USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

Implementing Activity-Based Costing (ABC) and Activity-Based Management (ABM) in Warehousing and Distribution

A Guide for Determining the Complete Costs of Warehousing and Distribution to Drive Supply Chain Performance

PRIVATE-SECTOR CONCEPTS

USAID
FROM THE AMERICAN PEOPLE

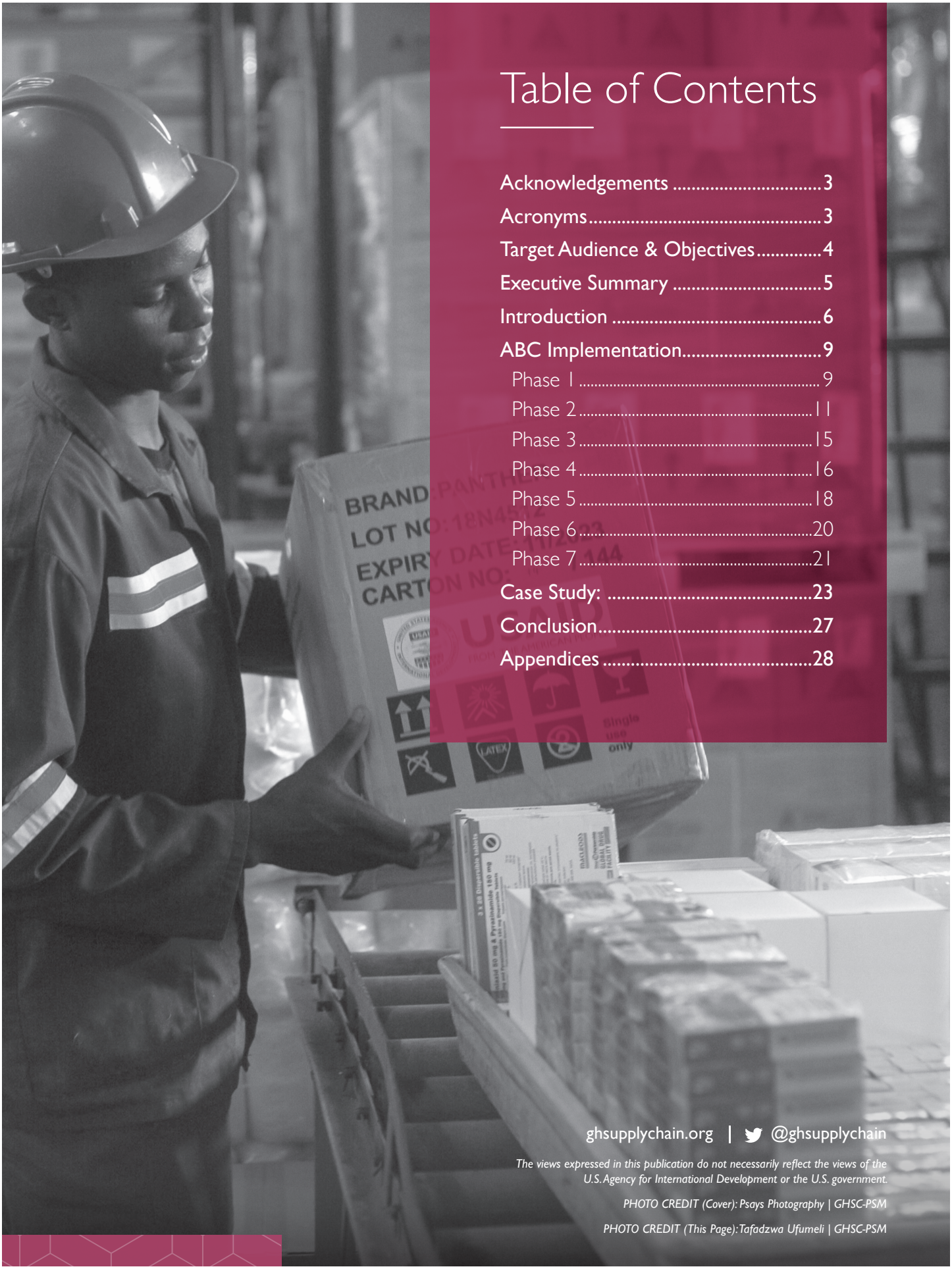

Table of Contents

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Acronyms

ABC	activity-based costing
ABM	activity-based management
COG	cost of goods
CMS	central medical store
ERP	enterprise resource planning
GHSC-PSM	USAID Global Health Supply Chain Program-Procurement and Supply Management project
KPI	key performance indicator
MOH	Ministry of Health
NDSO	National Drug Service Organization
PDCA	plan-do-check-act
WMS	warehouse management system

Target Audience

A primary target audience for this guide is supply chain managers in public health systems who work at the central medical store (CMS) or Ministry of Health (MOH) and manage **warehousing** for public health commodities and **distribution** of those commodities from the central medical store to local warehouses and through the last mile to service delivery points. They will find this document useful because they need the cost information provided by ABC to effectively manage their supply chains. Implementing partners that support supply chain managers are also a primary target audience and will find this document useful in supporting and building capacity for these supply chain functions.

Additional target audiences include:

- **Leaders of a central, regional, or district medical stores** who supervise operations managers and who are accountable for the overall financial and operational functions of the central stores. These readers will find this document useful in understanding the complete costs of warehousing and distribution to inform strategic supply chain decision-making (activity-based management), such as whether to outsource certain functions.
- **Ministries of Health and Ministries of Finance** that fund the central medical store and its distribution activities. The ministries will find this document useful in understanding the complete costs of warehousing and distribution and how that information enables improved supply chain management and performance and informs outsourcing decisions.
- **Donors** who have committed funding to health product procurement and may also fund in-country warehousing and distribution operations or technical assistance. Donors will find this document useful in understanding the complete costs of warehousing and distribution and specifically how their donated commodities drive some of those costs.

