SUPPLY CHAIN EXPENDITURE AND PREPAREDNESS INVESTMENT OPPORTUNITIES

A COOPERATIVE STUDY BY HELP LOGISTICS AG, KUEHNE LOGISTICS UNIVERSITY AND ACTION CONTRE LA FAIM FRANCE

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Jonas Stumpf, Sara Guerrero-Garcia, Jean-Baptiste Lamarche, Maria Besiou, Sean Rafter

EXECUTIVE SUMMARY

Recognized as a leader in the fight against malnutrition, ACF is committed to save lives of malnourished children while providing communities with access to safe water and sustainable solutions to hunger. With an annual budget of € 307.6 M (budget of 2016) the organisation is currently active in 50 countries assisting around 15 million beneficiaries (Figure 1).

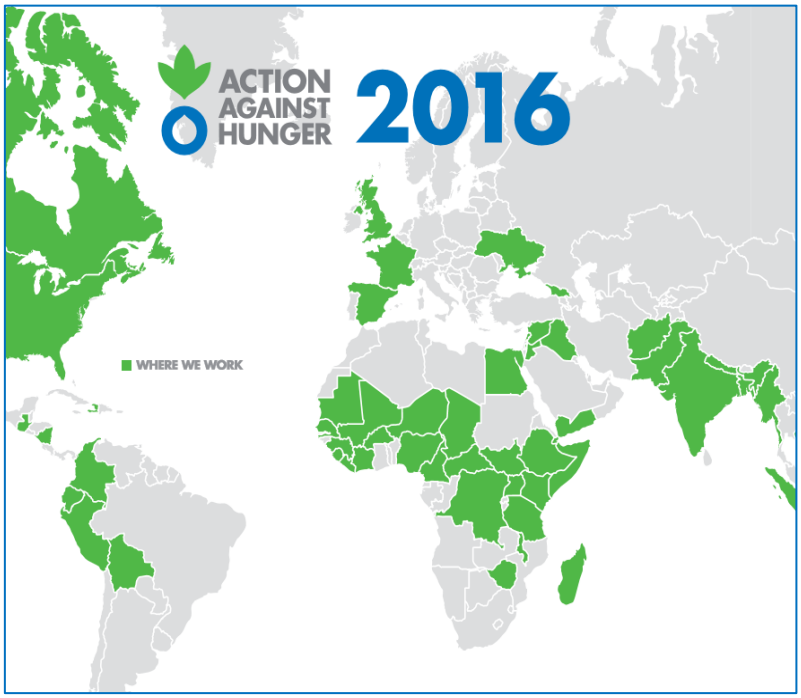


Figure 1: ACF's country highlighted in green

In the past 15 years, the organisation has been playing a very active role in international relief operations and responded to most major disasters around the globe. Aiming at working efficiently with minimal fundraising and administrative costs, it strives to commit $ 0.93 of every dollar directly to its field programs. Despite this lean and cost efficient approach, the organisation cannot escape the growing gap between available funding and actual financial requirements to meet the world humanitarian needs. On a global scale, 40% of US$ 19.7 billion appeals coordinated through the UN remain unmet (UNOCHA 2017) (Figure 2).

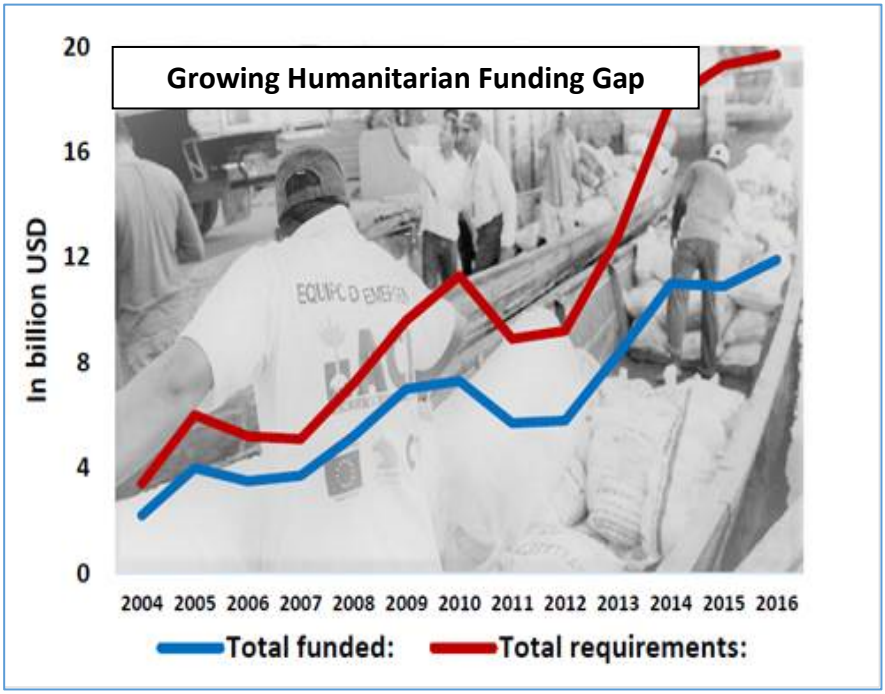


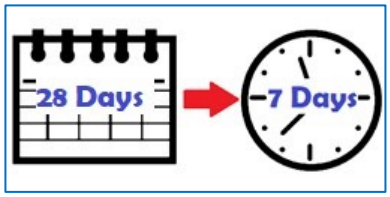
Figure 2: Trend of the humanitarian funding requirements (UNOCHA, 2017)

To tackle the complex challenges in the sector and to address major issues such as the growing funding gap, the international community gathered in May 2016 at the World Humanitarian Summit (WHS) in Istanbul. A new Agenda for Humanity was shared with the purpose of achieving "better, safer and more efficient aid". In preparation for the summit, the Global Logistics Cluster together with the Kuehne Logistics University (KLU), HELP Logistics and numerous INGOs published a paper "Delivering in a Moving World" (Guerrero-Garcia et al., 2016), putting strong focus on the importance of logistics and supply chain management for efficient (cost saving) and effective (time saving) humanitarian operations. The paper discussed current challenges in the humanitarian supply chain and provided recommendations toward overcoming them. ACF contributed very actively to the paper and strongly supports the key message that the supply chain, as a backbone of humanitarian operations, bears tremendous potential to make aid more efficient and effective. Subsequently, in the aftermath of the summit ACF showed strong interest to push the recommendations further and to refine its supply chain strategy accordingly.

In a very first step ACF envisaged to have an evidence based test on the significance of supply chain management within their organisation. In regards to the widely-spread assumption that supply chain represents between 60 to 80% of the humanitarian expenditures (Van Wassenhove, 2006), the organisation wanted to know whether this percentage also applies in their context. To independently assess data and to avoid bias, ACF entered into a third party partnership with the Kuehne Logistics University and HELP Logistics. The extensive research took place from June 2016

to September 2017 and consisted of analysing ACF's costs in six major relief operations of all types (natural disaster, complex emergency and epidemic) in the past 15 years. The supply chain expenses of the operations examined, namely Tsunami in Indonesia (2005), Conflict in Central African Republic (2009-2015), Earthquake in Haiti (2010), Cholera outbreak in Haiti (2010), Ebola crisis in Liberia and Sierra Leone (2013) and Earthquake in Nepal (2015) **ranged from 62 to 79%, with an overall average of 69%.** The methodology and a detailed breakdown of the major cost components are provided in the first section of this report.

While it was then proven that supply chain expenditures account for the greater part of ACF's previous relief operations, the question remained how this knowledge can be used to save money, reduce lead times and, enhance service quality for future operations.



While traditionally most humanitarian funding is provided after the disaster has happened, the summit paper highlighted investments in supply chain preparedness measures as a powerful lever for improvements. A study from The United Nations Development Programme (UNDP) (UNDP 2012)[1], which analysed the resilience of disaster prone countries, found that every dollar invested in fighting people's vulnerability prior to the disaster can save seven dollars in economic losses afterwards. ACF wanted to find out whether the 1:7 ratio can also be reached within the scope of their emergency operations. ACF decided to extend its collaboration with KLU and HELP Logistics to conduct a *Return on Investment (RoI)* study on the delivery of Non-food Items (NFI) kits in context of the relief responses to the earthquakes in Haiti and Nepal. Major objective of the study was to get a better understanding of potential areas of preparedness investments and identify the most beneficial ones. The RoI study also aimed to support ACF's International Strategic Plan 2016-2020 and to help the organisation to meet the target of developing emergency preparedness and response plans in all country offices. Based on a pre-defined Disaster Preparedness Framework, KLU and HELP Logistics developed an analysis tool to compare scenarios with and without investments in the areas of Personnel, IT/Processes, Prepositioning, Supplier Management and, Local Actors/Community. To accommodate both one-off investments and flexible running costs and to consider the fact that investments take time until they fully unfold, the analysis tool contains dynamic calculation methods. Subsequently, the RoI is significantly determined by the time that passes between investment made and disaster to happen. In the case of Haiti earthquake, the model demonstrated that an amount of

[1] The currency used in this report is euro (€), therefore, we prove that € 1 invested into preparedness saves € 7 aftermath.

€ 115k invested about a year and two months (439 days) before the catastrophe happened could have led to total savings of **€ 938k** (equal to 42% of total expenses). Likewise, in the case of Nepal earthquake, with **€ 39k** invested two months (71 days) beforehand, savings of **€ 341k** (equal to 39% of total expenses) would have been possible. Thus, in both situations the 1:7 ratio occurs at a certain point in time. In addition to the cost savings, the study showed that significant **lead time reductions of 21 days** (28 days lead time without investment in comparison to 7 days lead time with investment) can be achieved. The framework and the model are outlined in more detail in Section 3.

The Supply Chain Cost Analysis and the Return on Investment Study have manifested the key messages of the World Humanitarian Summit report. The results emphasise that humanitarian agencies, donors, governments (and indeed commercial partners) should recognise and further exploit that supply chain and logistics is the critical business component of an efficient and effective response. By examining the significant potential these findings suggest, the humanitarian community should take into consideration that chasing for more money is not the only way to close the funding gap. In fact, **investing earlier and smarter could ultimately reduce the requirements** and help the whole community of humanitarian actors to do more with less. (Figure 3).

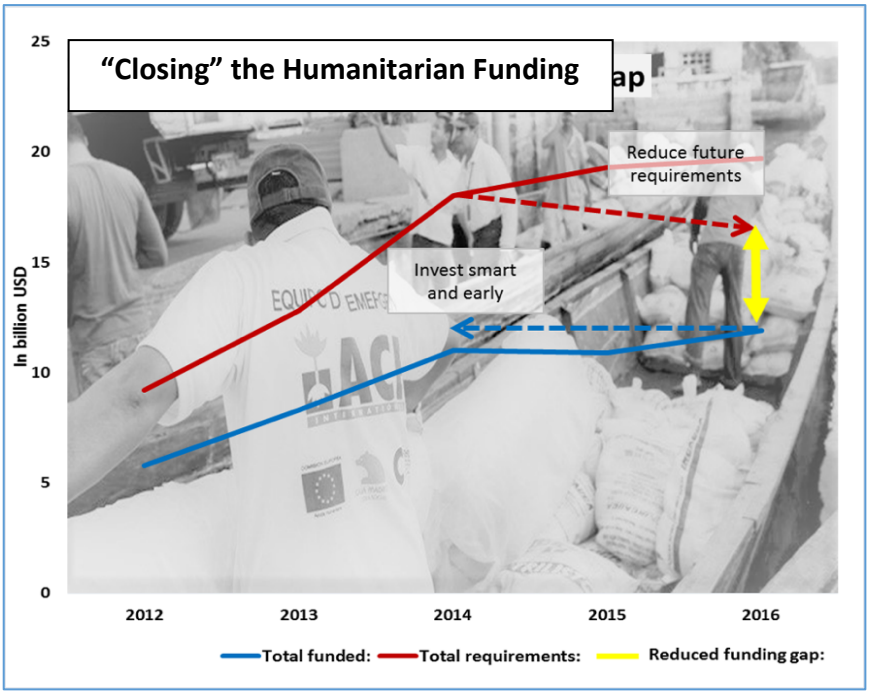


Figure 3: Closing the humanitarian funding gap

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LIST OF ABBREVIATIONS

ACF: Action Contre La Faim

CAR: Central African Republic

HQ: Headquarters

KLU: Kuehne Logistics University

NFI: Non-food Items

NGO: Non-governmental Organization

ROI: Return on Investment

UNDP: United Nations Development Programme

WHS: World Humanitarian Summit

1. RELIEF SUPPLY CHAIN OVERVIEW

Aiming to support the new Humanitarian Agenda and to develop a proof case of the relevance of its supply chain, ACF France, member of the ACF international network, joined forces with the Kuehne Logistics University and HELP Logistics to demonstrate that the humanitarian supply chain process is the backbone of its operations.

