



**Humanitarian Supply Chain Performance Management:
Development and Evaluation of a Comprehensive
Performance Measurement Framework Based on the
Balanced Scorecard**

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Table of Contents

Index of Illustrations.....	3
1. Introduction.....	4
2. Literature Review on Humanitarian Logistics and Performance Measurement.....	6
2.1 Humanitarian Logistics	6
2.2 Performance Measurement in Humanitarian Logistics.....	8
2.3 The Balanced Scorecard	9
2.4 Results	21
3. Development of a Balanced Scorecard for Performance Measurement in Disaster Relief	22
4. Evaluation of the Developed Balanced Scorecard for Performance Measurement in Disaster Relief	27
4.1 Research Strategy, Sample Selection and Data Analysis.....	27
4.2 Evaluation of the Challenges Concerning Performance Measurement and Requirements for Performance Measurement Frameworks (RQ 1)	29
4.3 Evaluation of the Balanced Scorecard Perspectives (RQ 2)	32
4.4 Evaluation the Balanced Scorecard Performance Measures (RQ 3)	34
4.5 Evaluation of the Recommendations Given for Humanitarian Organizations (RQ 4).....	36
5. Conclusion and Outlook	38
Bibliography.....	40



Index of Illustrations

III. 1: Commercial sector vs. non-profit sector strategy map 11

III. 2: Sources related to the use and applicability of the BSC in humanitarian logistics 12

III. 3: BSC approach centered around national policies for natural disaster management in project life cycle phases..... 13

III. 4: BSC objectives in the emergency relief phase..... 14

III. 5: IFRC Development Indicator Tool after the pilot phase 15

III. 6: Reference mission map for humanitarian supply chain management 17

III. 7: BSC strategy map for performance measurement in humanitarian logistics 19

III. 8: Evaluation of the BSC based on the evaluation criteria by Caplice and Sheffi..... 20

III. 9: Balanced Scorecard for performance measurement in disaster relief 24

III. 10: Perspectives, sub-categories and objectives of the BSC for performance measurement in disaster relief..... 25

III. 11: Overview of interview partners..... 28

III. 12: Distribution of the performance measures chosen by the interviewees..... 35

III. 13: Performance measures chosen by four out of five interviewees 36



1. Introduction

The number of natural disasters has steadily been increasing since 1960 (EM-DAT 2015). This increasing frequency is accompanied by an increased severity in terms of individuals injured or killed as well as the scale of the financial impact of these events (Tatham and Hughes 2011, 66). According to Munich Re's NatCatSERVICE database (2015), which is the most comprehensive natural catastrophe loss database in the world, eight out of the top ten deadliest as well as costliest natural disasters that were recorded between 1980 and 2014 have happened since 2003. Not only natural disasters, but also manmade disasters are expected to increase another five-fold over the next fifty years due to environmental degradation, rapid urbanization as well as the spread of diseases in the developing world (Thomas and Kopczak 2005, 1). Furthermore, the world faces many structural problems like hunger, lack of proper sanitation and displacement (Van der Laan, Brito and Vergunst 2009, 23). Therefore, the global demand for humanitarian assistance, especially with regard to disaster relief, is rising and will continue to rise (Christopher and Tatham 2011, 1; Thomas and Kopczak 2005, 1).

Van Wassenhove (2006, 475) estimates that around 80 percent of the expenditures of aid agencies are in the area of supply chain management. Consequently, measuring and optimizing the performance of their relief chains has become critical for all organizations involved in disaster management (Beamon and Balcik 2008, 5). Given the contributions of US\$24.5 billion that international humanitarian assistance received in 2014 (GHA 2015, 2), the resultant procurement and logistical spend of around US\$19.5 billion provide an enormous potential for improvement and thus a substantial benefit to those affected by disasters (Christopher and Tatham 2011, 2).

While performance measurement has long been recognized as an important competitive advantage (Kaplan and Norton 1992; 1996) and a critical element to improving the efficiency and effectiveness of commercial supply chains, measuring performance in a structured and standardized way unfortunately is still not common in the humanitarian context (Van der Laan, Brito and Vergunst 2009, 24). As of 2010, only 20 percent of humanitarian organizations consistently monitored and reported their performance (Blecken 2010, 677).

Due to the distinctive legal and financial status of non-profit organizations, it is difficult to assess their performance using common measures (e.g. profitability) of for profit organizations (Forbes 1998, 184). Furthermore, unlike the private sector, which often focuses solely on the financial



bottom line, non-profit organizations have two major bottom lines: mission effectiveness and financial sustainability (Beamon and Balcik 2008, 10).

Against the background of for-profit companies realizing in the late 1980s and early 1990s that financial measures alone are inadequate for measuring performance as they communicate little about long-term value creation, Robert Kaplan and David Norton introduced the Balanced Scorecard model (BSC) in 1992 (Kaplan 2001, 454). This performance measurement system retained an emphasis on financial measurements but complemented these with measurements from three other perspectives: customer, internal business processes as well as learning and growth (Kaplan 2001, 354). Today, the BSC has become one of the most commonly used tools in performance management and has been credited by the Harvard Business Review as one of the most important and influential management tools of the 20th century (Bourne, Kennerly and Franco-Santos 2005, 373).

Even though the initial focus and application of the BSC was in the commercial sector, Kaplan (2001, 354) states that: “the opportunity for the scorecard to improve the management of non-profits should be even greater.” Therefore, the objective of this paper is to develop and evaluate a comprehensive performance measurement framework for humanitarian supply chains based on the Balanced Scorecard model. This implies the identification of appropriate financial and non-financial performance measures that will assess the performance of humanitarian supply chains in the context of disaster relief. This paper is based on the assumption that a modified version of the Balanced Scorecard can be used to improve the efficiency and effectiveness of supply chain processes in the disaster relief context. It aims to answer the following research questions (RQ):

- RQ1: What are the challenges concerning performance measurement in the disaster relief context and what requirements should performance measurement frameworks meet?
- RQ2: How do the four perspectives of the Balanced Scorecard need to be adapted in order to be applicable in this context?
- RQ3: What are appropriate performance measures to track in this context?
- RQ4: What are recommendations for humanitarian organizations concerning the implementation of the Balanced Scorecard as a performance measurement framework?

Humanitarian organizations typically engage in two broad types of activities: relief activities and development activities. Whereas relief activities are short-term activities that aim at minimizing the



immediate risk after a disaster, development activities refer to longer-term aid focusing on community self-sufficiency and sustainability (Beamon and Balcik, 2008, 5). This paper will focus on supply chain performance measurement for relief activities.

2. Literature Review on Humanitarian Logistics and Performance Measurement

2.1 Humanitarian Logistics

There are numerous definitions of humanitarian logistics¹ but the one that is adopted most frequently in literature is the one given by Thomas and Kopczak (2005, 2). They define humanitarian logistics as follows:

“(...) the process of planning, implementing and controlling the efficient, cost effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people. The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing, and customs clearance.”

Logistics is central to disaster relief because it is crucial to the speed and effectiveness of response, because it accounts for a major part of the cost of aid agencies and because data captured by logistics departments provide an important source for post event learning (Pettit et al. 2011, 104; Thomas and Kopczak 2005, 2).

When comparing humanitarian supply chains to supply chains in the commercial field, there are striking differences in terms of strategic goals, customer characteristics as well as demand characteristics and order fulfillment:

(1) Strategic goals: While the strategic goal of the commercial supply chain is to produce high quality goods at low cost in order to maximize profitability, to deliver financial returns to shareholders and to satisfy customer demands, the strategic goal of humanitarian supply chains is to minimize the loss of lives and to alleviate the suffering of vulnerable people given financial constraints

¹ The terms ‘logistics’ and ‘supply chain management’ are used interchangeably in the humanitarian context (Ertem, Buyurgan and Rossetti 2010, 203). Therefore, this paper also uses this interchangeability.



(Beamon and Balcik 2008, 10; Thomas and Kopczak 2005, 2). Hence, the resulting consequences from delays in the supply chain are “only” a matter of reduced profitability and thus dissatisfaction of shareholders and customers in the commercial environment whereas it is often a matter of life or death in the humanitarian field, especially with regard to disaster relief (Beamon and Balcik 2008, 10). Furthermore, setting and prioritizing goals in the humanitarian context is complicated by the high number of stakeholders involved (e.g. donors, beneficiaries, media) who all have different and possibly conflicting concerns and demands (McLachlin, Larson and Khan 2009, 1050; Beamon and Balcik 2008, 11). Especially donors can have a high influence on goal-setting through earmarking their donations for a certain disaster or with respect to certain regions and usage (Wakolbinger and Toyasaki 2011, 38). As the focus of their donations is usually on particular operations or projects activities (e.g. specific relief efforts), the organizational infrastructure of aid agencies (e.g. information systems and techniques for inventory control and distribution) is often lacking behind (Beamon and Balcik 2008, 11).

(2) Customer characteristics: While there is only one type of customer in the commercial supply chain (those individuals that buy and receive a product or service), there are two types of customers in the humanitarian supply chain that greatly differ from each other (Beamon and Balcik 2008, 12). The primary customers of humanitarian organizations are the beneficiaries (those individuals that receive aid). However, donors are also increasingly being considered as customers in the humanitarian context as aid agencies provide them with the service of delivering aid to aid recipients (De Leeuw 2010, 198; Beamon and Balcik 2008, 12). Especially the beneficiaries differ considerably from customers in the commercial field as they neither have the luxury of market choice nor do they have any formal contract specifying their entitlements (Hilhorst 2002, 204; Beamon and Balcik 2008, 10).