Objectives

The objectives of this guide are to help readers:

- **Determine the complete costs of warehousing and distribution** in public health supply chains
- **Enable working toward a more efficient and well-performing supply chain** through understanding these complete costs
- **Assess these supply chain costs against private-sector costs** to inform decisions on outsourcing
- **Strengthen contract management and vendor accountability** by understanding internal costs and performance as a reference point

01.

Executive Summary

PHOTO CREDIT: Chris Norman | Chemonics

Implementing ABC in Warehousing and Distribution

This document serves as a guide for implementing activity-based costing (ABC) in warehousing and distribution for public health commodities. It describes how:

- This costing methodology helps determine the complete costs of operations
- Knowledge of complete costs drives improvements in supply chain performance and enables cost savings
- ABC informs decisions on contracting for private-sector warehousing and distribution services
- ABC helps improve staff engagement and morale
- ABC establishes more transparency in the use of public funds and empowers a country's supply chain leadership to achieve self-reliance and sustainability

The information provided is most relevant to supply chain managers at the central medical store (CMS) and Ministry of Health (MOH), as well as technical assistance providers. Donors, ministries of health and finance, and leadership of central, regional, or district medical stores may also find the information useful in understanding the benefits and considerations of ABC implementation.

While the guide provides a wealth of information to help the reader understand and conduct ABC, it is not an exhaustive resource. Other complementary literature on ABC is suggested in the box to help readers access all the information they need.

Structure of the Guide

The guide begins with an introduction that describes ABC and explains:

- The **value proposition** of ABC
- The **phased approach** to ABC implementation
- **Outcomes** of ABC

It then describes **six phases of ABC** implementation and the steps involved in each phase.

Following the description of the phases, the guide presents a **short case study from Lesotho**, followed by a **longer sample case study in** Annex A.

Additional annexes provide examples of the **tools developed** during ABC implementation.