When a major disaster strikes, ACF France supports the offices in the field and coordinates the global response from its headquarters in Paris. Critical supply chain functions such as Procurement, IT, Logistics and General Services are grouped together and report to the Global Head of Logistics (see Figure 4). When a large-scale disaster strikes, ACF activates its humanitarian crisis protocol, designs the response and sets up the supply chain to provide assistance to the affected population. To optimise the response time, ACF can use a push approach in the beginning of the operation switching over to pull when more reliable information on the actual needs is available. International experts can be deployed to support the national office, preparing the office infrastructure and equipment and carrying out more detailed assessment missions on the ground. When international supplies are activated, ACF headquarters initiates the transportation of prepositioned items from 9 potential depots around the globe (Figure 6) and/or starts the procurement process from international and local suppliers. For international air shipments, ACF uses commercial carriers or takes advantage of its partnership with the Airbus Foundation, which provides pro-bono cargo flights to disaster areas on a case by case basis. In the affected country, ACF generally manages a national warehouse to receive and accommodate the international shipments as well as larger quantities of locally procured commodities. Closer to the actual disaster area, ACF runs a smaller field warehouse to facilitate the distribution to the beneficiaries (Figure 3).

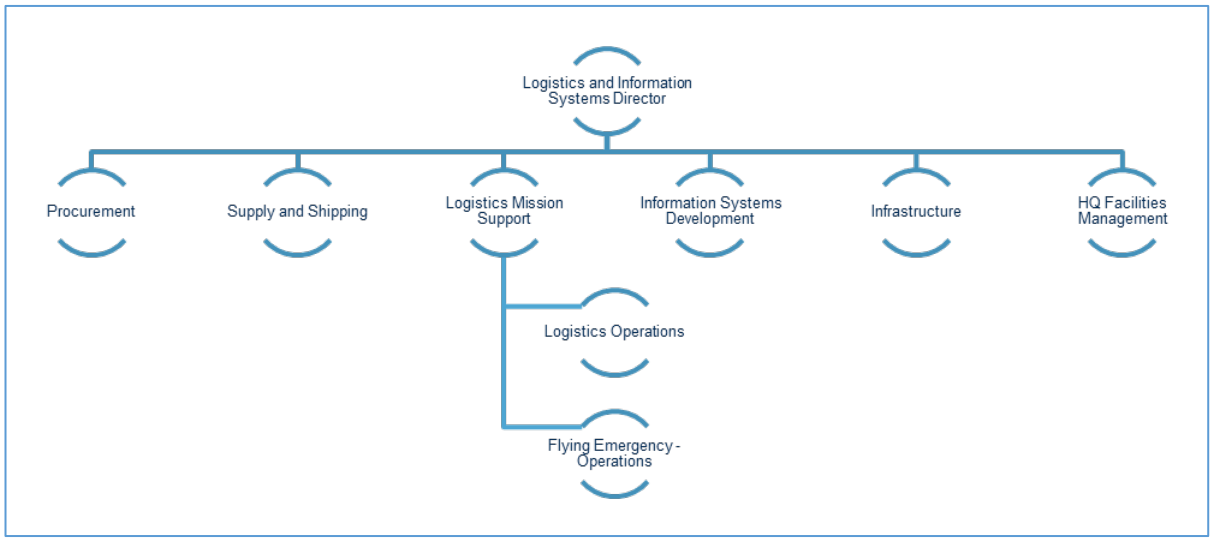

Figure 4: Organigram for the Logistics and Information Systems department at the headquarters in France

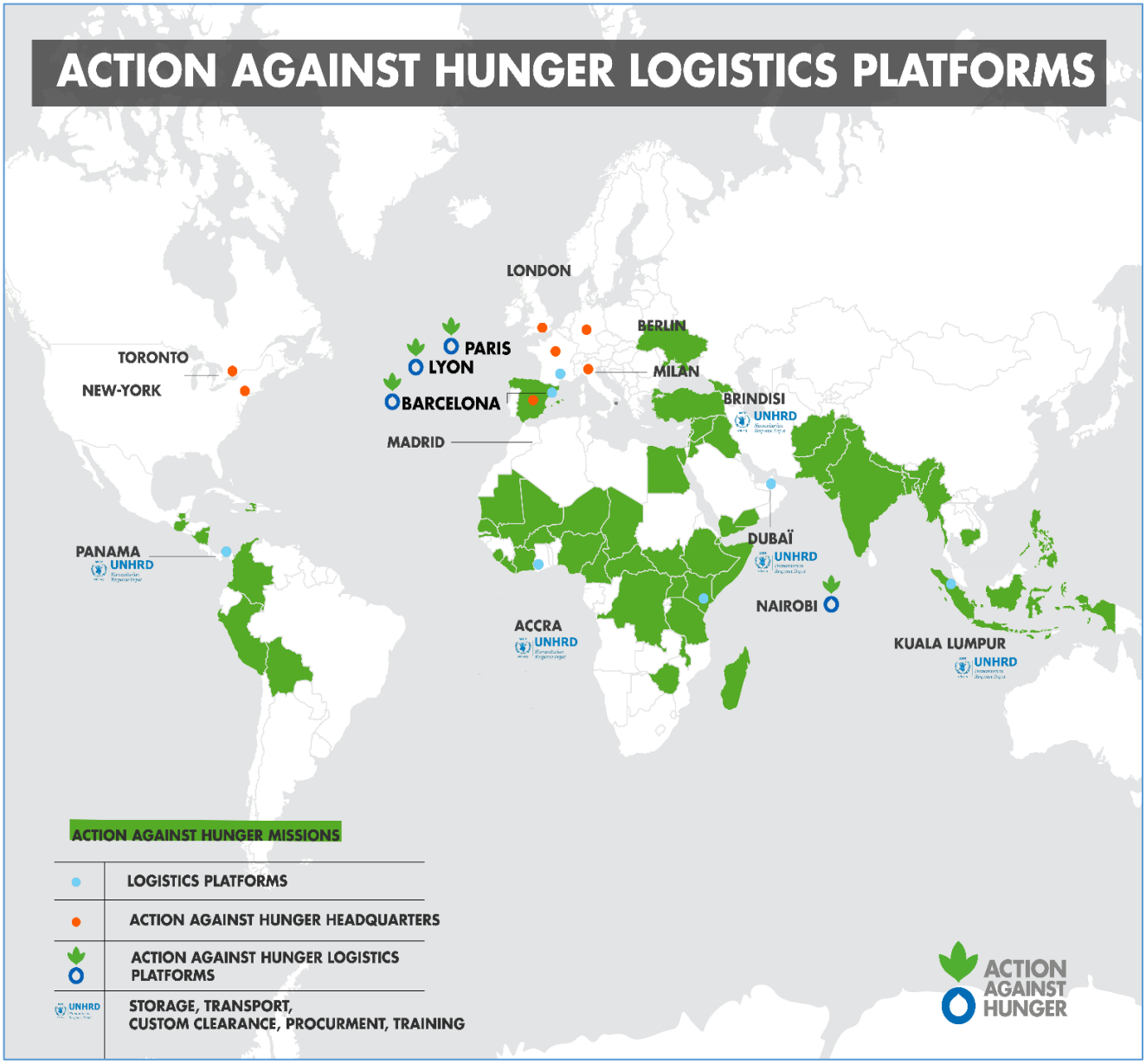

Figure 5: ACF's prepositioned stock of relief supplies

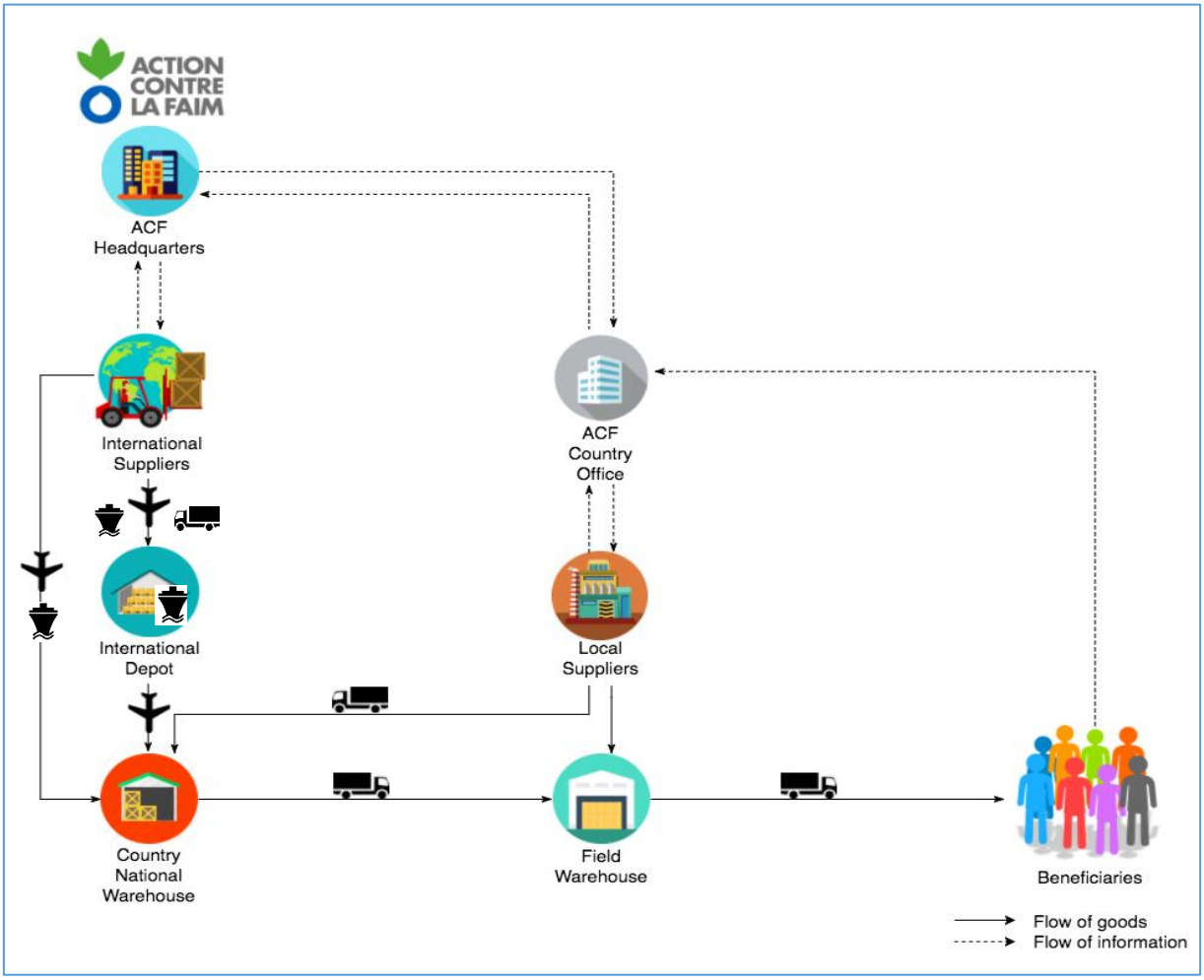

Figure 6: ACF's supply chain of emergency items

2. SUPPLY CHAIN COST ANALYSIS

Having responded to most of the major disasters in recent years, ACF has taken on an active role in international relief operations and has experienced the challenging and costly tasks of delivering aid into the affected areas. To prove the actual relevance of supply chain management within their organisation, an extensive cost analysis project was launched to show the actual percentage of the supply chain expenditures in relation to the total costs of its operations.

