

RECOMMENDATIONS FOR THE DEVELOPMENT OF A BALANCED SCORECARD FOR RISK MANAGE- MENT IN LOGISTICS

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Abstract The Balanced Scorecard is one of the most intensely discussed controlling instruments in recent literature. Countless papers deal with the application of this instrument to almost any department or problem of a company. The use of the Balanced Scorecard in logistics and risk management are two of these application areas. However, both application areas so far are only discussed separately in literature. Therefore, the paper provides some recommendations for the development of a Balanced Scorecard for risk management in logistics.

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1. INTRODUCTION

The increasing assimilation and substitutability of different firms' products in terms of functionality, quality, design and price make logistics an increasingly important critical success factor (Göpfert, 2005, p. 20). The high impact of logistics on a firm's success is empirically proved, whereby the effect of superior logistics services (in comparison to the competitors') is even higher than the one of low logistics costs (Dehler, 2001); (Engelbrecht, 2004). At the same time, individualisation of demand and contraction of product life cycles and innovation cycles considerably increase the complexity of logistics processes. In such a competitive environment characterized by increasing complexity and dynamics, enterprises are extremely vulnerable on a number of fronts. In order to guarantee effective and efficient logistics processes and a high service level, and to profit from the ability of logistics to increase a firm's success, it is crucial to implement an adequate logistics controlling system. The positive impact of a well-developed logistics controlling system on the (financial) success of logistics (and consequently of the whole enterprise) is also empirically proved (Blum, 2006). This system must not only focus on logistics costs (as traditional controlling systems often do), but must also account for logistics performance (which is even more important for success than is logistics costs). At the same time, the controlling system must ensure that detrimental factors which might affect the service level of logistics are recognized early enough, so that (logistics) managers can react preferably before any damage occurs. On the other hand, positive developments, i.e. chances should be perceived in time, too, in order to be able to profit from them before the competitors can.

The Balanced Scorecard is regarded as an instrument which meets all these requirements. Numerous publications on the use of this instrument in logistics and risk management prove this statement. However, both application areas so far are only discussed separately in literature so that there is no approach which deals with the potentials of the BSC for risk management in logistics. Therefore, this paper provides some recommendations for the development of a Balanced Scorecard for risk management in logistics. For this purpose, the approaches presented in (especially German) literature concerning the use of the BSC in logistics and risk management are first analysed separately and then integrated to an approach for risk management in logistics.

2. BSC-APPROACHES FOR LOGISTICS

2.1. Overview

In order to use the BSC adequately to control logistics processes, some modifications are necessary (Stölzle & Karrer, 2004, p. 137). Therefore, several suggestions have been made in literature concerning the (re-) design of a BSC for logistics which can be arranged according to the following criteria:

- First of all, we first have to discriminate between approaches which are designed for the logistics function of an industrial or trading firm for which logistics represents a secondary function that aids fulfilling the firm's main purpose from those which are designed for a logistics service provider whose primary purpose is to provide logistics services for other enterprises (logistics as the primary function of an enterprise). The following statements will focus on approaches designed for industrial and trading firms. For an analysis of approaches for logistics service providers see Siepermann, 2011.
- The second criterion refers to the way of adopting the BSC's basic form to the special needs of logistics. According to this criterion, we can distinguish approaches which only integrate logistical (performance) indicators into the four traditional perspectives (modification in content) from those which additionally modify the number and/or the mixture of perspectives (modification in content and structure).
- According to the level of detail we can differentiate between approaches for the aggregate logistics function and those which (alternatively or additionally) break down the total logistics function into sub-functions such as inbound, manufacturing, and outbound logistics.
- Finally we can distinguish between conceptual or theoretical approaches and those which arose from practical projects. The latter are italicised in Table 1. If the name of the firm for which the BSC was developed is mentioned in the respective paper, it is printed in brackets behind the authors' names.

Table 1 arranges the relevant approaches which can be found in literature according to these criteria.