ADDITIONAL RESOURCES ON ABC

- Activity-Based Costing (ABC) Used in Logistics and Supply Chain Management as Cost Optimization, and its Benefits. Antariksh Joshi, LinkedIn. November 12, 2016.
- The ABCs of Activity-based Costing for Logistics. Tan Miller. Material Handling and Logistics (MH&L). August 15, 2017.
- Cost Management in Logistics of Warehousing: The Use of Activity-Based Costing in the Logistics Service Provider. Tomáš Kučera. University of Pardubice. September 2018.
- Activity-Based Costing and Management in the Supply Chain: An Expired Hype or an Undervalued Tool? Arthur Zondervan. Groenewout. November 2009.
- Activity-Based Costing at UPS. Online presentation.
- Application of Activity-Based Costing to a Land Transportation Company: A Case Study. Adil Baykasoglu and Vahit Kaplanoglu. International Journal of Production Economics. December 2008.
- Guide to Public Health Supply Chain Costing: A Basic Methodology. USAID | DELIVER PROJECT. October 2013.

02.

Introduction

PHOTO CREDIT: Jennifer Moffatt | Chemonics

What is ABC and Why Is It Beneficial in Public Health Supply Chains?

In public health supply chains, a country's central warehouse (often called a central medical store) typically receives, stores, and acts as a warehouse for orders of medicines and medical products from suppliers (i.e., manufacturers, wholesalers).

These supplies are generally funded by the country government or by donors. As regional or district warehouses, hospitals, or health facilities order supplies, central warehouse staff pick and pack commodities for distribution. Orders are then transported to their destination.

These warehousing and distribution activities require infrastructure, equipment, transport, human resources, and expertise, all of which have costs.

To determine the real costs of warehousing and distribution activities, country governments and donors are shifting to a traditionally private-sector approach to measure warehousing and distribution costs. This approach is called **activity-based costing, or ABC**. ABC first assesses the wage costs for direct labor associated with warehousing and distribution activities and then allocates indirect costs, such as non-direct wage costs, overhead costs (building maintenance, utilities), equipment purchases and maintenance, and fuel costs.

Understanding these complete costs is critical for governments because they are usually resource constrained, and ABC helps them to identify non-value-added activities so they can modify or eliminate them. Knowing the costs of these supply chain functions, and specifically what is driving these costs, also enables governments to make informed decisions to improve supply chain performance and cost effectiveness over time, leading to a new way of managing the supply chain called activity-based management, which is further explained under "The Value Proposition of ABC."

Donors may pay a service fee to central warehouses to cover the costs of storing and distributing donated products. Often, this service fee is not based on actual costs of the warehousing and distribution activities but rather on a percentage of the value of commodities handled, which may not accurately reflect the costs associated with the managing services provided by the warehouse. ABC analysis supports setting appropriate fees for these services and justifying those costs to donors or programs with evidence.

ABC Implementation Begins With Warehousing and Distribution

In a public health supply chain, a country's central warehouse is often the first tier of supply chain functions for the country. The processes involved in managing a warehouse are also significant drivers of supply chain costs. This is why ABC implementation typically starts at the central warehouse and examines the costs of warehousing and distribution operations.

Once ABC is implemented at the central warehouse, it can be replicated downstream at smaller warehouses and health facilities, often with a more simplified approach appropriate for smaller operations. A country can also then decide whether to cost other aspects of the supply chain using ABC.

The Value Proposition of ABC: Shifting to Activity-Based Management Helps Improve Supply Chain Performance

ABC is more than a costing model. It is a supply chain performance strategy. This is because ABC implementation engenders an organizational shift into a new way of managing called **activity-based management (ABM)**.

To determine the complete costs of warehousing and distribution, ABC provides:

- **Tools** to capture cost information daily, monthly, and annually
- **New management processes** to track and calculate the real cost of activities
- **Organizational learning** about how these tools and processes help improve cost management

To determine the real costs of warehousing and distribution activities, country governments and donors are shifting to a traditionally private-sector approach to measure warehousing and distribution costs.

Using these tools and processes to capture costs also requires supply chain managers to take a close look at performance. When they see process inefficiencies, they can implement incremental improvements over time, thereby also lowering costs.

