Managing Humanitarian Supply Chains
Strategies, Practices and Research

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Preface

The BVL Working Groups are focusing on current topics of interests within logistics and bring together practitioners as well as researchers to work out specific answers and solutions to these topics. In the case of humanitarian logistics two subsequent working groups have been organized by the BVL in order to reflect the relevance and the need for discussion covering the most important topics. During that time a network of humanitarian organisations, logistics and IT companies as well as research institutions has grown together. We strongly believe that with our initiative we could already contribute and make – at least a little – change in the humanitarian logistics world.

Disaster relief is not only a challenge for humanitarian organisations, but a global one for politics, economies, and societies worldwide. Thus humanitarian operations need to be planned sustainable; all phases have to be considered adequately, from the first response and recovery to rehabilitation and mitigation as well as to prevention and preparation in order to build resilient communities in an interconnected and globalized world. As BVL members we are aware of the importance and power of supply chain management and logistics for our businesses. BVL International felt directly responsible and able to contribute in this field.

Two very promising projects have been designed and partly initiated:

1. The platform HumLog@BVL: an international network among humanitarian organisations, logistics services providers and humanitarian logistics researchers supporting a continuous dialogue, the exchange of knowledge and logistics education.
2. Get Seaports Ready for Disaster (GSRD): a programme to increase the disaster preparedness of seaports by raising disaster awareness and port performance in free, local trainings.

To conclude, we can say that we know there is still a lot to do. Thanks to the efforts and commitment of the more than 25 experts from industry, humanitarian organisations and research institutions of the Humanitarian Logistics Working Group we have made first important steps and we know where to go next. Thanks to the Professors Helmut Baumgarten and Bernd Hellingrath who initiated and guided the idea and the work. We cordially thank all members for all the time, expertise and efforts they brought in, it deserves our utmost respect and recognition.
Preface

We are pleased at your interest in humanitarian logistics and wish you an interesting and informative read.

Prof. Dr.-Ing. Raimund Klinkner
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BVL International

Prof. Dr.-Ing. Thomas Wimmer
Chairman of the Executive Board
BVL International
From Process Analysis to Performance Management in Humanitarian Logistics

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1. Introduction

On-going discussions on management and improvements of logistics processes in humanitarian organisations can be described controversial for both the practitioner and academic communities. On the one hand practitioners often state that humanitarian operations are unique and the main challenge for logisticians is therefore to be experienced and open enough for improvisatory and fast decision-making. On the other hand the vast majority of the scientific community postulates that humanitarian logistics contain universal elements and patterns which therefore can be anticipated by appropriate design, planning, executing and controlling of humanitarian supply chains. A detailed look on this apparent contradiction reveals that reality seems to be obviously somewhere in the middle of these general opinions. The actual positions within the humanitarian and practitioner communities are very multifaceted. The main difficulty of the discussion seems to be caused by different views on some fundamental interrelated areas: the definition of humanitarian logistics itself, the considered differences between humanitarian and commercial supply chains, and the approach to define and model as well as to measure humanitarian logistics processes.

In this paper\(^{32}\) we present one possible performance management approach which enables the analysis and improvements of humanitarian logistics processes with enough flexibility for organisational and operational specifications and adjustments. For this purpose first an appropriate process modelling approach will be

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\(^{32}\) This chapter is a recapitulated and rearranged compilation of three inter-related works presented in Widera and Hellingrath (2011a), Widera and Hellingrath (2011b) and Widera et al. (2013). These works have been pre-reviewed, presented and discussed at the conferences Logistikmanagement, NOFOMA and ISCRAM. Thus we would like to acknowledge the valuable remarks, feedback and discussions by the reviewers and the audience within those renowned research communities.
presented. In the second step we describe a performance measurement system (PMS) which can be applied for different humanitarian organisations in terms of objectives, structures, and processes.