Table 1 BSC-approaches for logistics of industrial and trading firms

	Modification in content	Modification in content and structure
Aggregate logistics function	<ul style="list-style-type: none"> – Engelke & Rausch, 2002 – Engelhardt, 2002 – Borsum, Kämpf & Kern, n.d. – Liberatore & Miller, 1998 – <i>Eschenbach & Haddad, 1999</i> – <i>Kindel, Lang, Schwarz & Sommerer, 2005 (Blechformwerke Bernsbach)</i> 	<ul style="list-style-type: none"> – Siepermann, 2003 or Vahrenkamp, 2007 – Piontek, 2007 or Gerberich, 2003 – <i>Stölzle, 2001</i> – <i>Karrer, Placzek & Stölzle, 2004</i> – <i>Galgenmüller, Gleich & Gräf, 2000 (Daimler-Chrysler)</i> – <i>Caplice & Sheffi, 1995 (Digital Equipment)</i>
Sub-functions	<ul style="list-style-type: none"> – Binner, 2002 	<ul style="list-style-type: none"> – Weber, 2002

2.2. Analysis of the approaches with modifications in structure and content

Among the approaches for industrial and trading firms, especially the modifications in structure, i.e. the suggested additional or modified perspectives are of major interest. Weber presents a system of Logistics-BSCs which consists of four scorecards: one for inbound logistics, one for manufacturing logistics, one for outbound logistics and one for the aggregate logistics function (Weber, 2002, p. 301 ff.). As sources and targets of the material flows are of the same significance for logistics, Weber proposes to introduce a supplier perspective into the scorecards for the logistical sub-functions, each of which contains the source-related objectives, measures and initiatives while the customer perspectives represent the target-side of the material flows. Thereby, the customer perspective of an upstream sub-function (e.g. the inbound logistics) maps the objectives regarding the respective downstream sub-function (e.g. the manufacturing logistics), and the supplier perspective of a downstream sub-function (e.g. the manufacturing logistics) maps the objectives regarding the respective upstream sub-function (e.g. the inbound logistics). Thus, the three sub-functional scorecards are linked together. In order to reduce the complexity of the sub-functional scorecards, the learning and growth-perspectives on this level are skipped. This perspective is only part of the scorecard for the aggregate logistics function which moreover contains a financial perspective, a coordination structure perspective, and a coordination process perspective. The two coordination perspectives should measure the performance of logistics with respect to the coordination of the value-added process, which is regarded as the main task of logistics. The coordination structure perspective measures

the coordination success achieved by structural initiatives (e.g. consideration of logistical aspects within product development and design). By contrast, the coordination process perspective indicates the extent of current coordination activities. As supplier-related interests are completely covered by the supplier perspective of the BSC for inbound logistics and customer-related aspects by the customer perspective of the BSC for outbound logistics, there is no reason to integrate these perspectives into the BSC for the aggregate logistics function.

Other authors introduce additional perspectives into their (aggregate) logistics scorecards, too:

- The perspective which is recommended most is a supplier perspective (Piontek, 2007, p. 179ff); (Gerberich, 2003, p. 361ff); (Karrer, Placzek & Stölzle, 2004, p. 506 ff); (Siepermann, 2003, p. 319ff); (Vahrenkamp, 2007, p. 431ff). The arguments are similar to Weber. As an alternative, a so-called market perspective is suggested. This contains supplier-related aspects as well as customer-related ones (Siepermann, 2003, p. 319 & 322). However, a supplier perspective is not only suggested in the context of logistics, but also completely independent of this application area (Friedag & Schmidt, 2002, p. 197ff).
- In order to link the logistics strategy to the strategy of the whole enterprise and to ensure that both are compatible with each other, Stölzle suggests an additional strategy perspective which should highlight the contribution of logistics to the implementation of the enterprise-wide strategy (Stölzle, 2001, p. 46 ff).

In order to avoid an overload of perspectives, the introduction of a new perspective is mostly compensated by skipping a traditional perspective or pooling two traditional perspectives together:

- Weber skips (as described above) the learning and growth perspective on the sub-functional level and on the aggregate level customer and internal business process perspective (Weber, 2002, p. 302 & 305 f.).
- Other authors skip the learning and growth perspective, too, because this perspective has no logistic-specific features and therefore seems to be dispensable in order to reduce complexity (Siepermann, 2003, p. 322; Vahrenkamp, 2007, p. 435 f.). Some enterprises abstain from integrating a learning and growth perspective into their logistics scorecard even when no other (non-traditional) perspective is implemented (Caplice & Sheffi, 1995, p. 69 ff); (Kohler & Köhler, 2002).
- As an alternative to total abandonment of a learning and growth perspective, Karrer, Placzek & Stölzle pool this perspective with the internal business process perspective and call the resulting perspective "people and processes". They argue that there is an extremely close relationship between effective and efficient processes (internal business process perspective) and the motivation and empowerment of the staff (learning and growth perspective) (Karrer, Placzek & Stölzle, 2004, p. 506).
- Galgenmüller, Gleich & Gräf choose the opposite route and split the learning and growth perspective of the traditional BSC into the perspectives

"management and people" and "innovation, learning and knowledge". The background of this modification is the interlinkage of the BSC and EFQM-model (Galgenmüller, Gleich & Gräf, 2000, p. 25).

