Performance Measurement in Humanitarian Logistics – a process-oriented perspective

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Abstract
Does performance measurement improve the performance in humanitarian aid? Approaches from the private sector are analyzed with their application to the humanitarian sector. One central finding is that performance measurement is more than the collection of data – approaches that are able to combine the process-oriented perspective with performance measurement are needed (e.g. the SCOR-model).

Keywords: Performance Measurement, Humanitarian Logistics, SCOR-Model

Introduction
In the year 2005 the Fritz Institute had worked out the state of the art and the gaps in the field of humanitarian logistics (Thomas and Kopczak 2005). The institute determined a "lack of recognition of the importance of logistics". Metrics and performance measurement had been identified as one step to close the lacks. The following citation illustrates the identified problem and a possible solution: "In general, humanitarian relief organizations have focused on getting the job done and have put little effort into performance measurement other than reporting to donors on the amount of relief and usage of funds for a given relief operation." … "The Plan-Do-Check-Act improvement process that is commonly used in the private sector could be quite useful when applied to humanitarian logistics." (Thomas and Kopczak 2005, p. 10). One question of this paper is, if the pain points, as they were identify in the paper from the Fritz Institute, still exist and if so, how they can be closed by performance measurement in humanitarian logistics.

Humanitarian logistics – significance, definition, and aims
Significance
In the actual Annual Disaster Statistical Review 2011 (CRED, [2]) is documented that in 2011 332 natural disasters were registered. The human and economic impacts of the disasters were massive: Natural disasters killed more than 30 thousand people and caused 244.7 million victims worldwide. Economic damages from natural disasters were the highest ever registered, with an estimated US$ 366.1 billion. The earthquake and tsunami in Japan was the most expensive natural disaster ever recorded, with estimated economic damages of US$ 210.0 billion. The disaster that made the most victims in 2011 was the flood that affected China in June, causing 67.9 million victims (Guha-Sapir et al., 2012).

Other statistical data from the World Bank with the measured logistics performance indicator in different parts of the world will be content of this paper, as well (Arvis 2012). With a special view to the title of this paper performance measurement could be the key to understand the complex impacts of disasters and with a special focus on humanitarian logistics it can be the key to enhance preparedness and therewith to lower the consequences for the affected people. Performance Measurement won't avoid disasters like droughts, storms, floods, or earthquakes – but it can be the key to lower the amount of affected people and economic damages by initiating continual improvement.

Definition and aims

Thinking about performance measurement in humanitarian logistics we first have to define humanitarian logistics. It is defined "as 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" (Thomas and Kopczak 2005, p. 2). This definition is adopted by several authors and organizations and corresponds with more general definitions with view to logistics management and supply chain management [4] with a special focus on "alleviating the suffering of vulnerable people" (Blecken 2010, pp. 57-61).

The aims and goals are part of the definition: "efficient, cost-effective" and "for the purpose of alleviating the suffering of vulnerable people". Both, the private sector and the humanitarian sector, focus on the both logistical aims service and costs. For most humanitarian organisations a high logistic service has a higher priority than the logistics costs (Thomas 2003 and following publications from the Fritz Institute). With a good or even optimal logistic service the supply is quick, save and reliable. If the right goods (e.g. food and non-food items, medicine items) are received by the right people (the most affected people) at the right place, at the right time (as fast as possible) and with the right quality (e.g. food items or medicine is not of less quality because of extreme weather conditions) than humanitarian logistics can contribute to alleviate the suffering of vulnerable people. Often it even can save lives. The "right" logistic costs (e. g. for infrastructure, human resources, food and non-food items) are part of the aims, as well. If humanitarian organizations lower the logistic costs they can use the budget for the core tasks of humanitarian aid. With this the aim for humanitarian logistics can be defined as maximizing logistic service under the restriction of a given logistic budget (Boelsche 2009, p. 88). Performance measurement for humanitarian logisticians must be geared to these aims. It opens up possibilities to measure the target achievement and therefore performance measurement provides the necessary information for improvement.