2. Visualization of Humanitarian Supply Chains

2.1. Background

In research literature there is no doubt about the contribution of logistics to the effectiveness and efficiency of humanitarian operations. However, there is no common definition about what effectiveness exactly means in the humanitarian context, especially when compared to business concepts (see e.g. Mays, Racadio und Gugerty 2012). Also, it is often stated that logistics related costs can sum up to 80% of the total spend of humanitarian organisations (see e.g. Long and Wood 1995; van Wassenhove 2006; Blecken 2010), but there is no data available explaining how this calculation was performed and what exactly is meant here with logistics related costs. In practice used definitions, existing data sets, and organisational policies regarding logistics vary between different humanitarian organisations. This is not big news and by far not specific for the humanitarian sector as it could be observed also in the corporate world within the recent decades. However, a difference can be found in the according research community: there are no proven management approaches for humanitarian logistics in the literature while a big number of established and evaluated management approaches for commercial logistics exist. In order to provide a clear view on what humanitarian logistics processes are about and how they can be managed, it is necessary to present a methodology for this specific application area which is adjustable for different humanitarian organisations – no matter if talking about a small local non-governmental organisation (NGO) or a huge inter-governmental disaster relief network. Based on a comprehensive description of organisation-specific processes and adequate performance measurements it can be defined what an “effective” process is, when a process can become “expensive”, or which delivery times are “fast” and which are not.

2.2. Humanitarian Logistics

Blecken (2010) proposed a definition of humanitarian logistics, which describes it as the "process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods, materials and equipment as well as related infor-
mation, from point of origin to point of consumption for the purpose of meeting the beneficiary’s requirements.” This definition is based on often cited works by van Wassenhove (2006), Thomas and Mizushima (2005) and Kotzab et al. (2008). It is very much oriented on the business concept of supply chain management (SCM) as the term “beneficiary” could be easily replaced with "customer". The main advantage of this definition is that it offers a broad scope on the relevant tasks, concepts, tools, and especially the management function of SCM processes in humanitarian operations, including disaster relief organisations, suppliers, logistics service providers or beneficiaries. Nevertheless, a more precise understanding of humanitarian logistics and supply chain management requires the consideration of the humanitarian space as well as the differentiation between the humanitarian and commercial sector.

The humanitarian space of relief organisations is surrounded by three main principles: humanity, neutrality, impartiality, and independence (for the following paragraph see United Nations 2004, Tomasini and van Wassenhove 2009). By humanity the actors are committed to save lives and reduce human suffering. Additionally, these organisations have to ensure neutrality by not interfering in e.g. political issues within the operational area. Impartiality obliges humanitarian actors to ensure equal treatment of beneficiary peers. Independence refers to the goal that all humanitarian operations need to be detached from political, economic, military or other objectives in specific operation regions. In consequence three main differences between humanitarian and commercial supply chains can be deduced, as they are responsible for a restricted transferability of existing SCM concepts (for the next paragraph see Widera and Hellingrath 2011a). First, the flows of personnel as well as knowledge and skills have to be added within the established supply chains flows, e.g. the flow of personnel as part of the flow of material and the flow of knowledge and skills as part of the flow of information. Secondly, the differentiation between typical humanitarian and commercial supply chain actors has to be highlighted, esp. the role of customers. In commercial supply chains it is the customer who is asking for goods or services willing to pay for his benefit, while in humanitarian supply chains it is the donor who is paying for goods or services delivered by humanitarian organisation. Thirdly, the product life cycle

33 Compared to humanitarian SCM, the term logistics is used in the following, when the focus lies on physical operations with all transportation and warehousing processes including all sub functions, such as handling or commissioning, with the aim of ensuring the availability of objects needed in line with demand. In contrast, by using the term humanitarian SCM the inter-organizational perspective, management, and coordination function is highlighted (see also Tomasini and van Wassenhove 2009).
in commercial supply chains differs from the disaster management cycle. In the current literature, the following four phases are commonly distinguished: mitigation, preparedness, response, and rehabilitation. These three characteristics: flows, supply chain actors, and disaster management life cycle are responsible for important differences in humanitarian and commercial supply chains, which are listed in the table below.