- Piontek and Gerberich finally pool financial and customer perspective together and call the resulting perspective "claims of the company" (Piontek, 2007, p. 181; Gerberich, 2003, p. 363). This idea is copied from a Balanced Scorecard for materials management developed by Eschenbach (Eschenbach, 1999, p. 39). Eschenbach argues that the function materials management only serves internal customers. Unfortunately, this argument does not hold for logistics which also serves external customers.

2.3. Analysis of the approaches with (pure) modifications in content

Among the approaches for industrial and trading firms with (pure) modification in content (i.e. without modification in structure), only Binner's ideas need some explanation. Binner subdivides the logistics function into six so-called main processes (sales, development, procurement, manufacturing, distribution, and disposal). For each main process, he presents a balanced scorecard consisting of the four traditional perspectives for which he suggests different measures (Binner, 2002, p. 265 ff.). In contrast to Weber, the scorecards of the different main processes are not linked to each other in any way.

3. BSC-APPROACHES FOR RISK MANAGEMENT

3.1. Overview

Due to the balance of lag and lead indicators, the traditional Balanced Scorecard already supports the identification of prospective risks as the performance drivers (lead indicators) provide early information about the expected development of the financial indicators (lag indicators) (Kaninke, 2004, p. 89). However, many authors argue that the simple existence of lead indicators and their linkage to the lag indicators via a chain of cause and effect do not suffice in order to fully comply with the requirements of risk management (Link & Münster, 2007, p. 147). Consequently, they postulate a more or less deep modification of the traditional Balanced Scorecard in order to enable the concept to be an adequate instrument of risk management. The approaches which can be found in the literature range from the simple integration of risk indicators into one or all of the traditional perspectives over minor modifications of the traditional concept, to suggestions which contain a fundamental rearrangement and expansion of the traditional Balanced Scorecard, see Fig. 1 (also see Burger & Buchhart, 2002, p. 208 f); (Kaninke, 2004, p. 80 ff);

(Schmitz & Wehrheim, 2006, p. 122 ff); (Bauer, 2007, p. 24). Some concepts refer not only to a single enterprise, but are designed for an entire supply chain. Although a single firm's risk management is within the focus of this paper, some supply chain-related approaches are discussed, too, because they also provide valuable ideas for the development of a (single) enterprise-related BSC for risk management. By contrast, the approaches which profoundly modify the traditional BSC are excluded from the further analysis, since they veer rather far away from the traditional structure of the BSC (for a description and evaluation of these approaches see Siepermann, 2011). Although especially the approaches based on strategic success factors are able to capture the risks to which a firm is exposed much more comprehensively than the comparatively simple approaches which abstain from major modifications of the traditional BSC, their complexity hinders the integration into a possibly already existing scorecard and may lead to serious implementation and acceptance problems (Homburg, Stephan & Haupt, 2005, p. 1075). The RABASCO is mainly focused on banks; outside the bank sector, it is only of minor interest (Form, 2005, p. 140).

