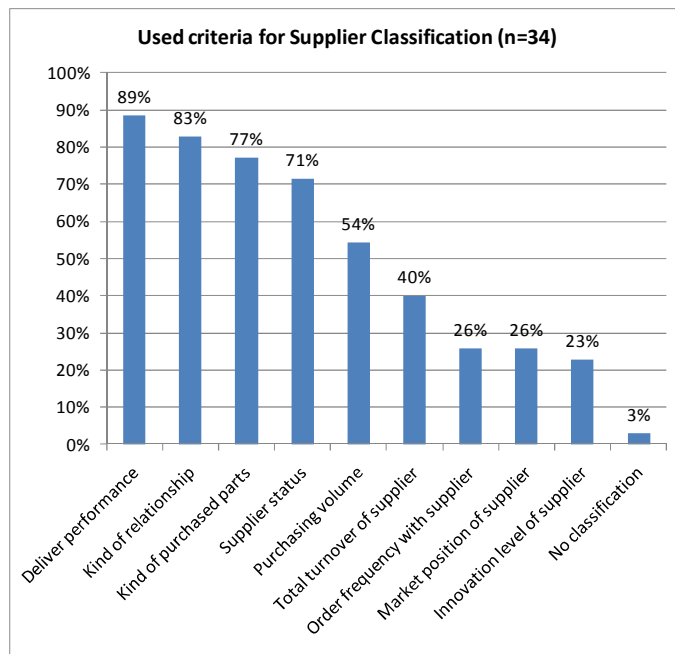


Figure 41: Used Criteria for Supplier Classification

The next question in the survey was aimed at the method to classify suppliers. 80% of the survey participants answered to use an ABC-analysis. Due to a multi-selection possibility also 29% indicated to use a portfolio-analysis. Only 3% - which is one person - does no supplier classification at all.

Figure 42 shows that multiple systems are used in parallel. Three quarter of the participants (74%) use Excel as tool for supplier ratings; 46% of the participants use an enterprise resource planning (ERP) system like SAP or Navision. More than one third (37%) is using a database and almost a quarter (23%) is using special software for supplier rating.

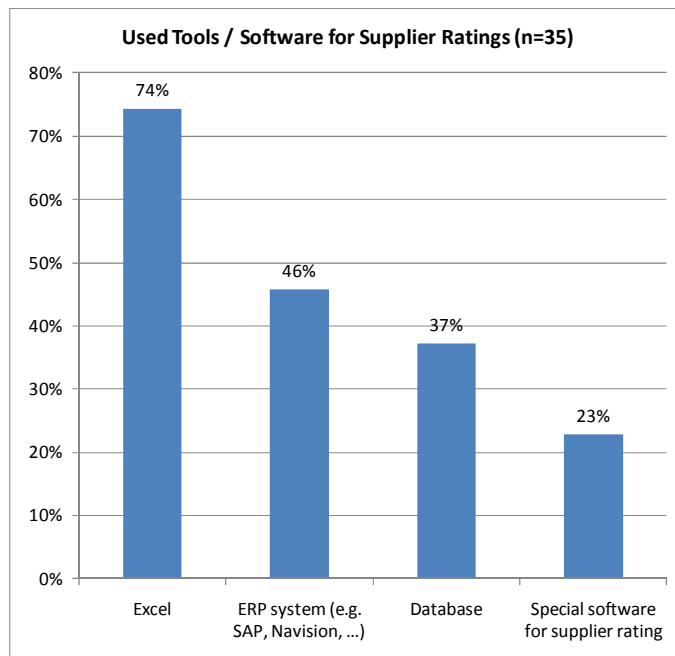


Figure 42: Used Tools / Software for Supplier Ratings

The last question of the survey targeted to figure out the frequency of a supplier rating. The question was: “How often according your opinion a supplier should be rated?” Since it was not clearly defined which rating was meant it is not possible to evaluate this question.

Taking the theoretical approach and the results from the survey as a basis, the following can be summarized:

The survey confirmed that there is high demand on processes and tools to handle financial critical suppliers. Nearly all managers asked (97%) had to deal with supplier insolvencies in the last two years. 68% had up to 5 insolvencies to handle, whereas 26% dealt with 5 to 10 insolvencies (see Figure 34). This strongly supports the motivation of this thesis to develop a new supplier rating method to sort suppliers according their risk for a company.

As is can be seen in Figure 36, the “analysis of financial key figures / KPI’s” is the most useful activity to identify suppliers with financial troubles. This result supports the theoretical approach mentioned in chapter 2.3 and chapter 3.4.1, that financial key figures are very reliable and their analysis should identify a trend for the future respectively chances and risk potentials. Additionally, regular audits and talks with a supplier give the possibility to gain information besides the official communication and are part of an effective early warning system described in chapter 2.3.

