

Comparative Analysis of the Challenges of Generic Engineering Logistics to Humanitarian Logistics in Disaster Response and Relief Support in South Africa

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Abstract— Logistics management has been extensively researched and implemented in the private sector, but gradually gaining traction in the humanitarian sector. Humanitarian organizations, particularly Non-Governmental Organizations (NGOs) are the primary vehicle through which donors channel their contributions but many of these organizations face logistic challenges in effectively getting relief materials to the intended users. The purpose of this paper is to identify the key challenges affecting aid agencies in South Africa. A comparative analysis of the challenges of generic engineering logistics to humanitarian logistics in disaster response and relief support system in South Africa was also conducted. The findings from the research survey shows that there is an awareness of the importance of humanitarian logistics in the sector, but the results also show that only half (50%) of the participants of the survey reported that they have a logistics professional employed in their organization. Furthermore, only 50% of the participants of the survey indicated that their organization has a preparedness plan in place in the event of an emergency. Other challenges identified are: lack of funds; difficulty to obtain real time information and poor knowledge management system. The study also suggests that learning and forging closer ties with private organizations is an effective means of overcoming some of the identified challenges. In comparison to the generic engineering logistics, the humanitarian sector is encouraged to benchmark their operations with similar private sector to improve their services.

Keywords— challenges, disaster, logistics management, humanitarian response, non-governmental organizations.

I. INTRODUCTION

Disasters have been predicted to increase five-fold over the next fifty years [1]. Tsunamis, volcanic activity, typhoons, and floods are some of the most common natural disasters that continue to wreak havoc on humankind, also HIV/AIDS, poverty and wars also exist to make life much

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more difficult for people, most especially in Africa. According to the Emergency Event Data Base (EM-DAT) [2], 332 natural disasters were recorded in 2011, a total of 244.7 million people were affected and about 30,773 deaths were recorded. The economic and financial impact of large scale disasters are quite significant, such disasters leave in their wake, damaged infrastructures and development made over a number of years is destroyed in minutes. The estimated economic damage caused by natural disasters in 2011 was estimated at over \$360 billion [2]. Man-made disasters such as wars and armed conflicts on the other hand, have been reported to claim more lives and results in the displacement of people. Research has shown that only 3 per cent of disasters are attributed to natural causes, [3].

According to the United States Agency for International Development (USAID) [4], the ongoing crisis in Syria has resulted in about 6.5 million internally displaced persons and about 2.4 million Syrian are displaced to neighbouring countries. These staggering figures disclose the amount of people that are in need or dependent on humanitarian organizations for support and aid. Humanitarian organizations get billions of dollars in aid annually from various donors around the world. The combined budget of the top ten aid agencies in 2004 was estimated to be over 14 billion dollars [1].

Most emergencies require an immediate response. Hence, supply chains are designed and activated as soon as possible. Logistics has gradually become more essential in humanitarian operations by providing an essential connection between processes that facilitates the transportation of aid material, personnel and distribution of goods and services. Some researchers have described relief operations to be 80% logistics and the most expensive part of the operation [3]-[5]. Thus, the success or failure of a relief operation depends to a large extent on how the various logistics elements of the operation are handled. In the past, logistics was not considered an important part of relief operations [3]-[6]-[7]. It was seen as a back office function, rather than an integral part of a relief operation. Interest in humanitarian logistics from both scholars and logistics practitioners is believed to have increased since the 2004 Indian Ocean Tsunami [8]-[9]. The problems created by civil unrest, natural and manmade crisis, epidemic

outbreaks like HIV/AIDS, and the resulting effect from each, calls for concerted efforts that focus on deliberate, effective and well-timed responses. This paper aims to improve the understanding of humanitarian logistics (HL) and identify the key challenges affecting NGOs involved in relief support and disaster response in South Africa and proffer solutions.