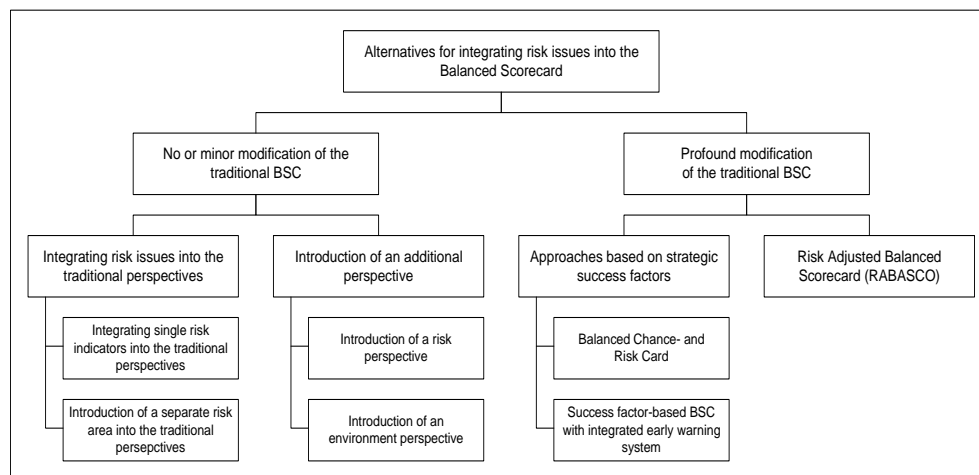


Fig. 1 Alternatives for integrating risk issues into the Balanced Scorecard

3.2. Integrating risk issues into the traditional perspectives

Within the approaches which integrate risk issues into the four traditional perspectives, we have to distinguish between those which do not modify the traditional structure of the perspectives and those which do by introducing a separate risk area into each perspective. Within the first group, we find the following suggestions in the literature:

- Approaches that integrate risk-related objectives and measures into the financial perspective (this possibility is already discussed by Kaplan & Norton, 1996, p. 50 f., 60 f. & 157),
- Approaches that integrate risk issues into the process or learning and growth perspective (Kaninke, 2004, p. 83 & 85); (Scholey, 2006),
- Approaches that integrate risk issues into each of the traditional perspectives (Oepping & Siemes, 2003); (Scheibeler, 2004); (Aichholz, 2002, p. 279 f); (Kaganskaya, 2007, p. 69 ff); (Horstmann, 1999, p. 198).

The approaches belonging to the second group differ from each other especially in the risk area design of each perspective:

- Weber, Weißenberger & Liekweg report in their "Balanced Scorecard Plus" for each objective aside from measures, targets and initiatives additionally important chances and risks and the related drivers which can influence the target achievement positively or negatively. For each driver or measure, a critical value has to be defined. When a measure exceeds or falls below the critical value, the achievement of the related objective is supposed to be at risk (Weber, Weißenberger & Liekweg, 1999a); (Weber, Weißenberger & Liekweg, 1999b, p. 31 ff.).
- Horváth & Partners propose building so-called "pairs of opposites" consisting of an objective (= chance) and a related risk which shall be operationalised by common measures for which not only targets (representing the chances), but also critical values (representing the risks) have to be defined. When a measure exceeds or falls below the critical value, initiatives to fend the risk have to be taken which are also displayed in the Balanced Scorecard (Horváth & Partners, 2007, p. 366 ff); (Gleich & Höhner, 2002); (Höhner & Rossitsch, 2002). Problems occur when there is no or more than one risk which is related to a special objective or when a risk is related to more than one objective or occurs independently of any objective which is especially true for external risks (Schmitz & Wehrheim, 2006, p. 129).
- Another approach which assigns possible risks to each measure of the BSC was developed by Gleißner and is called *Value-Based-Scorecard* (VBS) or *FutureValue Scorecard* (FVS) (Gleißner, 2000, p. 162 f, especially p. 163, note 4); (Gleißner, 2003a, p. 309 ff, especially p. 309); (Gleißner, 2003b, especially p. 4); (Gleißner, 2004, p. 255 ff., especially p. 285). However, further comments concerning the design of each perspective's risk area are missing in the author's papers.
- Kaluza & Dullnig and Winkler present an integrated performance-risk-BSC for supply chains (Kaluza/Dullnig, 2004, p. 503 ff); (Winkler, 2005, p. 281 ff. & 387 ff.). Into each perspective, a special risk area is introduced in order to capture the risks which endanger the achievement of the objectives of the related perspective. The risks are interpreted as objectives which have to be minimized. Just like the traditional objectives (which can be interpreted as chances), they are operationalised by measures, targets

and initiatives. In contrast to the approaches mentioned above, the integrated performance-risk-BSC abstains from an 1:1-assignment of objectives (chances) and risks. Thus, the problems which might occur in the approach according to Horváth & Partners are avoided.

