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HUMANITARIAN SUPPLY CHAIN RISK MANAGEMENT (HSCRM)[1]

Arcione Ferreira Viagi | afviagi@gmail.com | UNITAU | ITA
Roberto Panizzolo | roberto.panizzolo@unipd.it |University of Padova, Italy
Alberto Maria de Crescenzo | albertomaria.decrescenzo@studenti.unipd.it| University of Padova, Italy
Felipe Monteiro Viagi |felipe_viagi@hotmail.com| UFF

SUMMARY ABSTRACT

Natural disasters or complex emergencies affect millions of people every year and cause losses such as the damage to buildings, infrastructure and natural resources. Because of this, humanitarian organizations acting increasingly pro-actively to be efficient and effective in responding to emergencies worldwide. The management of the supply chain has been used to help in taking preventive action, creating an integrated logistics structure which reduced the response time. This paper proposes a framework with a new stage in the disaster management cycle, making risk management proactively planning and execution and control of the process organizations to act effectively with catastrophic events.

Keywords: Disaster, Humanitarian, Risk, Supply Chain

1. INTRODUCTION

Speed is a major feature that mobilized efforts to develop controls in order to meet needs relating to commercial transactions. As a result, the importance of supply chain management (SCM) concept is growing in all aspects of daily life. The collaboration feature between different companies is the basis for the Humanitarian Supply Chain (HSC) concept. The goal is to use the tools developed to plan, operate and manage supply chains for providing flexibility for events where time and quality management are essential to minimize the disaster´s consequences (Abidi et.al,2014; Pateman et.al,2013). The objectives are now achieved through collaboration between companies that must work together in a network of relationships to create value and reduce costs to compete with other social networks that are formed in other regions or countries.

In addition to the problems that are common to all interventions when a disaster occurs, there are others that may further complicate the situation, such as infrastructure destroyed, Communication interrupted, lack of qualified professionals with knowledge of the affected area

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and proper equipment (Ergun et al, 2009; Gatignon et al, 2010). There are two approaches that complement each other in preparing individuals, organizations and governments to act in the management of the consequences deriving from natural disasters on human activities. The first is reactive, i.e. to prepare for action when something happens, be ready to mobilize people and resources to act when an event causing losses, injuries and fatalities. The second approach is proactive and involves risk management, where the focus is on minimizing the effects of an accident or disaster by risk identification, preparation of mobilization plans, evacuation etc.

The aim of this paper is to present the characteristics associated with mobilization of people, companies and organizations in order to solve a given humanitarian problem anywhere in the world. The second objective aims to propose a HSC integrated model with risk management (RM). The research methodology uses an extensive review of literature on the one hand, the current HSC and RM, and secondly, a qualitative approach regarding the strategic objectives of humanitarian organizations, with emphasis on efficiency in relation to the response time and quality of services and in the background the efficiency with which resources were used. This study is articulated in three sections: discussion of HSC and RM; the discussion of proposed model and conclusions.

2. HUMANITARIAN SUPPLY CHAIN

Humanitarian supply chain has been defined in different ways in the literature, in this work will be used the definition of Mentzer et al. 2001: “humanitarian supply chain refers to the network created through the flow of supplies, services, finances and information between donors, beneficiaries, suppliers and different units of humanitarian organizations for the purpose of providing physical aid to beneficiaries”.

Humanitarian organizations can include government agencies such as United States Agency for International Development (USAID) and the United Kingdom’s Department for International Development (DFID), multilateral agencies such as the United Nations Children’s Fund (UNICEF) and the World Food Program (WFP), non-government organizations (NGOs) such as Save the Children and Medecins Sans Frontieres (MSF) and members of the International Federation of Red Cross and Red Crescent Movement (Oloruntoba and Gray, 2006; Howden, 2009; Kabra and Ramesh, 2015).

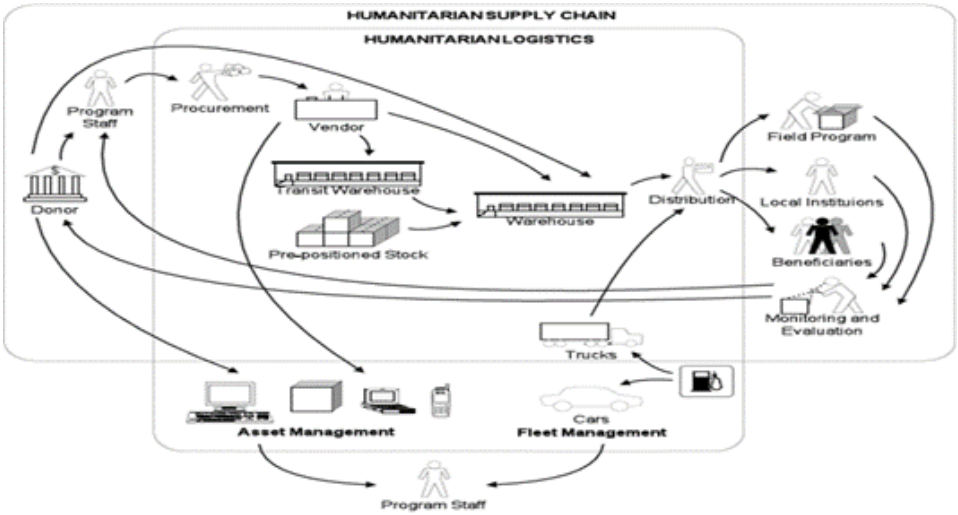
Given the various causes and characteristics associated with catastrophic events, there are numerous classifications and differences that may hinder the understanding of the theme of this paper, for example, Pateman et. al (2013) defines that disasters may be sudden-onset or slow-onset; or even the combination of the two and for them, humanitarian supply chain is associated with the response to sudden-onset disasters, while aid for slow-onset disasters is often called humanitarian relief chains.

To focus on the desired objective and to facilitate understanding will be deemed to every event involving widespread human, material, economic or environmental losses, regardless of the cause or duration, will be set to "disaster" and considered Humanitarian Supply Chain object.

Initially, efforts associated with the management of humanitarian activities focused on logistics related to: remove people from places affected by disasters, transport of volunteers and workers to disaster sites, to identify and quantify the supply needs, purchase and distribute supplies. Different logistics functions can be include in the scope of humanitarian organizations, as: procurement, transportation (supplies and people in need and humanitarian relief workers), asset management, ICT, warehouse operations, security, distribution e building and fleet management.

Later, the centralized management in a humanitarian organization which is in charge of resources and logistical activities, have led to supply chain humanitarian who manage the integration of the network of relationships between international and local humanitarian organizations with suppliers, service providers, donors and governmental. Figure 1 outlines the scope of the humanitarian logistics and humanitarian supply chain.

