INVESTING IN SUPPLY CHAIN PREPAREDNESS

A COOPERATIVE STUDY BY HELP LOGISTICS AG, KUEHNE LOGISTICS UNIVERSITY AND SAVE THE CHILDREN INTERNATIONAL

DECEMBER 2018

INVESTING IN SUPPLY CHAIN PREPAREDNESS

A Cooperative Study by HELP Logistics AG, Kuehne Logistics University
and Save the Children International

EXECUTIVE SUMMARY

In view of the ever-increasing humanitarian needs and the growing funding gap (Figure 1), actors in the humanitarian space are asked to look into different and new ways of operating to ultimately achieve more with less.
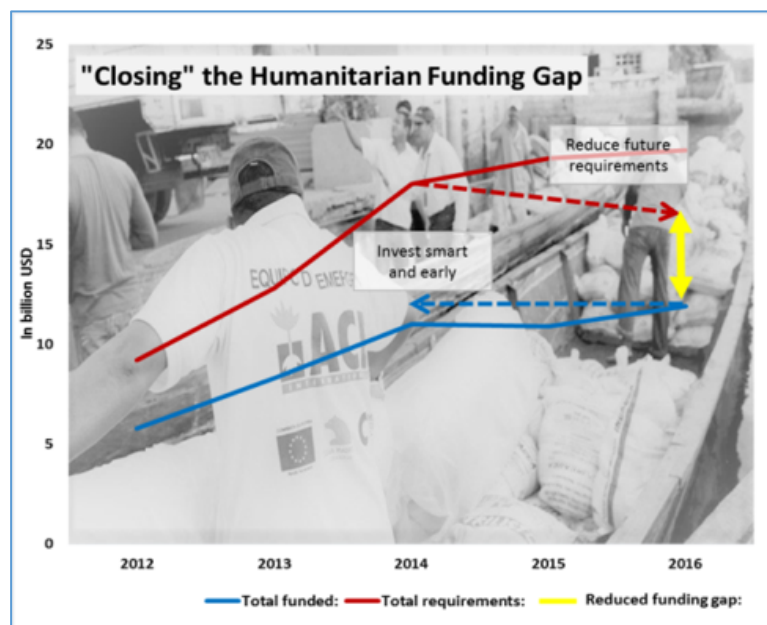

Figure 1: Funding gap (OCHA 2017)

Recent studies carried out by HELP Logistics and the Kuehne Logistics University (KLU) have analysed the expenditures of 5 organisations in 23 emergency operations of different kinds between 2005 and 2018. The studies revealed that an average of **73%** of the total expenditure was spent in the supply chain (Figure 2). It follows that efficiencies must be found here if the humanitarian community is to effectively meet the increasing needs with the available resources. A number of organisations such as Action Contre la Faim (ACF) France, the International Federation of Red Cross and Red Crescent Societies (IFRC) and Save the Children International (SCI) picked up on those findings and launched a second series of studies to identify potential triggers for cost and time savings in the supply chain.
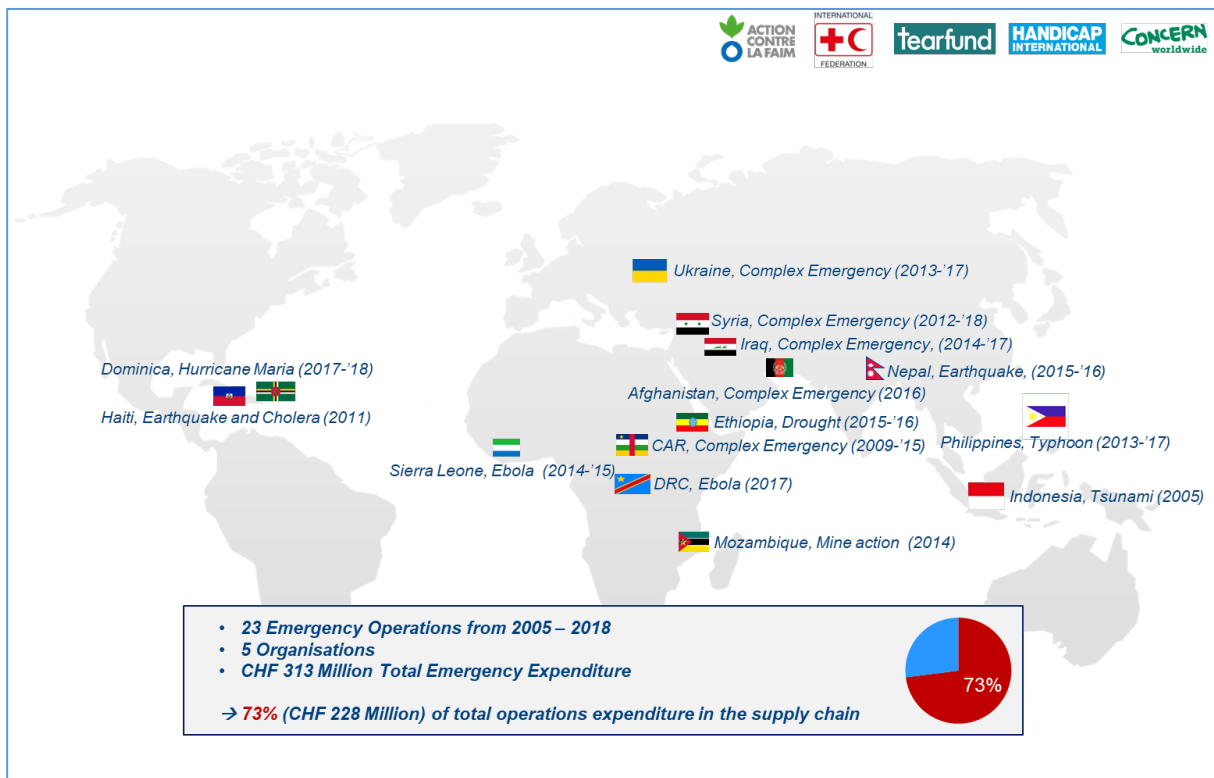
Figure 2: Worldwide expenditure analysis

Following the statement that every dollar (USD) invested prior to a disaster can save up to 7 dollars (USD) in the response (United Nations Development Programme (UNDP), 2012) and based on a pre-existing preparedness framework (Wassenhove 2006), HELP Logistics and KLU developed a dynamic return on investment model to investigate the saving potential of supply chain preparedness investments.