(3) Demand characteristics and order fulfillment: While there is a predictable demand and a predetermined set of suppliers in commercial supply chains, humanitarian supply chains are often characterized by irregular demand and variability in supplies and suppliers (Kovács and Spens 2007, 108). Furthermore, whereas customers in the commercial sector may accept long lead times, the time between the moment a demand occurs and the point supplies are needed in sudden-onset disaster situations is usually close to zero (Beamon and Balcik 2008, 12).



2.2 Performance Measurement in Humanitarian Logistics

Neely, Gregory and Platts (1995, 1229) define performance measurement as the process of quantifying the efficiency and effectiveness of an action using a set of performance metrics. According to Parker (2000, 63) the purpose of measuring organizational performance is (1) to identify success; (2) to identify whether customer requirements are met; (3) to help understand organizational processes; (4) to identify problems, bottlenecks, waste etc.; (5) to ensure decisions are based on facts rather than on supposition or emotion and (6) to show whether planned improvements actually happened.

Performance measurement is particularly important in the humanitarian sector, where limited resources have to be used in the most efficient and effective way (Abidi and Scholten 2015, 257). Furthermore, the increased frequency and severity of natural and manmade disasters, the costs involved in humanitarian supply chain operations as well as the growing competition for scarce resources and donor funding, make performance measurement vital for all organizations involved in disaster management (Beamon and Balcik 2008, 5 & 15; Santarelli et al. 2013, 1).

According to Poister (2003, 17), effective performance measurement systems can help public and non-profit managers to make better decisions, to improve performance and to provide accountability. Furthermore, performance measures provide feedback on agency performance and help redirect resources more effectively. Performance measurement therefore allows for greater control over operations while increasing flexibility at the operating level (Beamon and Balcik 2008, 15).

Yet, performance measurement systems have not been systematically implemented in the humanitarian supply chain (Beamon and Balcik 2008, 5). According to Blecken (2010, 677) 55 percent of all humanitarian organizations do not monitor any form of performance indicators for their supply chain, while 25 percent only use a few performance indicators. Merely 20 percent of all humanitarian organizations consistently measure the performance of their supply chains.

In a systematic literature review, Abidi, De Leeuw and Klumpp (2014, 597 et sqq.) evaluate the current state of research on performance management in humanitarian supply chains. They conclude that even though there are a variety of approaches, there is still a long way to go in research on performance measurement in humanitarian supply chains. Only few performance measurement



frameworks have been empirically tested and likewise, relatively few humanitarian organizations have contributed to research projects in the field.

Furthermore, result-based management is often very difficult to implement in humanitarian organizations, as it is often problematic to determine the relationships between inputs and activities as well short-term outputs, midterm outcomes and long-term outcomes (Abidi, De Leeuw and Klumpp 2014, 599). Moreover, standard indicators are often unsatisfactory, as cultural nuances that have an impact on activities are often not adequately accounted for (Abidi, De Leeuw and Klumpp 2014, 599).

Even though various performance measurement frameworks (e.g. SCOR Model or Performance Prism) and indicators exist for traditional supply chains, the distinct characteristics of the humanitarian environment cause many of these to be inappropriate or irrelevant (Beamon and Kotleba 2006, 196; Abidi, De Leeuw and Klumpp 2014, 599). However, performance measurement frameworks from the commercial sector are a useful starting point for the non-profit sector, and thus for the humanitarian organizations (Moxham 2009, 755).

2.3 The Balanced Scorecard

Historically, performance measurement systems in the commercial sector have been financial (Kaplan and Norton 1996, 21). However, these financial models failed to signal changes in the companies economic value as they were making substantial investments in intangible assets (Kaplan 2001, 357) and thus gave misleading signals for continuous improvement and innovation (Kaplan and Norton 1992, 71). For this reason, Robert Kaplan and David Norton developed the Balanced Scorecard model in the late 1980s and early 1990s. This performance measurement framework provides executives with a comprehensive and transparent overview of the vision and strategy of their organization from four different perspectives: financial, customer, internal business process, and learning and growth (Kaplan and Norton 1996, 25). It links a company's strategic objectives to performance measures, sets targets and aligns them with strategic initiatives (Kaplan and Norton 1996, 10). The performance measures of the BSC do not only represent a balance between financial and non-financial measures, but also between external and internal measures, short- and long-term measures as well as outcome measures and performance drivers of these outcomes (Kaplan and Norton 1996, 10). The BSC provides managers with information from four different perspectives



while at the same time minimizing information overload through a limited number of measures (Kaplan and Norton 1992, 72).

Even though the performance measures are derived from the individual organization's strategy (1996, 44) there are some generic measures that show up in most organizations' Balanced Scorecards. Amongst others, these include e.g. return on investment and economic value added (financial perspective), customer satisfaction, retention, market share and account share (customer perspective), quality, response time, cost and new product introductions (internal business process perspective) as well as employee satisfaction and information system availability (learning and growth perspective).

The Balanced Scorecard was later supplemented with the so-called strategy map, a tool that provides a visualization of the cause-and-effect relationships that exist among the strategic objectives of a company (Kaplan and Norton 2004, 6). Kaplan and Norton (2000, 170) suggest that the best way to build such a strategy map is from the top down. This process starts with a review of the company's mission statement and core values in order to determine the "destination". Then, the strategy must define the logic of how to arrive at this destination. Starting with the long-run financial objectives, sequences of actions must be identified within the financial, customer, internal business process and finally the learning and growth perspective that deliver the desired long-term economic performance (Kaplan and Norton 1996, 62).

While the initial focus and application of the Balanced Scorecard was in the commercial sector, Kaplan (2001, 354) states that the opportunity for the BSC to improve the management of non-profits should be even greater. The reasoning behind his statement is as follows:

"For profit-seeking corporations, the financial perspective provides a clear long-run objective, but it provides a constraint rather than an objective for nonprofits. Although these organizations must certainly monitor their spending and comply with financial budgets, their success cannot be measured by how closely they keep spending to budgeted amounts, or even if they restrain spending so that actual expenses are kept well below budgeted amounts."

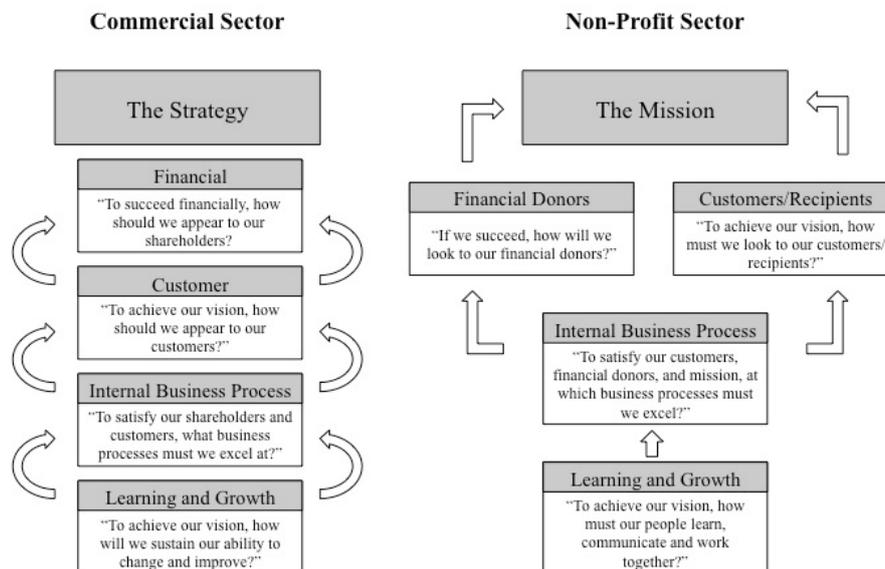
Starting in 1996, Kaplan conducted a multiyear action research program to apply the Balanced Scorecard to several non-profit organizations. Based on the results from this research program,



Kaplan (2001, 360 et seq.) suggests three adaptations that are necessary to apply the Balanced Scorecard in the non-profit sector:

- (1) Placing the customer perspective at the top of the Balanced Scorecard: In the original architecture of the Balanced Scorecard, the financial perspective was placed at the top of the hierarchy since financial considerations are the primary objective of commercial companies and because financial measures provide the accountability measure between the organization and its shareholders. As the primary goal of a nonprofit organization is to effectively and efficiently meet the needs of its constituencies, the customer perspective should be placed at the top of the Balanced Scorecard in the non-profit sector.
- (2) Placing an overarching mission at the top of the Balanced Scorecard: For nonprofit organizations, the agency's mission represents its accountability towards society. It reflects the organization's long-term objective. Therefore, it should be featured at the highest level of the Balanced Scorecard so that the objectives within the BSC can be oriented towards improving the long-term objective of the organization.
- (3) Placing both, the donor perspective as well as the recipient perspective in parallel at the top of the Balanced Scorecard: While in private sector transactions customers both pay for and receive the services of an organization, these roles are separate in the non-profit sector. Donors assume the role of providing the financial resources whereas the constituents assume the role of receiving the service. Therefore, both parties should be placed in parallel at the top of the Balanced Scorecard.