Managers can also take ABC a step further and evaluate performance and costs trends annually to identify further needed costing adjustments and performance improvements. Key performance indicators (KPIs) can be set based on this continual gathering of cost and performance data, enabling targeted improvement and more efficient supply chain management overall.

Through improved monitoring and management of costs and performance, supply chain managers can make **more informed decisions on outsourcing** warehousing and distribution services to private-sector vendors. If services are outsourced, managers can set more realistic **cost and performance expectations for vendors** and can better manage vendor contracts accordingly.

In this sense, ABC is not as much about the "C" in ABC (cost) as it is about the "A" (activity). Cost is an indicator in this context; the ultimate focus and goal of ABC implementation is better managing the activities that drive costs to achieve improved supply chain performance and cost savings (ABM).

RESOURCES ON CHANGE MANAGEMENT

The Kotter 8-Step Process for Leading Change: "The 8-Step Process for Leading Change was cultivated from over four decades of Dr. Kotter's observations of countless leaders and organizations as they were trying to transform or execute their strategies. He identified and extracted the success factors and combined them into an 8-step methodology." Click here to learn more.

The STEP 2.0 Program: "The jointly coordinated Strategic Training Executive Program (STEP) 2.0, managed by **People that Deliver,** is a professional development tool specifically tailored to the needs of health supply chain leaders and managers. Crucially, it blends elements of self-paced learning, facilitator-led training, on-the-job application of leadership skills, and coaching support. What makes it particularly unique is that it pairs public-sector supply chain managers (the delegates) with private-sector supply experts (the coaches)." Click here to learn more.

Tapping the Full Potential of ABC: "Managers often do not think of activity-based management as a major organizational-change program. It is. Combing the organization to pinpoint all the useful information about the direct and indirect costs of a product or service is a huge undertaking. So is setting up an information system that can track those cost-contributing activities and present them in formats that employees can use. To win over employees, each company needs a carefully crafted rollout that takes into account its culture and operating idiosyncrasies." Click here to read this *Harvard Business Review* article.

A Phased Approach to Implementation to Allow for Change Management

Because ABC is a fundamental shift in costing and organizational management, implementing ABC requires support for the change throughout all levels of the organization, and a commitment to maintaining new business processes in the long term. This requires a change in management culture that is understood and supported by staff at all levels.

As such, ABC implementation is best done in phases, allowing time within the operation for adaptive learning and continual improvement, as well as building

of capacity and ownership. Generally, initial implementation takes six months to complete. Time is built in periodically during those six months to allow the supply chain organization to acclimate to new processes and conduct costing activities.

Staff may understandably resist this change initially based on uncertainty over how their jobs could change, how their performance could be measured, and whether oversight of individual performance will be greater in general. A gradual implementation process allows time for education about ABC to reassure staff that the method examines the performance of the whole system, not the performance of individuals. Its intent is to analyze processes and costs to ultimately balance the orchestration of the whole system and balance resource allocation for greater efficiency and cost effectiveness.[1]

Outcomes of ABC and ABM

ABC and ABM can result in further long-term benefits for a country's supply chain operations.

Cost transparency. With ABC in place, the operation can routinely monitor the costs of every aspect of its operations and better monitor and control its expenses. Countries can implement more realistic service fees for providing warehousing and distribution services to public health programs. Since public health supply chains generally use public funds, transparency is essential to demonstrating good use of this money.

Improved supply chain performance. ABC provides the tools and processes that help establish continuous quality improvement at a supply chain institution. Managers are empowered to improve supply chain performance gradually over time through continual monitoring of costs and processes, not just for costing warehousing and distribution activities but also for identifying inefficiencies and implementing improvements.

Increased staff engagement and morale. Once supply chain staff understand the intention and benefits of ABC implementation and buy into the change, they can become more engaged in the process changes, collaborate more as a team, and have direct input into evolving processes, boosting staff morale.

Self-reliance. Implementation of ABC empowers warehousing and distribution leadership to operate the supply chain with an understanding of real costs and performance, and they can now make informed decisions on further cost savings and efficiencies, including outsourcing. By using ABC and ABM, supply chain leaders can exercise full control of their supply chain and operate in a state of continual improvement. Ultimately, this contributes to supply chains being more sustainable long term.