The model analyses data from a real disaster context and compares scenarios without and with investments considering the available preparedness time until the disaster strikes. It takes into consideration the interdependencies across the different investments and the impact generated.

SCI, being an organisation that aims at using a holistic, efficient and sustainable approach to improve the situation of children around the globe, chose the disaster context of the Haiyan typhoon response in the Philippines and the distribution of Non-food Items (NFI), namely blankets, to the affected population. The model showed that by investing in key elements such as *Personnel, IT/Processes, Supplier Engagement, Prepositioning* as well as *Local Actors/Community*, significant time and cost savings are possible (Figure 3).

Philippines Typhoon

- USD 145k investment
- 90 preparedness days
- USD 1,164k savings possible

- USD 146k investment
- 106 preparedness days
- 16 days lead time reduction possible

Figure 3: Study results

After **90 days** of preparation and investments of around **USD 145'000** in supply chain preparedness measures, cost savings of **USD 1'164'000** and a **maximum return on investment ratio of 1:7** were generated**.** Furthermore, the model showed that the maximum possible lead time reduction (**16 days**) to reach the affected population could be achieved with slightly higher investment expenses (USD +1'000) and additional **16 days of preparedness efforts.**

These results reassert the fact that supply chains are the backbone and key success factor of emergency operations. Critical stakeholders such as humanitarian organisations, commercial companies, governments and donors should feel encouraged to put more focus on the optimisation of supply chain processes by investing earlier and smarter to elevate humanitarian assistance to a more effective and efficient level.

CONTENTS

LIST OF FIGURES

LIST OF ABBREVATIONS

ACF:	Action Contre la Faim
GIK:	Gift in-kind
HQ:	Headquarters
IFRC:	International Federation of Red Cross and Red Crescent Societies
KLU:	Kuehne Logistics University
NFI:	Non-food Item
NGO:	Non-governmental Organisation
RoI:	Return on Investment
RoRo:	Roll-on-roll-off
SCI:	Save the Children International
UNDP:	United Nations Development Programme
USD:	United States Dollar
VMI:	Vendor-managed Inventory

1. INTRODUCTION

This report outlines the methodology of the Return on Investment (RoI) model and its application in the supply chain preparedness project with SCI conducted from May to September 2018. It furthermore presents and discusses the findings of the project and concludes on potential next steps to further enhance the response capacity of Save the Children and other actors operating in the humanitarian space.

2. METHODOLOGY AND MODEL FRAMEWORK

In the aftermath of the World Humanitarian Summit 2016, HELP Logistics and KLU developed an analytical approach that equips humanitarian actors with an enhanced understanding of investment opportunities in the context of supply chain preparedness. The approach resulted in a dynamic model which outlines potential investment elements and evaluates their impact in terms of cost and time savings. The architecture of the model is based on Van Wassenhove's Preparedness Framework (2006) and is illustrated in Figure 4.
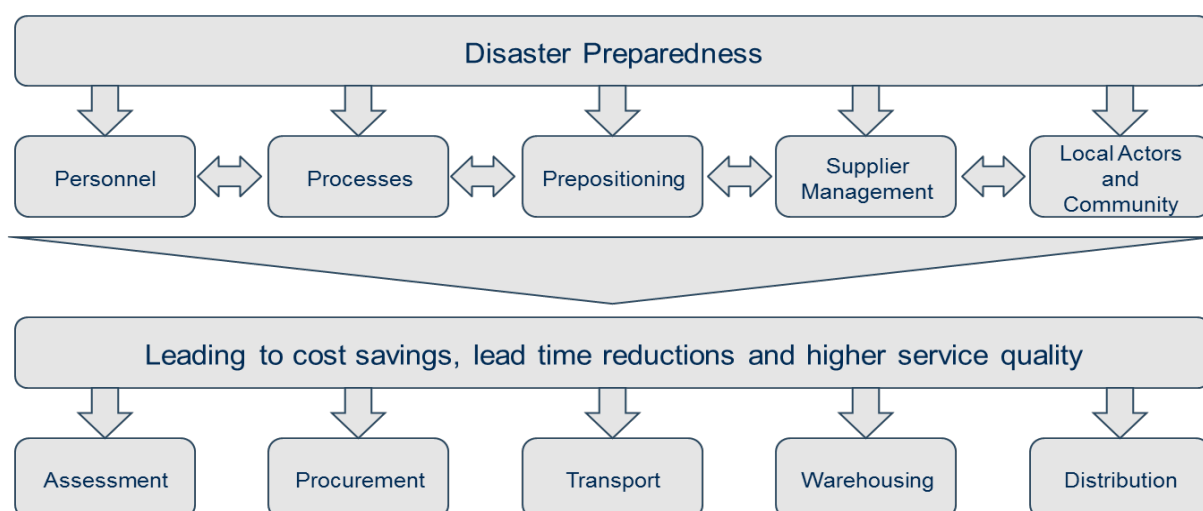
Figure 4: Architecture of the RoI model

The model operates under the following conditions and assumptions:

- As proven in several supply chain expenditure studies conducted by HELP Logistics and KLU, the majority of the expenditure of a relief operation is in the supply chain.