Due to the resources involved in financial auditing, the audits have to be focused on those suppliers first who would create the most negative impact on a company in case they get into financial difficulties. To do so, a supplier rating method is requested to sort suppliers according their risk and their possible negative impacts. The following chapter will deal with the development of a new supplier rating method to fulfill this request.

5. Business Case

At MAGNA the department “Risk Management” is the highest escalation level for dealing with financial critical suppliers meaning that all divisions report to it, as it is responsible for conducting financial audits for all suppliers. How it is done and why there is a need to improve this process is described in the following chapter.

5.1. Current Approach for Supplier Risk Management at MAGNA

As the MAGNA risk managers themselves are not involved in the daily business with the suppliers, they need to be informed by the responsible buyers which suppliers are to be rated in terms of financial stability. The current financial supplier auditing process is shown in Figure 43. The letters on the right side indicate the responsible person, either the Buyer or the Risk Manager.

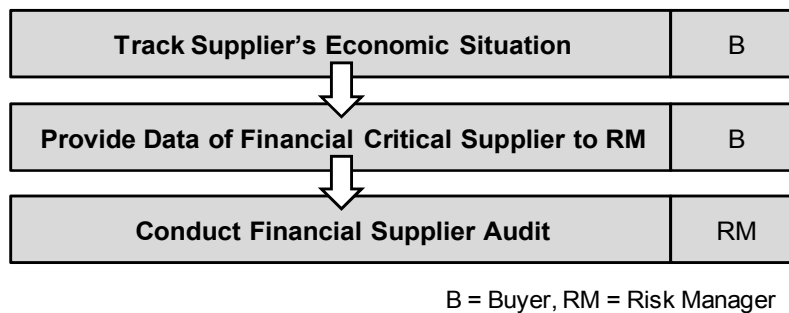


Figure 43: Current Financial Supplier Auditing Process

To support the buyers in tracking a supplier's economic situation, “Coface Rating” was introduced. Coface is a global credit insurance company offering assessments on the financial stability of companies. Although it is a credit insurance company, credit insurance cover is not included in this service. The rating represents only the level of cover Coface would provide, in case a company is insured with them. A supplier is rated and monitored online after he is added to a watch list which is decided by the responsible buyer. In case of any change to the credit rating, Coface notifies its client immediately by sending an email. Furthermore, an early warning system was implemented in the “eRFX”, a web-based global supplier data base at MAGNA. eRFX stands for electronic Request For [X], whereby X can be Proposal (RFP), Quotation (RFQ), Information (RFI) or Tender (RFT).

As not all suppliers are equally important, the responsible risk manager has to decide which supplier is audited first. To support the risk managers in doing so, the suppliers should be sorted according their risk and their possible negative impact. As there is no tool available, it depends on the risk managers who rely on the buyer's information about the "quality" of a supplier. Since not all suppliers can be audited at the same time, some risk managers consider suppliers with the highest purchasing volume as very important and prefer to audit these suppliers first. That this approach is not always target-oriented will be shown in chapter 5.2. In order to support the risk manager's work in choosing the most critical suppliers for auditing first, and to improve the quality and the transparency of the process, a customized supplier rating method will be developed in the following chapter.

5.2. Development of a Customized Supplier Rating Method

The aim is to improve the current financial supplier auditing process and to develop a supplier rating method for sorting suppliers according their risk and their possible negative financial impact on a company. This sorting is part of the risk identification process described in chapter 2.3. and enables the identification of the suppliers which should be rated first.

As stated in chapter 2.4, two main questions need to be answered to assess the risks:

- How likely (probable) is it that an event will occur?
- What is the significance of the consequences and losses?

Since the result of the customized supplier rating will be a sorting of the suppliers according their risk and their possible negative impact, the questions need to be adopted accordingly. The first question needs to figure out the probability of a supply interruption in case of a supplier default - in other words - the risk of a supplier. The significance of the consequences and losses is expressed with the influenced turnover. Therefore the two main questions which need to be answered with the new Supplier Rating Method are:

- How risky is a supplier for a company?
- Which turnover is influenced by a supplier?

To identify the factors necessary to determine the relevance of a supplier was part of the questionnaire and was therefore presented in chapter 4.2.3. The three most important factors according to the survey are: 1) number of alternative suppliers with production capability, 2) necessity of new development in case of a supplier change and 3) share of the supplier's total turnover. The next step is to determine an appropriate rating method. Considering the methods explained in chapter 3.4, the most useful one is the score method. This qualitative method enables subjective evaluations and the weighting of the criteria according their importance. A requirement originated from the MAGNA Risk Management Team which is based on previous experiences of the risk managers, is the ability to perform the rating within 10 minutes. If it takes longer, the responsible person will not use it due to lack of time beside the daily business duties.

Figure 44 shows the new financial supplier auditing process including the developed supplier rating method.