2.1 Methodology

To clearly define the project scope, to cope with large data sets and to reach tangible outputs, the project team developed a consistent methodology containing of the following steps (Figure 7):

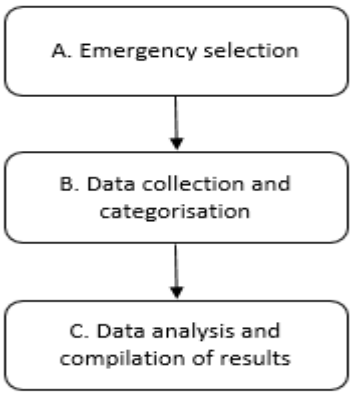

Figure 7: Methodology of the 60-80 analysis

A. Emergency selection. With the main purpose to cover all types of disaster (natural disaster, complex emergency and epidemic), the team selected six of the most challenging past emergencies that ACF responded to: tsunami in Indonesia (2005); conflict in Central African Republic (2009-2015); earthquake in Haiti (2010); cholera outbreak in Haiti (2010); Ebola crisis in Liberia and Sierra Leone (2013) and earthquake in Nepal (2015) (Figure 8).

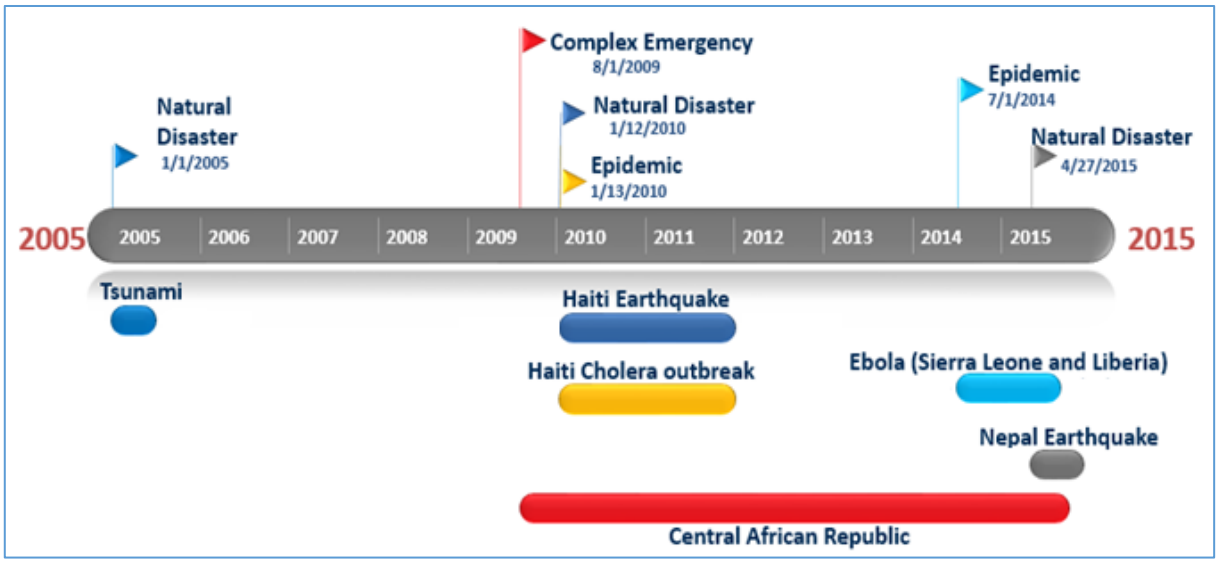

Figure 8: Timeline of the emergency responses considered for the 60-80 Analysis

B. Data collection and categorisation. Excel data of the expenses for each catastrophe was collected and emergency programs filtered. The raw data included a starting and ending date for each project.

For practical purposes, Figure 9 shows the initial date of the very first project and the end date of the last one for each emergency.

Emergency type and place	Project Timeframe
Tsunami in Indonesia	01.1.2005 – 30.06.2005
Armed Conflict in Central African Republic	01.8.2009 – 30.9.2015
Earthquake in Haiti	12.1.2010 – 31.12.2011
Cholera Outbreak in Haiti	12.1.2010 – 31.12.2011
Ebola Crisis in Liberia and Sierra Leone	01.7.2014 – 31.8.2015
Earthquake in Nepal	27.4.2015 – 30.11.2015

Figure 9: Humanitarian projects analysed, including their time frame

The project team defined and categorised the supply chain expenses according to ACF internal reporting standards and per charts of accounts. The 18 categories factored in the supply chain expenses were merged into 10 for a better exhibition (Figure 10). However, the reader can refer to Appendix 1 for a detailed description of the categories including their sub-categories.

No	Supply Chain Expenses	Merged Categories
1	Transport costs	Transport: 2x4 /4x4/Trucks/2 wheels/Boats Transport/Other
2	Hydraulics and hygiene	Hydraulic products Hygiene equipment
3	Program running costs	n/a
4	Logistics staff	Expatriate staff National staff
5	Construction works	n/a
6	Communication and IT	Computer equipment Radio equipment Other equipment
7	Warehousing	n/a
8	Nutritional and medical products	Food products Nutritional products Medical products Food security products
9	Office running costs	Originally named as “Office setting up and running costs”
10	Other products	n/a

Figure 10: Merged categories of the supply chain expenses

Once the projects were listed, per month average exchange rates were obtained from: http://www.x-rates.com/ and https://www.oanda.com/ and, expenses were accordingly converted into euros.

C. Data Analysis and compilation of results. The results were then compiled to calculate the percentages.

2.2 Findings of the Analysis

The compilation of the results shows that, in the context of the six operations analysed, supply chain expenditures ranged between 62% and 79% with a total average of 69%. When comparing the results by type of disaster (Figure 11) complex emergencies in armed conflicts (CAR) represent the highest expenditure (79%), followed by medical emergencies (Cholera and Ebola) with a range between 63 and 71% and, natural disasters (tsunami and earthquakes) ranging from 62 to 71%

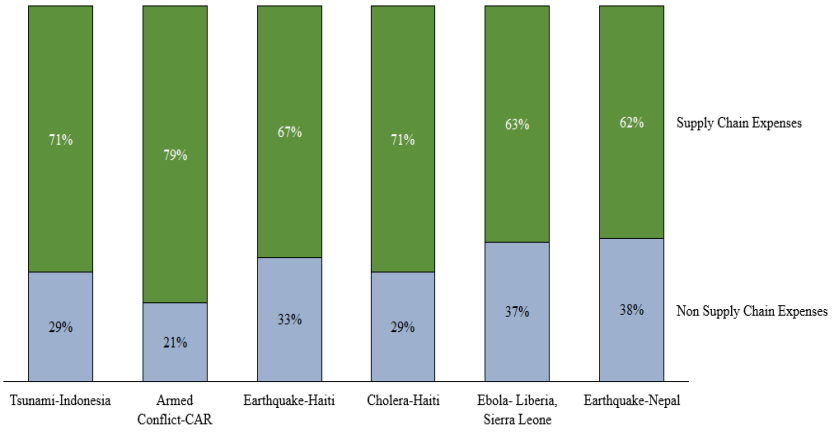

Figure 11: Results of the 60-80 Analysis

The detailed breakdown of the costs by logistics activity for each operation is illustrated in Figure 12.

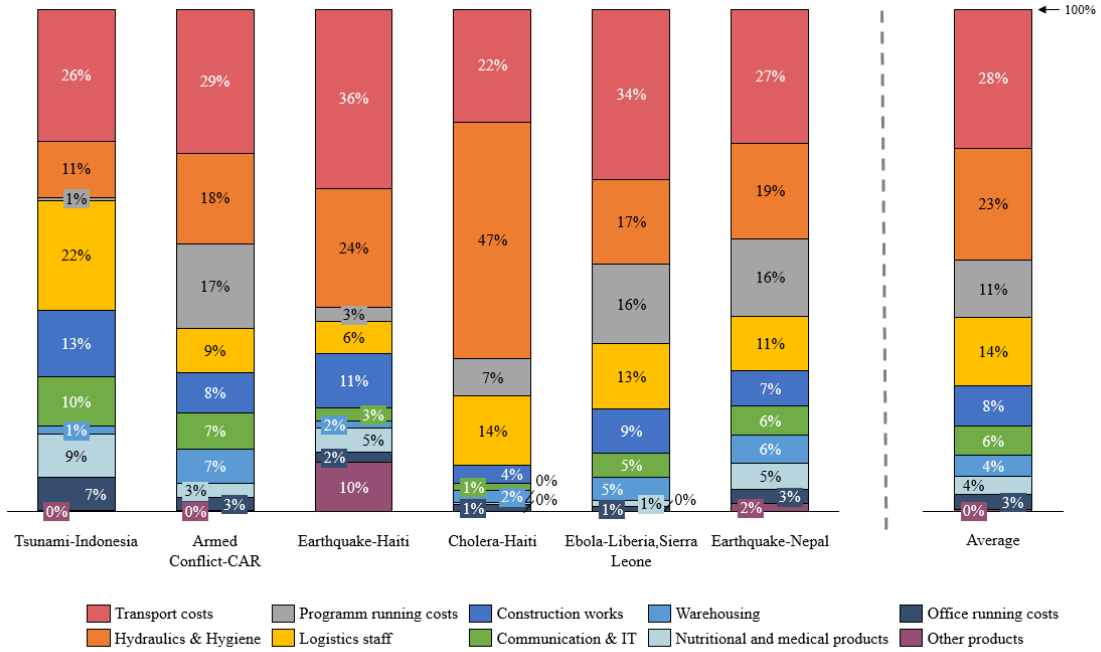

Figure 12: Breakdown of the supply chain expenses

With an average of 28% (range between 22% and 36%), *Transport Costs* is the highest expense within the supply chain for five out of six emergency operations analysed (hydraulics and hygiene was the largest one in case of the response to the Cholera outbreak in Haiti). The second highest average cost is *Hydraulics and Hygiene* with an average of 23% followed by *Logistics Staff* (including international and local personnel) with 14%. *Program Running Costs* and *Construction works* are the two-subsequent costs with an average of 11% and 8% respectively.

When taking a closer look at the complex disaster type (Figure 13) *Transport costs* are close to the total average (scoring 29%). *Hydraulics & Hygiene* and, *Logistics staff* are five points below the overall average (18% vs 23% and 9% vs 14% respectively). With 17% *Programme running* costs are 6 points above average. This is presumably related to access limitations to distribution spots due to security issues in conflict areas.

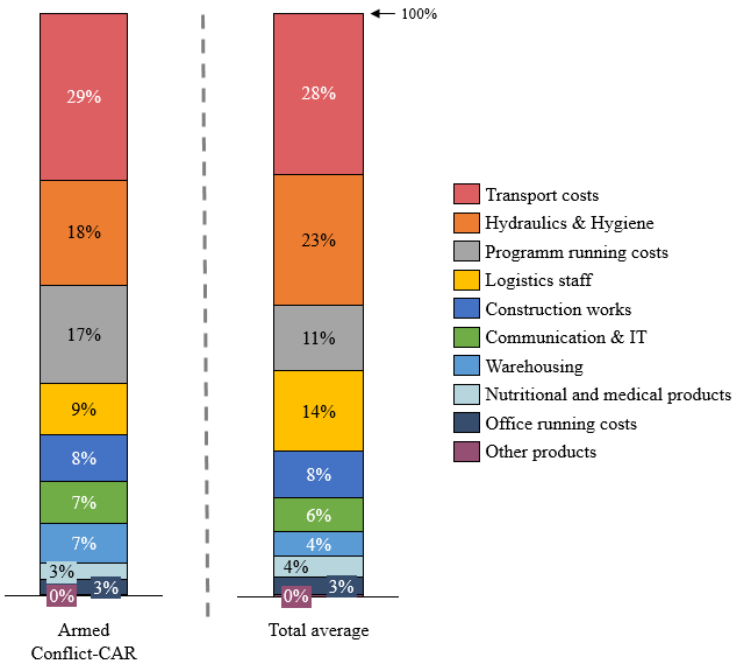

Figure 13: Comparison of the average expenditure of the armed conflict vs the total average

In the case of natural disasters (Figure 14) *Transport Costs*, *Hydraulics & Hygiene* and *Program running costs* are below total average (26% vs 28%, 15% vs 23% and 8% vs 11% respectively). The higher cost for *Logistics staff, Construction works, Communications & IT* (each two points above average) can possibly be explained by the sudden appearance of most natural disasters (more logisticians needed on the ground) as well as the severely damaged infrastructure (construction work and communication).