   Assumption: saving potentials should be found here

- Supply chains are complex systems with a great level of interconnectedness amongst actors involved.

Assumption: supply chain investments cannot be looked at in isolation but from a holistic view point

- The RoI model has been designed to reflect and analyse a real operational environment.

  Assumption: the successful set-up and application of the model depend heavily on a critical mass of data input provided by the participating organisation

- Preparedness investments take time until they fully unfold.

  Assumption: the time between investment decision and disaster to happen has strong impact on the calculated return of investment

- Investments cost can be one-off (e.g. development of IT system) or continuous (e.g. holding cost for pre-positioned items)

To apply the model in practice as part of an analysis project the methodology in Figure 5 is followed.

Define Baseline Scenario (Without Investment)

- Develop common understanding of the emergency supply chain
- Define the disaster context and response operation parameters
- Describe the baseline scenario
- Inject data for the baseline scenario model

Design Investment Scenario

- Identify and discuss investment opportunities
- Analyse interrelations and synergies
- Evaluate impact on supply chain

Calculate Return of Investment

- Compare baseline and investment scenario
- Identify maximum RoI ratio in terms of cost and time
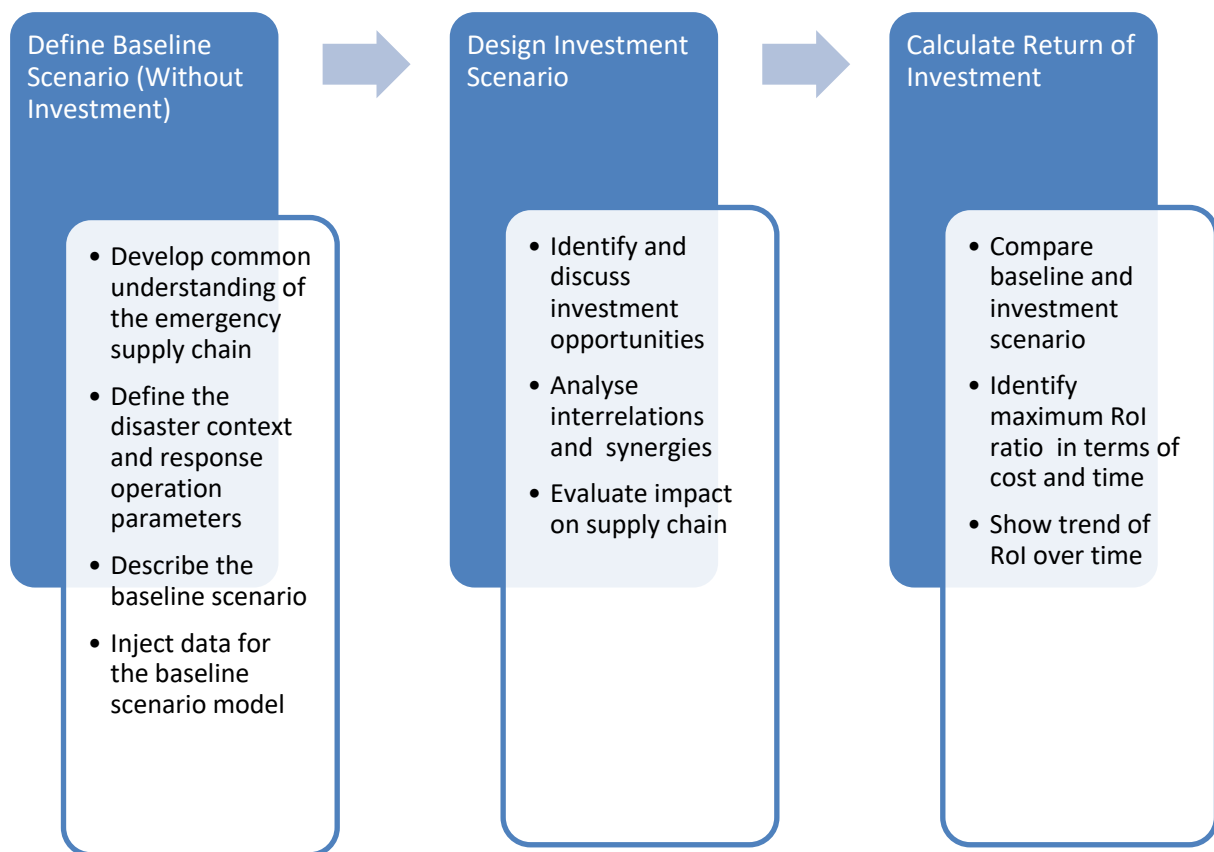- Show trend of RoI over time

Figure 5: Methodology of the RoI model

3. APPLICATION OF THE MODEL

3.1 Phase 1: Define Baseline Scenario

The baseline scenario forms the foundation of the subsequent modelling process as it frames the operational context and provides the first set of supply chain data. The following steps are essential elements of the design phase and were completed in close collaboration with SCI staff from Headquarters, Regional Office Asia Pacific and Country Office Philippines.