State of the Art

The following state of the art is an application-oriented state of the art with a special view on performance measurement in humanitarian logistics. The first publications considering humanitarian logistics and performance measurement in humanitarian logistics were published by members of the Fritz Institute ([5], www.fritzinstitute.org). The researchers from the Fritz Institute analyzed external pressures on humanitarian logistics and worked

out the main pain points in humanitarian logistics as a foundation for new strategies and actions which were named as the path forward (Thomas 2003, p. 8; Thomas and Kopczak 2005, p. 5-8). They identified

- three main external pressures: increasing needs, increasing donor expectations and calls for accountability,
- five central pain points: lack of recognition of the importance of logistics, lack of professional staff, inadequate use of technology, lack of institutional learning, limited cooperation and
- five strategies for a path forward: professional logistics community, standardized training, performance measurement, communicating about the strategic importance of logistics and technical solutions.

Hence performance measurement was already recognized as an instrument for improvement and for closing the identified lacks in humanitarian logistics. With the use of metrics, aid agencies would have the chance to use actual performance as input into future operational plans, identify and eliminate causes of performance breakdowns, use analysis of current performance to inform about continuous improvement, use actual data to strengthen voice with donors, suppliers and logistics service providers and report performance to enhance the reputation (Thomas and Kopczak 2005, p. 10-11).

The aims and goals are also a central content of the publication "Key Performance Indicators" (KPIs), which focuses solely on performance measurement in humanitarian logistics (Davidson 2006). "A disaster relief operation involves trade-offs of speed, cost, and accuracy with regard to the type of goods that are delivered and their quantities. Balancing these trade-offs requires a means of measuring supply chain performance" (Davidson 2006, p. 1). Four indicators have been developed as key performance indicators which measure logistic performance (Davidson 2006, pp. 4-5):

- appeal coverage (percent of appeal coverage and percent of items delivered),
- donation-to-delivery time (how long does it take for an item to be delivered to the destination country after a donor donated it),
- financial efficiency (comparing the budgeted prices to the actual prices paid for the items delivered and ratio of the total transportation costs in comparison to the total costs for delivered items),
- assessment accuracy with a special focus on the first three indicators.

This system of scorecards and metrics has been an initial attempt to place a framework for performance measurement in humanitarian logistics. Since building up the first framework of KPIs and scorecard for humanitarian logistics by Fritz Institute humanitarian logistics has been content of several research activities but in most cases not with a special view on performance measurement. Important research groups in the field of humanitarian logistics are considered in this second part of the state of the art.

A more general indicator for performance measurement in humanitarian logistics is the "Logistics Performance Indicator" (LPI) documented by the World Bank every two years (Arvis 2012). The efficiency of a country's supply chain (in cost, time, and reliability) depends on specific features of its domestic economy and logistics performance. "It provides a simple, global benchmark to measure logistics performance, filling gaps in datasets by providing systematic, cross-country comparisons. A joint venture of the World Bank, logistics service providers, and academics, the LPI is built around a survey of logistics professionals. By asking freight forwarders to rate countries on key logistics

issues it captures a broad set of elements that affect perceptions of the efficiency of trade logistics in practice" (Arvis 2012, p. iii). Whereas countries like Singapore (Rank 1) and Germany (Rank 4) have high LPIs, countries of emerging and developing countries have much lower LPIs. E.g. Mauritania is ranked as 127 from 155 countries (Arvis 2012, p. viii). The LPIs six components include (Arvis 2012), p. 1): The efficiency of the clearance process, the quality of trade- and transport-related infrastructure, the ease of arranging competitively priced shipments, the competence and quality of logistics services, the ability to track and trace consignments, and the frequency with which shipments reach the consignee within the scheduled or expected delivery time. Especially Annex 3 with domestic LPI results, time and cost data are valuable for performance measurement in humanitarian logistics with a special view on different countries (Arvis 2012, pp. 43-50). Keßler and Schwarz refer to the LPI in their analysis about humanitarian logistics in Africa and the challenges on the last mile (Keßler and Schwarz 2011, p. 230). After presenting this more general indicator for logistics in a global world we now come back to the centre of humanitarian logistics again.