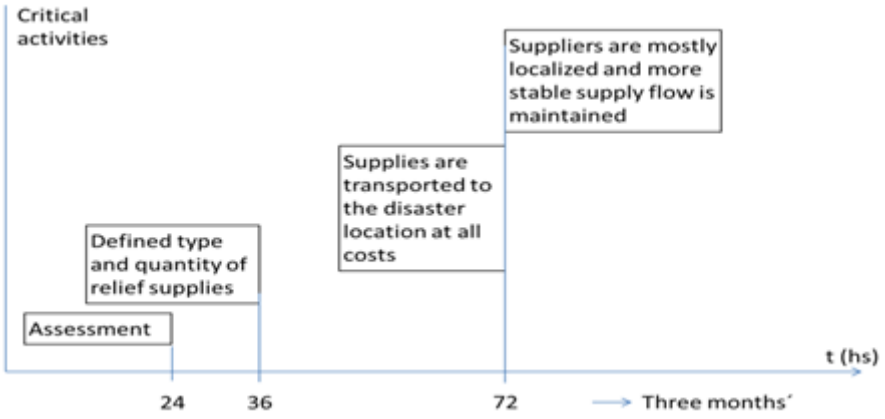
Figure 1 | Humanitarian Logistics and Humanitarian Supply Chain Flows



Source: Howden (2009)

In particular, in relation to the lead-time, the emergency leads to control every minute because a detail can be decisive in relation to survival or not of those affected in a disaster. Figure 2 shows the critical activities after the disaster strikes in terms of basic supplies for survival of those affected. The first 72 hours are crucial and should mobilize experienced and significant group of people to define needs, obtain and deliver products to every people in the disaster site.

Figure 2 | Critical activities on time after the disaster strikes



Source: Adapted from Ertem and Buyurgan (2010)

Table 1 features 12 topics with their characteristics in respects to commercial and humanitarian SC. The analysis of these data shows that the main differences are related to the level of predictability, lead-time, definition of responsibilities, expertise of the professionals involved, sources of funds and desired goals. In the case of commercial SC the goal is to maximize profits while for humanitarian SC the goal is to save lives and minimize the immediate consequences of a fatality.

Humanitarian supply chain covers the activities since the occurrence of the disaster, such as identifying disaster characteristics; find qualified professionals to manage, plan activities, mobilize people, raise funds and supplies, buying supplies, prepare and distribute supplies, look for alternatives to housing, coordinating the distribution and occupancy of accommodation, control various working groups, correct faults and prepare contingency plan. There is also a concern to make reports to guide actions in future cases.

Table 1 | Comparison of Commercial and Humanitarian SC

Topic	Commercial SC	Humanitarian SC
Main objective	Maximize profit	Save lives and help beneficiaries
Demand pattern	Fairly stable and can be predicted with forecasting techniques	Irregular with respect to quantity, time and place. Demand is estimated within the first hours of response
Supply pattern	Mostly predictable	Cash is donated for procurement. Unsolicited donations and in-kind donations need sorting, prioritizing to decrease bottlenecks
Flow type	Commercial products	Resources like evacuation vehicles, people, shelter, food, hygiene kits, etc.
Lead time	Mostly predetermined	Approximately zero lead time, demand is needed immediately
Delivery network structure	Established techniques to find the number and locations of warehouses, distribution centres	Ad hoc distribution facilities or demand nodes, dynamic network structure
Inventory control	Safety stocks for certain service levels can be found easily when demand and supply pattern is given	Unpredictable demand pattern makes inventory control challenging. Prepositioned inventories are usually insufficient
Technology and information systems	Highly developed technology is used with commercial software packages	Less technology is used, few software packages that can record and track logistics data. Data network is non-existent
Performance measurement method	Based on standard supply chain metrics	Time to respond the disaster, fill rate, percentage of demand supplied fully meeting donor expectation
Equipments and vehicles	Ordinary trucks, vehicles and forklifts	Robust equipment are needed to be mounted and demounted easily.
Human resources	Commercial SCM is now a respected career path (Thomas, 2003)	High employee-turnover, based on voluntary staff, harsh physical and psychological environment
Stakeholders	Shareholders, customers and suppliers	Donors, governments, military, NGOs, beneficiaries, United Nations, etc.

Source: - adapted from Ertem and Buyurgan (2010)

DISASTER MANAGEMENT STRUCTURE

Phases of disaster management are: response, recovery, mitigation and preparedness, but the transition from the response phase to recovery is seen as an important moment because the changes between these phases affect the general characteristics of humanitarian aid. On the timeline the preparation must be performed before the disaster, i.e., humanitarian organizations can build a knowledge base and standards measures to respond quickly when disaster strikes, acting proactively based on previous experience.

Because of this the representation of the disaster management cycle has the following sequence: preparedness, response, transition, recovery and mitigation (Figure 3):

Preparedness - involves building capacity to respond quickly in the event of a disaster, such as:

- Preparation of evacuation plans,
- Definition of basic supplies and standardized to meet emergency, such as water, food, medicine,

household kits, sanitation, shelter etc.

- Acquisition and pre-positioning of supplies in areas considered strategic
- Development of human and technical capacity to respond to disasters.

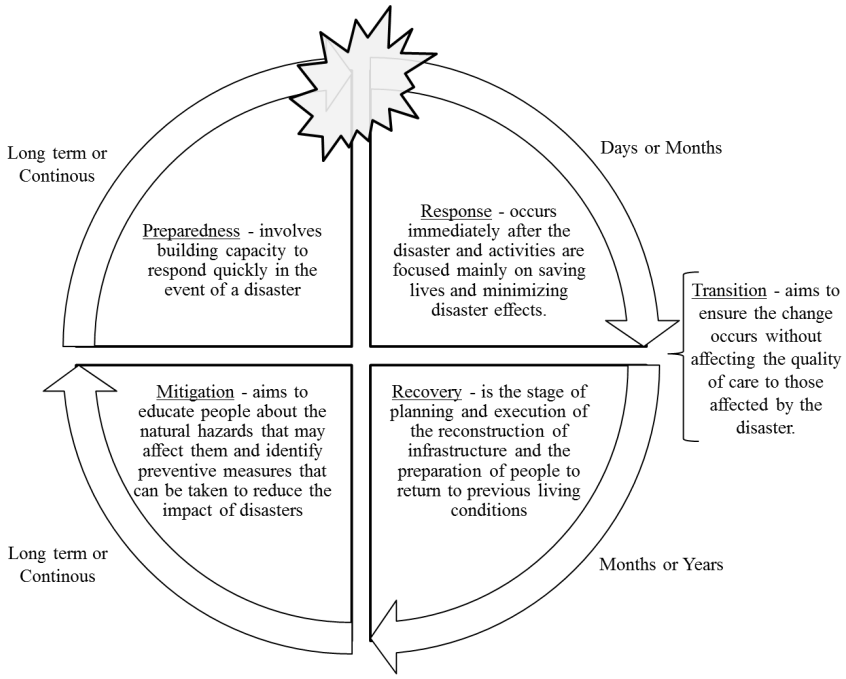
Response - occurs immediately after the disaster and activities are focused mainly on saving lives and minimizing disaster effects. It is the most critical phase in terms of logistics because the time is short and is large volume of steps to ensure the maintenance of life.