PHASES OF ABC IMPLEMENTATION

Phase 1:
Define operational activities, collect initial data on warehousing direct labor and commodities

Phase 2:
Create and implement the daily planner for warehousing

Phase 3:
Develop a daily planner summary and direct labor report for warehousing, review results and take necessary action

Phase 4:
Collect initial data on distribution costs

Phase 5:
Calculate and allocate indirect costs, determine complete costs (direct + indirect)

Phase 6:
Apply ABC findings: Consider whether outsourcing is an option, calculate costs by program or donor, determine a service fee

Phase 7:
Create an executive dashboard, review results and take necessary action

[1] Joseph A. Ness, Cucuzza, T.G. "Tapping the Full Potential of ABC." *Harvard Business Review:* July–August 1995. Online: https://hbr.org/1995/07/tapping-the-full-potential-of-abc

03.

ABC Implementation

PHOTO CREDIT: Tafadzwa Ufumeli | GHSC-PSM

A Phased Approach

ABC implementation is a phased approach to allow the organization time to adapt to this new approach to costing and managing the supply chain. Time should be built into the process periodically to give warehousing and distribution staff time to practice and absorb the changes.

The phases, and the steps within each phase—which are described in this section—can and most likely will be customized to fit each system's context and needs.

Adoption of ABC is an iterative process. ABC is a continuous improvement process. The longer the new ABC processes are practiced, the better supply chain operation will get. Warehousing and distribution managers can then further analyze cost and performance over time and get more specific with this model.

PHASE 1: Define Operational Activities | Collect Initial Data on Warehousing Direct Labor and Commodities

Step 1. Define the Operational Activities of Warehousing and Distribution

The first step is to define the operational activities of warehousing and distribution. Generally, the operational activities are **receiving**, **put-away, picking**, **packing**, **loading and dispatch**, **transporting**, and **unloading**. These are the activities that will be measured to calculate ABC.

Sometimes, a warehousing and distribution operation may have a slightly different list of activities. For example, picking and packing may all be done by the same staff, so these activities would be grouped together as a single measurement. Or a central warehouse may manage several buildings where commodities are stored, which requires workers to spend considerable time transferring commodities from one building to another; in this case, "transferring" would be an additional activity that needs to be measured as part of ABC.

OPERATIONAL ACTIVITIES OF WAREHOUSING AND DISTRIBUTION

Receiving: The physical receipt of products at a warehouse, inspection of the products for accuracy and quality assurance, determination of where the stock will be stored, delivery to that location, and completion of receiving reporting.

Put-Away: Taking incoming orders from the location where they are received to the storage area, placing them in storage units and recording their storage location.

Picking: Retrieving items for an order from their storage location, taking them to be prepared for distribution, and recording preparation of the order.

Packing: Packaging items in an order for distribution.

Loading and Dispatch: Loading vehicles with orders for distribution.

Transporting: Transporting orders from the warehouse to their destination.

Unloading: Unloading orders from vehicles at their destinations.

Once ABC is implemented at the central warehouse, it can be replicated downstream at smaller warehouses. PHOTO CREDIT: Andi Gultom | GHSC-PSM

As ABC implementation moves forward, the direct labor involved in each of these activities will be tracked and the associated wage costs will be calculated. In a later phase of implementation, indirect costs will be analyzed and allocated to each of these activities as well. This will ultimately give the complete costs (direct + indirect) of warehousing and distribution operations.

Step 2. Collect Data on Direct Labor Costs for Warehousing

The next step is to collect data on direct labor costs from the warehouse's existing data management systems. The format of the data may vary due to the **type of systems** being used in different country warehouses, which could be:

- Paper forms
- Excel spreadsheets
- A warehouse management system (WMS)
- An enterprise resource planning (ERP) system
- Some combination of these

Implementing ABC will require a list of all **direct labor job types** in warehousing and distribution. A job type is considered direct labor when it conducts any of the operational activities of warehousing and distribution defined in Step 1. Direct labor job types can encompass both employees and contract staff.

