



World Food Programme

UNICEF/WFP Return on Investment for Emergency Preparedness Study

Detail of ROI calculations for Chad, Pakistan and Madagascar



January 2015

Conducted by The Boston Consulting Group

Funded by DFID

BCG

THE BOSTON CONSULTING GROUP



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1. CHAD

1.1. Food and non-food pre-positioning

Cost savings

Exact figures from UNICEF and WFP COs have been used to evaluate the total cost of the pre-positioning investment until the first emergency. To estimate the increased transport costs during an emergency in case of no pre-positioning, different techniques have been used:

- For HEB and RUSF, they have been estimated based on an emergency order made earlier in the year of 15 Mt of HEB from Dubai.
- For bleach and soap, they have been approximated by using the average price premium asked by local carriers during an emergency.
- For Aquatab and LLIN, they have been estimated based on the freight calculator and quotes of freight forwarders.

Table 1 summarizes the ROIs of the different pre-positioning investments. All of them have a ROI between 1 and 2. As discussed before, the highest ROI come from the commodities sourced internationally. On the other hand, bleach and soap that are locally sourced are almost cost neutral with a ROI of 0.96.

Table 1 – ROIs from pre-positioning investments

	HEB	RUSF	Bleach	Soap	Aquatab	LLIN
Quantity pre-positioned	25.0 Mt	25.0 Mt	48.1 kl	77.4 Mt	1.1 M tab.	6,605
Total cost with pre-positioning [k\$]	86.9	118.0	113.9	147.0	36.2	32.7
Total cost without pre-positioning [k\$]	136.2	198.2	109.2	141.1	90.1	52.8
ROI	1.6	1.7	1.0	1.0	2.5	1.6

Time savings

As for cost savings, time savings have been derived from past experiences of the COs. With the commodities already pre-positioned, the delivery to the final point of control takes between one and two days for HEB and RUSF and approximately three days for the others. Without the pre-positioning investment:

- It took 30 days to the CO between the ordering and the delivery of the HEB from Dubai (used as proxy for HEB and RUSF).

- In case of local sourcing (bleach and soap), the CO estimated that it would take a total of 15 days to deliver the commodities if there were a LTA previously negotiated with a supplier:¹
 - 3 days to prepare the sales order
 - 2 days to establish the agreement with the supplier
 - 10 days to prepare and deliver the commodities
- In case of international sourcing (Aquatab and LLIN), the CO estimated that it would take a total of 17 days to deliver the commodities from Copenhagen:
 - 14 days to treat the sales order and transport the commodities to Chad ²
 - 3 days to deliver the commodities to the final point of control

Table 2 summarizes the time savings from the different pre-positioning investments. These savings are extremely remarkable, ranging from 23 to 42 days. Interestingly, the largest time savings come from the commodities sourced locally. This is explained by the fact that internationally sourced commodities in case of emergency are directly available in UNICEF/WFP central warehouses while the time figures for locally sourced commodities take into account the need to find local suppliers.

Table 2 – Time savings from pre-positioning investments

	HEB	RUSF	Bleach	Soap	Aquatab	LLIN
Delivery time with pre-positioning [days]	1-2	1-2	3	3	3	3
Delivery time without pre-positioning [days]	30	30	15	15	17	17
Time savings [days]	28-29	28-29	12	12	14	14

¹ However, if no LTA were previously negotiated with the suppliers, this delivery time would go up to 45 days.

² As noted in the “ROI model” section of this report, this figure is based on a highly conservative assumption that international supply order treatment and delivery by air to the country port of entry would take a maximum of 14 days, according to organizational minimum standards for emergency supply and logistic modalities. The actual delivery time would very likely be much shorter.

Illustration 1 – Pre-positioning in the displacement centre of Tissi



1.2. Infrastructure work – Tissi airstrip

Cost savings

The rehabilitation cost of the airstrip amounted to 680 k\$. An annual maintenance cost of 90 k\$ must be added to this initial investment.

Cost savings have been calculated by comparing the situation before and after the rehabilitation. Before the rehabilitation, a Let 410 plane from UNHAS was used during the dry season (7 months) while a 1Mi8 helicopter had to be specifically dedicated to Tissi during the 5 months of the rainy season. Since the rehabilitation, planes can also land in Tissi during the rainy season and a Dash 8 plane from UNHAS is now stopping in Tissi during its rotation for the entire year.

When comparing the operating costs of both scenarios, the rehabilitation of the airstrip generates annual savings of 940 k\$. To calculate the ROI of the investment, the initial investment has been compared with the discounted annual cash flows (the annual savings reduced by the annual maintenance costs) over the time period of 10 years. The total cash flows amount to 5,220 k\$, which represents a very large ROI of 7.7 (see *Table 3*).

Table 3 – ROI from Tissi airstrip rehabilitation

	Initial investment	Annual maintenance costs	Annual savings	Total cash flows	ROI
k\$	680	90	940	5,220	7.7

Time savings

Time savings from the rehabilitation of Tissi airstrip are rather limited. In case of large emergency, most of the food transport would occur by road during the dry season and by helicopter (with a larger cargo capacity than Dash planes) during the rainy season, independently of the rehabilitation of the airstrip. Thanks to the rehabilitation, Dash planes may transport more people per rotation than helicopters (maximum 50 passengers for a Dash 8 (300) plane compared to 14 passengers for a 1Mi8 helicopter) and may perform more rotations per day (three compared to only one to two for the helicopter). It is however unlikely than more than 50 people would need to be deployed in Tissi on the exact same day. Theoretical time saved in emergency response would therefore not exceed one day and have not been considered in this study.