The illustration below shows the commercial sector strategy map as well as the strategy map adapted to the characteristics of the non-profit sector:



Publications on the applicability and the use of the Balanced Scorecard in the context of humanitarian logistics are scarce. Five publications deal with the applicability and use of the Balanced Scorecard as a performance measurement tool in the humanitarian relief and development context. The table below gives an overview on important features of these publications:

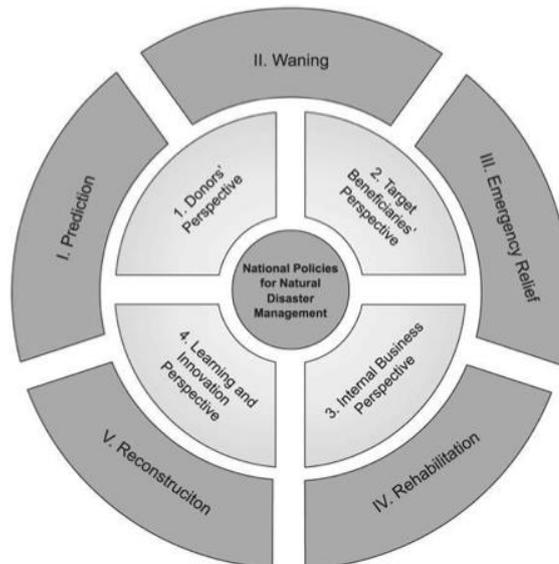
Ill. 2: Sources related to the use and applicability of the BSC in humanitarian logistics

Author(s) and year of publication	Type of publication	Development of a framework	Input from practice	Framework tested in practice
Moe et al. (2007)	Conceptual paper	Yes	Yes	No
Schulz and Heigh (2009)	Case study	Yes	Yes	No
De Leeuw (2010)	Multiple case study	Yes	Yes	No
Schiffing and Piecyk (2014)	Literature review	Yes	No	No
Abidi and Scholten (2015)	Conceptual paper	No	Yes	Not applicable

Moe et al. (2007) discuss the application of the BSC for natural disaster management projects and demonstrate this at the example of a real flood disaster management project in Hat Yai Municipality in Southern Thailand. The BSC perspectives that were chosen for the framework are (1) donor perspective, (2) target beneficiaries' perspective, (3) internal business perspective, and (4) innovation

and learning perspective. These four perspectives are centered around national policies for natural disaster management as the illustration below shows:

Ill. 3: BSC approach centered around national policies for natural disaster management in project life cycle phases (Moe et al. 2007, 792)



According to the authors, establishing BSC measures must begin with formulating national policies for natural disaster management, which then have to be translated into the project's objectives. In a next step, the authors suggest to construct a lifecycle framework for the five generic phases of a natural disaster management project. Thereafter, appropriate BSC measures can be selected based on the project objectives. Instead of measuring the project's overall success, the framework of Moe et al. (2007) measures success for each disaster phase. As the outcome of the preceding phase will be the input for the following phase, ensuring success in one phase will lead to success in the subsequent phase. As the different project phases require different ways to succeed, Moe et al. identify different objectives for the five phases.



The following objectives are identified for the emergency relief phase:

Ill. 4: BSC objectives in the emergency relief phase (Moe et al. 2007, 804)

BSC perspective	BSC objectives
Donor	Good accountability of resource utilization; Resources mobilized and used as planned
Target beneficiary	Emergency and relief services met expectations of target beneficiaries
Internal business	Timely and responsive relief activities were carried out without delays
Innovation and learning	Sharing previous lessons learned and adopting best practices

The authors do not suggest any specific performance measures.

Schulz and Heigh (2009) share the design and testing procedure of the “Development Indicator Tool” – a tool developed by the International Federation of Red Cross and Red Crescent Societies (IFRC) for performance management of their regional logistics units. The objectives of its implementation were to spotlight areas or projects that have an impact on business performance, to help exchange experience on how to improve procedures across the different regional logistics units as well as to inform donors about the efficiency and continuous improvement of the regional logistics units.

The following BSC perspectives were chosen for the framework: (1) customer service, (2) financial control, (3) process adherence, and (4) innovation and learning. Performance indicators were identified through interviews with staff from the Geneva based Logistics and Resource Mobilization Department and selected based on the following criteria: (1) the indicator score can be influenced by the regional logistics unit, (2) the indicator is relevant to the regional logistics unit’s performance and/or is of special interest from a management perspective, and (3) data that enter into the indicator calculation exist in IFRC systems and are or can be made accessible to the regional logistics units. Based on the interviews, a basic tool including 20 preliminary indicators was developed. To involve the view of future users at an early stage of the tool development, this basic tool was discussed with the heads of the regional logistics units. After some indicators were exchanged, IFRC started piloting the tool in December 2006 for a period of four months. The illustration below shows the set of indicators that were determined after the pilot phase:



III. 5: IFRC Development Indicator Tool after the pilot phase (Schulz and Heigh 2009, 1045)

Level	Development indicator	Unit	Objective
1	Customer service		
1.1	Delivery performance	%	Identification of lead time issues
1.2	Orders with agreed delivery time in days	%	Force customers and procurement to plan needs and agree on delivery date
1.3	Stocks managed by service agreements	%	Drive use of service agreements
1.4	Monthly reports to customers on time	%	Drive process stabilization for customer reports
2	Financial control		
2.1a	Deviation from unit budget YTD	%	Stay within budget lines
2.1b	Deviation from project budget YTD	%	Stay within budget lines
2.2a	Service turnover versus plan YTD	%	Generate income for cost recovery
2.2b	Service income versus plan YTD	%	Generate income for cost recovery
2.3	Cost recovery YTD	%	Drive invoice management and timely cost recovery
3	Process adherence		
3.1a	Available stock capacity to supply 5,000 in 48h (segmented by ownership of stock)	%	Keep to logistics strategy
3.1b	Available stock capacity to supply 15,000 families (segmented by ownership of stock)	%	Keep to logistics strategy
3.2	Relief stock turnover rate YTD	# of turns	Drive utilization and fix costs digression of warehouse
3.3	Procurement transactions using Humanitarian Logistics Software	%	Promote usage of HLS software
3.4	Operational vehicles using IT-software Fleet Wave	%	Promote usage of Fleet Wave
3.5a	Average procurement	CHF	Drive cost efficiency and process improvement
3.5b	Average warehouse cost per m ² stored YTD	CHF	Drive cost efficiency and process improvement
3.5c	Average % of transport cost of total order cost YTD for airfreight	%	Drive cost efficiency and process improvement
3.5d	Average % of transport cost of total order cost YTD for other transport mode	%	Drive cost efficiency and process improvement
4	Innovation and learning		
4.1	Staff development	%	Drive staff development through use of development tool AR-online
4.2	Actual project time versus planned project time	G, Y, R	Drive good project management
4.3	On time reporting	G, Y, R	Drive process stabilization for internal reports



Schulz and Heigh (2009, 1044) note that the tool is meant to be an active instrument. Therefore, continuous review and improvement of the tool and the performance indicators is necessary. No information was found on whether the tool was actually implemented after the pilot phase.

De Leeuw (2010) develops a reference mission map (= strategy map for the nonprofit sector) for humanitarian supply chains based on a literature review and four mini-case studies. In a first step, De Leeuw investigates humanitarian supply chain literature on each of the four perspectives proposed by Kaplan and Norton. He discusses his findings with the managers of four humanitarian organizations and develops the following reference mission map:



III. 6: Reference mission map for humanitarian supply chain management (De Leeuw 2010, 198)

	Product & service attributes	Customer relationships			Image
	Customer	High quality High availability Sufficient quantity Speedy delivery Reliable delivery Relevance	<u>To donors:</u> Ensure efficient and effective processes Provide feedback and information	<u>To intermediaries:</u> Provide relevant and timely service Provide feedback and information	<u>To beneficiaries:</u> Provide relevant and timely service

	Operations management	Donor management	Partner management		Innovation	Regulatory & social
	Internal	Create operational excellence in processes from needs assessment to delivery	Target, acquire and retain donors Provide feedback to donors	<u>Local government:</u> Build partnerships with local government	<u>Intermediaries:</u> Target, acquire, retain partners and build partnerships	Identify, develop, manage new products & services

	Human capital	Information capital	Organizational capital
	Learning & Growth	Build and expand supply chain skills and competencies and manage job turnover	Develop, utilize and capitalize on supply chain ICT

	Budgeting	Funding management	Cost management
	Financial	Develop, monitor and adjust budgets	Ensure steady and timely flow of donations

De Leeuw compares his framework to the original Balanced Scorecard and points out the following differences: In the customer perspective, different relationships with different customers are kept simultaneously. For all customers, relevancy of products and services stands out, although beneficiaries are not really demanding voices. The internal perspective deals with donor management (e.g. selecting, acquiring, retaining and collaborating with donors) as well as partner



management (e.g. local government of the host country or intermediaries). Furthermore, organizations need to take account of their environmental as well as their social impact and manage innovation. Yet, the latter is and will continue to be a challenge due to a lack of time and money. The learning and growth perspective resembles its commercial counterpart. However, humanitarian organizations have difficulties in managing human capital as well as in the development of information systems. Lastly, as opposed to the commercial sector, the financial perspective of non-profit organizations focuses mainly on funding management. Many humanitarian organizations are dependent on obtaining the necessary funds before they are able to provide service.