The **direct labor job types** may look like the following:

- Warehousing operations manager
- Warehousing operations supervisors
- Warehousing team supervisors
- Warehouse worker (perhaps more than one level or type)
- Forklift driver

Implementing ABC will also require a **list of staff** who perform these job types and **their combined total wages**. Wages are collected in aggregate for each job type through an assigned job code (discussed in the next section), not as individual wages to ensure personal information is safeguarded.

Job Code Assignment

A job code must be assigned to each direct labor job type so that it can be tracked. These job codes may already exist in the warehouse's tracking and financial systems. But if they are not in place, the codes must be created and added to the system in which labor time and wages are tracked. This will enable tracking of the total cost of labor (wages) by operational activity for ABC implementation.

An Opportunity for Operations and Accounting to Work in Partnership

Warehousing operations and the accounting department often work in silos without an understanding of the important role each team plays in managing and costing operational activities.

This stage of ABC implementation—defining direct labor roles and tracking their costs through job codes—brings an opportunity to establish a new management culture in which operations and accounting work together as partners to understand the cost drivers (the operational activities) in a warehousing and distribution operation and routinely analyze the job types and wages being tracked by job code.

Ideally, through this process, operations and accounting should set up regular communication and collaboration to monitor direct labor cost information.

This is an example of how broader changes in management—activity-based management—can evolve through ABC implementation.

Step 3. Collect Data on Commodity Units, Categories, and Volume

Collecting data on commodity units, categories, and volume at this early stage of ABC implementation will—later in the implementation process—enable the complete costs of warehousing and distribution (direct + indirect costs) to be allocated to each commodity category based on the volume of storage space each category consumes.

The reason for assessing and collecting these data early on is to ensure that this commodity information will be properly documented and tracked going forward to allow for later cost calculations under ABC.

Commodity Units

Using existing warehouse systems, collect a list of all commodities managed by the facility. This is usually tracked by the stock-keeping unit (SKU) for each commodity.

Commodities should be documented and tracked down to the specific item level and not just under a broader drug name, such as aspirin. For example, each of Manufacturer #1's aspirin products below should have its own SKU:

- **Manufacturer #1's aspirin**, 500 mg tablets, bottle of 1,000 tablets
- **Manufacturer #1's aspirin**, 500 mg tablets, bottle of 500 tablets
- **Manufacturer #1's aspirin**, 500 mg gel capsules, bottle of 500 capsules

Each SKU will track the item's unique unit of measure, bar code, pack size, and dimensions.

Commodity Categories

Next, determine the commodity categories of the warehouse's product mix. Commodity categories will be monitored under ABC. ABC analysis looks at commodity categories only in terms of how they consume warehousing and distribution resources (in other words, how they drive costs). Therefore, for purposes of ABC, commodities are not categorized by monetary value or importance to health outcomes. Rather, they are categorized in ways meaningful to warehousing and distribution processes and costs, such as by:

- **Commodity type:** For example, medicines, laboratory products, medical supplies
- **Temperature requirements:** For example., cold-chain products such as vaccines, non-cold-chain products
- **Health program:** For example, HIV, malaria, TB, family planning
- **Funding source:** For example, donor-funded products, government-funded products; the breakdown could be like this:
  - HIV, malaria, and TB medicines funded by Donor #1 (e.g., USAID)
  - Bed nets to prevent malaria funded by Donor #2 (e.g., the Global Fund)
  - Childhood immunizations funded by Donor #3 (e.g., UNICEF)
  - Essential medicines funded by the Ministry of Health

Categorizing by donor becomes helpful later in ABC implementation, when complete costs of warehousing and distribution are allocated to commodity categories based on the volume of storage space each category consumes. For commodity categories by funding source, this gives each funding party an understanding of the actual warehousing and distribution costs incurred to handle, store, and distribute its products, thereby enabling a more representative service fee to be proposed. This will be covered in detail below.