Specific qualitative benefits

As all the humanitarian agencies active in the Tissi area are dependent from UNHAS services, this investment benefits to the entire aid community. Prior to the rehabilitation, organizations like MSF were obliged to stock their entire commodity needs before the start of the rainy season for the next 5 months and were frequently experiencing shortages. Also, when medical patients from the camps need to be transferred to a hospital, a much greater number of medical evacuations can now be performed in a reduced period of time.

Illustration 2 – Rehabilitation of the Tissi airstrip**1.3. Infrastructure work – pre-fabricated offices in Bol****Cost savings**

The total cost of this preparedness intervention amounts to 359 k\$. This includes the procurement costs for the electric equipments, the pre-fabricated containers and the ICT and Telecom equipments and an estimation of the transport costs and the maintenance and security costs for these equipments once in Bol.

However, no ROI has been estimated due to the lack of sufficient data for two specific information inputs. First, without the pre-fabricated containers, the CO would need to search for office space to rent from the government. While it is unsure such office space would be available, the current market price could hardly be quantified. Second, without pre-positioned ICT

equipments, the CO would have to investigate purchasing these materials internationally at the onset of the emergency or borrowing them from other sub-offices if available in sufficient quantities without harming their normal operation excessively. Again, the price increase linked to the procurement and transport costs could not be estimated.

Time savings

When comparing both scenarios with and without the emergency preparedness investment, a time saving of 26 days can be inferred.

Indeed, with the Bol investment, only 48h are required to start the operations. This time corresponds to the transport of the staff from other sub-offices to Bol and to set up the pre-fabricated offices. The CO keeps always an up-to-date roster of staff members available for an emergency in the region, so their deployment can be very fast. Once people are on the ground, they can directly communicate their need assessment to N'Djamena thanks to the ICT equipments and can directly meet and work with the relevant partners in the pre-fabricated offices.

Without the pre-fabricated offices and ICT equipments in place, 4 weeks would be approximately required due to a long list of additional steps to perform. First, the CO would need to look for available office space with the local authorities. They would then have to negotiate with them to allow access to this space for their partners. Another step would be to ship in the ICT equipments to Bol. Finally, the CO would need to electrify the new office space, which can take several days or even a week as electrical equipments need to be bought and transported.

Specific qualitative benefits

Thanks to the pre-positioning investment, the CO drastically reduces the safety risks for its staff and equipment. Bol is indeed an unsecure area due to the increased pressure from Boko Haram in the North of Nigeria and the frequent floods. Securing a safe working and storage space with the pre-fabricated offices is a strategic investment to ensure the possibility of the CO to be safely and efficiently active in the region. The investment also has positive spill-over effects on the entire humanitarian community. In case of emergency, Bol would serve as humanitarian hub supporting the entire ETC cluster.

1.4. Long Term Agreements

Cost savings

The primary reason for the signature of local LTAs in Chad is to save time and ensure availability of the products at the supplier. Concerning cost savings, a different pattern has been observed for commodities and transport LTAs.

It has been observed by the Logistics division that commodities' prices negotiated in the LTAs are on average slightly higher than the local market prices. This price difference can be considered as a hedge for the supplier in case of any price fluctuation during the time period of the LTA. Comparing the current local market prices of soap and bleach with the prices negotiated in the LTAs, an increase of respectively 10.4% and 5.5% has been noted. Based on the Logistics' experience, the same 5 to 10% difference holds in the time of an emergency.

The logic is the opposite for transport LTAs. Prices negotiated in LTAs are believed to be lower than local market prices. However, as the CO is solely operating with transport LTAs since multiple years, only one market price for one specific route with one specific supplier could be found³. This single data point was not sufficient to draw any conclusion on the cost savings from transport LTAs.

As LTAs do not include any upfront investment – costs of commodities or transport routes are only paid when and if ordered by the CO, no quantitative ROI has been calculated for this preparedness intervention.

Time savings

Time savings have been calculated by comparing the time required to have the goods available or transported with and without a LTA in place. Based on the CO experience, shows the different time components. On average 30 days are saved thanks to commodities LTAs and 21 days thanks to transport LTAs.

³ Showing a 30% higher market price compared to the transport price negotiated in LTAs.

Table 4 – Time savings from commodities and transport LTAs

	Commodities		Transport	
	Without LTA	With LTA	Without LTA	With LTA
RFP preparation	3 days	3 days	3 days	-
Responses from suppliers	15 days	-	10 days	-
Treatment of the received offers	5 days	-	5 days	-
Signature of the contract	7 days	2 days	5 days	2 days
Delivery	15 days	10 days	10 days	10 days
Total time savings	30 days		21 days	

1.5. Trainings

Cost savings

Cost savings have been deduced from past evidence. Shortly after the training, the local staff of Moundou had to response to a new influx of 35k displaced people. It managed the new arrivals without any gap in their response and without any need for additional office coordinators. If the staff would not have been trained on how to coordinate the emergency response and on the key actions to perform, country office staff estimated that t four additional experienced coordinators from the N'Djamena central country office or from other sub-offices would have been required to fill capacity gaps in the response team.