3.1.1 Develop Common Understanding of the Emergency Supply Chain

SCI is an international non-governmental organisation (NGO) operating across the world to give children a healthy start in life, the opportunity to learn and protection from harm. When a major disaster strikes, SCI follows its humanitarian crisis protocol to plan and design the response according to the identified needs. Depending on the scale of the disaster, the response is either coordinated by the national office (Category 3-5), regional office (Category 2) or international headquarters (Category 1). To provide assistance to the affected population in a timely manner, a well-functioning supply chain is of utmost importance for SCI. Despite the fact that cash transfer programmes are on the rise, there is, in most cases, still large amounts of cargo (relief items as well as equipment) which have to be moved to the country and to the disaster zone. Critical supply chain processes encompass needs assessment, procurement and sourcing, transportation, storage and distribution. To source for the urgently needed relief goods, SCI can draw upon the following sourcing options:

- International suppliers
- Established prepositioning hubs in Brindisi (Europe), Dubai (world-wide coverage) and Subang (Asia)
- Local suppliers in the country
- In-kind donations (both internationally and locally)

The goods are then, subject to the chosen sourcing option, flown or shipped into the affected country. Within the country, road transport is the usual choice to move goods further to the response destination. However, in some countries, for example in the Philippines, boats or ferries as well as smaller aircrafts or helicopters are needed to overcome access constraints (e.g. due to infrastructure damages). Figure 6 shows SCI's general supply set up in the context of a major response in the Philippines.
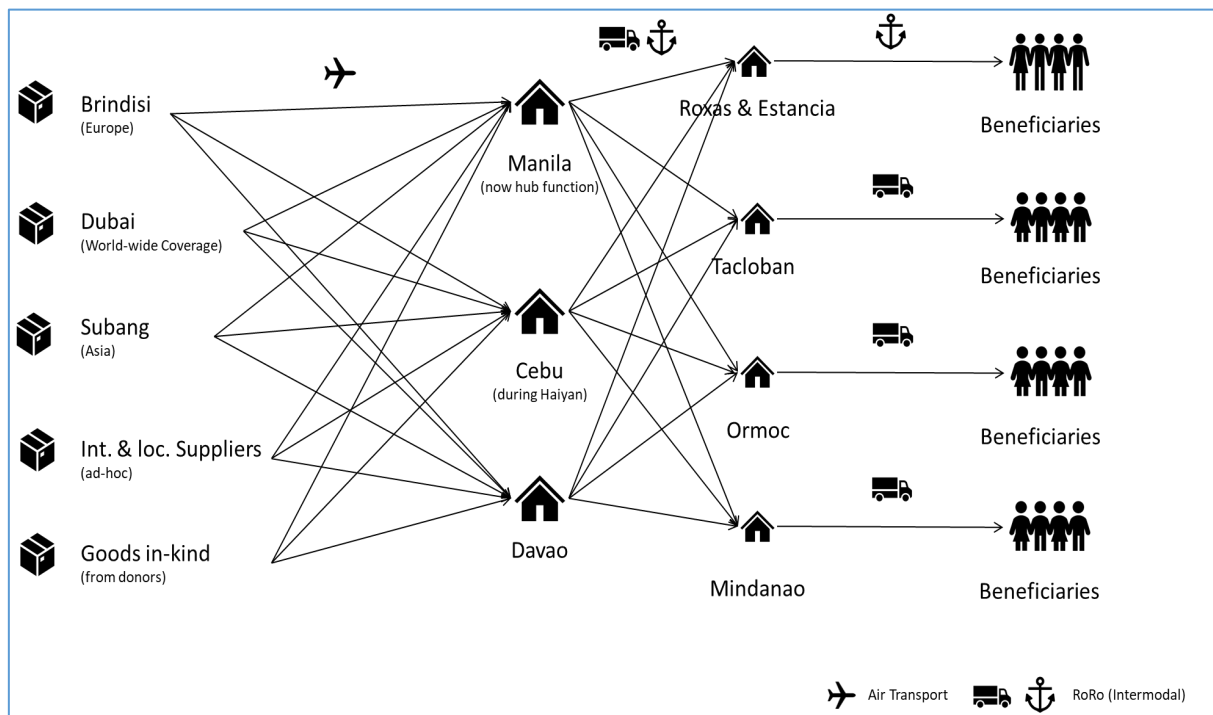
Figure 6: General SCI supply chain in the context of the Philippines

3.1.2 Define the Disaster Context and Response Operation Parameters

The disaster which is to be analysed by the model should be an operation of significant size and relevance to the organisation. The duration of the response reflects the time the organisation is operating in emergency mode. The commodity is recommended to have a certain degree of standardisation, long shelf life, be distributed in large volume and to be available both locally and internationally. SCI selected the context of the **typhoon Haiyan in the Philippines** (November 2013) due to its magnitude, available operational data and the advanced preparedness level the country has reached over recent years. The **response period** was estimated at **180 days** which reflects the time SCI operated in emergency mode after the typhoon made landfall. In regards the chosen commodity, **blankets** met the criteria and were procured in large quantities (68'533) throughout the actual Haiyan response.

Figure 7: Loading of blankets during the typhoon Haiyan response

3.1.3 Describe the Baseline Scenario

For the SCI baseline scenario, the needed blankets are neither pre-positioned at any of the hubs, nor available locally and are also not donated in-kind. Therefore, international sourcing from a supplier in Nairobi (Kenya) is the only valid option. The blankets are flown into Cebu which, besides Manila, is the main entry point for international humanitarian cargo in the Philippines. The onward transportation from Cebu to the affected locations is done through a combination of sea and road. Trucks are the predominant transport means using so-called roll-on-roll-off (RoRo) services or general ferry boats when crossing waters. The main warehouse of the baseline scenario is based in Cebu and serves as the critical transhipment point for large volumes arriving at the airport. Field warehouses, rub halls as well as trucks parked on government compounds, are used as temporary storage in the disaster-hit regions of Roxas/Estancia, Tacloban and Ormoc. From these locations, items are distributed to the beneficiaries.