Transition - aims to ensure the change of the initial emergency focusing on the maintenance of life for the recovery phase occurs without affecting the quality of care to those affected by the disaster.

Recovery - is the stage of planning and execution of the reconstruction of infrastructure and the preparation of people to return to previous living conditions. Can be plans of medium and long term and involves: training people, distribution of supplies for the construction of livelihoods, reconstruction of houses, buildings and infrastructure.

Mitigation - this phase aims to educate people about the natural hazards that may affect them and identify preventive measures that can be taken to reduce the impact of disasters, such as planting trees on hillsides, building dams and canals to contain excess rainy or changing tides, making reinforcements in buildings etc. The Figure 3 presents the disaster management cycle.

Figure 3 | The Disaster Management Cycle



Source: Adapted from Howden (2009) and Haddow and Bullock (2004)

Despite the common origins and motivations, there are different characteristics in each *phase* of the humanitarian operation in terms of response time, qualification of the people involved, necessary supplies and resources and dependence levels of public and private organizations. Initially, after a disaster people's survival is a priority and gets the attention of governments, international media and humanitarian organizations, however, there are many other activities to be undertaken to restore general order and must be valued equally.

The motivation in companies to adopt supply chain management has been improved management to minimize losses and maximize profit. In the case of the humanitarian organizations, the adoption of this concept can be instrumental to improve the management of scarce resources efficiently in the short-term and effectiveness in preparing people and environments affected to return to regular situation.

Howden (2009) summarized in Table 2, the relationship between logistics humanitarian and disaster management cycle in terms of period, supplies required, urgency and procurement of supplies, showing that at every stage there are logistic activities, changing the type and intensity in each stage from the preparation for a possible disaster to the awareness of people to be better prepared for new eventualities.

Table 2 | Humanitarian Logistics and Disaster Management Cycle

Phase	*Preparedness*	*Response*	*Transition*	*Recovery*	*Mitigation*
Period	Long Term - Continuous	Days – Months	Months – Years		Long Term - Continuous
Logistics Volume	Low	High	Medium		Low
Supplies Required	Specific standard supplies pre-positioned for disaster response	Specific standard supplies: Food, medical supplies, water and sanitation equipment, shelter, household kits, etc.	Varied supplies depending on the context of the disaster: reconstruction material, livelihoods equipment		Varied supplies
Urgency	Low	High: Lead times for supplies can make the difference between life and death.	Medium: There may be government and donor pressure to complete recovery activities		Low
Procurement of Supplies	Local	International	Local-International		Local

Source: Howden (2009)

SOME TOPICS IN STUDY IN HUMANITARIAN SUPPLY CHAIN

The humanitarian supply chain theme is recent and several studies and proposals have been researched due to the large impact a disaster can cause in terms of costs for maintenance of life of those affected and to rebuilding infrastructure, building and affected households.

The following are 7 cases from the literature in order to stimulate thinking regarding the application possibilities of supply chain management, and the results desired in relation to its application in humanitarian aid activities. The choice was made without a specific criterion of importance or breadth was simply made to give a current view of what researchers are studying on the subject. The Table 3 summarizes some topics under study.

Table 3 | Topics in study in Humanitarian Supply Chain

Focus	Topics	Description	Authors
Supply management	Procurement auctions framework	Focuses on the process of supply with the main idea of introducing some parameters of auction design and decision-making logic.	Ertem and Buyurgan, 2010
Human resource management	Human resource and collaborating	Explores the response to sudden-onset events focusing on human resource issue and the challenges in collaborating in humanitarian supply chain.	Pateman et.al, 2013
Supply management	Agile supply chain and lean in HSC	Aims to apply key assumptions of business supply chain management and to determine their suitability for the analisys of humanitarian supply chain.	Oloruntoba and Gray, 2006
General manager	Performance measurement schemes in practice HSC	Provides a performance evaluation system with financial and non-financial performance indicators to assess the performance of humanitarian logistics operation.	Santarelli et.al, 2015
General manager	Drivers and barriers of coordination in HSC	Aims to demonstrate the feasibility of applying the decision-making techniques such as fuzzy analytic hierarchy process (AHP) to optimize coordination in humanitarian supply chain.	Kabra and Ramesh, 2015
Supply management	Decentralized supply chain	Analyzes the process of change in supply chain management in IFRC, from centralized to decentralized in order to increase efficiency and effectiveness in humanitarian activities and meet the expectations of donors and improve care for those affected by disasters.	Gatignon et.al, 2010
Information Systems	Humanitarian logistics information systems	Improve the logistics activities in each phase and continuity of humanitarian operations. Through collaboration between humanitarian organizations, the information systems also can reduce corruption and market distortion.	Howden, 2009

Source: Authors

PROCUREMENT AUCTIONS FRAMEWORK

Ertem and Buyurgan, (2010) provide for the participation of multiple auctions and multiple bidders and caters to both the immediate response with the resources and local suppliers as to the long-term purchases of local and global suppliers. The parties auctioneer representing NGOs, government institutions, or any humanitarian organization in disaster sites and the bidder represent parts suppliers, warehouses or manufacturers.