These four staff reassignments have been used as proxy for the cost savings of the training preparedness investment. Taking into account the DSA (124 \$/day) for these four people during the entire time period of a conflict emergency and the transport cost to and from the emergency (using UNHAS fee of 100 \$/trip as proxy), an extremely high ROI of 18.9 is calculated. The high rate of ROI is partially due to relatively small initial investment of 6.5 k\$ required to hold trainings. Investing in the capacity of the local staff had therefore a very large financial payoff.

Time savings

Using the same logic as for the cost savings, the time savings have been calculated by taking the deployment time of the four additional office coordinators. It has been evaluated by the CO that three days would have been needed on average to identify the adequate and available staff members and to get their travel authorization and one additional day would have been required for them to go to the emergency area. In total, four days are therefore saved thanks to the Emergency Preparedness and Response workshop.

1.6. Capacity reinforcement

Cost savings

4 GS05 have been hired by the CO. Based on the country risk profile, the first emergency already occurs during the first year of the investment. Therefore, the total cost to take into account corresponds to the total employer cost of these 4 additional staff members during one year, which amounts to 84.7 k\$.

Savings from capacity reinforcement come from lower need of additional staff external to the zonal offices during an emergency. Thanks to the additional logistics staff members, there is no need any more to reassign staff from other offices to the emergency. The cost savings have been estimated based on cost of staff reassignment during the time of the emergency. As for the training investment, we have taken into account the costs of the DSA (124 \$/day) and of the transport from/to the emergency (using UNHAS fee of 100 \$/trip as proxy) for 4 staff members who would do the job of the reinforced capacity during the emergency. This represents a total cost of 85.5 k\$ during the first emergency.

The ROI from capacity reinforcement in Chad is just at 1.0. Adding capacity in the zonal offices does not represent a much lower cost than only reacting occasionally to the emergencies. However, capacity reinforcement interventions have significant other qualitative benefits.

Time savings

The estimated time saving is the same as for the training investment. It is the four days required for reassigned staff to get their travel authorization and to go to the emergency zone.

1.7. PCAs / FLAs

Cost savings

The considered emergency preparedness investment is here the staff time invested in negotiating the agreement. Such PCA takes between one and two weeks to be signed and various people are involved in the process:

- The focal point of the concerned section (WASH, Health and Nutrition, etc.) – a LE03 or NO03 during up to 10% of its time
- The programme assistant – a GS06 during up to 10% of its time
- The PCA Committee, consisting of the President (PR05), the secretary (NO03), one Programme Officer (LE03 or NO02) and one Administrative Officer (LE03 or NO02) during ~5% of their time
- CO Representative – DI01 for less than 5% of its time

When combining the salaries of these people for the time they spend on the process, an initial investment of 1.2 k\$ per PCA can be approximated. This investment must be repeated at the end of each PCA duration.

Based on the CO experience, the cost saving of having these emergency contingency clauses could be assessed by taking 25% of the total contribution of the CO in these PCAs. Indeed, without these clauses, the CO would have to sign new PCAs during the emergency and to pay up to 25% additional cost to cover the support costs of the partner.

For the 9 PCAs in scope, the total cash flows amount to 383.3 k\$ while the total investment amounts to 23.2 k\$. This represents a ROI of 16.6. As for the training, such high ROI is explained by the small upfront investments required.

Time savings

If no PCA with emergency clause is in place, a new PCA need to be signed when an emergency occurs before the start of any activity from the partner. Based on past experiences, it takes between one and two weeks to agree on such PCA with a partner, even in time of an emergency. On average, the time saving from the PCA investment is 11 days.

2. PAKISTAN

2.1. Food and non-food pre-positioning

Cost savings

The pre-positioning investments in Pakistan fell under three main categories;

- Food commodities – Ready to Use Therapeutic Food (RUTF), micro-nutrient powders
- Non-food items – Oral Rehydration Salts (ORS), Zinc, Long Lasting Insecticide treated Nets (LLINs) and two types of hygiene kits
- Operational support equipment – Mobile Storage Units (MSUs) and Information Communication Technology (ICT) equipment.

The quantities of RUTF, micro-nutrient powders, ORS, zinc, LLIN and hygiene kits analyzed correspond to the exact quantities prepositioned in different warehouses in Islamabad and Karachi. Part of them has been financed under the DFID program, but not entirely. For the operational support equipment, a total of 17 MSUs that had been rendered unusable due to missing spare-parts were fully re-kitted and pre-positioned in Nasir Bagh (Peshawar) for faster deployment to emergency locations during emergencies. While DFID funds only covered the costs of procuring the MSU spare-parts, the total cost of the fully functional MSUs was considered as the initial investment in order to calculate the financial ROI. ICT kits for two emergencies (of any kind) were also pre-positioned in Islamabad and Peshawar.

The exact cost variables for each of these investments were obtained from the UNICEF and WFP country offices and used to evaluate the total cost of the pre-positioning investments until the first emergency (including procurement, transport and warehousing costs). For instance, the warehousing costs took into account different variables such as;

- Average storage cost per pallet and handling costs negotiated with external contractor (in charge of Islamabad and Karachi warehouses) for RUTF, micro-nutrient powder, ORS, zinc, LLIN and the two types of hygiene kits.
- Rental and maintenance costs for warehouse (Nasir Bagh) holding MSU stocks.
- Warehousing costs for ICT equipment considered to be negligible due to the low volume of items thus limited storage space required.