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<th>Commercial Supply Chain</th>
<th>Humanitarian Supply Chain</th>
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<tr>
<td><strong>Range</strong></td>
<td>From supplier to customer</td>
<td>From donors and suppliers to beneficiaries</td>
</tr>
<tr>
<td><strong>Actors</strong></td>
<td>Known, with aligned incentives</td>
<td>Multiple in nature, with misaligned incentives</td>
</tr>
<tr>
<td><strong>Customer</strong></td>
<td>End user = Buyer</td>
<td>End user (Beneficiary) ≠ Buyer (donor)</td>
</tr>
<tr>
<td><strong>Supplier</strong></td>
<td>Supplier, known in advance generally</td>
<td>Supplier and/or donor uncertain and multiple</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>More and more volatile</td>
<td>Highly complex, volatile and unstable</td>
</tr>
<tr>
<td><strong>Shelf Life</strong></td>
<td>Some years, but tends to shorten</td>
<td>Some weeks to some months in total, depends on type of crises</td>
</tr>
<tr>
<td><strong>Supply Chain Driver</strong></td>
<td>Purchasing power-based demand: relatively stable and predictable</td>
<td>Beneficiaries’ needs: relatively uncertain and unpredictable in terms of timing, location, type, and size</td>
</tr>
<tr>
<td><strong>Lead Time</strong></td>
<td>Determined by the supplier-manufacturer-DC-retailer chain</td>
<td>Approximately zero lead time requirements</td>
</tr>
<tr>
<td><strong>Distribution Network Configuration</strong></td>
<td>Well-defined methods for determining number and locations of distribution centres</td>
<td>Challenging due to the nature of the unknowns (locations, type and size of events, politics, and culture), and “last mile” considerations</td>
</tr>
<tr>
<td><strong>Information System</strong></td>
<td>Well-defined, advanced technology</td>
<td>Information often unreliable, complex, incomplete or non-existent</td>
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*Table 1: Own selection of main differences between humanitarian and commercial logistics acc. to Beamon 2004, Charles et al. 2009, Walton et al. 2011, Mays et al. 2012*
As shown in the table, the strategic goal on saving lives and relieving human suffering radically determines humanitarian supply chains (for further explanations see the literature referred). The following characteristics of humanitarian logistics can be highlighted as being of crucial importance for managing the processes involved in relief operations: relatively unstable, uncertain and unpredictable needs (Mays et al. 2012); role of donors as buyers and beneficiaries as end users; high importance of speed (Beamon 2004); highly volatile and unstable environment (Charles et al. 2009); partly temporary and unknown supply chain design (Jahre et al. 2009); the importance of personnel as additional material flow (e.g. service provider) and knowledge and skills as additional information flow (Tomasini and van Wassenhove 2009); and finally the focus on procurement and distribution within the logistics value chain (Blecken 2010). These findings are of high importance in order to understand, analyse, and manage humanitarian supply chains.

2.3. Modeling Humanitarian Supply Chains

There are two possible directions of modelling organisational structures, responsibilities and processes: one can follow a from-scratch approach in order to identify one specific scenario (an organisation or processes) or a reference model approach in order to follow a predefined view on specific elements (like organisational structures). In recent humanitarian logistics literature both approaches have been presented and discussed. Models from the first category can hardly be applied to the whole sector, because of the specific organisations’ underlying structures, predefined standard operational procedures, conventions in terms of objectives, and scope. The second category focuses on reference models that are applicable in various humanitarian organisations with their different logistics processes (e.g. Tufinkgi, 2006). As shown in Widera and Hellingrath (2011b) for the humanitarian logistics the application of a specific reference model promises to ensure the required domain-knowledge, reusability, adjustability, and cost-benefit ratio.