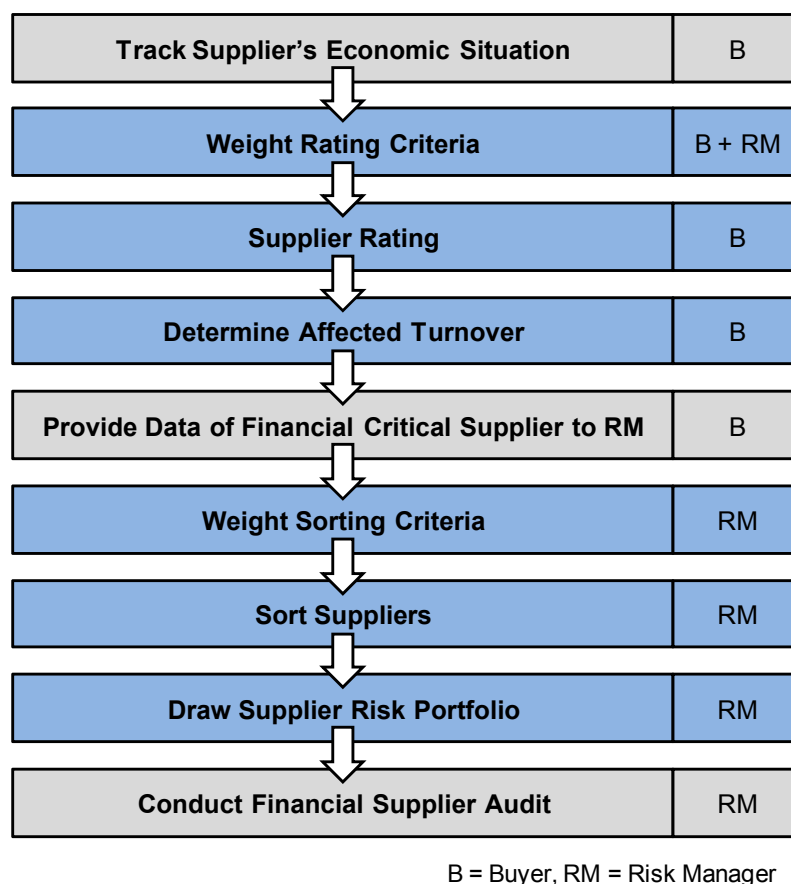


Figure 44: New Financial Supplier Auditing Process

They grey boxes were already explained in chapter 5.1. as part of the existing financial supplier auditing process, the blue boxes show the newly developed process steps which will be described in detail in the following. The result of the customized supplier rating method will be forwarded to the risk managers where it is displayed together with the rating results of other suppliers in a Supplier-Risk-Portfolio. On basis of this data, the risk managers can sort the suppliers according their importance and their negative financial impact. At the end of the new process the financial supplier audit is conducted in the sequence of the rating result.

The tracking of the supplier's economic situation was already described in chapter 5.1. The next step is to rate the suppliers. Before that, the rating criteria must be weighted. This needs to be done only once before the rating started the first time. A subsequent change of the weighting would lead to re-rating of all suppliers since the rating results would base on a different weight distribution and therefore the results are not comparable. Buyer and risk manager should do the rating together, in order to make sure, that both have the same understanding about the criteria and the weighting used.

		Number of alternative suppliers with production capability	Possibility of supplier change WITHOUT new development	Max. turnover share at supplier (own or from another customer)	Possibility of design change WITHOUT customer approval testing	Turnover with supplier	Interest of any OEM to keep supplier "alive"	Total turnover of supplier			Total	Weighted [%]
No.	Criteria	1	2	3	4	5	6	7	8	9		
1	Number of alternative suppliers with production capability	3	5	5	5	5	5	5			33	22,4
2	Possibility of supplier change WITHOUT new development	1	3	5	5	5	5	5			29	19,7
3	Max. turnover share at supplier (own or from another customer)	1	1	3	5	5	5	5			25	17,0
4	Possibility of design change WITHOUT customer approval testing	1	1	1	3	5	5	5			21	14,3
5	Turnover with supplier	1	1	1	1	3	5	5			17	11,6
6	Interest of any OEM to keep supplier "alive"	1	1	1	1	1	3	5			13	8,8
7	Total turnover of supplier	1	1	1	1	1	1	3			9	6,1
8											0	0,0
9											0	0,0
Total		9	13	17	21	25	29	33	0	0	147	100,0