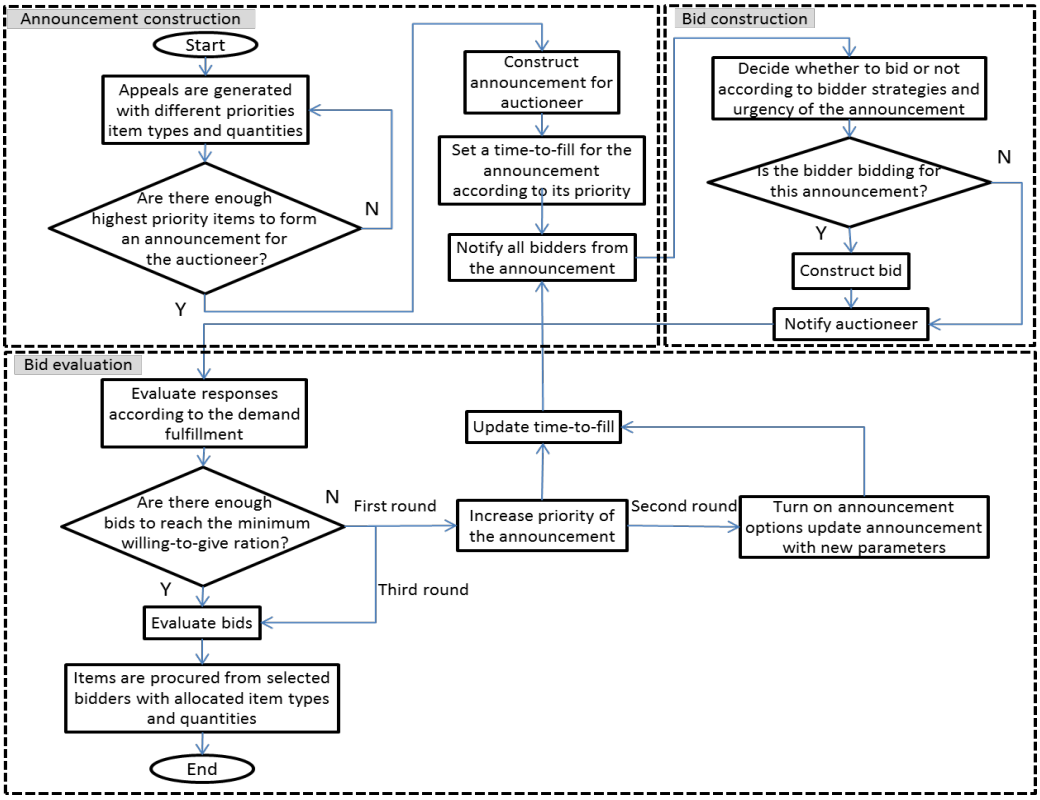
The proposal considers three main parts in the framework, see Figure 4 - Procurement Auctions Framework, the first is the “announcement construction” that starts the process by identifying the needs of the items by type and priority, check if there are number of priority items that justify starting an auctioneer process and in case positive structure the process - defining the auctioneer’s characteristics and deadlines for their implementation and disseminating to the bidders.

The second, “bid construction,” makes the analysis of bidding strategies and decides whether to bid or not and whether the bidder bidding for this announcement. After that, construct bid and notify auctioneer.

Finally, “bid evaluation” evaluates responses according to the demand fulfillment and three times adjusts the process to have enough bids to reach the minimum willing-to-give ration, evaluate bids and allocates item types to selected bidders.

This framework was tested in an experimental study and the results were considered satisfactory, being suggested for application in real cases and to expand the scope, including shipping and vehicle routes to transport the products.

Figure 4 | Procurement auctions framework



Source: Adapt from Ertem and Buyurgan (2010)

HUMAN RESOURCE AND COLLABORATING

Pateman et. al, (2013) recognize the complexity involved in managing supply chain humanitarian activities. And show that the constantly changing environment makes it difficult to improve the relations between the organizations in order to break paradigms concerning management practices, collaboration and relationship between people and institutional boundaries. Presents argument that to improve collaboration there should be focus in the learning and knowledge managing, but the high rates of turnover of relief workers are a barrier and should be considered. So focus on humanization of humanitarian supply chain, proposing to consider two main subjects of the process. The victims who need help and relief workers for which are adapted practices from international human resource management (IHRM) research and defends the need to define strategies for the management of knowledge associated with humanitarian aids.

AGILE SUPPLY CHAIN AND LEAN IN HSC

Oloruntoba and Gray, (2006), present common and divergent points compared to apply the concepts of supply chain in business management and humanitarian aid.

Analyzes the main characteristics related to the planned approach, the strategic long-term perspective, the importance of coordinated functions and commercial aspects of humanitarian supply chains.

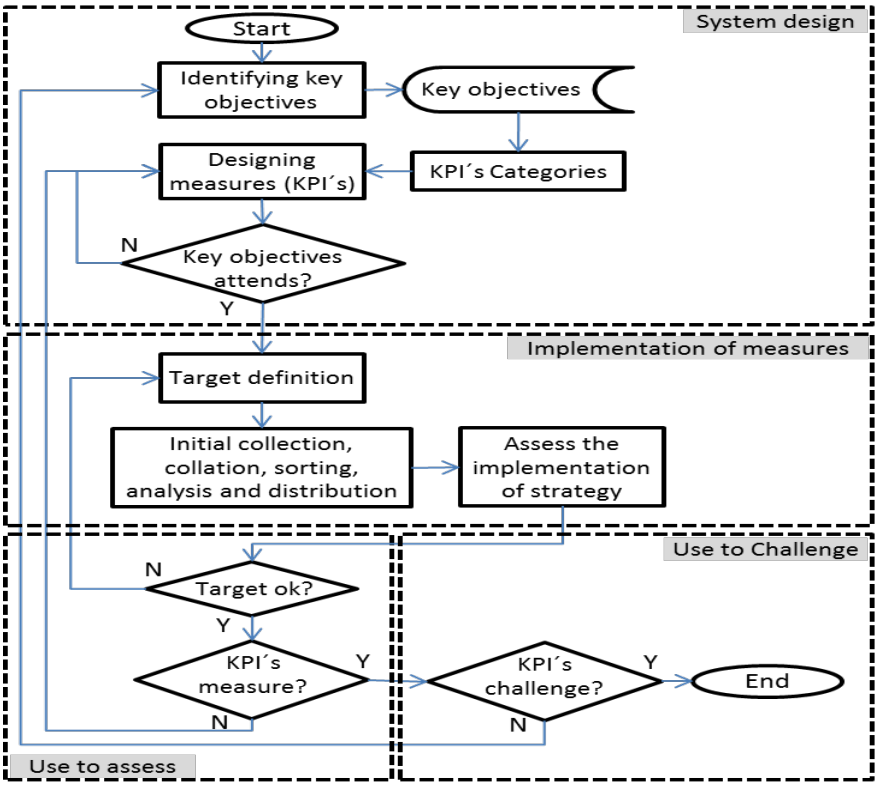
Featuring international humanitarian supply chains as unpredictable, turbulent, and require flexibility and presents a proposal that involves agile supply chain and lean manufacturing as a basis for structuring Humanitarian Supply Chain, so that the information needs identified at the sites affected by disasters flow agile and the process of demand forecasting, mobilization, procurement and transport sourcing elapsed lean.

PERFORMANCE MEASUREMENT SCHEMES IN PRACTICE HSC

Santarelli et al, (2015), based on complexity, high costs associated with management and humanitarian operation and the desire of the leading providers of higher efficiency resources in the use of available resources, formulated a performance measurement system of the supply chain to track performance both emergency operation, and during the reconstruction after the occurrence of a natural disaster or manmade.