- Finally, Zimmermann & Jöhnk describe the approach developed by a building association which has implemented a separate Balanced Scorecard for risk management in addition to the traditional BSC which they call BSC of strategic management. Both scorecards consist of the traditional perspectives (Zimmermann & Jöhnk, 2002, p. 896 f.). This approach can be regarded as a pre-stage of the Balanced Chance- and Risk-Card which also provides separate scorecards for chances and risks. We will discuss this approach in chapter 3.4.

3.3. Introduction of an additional perspective

Within the approaches that suggest the introduction of an additional perspective, we have to distinguish between a risk and an environment perspective:

- A special risk perspective is especially recommended for risk management in banks (Meyer & Köhle, 2000); (Kaum, 2000); (Harengel, 2000, p. 182 ff); (Wagner, 2000); (Schwaiger, 2002, p. 20). In that risk perspective, risk-related objectives are displayed and operationalised by measures, targets and initiatives to combat the risks. Although up to now, a separate risk perspective has almost exclusively been discussed for risk management in banks (the only concept with a separate risk perspective which is not developed for banks originates from Teichmann & Erkens, 2000, and was designed for the residential trade and industry), the idea seems to be transferable to other fields of application.
- Approaches with an additional environment perspective have been developed by Broetzmann & Oehler, Kirchner, Dieckmann, Fröhling and Lingnau & Jonen. The main idea of the Broetzmann & Oehler approach is the integration of environment-related measures into the cause-and-effect relationships. These environment indicators should help to identify trends that might affect the objectives of the other perspectives (Broetzmann & Oehler, 2001); (Broetzmann & Oehler, 2002). Kirchner proceeds in a similar manner. He also suggests an environment perspective for the external risks, while the internal ones are assigned to the traditional perspectives. In contrast to the traditional perspectives, which consequently contain chances and risks, the environment perspective only covers risks (Kirchner, 2002, p. 56 ff., especially p. 66 ff). Other suggestions concerning the introduction of an environment perspective originate from Dieckmann and Fröhling (Dieckmann, 2002); (Fröhling, 2003, p. 201); however, both authors abstain from further comments regarding that perspective. Lingnau & Jonen

finally pickup the idea of introducing an environment perspective for their *Balanced Supply Chain Risk Map* (BSCRM) and add a risk table to the scorecard in order to illustrate the interdependencies between the different risks (Lingnau & Jonen, 2007, p. 345 f.).

4. RECOMMENDATIONS FOR THE DEVELOPMENT OF A BALANCED SCORECARD FOR RISK MANAGEMENT IN LOGISTICS

4.1. Further proceeding

As the above comments show, there is no consensus in the literature as to how a Balanced Scorecard for logistics or risk management should be structured. In this chapter, we therefore analyse the presented approaches of a BSC for logistics on the one hand and for risk management on the other, in order to deduct some recommendations for the development of a BSC for the respective context. Finally, we use the insights of this analysis to develop a BSC-approach for risk management in logistics.

4.2. Recommendations for the development of a Balanced Scorecard for logistics

The relevance of the financial perspective is beyond dispute. This perspective helps verify whether the logistics strategy could successfully be implemented and to what extent the logistics function contributes to the (financial) success of the whole enterprise.

The customer perspective shall inform about the ability of logistics to fulfil the requirements of the external and/or internal customers. Even if an immediate external customer contact is missing, e.g. because the outbound logistics has been outsourced to an external service provider or an internal logistics sub-function like inbound or manufacturing logistics is regarded, the logistics services have a high impact on the service level perceived by the (external) customers and consequently their satisfaction which, for its part, influences their future buying behaviour and, in the end, turnover. Against this background and in light of the empirically proven high impact of logistics services on a firm's (financial) success, the customer perspective should not be pooled together with the financial perspective as Piontek and Gerberich propose.

The internal business process perspective deals with the effective and efficient design of the logistics processes. Effective processes are an important precondition for a high service level and therefore affect the objectives of the customer perspective. Efficient processes allow for low logistics costs and consequently

have immediate impact on the firm's financial objectives. Due to the variety, complexity and heterogeneity of logistics processes, we should abstain from pooling the internal business process perspective together with another perspective as proposed by Karrer, Placzek & Stölzle, at least in industrial enterprises for which the logistics function represents a critical competitive advantage.