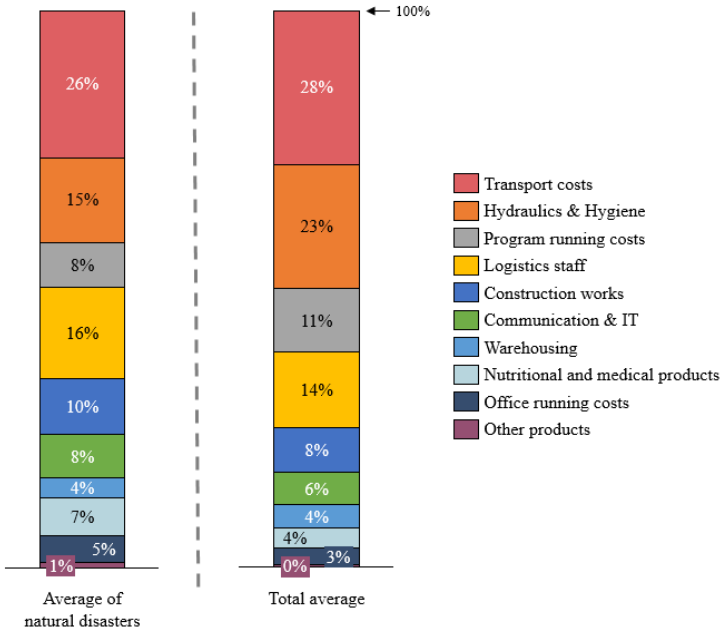

Figure 14: Comparison of the average expenditure of natural disasters vs the total average

Expenses for *Hydraulics & Hygiene* in medical emergency operations (Cholera and Ebola) are unsurprisingly almost nine points above average. The other cost categories do not differ much from the total average (Figure 15).

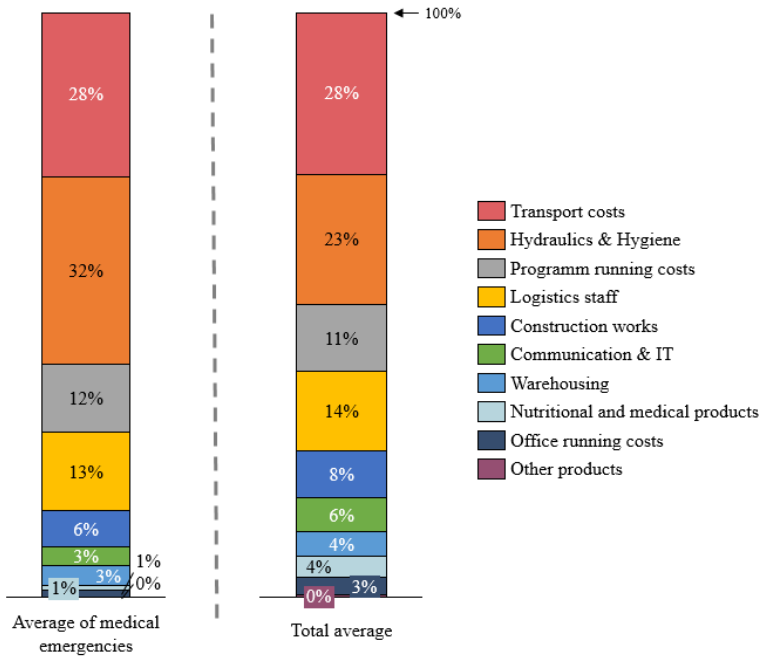

Figure 15: Comparison of the average expenditure of medical emergencies vs the total average

2.3 Conclusion

The project envisaged to analyse previous ACF emergency responses and determine the percentage of the total operational cost that can be attributed to supply chain and logistics. In the analysis of six recent major emergencies the findings consistently demonstrated that supply chain and logistics costs were between 62% and 79%. The results support unequivocally statements made by Van Wassenhove (2006) used also by the humanitarian community in the WHS paper that, “supply chain management is the backbone of humanitarian operations”.

These findings should be of interest to humanitarian organisations leaders. As stated in the WHS paper, if supply chain and logistics functions require most of the funding in an emergency response, then they should have an essential voice in the “the global strategy of a humanitarian organisation, be involved in the planning process and be positioned high up in the organisational structure by making them part of the decision-making processes”.

Donors, governments (and indeed commercial suppliers) should take note that supply chain and logistics is ‘the’ critical business component of an efficient (cost saving) and effective (time saving) humanitarian response. Therefore, the focus of humanitarian investments should at least give further consideration to build capacities in this field.

The obvious questions arise, if investments in supply chain and logistics are to be made, what specific areas should be funded to maximise efficiency and effectiveness and, when would be the best time to do so?

To encourage preparedness investments and to show their benefits, ACF requested KLU and HELP Logistics to run an extensive Return on Investment Study in the context of the organisation’s emergency relief operations.

3. RETURN ON INVESTMENT STUDY (ROI)

As discussed in the WHS 2016 paper, UNDP stated in its resilience study in 2012 that significant savings can be generated if investments are made before the disaster strikes ("one dollar saves seven dollars"). The UNDP study looked at the general resilience of a country from a macro perspective and included the role and capacities of all sectors and considered major investments in the country's infrastructure.

To prove that the 1:7 ratio can also be reached in the context of an international Non-governmental Organisation (NGO), ACF requested KLU and HELP to run a *Return on Investment* study narrowing the scope to the organisation's role in emergency operations and more specifically, on its supply chain management functions.

In recent times, ACF has been making investments into preparedness measurements. Since 2010, the organisation's Board of Directors endorsed the allocation of € 1.8 M budget for emergency stocks in 9 potential depots around the world (Figure 2) to make ACF's emergency responses more effective (Figure 2). As of April 2017, the organisation has around € 1.3 M worth of emergency items in stock. These include commonly needed items such as family and shelter kits but also a number of very specific high value commodities and equipment which have a long procurement lead time (e.g. drilling machine with procurement time of 6 to 9 months). Hence, ACF experienced significant lead time savings in their operations when they were able to tap into the prepositioned stocks during major relief responses.

To increase the readiness of personnel being deployed in emergencies, ACF built an emergency pool of approximately 20 experts. Furthermore, ACF has been constantly investing in staff and trained them on different levels. The measures allowed the organisation to deploy international experts swiftly to support the national offices on the ground, if needed.

Another major investment was the development and implementation of the new Field Logistics Information System "LINK" to improve supply chain visibility, streamline processes and achieve cost reductions. After one year, the system had generated the first savings and after three years of usage with the full functionalities package, ACF foresees to have capitalised its initial investment. Figure 16 summarises the benefits achieved through LINK.

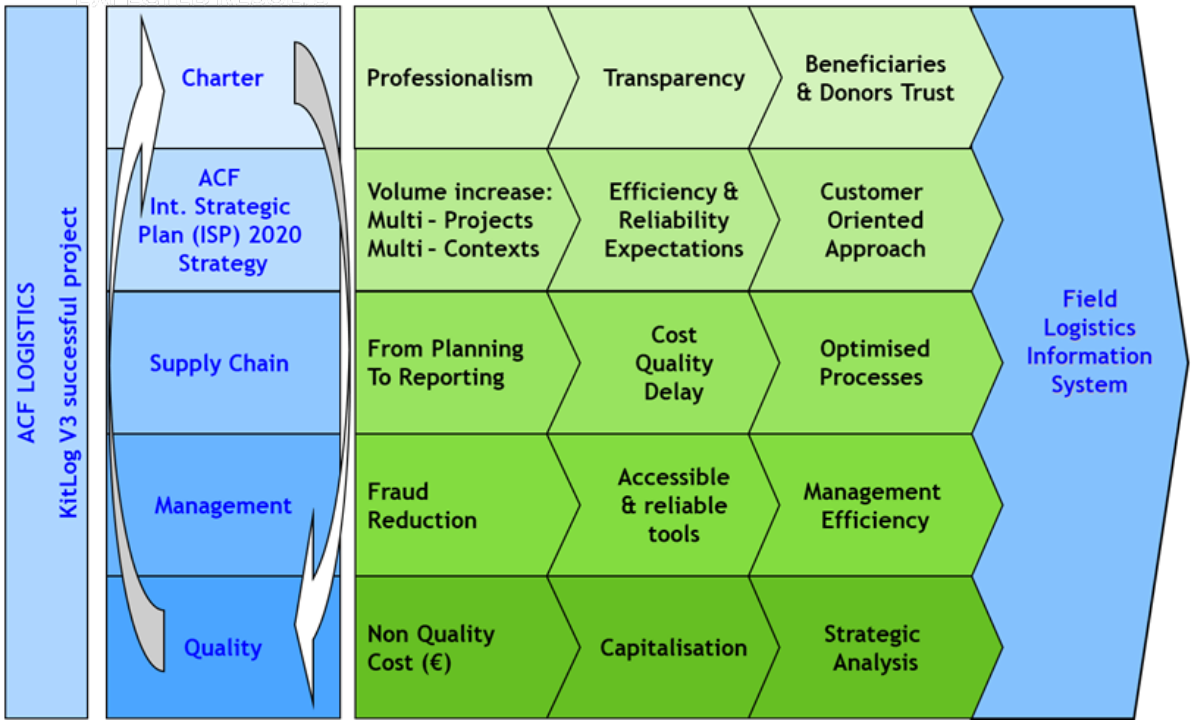

Figure 16: Benefits of LINK

For the RoI study, ACF, KLU and HELP Logistics took into consideration already made investments as well as possible investments the organisation could make if funding was available.

3.1 Framework of the RoI Study

According to Van Wassenhove (2006), preparedness should consist of key elements that must be in place to produce effective results. For the case of ACF, these key elements are Personnel, IT/Processes, Prepositioning, Supplier Management and Local Actors/Community (Figure 17). The RoI study outlines various investment opportunities in those five areas, discusses the interrelations amongst them and, draws the correlation between investments made and their impact on the supply chain; i.e. from assessment and planning to the final distribution.

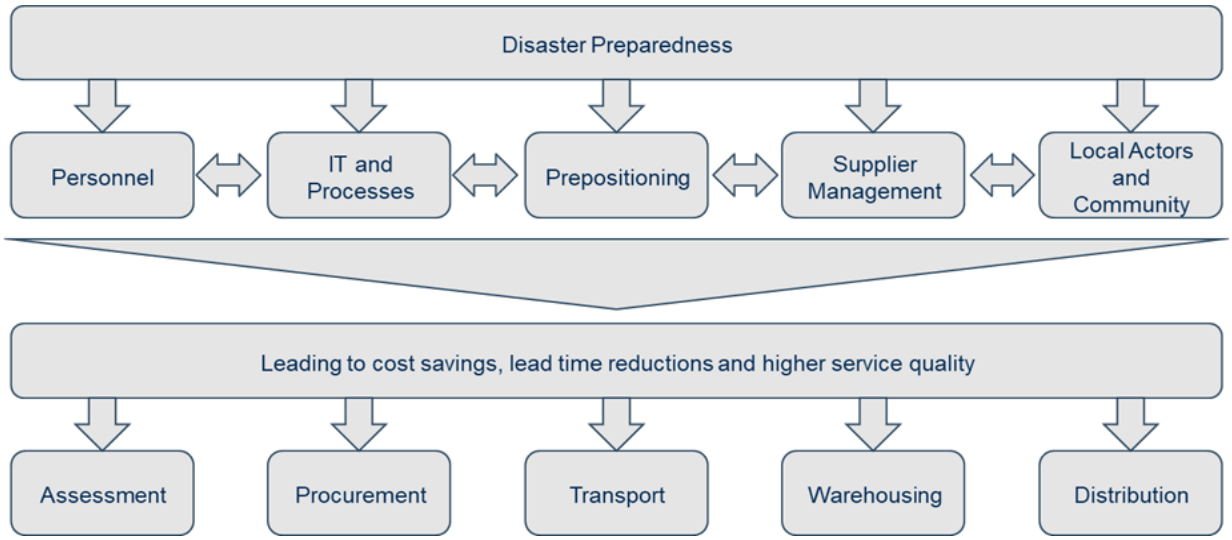

Figure 17: Disaster preparedness framework (based on Van Wassenhove, 2006)

Personnel
Context
As any other international agency, ACF deploys international staff to support the national office and to increase capacity on the ground when responding to a large-scale disaster. Based on data received from the organisation, the cost for an international deployment can be between 5 and 15 times higher than a local staff member in an equal position. Direct savings will therefore be generated across the in-country supply chain part when the competence level of local staff is high enough and fewer international deployments are required. Strengthening the capacity of the national office and staff will furthermore save costs and time through its interactions with the investment areas *Supplier Management* and, *Local Actors and Community*.