Classified as category 1, the Haiyan response was led by SCI's Headquarters in the UK. Overall, 25 international supply chain staff were deployed to manage and support the operation together with 86 local staff with supply chain relevant functions. Figure 8 shows SCI's supply chain in the baseline scenario.
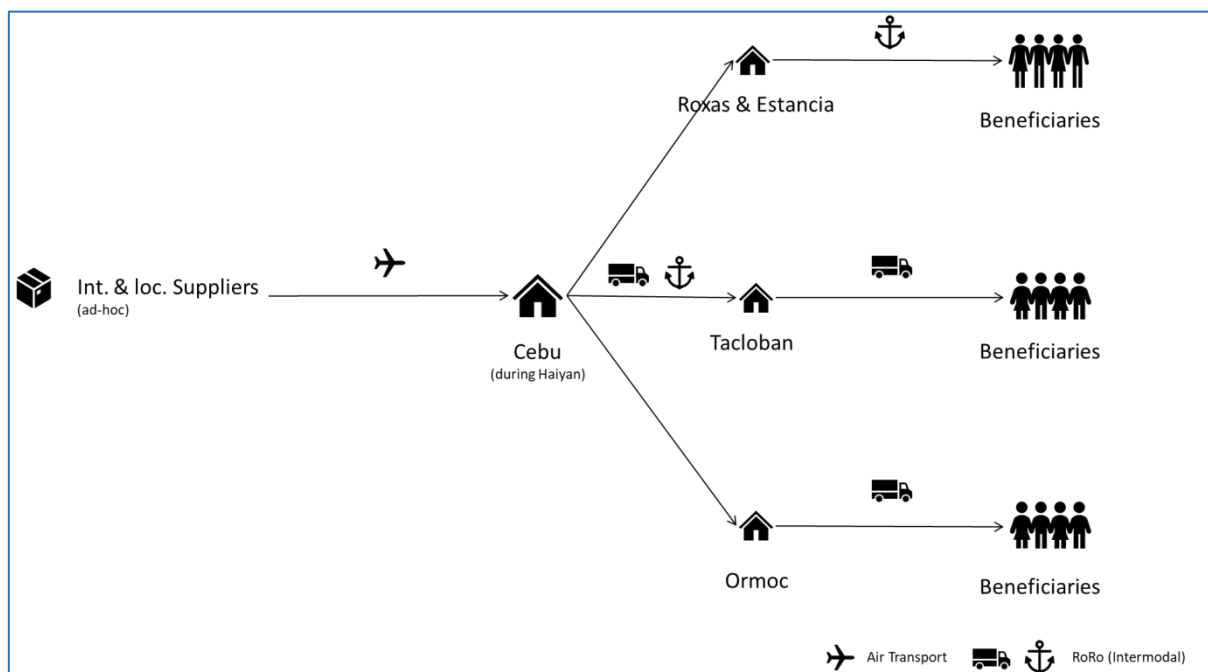
Figure 8: Supply chain in SCI's baseline scenario

3.1.4 Inject Data for the Baseline Scenario Model

Specific data on lead times, costs and capacities across all supply chain functions starting from assessment to final distribution were collected for injection in the baseline scenario model. Detailed data and information provided can be found in the Annex.

3.2 Phase 2 Design Investment Scenario

Based on the preparedness framework by Van Wassenhove (2006), 5 different investment elements (i.e. Personnel, IT/Processes, Prepositioning, Supplier Management and Local Actors/Communities) were discussed with SCI. Concrete investment opportunities were gathered and put into the context of the Haiyan response. The data that was used to identify the investment elements and evaluate their impact is both quantitative and qualitative. Most data comes from historical sources and brainstorming sessions with relevant experts. Nevertheless, several assumptions were taken, jointly with the SCI experts, in order to model the chosen scenario.

Personnel	
Context	
The performance of SCI's supply chain and, therefore, the overall response, depends heavily on the capacity, productivity and the skill set of its staff. At the same time, Personnel expenses represent a major cost component in particular in the case of international deployments.	
Investment Opportunity	*Investment Impact*
For the case of the Philippines, SCI identified the establishment of a roster of local and regional staff, a comprehensive training and mentoring programme to develop special knowledge on particular supply chain functions as potential investment opportunities.	In the model, those investments result, first of all, in a reduced need for international deployments in the future. Based on the data collected, the cost of an international deployment for a month can be as high as the yearly salary of a staff from the country or the region. To reach the maximal possible level of (local) staff capacity through investments related to Personnel, a time period of 730 days is anticipated. These days include not only trainings, but also the build-up of a regional roster. During that time period, the capacity is growing steadily which is reflected in the country readiness level in the model.
Synergies with other Investment Elements	
Having dedicated staff capacity for improvement activities such as trainings and rosters will facilitate the activities related to other investment elements such as Supplier Management and Local Actors. Likewise, investments in elements such as IT/Processes also increase the productivity and therefore complement the enhancement of staff capacity.	

IT/Processes	
Context	
The speed and quality of information flowing in a supply chain is determined by the establishment of streamlined processes, the information technology and systems backing those processes up.	
Investment Opportunity	**Investment Impact**
Based on SCI's input, this investment element is related to types of information technology and the impact on SCI's supply chain processes. Firstly, this would be telecommunication equipment to be used on the ground such as generators, satellite phones and laptops. Communication between the field and the national office or global HQ is critical for SCI response operations. Secondly, SCI considers systems which are matching the operational requirements, are well implemented and have great potential to increase the transparency and streamline working processes. SCI has recognised that potential and started investing into a world-wide procurement system Source-to-Pay, and is currently analysing an upgrade of the warehouse Inventory Management system (TIM) or, alternatively, an investment in data analysis software such as Kobo.	Investing into this element will generate lead time savings, in particular during the early stage of the response such as needs assessment phase.
Synergies with other Investment Elements	
Investments in IT/Processes will increase the productivity of staff as it reduces the need for manual data input as well as lengthy authorisation processes and increases the visibility on available stock piles and suppliers.	