According to Thomas (2006) a reference model “is an information model used for supporting the construction of other models. (…) The re-utilization of reference models connected with this can be seen as a fundamental idea resulting from the paperless, tool-supported data-processing consulting at the beginning of the 1990’s and must be emphasized as a fundamental characteristic of reference models.” An investigation and comparison of existing reference models for humanitarian logistics that are provided by Tufinkgi (2006), McGuire (2006), and
Blecken (2010) qualifies the reference task model (RTM) from Blecken as an adequate basis for the purpose of the approach presented in this paper (see also Widera and Hellingrath 2011b). The development of the RTM was based on a combination of a comprehensive literature analysis and interviews with more than 30 humanitarian organisations (for the following paragraph see Blecken 2010). Thus it reflects the current state of the art in supply chain management research as well as real world awareness of humanitarian organisations in disaster relief. The RTM respects the required adaptability, manageability, and accuracy for process analysis. Thanks to the application of the Business Process Model and Notation (BPMN) within the RTM, an established and continuously approved modelling language is used (White, 2004; Franke et al. 2011). BPMN can be described as a “readily understandable” notation providing a “standardized bridge for the gap between the business process design and process implementation” (Object Management Group, 2011).

The operationalization of the RTM provides a tool for humanitarian organisations to rapidly visualize the tasks carried out by the organisation and its supply chain partners (Blecken 2010, Widera and Hellingrath 2011b). The RTM distinguishes the tasks in a humanitarian supply chain along two axes: A hierarchical decomposition of the planning horizon (strategic, tactical and operational) and a division according to the function (assessment, procurement, warehousing and transport). By clarifying roles, responsibilities, and definitions the RTM is able to support the standardization of these tasks. The RTM has been operationalized, transferred into a modelling and analysis tool as well as applied in two use cases (for a detailed documentation of these results see Widera, Hellingrath 2011b and Widera et al. 2013). The aim of the use cases was to map and analyse logistics processes of two humanitarian organisations as well as to evaluate the applicability of the RTM. In result two organisation-specific process models and descriptions respecting the strategic, tactical and operational levels as well as all relevant functional divisions have been developed. The following figure illustrates a screenshot of a process model generated in the modelling tool.
The output documents – the process models and descriptions – can be used for two major tasks: (1) humanitarian logistics responsibilities, tasks and processes within the organisation can be communicated within the organisation and with other actors (e.g., the contracted logistics service provider); (2) the models can be used for process analysis as AS-IS scenarios and the development of appropriate improvements, e.g., TO-BE scenarios on a design level or other managerial components like the selection of appropriate warehouse management systems on operational level. The chosen process modelling approach has been evaluated and proven very beneficial within two use cases, where semi-structured interviews and mapping sessions with logisticians from both strategic and operational level with different humanitarian organisations were executed (see Widera and Hellingrath 2011b). The interviewees could identify and reflect their daily practices and organisational structures using the process models. With application of the RTM a comprehensible visualization and description of organisation specific processes could be created. The process mapping support by the modelling tool was very helpful in terms of time invested and automated securing the accurate BPMN application. These findings form the basis for improvements of the management of logistics processes by humanitarian organisations and the communication and coordination of relief operations.
3. Improving Humanitarian Logistics Processes

3.1. Performance Measurement in Humanitarian Logistics

In practice of humanitarian organisations, on the one hand, performance measurement is seen as useful by the large majority of humanitarian organisations. On the other hand, 55% of humanitarian organisations do not monitor any key performance indicators (KPI), about 25% declare to control a few indicators, and only 20% are measuring the performance consistently (Blecken 2010).

The need for performance measurement of humanitarian supply chains was recognized by the scientific community. The current research in the area of performance measurement covers two directions. The first one deals with requirements for performance measurement in humanitarian supply chains, procedures for developing PMS and new KPIs as well as supporting information systems (e.g. Beamon 2004; Schulz and Heigh 2009, Beamon and Balcik 2008; Blecken and Hellingrath 2008; Howden 2009; Schulz 2009, de Leeuw 2010). For example, Beamon (2004) discussed the transferability of a PMS for commercial supply chains considering resource, output and flexibility performance measures. Blecken and Hellingrath (2008) presented a review and assessment of current SCM tools for humanitarian operations and their support of specific performance indicators. These works give important insights on humanitarian performance measurement, but only partly provide elements of a thorough PMS and its implementation, which is applicable for different organisations covering different relief operation stages and objectives.