The proposed model was built in three stages: design, implementation and operation of the performance measurement system. The KPIs were defined consider the success factors obtained in a case study and were classified into five categories, namely: the response time, reliability/flexibility, cooperation/standardization, satisfaction beneficiaries and donors and cost performance. The Figure 5 shows the phases of model proposed.

Figure 5 | Phases of Performance Measurement Model



Source: Adapt from Santarelli et.al,(2015) e Bourne et.al,(2000)

The model was tested empirically in 11 international humanitarian organizations and the result was satisfactory in both, cases of emergency when time is a decisive factor as in the case of reconstruction that are mostly cost-benefit.

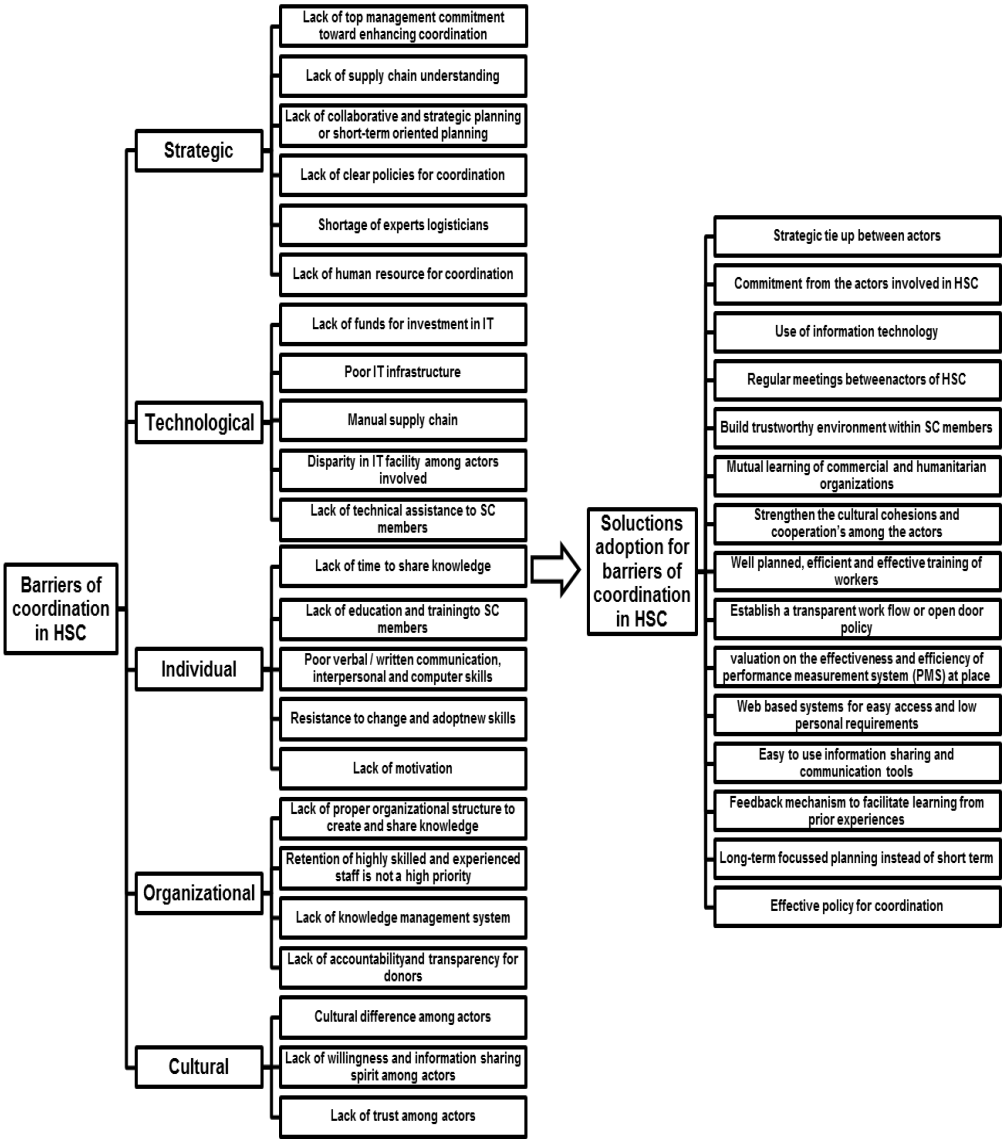
DRIVERS AND BARRIERS OF COORDINATION IN HSC

Kabra and Ramesh (2015), in a study that aims to demonstrate the feasibility of applying the decision-making techniques such as fuzzy analytic hierarchy process (AHP) to optimize coordination in humanitarian supply chain, identified 23 barriers and explored 15 solutions with the help of a literature review and sessions with brainstorming experts. The full study examined a case occurred

in India and prioritized barriers and solutions using the proposed method. The list of barriers and possible solutions is important as a starting point in a work facing humanitarian supply chain management. The authors classify the barriers in strategic, individual, technological, organizational and cultural. The Figure 6 shows barriers and solutions identified.

We cannot generalize, assuming the list below can be adopted in all cases, however, it is a base that can serve as a basis for initiating a process of planning and structuring to implement the concept of supply chain management in companies and organizations specializing in activities focused on humanitarian aid.

Figure 6 | List of barriers and solutions of coordination in HSC



Source: Adapt from Kabra and Ramesh,(2015)

DECENTRALIZED SUPPLY CHAIN

Gatignon et.al, (2010) presents the analysis of the supply chain management process of change in International Federation of Red Cross Red Crescent Societies (IFRC), which had a centralized management to a new decentralized management model.

The IFRC is considered the largest humanitarian organization in operation and has 186 autonomous National Societies (NSs), which it assists in responding to humanitarian crises in the world. The IFRC is headquartered in Geneva, which manage the humanitarian operations through its affiliates NSs.

However, results of operations considered inefficient, highlighted the need to review the management process, in particular the supply chain management because represent 80% of the organization's costs.

The slow operation, according to humanitarian standards, in response to the disaster in Honduras, 1998 (Hurricane Mitch) initiated a series of external pressures, mainly from donors and internally from the NSs. After analyzing the supply chain management structure concluded that it was centralized and needed to change to be more efficient and effective. The alternatives were evaluated and in January 2006 approved the budget to make changes and decentralize supply chain management. The model approved remained the central strategic management team in Geneva and set three strategic locations to be installed three Regional Logistics Units (RLUs) would be tasked with delivering mobilization, procurement, stocking, warehousing and fleet within their respective regions. The Figure 7 shows the change in IFRC supply chain.

