

INVESTING IN SUPPLY CHAIN PREPAREDNESS

A COOPERATIVE STUDY BY HELP LOGISTICS AG, KUEHNE LOGISTICS UNIVERSITY AND UNICEF (THROUGH THE GLOBAL LOGISTICS CLUSTER)

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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 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. Under its strategic pillars 'Advocacy' and 'Preparedness', the Global Logistics Cluster (GLC) has been advocating for more studies to support its partners in increasing visibility on humanitarian supply chain and identify opportunities to improve supply chain efficiency. In this context, UNICEF was put forward by the Logistics Cluster Community as a case study together with other partners such as Action Contre la Faim (ACF) France, the International Federation of Red Cross and Red Crescent Societies (IFRC), Save the Children International (SCI) to a second series of studies in order to identify potential triggers for cost and time savings in the supply chain.



Figure 2: Worldwide expenditure analysis

HELP Logistics and the KLU developed a dynamic return on investment (ROI) model, based on a preexisting preparedness framework (Wassenhove 2006), to investigate the saving potential of supply chain preparedness investments. The study set out to prove 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). 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.

This report focuses on the assessment for UNICEF's relief operation in South Sudan and was conducted between August and November 2018 with support from its Headquarters in Copenhagen and Country Office in South Sudan. UNICEF, 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 ongoing South Sudan complex emergency and the supply of squatting plates to the affected country. 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).



Figure 3: Study results

Based on the available data, the model shows that, with a total invested amount of around **USD 59'000** in supply chain preparedness measures (for squatting plates) over a period of 198 days, cost savings of **USD 241'000** could be generated resulting in a **return on investment ratio of 1:3.** Besides the financial saving potential, the model calculated a possible lead time reduction of up to **38 days** in comparison to the scenario with no investments. It should be noted that the operational environment in South Sudan is highly complex with many external factors which are impacting the supply chain performance and which cannot or can only partially be influenced through the investment measures of the model. Furthermore, the full end-to-end supply chain dataset necessary to run the model (e.g. cost, lead times and capacities) was not available resulting in additional assumptions. Subsequently, not all possible supply chain processes could be reflected in the model.

However, similar studies conducted with ACF France, IFRC and SCI confirmed the positive Return on Investment ratio and demonstrated that supply chain and logistics is the backbone and key success factor in emergency operations. In addition, it can be reasserted that preparedness measures have a huge potential to do more with less. 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.

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LIST OF ABBREVATIONS

ACF:	Action Contre la Faim
GLC:	Global Logistics Cluster
HQ:	Headquarters
IFRC:	International Federation of Red Cross and Red Crescent Societies
NFI:	Non-food Item
NGO:	Non-governmental Organisation
Rol:	Return on Investment
SCI:	Save the Children International
UN:	United Nations
UNDP:	United Nations Development Programme
USD:	United States Dollar

1. INTRODUCTION

This report outlines the methodology of the Return on Investment (RoI) model and its application in the supply chain preparedness project with UNICEF conducted from August to November 2018. It furthermore presents and discusses the findings of the project and concludes on potential next steps to further enhance the response capacity of UNICEF 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.



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 UNICEF staff from Headquarters and the Country Office in South Sudan.

3.1.1 Develop Common Understanding of the Emergency Supply Chain

The United Nations Children's Fund (UNICEF) is a United Nations programme operating across the globe to advocate for the protection of children's rights, to help meet their basic needs and to expand their opportunities to reach their full potential¹. When a major disaster strikes, UNICEF follows its humanitarian crisis protocol to plan and design the response according to the identified needs. To provide assistance to the affected population in a timely manner, a well-functioning supply chain is of utmost importance for UNICEF. Despite the fact that cash transfer programmes are on the rise, there are, 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, UNICEF can draw upon the following sourcing options:

- International suppliers
- Established prepositioning hubs in Copenhagen, Panama and Dubai
- Local suppliers in the country

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 South Sudan during rainy season, river boats as well as smaller aircrafts or helicopters are needed to overcome access constraints (e.g. due to infrastructure damages or security reasons). Figure 6 shows UNICEF's general supply set up in the context of the on-going response in South Sudan.

¹ https://www.unicef.org/about/who/index_mission.html



Figure 6: General UNICEF supply chain in the context of South Sudan

3.1.2 Define the Disaster Context and Response Operation Parameters

The disaster 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, have a long shelf life, be distributed in large volumes and be available both locally and internationally. UNICEF selected the context of the **South Sudan slow-onset complex emergency** (year 2017) due to its magnitude, supply chain challenges and the significant preparedness efforts the organisation has put into the country. The **response period** to be analysed was estimated at **365 days**. In regards the chosen commodity, only **squatting plates** met the criteria (available locally and internationally) and were procured in large quantities (**18'300**) within the actual operation.