The second direction focuses on investigations of PMS applied in certain organisations (e.g. Davidson 2006; van der Laan et al. 2009; Samii 2008; Schulz and Heigh 2009; Rongier et al. 2010). Davidson (2006) e.g. discusses different PMS (as the Balanced Scorecard or the SCOR model) in order to select, implement, and evaluate a PMS for the International Federation of Red Cross and Red Crescent Societies (IFRC). Based on interviews with the IFRC, existing PMS were abandoned and an organisation specific solution was chosen: a time-oriented PMS including the indicators (1) Appeal to Coverage, (2) Donation-to-Delivery-Time, (3) Financial Efficiency, and (4) Assessment Accuracy (Davidson 2006). Rongier et al. (2010) investigated different process-oriented PMS (Activity Based Costing, the Fraunhofer Holistic Process PMS, SCOR-Model, and the Balanced Scorecard) and presented a measurement concept exclusively for the response phase, which is based on process definitions and a specific KPI selection for the French Red Cross. For generic process mapping, the promising Business Process Management
(BPM) approach was chosen and, while a logistics-oriented perspective and existing process models for humanitarian logistics was neglected (Rongier et al. 2010). Additionally, the focus on the response phase does not reflect the requirements for performance measurement of humanitarian organisations during the whole disaster response life cycle. These works focus on organisation-specific solutions and offer important cognitions about end user demands on PMS as well as its applicability and prospects of success. Accordingly, the adaptability of PMS presented by Rongier et al. (2010) for other organisations is limited.

Organisations in the humanitarian sector differ greatly in terms of size, structure, field of application, and professional staff. Therefore these findings have to be seen in the light of the requirements for a reusable, modular, and adaptable PMS. Additionally, an appropriate PMS needs to reflect a process driven view on logistics performance based on standardized processes in order to identify vulnerability issues within the supply chain. A detailed analysis of appropriate measurement approaches, specific end-user requirements and restrictions as well as required data and according information systems has been presented in Widera and Hellingrath (2011a). In order to increase the capability for improving logistics by humanitarian organisations it is necessary to know what to measure, to identify why it is relevant for an organisation and to learn how to measure it. The operationalized RTM presented in the chapter above seems to be a good starting point for the development of a performance measurement system which is able to fulfil the identified requirements.

3.2. Process Analysis

The improvement of humanitarian logistics processes starts where existing practices are critically scrutinized. Thus, the application of the process modelling approach presented in the chapter 2.3 represents already a first analysis step. The process models are generated during interviews with personnel involved in logistics tasks at all organisational levels. It is a common phenomenon that the interviewees automatically reflect their practices when talking and answering questions about them. Very often, first ideas on improvements are already identified during the step of process mapping. This first strength-weakness analysis of responsibilities, process structures or flows can be completed with a detailed comparison of the AS-IS scenarios using predefined reference processes, which are the first major extension of the RTM (see Widera and Hellingrath 2011a). Reference processes can be described as common and recommended flows or “best practices” visual-
ized as logical process sequences. This step can be seen as a structural analysis on a conceptual level. Deviations from reference processes compared with organisation specific AS-IS scenarios indicate inconsistencies or reasonable organisational characteristics. Once such deviations are recognized, improved TO-BE scenarios can be designed (see Widera and Hellingrath 2011b). For this purpose the RTM was enriched with reference processes for all functional areas (from assessment to transport) and planning horizons (from strategic to operational). Additionally, the ability of the identification, modelling, and description of new processes was successfully tested and integrated within the modelling tool. The RTM can be extended in case of a justified process by refining existing or adding new processes with the basic BPMN. Redundant processes can be highlighted in the AS-IS scenario in order to be considered (i.e. avoided) within the design of a TO-BE scenario. This step has been automated by an adjustment of the modelling tool (see Widera et al. 2013). For an on-going reflection of the new designed (and installed) TO-BE scenarios further a dedicated quantitative, and therefore real data is necessarily required. This step ensures a sustainable logistics management at humanitarian organisations as it enables self-reflection and continuous organisational learning.