As logistics is a very people-intensive service area, qualification and motivation of the staff have a high impact on the effectiveness and the efficiency of the logistics processes. Moreover, in customer-oriented logistics sub-functions, the employees' behaviour immediately affects customer satisfaction. However, the (logistical) staff is only able to satisfy external as well as internal customers if they have access to all necessary information on time. Following these arguments, the significance of the learning and growth perspective within a logistics scorecard must not be underestimated, even when the objectives and measures of this perspective will hardly be logistics-specific. In order to achieve the (logistics-specific) objectives of the other perspectives, we have to carefully monitor that the objectives of the learning and growth perspective are met by the logistics function. However, a further splitting of this perspective as proposed by Galgenmüller, Gleich & Gräf seems unnecessary.

Especially in times of decreasing manufacturing penetration, the service level which a firm can offer its customers depends not only on its own logistics services, but also on the suppliers' service capability. In order to adequately control collaboration with suppliers, the introduction of a separate supplier perspective seems useful. By contrast, an integration of supplier-related objectives and measures into the customer perspective is not recommended, since an enterprise normally pursues different objectives up- and downstream and different employees are responsible for achievement of the respective objectives. In scorecards for logistical sub-functions, suppliers can also be upstream departments whose (logistical) service capability has high impact on the service level which the regarded sub-function is able to provide to its (internal or external) customers.

The main task of logistics consists of providing a smooth flow of goods and information. In order to fulfil this task, the purchasing, manufacturing and sales activities have to be coordinated and harmonised. Against this background, we could add a coordination perspective to our logistics scorecard which measures coordination success. On the other hand, the (leading) logistics employees are responsible for coordination and successful coordination activities immediately lead to effective and efficient processes, satisfied customers, smooth collaborative processes with suppliers and (finally) low logistics costs. Thus, coordination aspects can be captured in the other perspectives as well. The introduction of a separate coordination perspective would even be counterproductive due to several overlaps with other perspectives, as described above. Therefore, it seems preferable to abstain from integrating a separate coordination perspective into a logistics scorecard. The two coordination perspectives, as proposed by Weber, would be absolutely exaggerated.

Another dispensable perspective is the strategy perspective which Stölzle discusses, since an inferior scorecard like the one for logistics always has to be ali-

igned with the superior scorecards and the strategic reference has to be assured for all objectives and measures displayed in the scorecard.

4.3. Recommendations for the development of a Balanced Scorecard for risk management

In order to rate the BSC-approaches for risk management presented in chapter 3, we especially have to weigh the integration of risk issues into the traditional perspectives against the introduction of a separate risk perspective. Table 2 states a slight advantage for the first mentioned alternative (Tewald, 2005, p. 21 ff); (Homburg, Stephan & Haupt, 2005, p. 1074 f); (Pedell & Schwihel, 2004, p. 151); (Wurl & Mayer, 2001, p. 204 ff); (Lingnau & Jonen, 2007, p. 342); (Romeike, 2003, p. 96 ff); (Gleißner & Romeike, 2005, p. 71 ff); (Wolf, 2003, p. 99 ff); (Bauer, 2007, p. 24 ff.). This advantage can even be enlarged by introducing an environment perspective into the BSC, allowing one to capture the external risks. The establishment of separate areas for chances and risks within each perspective moreover makes it possible to benefit (at least to some extent) from the advantages of a separate risk perspective. Altogether, the introduction of a separate risk area into each (traditional) perspective, combined with a fifth (environment) perspective for the external risks (and chances), seems to be the best alternative for adapting the Balanced Scorecard to the special requirements of risk management.

Regarding the inner structure of the risk areas within the different perspectives, we recommend a partition into the columns "risks", "risk indicators", "critical values" and "initiatives". The similarity to the traditional structure of the perspectives, and therefore the chance-side, guarantees a balanced view of chances. The responsibilities for the risk-related initiatives result from the perspective to which the respective risk is assigned. A 1:1-assignment of objectives (chances) and risks in terms of pairs of opposites, as proposed by Horváth & Partners, is not recommended (at least not imperatively), since it must be possible to assign any number of risks (including zero) to an objective. The total number of risks and risk indicators displayed in the Balanced Scorecard should approximately equal the total number of objectives and related measures. Thus, an adequate overview over a firm's risk situation is guaranteed without overloading the scorecard. In order to select the most important ones from the multitude of risks, we can use the well-known instruments of risk assessment (e.g. risk maps). The relationships between the different risks as well as between risks and objectives (chances) have to be integrated into the chain of cause-and-effect relationships, whereby it is not mandatory that the relationships between the risks are identical to those between the corresponding objectives (chances).