Commodity Volume

Knowing the volume of commodities managed by the facility is essential for determining the storage space consumed by each commodity category.

In supply chains, the term "**volumetrics**" refers to measuring a unit's dimensions—width, depth, and height—to calculate volume. Volume tells supply chain managers how much space these commodities will need to ship them, store them at the central warehouse, load them onto vehicles for local distribution, and store them at their destination, such as a health facility.

MORE INFORMATION ON VOLUMETRICS

Click here to watch a short video on volumetrics in health supply chains, from the USAID Global Health Supply Chain-Procurement and Supply Management (GHSC-PSM) project.

Public health warehouses usually receive information on commodity volume from the vendor with each order. However, the warehouse may not be documenting and tracking that information in its systems to help determine warehousing and distribution costs.

If volumetrics are not currently being documented and tracked, staff must begin to do so from the vendor-provided information, or by manually measuring the dimensions of all items received, calculating volume, and entering these data into a warehouse data management system. Once these data are captured in a warehouse system, they only need to be updated when a vendor makes a change to the packaging.

PHASE 2: Create and Implement the Daily Planner for Warehousing

Step 1. Create a Daily Planner for Warehousing

Once the initial data are collected and supply chain managers have addressed any gaps in how data are documented and tracked (e.g., creating job codes, documenting commodity volume), the next step is to create the most essential tool of ABC—the daily planner.

The daily planner is the critical tool of ABC implementation because it helps capture operational data in more detail, and it is also where activity-based management starts to evolve.

The daily planner serves two purposes. It:

- **Refines the operational data inputs for ABC even further** by recording and tracking the warehousing activities to be measured. Specifically, the daily planner tracks each. Day the number of staff assigned to each activity, the number of commodity units they

handled, and the number of hours they worked. These data, combined with the wages of staff assigned to each activity, help pinpoint the real direct labor costs of each activity.

— **Shows how a warehouse is performing by tracking a measurement called throughput**, which is the number of units moved through a particular warehousing operational activity (receiving, put-away, picking, packing, or loading for dispatch) over a certain period of time. See the box for a more detailed explanation.

Over time, tracking operational activities and measuring warehousing throughput enables operational managers to **more closely identify, observe, and address any inefficiencies** in work processes or staff allocations. By continually using the daily planner, managers can take a more proactive and collaborative role in planning the day's activities, reallocating staff where needed, and adjusting processes to be more streamlined and efficient, ultimately **helping to improve performance and save costs.**

THROUGHPUT

Throughput is the **number of units** moved through a particular operational activity (receiving, put-away, picking, packing, or loading for dispatch) over a certain **period of time, usually an hour**.

It is calculated by dividing the **number of items** moved through an activity during a given day by the **number of labor hours** spent on that activity that day.

In other words, this is where the **continuous quality improvement approach of activity-based management takes root.**

The complexity of the daily planner depends on how detailed the management decisions will need to be. As ABC implementation continues, the daily planner can be revisited and customized further based on staff feedback. Managers may want to begin with the simplest planner and increase the complexity of the data gathered over time as staff become more accustomed to its use and understand the benefits of data collection and process improvement.

See Annex B for other examples of daily planners that include targets and measure variance.

Since the daily planner will become the basis for the ABC analysis, its design and use should be clear and easy to complete. Therefore, a job aid (see Annex C) that explains how to complete the sample daily planner may be useful in warehouses with more than one team leader, supervisor, or manager.

Step 2. Implement the Daily Planner for Warehousing

Once the data for the daily planner are decided and agreed to with supply chain managers, and the form is created, the next step is to implement its use.

Change Management: Preparing the Operational Team

This is another opportunity for change management among the operational

An example of a simple daily planner:

Daily Planner						
Day of the Week:				Date:		
Activity	**Staff Members Assigned**	**Number of Staff Assigned**	**Number of Commodity Units Handled**	**Hours Worked**	**Throughput** *(Number of Units Handled Divided by # Hours Worked)*	**Comments**
Receiving						
Put-Away						
Picking						
Packing						
Loading for Dispatch						

managers (the managers on the warehouse floor supervising staff and the movement of goods each day) and staff that will be using the daily planner. Using a daily planner may not be well understood by the operational team. The daily planner is part of how ABC analyzes processes and costs to balance orchestration of warehousing and distribution to improve performance and cost effectiveness. It does not measure individual job performance, but staff may fear that it does and that their job security could be affected.

