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# Zambia Costing Evaluation: Transport & Warehousing Options



**March 2016**

This publication was produced for review by the U.S. Agency for International Development. It was prepared by the USAID | DELIVER PROJECT, Task Order 4.



# **Zambia Costing Evaluation: Transport & Warehousing Options**

**USAID | DELIVER PROJECT, Task Order 4**

The USAID | DELIVER PROJECT, Task Order 4, is funded by the U.S. Agency for International Development (USAID) under contract number GPO-I-00-06-00007-00, order number AID-OAA-TO-10-00064, beginning September 30, 2010. Task Order 4 is implemented by John Snow, Inc., in collaboration with PATH; Crown Agents Consultancy, Inc.; Eastern and Southern African Management Institute; FHI360; Futures Institute for Development, LLC; LLamasoft, Inc; The Manoff Group, Inc.; Pharmaceutical Healthcare Distributors (PHD); PRISMA; and VillageReach. The project improves essential health commodity supply chains by strengthening logistics management information systems, streamlining distribution systems, identifying financial resources for procurement and supply chain operation, and enhancing forecasting and procurement planning. The project encourages policymakers and donors to support logistics as a critical factor in the overall success of their healthcare mandates.

**Recommended Citation**

Bem, Julia. March 2016. *Zambia Costing Evaluation: Transport & Warehousing Options*. Arlington, VA.: USAID | DELIVER PROJECT, Task Order 4.

**Abstract**

In March 2016, the Zambia USAID Mission requested technical assistance from the USAID | DELIVER PROJECT, Task Order 4, to conducted a costing evaluation to best answer three key supply chain questions they are faced with.

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**USAID | DELIVER PROJECT**

John Snow, Inc.  
1616 Fort Myer Drive, 16th Floor  
Arlington, VA 22209 USA  
Phone: 703-528-7474  
Fax: 703-528-7480  
Email: askdeliver@jsi.com  
Internet: deliver.jsi.com

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# Executive Summary

In order to support the USAID Zambia Mission's ability to make clear and well informed decisions on key supply chain activities moving forward, they have requested the has requested the USAID | DELIVER PROJECT to provide a costing evaluation on long-term solutions to transportation, warehousing and laboratory control distribution. The cost evaluation is focused on answering the benefits and challenges associated with the following three questions:

1. USAID procuring additional vehicles for MSL VS. Continuing / expanding the current 3PL contract
2. USAID Procuring Prefabricated Warehouses for Regional Hubs VS. Outsourcing / Renting Warehouse Space
3. USAID Procuring Refrigerated Vehicles for MSL Distribution of Blood Reagents VS. Continuing with 3PL Services for Blood Reagent Distribution

In order to best answer these questions, MSL's 2015 Management Accounts provided the bulk of the costing information used to compare and contrast with the 3PL currently under contract. In addition stakeholder meetings were set up to verify the information received as well as the interpretation of the existing data.

For the first question of whether USAID should consider procuring additional vehicles for MSL verse continuing / expanding the current 3PL contract, the final conclusion is that MSL costs are higher than the currently contracted 3PL when using a new vehicle or even an old vehicle for deliveries to Choma. The costs are a little more equal to 3PL costs for Chipata & Mongu when using costs associated with delivering in an older vehicle. The final conclusion was that continuing with utilizing the 3PL gives MSL the needed flexibility when it comes to available transportation assets at seemingly no added cost to USAID.

For the second question of whether USAID should consider procuring prefabricated warehouses for regional hubs verse outsourcing / renting warehouse space, the cost evaluation showed that to procure an IHS pre-fabricated warehouse, the costs are less expensive than what the SCMS Project is currently spending on the Katanga rental when depreciated out over 30 years. Looking at up-front costs though, the pre-fab warehouses require a significant amount of money in which USAID would not see returns on investment for about 17 years. Based on this 17 year wait for a return on investment on just the building expense, serious consideration should be taken before committing to building warehouses for MSL. Renting already built warehouses and outfitting them appropriately will be a less costly option in the medium term (5-15 years), allowing for flexibility in the long-term.

For the third question of whether USAID should consider procuring refrigerated vehicles for MSL distribution of blood reagents verse continuing with 3PL services for Blood Reagent Distribution, as it was difficult to compare since MSL is not currently conducting similar type work, when examining some rough high level costs, MSL's costs could easily be much more expensive than the 3PL's if they were to take on the full responsibility, as just their transportation costs, without fuel, vary from 100% to 50% of the 3PL's costs to complete all management, picking and packing and distribution.

