



Humanitarian Technology: Science, Systems and Global Impact 2015, HumTech2015

A Raspberry in Sub-Saharan Africa?

Chances and Challenges of Raspberry Pi and Sensor Networking in Humanitarian Logistics

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Abstract

This paper addresses the chances and challenges of humanitarian logistics in Sub-Saharan Africa with a special view on the application of single-board computers – such as the Raspberry Pi – in combination with sensor networking. In this connection the paper deals with the following questions: Which special circumstances in and challenges for Sub-Saharan Africa need to be considered? How can humanitarian logistics contribute to enhance the supply of people in need with food and medicines? Are Raspberry Pi or other single-board computers and their integration into sensor networks adequate solutions for humanitarian logistics and the supply of food and medicines in Sub-Saharan Africa?

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Peer-review under responsibility of the Organizing Committee of HumTech2015

Keywords: Humanitarian Logistics; Raspberry Pi; Sensor Networking; Africa, Cold Chain; Single-Board Computer

1. Introduction

For Sub-Saharan Africa can be stated that droughts and hunger occur regularly and that life expectancy is comparatively low. Many challenges have to be addressed to overcome the existing situation, e. g. the supply with food and medicines must be enhanced and there are necessities to improve the infrastructural situation as well as education and political conditions. When addressing these challenges special circumstances in African countries such as heat, humidity, power outages and others have to be taken into account.

This paper addresses the chances and challenges of humanitarian logistics in Sub-Saharan Africa with a special view on the application of single-board computers – such as the Raspberry Pi – in combination with sensor networking. In this connection the paper deals with the following questions: Which special circumstances in and challenges for Sub-Saharan Africa need to be considered? How can humanitarian logistics and supply chain management contribute to enhance the supply of people in need with food and medicines? Are Raspberry Pi or other single-board computers and their integration into sensor networks adequate solutions for humanitarian logistics and the supply of food and medicines in Sub-Saharan Africa?

Answers to these questions – and in addition still open research questions – will be given in this paper on basis of literature and statistics analysis, former experiences in humanitarian logistics research, first on-location inspections in Africa and tests with the Raspberry Pi and surrounding networks.

One central objective is to identify a fast and low cost temperature control system (estimated overall costs of the whole system max. US\$ 350) for humanitarian logistics in Sub-Saharan Africa, which is easy to implement, to use and to maintain and which works effectively (e.g. fast and reliable).

2. Challenges for Sub-Saharan Africa

Winner of the peace Nobel Prize Wangari Maathai describes in her book “The Challenge of Africa” [1] in a traceable way a traditional African stool, which is comprised of a seat and three legs: Within the picture of a three leg stool

- the first leg represents democratic space, where rights are respected,
- the second leg symbolizes the sustainable and fair management of natural resources, and
- the third leg stands for the culture of peace in form of fairness, respect, compassion, forgiveness, recompense, and justice.

The three legs of the stool support the seat, which represents the milieu in which development can take place. In Africa today, a number of countries are trying to balance on two or less of the stool’s three legs. “It is essential to recognize when one or more of the three pillars is absent, and accept that, no matter how many funds are provided, in a country that is balancing on two, one or no legs, the money may not only be wasted or have only a temporary effect, but may even contribute to the continuing instability of that society [1, p.58].” Maathai describes several examples, especially from Sub-Saharan Africa and necessary measures to overcome such situations. This is a wide view on the macro-level of the challenges of Sub-Saharan Africa challenges. We should bear them in mind when dealing with humanitarian logistics in Africa.

Going more into detail with view to consequences of instability and other special circumstances in Sub-Saharan Africa, several statistics describe the actual situation these countries and their people face. The World Health Statistics 2014 published by the World Health Organization (WHO) is one of the central statistics with view to health, nutrition, and other central information with relevance for humanitarian aid and humanitarian logistics [2]. This report and statistics also address the eight UN Millennium Development Goals (MDG) as they have been defined in the year 2000 and as they will be met until the year 2015 [3]. But with a special view to Africa and Sub-Saharan Africa several goals will not be fulfilled until 2015, e. g. the reduction of poverty, malnutrition, and hunger in Africa. In addition there are still enormous differences between the worldwide regions. For example the risk of a child dying before the fifth birthday is still highest in the WHO African Region (95 per 1000 live births) – eight times higher than that in the WHO European Region (12 per 1000 live births, see [3] and [4]). Sub-Saharan Africa

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