3.3. Quantitative Analysis

For the purpose of a quantitative analysis, all reference processes need to become quantifiable with appropriate KPIs. KPIs can be defined as “[...] a set of measures focusing on those aspects of organisational performance that are most critical for the current and future success of the organization” (Parameter, 2010). An open set of appropriate KPIs respecting various recommended requirements was identified in Widera and Hellingrath (2011a). One major requirement needs to be highlighted at this stage: the relevance of the performance metrics. For this purpose, a comprehensive literature review has been conducted with the aim to identify primary objectives of humanitarian organisations, e.g. responsiveness or beneficiaries’ satisfaction. The identified objectives form an orientation framework for relevant KPIs (see Widera and Hellingrath, 2011a).

In order to (re)focus on the analysis of the process level, the orientation framework with KPI objective relations needed to be reflected with actual humanitarian logistics processes. The Association of German Engineers (VDI, 2002) pointed out that existing SCM tools document relevant processes by the identification of events in form of quantity and time data as each KPI has to be quantifiable. In that sense all identified KPIs had to be assigned to specific processes by setting
adequate measurement points. From a technological perspective, these model elements were assigned to corresponding KPIs (and vice versa from a conceptual point of view). In order to create awareness for both the required data collection and analysis, and for the relevance of the logistic processes, the humanitarian personnel need to become aware of the interrelations between processes and performance. For this purpose all relevant KPIs, their measurement points, and the importance for the humanitarian organisations need to be visually highlighted and explained in detail, with frequent links to the process level. To allow the highlighting of model elements that are assigned to a specific KPI, the plugin for model queries is used. The plugin uses a query language that applies set theory and functions on these sets to perform the actual query.

The following figure illustrates how the measurement points of a KPI can be added as attribute to specific process elements.

![Figure 2: Exemplary assignment of KPI’s to a warehousing process](image)

One example for a KPI is the “Mean quality inspection costs per incoming goods item”, which is related to the objective “Inventory Performance” (see Widera et al. 2013 for the following paragraph). In the following the KPI is named IP.4 including the relation the objective (“IP”=Inventory Performance) and the identification number (=4) within the KPI set. The measurement of IP.4 starts with the process “Verify Shipment Information” on the level of goods directly ordered by the humanitarian organisation and with the task “Receive Goods (unsolicited)” on level of in-kind donations. According to the definition of IP.4 the accounting costs goods arrival, materials and equipment costs, and personnel costs are considered with
a predefined calculation rule. The ending measurement point of IP.4 is initiated with the process “Check Quality”. In result the performance of the “Mean quality inspection costs per incoming goods item” (IP.4) can be measured by the relation of quality inspection costs (defined as the sum of personnel costs plus material and equipment costs) and the number of incoming goods which occur during the warehousing process on different network levels of the supply chain like defined in VDI (2002).

The modelling tool supports the assignment of measurement points as attributes of process elements and has been extended by a plugin for pattern search in order to support an automated visualization of KPI’s within the process models. The plugin uses a query language that applies set theory and functions on these sets to perform the actual query (the modelling tool and its functionality is described in detail in Dietrich et al. 2011 and Widera et al. 2013). In result the relations between processes and according KPI’s can be intuitively visualized within the modelling tool. Once the RTM is applied within a specific organisation all relevant processes and KPIs are documented within organisation-specific process models and descriptions. The detailed documentation of the process models is facilitated by the development of a report generator that enables the export of text files with process models and the corresponding descriptions. This allows communicating the models in printed or digital form even to employees during humanitarian operations, e.g. to quickly show them best practices. The process models and descriptions can be used to support the identification of relevant data collection, monitoring, and analysis by the organisations in order to influence their performance, as desired by management.