Scientific and applied researches by INSEAD and its Humanitarian Logistics Group, documented in several case studies and journal articles [6], have been carried into a book "Humanitarian Logistics" by Tomasini and van Wassenhove (2009). Performance measurement is not a main part of this publication but it is a side issue of the chapter information and knowledge management. Tomasini and van Wassenhove deal with topics like visibility, transparency and accountability (Tomasini and van Wassenhove, 2009 pp. 90-114). In 2012 the Humanitarian Research Group of INSEAD published findings from an empirical survey which they generated in cooperation with the Humanitarian Logistics Association and its members (Wassenhove and Allen 2012). Some findings can be used as a foundation for performance measurement, or benchmarking.

Several publications, especially dissertations which are published in a book series of the Kühne Foundation deal with humanitarian logistics (Tufinkgi 2006, Blecken 2010). Tufinkgi and Blecken both have built up reference models for humanitarian logistics. They refer to existing supply chain management frameworks and reference models like SCOR (e.g. Blecken 2010, pp. 80-114) but both of them decided to build up special reference models for humanitarian logistics. Processes which are characteristic of the humanitarian sector can be integrated into the specific model. But with a view on the title of this paper the reference models for humanitarian logistics are as complex that an integration of metrics for performance measurement had not been carried out. Short references to the needs of accountability, reporting and controlling are given (e.g. Blecken 2010, p. 219).

The Kühne Foundation is also a member of the working group Humanitarian Logistics founded by the German Logistics Association (BVL) in 2010. Members of the working group are representatives from the humanitarian sector and the private sector, researchers and other organizations (see detailed information in Baumgarten 2011). Central results from the working groups have been published. One working group has concentrated on "processes" as one of three main topics (Hellingrath 2011) but performance measurement wasn't a central topic because the working group has focused on the humanitarian processes and the interfaces across the chain.

A deeper analysis of evaluation and performance management has been worked out by ALNAP, the Active Learning Network for Accountability and Performance in Humanitarian Action [7]:

- The researchers have worked out general overviews about the understanding, use and improvement of evaluation (e.g. Hallam 2011).
- Studies about the state of the humanitarian system have been worked out with a special view on performance and progress, but these studies concentrate on a global overview and not on performance measurement as an instrument for the organizations themselves. As central indicators the study considers coverage/ sufficiency, relevance/ appropriateness, effectiveness, connectedness/ capacity building, efficiency, and coherence (Harvey et. al. 2010).
- A guide for real time evaluation has been published which refers to indicators comparable to the ones mentioned in the bullet above (Cosgrave 2009).
- The organization has dealt with the question how general data, especially from the OECD can be used to evaluate humanitarian action (ALNAP 2006).
- Most relevant for this paper is a study about performance and effectiveness in the humanitarian sector under the headline "counting what counts". In this study the authors have not only dealt with indicators but in addition with wider concepts, especially the balanced scorecard (Ramalingam and Mitchell 2009).

After the first steps of Fritz Institute in the direction of performance measurement in humanitarian logistics further developments have been worked out but not as extensive as it could have been expected.

Specific challenges for performance measurement in humanitarian logistics

Humanitarian performance: Definition and challenges

Performance measurement in humanitarian logistics requires a fundamental definition of humanitarian performance. This paper refers to an existing definition which matches the understanding of humanitarian logistics given in this paper (see chapter 2):

Humanitarian performance is "the effective collective performance of a complex system of international, national and locally-based organisations, which works to save lives, alleviate suffering and maintain human dignity both during and in the aftermath of man-made crises and natural disasters, as well working to prevent and strengthen preparedness for the occurrence of such situations." In addition "effective performance means undertaking work in ways that are consistent with humanitarian principles, mobilising and deploying sufficient financial, material and human resources in ways that are relevant, well-managed, accountable, impartial, durable and ensure good quality" (Ramalingam and Mitchell 2009, pp. 48-49).

The definition gives an impression that measuring performance with a humanitarian focus is more than collecting indicators or metrics, such as the mentioned key performance indicators or logistics performance indicators. The definition above refers to a complex system which includes several organisations and actors. The necessity is given to consider connections and relationships across logistical processes and the whole supply chain. In addition performance management should not only focus on the end of the supply chain but also on former processes, because the performance of these processes influence the overall performance, as well.