The final recommendation is to keep the reagent distribution outsourced, as it is a very specialized, irregular distribution which would require MSL to have to bring on additional vehicles and resources that could never be fully utilized.



# Introduction

## Background

USAID Zambia is finalizing a concept note for future supply chain interventions. Support to MSL has been a major intervention undertaken by SCMS and DELIVER in the past two years. A few key challenges that MSL has faced include:

- Unable to meet monthly transportation demands to all health facilities as the volume of orders has grown exponentially
- Inadequate space in the central warehouse for increasing volume of commodities procured by GRZ and donors
- Unavailable transportation and staff to distribute short shelf-life cold chain laboratory controls outside of the routine delivery schedule

MSL's infrastructure and funding have not grown as fast as the demand for and availability of key health commodities. By March 2015, MSL became unable to cope with the supply chain requirements of the country and MSL became over 2 months behind on their monthly distribution schedule. To respond to this crisis, USAID, through the SCMS Project, developed an emergency response approach including three key interventions.

The first key intervention consisted of outsourcing part of the distribution chain using third party logistics (3PL) companies to enable MSL to meet a monthly distribution schedule given increasing demand.

The second key intervention is the rental of supplemental warehouse space for the central warehouse while a warehouse extension is being built, and supplemental staffing to enable MSL to start a second (and soon a third shift).

And last the third has been SCMS supporting the MOH to distribute short shelf-life cold chain laboratory controls through a third party logistics company. These controls arrive at MSL with a very short shelf-life and must be immediately distributed to the needed facilities maintaining cold chain. As this is outside of the routine MSL schedule, they have been unable to take on this activity given their vehicle fleet and staffing.

MSL has indicated that they will be able to fund the additional staffing positions upon the end of the DELIVER and SCMS projects. But, the other three interventions listed above may need additional support. As the interventions in the current state were implemented as an emergency response to enable MSL to meet a growing demand, the USAID mission has requested DELIVER to provide some cost-benefit data on long-term solutions to transportation, warehousing and laboratory control distribution.

## Objectives

The purpose of this technical assistance is to conduct a cost-benefit analysis study on the direct costs and resulting benefits and challenges associated with the following three questions:

1. USAID procuring additional vehicles for MSL VS. Continuing / expanding the current 3PL contract
2. USAID Procuring Prefabricated Warehouses for Regional Hubs VS. Outsourcing / Renting Warehouse Space
3. USAID Procuring Refrigerated Vehicles for MSL Distribution of Blood Reagents VS. Continuing with 3PL Services for Blood Reagent Distribution

## Methodology

### Desk Based Analysis

The 2015 MSL Management Accounts which were requested and collected before arrival in-country. This information was then used to update the previous MSL Costing Exercise conducted in January and February of 2015, which then served as the basis for all MSL cost inputs for the purposes of answering the three questions above. Other cost information was collected from the USAID | DELIVER PROJECT and SCMS project office, which included contracts for the 3PLs, contracts for the rented warehousing space and previous quotes obtained from IHS for pre-fabricated warehouses.

### Key Stakeholder Interviews

In order to verify and confirm the desk based analysis and certain pieces of information collected; meetings with key stakeholders were set up.

At MSL, the TA provider met with the Finance Manager, Collins Katungu, an accountant, Neil Perry and the Transportation Manager, Richard Chitembeya. They confirmed the information provided in the 2015 MSL Management Accounts was being interpreted correctly and assisted with providing additional information on some gaps found.

In addition to MSL, the TA provider met in-person with the UPS representative managing the cold chain blood reagent distribution to provide information on the process and service they are providing.

# Cost Evaluation Question #1:

## USAID procuring additional vehicles for MSL

### VS. Continuing / expanding the current 3PL contract

To being answering the question, information on what MSL's and the 3PL's responsibilities are for the routine delivery from MSL HQ to Hubs was collected. MSL currently delivers stock to hubs every month and states that on average 8 runs a month to each hub are necessary. Each MSL run to Choma, Chipata and Mongu uses 2 drivers and takes 3 days / 2 nights. The 3PL's responsibilities under their contract are to deliver 6 times per month to Chipata & Mongu and 8 times per month to Choma. The 3PL is to be given 5 days' notice from MSL before performing any distribution run.

For MSL, the below shown costs included the depreciated cost of a new vehicle, loaded salary and per diem for 2 drivers per route, fuel and a portion of maintenance attributed to each vehicle. No MSL overhead/management costs included. For the 3PL, costs per run are all inclusive of everything, including vehicle, driver and fuel.