To estimate the increased transport costs during an emergency in case of no pre-positioning, different approaches were used – the main factor considered was local vs. international sourcing:

- For RUTF, micro-nutrient powder, ORS and zinc, they have been estimated based on the freight calculator and quotes of freight forwarders
- The two types of hygiene kits were sourced locally. Based on previous experience from the COs, no significant increases in procurement and transport prices were observed during emergencies.
- MSU costs were based on the average price of airlifting containers from Dubai.

- The costs for the ICT equipment, was approximated based on a 10% average price premium asked by local carriers during past emergency responses.

Table 5 summarizes the ROIs of the different pre-positioning investments.

Table 5 – ROIs from pre-positioning investments

	RUTF	MNP	ORS	Zinc	Fam. hygiene kit	Hygiene kit	LLIN	MSU	ICT
Quantity pre-positioned	16.6 Mt	441 k	1.4 M pills	382 k pills	40,289	30,000	8,600	17	-
Total cost with pre-positioning [k\$]	64.7	13.5	82.0	8.3	400.4	453.2	27.5	388.7	137.1
Total cost without pre-positioning [k\$]	119.3	17.8	184.9	8.6	378.5	428.4	24.5	726.2	143.6
ROI	1.8	1.3	2.3	1.0	0.9	0.9	0.9	1.9	1.0

Time savings

As with cost savings, time savings were derived from past experiences of the COs. For the commodities already pre-positioned:

- The delivery to the final point of delivery prior to handover to cooperating partners takes on average one day for RUTF, micro-nutrient powder, ORS, zinc, LLIN and the two types of hygiene kits..
- The MSUs required two days lead time; one day for dispatch to emergency locations and conducting site security assessments, and an additional day for installation and making the MSUs operational.
- The ICT equipment required one day lead time to be transported from the main warehouse to emergency locations.

Without the pre-positioning investment:

- For RUTF, micro-nutrient powder, ORS and zinc, the delivery time has been estimated using the assumption that international supply order treatment and delivery by air to the country port of entry would take a maximum of 14 days, plus one day to transport the commodities to the emergency.
- For the two types of hygiene kits and LLIN, local producers would need one week to deliver the kits to the CO's warehouses.
- On average 4 days would be required to order the MSUs and transport them by air to Peshawar. The same time requirements (2 days) were then required for the site security assessments, in-country transport to emergency locations and MSU installation.

- Due to government restrictions placed on international procurement of certain ICT commodities, ICT equipment is ordered through pre-approved local suppliers who still face strict importation regulations and bureaucratic customs procedures resulting in long lead times of 6-8 weeks from when the order is placed to delivery in CO warehouses.

Table 6 summarizes the time savings from the different pre-positioning investments.

Table 6 – Time savings from pre-positioning investments

	RUTF	MNP	ORS	Zinc	Fam. hygiene kit	Hygiene kit	LLIN	MSU	ICT
Delivery time with pre-positioning [days]	1	1	1	1	1	1	1	2	1
Delivery time without pre-positioning [days]	15	15	15	15	7	7	7	6	50
Time savings [days]	14	14	14	14	6	6	6	4	49

2.2. Infrastructure work – Nasir Bagh

Cost savings

The total cost of this preparedness intervention amounts to \$ 1.5 million. This includes the cost of the rehabilitation works; construction of 45 (one-meter high) concrete platforms for \$475,000⁴ that was covered through DFID funds, as well as the cost of 45 MSUs (average of \$23,000/per MSU including transport) that were installed on the concrete platforms to expand the covered storage capacity of the warehouse. The MSU were already stocked in the CO warehouses and no DFID funds were utilized in procuring them. The full cost of both the platforms and the MSUs was however factored into the calculations since no cost-savings would have been generated from a partial investment.

Cost savings from the Nasir Bagh warehouse were twofold: firstly there were annual cost savings from the improved commodity tracking/warehousing operations and secondly savings from warehouse losses/damages due to floods.

1. Due to the additional 10,000-15000 MT of covered storage capacity, the annual costs of temporary storage supplies (plastic sheeting & tarpaulins) to protect commodities from

⁴ Bill of Quantities

adverse weather conditions and potential losses due to poor storage conditions are eliminated.

2. In the event of floods or heavy run-off, the elevated concrete platforms mitigate commodity losses for humanitarian partners utilizing the facility through the Logistics Cluster. Historical evidence from the 2010 floods indicated significant food losses as high as 66% of total warehouse stocks in a different warehouse within the same area. These loss estimates were also applied for the Nasir Bagh warehouse in case of a large flood scenario affecting over 10 million people as defined in the Pakistan risk profile. This still represents a conservative estimate because other higher value commodities besides food such as vaccines, ICT equipment are also stored at the warehouse during emergencies.

When discounting the savings from avoided losses as well as the annual cost savings over the average life time of the MSUs (average lifespan of 6 years when no maintenance costs are taken into account), a total cash flow of \$ 2.2 million was calculated. When compared the total initial investment, a financial ROI of 1.5 was deduced.

Time savings

While there are time savings accrued from the efficiency gains resulting from streamlined warehouse operations due to the expanded covered storage capacity (better commodity tracking & loading/offloading capacities) these are negligible (less than 1 day) compared the time savings accrued by other humanitarian partners due to the reduced need to transport emergency supplies over much longer distances to emergency locations in the KP/FATA region. This would however be difficult to quantify since different humanitarian partners would opt for a wide range of possible transport routes to move emergency supplies into the region from other parts of the country.