3.4. Development of a Performance Measurement System for Humanitarian Logistics

By extending the presented process modelling approach with adequate structural and quantitative analysis functions an integrated process analysis toolkit has been developed. However, a performance management approach supports decision-makers to understand and analyse the past, to observe and manage the presence as well as to improve and prepare for the future. The approach presented so far supports already partly the ex-post analysis and the design of the future setting. In order to complete this support and add a continuous management dashboard of on-going processes a dedicated PMS has to be provided. As Neely (2005) summarizes “(A) performance measurement system enables informed decisions to be
made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data.” For the purpose of humanitarian logistics an appropriate PMS needs to reflect the presented process analysis toolkit, i.e. all relevant processes and perspectives must be contained, the organisational objectives and KPIs need to be integrated and the context specific user requirements have to be fulfilled.

The results generated by the comprehensive literature analysis in Widera and Hellingrath (2011a) form the basis for the design of an adequate PMS for humanitarian logistics. A supply chain Balanced Scorecard (BSC) has been identified as a promising PMS for the domain of humanitarian logistics able to integrate the compiled KPI set. The following reasons can be highlighted for this conclusion; a supply chain BSC offers:

- Flexible integration of relevant KPIs
- Mix of financial and non-financial metrics
- Consideration of organisation-specific objectives
- Expandable perspectives (e.g. cooperation- or resource-oriented)
- Relatively high acceptance within the humanitarian sector

The chosen supply chain BSC is reusable and allows an organisation-specific configuration of the KPIs. Thus, the adaptability of the PMS proposed is ensured by the provided set of KPIs, which can be extended on demand. Furthermore, the perspectives chosen are not fixed and can be adapted if necessary. Additionally, the specific demand of humanitarian organisations is ensured (e.g. objective-orientation, low complexity and application flexibility). The objective-oriented selection of KPIs identified above and its integration in the developed supply chain BSC, called “HumLog BSC” in the following, offers low complexity of performance measurement. The flexibility of HumLog BSC enables the consideration of different objectives of the relief organisations. These conclusions can be supported by three relevant works reflecting and proposing the BSC for humanitarian logistics by Samii (2008), Schulz and Heigh (2009), and De Leeuw (2010). However, in opposite to these three papers the HumLog BSC presented in this paper does not function as a stand-alone solution for performance measurement, but forms a framework and a user front-end dashboard of the entire performance manage-
ment approach including the process modelling and analysis toolkits presented above.

Referring to the conditions identified by van der Laan et al. (2009), the importance of SCM in humanitarian supply chains is enabled by adding the network perspective into the BSC construction. The traditional customer perspective is turned into a beneficiary and donor perspective (Widera and Hellingrath 2011a). Although both different actors have partly different performance drivers (e.g. complaint rate of relief items vs. donation to delivery time) one perspective has been chosen for HumLog BSC. The main reason is that a significant number and relevance of some KPIs reflects both the beneficiary’s and the customer’s interests (e.g. minimum response time). Another reason for the junction of both addressees in one perspective is to depict the political economy of humanitarian organisations which have to balance their efforts for both stakeholders. Focusing on the satisfaction of donors alone neglects the humanitarian idea and misses major objectives of humanitarian organisations, while targeting the beneficiaries’ needs alone can lead to financial or material collapse of the organisation. Thus, the decision of balancing the interests of both addressees has to be defined and continuously adjusted by the humanitarian organisations themselves, respecting their mission statements, specific operations, specific operation phases as well as its current financial conditions. In order to respect the required differentiation between end-user’s (beneficiary) and buyer’s (donor) interests dedicated KPIs have been identified and deposited within the common perspective. Thanks to the BSC concept the target figures for all KPIs can be adjusted individually on different organisational and operational levels. The HumLog BSC framework, general reference points presented by de Leeuw (2010) and the identified objectives are illustrated in the following table.
<table>
<thead>
<tr>
<th>BSC Perspective</th>
<th>Reference Point</th>
<th>Objectives</th>
</tr>
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</table>
| Beneficiary and Donor Perspective| • Product and Service Attributes  
• Image                                  | Responsiveness/Speed                  |
|                                 |                                                      | Beneficiary’s and Donor’s Satisfaction |
|                                 |                                                      | Reliability                           |
| Process Perspective             | • Operations Management  
• Regulatory and Social  
• Information Capital            | Flexibility                           |
|                                 |                                                      | Inventory Performance                 |
|                                 |                                                      | Bottleneck Management                 |
| Learning and Growth Perspective | • Human Capital  
• Innovation  
• Organisational Capital          | Innovation                            |
|                                 |                                                      | Standardization                       |
| Network Perspective             | • Customer Relationships  
• Donor Management  
• Partner Management          | Cooperation                           |
| Financial Perspective           | • Budgeting  
• Funding Management  
• Cost Management                | Costs Efficiency                      |