Key: more important as as important as less important as

Input Field

Figure 45: Weighting for Rating Criteria

As shown in Figure 45, the weighted-value is determined by using a pair-wise comparison. As described in chapter 3.4.2, this method is determining the weight by comparing two criteria with each other. For doing that, all criteria are put first vertically and then in the same sequence horizontally in a matrix. Usually the weight is determined by comparing the criteria from the lines with the criteria from the

columns by giving values of “5” (criterion in line is more important than criterion in row), “3” (both criteria are equally important) or “1” (criterion in line is less important than criterion in row). For the work in hand the importance of the criteria was rated in the survey and the factors are weighted according to the survey result from Figure 38. Therefore all blue input fields from Figure 45 have a rating of “5”, meaning that the criterion in the line is more important than the criterion in the row. To increase the operator convenience all white number-fields are calculated automatically. The number of criteria is not limited to a certain number. The above table is prepared for 9 criteria whereas only 7 are used. That means, two more criteria could be easily added for the supplier rating. After comparing the criteria the sum is calculated, starting with the factors, and then from the total as well. The vertical sum of the factors is just for double-checking since both, the vertical and the horizontal sum, must have the same total value. In this case factor no. 1 has a horizontal total value of 33. The total value of all horizontal and vertical factors is 147 which is the base for calculating the weight of all factors. The weight is calculated by multiplying the total value of a factor times 100 and then divided by the total value of all factors. This gives a weight for factor no. 1 of $33 \times 100 / 147 = 22.4$. The total of all factor weights must be 100.

The next step is to rate the supplier according the above defined and weighted criteria. As shown in Figure 46, on the left side of the table the criteria are listed in the same sequence as before in the table where the criteria were weighted. Beside the criteria the determined weight for every criterion is stated. The next row to the right is for rating a supplier by giving scores from 0 to 4 whereby 0 is of very low relevance and 4 of very high relevance. The scores are then multiplied by the above calculated weight of each criterion. At the end the vertical totals of the values are calculated and normalized to 100% by dividing the total weighted scores by the maximal score of 4. In case the rating would be done with scores from 0 to 10, the total weighted scores need to be divided by 10 to get the normalized value.

The key at the bottom of Figure 46 explains the different input fields. The blue field is used for the scores whereas in the white field the weighted value is calculated automatically by multiplying the weight value of the factor times the scores from the rating. For factor no. 1 and supplier Beta the weight value therefore is $22.45 \times 2 = 44.9$. The justification of the scores in the grey field is very important, as it makes the whole process transparent and replicable.

No.	Criteria	Weight [%]	Suppliers					
			Supplier Alpha		Supplier Beta		Supplier Gamma	
1	Number of alternative suppliers with production capability	22,45	0	0,0	2	44,9	4	89,8
			company A, B and C		company D		special prod. technology, no other supplier available	
2	Possibility of supplier change WITHOUT new development	19,73	0	0,0	4	78,9	4	78,9
			turning part		dc-motor		new development for other production technology	
3	Max. turnover share at supplier (own or from another customer)	17,01	1	17,0	1	17,0	4	68,0
			company Y with 11%		company X with 14%		company Z with 30%	
4	Possibility of design change WITHOUT customer approval testing	14,29	0	0,0	4	57,1	4	57,1
			part in the gear box, not testing relevant		interface to customer, part is testing relevant		new development, part is testing relevant	
5	Turnover with supplier	11,56	2	23,1	4	46,3	2	23,1
			turnover 0,5 mil.		turnover 2mil.		turnover 0,25mil.	
6	Interest of any OEM to keep supplier "alive"	8,84	4	35,4	0	0,0	2	17,7
			only Tier 2 supplier		supplies several OEM's		supplies 2 OEM's	
7	Total turnover of supplier	6,12	4	24,5	0	0,0	1	6,1
			4,5mil.		310mil.		89mil.	
8	0	0,00		0,0		0,0		0,0
9	0	0,00		0,0		0,0		0,0
Total		100,0	11		15		21	
Total Weigthed Scores			100,0		244,2		340,8	
Supplier Risk			25,0		61,1		85,2	
			Date:					
			Processor:					

Scores from 0 to 4	Weighted Scores
Justification for Scores	

Figure 46: Supplier Rating

To give a guideline of which score expresses which qualitative value, a valuation key is used to describe every criterion. The following valuation key is a proposal and can be adjusted according to the specific needs of a company. It needs to be determined at the very beginning of a supplier rating and must be the same for all ratings. A subsequent correction would change all ratings results and the final sorting result of the suppliers.

1) Number of Alternative Suppliers with Production Capability

No.	Criteria	Valuation Key				
		0	1	2	3	4
1	Number of alternative suppliers with production capability	≥ 2		1		0

Figure 47: Valuation Key for Criterion No. 1

As mentioned already in chapter 4.2.3, if the supplier runs into problems without having alternative source available, he needs to be supported even if (substantial) financial funds are involved. In the above proposed valuation key (see Figure 47), no alternative supplier is considered with a score of “4”, one alternative supplier is considered with a score of “2” and two or more suppliers are considered with a score of “0”.

As shown in Figure 46, for supplier Alpha three alternative suppliers are available, therefore the score is “0”.

2) Possibility of Supplier Change without new Development

No.	Criteria	Valuation Key				
		0	1	2	3	4
2	Possibility of supplier change WITHOUT new development	yes				no

Figure 48: Valuation Key for Criterion No. 2

A new development, caused by a supplier change, would generate additional costs and would probably lead to a delayed delivery since the development needs a certain time as well. This criterion offers only two possible answers (see Figure 48). If there is no possibility of a supplier change without a new development, a score of “4” is considered; otherwise a score of “0” is selected.