Specific qualitative benefits

In addition to the increased efficiency and reliability of warehouse operations in the Nasir Bagh as a result of this investment, the reputational risk associated with significant commodity losses due to floods and run-off is mitigated boosting confidence amongst humanitarian partners in the capacity of the Logistics Cluster to fulfill its mandate during emergencies. Since it's a government warehouse facility, it also boosts national response capacities in the long-term.

Illustration 3 – Construction of the concrete platform to extend the covered capacity of Nasir Bagh



2.3. Long Term Agreements

Cost savings

The initial preparedness investment that was considered for this analysis was the staff time allocated to negotiating and signing of the long-term agreements. Three main steps were considered in the preparation and signature of a LTA:

1. 2 staff days of a Program (NOB) and a Supply (GS7) staff fully dedicated to the bidding process (1 day) and processing the offers respectively.
2. The members of the Contract Review Committee review the LTA prior to a meeting of the Committee to approve it.
3. Once approved, the Supply Division staff spends two additional days preparing the exact terms and conditions of the contract.

After consolidating the cost of total staff time allocated to the process, an initial annual investment of \$ 2,100 per LTA was approximated.

For the field monitoring LTAs, cost savings were deduced by comparing the cost of the field monitors and coordinators as negotiated in the agreements with the cost of sending CO staff members (NOB level) to do the monitoring activities during the two first months of the emergency (estimated time to sign an agreement if no LTA was in place before the emergency). Based on past CO experience, the same number of staffs in the 'without LTA' scenario would be sent to the emergency as the number of monitors and coordinators from the partner in the 'with LTA'

scenario. The comparison was made based on the number of field monitors and coordinators negotiated in the LTAs for the four regions (KP/FATA, Punjab, Sindh and Balochistan). When accounting in the 'without LTA' scenario for the salary, DSA, transport cost and hazard pay (for KP/FATA region) of the CO staffs and when taking into account the time of the first emergency, a total cash flow of 67.1k\$ was calculated.

However, no financial ROI was calculated for the commodities and services LTAs as no clear cost trends could be identified between having and not having LTAs. While cost savings were difficult to quantify, the main purpose of the LTAs was to save time.

Time savings

Based on the CO experience, the additional times required without LTA would be the following:

- Goods and services LTAs – the entire process of issuing tenders, reviewing offers, convening international panel to obtain recommendations up until the final delivery of the goods and services would take an average of 10 days and 4-6 weeks for goods and service LTAs respectively.
- Commodities and transport LTAs – one additional week required to process these LTAs.
- Monitoring LTAs – approximately two weeks required for CO staff from Islamabad to get a Non-Objection Certificate (NOC) as stipulated by the Pakistan Government for emergency areas in KP/FATA and to travel to the exact emergency location.

2.4. Trainings

Cost savings

For the IT emergency management training, the HPM training and the EPRP workshop, the initial investments taken into account included the total costs of the training:

- \$ 15,604 for IT emergency management
- \$ 20,000 for HPM
- \$ 15,000 for EPRP

The cost savings were calculated based on the additional staff resources required during an emergency due to inadequate skills and capacity of existing staff.. For each of these additional staff resources assigned to the emergency, the transport costs (200 to 400 \$ both way depending on the origin and the destination), the DSA (176 \$/day on average in Pakistan) and the hazard pay (52.6\$/day when applicable) were included in the calculations, as well as the salary of these staff during their reassignment period as the CO would need to back-fill for their original jobs (salary cost depending on the function of the person).

Table 7 – Need in extra capacity during emergency per type of training

	Level	Additional resources	International vs. national	Duration of reassignment	Total cost [k\$]
IT emergency	P4	1	International	Full emergency	165
HPM	NOB	2	National	6 months	156
	P3	1	National	2 months	
EPRP	P4	1	National	1 month	24

When discounting the total costs and comparing them with the total investments, the ICT emergency management training, the HPM training and the EPRP workshop yielded financial ROIs of 18.5, 7.8 and 1.6 respectively.

Two additional trainings: the Rapid Needs Assessment training and Sectoral trainings, were also analyzed. No cost savings were however calculated for these trainings because the additional costs needed to reach the same quality of service without the trainings were difficult to quantify. The main gains included improved quality and rapidity of UNICEF/WFP emergency responses, captured in the time-savings and additional qualitative benefits sections below.

Time savings

Time savings were calculated based on the following assumptions for each of the trainings:

- For the IT emergency management training, it was estimated that the skills and technical knowledge obtained from this intensive course, enabled training participants to conduct high quality ICT emergency assessments within 2-3 days while without the trainings 10-12 days would be needed. The trainings therefore result to an an average time saving of 8-9 days.
- Time saving from HPM training was estimated based on the deployment time of the additional staff resources needed on the ground. It would take the CO 1-2 days to identify qualified personnel who were available for deployment. Staff deployed from other field sites to the KP/FATA and Balochistan regions would also need to obtain an NOC that would further delay deployment by an additional 2 weeks. In total, this corresponds to an average time saving of 15-16 days.
- As a result of the EPRP workshop, the local staff can be fully operational in an emergency within one week. However, without the workshop, the lack of preparedness capacity could potentially delay the response by 4-6 weeks. The EPRP workshop therefore allows for a time saving of 30-31 days.
- During the rapid need assessment training, training participants were trained to use mobile devices and Personal Digital Assessment (PDAs) for real-time interviews. This

speeds up the rate at which emergency needs assessments are conducted by at least one week while reducing data entry errors related to paper-based assessments.