Schiffing and Piecyk (2014) develop a performance measurement framework that reflects the views and characteristics of the key stakeholders of humanitarian organizations. To identify these key stakeholders, the authors conduct a systematic review of academic literature on humanitarian logistics and adopt the stakeholder salience framework developed by Mitchell et al. (1997), which classifies stakeholders according to their power, the legitimacy of their claim as well as the urgency of their claim. The resulting stakeholder typology reveals that donors and beneficiaries are the two external stakeholders with the highest salience in the humanitarian supply chain. Therefore, Schiffing and Piecyk develop a customer-centric performance framework that focuses on donors and beneficiaries throughout all four perspectives of the BSC.

Like Kaplan (2001, 360 et seq.) proposed, the authors place the organization's mission, which they identified as "to improve customer value" at the top of the BSC and further split it into "donor value" and "beneficiary value." Moreover, the authors divide the BSC perspectives into three columns. The first column includes aspects that are of value only to the donors, the second column includes aspects that are relevant for both customer groups and the third column includes aspects that are of relevance only to the beneficiaries.

The illustration below presents the proposed framework. Schiffing and Piecyk base their examples on the framework developed by De Leeuw (2010).



Ill. 7: BSC strategy map for performance measurement in humanitarian logistics (Schiffing and Piecyk 2014, 206)

IMPROVE CUSTOMER VALUE			
		Donor Value	Beneficiary Value
Customer Perspective	Efficiency and effectiveness, cost monitoring, sustainability	Reliability	Quality and availability of goods and services, timely delivery, relevance to the circumstances
Internal Process Perspective	Acquisition and retention of donors, feedback to donors	Innovation, direct contact with humanitarian organization, excellent processes	Social/cultural/environmental awareness
Learning and Growth Perspective	Organizational learning and development, use of appropriate technology	Consistency despite personnel changes	Local leadership, quick adaptation to actual demand
Financial Perspective	Transparency, budgeting	Steady and timely financial flows	

Schiffing and Piecyk note that taking a customer-centric approach means more than just splitting the BSC's customer perspective into two. It means that organizations have to be aware of the way the supply chain looks from each customer's point of view. While donors see performance mainly through media coverage on the overall disaster response, beneficiaries will generally have little awareness of the wider workings of the supply chain. As media coverage usually does not feature a particular organization, donors are likely to get information about many different organizations and will base their donation behavior on it. Therefore, it is important to do performance measurement in terms of what the potential donor is able to see in order to maximize donations. Beneficiaries on the other hand have difficulties comparing the outputs of humanitarian supply chains as their sources of information are usually unreliable or biased. Therefore, performance measurement will be based on criteria like speed of the initial response or responsiveness to urgent needs.



Abidi and Scholten (2015) evaluate the applicability of the Balanced Scorecard for performance measurement in the humanitarian supply chains based on the evaluation criteria for appropriate logistics performance measurements by Caplice and Sheffi (1995). For this purpose, the authors adapt the six evaluation criteria (comprehensiveness, causal orientation, vertical integration, horizontal integration, internal comparability and usefulness) to the specificities of humanitarian supply chains.

The table below summarizes their findings classified into the six evaluation categories:

III. 8: Evaluation of the BSC based on the evaluation criteria by Caplice and Sheffi (Abidi and Scholten 2015, 251 et seq.)

Criterion	Evaluation
Comprehensiveness	The BSC is not directly comprehensive as only two stakeholders (shareholders and customers) are considered. Other stakeholders might be included, but changes might take away from the strength of the BSC in terms of established standardized measurements.
Causal orientation	The BSC is causally oriented as it reports about current and future success, provides cause and effect assumptions, ensures transparency among included stakeholders and enables measurement of the efficiency of a supply chain network. However it is incomplete due to a lack of comprehensiveness.
Vertical integration	The BSC is vertically integrated as it provides relevant information to decision makers at a strategic, tactical and operational level internally. Externally this is more problematic as collaborative supply chain parties need to integrate a BSC as well.
Horizontal integration	The BSC is horizontally integrated as the learning and growth perspective allows for continuous improvement. However, it does not involve human resources and does not facilitate the measurement of operational activities that are executed in cooperation within the supply chain.
Internal comparability	The BSC is internally comparable as it recognizes trade-offs between the different dimensions of performance (e.g. in relation to cultural nuances or language).
Usefulness	The BSC is useful as it supports the user in decision-making and action. However it does not allow transparency at a process level and causalities have not been empirically tested.



Abidi and Scholten conclude that the BSC shows potential for implementation in the humanitarian setting, both in the context of emergency and development operations. However, adaptations (e.g. including all relevant stakeholders) are necessary.

2.4 Results

Five current publications on the applicability and the use of the BSC in humanitarian supply chain management were presented. Abidi and Scholten (2015) evaluate the BSC for its applicability in humanitarian logistics and come to the conclusion that the BSC has potential to be applied both, for relief, as well as for development activities. Moe et al. (2007), Schulz and Heigh (2009), De Leeuw (2010), and Schilffing and Piecyk (2014) each present different modifications of the BSC for an application in humanitarian logistics. Whereas De Leeuw (2009) and Schilffing and Piceyk (2014) develop a BSC for a rather general use in humanitarian logistics, the framework developed by Schulz and Heigh (2009) focuses on performance measurement in disaster relief. The framework by Moe et al. (2007) covers all phases of a natural disaster management from prediction to reconstruction.

After a review of these publications, it seems like a modified version of the Balanced can be applied to improve the efficiency and effectiveness of humanitarian supply chains. However, all of the frameworks are largely based on theory and none of them has yet been tested in practice. Furthermore, only the framework developed by Schulz and Heigh (2009) focuses on performance measurement in disaster relief. Therefore a modification of the BSC specifically for performance measurement in disaster relief will be developed in the next chapter and serve as a basis for discussions with experts from the field.

In order to evaluate the applicability of the BSC in this context, a thorough understanding of the challenges that affect performance measurement as well as the resulting requirements that performance measurement frameworks have to meet, is required. Therefore, the aim of RQ1 is to find out what challenges exist concerning supply chain performance measurement in disaster relief and what requirements a performance measurement framework has to meet in this context.

For the application of the Balanced Scorecard in the non-profit sector, Kaplan (2001) proposed placing an overarching mission statement at the top of the BSC and to replace the financial perspective by the customer perspective at the top of the BSC. As non-profit organizations serve two types of customers, Kaplan furthermore proposed placing both of them in parallel at the top of the



BSC. Although the majority of the frameworks presented for the humanitarian field place the customer perspective at the top of the BSC, all of them take a different approach of integrating the two customers. Therefore, RQ2 aims to answer how the four perspectives of the Balanced Scorecard need to be adapted in order to be applicable in this context. The focus of this question lies on how to best integrate the two kinds of customers that humanitarian organizations have.

Out of the four publications that propose a modified version of the BSC for performance measurement in humanitarian logistics, only Schulz and Heigh (2009) develop performance measures that assess the performance of an organization within the four perspectives. However, these are developed specifically for the operations of the International Federation of Red Cross and Red Crescent Societies (IFRC) and therefore will not be equally relevant for other organizations in this sector. Consequently, RQ3 aims to identify appropriate performance indicators that organizations involved in disaster relief should track.

As literature on the use and applicability of the BSC for performance measurement in humanitarian logistics is scarce, there are barely any recommendations as to what organizations should consider when developing and implementing a BSC on their own. Therefore, RQ4 follows up on recommendations concerning the development and implementation of a BSC in this context.

3. Development of a Balanced Scorecard for Performance Measurement in Disaster Relief

The authors of this paper have chosen to include the following four perspectives in the Balanced Scorecard: (1) Beneficiary, (2) Financial, (3) Internal Processes, and (4) Learning and Growth. Furthermore, as Kaplan (2001, 360 et seq.) proposed, an overarching mission statement was placed at the top of the Balanced Scorecard in order to guide in the selection of appropriate objectives and performance measures that are oriented towards improving the long-term objective of the organization. The mission of humanitarian supply chains in the disaster relief context was identified as follows (Thévenaz and Resodihardjo 2010, 7): To rapidly provide relief to vulnerable people with the intention to save and sustain lives.