Table 2 Comparison between the integration of risk issues into the traditional perspectives and the introduction of a separate risk perspective

Integrating risk issues into the traditional perspectives	Introduction of a separate risk perspective
+ Relationships between objectives (chances) and related risks are pointed out by assigning the identified risks to the respective perspectives and measures where they could cause deviations; this enhances risk awareness	– Relationships between objectives (chances) and related risks are lost as risks are displayed in a separate perspective and an immediate allocation between risks and measures, where they could cause deviations, is missing
– Recording risks which cannot be assigned (clearly) to one of the existing perspectives is problematic; this especially affects external risks, so that the scorecard cannot reflect the complete risk situation	+ Risks can completely be reported in the risk perspective which is especially advantageous for external risks that usually cannot be assigned to one of the traditional perspectives
+ The responsibilities for the different risks are clearly defined and the employees are sensibilised for risk management by assigning the identified risks directly to the respective perspectives	– Danger of separating the responsibility for objectives and risks
– The overview over the complete risk situation is damaged as risks are scattered over different perspectives	+ Compressed overview over a firm's complete risk situation which facilitates the communication of risks
+ The understanding of risk interdependencies is enhanced via cause-and-effect analysis	– The understanding of risk interdependencies is damaged as the cause-and-effect relationships that normally stretch from the learning and growth to the financial perspective are interrupted by the risk perspective

4.4. A Balanced Scorecard for risk management in logistics

Bringing the statements concerning the design of a Balanced Scorecard for logistics and for risk management together, we get a Balanced Scorecard for risk management in logistics consisting of five perspectives (finance, customer, supplier, internal business processes, and learning and growth) and eight fields or columns within each perspective (objectives, measures, targets, and initiatives for the chances and risks, risk indicators, critical values and initiatives for the risks). As the external risks displayed in the environment perspective usually do not have corresponding objectives or chances, the first four (traditional) columns "objectives", "measures", "targets" and "initiatives" can be dropped. This structure allows one to capture at least a good portion of the logistics-related risks and to align them to the corresponding objectives or chances. Thus, the employees responsible for achieving the different (logistical) objectives displayed in the Balanced Scorecard

can easily identify the risks that might affect the achievement of the objectives. Risks that absolutely cannot be assigned to one of the suggested perspectives can alternatively be reported in the financial perspective, since sooner or later all risks affect the financial objectives and measures (Tewald, 2005, p. 21).

5. CONCLUSION

The implementation of a Balanced Scorecard for logistics requires a logistics strategy which has to be deduced from the enterprise strategy, since a differentiation strategy requires a separate logistical orientation than a cost leadership strategy does. However, the implementation process can also be used in order to become clear about the strategy and to establish consensus about it. As the achievement of the objectives deduced from (logistics) strategy is exposed to several risks, it seems useful to integrate risk issues into a logistics scorecard. This helps to communicate the risk strategy. The analysis of the cause-and-effect relationships among the different objectives (which can be interpreted as chances), between the different risks and between both of them (i.e. between chances and risks), reveals the total network of relationships between chances and risks. The definition of critical values for the risk indicators assures the concentration of relevant threats and prevents an information overload of the (logistics) managers.

Problems may occur in defining the "correct" critical values of the risk indicators, since a too low level might imply a precipitate reaction, while a too high level reduces the available time to fend off the risk. Further problems are related to the cause-and-effect analysis which is much more complex than in the traditional Balanced Scorecard since not only the relationships between the different objectives have to be modeled, but also those between the risks and between objectives and risks, as well. An appropriate approach for the identification and mapping of risk interdependencies is presented by Lingnau & Jonen. They call it "cognitive card" (Lingnau & Jonen, 2007, p. 346 ff.). Finally, the identification of logistical risks is focused on the perspectives of the logistics scorecard, so that we cannot be absolutely sure we have truly identified all important logistical risks. Therefore, the logistics scorecard has to be integrated into a comprehensive early-warning system (Homburg, Stephan & Haupt, 2005, p. 1074). As a core element of such a system, it can help a firm find its way in an increasingly turbulent environment.

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