Supplier Alpha in Figure 46 is delivering turning parts. As there is no new development needed, both, the score and the weighted score for this question are “0”.

3) Maximum Turnover Share at Supplier

No.	Criteria	Valuation Key				
		0	1	2	3	4
3	Max. turnover share at supplier (own or from another customer)	<10%	<15%	<20%	<25%	>25%

Figure 49: Valuation Key for Criterion No. 3

In case any customer would reduce his share significantly due to economic fluctuations or other reasons, a supplier could face troubles because of a turnover shortfall which might lead to liquidity problems. Therefore the purchasing volume with a supplier should not exceed 25% to 30% of the total turnover in the supplier's business segment (Heß 2008: p. 216, Disselkamp & Schüller 2004: p. 169, Large 2009: p. 122). In this valuation key a turnover share of more than 25% is considered with a score of "4" whereas a turnover share below 10% is given a score of "0". In between the scores are distributed in 5% steps as it is shown in Figure 49.

Company Y has a purchasing volume of 11% of the total turnover of Supplier Alpha (Figure 46). The score is "1" since the value is between 10% and 15% and the weighted score for this question is "17".

4) Possibility of Design Change without Customer Approval Testing

No.	Criteria	Valuation Key				
		0	1	2	3	4
4	Possibility of design change WITHOUT customer approval testing	yes				no

Figure 50: Valuation Key for Criterion No. 4

The possibility of a design change without a customer approval testing is similar to the already mentioned new development from Figure 48. A customer approval testing would generate additional costs and time on the customer side. This criterion can concern all kind of parts since it depends on the requirements of the customer. This criterion has only two answering possibilities (see Figure 50). When there is no possibility of a design change without a customer approval testing a score of "4" is to choose, otherwise a score of "0" is considered.

The part of supplier Alpha in Figure 46 does not need a customer approval testing. Therefore the score is “0” and the weighted score for this question is also “0”.

5) Turnover with Supplier

No.	Criteria	Valuation Key				
		0	1	2	3	4
5	Turnover with supplier	C		B		A

Figure 51: Valuation Key for Criterion No. 5

The valuation key for the turnover with a supplier considers A, B and C-suppliers in terms of turnover with the supplier (see Figure 51). As already described in chapter 3.4.2, every single A-supplier needs to be checked in terms of his capability, his risk profile and his potential. In this valuation key a score of “4” is given to an A-supplier, a score of “2” is considered for a B-supplier whereas a score of “0” stands for a C-supplier.

Since the turnover with the supplier Alpha (see Figure 46) is €0.5 million which correlates with a B-supplier, the score for this question is “2” and the weighted score is “23.1”.

6) Interest of any OEM to keep Supplier "Alive"

No.	Criteria	Valuation Key				
		0	1	2	3	4
6	Interest of any OEM to keep supplier "alive"	yes		mid-term		no

Figure 52: Valuation Key for Criterion No. 6

If there are OEM's involved which need a certain supplier as well, the risk of a supplier default could decrease. For sure this question is not easy to answer and needs a careful investigation before a decision is taken. This criterion has three answering possibilities (see Figure 52). When there is no interest from an OEM a score of “4” is considered, when there is at least a mid-term interest from the OEM a score of “2” is chosen and when there is an interest of an OEM a score of “0” is selected.

Supplier Alpha from Figure 46 is a tier two supplier and does not deliver directly to an OEM. In this case an OEM has less interest to keep this supplier alive and a score of “4” is considered which results in a weighted score of “35.4”.

7) Total Turnover of the Supplier

No.	Criteria	Key				
		0	1	2	3	4
7	Total turnover of supplier		>100mil.	50-100mil.	5-50mil.	<5mil.

Figure 53: Valuation Key for Criterion No. 7

The total turnover is important since it indicates a company's size and the likelihood of its failure due to insolvency. This criterion has four possible answers which are based on a study from Euler Hermes Kreditversicherungs-AG and “Zentrum für Insolvenz und Sanierung” at the University of Mannheim (ZIS). The survey included 125 insolvency administrators who were at that time responsible for in total 19.000 insolvencies (Wirtschaft Konkret 2006: p. 15). In this valuation key a score of “4” is considered for a supplier turnover of less than €5 million, between €5 and €50 million a score of “3” is given and between €50 and €100 million a score of “1” is considered. A turnover above €100 million is rated with a score of “1”.

Supplier Alpha from Figure 46 has a turnover of €4.5 million and therefore a score of “4” is given which results in a weighted score of “24.5”.

The supplier rating described above considers the risk of a supplier which is shown at the vertical axis of the Supplier-Risk-Portfolio. To display the significance of the consequences and losses, the turnover share of the supplied projects is reflected by the horizontal axis. It gives a percentage of the affected total turnover, in case of a supplier default. A calculation can be seen in Figure 54.