- The sectoral trainings are considered as a pre-requisite to any emergency response. Very technical practices are indeed taught such as how to provide medical care and in which quantity/frequency for the Health sector. To ensure the same level of quality in the emergency response, the trainings would need to be given at the beginning of the crisis if they would not have happened before. This would take from 5 to 10 extra days.

2.5. Capacity reinforcement – new staff

Cost savings

For the VAM team reinforcement, the investment corresponds to the employer cost of the 3 additional staff members (\$ 1,800/month) until the year of the first emergency. As the first emergency occurs already during the first year, the initial investment is equated to their annual salaries.

Savings from capacity reinforcement come from lower need of external staff during an emergency. Thanks to the additional VAM staff members, there is no need any more to hire one new person and send this person to the emergency to realize the rapid need assessment during two weeks. The hiring cost (on average 1 k\$/FTE) as well as the salary of these extra people have been taken into account. As the VAM new person would need to be send to the emergency zone, transport cost (on average 100 \$/trip) and DSA (176 \$/day) have also been included in the total cash flows. When comparing these total discounted cash flows with the total discounted investments, a ROI of 0.2 is computed. This low cost savings were attributed to the higher costs of increased staffing capacity throughout the year as opposed to periodical staff increases during emergencies. It however has many qualitative benefits including improved service provision and coverage.

Time savings

Due to the reinforced capacity, an average of one week is needed by the Food Security Cluster to develop the Preliminary Response Plan (PRP) at the onset of an emergency. Without this additional capacity, it would take 2-3 weeks to identify, recruit and operationalize the relevant staff resources. The comparatively lower levels of contextual knowledge and experience would then result to a longer timeframe of an estimated 10 days to develop the (PRP). A significant time saving of approx. 20-21 days can therefore be realized for this investment. The same logic applies for the VAM capacity reinforcement investment. The additional VAM staff deployed to field locations would require two weeks to conduct emergency needs assessments but in their absence an additional two days would be required to identify and re-assign staff from the CO while an additional two weeks would be required to obtain a NOC to authorise staff movement. Once on site, an additional one week would be required to identify and establish networks with relevant stakeholders including local authorities, community leaders and cooperating partners. As

a result the time savings from this investment once these additional requirements are eliminated is an average of 23 days.

2.6. Capacity reinforcement – national rosters

Cost savings

The initial investment was limited and only consisted of the staff time necessary to keep the national rosters of UNICEF and WFP up-to-date. Typically, one or two GS05 persons (and in some cases also a NOA) dedicated part of their time every month to the roster. This included updating the roster with new candidates who had passed interviews and while also verifying the availability and personal contact details of existing roster members. In total, the annual investment for both UNICEF and WFP amounted to \$ 3,500.

In comparison, the cost savings were generated due to the avoided recruitment costs of additional staff during an emergency. The number of people to be hired in the absence of a roster was estimated based on previous emergencies. On average both UNICEF and WFP COs estimated local recruitment costs during emergencies at \$1,000/FTE. Based on the risk profile of Pakistan, on average 46 people would need to be hired in the absence of the rosters. When taking into account the discount factor, a total cash flow of \$ 43,797 was obtained, equivalent to a healthy ROI of 12.4.

Time savings

With the roster, only 1 to 2 days are needed to identify the relevant qualified personnel and operationalize them. Without the roster, the recruitment procedure during emergencies (for a Short Service Agreement) takes on average 10 days. Having national rosters up-to-date therefore has time savings of an average of 8-9 days.

2.7. PCAs / FLAs

Cost savings

The initial investment to contract a PCA with an emergency clause is similar to that of LTAs. \$ 2,773 per PCA corresponds to the staff time required to identify partners, negotiate and sign the contract. The exact process is as follows:

1. Three different assessments: a Program assessment, Supply assessment and financial assessments are conducted. The first two are conducted internally by the respective Program and Supply sections and both take one day each while the financial assessment is conducted by an external audit company for an estimated \$ 1,000 (3-4 day exercise).
2. A program officer (NOD level) consolidates all relevant data.
3. A Contract Review Committee is convened to approve the PCA.

It was however not possible to quantify exact cost savings from PCAs due to insufficient historical data.

Time savings

Without a PCA with an emergency clause in place, if the conservative assumption is taken that the potential partner has already been assessed by the CO, it was estimated that two weeks would be required to sign a partnership during an emergency.

3. MADAGASCAR

3.1. Food and non-food pre-positioning

Cost savings

RUTF, water flocculant powder and soap quantities reflect those currently stocked in the central warehouse of Antananarivo. These commodities will be dispatched to the emergency zone in case of a cyclone. Exact figures from the CO have been used to evaluate the total cost of the pre-positioning investment until the first emergency (including procurement, transport and warehousing costs). More particularly, warehousing costs have been based on the average rental, security, handling and insurance cost of Antananarivo warehouse. In case of no pre-positioning:

- RUTF⁵ and water flocculant powder would be procured internationally, in France and South Africa respectively. To estimate the increased transport costs, the freight calculator and quotes of freight forwarders have been used. Procurement price of RUTF agreed in LTA with the international supplier has been factored in the 'no-prepositioning' scenario. Indeed, in this specific case, the assumption of no change in the procurement price does not hold as different types of suppliers – local with pre-positioning and international without pre-positioning – are used.
- Soap would be locally purchased. Based on past experience, no increase in procurement nor transport price would be incurred.