The places chosen and operated from July 2006:

- Dubai to cover Europe, The Middle East and Africa;
- Kuala Lumpur to cover Asia and Australia;
- Panama to cover America

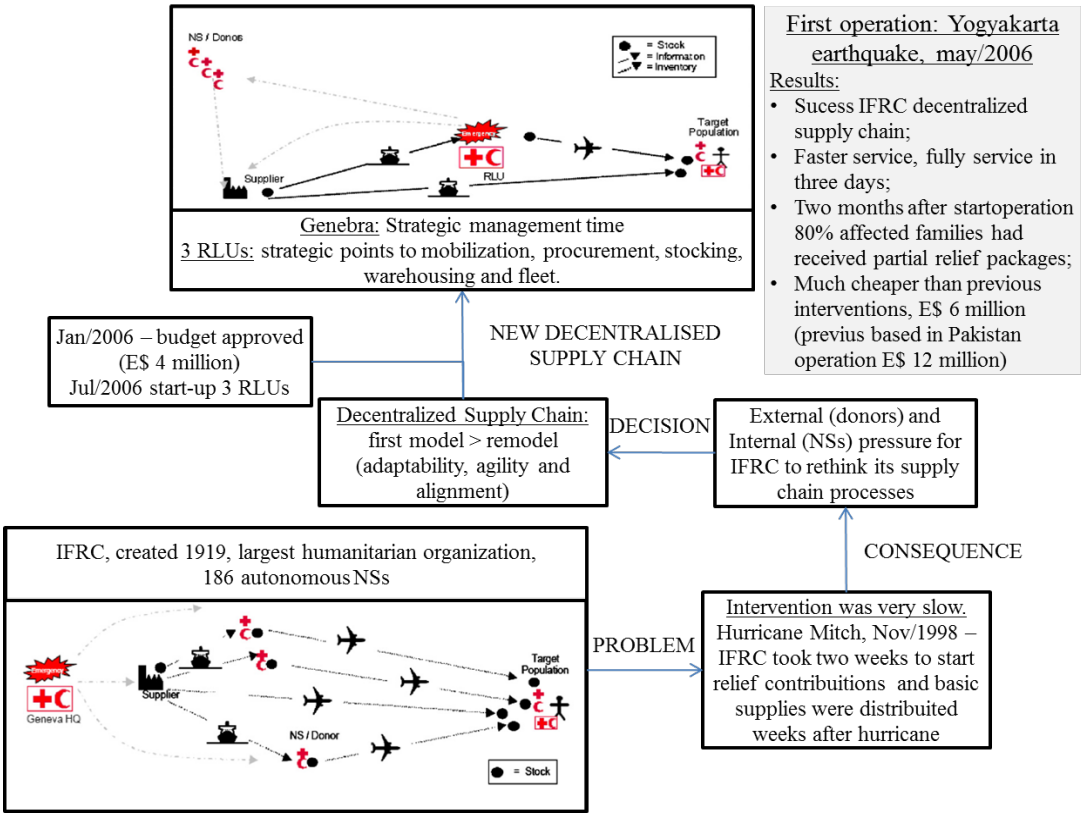
On May 27th, 2006, the new decentralized management model of the supply chain was tested when at 5:54 am; the Indonesian province of Yogyakarta was hit by an earthquake.

Results:

- Fast service - in 3 days the supply chain, became fully operational, while in Pakistan earthquake operations took in nine days and in the Indian Ocean tsunami operation took in 18 days.
- The Pre-positioned, regional operational capacity was Considered the key element in this increased rapidity

- Provide better service to the disaster victims - 2 months after had started the operation, it had provided at least partial relief packages for 80 percent of affected families, while in the Indian Ocean tsunami and Pakistan earthquake, after the same interval, had delivered partial packages to only 30 percent of families.
- Operation was much cheaper than previous interventions - based on operation data from Pakistan operation it would have cost around $ 12 million and but the actual cost was $ 6 million and has been able to assist two times more families in Yogyakarta disaster.

Figure 7 | IFRC Decentralization Supply Chain Process



Source: Adapt from Gatignon et.al,(2010)

HUMANITARIAN LOGISTICS INFORMATION SYSTEMS

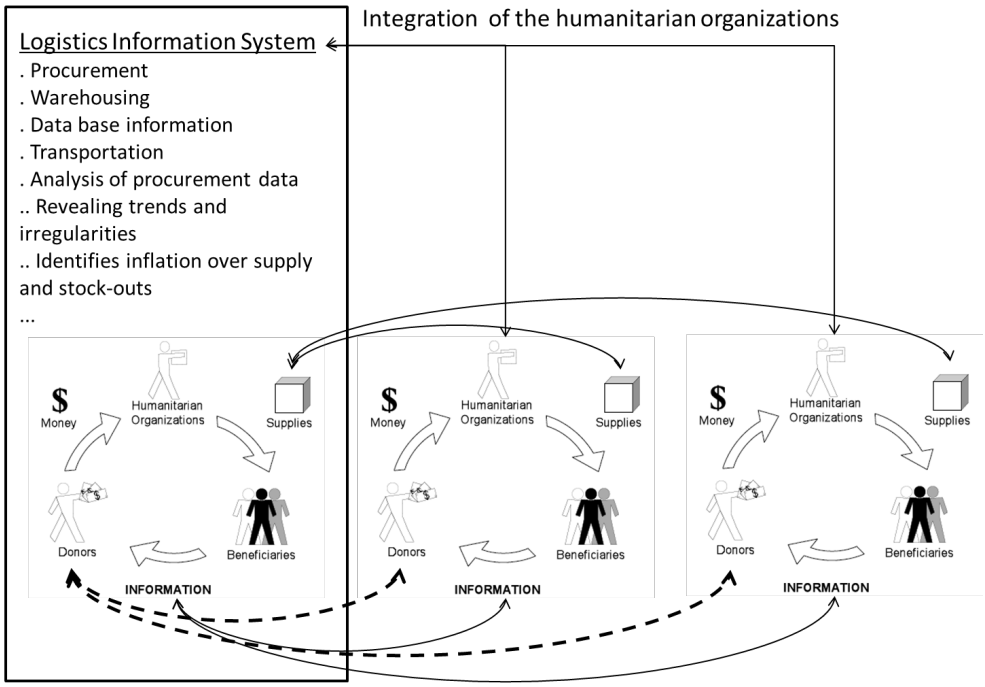
Howden (2009) points out that despite the logistics activities represent about 80% of all support activities to a disaster, this is not an activity that gets the proper recognition and therefore lack information to ensure the fairness of the proceedings as all and to demonstrate for donors (key decision makers) how the funds were used. Then, propose the logistic information system to improve the management of information and materials, providing access for all involved to better use of available resources and greater control to managers and donors.