Even though donors are often identified as customers and key stakeholders in humanitarian supply chain literature (e.g. Schiffing and Piecyk 2014; Beamon and Balcik 2008), the authors refrained from

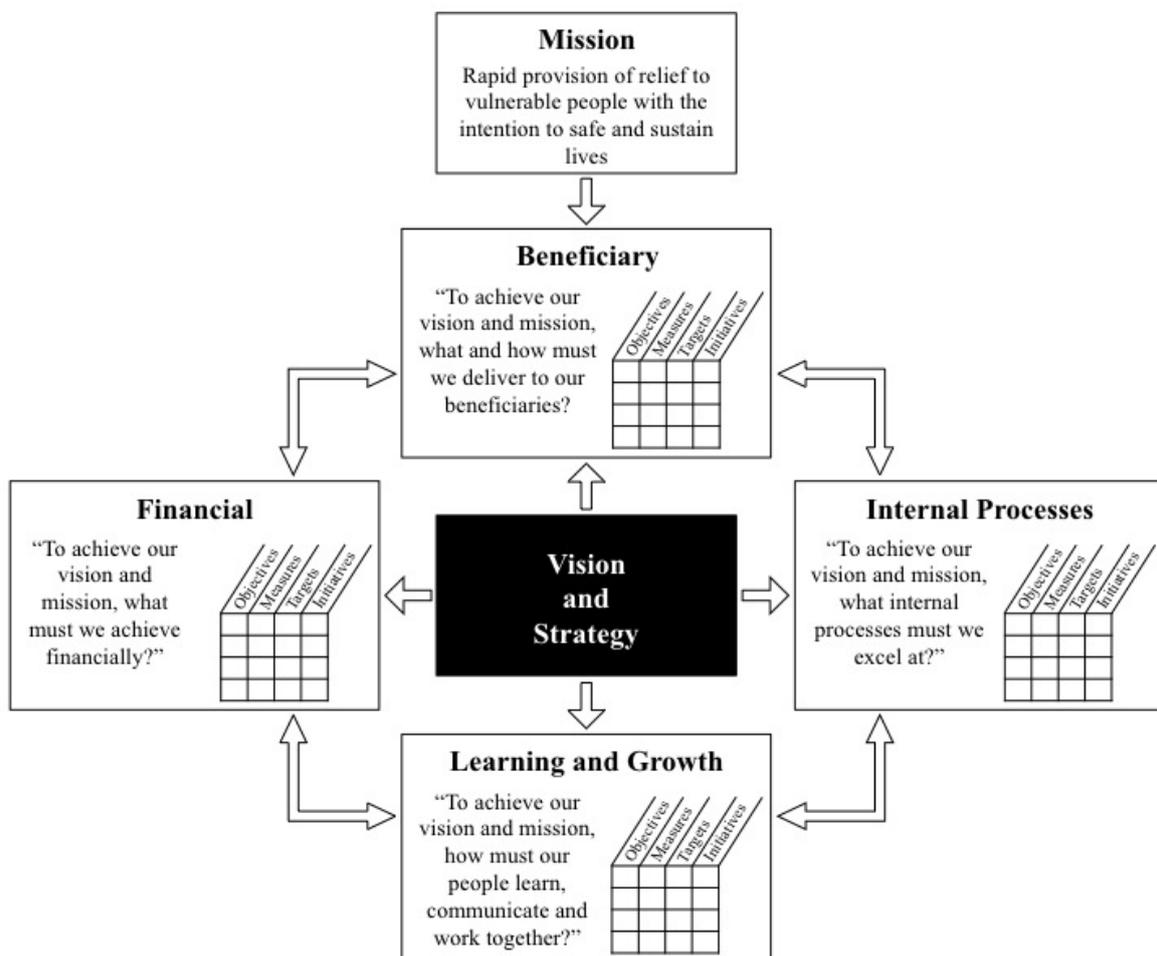


including donors in the “customer perspective” as well as from assigning a perspective exclusively to them. There are two key reasons for that:

- (1) For many humanitarian organizations, donations from governments are their key source of income. According to the Global Humanitarian Assistance Report (GHA 2015, 2) more than 75% of all contributions for humanitarian assistance were provided by governments in 2014. These governmental contributions are often tied to wider political agendas and thus may not be influenced by the performance of humanitarian organizations (Schiffing and Piecyk 2014, 205).
- (2) Different aspects of the donor’s objectives are already reflected in the four perspectives chosen for the Balanced Scorecard. This is mainly the case for the financial and beneficiary perspectives but the donor’s objectives are also reflected in the internal processes perspective as well as learning and growth.

The customer perspective of the original Balanced Scorecard was renamed to beneficiary perspective to avoid confusion about who is included in this perspective. Moreover, it was placed at the top of the Balanced Scorecard as meeting the needs of beneficiaries is the primary goal of any humanitarian organization.

III. 9: Balanced Scorecard for performance measurement in disaster relief (based on Kaplan and Norton 1996, 9)



Sub-categories for each of the four perspectives as well as the corresponding objectives were largely adopted from the framework developed by De Leeuw (2010, 198). However, changes were made where the authors deemed them to be necessary.



*Ill. 10: Perspectives, sub-categories and objectives of the BSC for performance measurement in disaster relief
(based on De Leeuw 2010, 198)*

Perspective	Sub-Categories	Objectives
Beneficiary	Product attributes	Deliver quality products
		Deliver relevant products
		Deliver sufficient quantities
	Service attributes	Rapid delivery
		Reliable delivery
		Deliver sustainable aid
Financial	Funding management	Ensure steady and timely flow of donations
	Cost management	Ensure efficient use of funds in a transparent manner
	Budgeting	Develop, monitor and adjust budgets
Internal Processes	Operations management	Efficient and effective processes/operational excellence in processes
	Donor management	Target, acquire and retain donors
		Provide feedback and information to donors
	Partner management	Build partnerships with local government
		Target, acquire and retain partners
	Innovation processes	Identify, develop and manage new products and services
Regulatory and social processes	Ensure compliance with regulations	
Learning and Growth	Human capital	Build and expand supply chain skills and competencies
		Manage job turnover
	Information capital	Develop, utilize and capitalize on supply chain information and communication technology
	Organizational capital	Nurture local leadership
		Foster team work internally and with partners
		Integrate volunteers

In a subsequent step, the authors investigated humanitarian supply chain literature (Schulz and Heigh (2009), Santarelli et al. (2013), Beamon and Balcik (2008), Van der Laan, Brito and Vergunst 2009, Davidson (2006), Beamon and Kotleba (2006), Medina-Borja, Pasupathy and Triantis (2007),



Blecken et al. (2009), Kumar, Niedan- Olsen and Peterson (2009), Quiang and Nagurney (2012), Gatignon, Van Wassenhove and Charles (2010)) to collect appropriate measures that will assess the performance of the humanitarian organization towards these objectives. In doing so, the authors identified several gaps, especially in the learning and growth perspective, where none or only a limited number of performance measures were mentioned in the investigated literature. Therefore, additional performance measures were suggested by the authors in order to close these gaps. This way, the framework presented above was filled with a total of 93 potential indicators (cf. Appendix 1 for the complete list of performance measures).

The framework developed here was used as a basis for interviews with six experts from international organizations and NGO's, foundations and the research field.



4. Evaluation of the Developed Balanced Scorecard for Performance Measurement in Disaster Relief

4.1 Research Strategy, Sample Selection and Data Analysis

The research strategy of the paper follows a multiple case study approach. According to Robson (2002, 176), a case study involves “empirical investigation of a phenomenon within its real life context using multiple sources of evidence.” This enables the researcher to develop a deeper understanding of specific instances of a phenomenon (Santos and Eisenhardt 2004, 684). The authors of this paper decided to use multiple cases in order to establish whether findings from one organization also apply to other organizations within the field (Saunders, Lewis and Thornhill 2009, 146; Santos and Eisenhardt 2004, 685).

Data was gathered by means of semi-structured qualitative interviews, which are scheduled conversations between a researcher and an interviewee (Rubin and Rubin 2012, 31). As opposed to the structured interview, which uses a standardized set of questions, researchers have a list of themes to be covered in a semi-structured interview, but questions may vary from interview to interview depending on the organizational context that is encountered with respect to the research topic as well as the flow of conversation (Saunders, Lewis and Thornhill 2009, 320). Through the use of open-ended questions, interviewees are encouraged to answer at length, which allows the researcher to explore in detail their motives, opinions and experiences (Rubin and Rubin 2012, 3; 31).

For the interviews, qualified experts from the humanitarian field were sought throughout Germany. Before conducting the interviews, an interview guide (cf. Appendix 2) was created to serve as orientation during the interview process and to guarantee comparability of results. The interview guide was based on the research questions and covered areas that are likely to generate data to address these questions (Mason 2004, 518). A total of six interviews were conducted between 11th and 28th of August 2015 (cf. table below).



III. 11: Overview of interview partners

Interview Partner	Position	Years of expertise	Theoretical/ practical expertise
1	Research associate at the institute for logistics and service management at a private University of Applied Sciences	4 years	Rather theoretical
2	Project manager at the foundation of a global reinsurance company; responsible for disaster risk reduction, social vulnerability and resilience	7 years	Rather theoretical
3	Deputy CEO of an international medical aid organization and member of the working group of a German logistics association	8 years	Theoretical and practical
4	Head of emergency and disaster relief at an international medical aid organization	7 years	Rather practical
5	Head of logistics and procurement at the German national society of a large international humanitarian organization	15 years	Rather practical
6	Founder and CEO of a national medical aid organization and head of operations at an international humanitarian aid organization	30 years	Rather practical



4.2 Evaluation of the Challenges Concerning Performance Measurement and Requirements for Performance Measurement Frameworks (RQ 1)

According to the interviewees, the greatest challenge concerning performance measurement in the disaster relief context is that no disaster situation is like the other. Disasters vary in terms of environmental factors, material demands as well as logistical requirements. This makes it very difficult for organizations to plan ahead as they cannot transfer their experience from one operation onto another.