For the MSUs, motorized boats and ICT equipment, the list of items funded under the DFID program and exact procurement, transport and storage figures from the CO have been used:

- One MSU is given to the CPC (Corps de Protection Civil, the operational branch of BNGRC) to be deployed in the South East and one remains in Tamatave in case of cyclone. Warehousing costs for the first one are being supported by the CPC while the rental cost of Tamatave warehouse has been used for the second one.
- The two purchased motorized boats were also donated to the CPC. They are stored in Antananarivo, but their storage and maintenance costs, their transport costs to the emergency zone as well as their operating costs during the emergency (fuel and driver) are supported by the CPC.
- ICT equipment is a mix of locally and internationally procured items. They have been dispatched in the different sub-offices. Warehousing costs have been estimated as negligible given the low storage place required in each sub-office.

⁵ Although a local supplier of RUTF has recently been approved by HQ, an international supplier would still be used in case of emergency as local procurement required a 21-day sample test prior to any delivery.

To estimate the increased transport costs during an emergency in case of no pre-positioning, different approaches have been used:

- For MSUs, they have been estimated based on freight forwarder quotation from UNHCR for airlifting them from Brindisi.
- For the boats, the outside option would not be to fly in boats during the emergency but to rent available boats in the country.⁶ Rental costs during the last cyclone in Soalala have been used as proxy.
- For ICT equipments, there would not be any change in the international procurement and transport costs. However, prices of local items would increase during the emergency due to peak demand. This increase has been approximated by using the 15% average price premium during an emergency based on CO experience. Also, in-country transport would need to be done by air rather than by road. Based on past emergencies' data, this would correspond to an increase in in-country transport of approximately 20%.

Table 5 summarizes the ROIs of the different pre-positioning investments.

Table 8 – ROIs from pre-positioning investments

	RUTF	Water flocc.	Soap	ICT	MSU	Boats
Quantity pre-positioned	13.8 Mt	103.2k units	33.8 Mt	-	2	2
Total cost with pre-positioning [k\$]	57.1	4.3	4.2	64.9	32.9	24.3
Total cost without pre-positioning [k\$]	122.7	7.9	3.0	61.8	52.6	49.8
ROI	2.1	1.8	0.7	1.0	1.6	2.1

Time savings

As for cost savings, time savings have been derived from past experiences of the COs. With the commodities already pre-positioned, the delivery from the warehouse (Antananarivo or Tamatave) to the emergency zone takes on average two days except for ICT equipments that are already stored in the different local areas. On the opposite, without the pre-positioning investment:

⁶ Assuming such boats are available during the emergency.

- For RUTF, the delivery time has been estimated using an assumption that international supply order treatment and delivery by air to the country port of entry would take a maximum of 14 days, according to organizational minimum standards for emergency supply and logistic modalities. This additional time frame can be reduced to 3 to 4 days for water flocculant powder as they would be sourced from neighboring South Africa.
- For soap, 2 additional days would be needed for the local producer to deliver to the central warehouse.
- For the MSUs, an average of 7 days is needed to ship them by air from Brindisi (a cargo flight is operating every Sunday). Both in the 'with' and 'without' scenario. Two days on average would then be required to transport the MSUs and install them in the emergency zone.
- To rent motorized boats with local providers, agreements need to be settled as per regular contracting requirement. Although informal contracting might be done quickly on the spot in an emergency situation, a reference time of one week would still be needed.
- Internationally procured ICT equipment will be ordered from Dubai. The delivery time, including custom clearance process, would take between 4 and 6 weeks. For items purchased locally, a same delivery time of 4 to 7 weeks applies as local suppliers mainly source their products from abroad (mainly Mauritius or China).

Table 6 summarizes the time savings from the different pre-positioning investments.

Table 9 – Time savings from pre-positioning investments

	RUTF	Water floc.	Soap	ICT	MSU	Boats
Delivery time with pre-positioning [days]	2	2	2	-	2	2
Delivery time without pre-positioning [days]	16	5-6	4	35-36	9	7
Time savings [days]	14	3-4	2	35-36	7	5

3.2. Infrastructure work – UAVs

Cost savings

The cost of 2 UAVs suitable for post-cyclone need assessment, including training costs for the UAVs operators, was estimated by the CO at 20 k\$. Thanks to the 2 UAVs, part of the evaluation and assessment work of helicopter after a cyclone can be saved. As head of the Logistics cluster, WFP estimated that 12 hours of rotation would be required for the assessment work in case of cyclone impacting 100,000 people and 20 hours in case of 150,000 people impacted. One hour of rotation has an average cost of 2,000 \$. Furthermore, the use of two UAVs could

replace the helicopter for the more precise analysis of the most damaged areas. This would represent a saving of up to 20% of the helicopter time. Based on these data points and on the caseload of the next expected cyclone as defined in the country risk profile, a total cost saving of 13.7 k\$ per emergency is approximated. Over a 10-year period, and when accounting for annual maintenance cost of 250 \$ and the cost of transporting a GS4 staff member to each emergency to pilot the operations (including salary and DSA), this represents a total discounted cash flow of 46.4 k\$. Comparing it with the initial 20 k\$ investment, a ROI of 2.3 is deduced.

Time savings

Time savings from the purchase of the UAVs have not been considered. The UAVs will not fully replace the need for helicopter in case of large cyclone, so deployment time will remain unchanged.