II. HUMANITARIAN LOGISTICS

Humanitarian logistics involve many of the same processes found in the commercial logistics. However, modern logistics practices have only recently been applied in the humanitarian sector. Humanitarian logistics is still considered to be in its infancy, researchers have compared humanitarian logistics capability to that of the private sector in the 1980s [10], but with the increased interest from both academic and logistics practitioners, it is slowly gaining prominence and developing into a discipline of its own. Humanitarian logistics has been described by several authors in various ways.

The most comprehensive and widely quoted definition of humanitarian logistic is described as “The process of planning, implementing and controlling the efficient and cost effective flow and storage of goods and materials as well as related information from point of origin to point of consumption for the purpose of alleviating the suffering of vulnerable people” [1], this definition is very similar to that of business logistics. Humanitarian logistics can be categorized into two parts; continuous aid work and disaster relief [8]. Disaster relief are short-term operations carried out immediately after a disaster and include activities such as providing food, medicine, health care services and shelter. Continuous aid works in contrast are long term efforts aimed at restoring normalcy to the disaster ravaged society.

A. Disaster Management

Many definition for disasters are widely available, such as, Van Wassenhove [3], the World health organization [11], the Center for research on the epidemiology of disaster [2]. Generally, from these definitions disasters are described as catastrophic events caused by hazards that lead to destruction, disruptions and death. Disasters can either be natural or manmade and can further be classified based on the speed of its occurrence [3]. Disaster management consists of a number of phases. However, the naming and number of the phases varies according to the perspectives of different authors [12]-[13]. Generally, it is categorized into four phases, namely: mitigation, preparations, response and recovery. The logistics requirement for each of the identified phases varies, as each involve different activities and support.

Factors such as poverty, pandemic, climate change, drought, poor economy, armed conflicts and environmental degradation increases the vulnerability of southern African countries to disasters [14]. However, the rate of recurrence and scale of disasters in Southern Africa varies by country. South Africa faces an increasing level of disaster risk; it is exposed to a wide range of natural hazards, such as drought, cyclones and severe storms that can lead to widespread destruction and devastation. Based on statistical data from Preventweb [15],

floods are the most prevalent natural disaster reported and also account for most people affected, followed by storm and wildfires, South Africa also experiences drought and epidemic outbreaks. Fig. 1 provides data related to disaster occurrence in South Africa between 1980 and 2010.

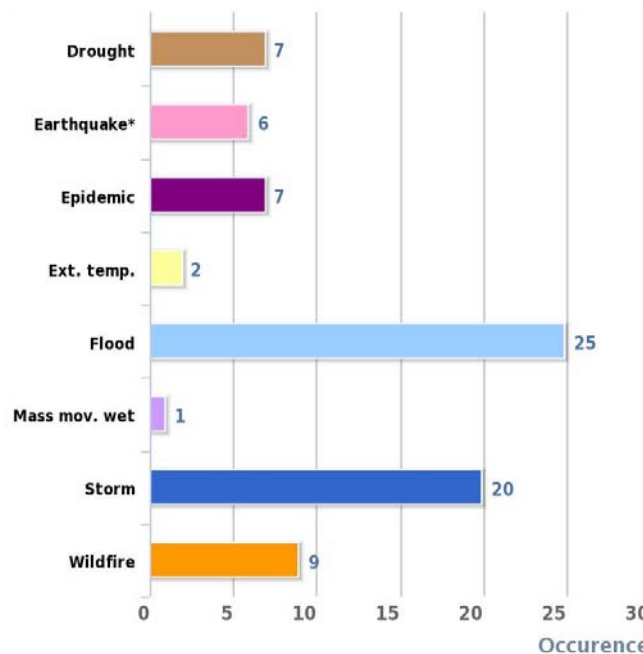


Fig. 1. Disaster Occurrence [15]

B. Relief mission lifecycle

Each of the disaster types described above demands a particular response; the nature of the emergency affects the design and execution of humanitarian supply chains. For instance, a slow onset disaster like famine takes a long time to fully develop, which give relevant authorities ample time to take appropriate actions. Whereas, sudden onset disasters like Tsunami, happen with little or no warning. However, irrespective of the nature of a disaster, the resource requirement of the relief mission follow a lifecycle model described by Balcik and Beamon [16], which is a modification of models described by Thomas [10] and Beamon [17] (See Fig. 2.).