Initially, two other commodities were also considered; an IEHK medical kit (basic unit) and tarpaulin plastic sheeting, but neither met the criteria. The IEHK Kit was not available to procure locally and is therefore sourced and assembled through the warehouse in Copenhagen. The tarpaulin is sourced through a "piggy-back" solution; whereby UNICEF makes use of existing UN-wide shared framework agreements with standing suppliers. The data available for squatting plates was the most comprehensive for analysis.



Figure 7: Airplanes in South Sudan

3.1.3 Describe the Baseline Scenario

For the UNICEF baseline scenario, the squatting plates are assumed to be neither available locally nor donated in-kind. Therefore, sourcing through the international warehouse in Copenhagen and from an international supplier in India are the only valid options. The squatting plates are shipped into Juba as the main entry point for international humanitarian cargo in South Sudan. The onward transportation from Juba to the affected locations is done via road, river or air. Field warehouses are used as temporary storage in the disaster-hit regions of Rumbek, Malakal, Wau and Yambio. From these locations, items are distributed to UNICEF's implementing partners for final distribution to the beneficiaries.

Overall, 6 international supply chain staff were deployed to manage and support the operation together with 25 local staff with supply chain relevant functions. Figure 8 shows UNICEF's supply chain in the baseline scenario.



Figure 8: Supply chain in UNICEF'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), five different investment elements (i.e. Personnel, IT/Processes, Prepositioning, Supplier Management and Local Actors/Communities) were discussed with UNICEF. Concrete investment opportunities were gathered and put into the context of the South Sudan operation. The data used to identify the investment elements and evaluate their impact is both quantitative and qualitative. The majority data comes from historical sources and is validated and enriched through one-to-one and workshop sessions with experts from headquarters to field staff. Nevertheless, several assumptions were taken, jointly with the UNICEF experts, in order to model the chosen scenario. It should be noted that discussions around hypothetical investment measures and their potential impact did not deliver in all cases sufficient input to be integrated in the model and are therefore only mentioned in the report but not further analysed.

PERSONNEL

Context

The performance of UNICEF'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 South Sudan, UNICEF	In the model, those investments result, first of all, in a
identified the establishment of a roster	reduced need for international deployments in the
of local and regional staff and a	future. Based on the data collected, the cost of an
comprehensive training programme as	international deployment for a month can be around
potential investment opportunities.	66% higher than having local staff in place; particularly
	due to per diem and travel payments. In order to raise
	the level of local staff capacity through investments
	related to Personnel, a time period of 90 days is
	anticipated. During that time period, the capacity is
	growing steadily which is reflected in the country
	readiness level in the model. Further, having a roster of
	staff that rotates, for example, within the country and
	amongst its duty stations, can provide better response
	mechanisms.

Synergies with other Investment Elements

The increased staff capacity (through trainings and rosters) will facilitate the activities related to other investment elements such as Supplier Management. Likewise, investments in elements such as IT/Processes also increase the productivity and therefore complement the enhancement of (local) 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 UNICEF's input, this investment element is	Investing into this element will generate
related to types of information technology and the	lead time savings, in particular during the
impact on UNICEF's supply chain processes. UNICEF	early stage of the response such as needs
considers systems which are matching the operational	assessment phase. These can be generated
requirements, are well implemented and have great	after an activation time of 180 days.
impact to increase the transparency and streamline	
working processes. The organisation has recognised	
that potential, works already with support of e.g. the	
largely known SAP - and started investing into another	
supply chain tool called LASEC to improve its data	
support and transparency for offices around the world.	

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		
UNICEF considers a total of 14'000 squatting	The pre-positioning takes out any procurement		
plates to be pre-positioned at all country	lead time and potentially also reduces		
locations for strategic purposes. To fully build	procurement and transportation expenses. As		
up that inventory, an activation time period of	time is not critical during the preparedness		
198 days is anticipated, including shipment	phase when the inventory is set up, slower but		
time. The investment comes with holding cost	cheaper transport modes can be chosen and		
until the goods are distributed and requires	better conditions can be negotiated with		
significant funding being available to procure	suppliers outside of the hectic response period.		
the goods prior to any demand spikes.	This will take an estimated 198 days due to		
	negotiations with suppliers (90 days) and the		
	consecutive shipment time (108 days).		

SUPPLIER MANAGEMENT

Context

Assessing local markets to identify and evaluate available suppliers and commodities, building relationships with selected suppliers and establishing framework agreements with traders are the essence of professional procurement practices. Note that even if the model does not consider cash programmes for the context of South Sudan, it should be mentioned in general that 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	
UNICEF acknowledges that these tasks require	In-depth market knowledge on available goods	
staff with the necessary competencies to	and guaranteed quantities and prices through	
conduct analyses and engage with the suppliers	framework agreements result in savings of	
as well as transportation service providers. To	procurement cost and time in the model. UNICEF	
reach that competency level, UNICEF would	assumes that it takes 90 days to complete the	
dedicate its local experts to the topic and	assessments and establish the agreements.	
potentially train the national team to carry out		
these activities.		