Specific qualitative benefits

UAVs are able to do large high-quality pictures of specific areas. These real-time transmitted images will allow UNICEF/WFP to better and faster assess the magnitude of the damages and the needs of the affected populations (how many people are blocked by flooding, how many houses have been destroyed, etc.). This will in turn improve the rapidity, quality and appropriateness of UNICEF/WFP response. Moreover, the collected information will be shared with the entire humanitarian community. This preparedness investment will therefore not only benefit UNICEF and WFP, but all agencies working on the emergency.

3.3. Trainings

Cost savings

The initial investments taken into account are the total costs of the three different trainings: 54.1 k\$ for the three workshops on emergency preparedness and operation, 35.8 k\$ for the ATRs training (including the simulation exercise) and 19.7 k\$ for IT emergency management training. And the cost savings have been calculated based on the additional resources that the staff would require on the emergency due to the lack of proper training. For each of these extra resources assigned to the emergency, the transport costs (1,250 \$ both way based on an international flight to Antananarivo and a national one to the coastal emergency zone) and the DSA (161 \$/day on average in Madagascar) have been included in the calculations, as well as the salary of these persons during their staff reassignment (salary cost depending on the function of the person). *Table 11* shows the needs for extra capacity accounted for the three types of training. For the ATRs training and simulation, the savings have been estimated based on the cost of an international consultant hired in the previous years during the 6-months cyclone period to reinforce the local teams. Thanks to the training, this additional consultant will not be needed anymore during the coming cyclone season.

Table 10 – Need in extra capacity during emergency per type of training

	Level	Additional resources	International vs. national	Duration of reassignment	Total cost [k\$]
Em. prep. & operation	P4	1	International	Full emergency	64
ATR	Emergency specialist	1	International	6 months	53
IT emergency	P4	1	International	3 months	78

When discounting these total costs and comparing them with the total investments, the emergency preparedness and operation workshop, the ATRs training and the IT emergency management training yield a ROI of respectively 1.3, 1.5 and 3.0.

Time savings

Time savings for the different trainings have been calculated based on the deployment time of the additional resources needed on the ground. In case of major cyclone, the regional office could identify and deploy a P4 resource in 4 days on average to the emergency. And without the ATRs training, it took in the past on average 3 days for the international consultant to travel to the emergency zone and to initiate the contact with the cooperating partners.

3.4. Capacity reinforcement

Cost savings

The investment corresponds to the salary of the additional staff members until the year of the first emergency. As the first emergency occurs already during the first year, the initial investment equals to their annual salaries. *Table 11* recaps the different FTEs that have been added via the 2 capacity reinforcement investment as well as their monthly salary.

Table 11 – Capacity reinforcement interventions

Function	Nbr FTEs	Monthly employer cost [\$]
Regional Technical Assistant (ATR)	7	2,373
Field Aid Monitor (Tamatave)	1	2,299
Field Aid Monitor (South East)	1	3,231
Programme Assistant	1	2,091
VAM Assistant	1	1,795

Savings from capacity reinforcement come from lower need of external staff during an emergency. For the additional ATRs embedded in the regional ministries, a one-to-one relationship can be assumed, each extra ATR save the reassignment of a NOC resource to the emergency region. And thanks to the new Field Aid Monitors, Programme and VAM assistants, on average 2 additional GS4 staff members do not have to be reassigned to the emergency in case of a cyclone. In each case, the salary of these 'saved' people as well as the transport cost to the emergency zone (on average 125 \$/trip) and DSA (161 \$/day) have also been included in the total cash flows. When comparing these total discounted cash flows with the total discounted investments, a ROI of 0.7 for the ATRs and 0.3 for the Field Aid Monitors, Programme and VAM assistants is computed. Adding capacity during the entire year represents a greater cost than only reacting occasionally to the emergencies. However, capacity reinforcement interventions have significant other qualitative benefits as outlined in the main report.

Time savings

Using the same logic as for the cost savings, the time savings have been calculated by taking the deployment time of the additional staff members to the emergency area. It has been evaluated by the CO that one day would have been needed on average to identify the adequate and available staff members and get their travel authorization, one day to transport them to the emergency and one day for them to identify the cooperating partners on the ground. In total, three days are therefore saved thanks to both capacity reinforcement investments.

3.5. PCAs / FLAs

Cost savings

Cost and time savings have only been calculated for the standby agreements. No quantitative analysis has been performed regarding the Early Warning System and the Cash & Voucher study and simulation.

The initial investment to contract the 15-20 new standby agreement consists of the 2-month time invested by a Programme Assistant (GS5). Additionally, field visits to the cooperating partners need to be performed to ensure the quality of the partners. To visit all new partners, 7 field visits of 5 days would be required, which represent a total cost of 7.4 k\$ (composed of the salary, DSA and transport costs for the Programme Assistant during the visits). On average, a quarter of the new partners will be visited every year.

Thanks to the standby agreements, cooperating partners can directly start the food distribution activities. However, if these agreements would not be in place, the CO would have to send its own staff to launch the operations before the contract with the partners are signed. On average, it has been estimated by the CO that staff reassignment for 3 GS4 staff members during 7 to 10 days would be required. When taking into account their salary, DSA and transport cost and when comparing it with the initial investment, a solid ROI of 1.5 is deduced.

Time savings

To identify and deploy the CO staff members that would need to start the food distribution operations before the signature of any agreement with cooperating partners, 2 to 3 days would be required. This corresponds to the total time saved by having standby agreements in place.