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Mobile phones: Established technologies for innovative humanitarian logistics concepts

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Abstract

Recent studies have shown an increased interest in the role of logistics function in supporting humanitarian relief operations. However, there is limited discussion in literature of how established technologies could be adopted effectively for supporting the delivery of basic relief items for beneficiaries. The purpose of this paper is to evaluate the appropriateness of mobile phone technology to support humanitarian operations and to create new humanitarian logistics concepts. With mobile phone technology, an established (humanitarian) technology is selected to enhance the performance of humanitarian logistics in disaster relief operations. This research provides insights for improved humanitarian relief operations and delivery for refugees in sub-Saharan Africa, Jordanian refugee camps and Germany.

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1. Introduction

Humanitarian logistics is that part of logistics management, which focuses on "the purpose of alleviating the suffering of vulnerable people" [3]. Humanitarian logistics is similar to business logistics in that it deals with the effective and efficient flow of goods and information from the point of origin to the point of consumption, with special regards however, to the affected population. Humanitarian logistics aims to reduce the suffering of the affected population, especially in the aftermaths of the acute or permanent disasters and crises. It is that part of humanitarian aid which should bring the right products of humanitarian aid, to the right (most affected) people, at the right time (quickly), in the right (good) quality, in the right amount (as needed), and to the right costs (with regard to efficiency) [4, 5].

This research concentrates on a specific technology that is able to support and enhance the performance in humanitarian logistics. With mobile phone technology, a simple and established technology is selected for a deeper analysis of humanitarian technologies and humanitarian logistics. The innovative character of this paper is less concentrated on the technology itself but more on innovative concepts for logistics and supply chain management. One important aspect is the distribution of mobile phones worldwide, even in emerging and developing countries. Worldwide 92 per 100 population mobile phone subscribers are documented in the 2015 report, "Measuring the Information Society" [6], with an increasing trend in developed and developing countries. By contrast, just less than half of the population worldwide has access to the internet and especially in African countries where the access rate is low [6].

From a humanitarian logistician's point of view, this paper creates ideas for two different applications of mobile phones for different processes in the humanitarian logistics chain, in different countries, and for different actors. One application

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concentrates on humanitarian aid in sub-Saharan Africa and the other application focuses on the support of refugees, e.g. with mobile "cash & vouchers". The design of these humanitarian logistics concepts with mobile phones is described in section three of this paper. Section four provides empirical data as a foundation for the relevance of worldwide humanitarian logistics and its support by mobile phone technology

2. Fundamental background: Empirical data from international statistics and reports

Why does humanitarian aid need innovative logistics concepts? Why could mobile phones be the right humanitarian technology for innovations in humanitarian logistics? The answers could be based on worldwide statistics, literature analysis, and existing applications. Starting with statistics and empirical data, the Human Development Report [7], the World Health Statistics [8], reports from the UN Refugee Agency UN HCR such as the 2015 Mid-Year Trend Report [9], the Annual Disaster Statistical Review [4], the Logistics Performance Index from the Worldbank [10], and the Information Society Report [6] are suitable to give some fundamental background. The mentioned statistics about human development, health, refugees, and disasters show that there is a need of humanitarian aid in general. In addition, reports about logistics performance and technologies give further insights for this paper regarding the strengths and weaknesses in logistics and relevant technologies.

Table 1 shows some selected values about human development [7], health [8], and refugees [9]. Three different human development groups are selected, and for each group one country as an example: Germany, Jordan and Cameroon. These three countries are typical for their corresponding development group. In addition, all of them were important host-countries for refugees in 2015: Jordan and Germany for the Syrian conflict refugees in specific and, Cameroon for several sub-Saharan countries (e.g. Central African Republic, Nigeria). Therewith, all three are relevant for a later chapter dealing with mobile phones for humanitarian logistics concept for refugees. Cameroon is furthermore an important country for the supply of people in the hinterland. Not only for itself with the huge seaport in Douala, but also for landlocked countries such as Central African Republic [11, 12]. Several interdependencies are shown in Table 1 between the development index and other values.

Table 1. Statistics and indicators about human development, health, and refugees [from 7, 8 and 9]

Human development index group or WHO income group, example	**Human Development** Index, from 0 (lowest) – 1 (highest) 2013 [7 UN DP, pp. 160-163]	**Population living on less than 1 US** $ per day, % average 2007 to 2013 [8 WHO, pp. 150-159]	**Living in urban areas** % 2013 [8 WHO, pp. 150-159]	**Cause specific mortality rate**, Malaria and HIV / Aids 2012/2013 per 100000 population / year [8 WHO, pp. 58-63]	**Total refugees** (assisted by UN HCR) total amount, mid 2015 [9 UN HCR, pp. 16-19]
1. Very high human development or high income group	0.890	<2	80	- -	
Example for 1: Germany	0.911 (Rank 6)	<2	75	- -	250,299 (UN HCR: -)
2. High human development or upper middle income group	0.735	5.2	62	Malaria: 1 HIV / AIDS: 14	
Example for 2: Jordan	0.745 (Rank 77)	<2	83	- -	664,102 (UN HCR: 664,102)
3. Low human development or low income group	0.493	43.6	30	Malaria: 36 HIV / AIDS: 67	
Example for 3: Cameroon	0.504 (Rank 152)	27.6	53	Malaria: 55 HIV / AIDS: 196	302,293 (UN HCR: 289,806)
World	0.702	14.6	53	Malaria: 11 HIV / AIDS: 22	57,959,702

As expected, there are tendencies for a higher rate of poverty, lower rate of population living in urban areas and higher mortality rates in countries with a lower human development index. These are just some values from the broad spectrum of empirical data in reports on development and health, which also incorporate data about a broad range of health data, education, nutrition, gender equality, infrastructure for energy and sanitation, and many more [7, 8]. The UN Millennium Development Goal Report summarizes: "Global poverty has declined significantly over the past two decades […] in contrast; sub-Saharan Africa's poverty rate did not fall below its 1990 level until after 2002. Even though the decline of poverty has accelerated in the past decade, the region continues to lag behind. More than 40 per cent of the population in sub-Saharan Africa still lives in extreme poverty in 2015" [2, p. 15]. The high rate of poverty, hunger, and the health situation in countries with a low development index, many of them are located in sub-Saharan Africa, are the reason why one main chapter of this paper deals with humanitarian logistics in sub-Saharan African countries. The last column in Table 1 addresses the significance of refugees on the different regions (see chapter 3.3).

Logistics performance in low developed countries is comparatively low (Table 2) and the distribution of mobile phones