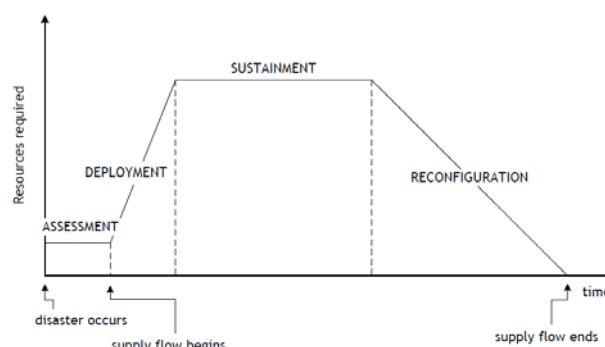


Fig. 2. Relief mission lifecycle [17]

The assessment phase involves a need analysis. The information obtained at this phase is used to develop the disaster relief supply chain [17]. The assessment determines the immediate needs of the affected people, the required resources and equipment needed based on the severity and nature of the disaster. After assessing the needs, the resource mobilization process begins. Once the necessary resources and aid material has been obtained, it is strategically transferred to a location for easy access for deployment. During deployment, the resource requirements are ramped up to meet the demands identified and as more accurate information is obtained, the needs of the beneficiaries can better be matched, thereby leading to a stability of demand. This leads to the third phase (sustainment), at this stage the relief effort is maintained at a particular level over a period of time. Lastly, at the reconfiguration phase, operations are ramped down and then eventually terminated. It is important to note that the relief chain is modified across the phases. For instance, in the initial stage of a disaster, aid materials are pushed through the relief chain, while a pull strategy is in effect at the later phase once demands have been well assessed. At the sustainment phase, focus shifts from speedy transportation of goods, to accurately meeting the requirements of the beneficiaries at minimal cost; in this stage an agile supply chain is required, while in the reconfiguration phase, leanness is needed [18]. Cozzolino et al. [19] defines leanness as the ability to do a lot with less.

III. CHALLENGES OF HUMANITARIAN LOGISTICS

Humanitarian organizations face many and sometimes complex challenges in getting the right assistance to the right place at the right time and doing all this in a cost effective manner. Some of the major challenges identified are hereby highlighted.

A. Professionalism

There is a shortage of qualified personnel who can effectively manage relief operations [20]. Petit and Beresford [21] described the level of logistics expertise within the humanitarian sector as relatively low. Thomas and Kopczak [1] concluded from their study that most of the employees in the humanitarian organizations have no formal training and only learn on the job.

B. Collaboration

During disaster relief operations, there is a large presence of disparate actors at the disaster site. The individual organizations present have different interests, mission, capacity and expertise [3]-[22]. Although, no single humanitarian organization has the capacity and funds to adequately respond to a crisis [22]. They however, tend to work independently or with very little collaboration despite facing similar challenges. Thomas and Kopczak [1] reported that in the Tsunami relief operation, only 56% of the humanitarian logisticians present actually worked together in setting up their supply chains.

C. Performance Management

Performance management deals with transparency, accountability and evaluation of relief operations. According to Beamon and Balcik [23], performance measurement is well-defined in the private sector, while there are no clear metrics for measuring performance in the humanitarian sector. The lack of an acceptable performance measurement system in the humanitarian sector makes it difficult to access relief operations and learning from it [24]. Without performance standard, relief workers have no yardstick to measure their success and also have no point of reference in order to improve their operations

D. Funding

Due to lack of funds, logistic managers in the field have an issue with meeting their short-term obligation with their suppliers [25]. Some donors have the tendency of tying their funding to specific projects. As such, humanitarian organizations are forced in such situations to focus on donor approved projects rather than carrying out activities based on the beneficiaries immediate needs. Furthermore, as a result of tagging, funds are not available for organizational expense and obtaining support infrastructure necessary for improved operations [26].