When it comes to humanitarian supply chain beyond the logistics management features already described, the logistics information systems can help improve the management as a whole,

avoiding possible corruption among buyers and sellers. On the other hand, if something out of control, the data analysis may reveal irregularities and the existence of deviations. In the case of largest integration information system would compare the data rates and conditions of several organizations in the same place and identify any deviations or bribes.

Another advantage of having information shared would be to reduce the effect of inflation motivated by the desire of suppliers to take advantage of the momentary urgency. Figure 8 shows information system management and integration between humanitarian organizations and the sharing of information at different levels.

Figure 8 | Humanitarian Logistics Information System



Source: Adapt from Howden,(2009)

3. RISK MANAGEMENT SUPPLY CHAIN

The use of supply chain management in conjunction with risk management is recent. The first works that have addressed this issue was published no more than 20 years as well as the concept of supply chain is recent (1980's); the application of this knowledge in risk management is still in development. To Ritchie and Brindley (2007), supply chain decisions are differentiated from the usual business decisions settings involving risk, in number of respects: it involves the chain of decision nodes, networked together, and each node defined roles, how can help each other and exert influence on the success of everyone (March and Shapira,1987).

One of the main objectives of supply chain risk management is to prepare companies to minimize the effects of failure associated with the use of integrated systems and integration of the supply chain. If the uncertainties about the possibility of executing a given production plan were before minimized with major investments in inventory and purchasing anticipation, nowadays, new management techniques such as supply chain management, lean manufacturing, ERPs etc, are being taken to reduce inventory, losses and other costs associated with the production management (Hallikas and Virolainen, 2004). However, this change has increased the interdependence of business partners in a given supply chain and a good management practice is to make the risk management process to assess, identify vulnerabilities and minimize the impact of any failure.

The results of the use of risk management concepts in the supply chain showed that the decision-making process for managing the risks of an operation requires coordination not only in relation to traditional performance indicators, but particularly those relating to the strategic risks that organization and its partners can tolerate without losing profitability and market share (Chopra and Sodhi, 2004; da Costa et. al, 2014).

The experience in this direction showed that the central issue is related more to how the available tools and techniques are being applied than the adequacy of individual players the tools available, being highlighted as important issues related to operating structure and decision-making, interactions between those involved, the mutual trust exchanges of experience, the systems available and the degree of availability and sharing of information (Paulsson, 2004; Peck, 2005; Santarelli et. al, 2015).

Other highlights are the fragmentation of the supply chain and the limited participation of some players, while some participating including the decision-making process, others have less participation due to arising limitation of risk managers or because they feel little involved in process as a whole. The challenge is to achieve a more dynamic interaction between the players, sharing a system that warns when the level of risk increases, however, the main barrier noted is the difficulty of sharing information among those involved because of the management systems are not prepared to exchange information simply with the other system.

It is also important to define how they should be conducted discussions for decision making in relation to the problems identified through the monitoring process.

4. HUMANITARIAN SUPPLY CHAIN AND RISK MANAGEMENT - FRAMEWORK

The 4 phases of the disaster management cycle include the preparation of humanitarian organizations to work in disasters and in other stages from the occurrence thereof. However, given the evidence that there are risks on the fulfillment of product delivery deadlines or delivery times of basic services urgently needed from the occurrence of a disaster, we present a proposal to incorporate risk management activity with cycle disaster management.

The proposal is that risk management takes effect at every stage of the cycle, starting with the mapping of risks and probability of occurrence of a disaster, working in preparation to ensure that major steps are taken to minimize the response time and maximize the effectiveness of work teams, following the whole process, from the occurrence of a disaster until the cycle is considered complete and the results can be analyzed to guide the correction of risk planning and preparation of organizations, increasing knowledge supply chain management of humanitarian organizations involved.

The preparedness phase of the disaster management cycle has a preventive character because it aims to identify and standardize the needed items, set strategic locations to be kept as outposts (to decrease the time from the beginning of humanitarian activities), identifying suppliers for the supply of needed supplies etc.

However, as the companies' shortages can cause failures in the manufacturing process that generate complex consequences in an increasingly competitive market, with the proper level of fitness, humanitarian activities involving risks for the maintenance of life and data relating to expenses and numbers of people affected by disasters in recent decades are significant to justify the incorporation of risk management into the context of humanitarian supply chain.

Ritchie and Brindley (2007) present five major components of the supply chain risk management framework, this components can be adapted and used in humanitarian supply chain context. In this case the proposed model will integrated the framework of risk management supply chain and humanitarian supply chain. The five components of the humanitarian supply chain risk framework adapted from Ritchie and Brindley (2007), are:

- Risk context and risk drivers - refers to aspects of the site under study and can be imposed by nature or consequence of disordered action of man in the occupation of spaces in the environment;
- Risk management influencers - are defined four key influencers, reward, supply chain risks, timescale

and portfolio considerations;

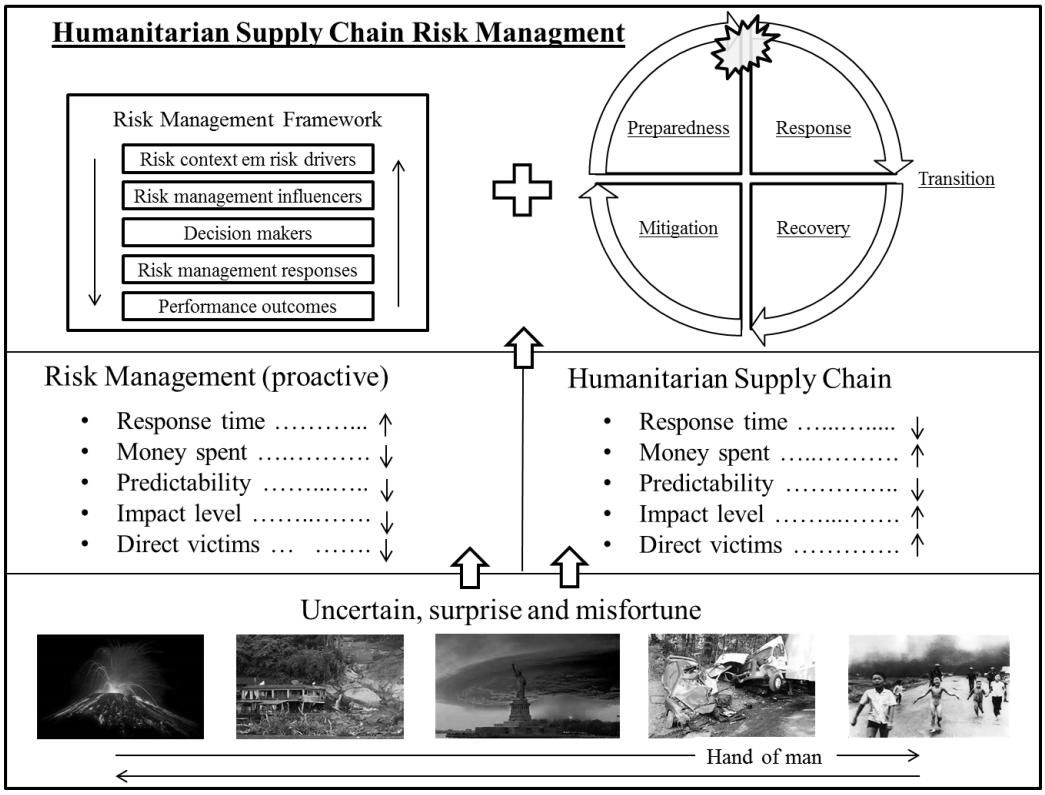
- Decision Makers - is a key point because at the time of emergency there are problems associated with the individual characteristics regarding the personal fears and group characteristics that influence the acceptance of the leadership of a deputy coordinator for the work;