IT/Processes
Context
The IT and Processes investments consist of two components which facilitate the information flow and increase visibility across ACF's supply chain – the global IT system – LINK and, the radio and communication (telecoms) equipment on the ground. As indicated earlier, ACF has invested a significant amount in the development of LINK leading to cost and time savings, mostly during upstream processes such as procurement. Due to immediate access to product catalogues, supplier lists and prices, the decision making and validation process is speeded up drastically. Furthermore, the timely availability and functionality of telecoms equipment (incl. generators and expert to install equipment) on the ground is seen as very critical. In places with severely damaged infrastructure, the non-existence of this equipment would hamper and delay the relief response for ACF significantly.

Prepositioning
Context
Holding stocks at international and national depots require an investment into the purchase of the items before the disaster hits and comes with storage and handling cost until the stocks are shipped out. Cost and time savings can be expected as there is no procurement lead time and in case of local prepositioning, the international transport will also be significantly reduced.

Supplier Management
Context
Investing into this area includes activities such as conducting detailed market assessments and building relationships with local suppliers and strengthening their supply chain capacity. These activities would be carried out by national staff with increased competence level (see *Personnel* section). Subsequently, sourcing of local supplies could be increased during the response and savings achieved from international transport cost and lead times. Potential savings, when purchasing the items locally, could be generated if prices are capped and not raised by the supplier after the disaster strikes. Detailed knowledge on local markets and resilient supply chains of direct suppliers is also considered as crucial for potential cash and voucher programs as part of the relief response.

Local Actors/Communities
Context
Building capacity and relationships with local governments and NGOs can have a positive impact on the importation process of international shipments. This investment might also result in ACF tapping into existing resources and capacities of local partners. Storing commodities at a partner warehouses in the field is one option. Furthermore, the local partner can provide support during the needs assessment as well as facilitate the final distribution of the relief items. Subsequently, ACF will have a faster and better picture of the situation on the ground that supports their operations planning and allows the organisation switch earlier from the effective push to the efficient pull mode. Like the supplier management activities, the increased staff capacity at the national office (*Personnel* section) would be carrying out the additional tasks and establish the relationships.

3.2 Building the tool and collecting data

Based on the framework and the identified investment areas, a simulation tool was designed to calculate the total costs and lead time of a specific emergency response with and without investment, the expenses of investment as well as the actual savings generated.

To clearly define the parameters for the tool, the following information and figures needed to be gathered from ACF (see also Annexes 2 and 3):

- What disaster in what country should be analysed: Haiti and Nepal Earthquake.
- How long should the response period be: 60 days for both cases.
- What is the number of staff with supply chain relevant functions in the country: 130 for Haiti and 10 for Nepal.
- What is the number of international deployments needed in case of no investment: 10 for Haiti and 5 for Nepal.
- What kind of commodities shall be delivered (incl. volume and weight): The kit selected is a standardized commodity with the following characteristics; dimension per kit is 0.018m³ and it includes 3 body soaps, 10m ropes, 2 laundry soaps, 1 mosquito net, 5 hygienic pads, 1 bucket 14L, 1 bucket 30L, 2 blankets and 1 plastic sheeting. The kits are received fully packaged from the supplier and no further assembling has to be done.
- How many commodities the organisation intents to distribute within the given response time: ACF targets to distribute 25,000 family kits as part of their response strategy in the early phases of the relief operation.
- What are the costs for personnel (local, international and consultants): The cost for international consultant and training is € 40,000 for the first year and the salary of local emergency coordinators is 30% above average. For international and local staff salaries refer to the tool in the Appendices 2 and 3.
- What are the costs for storage at international and local warehouses? The warehouse rent per year in Dubai is € 7,000 and € 75,000 in Lyon. The organisation yearly paid € 25,745.13 in Haiti and € 25,128.96 in Nepal.
- What are the transport costs (international and local) as well as commodity prices? Kits from international suppliers and the international depots 1 and 2 will be shipped by air. The calculated average price of the total number of planes was taken into consideration. The price per kit has been set at € 37.50. Price fluctuations are not considered due to limited data availability but also because of the conservative approach. Based on experience, it is though anticipated that the RoI could be even higher as prices tend to go up after the emergency if no agreements with the suppliers were made beforehand.

- Cost of IT systems (development, maintenance and equipment): The investment package for the purchase, storage, transportation and installation of the on-the-ground telecommunication is €20,000. The global system 'LINK' is used across all ACF operations (development and emergency relief). The cost is broken down as following in order to define the share of the system cost for one specific response; the initial development cost of € 1 Million is anticipated to be amortised over 10 years. The annual maintenance cost is € 200,000. The annual system cost therefore amounts to € 300,000. The share of this annual cost ('investment into LINK') for each emergency is then calculated based on the percentage of the emergency response in relation to the total annual ACF budget in the respective year. E.g. if the emergency response cost is 10% of ACF's total annual budget, the investment into LINK in the simulation tool would be 10% of the €300,000.
- Capacity of warehouses, transport means and local suppliers: The local supplier can provide up to 10,000 kits. The local warehouse can store up to 15,000 items. For capacity of overland and air transportation please refer to the analysis tool in Annexes 2 and 3.
- Outline the total lead time from assessment and planning to final distribution of relief items and the detailed breakdown by process in worst case scenario (Figure 18).

Activities	**Lead time (in days)**
Operations planning (demand)	1
Identify suppliers and get quotations	2
Suppliers selection	1
Contracting supplier	1
Stock availability and ship to the country (kitting and int. shipping)	10
National shipment to disaster area	10
Distribution	3

Figure 18: Response time breakdown

In a next step, the impact of the potential investment areas (reduction in time and cost) was outlined and agreed upon. Since preparedness activities were not so much measured and monitored in the past, the impact had to be pre-dominantly defined based on secondary data and information gathered through interviews with ACF senior staff at headquarters (HQ) and national level. It is anticipated that the simulation tool and its results will become more and more robust with the presence of sufficient primary fact based data and, with the application on further emergencies.

Impact of investments:

- The analysis tool takes into consideration a maximum preparedness time of 2.5 years or 911 days. This timeframe is anticipated by ACF to be needed by a country office to strengthen its local capacity and respond without international support. It is furthermore assumed that the country office can reach the 65% readiness level during the first year of preparedness, up to 90% in two years and, 100% in two years and a half. The readiness level determines how many international deployments are needed during the response; the higher the readiness level the less international support is needed (Figure 19). It is assumed that a higher readiness level can be reached by having one or more international consultants building capacity during the first year plus two additional local fix term staff working on tasks related to supplier management / market assessment and strengthening the relationships with local actors.

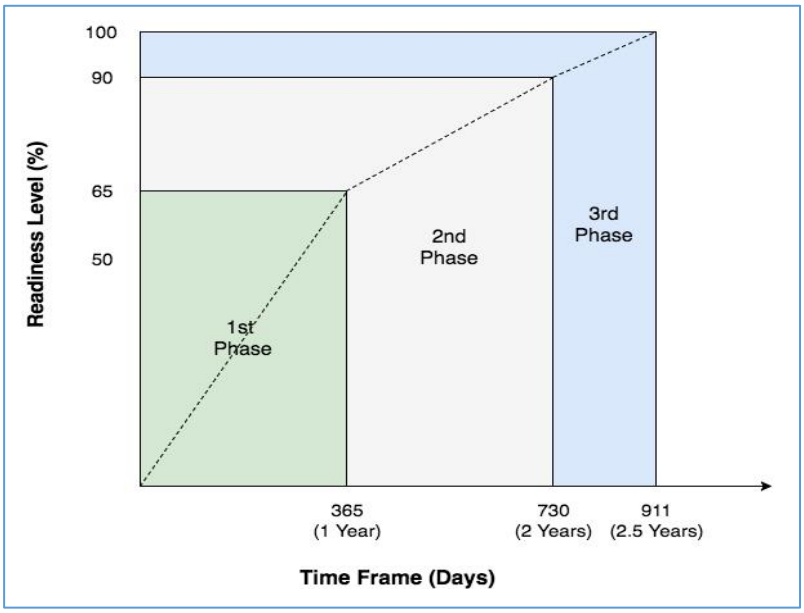

Figure 19: Readiness level by number of preparedness days

- It is assumed that a certain period of time passes between the moment the organisation decides to invest in systems and processes until they become beneficial for the response. In the analysis tool the telecommunication equipment on the ground can only be used if the preparedness period was at least 30 days (meaning 30 days between investment decision made and disaster to happen). For the sophisticated LINK system ACF needs at least 180 days to develop it and roll-it out. This means that even if the decision is taken to invest in both, if the disaster happens “too early”, no return can be expected.

- If telecoms are not functional on the ground after the disaster strikes, the minimum lead time to distribute the first kits is 28 days (this is irrespective of whether LINK is established or not as information on the ground is not available and it is considered a key limiting factor). In case telecoms are functional but LINK is not available, the lead time is anticipated to be 15 days. With both, telecoms on the ground and LINK up and running, the lead time can be reduced to 7 days.

- Local suppliers can only be used in case investment in local supplier management and market assessment has been done (through local personnel capacity building). It takes time for the local supplier to become a reliable sourcing option. If the disaster strikes during the first 30 days, no kits can be sourced yet. From day 31 to 50, 3,000 kits can be supplied. From day 51 to 70, 5,000 kits, from day 71 to 90, 8,000 kits and after 90 days, 10,000 kits (reaching the maximum capacity of the local supplier).
- Also, the local prepositioning in the country needs time to be set up. Subsequently, no kits will be sitting at the local warehouse for the first 30 days. However, from day 31 to 50, 3,000 kits will be stored and ready to use. From day 51 to 70, 5,000 kits, from day 71 to 90, 8,000 items and after 90 days 15,000 kits will be pre-positioned (maximum capacity of the local warehouse).
- Costs for road transportation and distribution can be reduced by 30% in case investment in local actors has been made (through local personnel capacity building). It is assumed that better rates can be negotiated with local transport companies and the distribution cost will go down as the local actors such as municipality will support the process with their resources.

Based on the information and data gathered from ACF as well as the expected impact of the various investment options, KLU and HELP Logistics built the analysis tool and piloted it with the emergency scenarios of the Haiti and Nepal earthquake.

3.3 Running the tool and results

To run the tool, two manual steps need to be taken by the user. Firstly, the user has to decide what investments to make ('Personnel', 'Systems and processes', 'Supplier management (procurement)', 'Prepositioning (warehousing)', 'Local actors (distribution)'). Secondly, the user has to fill in the number of days that pass between investment made and the disaster happened. Please also refer to Annexes 2 and 3.

The analysis tool then calculates the costs of the emergency operation with investment and without investment, the amount of the investments made and the savings in terms of cost and time.
The following sections show the results of the tool for the cases of Haiti and Nepal earthquakes and as per the major objective of the project, the tool was used to analyse if and when the RoI ratio is 1:7.

HAITI Earthquake

In the context of the Haiti earthquake, the tool runs under the assumption that all possible investments have been made in the relevant areas namely Personnel, Systems & Processes, Prepositioning, Supplier Management & Market Assessments and Relationship Management with local actors and community. More specifically this would have happened through investments in *international consultant(s) &*

trainings during the first year, additional national logisticians (working on supplier management and relationship management with local actors), telecommunications, LINK and prepositioning at a national warehouse (the detailed breakdown is shown in Figure 20).