IV. METHODOLOGY

The aim of this paper was to identify barriers to humanitarian logistics faced by aid agencies in South Africa in providing effective relief support. The study was conducted by gathering and analyzing primary and secondary data. Well-structured questionnaires were set up each corresponding to challenges and sent to both local and international relief organization. 50 questionnaires were sent out electronically to different NGOs, only 24 valid responses were obtained.

V. KEY FINDINGS AND DISCUSSIONS

The key finding of the research from the survey conducted, included major logistical challenges similar to those reported in the literature. The survey showed that resource mobilization is a major challenge faced by NGOs in South Africa. The results show that 60% of the respondents say that their organization is understaffed and only 55% say they have access to adequate training. This indicates that man power and capacity building is lacking. With regards to funding, 50% of the respondents said they do not have access to adequate funds when needed, and also when asked about earmarking of funds, majority (54%) of the respondents said that donors tag their funds to specific objectives. The results on availability of funds and tagging of funds are displayed in Fig. 3(a) and 3(b) respectively.

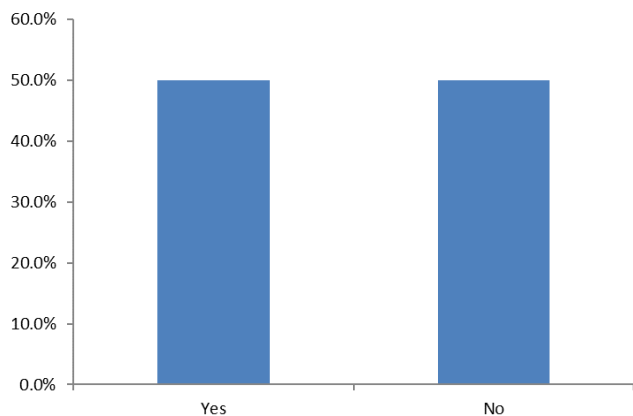


Fig. 3(a). Availability of funds

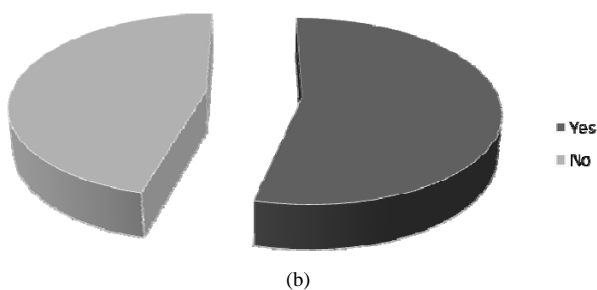


Fig. 3(b). Tagging of funds

Being well-prepared for an emergency increases an organization capacity to effectively respond to it, but data from the research shows that most of the organizations do not have a preparedness strategy in place. Only 50% of the respondents said that they have disaster or emergency plan in place in their organization.

Information plays a very important role when conducting relief operations. According to King [27], the speed at which information is gathered, analysed, evaluated and dispersed by aid agencies facilitates response effectiveness. The survey revealed that the adoption and utilization of communication and information technology systems was another challenge identified, 55% of respondents reported that they experience communication problems in the field. Furthermore, 70% of the respondents indicated the unavailability of knowledge management systems in their organizations, however, a departure from literature was noted with regards to tracking and tracing of goods, majority of the respondents (83.3%) said that their organization either make use of specialized software solutions or the Excel spreadsheet© for tracking and tracing, and only a few (16.7%) still manually track and trace goods. Furthermore, when asked “*how they rate the information used in managing their supply chain priorities*”, the results are presented in Table 1.

TABLE I
MANAGING SUPPLY CHAIN PRIORITY

	Mean	Standard deviation
Quality of information	3.91	0.848
Timeliness of information	2.7	0.765
Value of Information	3.96	0.767

Majority of the respondents said that the quality of information and the value of information used in managing their supply chain priority were either good or average, hence the reason for the high mean score of 3.91 and 3.96 respectively, but on the other hand, they rated the timeliness of the information obtained very low, resulting in a low mean score of 2.70. Which indicates a better systems need to be put in place to ensure timely information transfer.