Projects of Company X

(x) = project A to G		A	B	C	D	E	F
Project Volume / Year	A(x) [T pcs.]	10	20	40	80		
Product Price	B(x) [€]	90	100	110	140		
Turnover	C(x) = A(x) x B(x) [T€]	900	2.000	4.400	11.200		
Total Turnover	D = $\sum C(x)$ [T€]			18.500			
Share from Total Turnover	E(x) = C(x) / D [%]	5%	11%	24%	61%		

Project	Supplier Alpha				Supplier Beta				Supplier Gamma			
	A	B	C	D	A	B	C	D	A	B	C	D
Piece Price	1,20	3,55	10,50			32,80	34,10					3,14
Turnover with Supplier / Project	G(x) = A(x) x F(x)											
Total Turnover with the Supplier	12	71	420	0	0	656	1.364	0	0	0	0	251
Turnover of the Supplied Projects	H = $\sum G(x)$											
	503								251			
Turnover of the Supplied Projects	C(x) = A(x) x B(x)											
	900	2.000	4.400	0	0	2.000	4.400	0	0	0	0	11.200
Total Turnover of the Supplied Projects (= possible loss in case of supplier default)	J = $\sum C(x)$											
	7.300								11.200			
Share of Total Turnover of the Supplied Projects from the Total Turnover	K = J / D											
	39%								61%			

Figure 54: Calculation of the Affected Turnover

According Figure 54 supplier Alpha is delivering parts to company X for the three projects A, B and C. These three projects generate 39% of the total turnover of company X. In case supplier Alpha cannot deliver parts due to bankruptcy or any other reason, it would affect 39% of the total turnover of company X. Even if there is only one part missing from the final product, the production needs to be stopped and the product cannot be sold to the customer (see the Philips story in chapter 2.3). Supplier Beta is delivering parts for project B and C. The costs of these parts (€2.02 million) are in total four times higher than the costs for the parts of supplier Alpha (€503,000) for the projects A, B and C. Although the purchasing volume with supplier Beta is four times higher, supplier Alpha influences the total turnover of company X with 39% more than supplier Beta with 35%. Supplier Gamma is delivering parts for project D only. He is influencing 61% of the turnover of company X, although his turnover with the supplier is only €251.000. As confirmed by this example, the affected turnover is more informative in terms of significance of the consequences and losses than only the turnover generated with a supplier.

After calculating the risk of the supplier and the significance of the consequences and losses, the data is provided to the risk managers. They have to weigh the received data according to the company's risk strategy. The weighting works with the same method as explained above (Figure 46) and can be seen in Figure 55. When the turnover share is considered as more important as the supplier risk, the turnover share needs to be rated with a "5", if both are equally important the turnover share needs to be scored with a "3" and in case the supplier risk is considered as more important, the turnover share needs to be rated with a "1". In the example presented in Figure 55 the turnover share is considered as more important and results in a value of 66.7%.

		Turnover Share	Supplier Risk								Total	Weighted [%]
No.	Criteria	1	2	3	4	5	6	7	8	9		
1	Turnover Share	3	5								8	66,7
2	Supplier Risk	1	3								4	33,3
3											0	0,0
4											0	0,0
5											0	0,0
6											0	0,0
7											0	0,0
8											0	0,0
9											0	0,0
Total		4	8	0	0	0	0	0	0	0	12	100,0

Key: 5 more important as 3 as important as 1 less important as

Input Field

Figure 55: Weighting for Supplier Sorting

The logic behind the weighting is, that it provides the possibility to prefer either the turnover share or the supplier risk when the sorting is done. This decision depends on the company risk strategy as explained in chapter 2.2. and need to be defined before the rating is done. The calculation is performed by multiplying the turnover share times the weight of the turnover share. In the example in Figure 56 the calculation for supplier Gamma is $60.5 \times 66.7\% = 40.4$. After calculating the weighted turnover share and the weighted supplier risk, the values are added to the total value. For supplier Gamma the total value is $40.4 + 28.4 = 68.8$. According this total result the sorting is done as shown in Figure 56 on the right side. The rating is accomplished with MS Excel; the sorting process is automated by using a macro¹.