Total investments		***€ 115,271.15***
•	International consultant + trainings	€ 40,000.00
•	National additional logisticians	€ 20,411.99
•	Investment in telecommunications	€ 20,000.00
•	Investment in LINK	€ 15,852.90
•	Investment in national warehouse	€ 19,006.25

Figure 20: Breakdown of investments in the case of Haiti

Based on the set parameters discussed in subsection 3.2, the RoI study shows that cost savings of € 938,502.16 or 42% can be generated if the organisation invests € 115,271.15 a year and two months (439 days) before the catastrophe. Thus, the 1:7 RoI ratio would have been reached (the total expenditures with and without investment are outlined in Figure 21). The largest savings would be in transport (97.65%), staff salaries (32.60%), distribution (30%) and warehousing (13.80%). Since commodity price fluctuations were not taken into consideration, there is no saving in the procurement section in the current version of the tool.

In addition to the findings on the cost savings, the tool also presents a potential lead time reduction of 21 days (from 28 to 7 days) or 75%.

Baseline	Day when disaster is happening	439
Investments	Total investments made	€ 115,271.15
	Country readiness level	74%
Costs	Total expenditure without investment	€ 3,190,478.89
	Total expenditure with investment	€ 2,251,976.73
	Cost savings	€ 938,502.16
	Cost savings percentage	42%
Time	Lead time without investment	28 Days
	Lead time with investment	7 Days
	Lead time savings	21 Days
	Lead time savings percentage	75%
Return on Investment	RoI ratio	1:7

Figure 21: Results of the simulation in the case of Haiti

Figure 22 summarises the reduction in both cost and lead time in case of investments made.

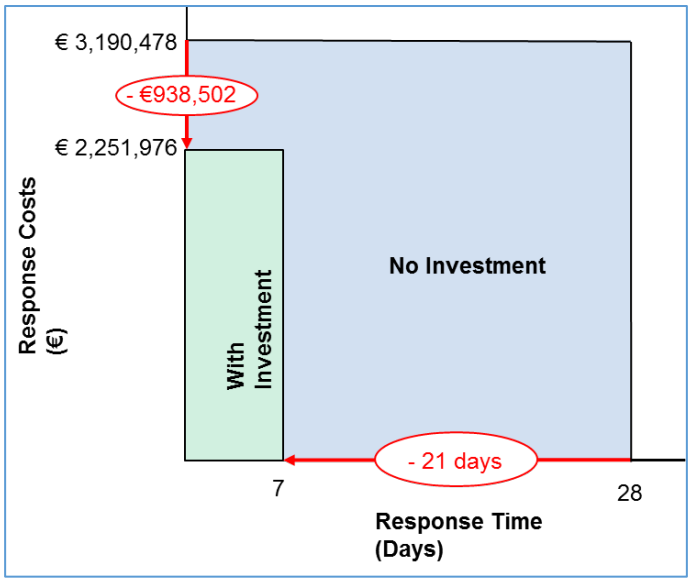

Figure 22: Reduction in cost and lead time in the case of Haiti

The time that passes between investment made and the point in time when the disaster happens is the determining factor on the RoI ratio and therefore impacts the funds to be invested and the savings generated. Figure 23 and 24 show the trend of the RoI ratio and actual savings over time from day 0 to day 911.

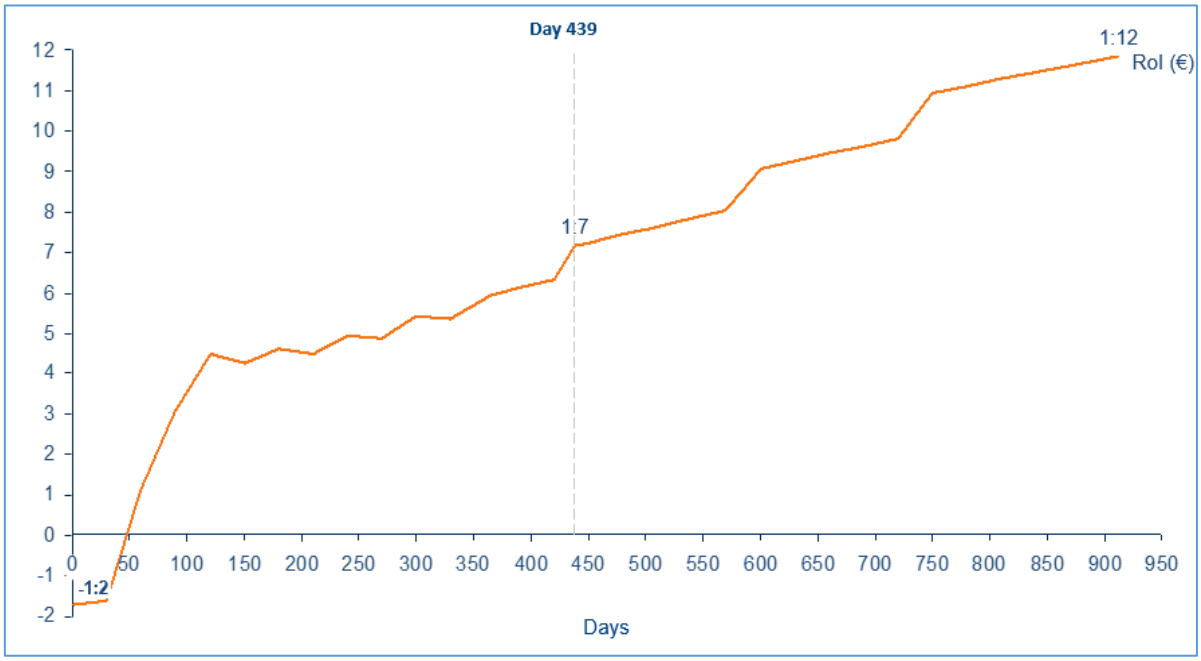

Figure 23: Trend of the Return on Investment in the case of Haiti

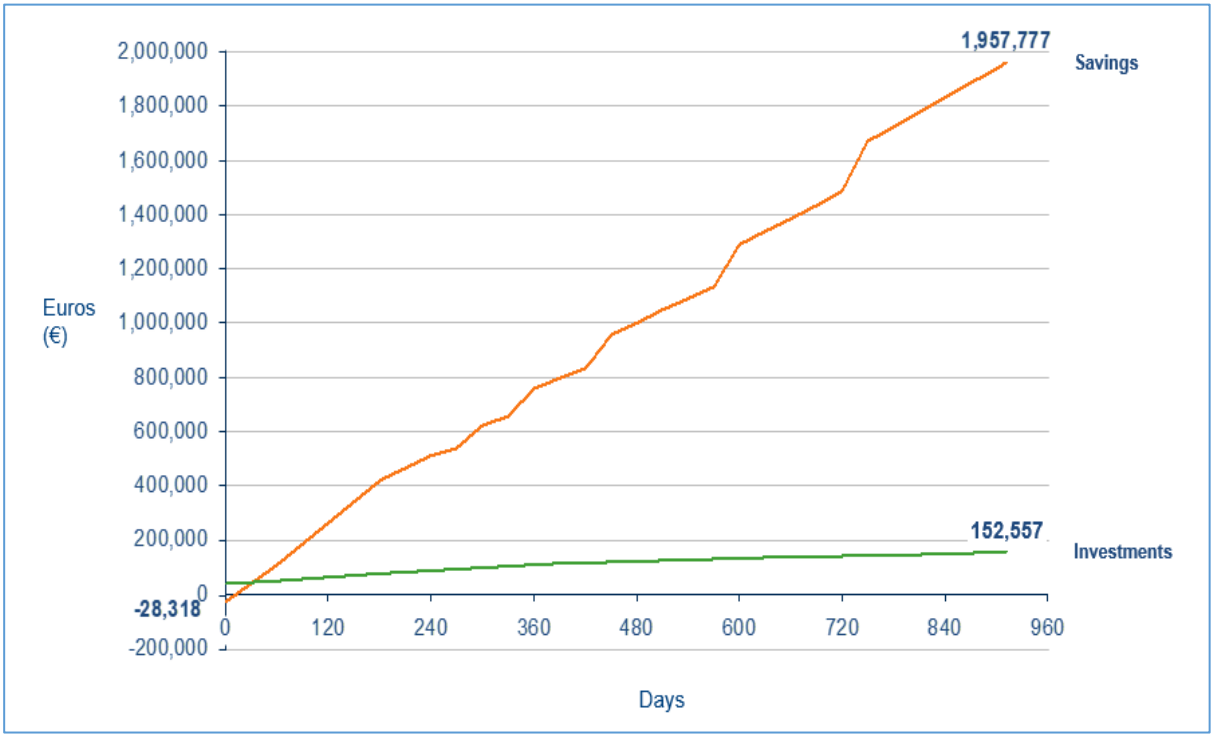

Figure 24: Savings vs Investments in the case of Haiti

NEPAL

In the case of the earthquake relief operation in Nepal it is likewise assumed that investments are made in all relevant areas namely Personnel, Systems & Processes, Prepositioning, Supplier Management & Market Assessments and Relationship Management with local actors & community. More specifically this would have happened through investments in *international consultant(s) & trainings during the first year, additional national logisticians (working on supplier management and relationship management with local actors), telecommunications, LINK and pre-positioning at a national warehouse* (the detailed breakdown is shown in Figure 25).

Total investments		***€ 39,397.67***
•	International consultant + trainings	€ 7,780.82
•	National additional logisticians	€ 9,415.77
•	Investment in telecommunications	€ 20,000.00
•	Investment in LINK	€ 1,389.38
•	Investment in national warehouse	€ 811.70

Figure 25: Breakdown of investments in the case of Nepal

Under those conditions the RoI study shows that cost savings of € 341,017.10 or 39% can be generated if the organisation has invested € 39,397.67 about two months (71 days) before the catastrophe occurs

reaching thus the 1:7 RoI ratio (the total expenditures with and without investment can be seen in Figure 26). The largest savings would be in transport (99.62%), staff salaries (6.29%) and warehousing (7.08%). As fluctuations of the kits prices were not taken into consideration there is no saving in the procurement section. The tool also calculates a potential lead time reduction of 13 days (from 28 to 15 days) or 54%. The lead time reduction is less than in the Haiti case as Nepal earthquake happened 'already' after 71 days (that is when the 1:7 is reached) and the LINK system is not operational yet. For more details on the costs calculation behind the RoI study please refer to Appendix 3.

Baseline	Day when disaster is happening	71
Investments	Total investments made	€ 39,397.67
	Country readiness level	13%
Costs	Total expenditure without investment	€ 1,212,846.35
	Total expenditure with investment	€ 871,829.25
	Cost savings	€ 341,017.10
	Cost savings percentage	39%
Time	Lead time without investment	28 Days
	Lead time with investment	15 Days
	Lead time savings	13 Days
	Lead time savings percentage	54%
Return on Investment	RoI ratio	1:7

Figure 26: Results of the simulation in the case of Nepal

Figure 27 summarises the reduction in both cost and lead time in case of investments made.

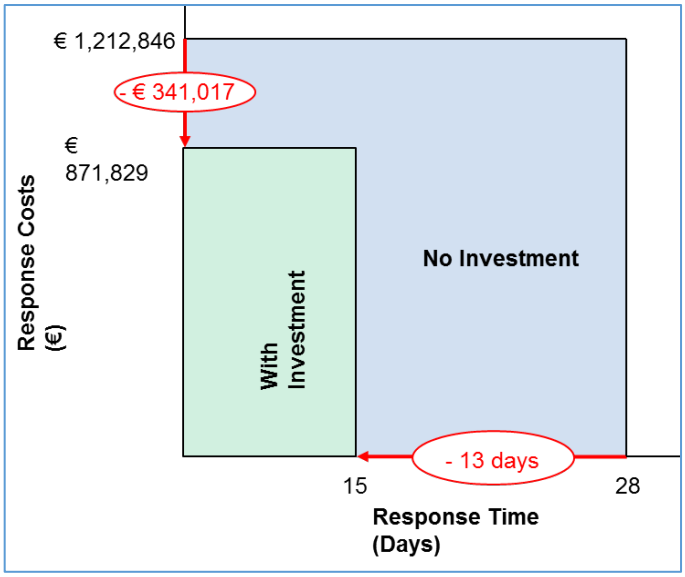

Figure 27: Reduction in cost and lead time in the case of Nepal

The time that passes between investment made and the point in time when the disasters happens is the determining factor on the RoI ratio and therefore impacts the amount to be invested and the savings generated. Figures 28 and 29 show the trend of RoI ratio and actual savings from day 0 to day 911.