- Risk management responses - must take into account two types of risk in relation to costs and deadlines, the risk of making the right or wrong decision, and the risk of not meeting the needs in the time available at the time of a disaster

- Performance outcomes - can be directed to several outbreaks in accordance with organizational goals and profile of stakeholders

The Figure 4 summarizes The Humanitarian Supply Chain Risk Management characteristics above mentioned.

Figure 4 | Humanitarian Supply Chain Risk Management[1]



Source: Author (2016)

The Figure 5 presents the proposed integration between the incorporated the risk management and the Disaster Management Cycle.

The aim of incorporating risk management concepts to the disaster management cycle is related to the larger goal of obtaining better management of humanitarian organizations as a whole.

1 Source photos: http://www.bing.com/?scope=images&nr=1&FORM=NOFORM

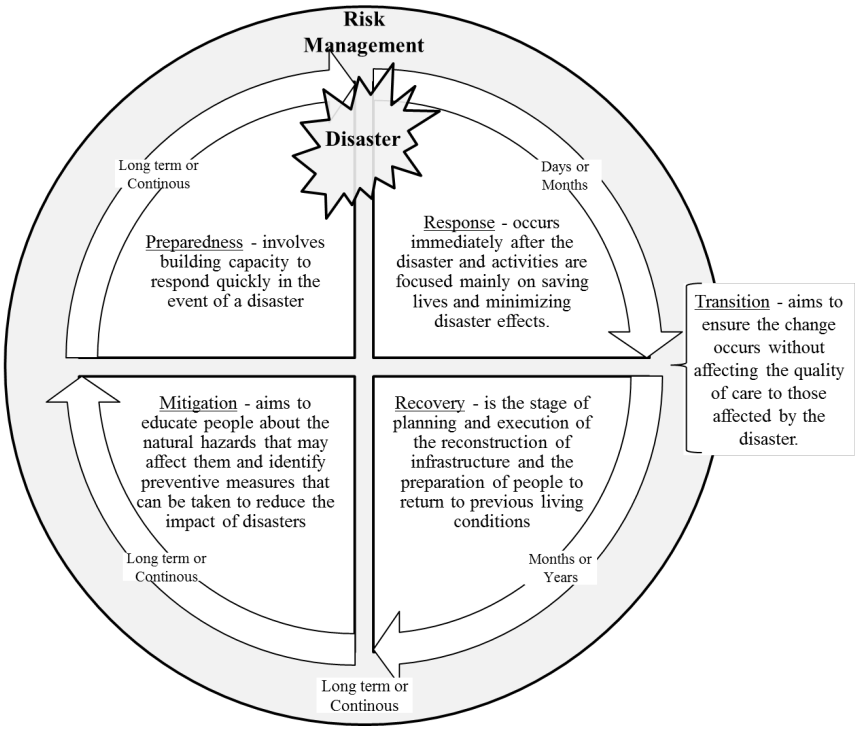
The presumption has thought of every detail related to an event or in the case of a company where managers have been content with the results is a convenience that the enterprises can lead to difficulties or even bankruptcy.

In the case of humanitarian activities, in reality, it is not possible prior to quantify the losses in terms of human and economic resources lives, caused by a failure in the disaster management process.

In fact, the outcome in the eyes of the world community is always favoring those who are willing to act in times of crisis. However, only a part of people works on a voluntary basis, nowadays there is an industry that operates professionally focused on humanitarian aid and must use all available resources to do it with quality.

Risk management can be understood as an audit activity performed to ensure that the professionals who manage the humanitarian organizations are doing everything possible to be efficient and effective. In this sense, risk management should be carried out by a work crew untied the operation as a whole, acting preventively in ensuring that the actions planned are updated and all involved aware of their responsibilities and the importance of each activity in the whole of the humanitarian operation.

Figure 5 | The Disaster Management Cycle Risk Management



Source: Author (2016)

5. CONCLUSION

The experience accumulated by the international community in recent years about the logistical issues involving humanitarian activities increased the awareness of the need for integration of humanitarian activities in accordance with the concepts related to supply chain management.

Within each humanitarian organization logistics activities representing about 80% of expenditures in general, assumed the role of organizing emergency care. The integration of the various organizations, among themselves, their suppliers and stakeholders is of paramount importance to improve management in general and in this case due to the logistics supply chain management, responsible for the integrated management of activities involving multiple players with common goals relating to humanitarian aid.

In this sense, immediately after the occurrence of a disaster, prevail the speed and efficiency of humanitarian aid and logistical skills in acquiring, transporting and receiving supplies are fundamental and humanitarian context, In general the supply chain management is critical to operate different players in an integrated activity involving non-profit organizations and the private sector. The growth rate unsustainable in recent years, the number of disasters and the amount spent to meet emergencies and to restore normalcy have encouraged one also growth in the number of research and proposals for improving the quality of management of resources used. All evolution is representative when it comes to numbers on average exceed twenty-five billion dollars a year.

In preparing this compilation of knowledge, we feel the need to propose an expansion in the scope of disaster management; namely in the disaster management cycle that is made traditionally by preparation activities, emergency level of operation and level of reconstruction and prevention to reduce the effects of recurrence.

In our view, as well as in businesses, where risk management is to ensure the integration of the supply chain, it is necessary to incorporate the concept of risk management to ensure control and continuous supply chain management in humanitarian organizations. The goal should be to ensure that the activities of disasters management are integrated and focused on the best use of time (scarce) and available resources.

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