Supplier	No.	Turnover Share	Supplier Risk	Turnover Share Weighted - 66,7%	Supplier Risk Weighted - 33,3%	Total
Supplier Gamma	3	60,5	85,2	40,4	28,4	68,8
Supplier 7	7	60,0	52,0	40,0	17,3	57,3
Supplier 5	5	67,0	32,0	44,7	10,7	55,3
Supplier Beta	2	34,6	61,1	23,1	20,4	43,4
Supplier 6	6	56,0	10,0	37,3	3,3	40,7
Supplier Alpha	1	39,5	25,0	26,3	8,3	34,6
Supplier 4	4	9,0	79,9	6,0	26,6	32,6
Supplier 9	9	31,0	17,0	20,7	5,7	26,3
Supplier 8	8	15,0	45,0	10,0	15,0	25,0

Figure 56: Risk Factor Calculation

After sorting the suppliers according their weighted values the risk managers can start to audit the suppliers according the sequence of the sorting result. To give a graphical overview about the relationships amongst the suppliers, the data is visualized in a Supplier-Risk-Portfolio as shown in Figure 57. It is Important to note, that the weighted values are only used to influence the sorting of the suppliers according the risk strategy of a company, but not to change the position of the suppliers in the Supplier-Risk-Portfolio. The reason therefore is that the values of the turnover share and the supplier risk are not changing in absolute terms, thus the position in the portfolio must not change as well. Like already explained in chapter 3.4.2, norm or standard strategies can be derived from the position in the portfolio to influence the supplier base according to the defined risk strategy. The numbers in the bubbles reflect the numbers of the supplier in Figure 56. The key on the right side of the Supplier-Risk-Portfolio reflects the sorting result from Figure 56 and shows the sequence of the later following financial supplier audits.

¹ A macro is a program which consists of a predefined sequence of commands or actions. It is often used in spreadsheets or data bases to accelerate the work with often used command sequences. In this case it enables a sorting of the suppliers with one mouse click.

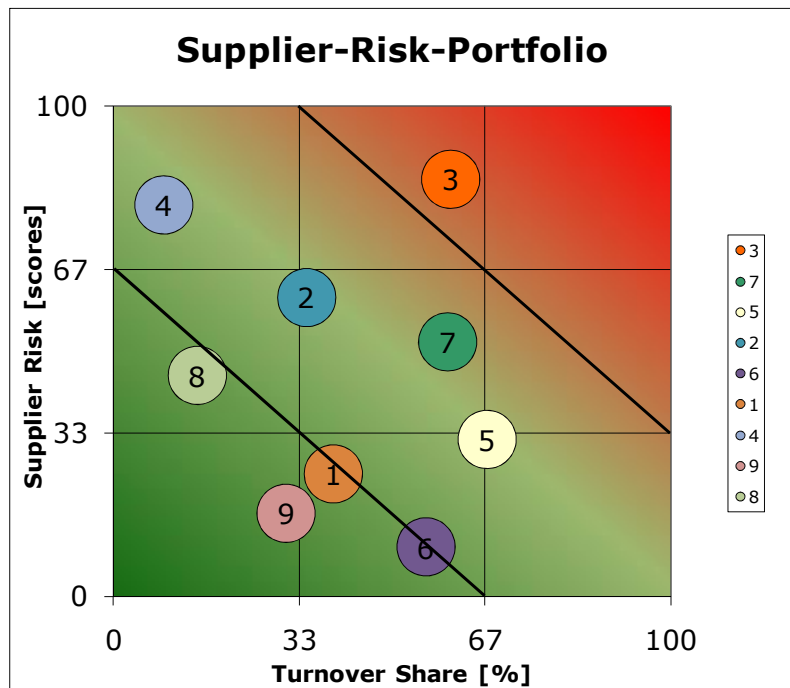


Figure 57: Supplier Risk Portfolio

Having the initial situation of an insufficient defined process, a customized supplier rating method was developed in this chapter. It was put together step by step, using theoretical approaches from established literature. Considering transparency and replicability as basic requirements of supplier ratings (see chapter 3.1.2), the customized rating method enables to sort suppliers according their risk and their possible negative financial impact to a company.

6. Conclusion

Target of this Master Thesis was to develop a rating method to sort suppliers according their risk and their possible negative financial impact to a company. To achieve such a sorting, sorting criteria needed to be defined and therefore the main research question to be answered in this master thesis was:

Which criteria are needed for a supplier pre-ranking in order to monitor a supply base of more than 10.000 suppliers worldwide efficiently and effectively?

The basics of risk management were explained in chapter 2. It was shown that risk identification coupled with risk analysis and risk assessment is the most important step in a risk management process. Both are part of the so called “early warning system” which should identify risks before they arise in order to have ample time to take countermeasures. The ranking of criteria was figured out by a survey among the European purchasing directors and department managers of several MAGNA divisions. Before the new rating method was developed, the theoretical approaches for supplier rating & classification were explained in chapter 3. The focus thereby was to figure out which rating method is useful to perform a meaningful rating with less effort and the possibility to adjust the weight of different parameters. The score method was chosen since this qualitative method enables to make subjective evaluations and enables to weight the criteria according their importance.

Based on the findings of chapter 2, 3 and 4, a customized supplier rating method was developed in chapter 5. The supplier rating starts with a weighting of the criteria whereby the significance of the criteria complies with the survey results from chapter 4. The rating itself consists of seven questions where at the end the total weighted value is calculated which basically reflects the relevance of a supplier for a company or in other words the supplier’s risks. To evaluate the possible negative impact of a supplier the influenced turnover was considered. Based on the calculated values, a Supplier-Risk-Portfolio was drawn whereby the horizontal axis reflects the turnover share and the vertical axis stands for the supplier’s risk. For the sorting of the suppliers an additional weighting possibility was considered to enable an adjustment according to the risk strategy of a company.