The Active Learning Network for Accountability and Performance in Humanitarian Action has worked out four central requirements for performance measurement in Humanitarian Action: "coherent, integrated, consistent and comprehensive" (Ramalingam and Mitchell 2009, pp. 77-83).
Few publications keep further challenges in mind and integrate the indicators and other contents of performance measurement in humanitarian logistics in wider concepts like the balanced scorecard (see e. g. Kaplan and Norton 1996). This approach has been adapted with first considerations to the humanitarian sector. The perspectives of the scorecard are denominated as five perspectives: impact, stakeholders, process, resource, and organizational capacity (Ramalingam and Mitchell 2009, p. 76). The balanced scorecard is a first approach for humanitarian logistics considering different perspectives like the process perspective, different actors and not only the past but also future expectations about indicators. In addition it tries to identify connections and correlations between the indicators – a requirement which succeeds rarely in the practical application of the balanced scorecard – and the influence of indicators on aims and goals, strategy and vision and with this on the impact of humanitarian logistics.
But what is still largely missing is the integration of the mentioned (and other) indicators into process models of logistics and supply chain management. This is a challenge for the future research on performance measurement, especially in the process-oriented humanitarian logistics.

Process-orientation in performance measurement for humanitarian logistics – with a special view on SCOR

In this paper the process-oriented performance measurement framework doesn't base on the reference-models specifically worked out for the humanitarian sector but on a more general model for supply chain management, the SCOR model in the current version 10.0 (Supply Chain Council 2012). This Supply Chain Operations Reference-model (SCOR) has been developed in 1996 by the Supply Chain Council (SCC), a global non-profit organization. The SCOR model is a global standard for supply chain management, "a model that provides a unique framework for defining and linking performance metrics, processes, best practices, and people into a unified structure" [9].
One expected question should be answered before going more in detail: Why does this paper focus on the standard model developed with a private and special industrial view and not on the models created individual for the humanitarian sector? Two main answers can be given to this question:

- First of all, SCOR is composed of three components: Not only process modelling is considered but also performance measurement and best practices (Blecken 2010, p. 106; Supply Chain Council 2012, p. 6). Therewith a basis for integrating metrics into the process model is given – which of course has to be adapted to the humanitarian sector.
- Secondly, the standard model is an inter-branch standard process reference-model and offers the integration of organizations from different sectors, such as the industrial sector, retail and (logistic) service providers. If an involvement of the humanitarian sector into the SCOR model succeeds than the complete humanitarian supply chain can be considered.

As it is illustrated in figure 1 the model spans over the supply chain from suppliers over the own organization to customers. Within the framework five distinct management processes are considered: source, make, deliver, return and plan (Supply Chain Council 2012; Blecken 2010, pp. 105-106; Bölsche 2009, pp. 212-213).

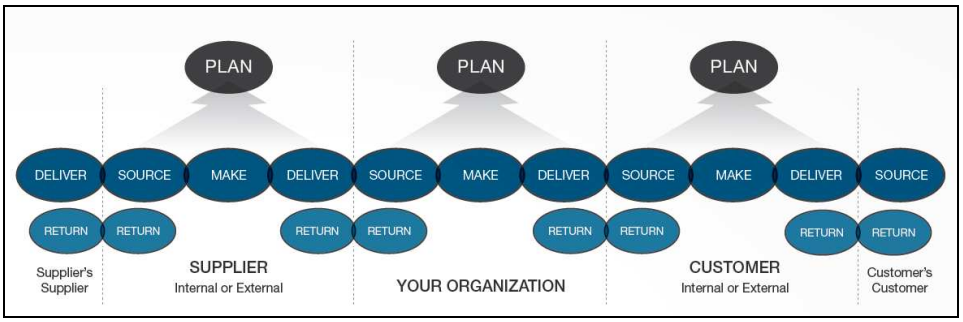

Figure 1: SCOR 10.0, First level [Supply Chain Council 2012, p. 6]

The SCOR model breaks down each of the management processes – visualized in figure 2 on the first level – at various organisational levels and establishes metrics at each of theses levels (Supply Chain Council 2010; Supply Chain Council 2012).
In this paper a first framework should be developed on the higher levels of SCOR considering the necessary modifications of the model when using it for performance measurement in humanitarian logistics. Starting on the first level:

- Some of the terminologies should be changed with special focus on the actors in a humanitarian chain, e.g. "customer". The organization in the centre could be a NGO organization (or several NGOs), the suppliers could be – in dependence from the needed items – the agriculture industry, the pharmaceutical industry, the food industry or others suppliers with relevance for humanitarian aid, and the ultimate customers should be dominated as beneficiaries or affected people.
- Another group of "customers" or stakeholders in humanitarian logistics are donors. They influence the budget for humanitarian logistics and in some cases donate items or services for humanitarian aid. In addition, they have special demands on the reporting and accounting system. Donors are not considered in the original SCOR model but have to be considered in an adaption for the humanitarian sector along the whole supply chain.
- In most cases "make" in the sense of "production"-processes aren't relevant for NGOs, and they can be disregarded for service providers (NGOs, logistics service providers and others) or they can be regarded as "make to order" processes. All other processes are to a great extent relevant for the actors in humanitarian aid: source, deliver, return (this process is needed especially in the aftermath of a disaster) and plan (as well for each organization as for the whole supply chain).

The following figure 2 considers the above mentioned requirements concerning the terminologies, integration of donors, and production processes. For a better understanding it illustrates a simplified example with a special view to the United Nations World Food Programme (WFP), which reached in 2011 99.1 million people in 75 countries and provided 3.6 million metric tons of food (for more information about WFP see [10]). This approach can be transferred to other humanitarian supply chains.

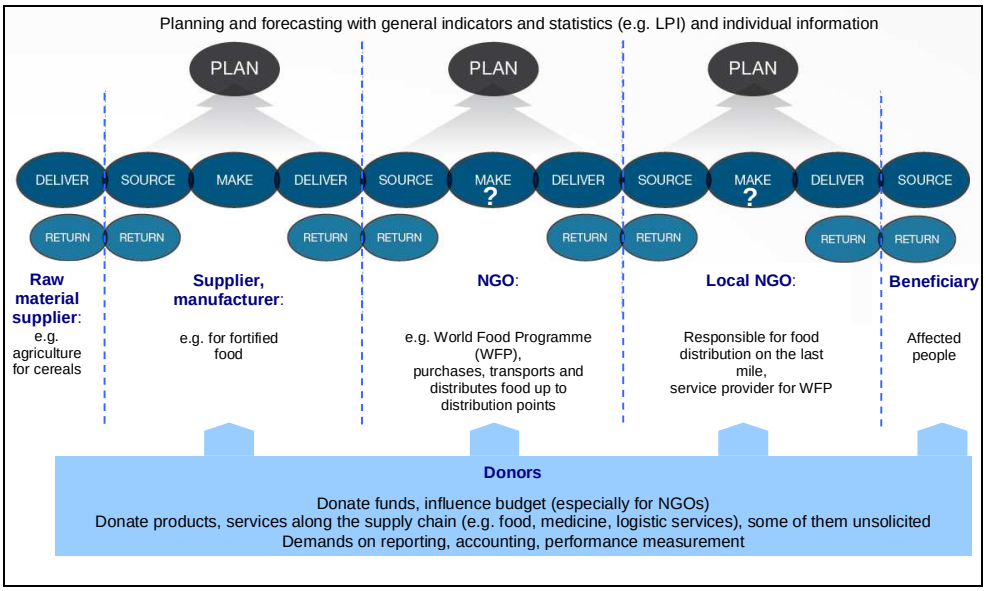

Figure 2: SCOR 10.0, First level, Example food supply chain

With a special view on performance measurement in humanitarian logistics, SCOR Level 1 metrics are strategic, high-level measures that cross multiple SCOR processes (Supply Chain Council 2012). They can be adjusted to the organizations in the humanitarian supply chain. On the more detailed levels two and three the processes are defined and described more and more extensive, e.g. with input and output relationships and a foundation for benchmarking and best practice analysis. For the purpose of performance measurement level two includes five performance attributes and level three more detailed metrics, which are linked with the performance attributes. Performance attribute are used to express a strategy, they cannot be measured itself. Metrics measure the ability of a supply chain to achieve these strategic attributes (Supply Chain Council 2012, pp. 6-10). Most of the attributes and metrics can be applied for humanitarian logistics, some are not relevant (especially when detailing make processes) and some have to be defined in addition (attributes and metrics concerning donors in the whole supply chain). This hierarchical structure is illustrated in the following figure 3 in consideration of performance measurement in humanitarian logistics. A view into level two and its performance attributes exhibits that these attributes (Supply Chain Council 2012, p. 7) are generally in accordance with the key performance indicators created by the Fritz Institute for humanitarian logistics (Davidson 2006, see also chapter three):