Prepositioning	
Context	
Having critical relief items readily available at strategically located depots before the emergency occurs, brings obvious advantages but needs to be managed carefully to avoid extreme over stocking or stock-outs as well as wrongly chosen locations.	
Investment Opportunity	**Investment Impact**
SCI considers a total of 45'689 blankets to be pre-positioned at 2 hubs in Manila (already established) and Cebu (temporarily established during Haiyan, future opportunities through gift in-kind (GIK) by commercial partners to be explored). To fully build up that inventory, a time period of 90 days is anticipated in order to purchase and transport the goods to their prepositioning location. The investment comes with holding cost until the goods are distributed and requires pre-funding being available to procure the goods prior to the disaster.	The pre-positioning takes out any procurement lead time and also reduces procurement and transportation expenses. As time is not critical during the preparedness phase when the inventory is set up, slower but cheaper transport modes can be chosen and better conditions can be negotiated with suppliers outside of the hectic response period. This impact can be seen in the calculated model. To take such initiatives even further, SCI could also look at engaging with suppliers in vendor-managed inventory (VMI) contracts in order to not hold all stock in their own premises and, furthermore, in order to ensure stock rotation for goods with limited shelf life[1].

---

[1] If the supplier holds an agreed quantity of goods for SCI, he/she can manage the stock and sell shelf life – critical items while always keeping a minimum agreed stock for the organisation.

Supplier Management
Context
Assessing local markets to identify and evaluate available suppliers and commodities, building relationships with selected suppliers and establishing framework agreements are the essence of professional procurement practices. Note that even if the model does not consider cash programmes, it should be mentioned that the market assessments carried out as part of this investment element can also serve as a foundation for the implementation of those.

Investment Opportunity	Investment Impact
SCI acknowledges that these tasks require staff with the necessary competencies to conduct analyses and engage with the suppliers as well as transportation service providers. To reach that competency level, SCI would invest the time of one local employee and train the national team to carry out these activities.	In-depth market knowledge on available goods and guaranteed quantities and prices through framework agreements result in savings of procurement cost and time in the model. SCI assumes that it takes 3 months to complete the assessments and establish the agreements.

Local Actors/Communities	
Context	
Two types of local actors are considered in this investment element. National governments play a critical role by coordinating the overall response and controlling in-flow of international organisations and commodities. Another important actor is the non-affected neighbours and communities as well as local NGOs in the disaster region that are typically the first responders and provider of assistance. Furthermore, they have great potential to support the following larger response phase through knowledge of local context as well as assets such as temporary storage in sports halls or community centres.	
Investment Opportunity	**Investment Impact**
SCI expects that building good and trustful relationships with government entities of the country as well as with local actors and NGOs at municipality level will come with a number of advantages to SCI's large scale relief operations. Similar to the supplier management investment element, the relationship management will be done through the investment of local staff capacity and training of the national office team. A preparedness time of 3 months is anticipated until the return of the investment can be expected.	The improved collaboration with national government and municipalities will speed up the needs assessment (support from municipality) and the custom process (national government) and increase the distribution capacity (support from municipality).

3.3 Phase 3 Calculate the Return on Investment

Based on the pre-defined baseline scenario and the inputs provided on potential investments and their impact, the model calculates the maximum possible "RoI ratio" in terms of time and cost savings over time (i.e. number of days between investment decision and disaster to hit). Figure 9 shows the development of investments in relation to the generated savings whilst Figure 10 represents the trend of the actual cost RoI.
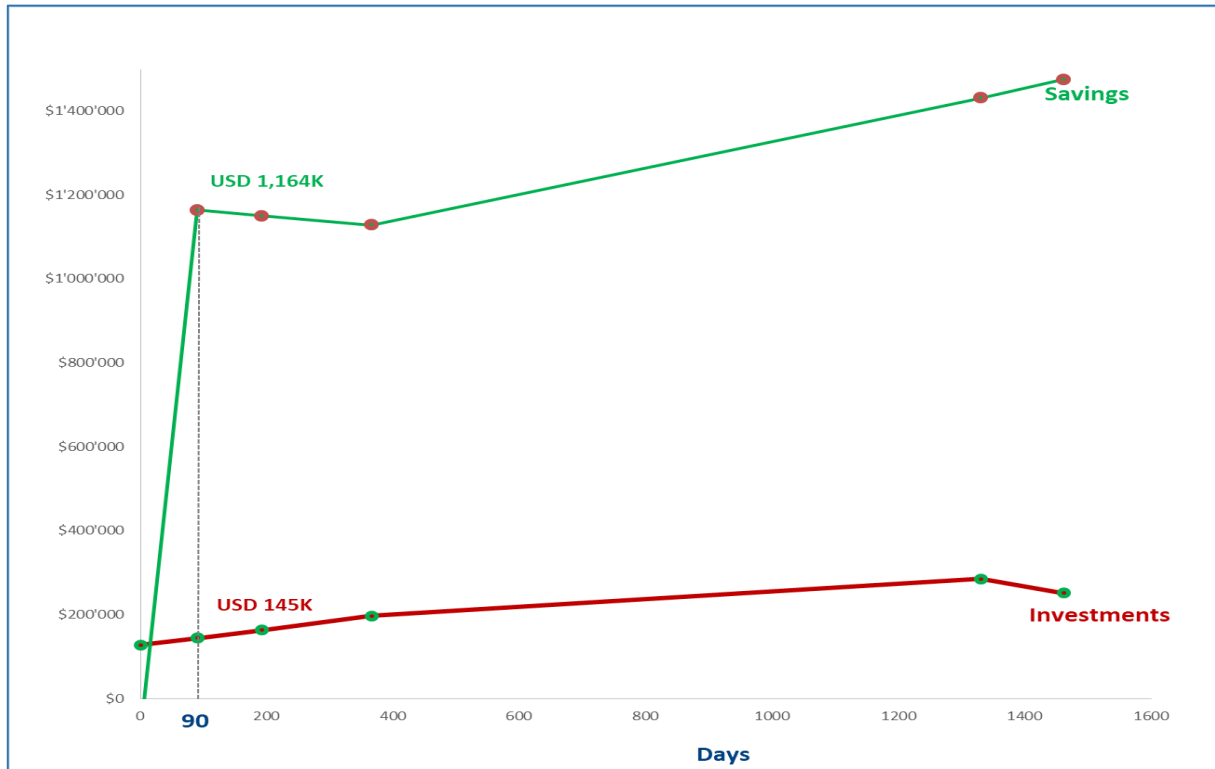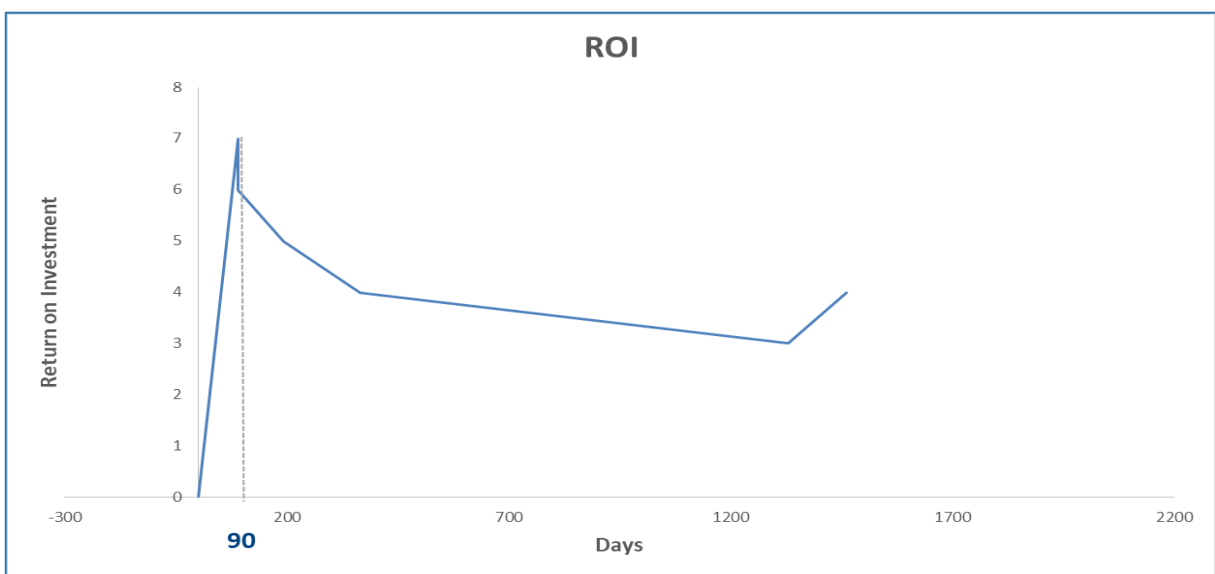
Figure 9: Investments and cost savings over time