Organizations have to respond to disasters in different countries and regions where they have to comply with different local legislation, e.g. import regulations. Moreover, the different languages, mentality, educational backgrounds as well as working methods of local partners and volunteers often present an obstacle to effective performance measurement. One interviewee quotes the following example: “There are some volunteers who have never seen a computer before. But we need these people. We have to take them even if they do not have the desired educational background“. The interviewees stress that it is essential that local employees understand the necessity of performance measurement and that they are motivated as well as capable to collect the required data.

As disaster relief is a very dynamic field and things happen ad hoc, frequent re-prioritization is necessary. Organizations constantly have to consider a new starting base when assessing whether their operations run efficiently. This, so the interviewees, makes it very difficult to assess the performance of an organization over time.

Due to the heterogeneity of disasters as well as the organizations involved in disaster relief, no standards in performance measurement have been developed so far. This makes it difficult to compare performance across organizations. Furthermore, it is very time consuming for donors to familiarize themselves with the different methods used for performance measurement and reporting across organizations.

Another challenge concerning performance measurement in the disaster relief context is that no organization has complete responsibility and control over the supply chain. From procurement to delivery, many organizations as well as organizational structures are linked and the exchange of information between them is often impaired. The interviewees believe that performance



measurement in the disaster relief context cannot be limited to an individual organization but has to be assessed in context with the other organizations involved.

According to the interviewees, data is a challenge in many respects. In order to collect data, electricity is essential, but not always available. Furthermore, organizations usually have no central database but use a number of different systems to collect different kinds of data: “There are aid organizations that use up to eleven different system. Every system is used for something else.” Moreover, the extent to which data is collected differs from one country to the next. While an organization collects data up to the last mile in one country, it might only collect data up to the distribution center in another country. This makes it hard to compare performance across countries and operations. Lastly, not all required data is available or can be used by the organization.

Another challenge that the organizations face is a lack of time, capacity and resources for performance measurement. This is particularly true for the beginning of an operation as first resources are usually used on-site. The interviewees state that there is usually neither time nor resources for performance measurement at the beginning of an operation.

Lastly, the large number of stakeholders that is involved in disaster relief as well as their diverse goals present another major challenge for performance measurement. This particularly concerns the different kinds of donors that an organization has. One interviewee suggests that organizations identify important stakeholders prior to the development of a performance measurement framework in order to be able to tailor it to their goals and needs.

This leads to the requirements that performance measurement frameworks have to meet in the disaster relief context. The interviewees addressed the following topics:

- (1) The goals of the different stakeholders, but particularly the KPIs of the different donors, should be reflected.
- (2) The framework should be simple and transparent and use a limited number of easy-to-understand quantitative as well as qualitative indicators.
- (3) The framework should be flexible in order to react to different kinds of scenarios and account for regional differences. Furthermore, it should be compatible with the systems used by the organization.



(4) Organizations should be able to use the framework from the beginning of an operation in order to be able to avoid waste from start.

Additionally, the interviewees mention several requirements that organizations have to meet in order to be able to establish an effective performance measurement system:

- (1) Employees must support performance measurement and the necessity for performance measurement must be seen at all levels of the organization.
- (2) Data should be transferable between all levels of the organization.
- (3) The same database should be used for all countries and operations.

Through the interviews, the multitude of challenges that affect performance measurement in the disaster relief context became apparent. Whereas most of the mentioned challenges above are also extensively discussed in literature on performance measurement in the humanitarian context, the fact that no organization has complete responsibility and control over the supply chain and therefore, performance measurement cannot be limited to an individual organization is only touched upon by Abidi and Scholten (2015). The authors of this paper consider this to be the key challenge concerning performance measurement in this context. If performance measurement cannot be limited to an individual organization, standards are essential to facilitate the measurement of operational activities that are executed in cooperation with other organizations (cf. Abidi and Scholten 2015, 251). However, standards are nonexistent. Furthermore, organizations seem to already struggle with the collection of data from their own operations.

It can be concluded that the challenges with respect to measuring the performance of relief chains by far exceed those of measuring the performance of commercial supply chains. Therefore, performance measurement frameworks have to fulfill additional requirements in order to be applicable in this context.

While most of the requirements mentioned by the interviewees are also of importance in the commercial sector (e.g. limited number of indicators, compatible with the systems used by the organization), the interviewees mentioned the following requirements that are exclusive to the disaster relief context: (1) the performance measurement framework should reflect the goals of different stakeholders, especially those of the different donors, (2) the performance measurement framework should be flexible to react to different kinds of scenarios and account for regional



differences, and (3) the performance measurement framework should use the same database for all countries and operations. These requirements are also addressed in the investigated literature on humanitarian supply chain performance measurement. As pointed out by the interviewees, performance measurement in the disaster relief context cannot be limited to an individual organization. Therefore, the authors believe that it is necessary to add the following requirement: (4) the framework should facilitate the measurement of operational activities that are executed in cooperation with partners.

4.3 Evaluation of the Balanced Scorecard Perspectives (RQ 2)

In order to find out how the four perspectives of the Balanced Scorecard need to be adapted to be applicable for performance measurement in disaster relief, the interviewees were presented the Balanced Scorecard developed in subsection 3. As opposed to the frameworks developed by Schulz and Heigh (2009), De Leeuw (2010) as well as Schiffing and Piecyk (2014), the customer perspective of the framework developed in this paper is limited to the beneficiaries. Therefore, one of the goals was to discover who the interviewees consider as customers of the humanitarian supply chain and how they should be integrated into the BSC.

Interviewee 1 believes that the four perspectives chosen for the framework are appropriate for performance measurement in disaster relief. As she considers the beneficiary as the ultimate customer of the humanitarian supply chain, she agrees to limit the customer perspective to the beneficiaries. She adds that if organizations manage to include the beneficiary into performance measurement, they will be able to identify their impact on them. Interviewee 1 recommends including the donor into both, the financial as well as internal processes perspective, as in-kind donations (e.g. clothes) cannot be accounted for in the financial perspective.

Overall, interviewee 2 agrees with the four perspectives of the framework. However, he recommends dropping the term 'internal' from the internal processes perspective. As a large part of humanitarian relief efforts is concerned with international cooperation, he believes that if the perspective were limited to internal processes, a large part (e.g. cooperation with local governments and partners) would be missing. As he considers donors and beneficiaries to be located at opposite sides of the supply chain, he would refrain from dividing the customer perspective into two. He believes that donors, governments as well as relief funds should not be included into the BSC at all as



they play a subordinate role in performance measurement. The customer perspective should therefore be limited to the beneficiaries.

Interviewees 3 and 4 find it necessary to make a distinction between the donor, the beneficiary as well as the financial management of the organization. They believe that all three have different characteristics as well as diverging goals and limits. Furthermore, they believe that the organization's responsibility towards their beneficiaries differs considerably from their responsibility towards their donors. Although they believe that performance measurement should match the needs of donors, they would not assign them an own perspective nor divide the customer perspective into two. They believe that the donor is important in all four perspectives of the model and therefore suggest including relevant performance measures in all four perspectives. However, these performance measures need to be adjusted depending on the type of donors an organization has (e.g. governments, institutional funds or private donors).

Interviewee 5 considers the beneficiary to be the most important element of the framework. He explains that in reality, donors are often considered as customers of the humanitarian supply chain as they are the ordering party. However, he believes that the beneficiary should be regarded as the actual customer of the humanitarian supply chain. Therefore, he agrees to limit the customer perspective to the beneficiaries and suggests including the donor into the financial perspective as well as internal processes.

As opposed to the other interviewees, the interviewee 6 views the donor as the ultimate customer and center of the humanitarian supply chain. He emphasizes the need to look after the donor in order to keep him for future projects. Therefore, he suggests adding both, the donor as well as media as two further perspectives to the Balanced Scorecard.

The results obtained differ from the suggestions in literature. In two of the publications (Schulz and Heigh 2009; Schiffing and Piecyk 2014), donors and beneficiaries are considered as customers of the humanitarian supply chain and therefore, the customer perspective includes performance measures that are relevant for each of them. De Leeuw (2010), in addition to donor and customers, also considers intermediaries such as governments or implementing partners such as customers of the humanitarian supply chain. Therefore, the customer perspective of his framework includes donors, beneficiaries as well as intermediaries. Only Moe et al. (2007) limit the customer perspective to



target beneficiaries. However, in their modification of the BSC, the financial perspective is replaced by a donor perspective and remains at the top of the BSC. Therefore, it seems like Moe et al. (2007) also consider the donor as a customer or at least a key stakeholder of the humanitarian supply chain.

Schulz and Heigh (2009), Schiffing and Piecyk (2014) as well as De Leeuw (2010) each place the customer perspective at the top of the BSC. Also, all of the interviewees acknowledged that the beneficiary perspective should be placed at the top of the BSC. Even interviewee 6, who considers the donor as the ultimate customer of the humanitarian supply chain agrees: “Like you just said, it is not important to put the financial perspective, but the beneficiary at the top of the Balanced Scorecard.” Therefore, it can be concluded that the financial perspective should be replaced by the customer perspective at the top of the BSC.

4.4 Evaluation the Balanced Scorecard Performance Measures (RQ 3)

In order to identify appropriate performance measures, the interviewees were provided with the list of 93 performance indicators that was developed in subsection 3 of this paper (cf. Appendix 1). They were asked to choose four to five performance measures from each of the four perspectives and to rank them according to their relevance. Although the interviewees were encouraged to add additional performance measures, none of them took the opportunity to do so.