Table 2: Adjusted Draft of the HumLog BSC (Widera and Hellingrath 2011a)

As shown in Widera and Hellingrath (2011a) all KPIs, once assigned to processes, are related to the objectives presented in the table above. This relation supports the required acceptance of the data gathered in organisations, as well as the understanding and management capabilities regarding the logistics processes in place (see Schulz and Heigh 2009 and Widera et al. 2013). These objectives are interrelated to the BSC perspectives. These relations strengthen the understanding and importance of the according KPIs in each perspective. Thus, the personnel – from the management level up to operational warehouse managers – can be supported by connecting the meaning of a specific KPI, e.g. delivery date reliability, the corresponding objective, e.g. reliability, and the according perspective, e.g. the beneficiary and donor perspective. In combination with the process modelling and analysis toolkit HumLog BSC forms a flexible and adjustable performance
management approach, which puts humanitarian organisations in a position to understand, analyse, and manage their logistics processes. The use cases described in the process modelling section provide a basis for the evaluation of the HumLog BSC. Intermediate results on an appropriate tool support combining the modelling tool and the HumLog BSC dashboard are promising. Thanks to appropriate design techniques basic functional requirements got complemented with human-centred design tools. However, the entire unfolding of HumLog BSC within the use cases depends on organisational learning process and thus remains to be discovered by the responsible personnel.

4. Outlook

In this paper we presented the design for an integrated humanitarian logistics process management approach. For this purpose a promising process modelling approach has been identified, operationalized, and transferred into a modelling tool. In a following step the modelling approach has been extended into a process analysis toolkit supporting a structural and quantitative analysis. The process analysis toolkit has been successfully evaluated in two use cases. Based on the developed process models the generation and analysis of two different AS-IS scenarios has been provided and the construction of TO-BE scenarios has been deduced. The extended RTM and the developed modelling tool supported these processes successfully in terms of time, accuracy, as well as visualization and documentation. Based on these results an according PMS has been designed in order to enable the management and improvement of logistics processes by humanitarian organisations. The use cases need to be complemented with the deployment and evaluation of the HumLog BSC framework. For this purpose a developed tool has to be applied, its functionality has to be tested, evaluated, and adjusted if necessary. Additionally, the managerial components in terms of appropriate best practices and IT support need to be completed and integrated into the toolkit. Further work can be seen in the application of simulation based on the generated process models. The process models can also be used for the development of simulation models in order to compare and evaluate possible modifications of the supply chain networks. Thus, humanitarian organisations are empowered to evaluate different methods, measures or strategies in an artificial environment in order to improve their preparedness and relief plans. Until then, humanitarian organisations can apply the approach presented in this paper in order to understand their logistics processes, to understand what is “effective” for their specific organisation, to define when a process is getting “expensive” or to identify which parts of their supply chains are “fast”, which are not and how they can be accelerated.
Bibliography


Part IV: Research


From Process Analysis to Performance Management in Humanitarian Logistics


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