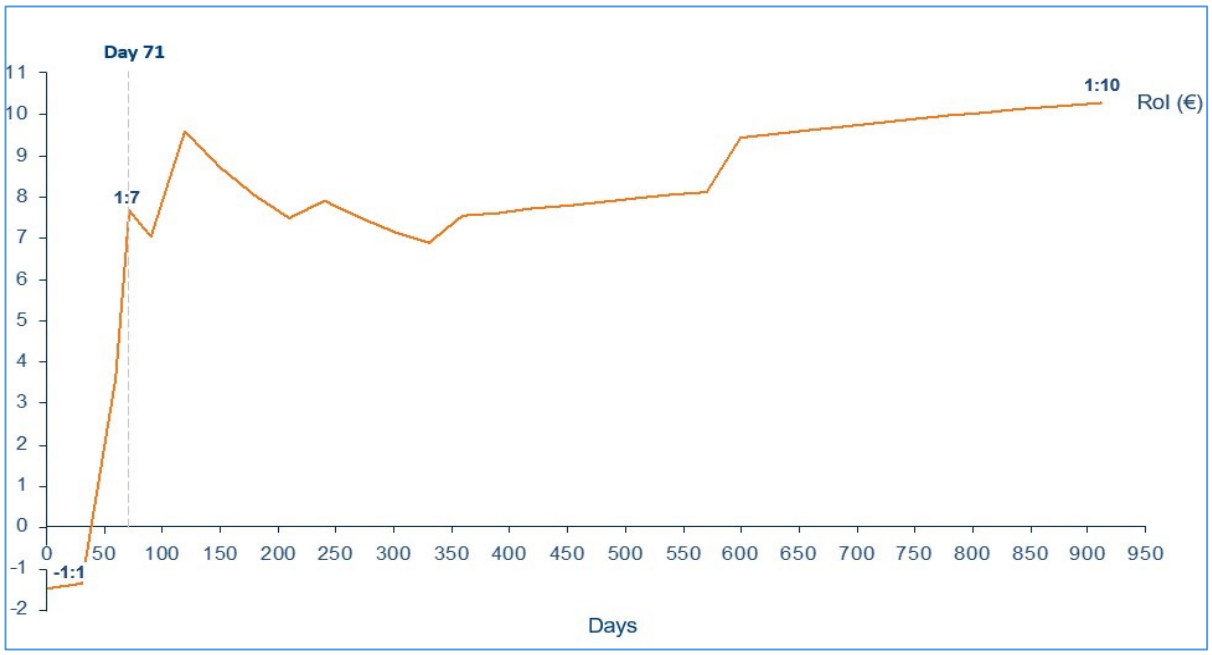

Figure 28: Trend of the Return on Investment in the case of Nepal

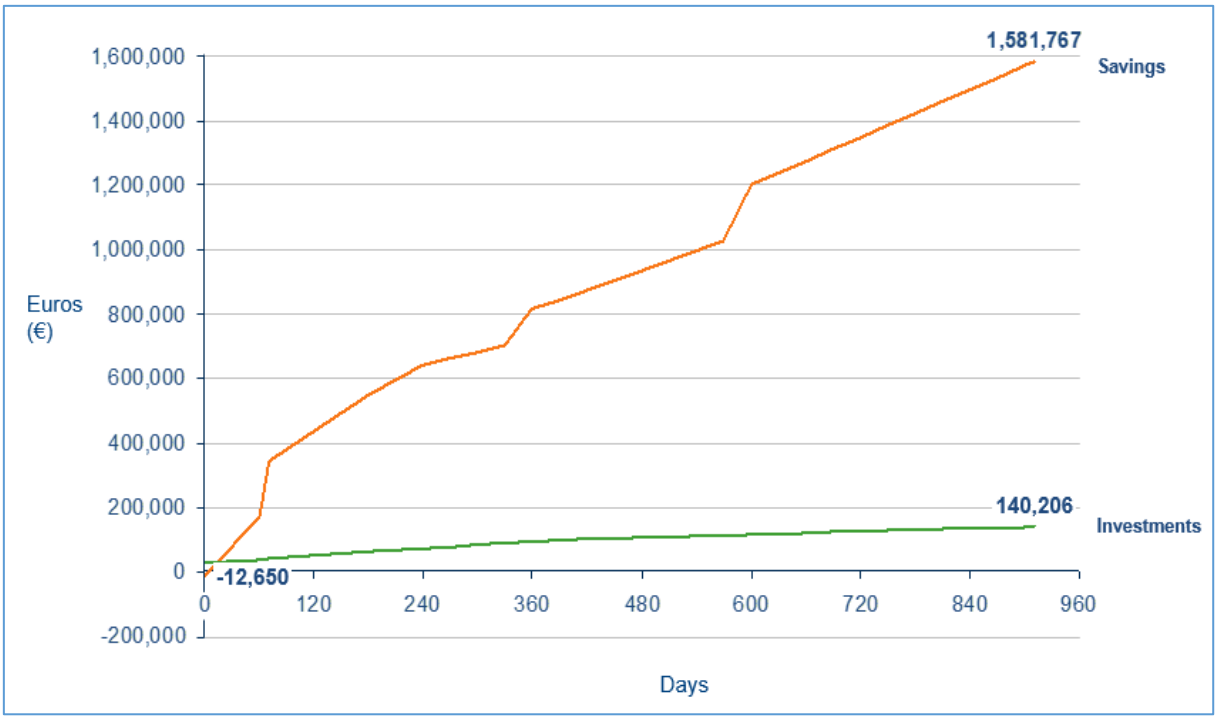

Figure 29: Savings vs Investments in the case of Nepal

3.4 Conclusions

The RoI study was conducted to validate the paradigm that 1 dollar invested before the disaster could save 7 dollars in disaster response. And indeed, the analysis of the Haiti and Nepal emergency responses clearly shows that a 1:7 Return on Investment and even more can be achieved. Based on the findings of the study, ACF decided to integrate the investment component in their preparedness and response strategy design.

The RoI ratio highly depends on the scale of the emergency operation and the impact of the investments made. For example, in the case of Nepal, the 1:7 was reached already after 71 days with relatively little investment whereas in the large scale operation in Haiti, the 1:7 was only reached after 439 days of preparation and with much more investment. However, clear benefits are achieved in case of early investments (this independent of the scale of the operation), as the trends demonstrate that the earlier the investment, the bigger the RoI.

The study emphasises that the objective of humanitarian operations is not always minimising cost but an optimal combination of effectiveness (timely response) and efficiency (cost). This can be seen in investments such as telecommunication equipment on the ground, which may not generate immediate financial savings. However, they speed up the response tremendously and provide improvement in tracking and tracing funds and relief items in particular along the downstream part of the supply chain.

Mapping the investment areas relevant to ACF's supply chain, identifying the inter-relations and analysing their impact were the key exercises of the study. Investments should be looked from a holistic perspective and be aligned with the organisation's emergency response strategies. Isolated funding of specific areas will be less beneficial than 'combined' investments in areas with synergy potential (e.g. investment in local staff to support supplier management and relationships with local partners).

The pilot with ACF analysed the Haiti and Nepal relief operations as individual cases and independent from each other. Both cases showed that investing in capacity in the country certainly generates the largest savings as less expensive international support will be needed. However, it should be noted that investment decisions to preposition many kits inside the country might be contrary to global strategies of international organisations. Holding stocks in costly international or regional depots is certainly an option to be considered if the organisation intends to respond to different disasters in different countries and regions. Identifying the right balance of global and local stocks backed up by a comprehensive supply chain risk analysis is just one out of many logical follow ups after the completion of the RoI study.
Humanitarian organisations should consider completing those exercises and integrate the findings in their response strategies and discussions with donors on investments of greatest impact.

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APPENDICES

Appendix 1

Expenses managed by the logistics teams and categories of costs considered as supply chain for the 60-80 Analysis.

Categories	Sub-categories	Detail
Office setting up and running costs	Office rental, construction and rehabilitation costs	Rental cost of the logistics office
		Setting up the office
		Any taxes associated
		Purchase of materials for construction and rehabilitation
	Office charges and insurance	Electricity bills
		Daily consumption items (water, hygiene, etc)
		Salaries for workers loading and unloading items/equipment
	Office equipment	Purchase of furniture
	Stationeries	Papers
		Tapes
		Photocopy
		ID cards
		Others
Transport: 2x4 / 4x4/ Trucks / 2 wheels/ Boats	Purchase of vehicles	
	Fuel for vehicles	Diesel
		Petrol
	Maintenance, repairs and spare parts	Change of engine oils
		Repairs
		Purchase of spare parts
		Tax provisions
	Insurances	
	Rental of vehicles	Rental costs for cars
		Any associated taxes
	Depreciation motorbikes ACF (12 months)	
	Vehicle depreciation (36 months for cars)	
Transport / Other	Administrative costs related to vehicles	Parking charges
		Road taxes
		Import duties
		Customs
	Subcontracted domestic road transport	Bus fares
		Passenger fees
	Subcontracted domestic air transport	Air fares
	Subcontracted international air transport	Air fares
		Airport handling services
	Subcontracted sea transport	Sea transport
		Handling and services
	Other subcontracted transports	Taxi fares

	Domestic transport for expatriates	
Program running costs	Equipment and running costs of programs' infrastructures	Purchase of projectors
		Cables
		Maintenance equipment
		Procurement of WASH or any other equipment
		T-shirts
	Programs' infrastructures rental and related charges	Setting up of cluster office
		Communication cost for cluster officers
		Service charges for setting up of COMM centre
	Distribution costs	Bags for transportation of food baskets
		Printing of vouchers for seed distribution
		Distribution kits (rope, t-shirt, flags, etc.)
		Transportation charges
	Consultancy costs & experts' mission	Topography
		Hiring consultants
		Flight tickets for consultants
		Transport costs of consultants
	Technical stationeries (except for training & office use)	Photocopying
		Printing of invoices
		Newsletters
	Technical documentation	Translations of documents
		Digital photo printing
		Printing of maps
		Simulation software licenses
		Microsoft office licenses
	Teaching material	Directories
		Printing
		Binding
	Training sessions and related fees	Per diem cost to logistics trainees
		Food and refreshments
		Accommodations
		Trainer fees
	Visibility	Stickers
		Banners
		Sign boards
		Training materials
	Other program running costs	Taxes
		Duties
		Customs
Computer equipment	IT Equipment	Purchase of laptops
		Purchase of desktops
		Purchase of printers
	Purchase of other computer equipment	Spare parts
		Toners
		Batteries
		Cameras
		Wireless access points

	Maintenance of computer equipment	Computer cleaning kits
	Communication equipment	Purchase of sat phones
		Purchase of mobile phones
	Purchase of other communication equipment	Telephone cables
		Internet cables
		Clips
	Maintenance of communication equipment	Power cable management
		Land line communication costs including fax and email
		Mobile communication costs
		Sat phones communication costs
		Communication equipment depreciation
Radio equipment	HF, VHF and Radio-Telex equipment (in case of importation, the expense related to transport is registered in the category "Transport")	Purchase of HF equipment
		Purchase of VHF equipment
		Purchase of Radio-Telex equipment
	Administrative costs related to radios	Import duties
		Customs
	Running costs of various radio equipment	Antennas
		Batteries
		Radio equipment depreciation
Other equipment	Generators	Purchase of generators (commonly bought nationally; in case of importation, the expense related to transport is registered in the category "Transport")
		Fuel for generators
	Maintenance and repairs of generator	Changing of wires
		Generator services
	Purchase of other equipment	Inverters
		Batteries
		Running costs of other equipment
		Depreciation other equipment
Warehousing	Warehouse rental, construction and rehabilitation	Land rent
		Warehouse rent
		Taxes
		Construction and rehabilitation materials
	Warehouse charges and insurance	Warehouse cleaning
		Air check up
		Salaries of security guards
		Electricians
	Other logistic costs	Warehouse equipment and tools
	Quality control	Humidity and temperature recording equipment
Food products. It includes the price paid to the supplier of food. Transport can be arranged by the supplier and included in the		Cereals
		Leguminous plants
		Oil
		Sugar
		Salt
		Dairy products
		Other fresh food products

price or by ACF (category: truck rental, or subcontracted national road transport)		Canned food
		Other food products
Nutritional products	F75	Therapeutic Milk
	F100	Therapeutic Milk
		Nutritional therapeutic flour
		Nutritional biscuits
		Plumpynut
		Nutritional kits
	Nutritional and anthropometric equipment	Weighting scales
		Weighting bags
		Measuring boards
Medical products		Drugs
		Medical kits
		Vaccines
		Other medical products and medical costs
		Medical equipment
Food security products		Seeds and seedlings
		Other agricultural inputs
		Animals
		Other veterinary inputs
		Agricultural equipment
		Income generating activities equipment
		Other food security products
Hydraulic products		Chemical products for water sanitation
		Hydraulic equipment remaining on site or infrastructures
		Reusable hydraulic equipment for several sites
		Other hydraulic products
Hygiene equipment		Collective hygiene products
		Individual hygiene products
Other products		Kitchen equipment and containers
		Sleeping items
		Clothes
		Cash for work
		Other consumable products
Construction works		Tools
		Building and rehabilitation materials
		Construction services (subcontracted)
Expatriate staff		Salaries and charges for salaried logistics expatriates
		Expatriates allocations for logistics staff
National staff		Administrative (finance and HR) and logistics staff salaries and charges