Out of the 93 performance measures that were provided within the four perspectives, a total of 54 were chosen. The fact that none of the performance measures was chosen by all interviewees, and only 14 indicators were chosen by either three or four of the interviewees, suggests that it is very complex to identify performance measures that are relevant across organizations. The table below shows the distribution of the performance measures chosen by the interviewees:



III. 12: Distribution of the performance measures chosen by the interviewees

Frequency chosen	Number of indicators	Percentage of indicators
Chosen by none of the interviewees	39 indicators	42%
Chosen by one interviewee	22 indicators	24%
Chosen by two interviewees	18 indicators	19%
Chosen by three interviewees	8 indicators	9%
Chosen by four interviewees	6 indicators	6%
Chosen by all interviewees	0 indicators	0%

When looking at the performance measures that were chosen by four out of five of the interviewees, it becomes apparent that all of these are measures that are relevant to the organization regardless of the characteristics of an operation as well as the partners an organization cooperates with.



III. 13: Performance measures chosen by four out of five interviewees

Performance Measure	Frequency frequency with which a measure was selected	Relevance relevance that each measure was attributed (5 = most relevant; 1 = least relevant)	Importance frequency x relevance
Customer Satisfaction	4	5	18
		5	
		4	
		4	
Average Response Time	4	5	15
		4	
		3	
		3	
Degree of Relevance of Products	4	4	13
		4	
		3	
		2	
Degree of Cooperation with Local Government	4	5	12
		4	
		2	
		1	
Degree of Cooperation with Partners	4	5	12
		4	
		2	
		1	
Staff Development	4	5	14
		5	
		3	
		1	

Regardless of the operation an organization is involved in and regardless of the partners the organization has to cooperate with, it is always important that the beneficiaries are satisfied and receive products that are relevant to them, that the average response time is short, that the degree of cooperation with partners and local governments is high and that staff is well trained and qualified.

4.5 Evaluation of the Recommendations Given for Humanitarian Organizations (RQ 4)

The recommendations given by the interviewees are related to different phases of the implementation process. Therefore, a distinction between recommendations (1) prior to the development, (2) during the development process and (3) during the application of the BSC is made.



Prior to the development: One of the interviewees believes that if the BSC is only used for performance measurement in disaster relief, the period between each application can be fairly long and therefore, organizations might not resort to the BSC in a disaster situation. Therefore, he believes that organizations should consider using the BSC also for performance measurement in development work. Furthermore, the interviewees recommend that before an organization starts using the BSC for performance measurement, they should be aware that once they start working with it, donors and partners will expect them to continue. Organizations should also think about what numbers they want to make available to their donors, partners as well as the public prior to the development of a BSC. Lastly, so the interviewees, organizations should consider whether it makes sense to develop one model for all disaster types or whether it is more favorable to classify them into different categories and develop a framework for each of these categories (e.g. earthquakes, tsunamis).

During the development process: The interviewees recommend that organizations consider environmental factors (e.g. cultural and political background) as well as the organizational context (e.g. goals of the organization or operation) when tailoring the BSC to their needs. Furthermore, employees from different levels of the organization should be included in the implementation process. As people from various cultural as well as educational backgrounds need to be able to work with it, the BSC should use a clear language. Moreover, it should be simple to use and not too scientific. Lastly, the interviewees believe that the BSC should be complementary and coherent with other relief measures as well as in line with other types of reporting used by the organization.

During application: Organizations should make clear to their employees as well as partners why performance measurement is important, discuss performance measures with them to ensure their understanding and take care that they are motivated to measure performance.

As with the requirements for performance measurement frameworks (see subsection 4.2), some of the recommendations given by the interviewees (e.g. clear language of the tool) are rather general recommendations that are relevant to the implementation of any performance measurement framework, regardless of its implementation in the commercial or non-profit sector.

Out of the five publications on the applicability and use of the BSC for performance measurement in humanitarian logistics, only one gives specific recommendations concerning the implementation of



the framework. As also suggested by one of the interviewees, Schulz and Heigh (2009, 1046) indicate that tool users should be involved in the development of the BSC at an early state. Furthermore, they promote early handover of the tool from the developer to the tool administrator in order to create a feeling of ownership and enable their understanding of the tool functions. Lastly, Schulz and Heigh recommend that tool users and administrators agree on the definition of each input data and its calculation modus.

5. Conclusion and Outlook

The increasing frequency and severity of natural and man-made disasters (Tatham and Hughes 2011, 66; Thomas and Kopczak 2005, 1) as well as the large expenditures of aid agencies in the area of logistics, have made measuring the performance of their supply chains vital for all organizations involved in disaster relief (Beamon and Balcik 2008, 5). However, their distinctive legal and financial status (Forbes 1998, 184) as well as their double bottom-line (Beamon and Balcik 2008, 10) makes it difficult to assess their performance with the common measures of commercial organizations.

As it compliments financial measures with measures from three other perspectives, the Balanced Scorecard provides a promising base for an application in the humanitarian setting. Moreover, it has explicitly been linked to non-profit organizations (Kaplan 2001).

Taking into account Kaplan's suggestions for the non-profit sector and guided by five existing publications on the use and applicability of the BSC in humanitarian logistics, the paper introduced a modified version of the Balanced Scorecard to assess the performance of humanitarian supply chains in the context of disaster relief. This modified version was used as a basis for conversations with six experts from the field, which were aimed at determining to what extent the BSC is applicable in this context, how it has to be adjusted and what humanitarian organizations should consider when implementing the BSC.

Whereas the literature suggested that a modified version of the BSC has potential for an implementation as a performance measurement framework in disaster relief, the interviews have revealed a number of issues that complicate the applicability of the BSC in this context. These can be reduced to two major points:



- (1) Performance measurement cannot be limited to an individual organization but has to be assessed along with the other organizations involved in an operation. Therefore, partners would have to implement a BSC as well. However this is not easy to achieve due to the large number of stakeholders (Abidi and Scholten 2014, 251) as well as the issues of humanitarian organizations to capture consistent data from their operations.
- (2) Due to the heterogeneity of disasters, the different countries of operation as well as the environmental factors influencing operations, the BSC would have to be adjusted on a project basis. However, this seems challenging due to the limited time, capacity and resources that organizations have – especially at the beginning of an operation.

In order to be able to apply the BSC for performance measurement in disaster relief, standards would be essential to facilitate the exchange of data between organizations and to make performance comparable across organizations. Moreover, the development of different versions of the BSC for different kinds of disasters could help organizations save time and resources adjusting the BSC at the beginning of an operation.

The interviews have confirmed Kaplan's modification of the Balanced Scorecard for the non-profit sector as all of the interviewees believe that the customer perspective (here beneficiary perspective) should be placed at the top of the Balanced Scorecard. Furthermore, the authors were able to identify two factors that influence the applicability of performance measures for different organizations. These factors are: (1) the operation that an organization is involved in; and (2) the partners the organization has to cooperate with. Performance indicators that are independent of these factors (e.g. average response time) are more likely to apply across a number of different organizations.

The next step in the practical implementation of the Balanced Scorecard as a performance measurement tool in disaster relief would be to develop different versions of the BSC with few, but yet essential performance indicators and to test these in practice. This approach could first be limited to an individual organization, but be extended over time as positive results from the testing phase will convince more organizations to cooperate. This iterative method might yield standardized performance indicators, a uniform documentation as well as a stringent reporting process. When developing Balanced Scorecards for different organizations, it is essential to involve tool users at an early stage as well as to sensitize its employees and volunteers about its importance.



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Appendix

Appendix 1: Objectives and measures of the BSC for performance measurement in disaster relief (based on De Leeuw 2010, 198)

Perspective	Categories	Objectives	Measure and Unit
Beneficiary	Product attributes	Deliver quality products	<ul style="list-style-type: none"> ▪ Customer Satisfaction (1-5 or %) [9] ▪ Perceived Quality of Products (1-5) [12]
		Deliver relevant products	<ul style="list-style-type: none"> ▪ Assessment Accuracy (1-5 or %) [5+9] ▪ Appeal Coverage (%) [5+11] ▪ Customer Satisfaction (1-5 or %) [9] ▪ Degree of Relevance of Products (1-5) [12]
		Deliver sufficient quantities	<ul style="list-style-type: none"> ▪ Number of People Helped (number of people) [2+9+11] ▪ Percentage of People in Need Helped (%) [12] ▪ Total Amount of Disaster Supplies Delivered to Aid Recipients (number of items or \$ amount) [3] ▪ Demands Satisfied (%) [10] ▪ Demands Not Satisfied (%) [10]
	Service attributes	Rapid delivery	<ul style="list-style-type: none"> ▪ Average Response Time (days) [2+3] ▪ Order Lead Time (days) [11] ▪ Distance of Organization's Warehouse to Disaster Location (km or hours) [12]
		Reliable delivery	<ul style="list-style-type: none"> ▪ Orders with Agreed Delivery Time in Days (%) [1] ▪ On-Time Delivery (%) [8] ▪ Delivery Date Reliability (%) [2]
		Deliver sustainable aid	<ul style="list-style-type: none"> ▪ Percentage of Goods Delivered From the Region (%) [11] ▪ Durability of Products and Services Delivered (1-5) [12]
Financial	Funding management	Ensure steady and timely flow of donations	<ul style="list-style-type: none"> ▪ Total Funds Available (\$) [12] ▪ Total Donor Dollars Received per Time Period (\$) [3]