**Table 1. Cost Comparison of Transport from HQ to Hub of MSL vs. 3PL**

<b>Truck Costs</b>	<b>Annual Total</b>	<b>Annual Per Truck</b>	<b>Monthly per Truck</b>	<b>Per Day</b>	<b>MSL COST: 3 day/2 night distribution run</b>	<b>3PL COST: 3 day/2 night distribution run</b>
* Repairs and Maintenance	K 607,005	K 31,948	K 2,662	K 121	K 363	
** Depreciated Value - New Truck		K 192,156	K 16,013	K 728	K 2,184	
<b>Fuel Costs</b>		<b>kms</b>	<b>***km/liter</b>	<b>fuel/liter</b>		
Choma (600km roundtrip)		600	2.80	K 8.60	K 1,843	
Chipata & Mongu (each 1200km roundtrip)		1200	2.80	K 8.60	K 3,686	
<b>Driver Costs</b>		<b>**** Annual per Driver</b>	<b>Monthly per Driver</b>	<b>Daily per Driver</b>		

<b>(Loaded)</b>						
Average Driver Salary per Month (2 drivers per truck)	K 61,083	K 5,090	K 231	K 1,388		
Per diem (350 a night)			K 350	K 1,400		
<b>TOTALS:</b>				<b>K 8,119</b>	<b>vs.</b>	<b>\$531</b>
	CHOMA			<b>K 9,962</b>		<b>\$823</b>
	CHIPATA & MONGU					
***** Option With Older Truck	CHOMA			<b>K 6,098</b>	<b>vs.</b>	<b>\$531</b>
	CHIPATA & MONGU			<b>K 7,941</b>		<b>\$823</b>

From the above analysis it can be seen that MSL costs are higher in when using a new vehicle or old vehicle for deliveries to Choma. The costs are a little more equal to 3PL costs for Chipata & Mongu when using an older vehicle. It should also be noted that MSL costs shown are for 2015 whereas the 3PL costs are for the current contract in 2016.

When analyzing the costs, invoiced costs were also looked at and it was determined that MSL is not utilizing the 3PL per the contracted amount (8 times a month for Choma, 6 times for Chipata & Mongu). Upon further investigation, MSL stated that the 3PL is not always providing the appropriate type of transport. The 3PL stated they are not getting the required amount of notice (5 days) and therefore cannot have the appropriate vehicle readily available. In addition communication between the two entities seems to be an issue as the 3PL has arrived numerous times only to be told the shipments are not actually ready for delivery. These issues should be resolved before committing to buy MSL additional assets, as it is unclear whether additional assets will actually resolve the current situation at MSL. In addition, depending on whether the Hubs will take on more responsibility, MSL HQ's role in transportation may decrease. This is another reason an increased number of trucks may not be needed.

Based on the above findings and the cost analysis, continuing with utilizing the 3PL gives MSL the needed flexibility when it comes to available transportation assets at seemingly no added cost to USAID.

# Cost Evaluation Question #2:

## USAID Procuring Prefabricated Warehouses for Regional Hubs VS. Outsourcing / Renting Warehouse Space

To best answer whether USAID should procure prefabricated warehouses for use as regional hubs or whether outsourcing/renting warehouse space is more cost effective, two key pieces of information were used: MSL/SCMS costs for owned and rented Katanga space and the IHS WiB Proposals from 2014. For MSL, the focus was on central storage costs instead of hub costs, since any prefabricated warehouses for regional hubs would most likely be operating more similarly to the central warehouses rather than the existing hub warehouses. For the IHS WiB proposals, costs were given for 3 locations: Kasama, Luanshya and Mansa. Since the proposed size of Luanshya was more comparable to that of Katanga or the MSL HQ warehouse, we focused on using those quoted costs for the analysis.

Cost per m2 broken for both MSL storage space and IHS down into 2 groups:

- Bottom to Top
  - For IHS, this includes site work, foundation, assembled prefab warehouse, fully fitted, people trained and operational
  - For MSL, this includes the cost of the storage space (depreciated costs for the owned space and rent paid for the rental space), assets and training
- Building Only
  - For IHS, this only includes site work, foundation, and assembled prefab warehouse
  - For MSL, this only includes the cost of the storage space (depreciated costs for the owned space and rent paid for the rental space).