Appendix 2

Cost calculations with and without investments to achieve 1:7 in the Haiti earthquake (2010)

Costs Calculation	No Investment	Investment	Savings
PERSONNEL. *The tool takes into consideration an investment of € 30,000 during the first year to pay one consultant who will train two Preparedness Coordinators, plus € 10,000 of training expenses (€ 40,000 total). The salaries of the two coordinators are 30% more of the monthly average.*	***€ 1,850,104.04***	***€ 1,246,912.57***	***€ 603,191.47***
Number of international logisticians needed	10	2	
Monthly average salary per international logistician (including travel expenses)	€ 4,987.00	€ 4,987.00	
International Consultant + Trainings	€ 0.00	€ 40,000.00	
Total cost for international logisticians	**€ 829,504.33**	**€ 205,900.87**	**€ 623,603.47**
Number of national logisticians	130	132	
Monthly average salary per national logistician	€ 471.99	€ 471.99	
Total cost for national logisticians	**€ 1,020,599.71**	**€ 1,041,011.70**	**-€ 20,411.99**
IT & PROCESSES	***€ 0.00***	***€ 35,852.90***	***-€ 35,852.90***
Investment in telecommunications		**€ 20,000.00**	
Total worldwide expenditure of the year when the catastrophe happens		€ 102,200,000.00	
Response costs of the catastrophe (only for the first 60 days including logistics and non-logistics expenses)		€ 5,400,555.71	
Percentage from the expenses of the first 60 days of the response vs. worldwide expenditure		5.3%	
Investments in LINK during the first 60 days of the response		**€ 15,852.90**	
PROCUREMENT	***€ 375,000.00***	***€ 375,000.00***	***€ 0.00***
NFIs procured from the international supplier			
Number of items directly procured from the international supplier	10,000		
Price per item	€ 37.50		
NFIs shipped from the international supplier	**€ 375,000.00**		**€ 375,000.00**
NFIs from local supplier			
Number of items directly procured from the local supplier (max. 10,000)		10,000	
Price per item		€ 37.50	
NFIs shipped from the local supplier		**€ 375,000.00**	**-€ 375,000.00**
WAREHOUSE	***€ 674,604.11***	***€ 581,506.25***	***€ 93,097.86***
National warehouse #1			
Location of the warehouse: Port-au-Prince			
Warehouse rent per year		€ 25,745.13	
Total capacity of the warehouse (m^3)		500	
Stock of NFIs		15000	
Price per item		€ 37.50	

	Utilisation of the warehouse (m^3)		270	
	Percentage utilised with NFIs		54%	
	Unit Holding Cost (€ / NFI / Day)		€ 0.0025	
	Investment in the national warehouse #1		€ 19,006.25	
	Cost of the national warehouse #1 (including the value of items)		**€ 581,506.25**	**-€ 581,506.25**
International depot #1				
Location of the warehouse: Dubai				
	Warehouse rent per year	€ 7,000.00		
	Total capacity of the warehouse (m^3)	500		
	Stock of NFIs	10000		
	Price per item	€ 37.50		
	Utilisation of the warehouse (m^3)	180		
	Percentage utilised with NFIs	36%		
	Unit Holding Cost (€ / NFI / per year)	€ 0.0019		
	Investment in the international depot #1	€ 9,569.86		
	Cost of the international depot #1 (including the value of items)	**€ 384,569.86**		**€ 384,569.86**
International depot #2				
Location of the warehouse: Lyon, France				
	Warehouse rent per year	€ 75,000.00		
	Capacity of the warehouse (m^3)	500		
	Stock of NFIs	5000		
	Price per item	€ 37.50		
	Utilisation of the warehouse (m^3)	90		
	Percentage of the capacity utilised with NFIs	18%		
	Unit Holding Cost (€ / NFI / per year)	€ 0.0411		
	Investment in the international depot #2	€ 102,534.25		
	Cost of the international depot #2 (including the value of items)	**€ 290,034.25**		**€ 290,034.25**
TRANSPORT		***€ 282,070.73***	***€ 6,615.00***	***€ 275,455.73***
Air freight				
	Total number of aircrafts sent with NFIs within the first 60 days	1	-	
	Average cost per aircraft	€ 364,894.31		
	Total aircraft capacity (m^3)	600		
	Average capacity occupied by NFIs (m^3)	450		
	Number of NFIs sent	25000		
	Utilisation of the aircraft	75%		
	Airfreight costs	**€ 273,670.73**		**€ 273,670.73**
Road freight (from air/seaport to national warehouse)				
	Type of truck used to move the NFIs from the airport to the national warehouse	40 ft		
	Average cost per truck from the airport to the national warehouse	€ 1,200.00		

	Number of trucks needed to move the items from the airport to the national warehouse	7		
	Costs to move the NFIs from the airport to the warehouse	**€ 8,400.00**		**€ 8,400.00**
Road freight (from national supplier to national warehouse)				
	Type of truck used to move the NFIs from the local suppliers to the national warehouse		40 ft	
	Average cost per truck		€ 945.00	
	Number of trucks needed to move the items from the supplier to the national warehouse		7	
	Costs to move the items from the supplier to the national warehouse		**€ 6,615.00**	**-€ 6,615.00**
DISTRIBUTION		***€ 8,700.00***	***€ 6,090.00***	***€ 2,610.00***
	Type of vehicle for last-mile distribution	3.5 Ton Truck	3.5 Ton Truck	
	Average cost per vehicle	€ 300.00	€ 210.00	
	Number of vehicles	29	29	
	Costs for last-mile distribution	**€ 8,700.00**	**€ 6,090.00**	**€ 2,610.00**

Appendix 3

Cost calculations with and without investments to achieve 1:7 in the Nepal earthquake (2015)

Costs Calculation	No Investment	Investment	Savings
PERSONNEL. *The tool takes into consideration an investment of € 30,000 during the first year to pay one consultant who will train two Preparedness Coordinators, plus € 10,000 of training expenses (€ 40,000 total). The salaries of the two coordinators are 30% more of the monthly average.*	***€ 1,321,641.05***	***€ 378,221.44***	***€ 943,419.61***
Number of international logisticians needed	5	0	
Monthly average salary per international logistician (including travel expenses)	€ 6,508.00	€ 6,508.00	
International Consultant + Trainings	€ 0.00	€ 40,000.00	
Total cost for international logisticians	**€ 1,053,211.33**	**€ 40,000.00**	**€ 1,013,211.33**
Number of national logisticians	10	12	
Monthly average salary per national logistician	€ 829.34	€ 829.34	
Total cost for national logisticians	**€ 268,429.71**	**€ 338,221.44**	**-€ 69,791.73**
IT & PROCESSES	***€ 0.00***	***€ 21,389.38***	***-€ 21,389.38***
Investment in telecommunications		**€ 20,000.00**	
Total worldwide expenditure of the year when the catastrophe happens		€ 160,000,000.00	
Response costs of the catastrophe (only for the first 60 days including logistics and non-logistics expenses)		€ 741,000.00	
Percentage from the expenses of the first 60 days of the response vs. worldwide expenditure		0.5%	
Investments in LINK during the first 60 days of the response		**€ 1,389.38**	
PROCUREMENT	***€ 375,000.00***	***€ 375,000.00***	***€ 0.00***
NFIs procured from the international supplier			
Number of items directly procured from the international supplier	10,000		
Price per item	€ 37.50		
NFIs shipped from the international supplier	**€ 375,000.00**		**€ 375,000.00**
NFIs from local supplier			
Number of items directly procured from the local supplier (max. 10,000)		10,000	
Price per item		€ 37.50	
NFIs shipped from the local supplier		**€ 375,000.00**	**-€ 375,000.00**
WAREHOUSE	***€ 780,642.47***	***€ 571,524.74***	***€ 209,117.73***
National warehouse #1			
Location of the warehouse: Sanepa, Lalitpur			
Warehouse rent per year		€ 25,128.96	
Total capacity of the warehouse (m^3)		2,000	
Stock of NFIs		15,000	
Price per item		€ 37.50	

	Utilisation of the warehouse (m^3)		270	
	Percentage utilised with NFIs		14%	
	Unit Holding Cost (€ / NFI / Day)		€ 0.0006	
	Investment in the national warehouse #1		€ 9,024.74	
	Cost of the national warehouse #1 (including the value of items)		**€ 571,524.74**	**-€ 571,524.74**
International depot #1				
Location of the warehouse: Dubai				
	Warehouse rent per year	€ 7,000.00		
	Total capacity of the warehouse (m^3)	500		
	Stock of NFIs	10,000		
	Price per item	€ 37.50		
	Utilisation of the warehouse (m^3)	180		
	Percentage utilised with NFIs	36%		
	Unit Holding Cost (€ / NFI / per year)	€ 0.0019		
	Investment in the international depot #1	€ 18,621.92		
	Cost of the international depot #1 (including the value of items)	**€ 393,621.92**		**€ 393,621.92**
International depot #2				
Location of the warehouse: Lyon, France				
	Warehouse rent per year	€ 75,000.00		
	Capacity of the warehouse (m^3)	500		
	Stock of NFIs	5,000		
	Price per item	€ 37.50		
	Utilisation of the warehouse (m^3)	90		
	Percentage of the capacity utilised with NFIs	18%		
	Unit Holding Cost (€ / NFI / per year)	€ 0.0411		
	Investment in the international depot #2	€ 199,520.55		
	Cost of the international depot #2 (including the value of items)	**€ 387,020.55**		**€ 387,020.55**
TRANSPORT		***€ 449,750.45***	***€ 1,741.60***	***€ 448,008.85***
Air freight				
	Total number of aircrafts sent with NFIs within the first 60 days	1	-	
	Average cost per aircraft	€ 597,345.13		
	Total aircraft capacity (m^3)	600		
	Average capacity occupied by NFIs (m^3)	450		
	Number of NFIs sent	25000		
	Utilisation of the aircraft	75%		
	Airfreight costs	**€ 448,008.85**		**€ 448,008.85**
Road freight (from air/seaport to national warehouse)				
	Type of truck used to move the NFIs from the airport to the national warehouse	20 ft		
	Average cost per truck from the airport to the national warehouse	€ 124.40		

	Number of trucks needed to move the items from the airport to the national warehouse	14		
	Costs to move the NFIs from the airport to the warehouse	**€ 1,741.60**		**€ 1,741.60**
Road freight (from national supplier to national warehouse)				
	Type of truck used to move the NFIs from the local suppliers to the national warehouse		20 ft	
	Average cost per truck		€ 124.40	
	Number of trucks needed to move the items from the supplier to the national warehouse		14	
	Costs to move the items from the supplier to the national warehouse		**€ 1,741.60**	**-€ 1,741.60**
DISTRIBUTION		***€ 8,700.00***	***€ 6,090.00***	***€ 2,610.00***
	Type of vehicle for last-mile distribution	3.5 Ton Truck	3.5 Ton Truck	
	Average cost per vehicle	€ 300.00	€ 210.00	
	Number of vehicles	29	29	
	Costs for last-mile distribution	**€ 8,700.00**	**€ 6,090.00**	**€ 2,610.00**


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