Figure 10: Trend of cost RoI

At day 90 (equal to 90 preparedness days), the optimal cost RoI ratio of 1:7 is reached. The investments made at that point in time across all elements (Figure 11) add up to USD 145'000 resulting in cost savings of USD 1'164'000 and reduction of 5 days in lead time (Figure 12 and 13).

Investments		
Total Investments		$145'463
HR / Personnel	Trainings, capacity building officer (for the roster and the talent programme), travel costs for MSU construction training	$17'138
IT & Processes	Equipment, system improvement	$58'198
Supplier Management	Partner engagement officer (for Cebu market (services and suppliers) and general CSR engagement (e.g. PAL)), travel costs Cebu	$8'638
Prepositioning	MSUs	$50'126
Local Actors	Subgranting NGOs/governments for final distribution	$11'364

Figure 11: Investments made

| Results	
Type the day when the catastrophe is happening (between 1 to 911 days)	90
Investments	
Return on Investment ratio (RoI)	**1:7**
Country readiness level	**45%**
Investment made	$145'463
Costs	
Total expenditure without investment	$2'811'131
Total expenditure with investment	$1'647'268
Costs savings	$1'163'863
Costs savings percentage	**71%**
Time	
Total lead time without investment	21 Days
Total lead time with investment	16 Days
Lead time savings	5 Days
Lead time savings percentage	**24%**