The lack of trained logisticians was another problem identified, according to Thomas [10], logisticians are seldom involved in the planning phase of relief operations. Majority of the respondents indicated the importance of logistics management, the survey showed that 67% of the respondents chose “Strongly agree” or “Agree” when asked if logistic management is essential to project success, however, only 50% of the respondents said that they have a logistics professional employed in their organization. With respect to supply chain performance measurement, only half (50%) of the respondents indicated they had a method for measuring the effectiveness of their supply chain.

VI. SUGGESTED SOLUTIONS TO IMPROVE HUMANITARIAN LOGISTICS

Logistic management in a way can be described as an implementation of system theory concept. In the sense that, organizations strive to improve their entire logistics system by evaluating and improving various components that make up the system. Research has shown that humanitarian logistics differ from business logistics but is also similar in various ways [17]-[28]. However, researchers have argued that despite similarities between humanitarian and business logistic, best practices have not crossed over [10]-[25].

Based on the challenges identified from the survey, some business logistics approaches that could be adapted to overcome some of these challenges are evaluated. Humanitarian organizations can benefit from benchmarking their operations with similar organizations like it is done in the private sector. Benchmarking is the process of assessing and matching one organisation against another in order to identify and carry out improvements [29]. Doyle [30] backs and promotes using benchmarking to improve performance in emergency management. In order to manage the risk associated with uncertainty in humanitarian operations.

While it is impossible to totally eliminate uncertainty, its effect can be minimized in various ways, methods used in the private sector in mitigating the effect of uncertainty focuses on reducing the performance variability of different components within the supply. For example, unsolicited or spoiled goods can be eliminated by sorting out the right supplies early in the

supply chain, thus ensuring that only the right supplies are transported. This is similar to quality management practices adopted in the manufacturing industry. Furthermore, the use of historical data to forecast demand can be used to manage uncertainty.

In the private sector, information technology has been used to improve inter-organizational coordination [31]-[32]. Information Technology (IT) developments in the private sector, such as Enterprise Resource Planning (ERP), Collaborative Planning, Forecasting, and Replenishment (CPFR) are examples of systems used to improve system wide performance, these IT systems enable businesses to share information, money and use method of collaboration to optimize their logistic task. These kinds of systems can be adapted for use in the humanitarian sector.

In terms of resource management, humanitarian organizations can learn a lot from the private firms. The ultimate purpose of a supply chain network is to facilitate the procurement of resources like; personnel, equipment and supplies and deliver it to the end user. Aid agencies need to deal with their lack of resources and capacity challenges, in order to succeed and become more competitive. Researchers have reported that private companies have the capacity and resources to address the resource requirements of organizations involved in a social cause when compared to individuals, government and other NGOs [33]. Aid agencies can increase their speed, and lower their operational cost, flexibility and accuracy, by partnering with private organizations. Thus, taking advantage of the available resources that they could provide.

VII. CONCLUSIONS

The presented results concerning logistic management in aid organizations identified lack of adequate funding, lack of proper communication and information technology system to promote knowledge sharing and coordinate logistic activities. Lack of preparedness and lack of trained logisticians to aid in the decision making process and manage logistics activities.

Considering these findings, it is the author's opinion that unavailability and tagging of funds presents the greatest hindrance to effective aid delivery. Addressing this crucial challenge is necessary if humanitarian organizations are to achieve significant progress in the coming years. The availability of adequate funds and the ability of humanitarian organizations to spend it freely on several key areas that would ultimately improve their organizational capacity and capability, as some of the respondents indicated from the survey that lack of funds affect their organizations cash flow, impedes their ability to employ and train more staff and also affect their ability to invest in other developmental activities that could improve their capacity to effectively carry out their mandate.

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