The developed rating method enables the risk managers to sort suppliers according to their risk, their possible negative impact or both combined. Based on the sorting result the financial audits can be conducted. The rating enables a prioritization of the suppliers according to the financial impact on the company. The Supplier-Risk-Portfolio also visualizes the relationships amongst the suppliers and gives the buyers a better overview of their supplier base. Based on the position in the Supplier-Risk-Portfolio activities can be derived to handle the supplier risks and to influence the supplier base according to the defined risk strategy.

The developed rating method is based on an MS Excel spreadsheet which is also the most common used software of the survey participants (see chapter 4.2.4). Up to a certain number of suppliers this seems to be reasonable, however, if the number of suppliers becomes larger and more people need to have access to the data, a customized tool or software is seen as reasonable. Therefore a future improvement would be to implement the supplier rating into the eRFX, a web-based supplier database of MAGNA. This would also support the approach of cross-company ratings which is very important for the survey participants (see chapter 4.2.4).

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10. Appendix

Questionnaire to Supplier Risk Management and Supplier Rating

0 Instruction to fill in the questionnaire

Please type an "x" in the field which you want to choose.

1	2	3	4	5
	x			

At some questions you can add something, type your remark directly in the text field.

e.g.:

Other method. If yes, which one: Test method

You can only type in grey shaded fields.

Thank you for taking the time to fill in the questionnaire!

1 Personal Details

All data will be processed strictly confidential and anonymous!

1.1 How many years work experience do you have?

<5	<10	<15	<20	>20

1.2 How many years do you work in the Automotive Industry?

<5	<10	<15	<20	>20

1.3 How many years do you work in your current company?

<5	<10	<15	<20	>20

2 Details to your Business Unit

2.1 To which Business Unit do you refer with your answers?

MAGNA Division

MAGNA Plant

2.2 How many suppliers (released for quotation) do you have in your business unit?

<50	<100	<200	<300	>300

2.3 Please indicate the geographical distribution of your suppliers.
(in % from purchasing volume)

EU

Asia / Pacific

North America

South America

Africa

<5%	<20%	<40%	<60%	>60%

2.4 How many people are working altogether in your business unit?

<500	<1.000	<2.500	<5.000	>5.000

2.5 How many people in your business unit work in purchasing?

<5	<15	<30	<60	>60

2.6 What was the purchasing volume [mil. €] in 2009 in your business unit?

<50	<100	<250	<500	>500

2.7 What was the total turn over [mil. €] in 2009 in your business unit?

<100	<200	<500	<1.000	>1.000

4 Supplier Rating

4.1 Are supplier risk's of any kind (market position, location, financing, ...) a part of your supplier rating?

If yes, how are they considered for the supplier selection?
If no, how they should be considered?

very					not at all
1	2	3	4	5	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 How important is it in your company that supplier risk management and supplier ratings are organized across different locations?

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.3 According to which criteria do you rate your suppliers?

Price / Costs
Quality of delivered parts
Quality capability (engineering, production)
Deliver performance (quantity, delivery date, wrong deliveries, ...)
Credit rating / financial strength
Location (engineering, production)
Corporate policy
Communication / Cooperation
Capacity (staff, machinery)
Flexibility
Engineering potential / Know How
Environmental protection

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other criteria. If yes, which:

4.4 Which departments are in your business unit responsible for supplier ratings?

Purchasing
Quality
Engineering
Logistic
Finance
Risk Management
No supplier rating

yes	no
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Other department. If yes, which:

4.5 How does the different departments work together for rating a supplier?

Work as interdisciplinary working- / project group
Work independent from another

yes	no
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

4.6 How the rating results of the different departments are considered?

Individually (approved / not approved)
Combined (key figure / portfolio, ...)

yes	no
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

4.7 According which criteria do you classify your suppliers?

Deliver performance (quality, delivery date, wrong deliveries, ...)
Purchase volume
Supplier status (system supplier, part supplier, ...)
Kind of purchased parts (standard parts, turning parts, ...)
Kind of relationship (potential, released, blocked supplier)
Market position of supplier
Innovation level of supplier
Total turnover of supplier
Order frequency with supplier
No classification

yes	no
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Other criteria. If yes, which:

4.8 With which method do you classify your suppliers?

ABC-analysis
Portfolio-analysis
No classification

yes	no
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Other method. If yes, which:

4.9 Which tools / software do you use for supplier rating?

ERP system (e.g. SAP, Navision, ...)
Special software for supplier rating
Database
Excel

yes	no
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Other. If yes, which:

4.10 How often according your opinion a supplier should be rated?

1 x in 2 years	1 x per year	1 x per half year	continuously	only on demand
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>