Figure 12: Overall results at day 90
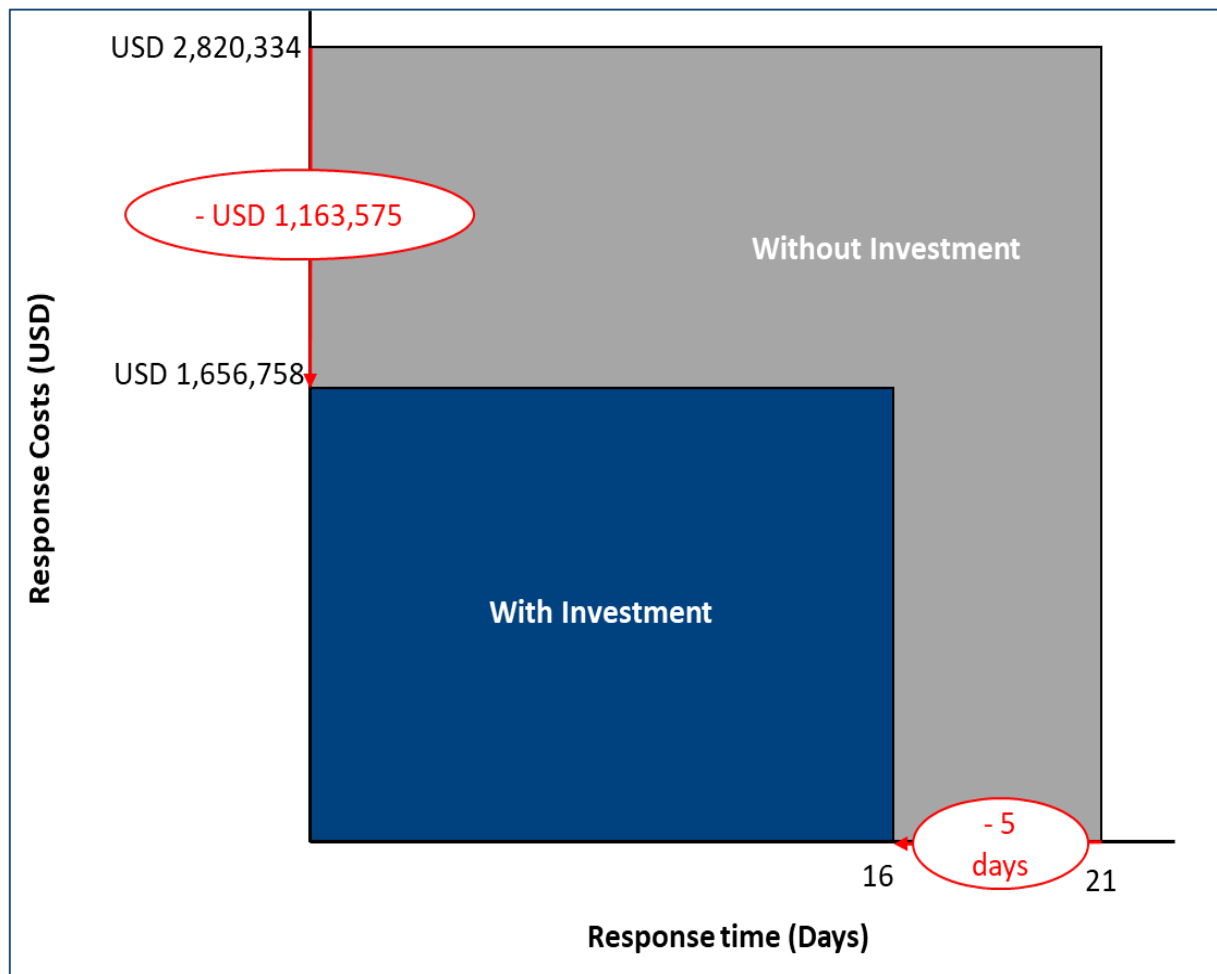
Figure 13: Reductions in cost and time at day 90

When taking a closer look at the investment status at day 90, it becomes obvious that, despite the maximum cost RoI ratio reached, not all investments have fully materialised yet at that point in time (e.g. readiness level only at 45%). While the cost RoI stabilises at around 1:4 after those 90 days, the model presents further lead time saving potential. At day 106, the overall lead time to reach the affected population can be reduced from 21 to 5 days (i.e. 16 days saving and with a total investment of USD 146'000).

4. CONCLUSION

This study was conducted to investigate whether the paradigm of 1 USD being invested in preparedness measures prior to the emergency could save SCI up to 7 USD during the response. The results of the study provided indeed a clear picture that this hypothesis can hold true in the chosen context.

It was found that, in the scenario of SCI's blanket supply chain in the Philippines Haiyan response, the ratio 1:7 can be reached and the lead time reduced by 16 days by investing in the 5 identified elements (i.e. Personnel, IT/Processes, Pre-positioning, Supplier Engagement and Local Actors) over a preparedness period of 3-4 months.

Interestingly, the model demonstrates that even if the cost RoI ratio declines after the maximum of 1:7 has been reached, it then stabilises at around 1:4 for a long period of time. The reason being the strong investment focus on local supply chain capacity building which reduces the need for costly international deployments and international air shipments and benefit the organisation over a long term basis. The combination of investment elements which complement each other reveals synergies and further optimisation could be expected over time. The model does not take into consideration the use of pre-positioned commodities or local staff in responses outside of the Philippines (which is partially already done by SCI and was subsequently utilised in the Nepal Earthquake response). This additional aspect would increase the RoI ratio even more. The investment in supply chain preparedness in the analysed context can therefore be considered as entirely beneficial with no risk of becoming disadvantageous to a situation when funding is only provided in the aftermath of a disaster.

The findings of the study have been presented to a number of institutional donors at the Humanitarian Liaison Working Group meeting in Geneva on 17 September 2018. The presentation, in particular the fact-based methodology, was very well received. The reaction showed the openness of donors to change their view on traditional funding streams and channel more funding towards supply chain preparedness.

Based on the lessons learnt from the 3 RoI studies (conducted with ACF France, IFRC and SCI), HELP Logistics and KLU suggest the next steps could be focused on 3 possibilities.

Firstly, despite the success of the studies and the attention gained, more advocacy on the donor side and also within humanitarian agencies is needed. The common understanding of the relevance and potential of supply chain and in particular in preparedness is not widely accepted yet and requires further efforts. This study proves the RoI can be quantified in supply chains in humanitarian context.

Secondly, the implementation of the identified investment shall be given utmost priority. As the model shows, investments take time to fully unfold their potential and the next disasters will not wait to happen. When implementing the investments, a comprehensive monitoring and evaluation approach is needed to go along to measure the impact and supports the advocacy efforts further.

Thirdly, whilst the current model is based on an established framework, requests have been received to expand the model. For example, it was suggested to add elements that represent the growing relevance of cash programmes, allowing resources to be deployed outside of the analysed country and looking into other return aspects beyond time and cost savings; such as environmental and social impact of supply chain preparedness investments.

ACKNOWLEDGEMENTS

REFERENCES

Guerrero-Garcia, S., Lamarche, J.-B., Vince, R., Cahill, S., & Besiou, M. (2016). *Delivering in a Moving World*

UNDP (2012). *Putting resilience at the heart of development – Investing in prevention and resilient recovery*

Van Wassenhove, L. (2006). *Humanitarian aid logistics: supply chain management in high gear.* Journal of the Operational Research Society, Vol. 57/5, 475-489.