**Table 2. MSL and IHS costs for “Bottom to Top” and “Building Only”**

	MSL HQ Owned	SCMS Katanga	IHS Luanshya (depreciated)	IHS Luanshya (up-front costs)
Storage Space	ZMW 430,313.13	USD 558,000.00	\$ 116,715.53	\$ 3,501,465.87
Assets / Equipment	ZMW 723,954.85	ZMW 564,684.78	\$ 45,594.83	\$ 1,367,845.04
Training	ZMW 22,779.22	ZMW 17,767.79	\$ 2,466.67	\$ 74,000.00
<b>TOTAL for Bottom to Top</b>	<b>ZMW 1,177,047.20</b>	<b>ZMW 6,162,452.57</b>	<b>\$ 164,777.03</b>	<b>\$ 4,943,310.91</b>
<b>TOTAL for Building Only</b>	<b>ZMW 430,313.13</b>	<b>USD 558,000.00</b>	<b>\$ 116,715.53</b>	<b>\$ 3,501,465.87</b>

<b>m2 of storage space</b>	<b>11927</b>	<b>9300</b>	<b>3360</b>	<b>3360</b>
<b>Bottom to Top - cost per m2</b>	<b>ZMW 98.69</b> ~ USD 9.87	<b>~ ZMW 662.63</b> USD 66.26	<b>~ ZMW 490.40</b> USD 49.04	<b>~ ZMW 14,712.20</b> USD 1,471.22
<b>Building Only - cost per m2</b>	<b>ZMW 36.08</b> ~ USD 3.61	<b>~ ZMW 600.00</b> USD 60.00	<b>~ ZMW 347.40</b> USD 34.74	<b>~ ZMW 10,421.00</b> USD 1,042.10

As seen above in Table 2, MSL HQ owned space costs very little, mostly due to the fact that the buildings are old and surely mostly depreciated. As also seen above, “Bottom to Top” costs per m2 are only marginally higher than “Building Only” costs for the SCMS Katanga rented space. From this analysis, and not knowing the full cost of outfitting the Katanga rental space, it was determined that the best comparison is between the SCMS Katanga Rental rate per m2 and the IHS Luanshya costs. These costs are all also originally quoted in USD, which makes the exchange rate fluctuation of the ZMW a non-issue.

As seen in Table 2, the cost comparison is as follows:

- SCMS Katanga: \$60.00 per m2 per year
- IHS WiB Luanshya (depreciated): \$34.74 per m2 per year
- IHS WiB Luanshya (up-front costs): \$1,042.10 per m2 per year

The above cost comparison shows that IHS pre-fabricated warehouse cost are less expensive than the Katanga rental costs when depreciated out over 30 years. Looking at up-front costs though, the pre-fab warehouses require a significant amount of money in which returns on investment won't be seen for about 17 years.

Based on this 17 year wait for a return on investment on just the building expense, serious considerations should be taken before committing to building warehouses for MSL. Renting already built warehouses and outfitting them appropriately will be a less costly option in the medium term (5-15 years), allowing for flexibility in the long-term. This is especially useful if the long-term vision for pharmaceutical supply chain management is not known. For example, will MSL continue to be the sole supply chain manager for pharmaceuticals or will Zambia move towards more vendor-managed inventory?

# **Cost Evaluation Question #3: USAID Procuring Refrigerated Vehicles for MSL Distribution of Blood Reagents VS. Continuing with 3PL Services for Blood Reagent Distribution**

When initially approaching this question, it was assumed that refrigerated vehicles were currently being utilized by the 3PL services for blood reagent distribution. When learning more about the process it was determined that due to the small product volume, erratic delivery schedule (see Table 3), rough terrain, and 72 hour delivery requirement due to the short-shelf life, refrigerated vehicles were not used by the 3PL and were not seen as the ideal mode of transportation. Due to these complex and unique requirements of the blood reagent cold chain, and knowledge from previous cold chain cost analysis, it was determined early on that whether to buy refrigerated vehicles was indeed not the right question, but rather the question is whether MSL should take on this particular distribution over from the 3PL.

As stated above, the process is quite complex. The 3PL (UPS) follows the steps listed below:

- SCMS clears shipments and forwards to MSL for storage in cold rooms.
- MSL calls UPS and gives them a time window they can come to MSL.
- UPS picks and repackages for all four reagents per facility, labels them, and puts an insulated wrapper around each facility package.
- Data loggers, which are received from SCMS, are put with all packages
- UPS supplies the cold boxes & ice packs
- UPS delivers to all facilities within 72 hours of arrival at MSL.