			<ul style="list-style-type: none"> ▪ Spending Capacity (dollars spent given by donors/total dollars requested to donors) [2] ▪ Donation Velocity (days) [9] ▪ Percentage of Donations by Private/Institutional/Governmental Donors (% of total donations) [12] ▪ Percentage of Earmarked Donations (%) [12]
	Cost management	Ensure efficient use of funds in a transparent manner	<ul style="list-style-type: none"> ▪ Total Dollars Spent (\$) [2 + 11] ▪ Total Cost of Resources Used (\$ amount or % of total dollars spent) [3] ▪ Cost of Goods (\$ amount or % of total dollars spent) [2] ▪ Order/Setup Costs (\$ amount or % of total dollars spent) [3] ▪ Average Procurement Cost (\$ amount or % of total dollars spent) [1] ▪ Transportation Cost (\$ amount or % of total dollars spent) [2+11] ▪ Total Cost of Distribution Including Transportation and Handling Cost (\$ or % of total dollars spent) [3] ▪ Warehousing Cost (\$ amount or % of total dollars spent) [1+2] ▪ Inventory Holding Costs (\$ amount or % of total dollars spent) [3] ▪ Overhead Costs (\$ amount or % or total dollars spent) [3] ▪ Administrative Costs (\$ amount or % of total dollars spent) [12] ▪ Fundraising Costs (\$ amount or % of total dollars spent) [12] ▪ Cost Recovery YTD (%) [1] ▪ Cost Efficiency (%) [8] ▪ Financial Efficiency (%) [5]
	Budgeting	Develop, monitor and adjust budgets	<ul style="list-style-type: none"> ▪ Unit Budget (\$) [12] ▪ Project Budget (\$) [12] ▪ Deviation From Unit Budget YTD (%) [1]



Internal Processes	Operations management	Efficient and effective processes/operational excellence in processes	<ul style="list-style-type: none"> ▪ Deviation From Project Budget YTD (%) [1] ▪ Average Response Time (days) [2+3] ▪ Order Lead Time (days) [11] ▪ Goods to Delivery Time (days) [2] ▪ Order Fulfillment Cycle Time (days) [8] ▪ Days to Activate and End Supply Chain (days) [11] ▪ On-time Delivery (%) [8] ▪ Target Fill Rate Achievement (%) [3] ▪ Order Fulfillment Rate (%) [8] ▪ Average Backorder Level (%) [3] ▪ Delivery Performance (1-5 or %) [1] ▪ Percentage of Prepositioned Goods (%) [2] ▪ Available Stock Capacity to Supply Specified Amount of People in Specified Amount of Time (%) [1] ▪ Stock-out Probability (%) [3] ▪ Number of Stock-outs (number or % of cycles) [3+6] ▪ Accuracy of Stock Records (%) [4] ▪ Supply Chain Adaptability (1-5) [8] ▪ Volume Flexibility (scale from 1-5) [2] ▪ Mix Flexibility (scale from 1-5) [2] ▪ Relief Stock Turnover Rate YTD (%) [1] ▪ Percentage of Goods not Distributed (%) [2] ▪ Inventory Obsolescence (\$ amount or %) [3]
	Donor management	Target, acquire and retain donors	<ul style="list-style-type: none"> ▪ Advertising Costs to Acquire a New Donor (\$) [12] ▪ Percentage of New/Recurring Donors (%) [12] ▪ Donor Satisfaction Level (1-5) [2]



		Provide feedback and information to donors	<ul style="list-style-type: none"> ▪ On-time Reporting to Donors (G, Y, R) [1] ▪ Donor Satisfaction with Reporting (G, Y, R) [12]
	Partner management	Build partnerships with local government	<ul style="list-style-type: none"> ▪ Degree of Cooperation (1-5) [2]
		Target, acquire and retain partners	<ul style="list-style-type: none"> ▪ Degree of Cooperation (1-5) [2] ▪ Stocks Managed by Service Agreements (%) [1] ▪ Degree of Information Sharing (1-5) [2] ▪ Degree of Standardization (1-5) [2]
	Innovation processes	Identify, develop and manage new products and services	<ul style="list-style-type: none"> ▪ Degree of Innovation of the Supply Chain (1-5) [12] ▪ Adoption Rate of New Products and Technologies (1-5) [12]
	Regulatory and social processes	Ensure compliance with regulations	<ul style="list-style-type: none"> ▪ Degree of Compliance with Legal Requirements (1-5) [12] ▪ Degree of Compliance with Environmental Standards (1-5) [12]



Learning and Growth	Human capital	Build and expand supply chain skills and competencies	<ul style="list-style-type: none"> ▪ Level of Supply Chain Skills and Competencies (1-5) [12] ▪ Staff Development (%) [1] ▪ Human Resources Efficiency (1-5) [8] ▪ Percentage of Staff Participating in Training Programs (%) [9]
		Manage job turnover	<ul style="list-style-type: none"> ▪ Percentage of Job Turnover (%) [12] ▪ Training Cost Associated With Job Turnover (\$) [12]
	Information capital	Develop, utilize and capitalize on supply chain information and communication technology (ICT)	<ul style="list-style-type: none"> ▪ Level of Information and Communication Technology Available (1-5) [12] ▪ Application of Information and Communication Technology in Everyday Practice (1-5) [12] ▪ Procurement Transactions Using Information and Communication Technology (%) [1]
		Nurture local leadership	<ul style="list-style-type: none"> ▪ Percentage/Number of Local Workers Employed (% or number) [12]
	Organizational capital	Foster team work internally and with partners	<ul style="list-style-type: none"> ▪ Degree of Team Work with Partners (1-5) [12] ▪ Degree of Team work Internally (1-5) [12]
		Integrate volunteers	<ul style="list-style-type: none"> ▪ Share of Volunteers of Total Staff (%) [12] ▪ Volunteer Hours [9]

Sources: [1] Schulz and Heigh (2009), [2] Santarelli et al. (2013), [3] Beamon and Balcik (2008), [4] Van der Laan, Brito and Vergunst 2009, [5] Davidson (2006), [6] Beamon and Kotleba (2006), [7] Medina-Borja, Pasupathy and Triantis (2007), [8] Blecken et al. (2009), [9] Kumar, Niedan-Olsen and Peterson (2009), [10] Quiang and Nagurney (2012), [11] Gatignon, Van Wassenhove and Charles (2010) [12] additional measures identified by the author of this thesis

Notes: The measurement units are indicated in parentheses after the performance measure. Here, “1-5” refers to “on a scale from 1-5” and “G, Y, R” to the traffic-light colors “green, yellow and red.”



Appendix 2: Interview guide

Introduction

- Introduction of the interviewer
- Topic of the scientific investigation
- Procedure of the interview
- Questions to the interviewer

0. Personal Background

What knowledge/experience do you have concerning humanitarian supply chain management?

- How is your job related to the field of humanitarian supply chain management? Have any of your former jobs been related to this field?
- How many years of knowledge/experience do you have in this area?
- Is your knowledge/experience rather theoretical or practical?

1. Performance Measurement

What are the challenges concerning performance measurement in the disaster relief context and what requirements should performance measurement frameworks meet?

- What are some of the unique challenges you have experienced/know of concerning humanitarian supply chain performance measurement, especially with regards to disaster relief situations?
- What requirements does an effective performance measurement framework in this context have to meet?
- What performance measurement frameworks do you know of and how do they deal with the unique challenges of the field?

2. Balanced Scorecard

2.1. Balanced Scorecard Perspectives



How do the four perspectives of the Balanced Scorecard need to be adapted in order to be applicable in this context?

- Are the four perspectives of the framework appropriate?
- What changes would you suggest? Please give an explanation.
- Donors are often considered as customers in the non-profit context. Should the “customer perspective” (here beneficiary perspective) be divided into two to include the donor? Should donors be given their own perspective?

2.2. Balanced Scorecard Performance Measures

What are appropriate performance measures to track in this context?

- Please select four to five performance measures from each of the four perspectives and quickly explain your choice. Please start with the most relevant measure and end with the least relevant.
- Is the framework missing any important performance measures? If yes, under which perspective would you place this performance measure? What objective does it measure?



2.3. Balanced Scorecard Performance Measures

What are appropriate performance measures to track in this context?

- Please select four to five performance measures from each of the four perspectives and quickly explain your choice. Please start with the most relevant measure and end with the least relevant.
- Is the framework missing any important performance measures? If yes, under which perspective would you place this performance measure? What objective does it measure?

2.4. Applicability

To what extent is the Balanced Scorecard applicable for measuring supply chain performance in the disaster relief context?

- What do you consider strengths and weaknesses of the Balanced Scorecard framework?
- How would you rate the Balanced Scorecard as a performance measurement framework?
- How does the Balanced Scorecard deal with the unique challenges of supply chain performance measurement in the disaster relief context?

2.5. Recommendations Concerning the Implementation

What are recommendations for humanitarian organizations concerning the implementation of the Balanced Scorecard as a performance measurement framework?

- What should organizations consider when they customize the framework for their needs?
- What should organizations consider when they implement the framework?