LOCAL ACTORS / COMMUNITIES

Context

As UNICEF works with third parties to execute final distribution, this topic is out of scope for the present study. In studies conducted with other organisations (and other countries), this investment element led to time savings in customs process (through enhanced coordination with Government), time savings during assessment period and also increased distribution capacity (both due to relationship management and coordination with municipalities and local population).

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 "Rol 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 summary of investments considered for this study whilst Figure 10 represents the overall Rol results after 198 days of preparedness.

At that time, the maximum cost Rol ratio of 1:3 is reached. The investments made at that point in time across all elements add up to USD 59'000 resulting in cost savings of USD 241'000 and time savings of up to 38 days.

Investments			
Total Investments		\$59'074	
HR / Personnel	Global Roster, (Online) Trainings	\$35'282	
IT & Processes	LASEC	\$1'376	
Supplier Management	Local LTA	\$21'267	
Prepositioning	Prepo Stock	\$1'149	
Local Actors	(Out of Scope)	\$0	

Figure 9: Investments made at day 198

Results		
Type the day when the catastrophe is happening (between 1 to 911 days)	198	
Investments		
Return on Investment ratio (RoI)	1:3	
Country readiness level	55%	
Investment made	\$59'074	
Costs		
Total expenditure without investment	\$3'762'726	
Total expenditure with investment	\$3'521'881	
Costs savings	\$240'845	
Costs savings percentage	7%	
Time		
Total lead time without investment	46	
Total lead time with investment	8 Days	
Lead time savings	38 Days	
Lead time savings percentage	83%	

Figure 10: Overall results at day 198

Over time, a clear picture crystallises: After the major investments having materialised and after the maximum cost ROI ratio of 1:3 having been reached, the ROI ratio stabilises around 1:2. This can be viewed in Figure 11.



Figure 11: ROI over Time

4. CONCLUSION

This study was conducted to investigate the impact of preparedness investments from a lead time and cost perspective in the context of an emergency supply chain and logistics response operation. The entire supply chain for squatting plates in UNICEF's South Sudan operation was analysed. The findings demonstrated that it would be possible to achieve an investment ratio of 1:3 and reduce the lead time by 38 days to 8 days.

These savings could be achieved by investing over a preparedness building period of 198 days in the 4 key investment elements of Personnel, IT/Processes, Pre-positioning and Supplier Engagement. More time would naturally be needed to fully develop the potential of the investments, but this short period would already be able to generate significant improvements in UNICEF's supply chain processes.

Interestingly, the model demonstrates that even if the RoI cost ratio declines after the maximum of 1:3 has been reached, it then stabilises at a ratio of around 1:2 for a long period of time. The reason

is the strong investment focus on local supply chain capacity building which reduces the need for costly international deployments and international air shipments. Basically, local capacity building benefits the organisation over the longer term.

The model accounts for synergy between investments and therefore, the investment in a combination of elements reveals further potential. In the analysed context, the preparedness investment 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 results indicated that, whilst UNICEF has quite sophisticated structures, systems and processes it is still able to generate additional cost and time savings returns with a further investment.

The findings of the previous studies with ACF, SCI and IFRC 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 data-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 three RoI studies (conducted with ACF France, IFRC and SCI) as well as this current result with UNICEF, HELP Logistics and KLU suggest the next steps could be focused on three possibilities.

Firstly, this study comprehensively proves that the RoI can be quantified in supply chains in the humanitarian context. Yet the common understanding on the relevance, importance and potential of supply chain, in particular in preparedness activities, is not widely accepted yet. Despite the success of the studies and the attention gained further advocacy with donors and humanitarian agencies is needed.

Secondly, a comprehensive monitoring and evaluation approach is needed to measure the impact of the investments. As the model shows, investments take time to fully deliver their potential. Therefore, mechanisms need to be in place during the implementation phase, not only to accurately measure Rol, but to transform the funding behaviours in the current humanitarian ecosystem.

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 aspects beyond time and cost savings; such as environmental and social impact of supply chain preparedness investments.

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REFERENCES

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

Stegemann, L., Stumpf, J. (2018). Investing in Supply Chain Preparedness – A Cooperative Study (...) [with] SCI.

Stegemann, L., Stumpf, J. (2018). Supply Chain Expenditure and Preparedness Investment Opportunities – A Cooperative Study (...) [with] the IFRC.

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.



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