It should also be noted that vehicles being used depend on terrain (4x4, motorbikes in western province in rainy season, boat to Chilubi). UPS also has back up refrigerators in all provincial centers to switch out ice packs, which they routinely change out on every delivery run.

**Table 3. Blood Reagent Delivery Schedule**

<b>ABX Minotrol H, L &amp; N</b>	<b>Sysmex Pochi 100i</b>	<b>BD FACS Calibrite</b>	<b>Sysmex XT 1800/200 E-CHECK</b>
	15-Jan-15		5-Jan-15
	15-Feb-15	12-Feb-15	
	15-Mar-15		
			30-May-15
	15-Jun-15		
15-Jul-15		14-Jul-15	25-Jul-15
	15-Aug-15		5-Aug-15
	2-Nov-15		30-Nov-15
	15-Dec-15	10-Dec-16	25-Dec-15
16-Jan-16		13-Jan-16	
10-Feb-16	3-Feb-16	14-Feb-16	15-Feb-16

Depending on the fact that sometime reagent arrivals don't always overlap and that UPS must deliver all reagents within 72 hours of arrival in-country, UPS has at least 25 vehicles available for the blood reagent distribution. For example, just for ABX Minotrol, at least 12 vehicles go out at the same time to ensure the reagent is distribution to all 195 facilities within 72 hours.

To decide whether it makes sense from a cost perspective to continue using the 3PL vs. handing it over to MSL, the existing costs the 3PL is incurring were analyzed. The costs are shown below in Table 4.

**Table 4. UPS Lechwe Express Cost Breakdown**

<b>Reagent</b>	<b>Cost per Distribution Run</b>	<b>Total Cost</b>	<b># of deliveries (Jan 2015-Feb 2016)</b>	<b># of facilities</b>	<b># of vehicles</b>	<b>*Cost per Run</b>
ABX Minotrol H, L & N	K 78,272	K 234,816	3	195	12	<b>K 6,523</b>
Sysmex Pochi 100i	K 50,531	K 404,248	8	92	10	<b>K 5,053</b>
BD FACS Calibrite	K 12,258	K 61,288	5	18	5	<b>K 2,452</b>
Sysmex XT 1800/200 E-CHECK	K 27,755	K 194,283	7	47	6	<b>K 4,626</b>



In order to compare costs, the transportation costs gathered from question #1 were used to provide a rough comparison. Below is an approximation of MSL's costs to carry-out 1 distribution run in a Toyota Hilux.

**Table 5. MSL Cost per Blood Reagent Distribution Run (Approximation)**

	<b>Cost per Run (2 day/1 night)</b>
<i>Repairs and Maintenance</i>	K 363
<i>Depreciated Value of 1 Hilux</i>	K 656
<i>Average Driver Salary per Month (2 drivers per truck)</i>	K 926
<i>Per diem (350 a night)</i>	K 700
<b><i>Total for Car &amp; Drivers</i></b>	<b>K 2,645</b>

As seen in Table 5 above, MSL costs about K 2,644.70 for a 2 day/1 night distribution run. This cost does not include:

- Picking and packing labor
- Packaging materials (cold boxes, ice packs, insulated wrappers)
- Fuel
- Active management of route planning

With that in mind MSL's costs could easily be much more expensive than the 3PL's if they were to take on the full responsibility, as just their transportation costs, without fuel, vary from 100% to 50% of the 3PL's costs to complete the entire management, picking and packing and distribution.

If MSL were to take on the reagent distribution, a number of vehicles & drivers would need to be brought on to be available immediately for this type of distribution, but would most likely not be fully utilized year-round. MSL would also need to appoint a resource to manage the route planning, which depending on arrival of the reagent, can change.

An advantage of outsourcing this type of distribution is that we are only paying for what we need when we need it AND based on some rough cost comparison, there are no cost savings to be realized by utilizing MSL vs UPS.

The recommendation is to keep the reagent distribution outsourced, as it is a very specialized, irregular distribution which would require MSL to have to bring on additional vehicles and resources that could never be fully utilized.



For more information, please visit [deliver.jsi.com](http://deliver.jsi.com).

**USAID | DELIVER PROJECT**

John Snow, Inc.

1616 Fort Myer Drive, 16th Floor

Arlington, VA 22209 USA

Phone: 703-528-7474

Fax: 703-528-7480

Email: [askdeliver@jsi.com](mailto:askdeliver@jsi.com)

Internet: [deliver.jsi.com](http://deliver.jsi.com)