- Responsiveness attribute (describes in SCOR level two the speed at which tasks are performed) corresponds with donation-to-delivery time (Fritz Institute).
- Agility attribute (describes in SCOR level two the ability to respond to external influences and the ability to change) isn't part of the KPIs developed by the Fritz Institute but is of high relevance for humanitarian logistics.
- Costs attribute (describes in SCOR level two the costs of operating the process) and assets attribute (describes in SCOR level two the ability to efficiently utilize assets) are consolidated in Fritz Institute KPIs to financial efficiency.
- Reliability attribute (describes in SCOR level two the ability to perform tasks as expected) corresponds with assessment accuracy (Fritz Institute).

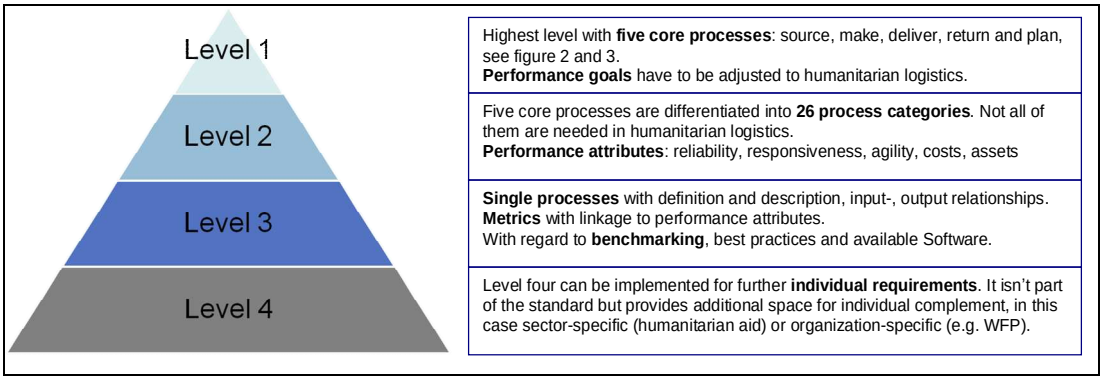

Figure 3: SCOR 10.0, Different hierarchical levels

This comparison shows that the differences between performance measurement in commercial logistics and humanitarian logistics are not as large as it could be expected at first view. Both sectors have different impacts, aims and goals and with this they have different ambitions concerning the degrees of fulfilment. But the relevant attributes, metrics and indicators are to a great extent consistent with each other. Because of the linkages between level two attributes and level three metrics this statement holds for level three, as well. In consequence the SCOR model can be an adequate instrument for performance measurement in humanitarian logistics.
Some further topics are not part of this paper, e.g. a detailed view into levels three and four, a more critical analysis of the SCOR model a discussion about quantitative metrics and performance indicators, so that first ideas for future research and application are given.

Conclusion

The instrument of performance measurement is not able to avoid the occurrence of disasters, but with each step of improvement the aims of humanitarian logistics could be achieved on a higher level – and in consequence it contributes to alleviate the suffering of the affected people. In this paper some considerations how to reduce the identified lacks in humanitarian logistics have been worked out. After dealing with statistics and performance indicators such as the Annual Disaster Statistical Review by CRED and the Logistics Performance Indicator by the World Bank some ideas are created which general global metrics, indicators and data about disasters and logistics are available and can be used for performance measurement. Even though future demand in humanitarian aid and humanitarian logistics will be uncertain such information can be integrated into planning activities along the whole supply chain. Over that, wider concepts of performance measurement, successfully implemented by the private sector, have been presented: In a short overview the balanced scorecard and more detailed the process-oriented SCOR model. This paper gives several ideas for future research and the application in practice: E.g. the integration of statistics and indicators into planning and forecasting, working out the SCOR model for humanitarian logistics in detail, its practical implementation, and questions concerning the inter-sectoral collaboration.

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