Therefore, it is important to manage this change and gain buy-in by clearly explaining what is being measured, how it is being measured, and how the results will be used during ABC implementation and long term—not to assess worker performance or eliminate jobs but rather to understand costs, reduce non-value-added activities and costs, and improve performance.

Rolling Out the Daily Planner: A Suggested Timeline

The first 60 days are spent increasing use of the daily planner.

For the first 5 to 10 working days, operational supervisors should work on understanding how to count the number of commodity units handled in each activity area, particularly the **unit of measure** for each item—that is, the smallest unit that will be handled by the warehouse. They must also determine whether the commodities arrive in units, boxes/cases, cartons, bales, or pallets, for example.

Initially, warehousing and distribution supervisors may want to keep the number of workers typically assigned to each activity the same and just observe the number of commodity units handled and number of hours worked in each area. In warehouses with a smaller number of workers, managers may want to be attentive to workers who work on more than one activity during a day (e.g., receiving in the morning, put-away in the afternoon) to monitor the number of hours spent on each activity.

During days 11 to 45, supervisors should become comfortable with counting the units handled and with monitoring performance without yet making process changes. This is the time when supervisors observe what the baseline workload and performance are and how workload and performance change across this period of about a month.

For example, a warehouse that receives a large shipment in one week and no shipments for the next several weeks will see significant variations in workload for each activity. Or a warehouse that fulfills orders only in the first 10 working days of the month would expect picking, packing, and loading for dispatch to be high during those days, while receiving and put-away actions might be low.

In a warehouse, the day's work plans often change if shipments arrive earlier or later than expected or if the number of orders is higher than usual. When the workload is low in one activity area and high in another because of these variations, supervisors should begin to consider **how staff can be reallocated to improve efficiency and save costs**, ensuring that workers are not left without work. Supervisors should also begin to understand how performance targets might be set and later added to the daily planner.

Supervisors should meet at the end of each day to **calculate throughput** and discuss the day's workloads and performance, and to plan staff allocations for the next day while remaining flexible about their expectations. Supervisors may begin to share data from the daily planner with workers, but refrain from giving performance feedback or set targets. Workers and supervisors may begin to consider root causes for performance inefficiencies and note these on the daily planner—for example, if a shipment arrived without palletization, receiving may have been slower than usual.

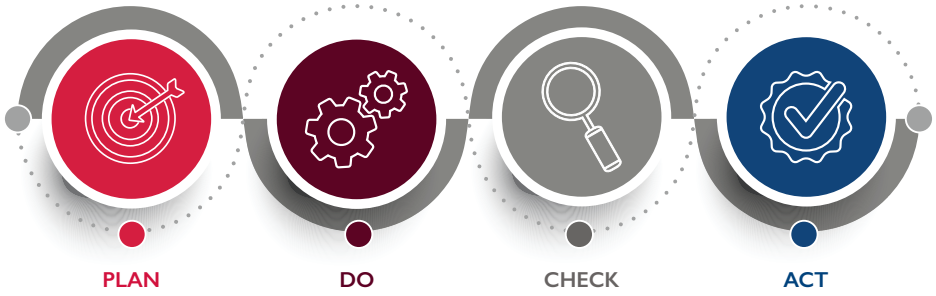
From days 45 to 60, supervisors can **begin to set performance targets** and add them to the daily planner. Supervisors should also collaborate each day to **consider how to move workers among activity teams** depending on variations in workload, and they can begin to suggest and make process changes in the order of tasks or the way equipment is used. For example, supervisors accustomed to having a fixed number of workers may find it valuable to have more workers available to help unload a large shipment.

At this point, supervisors should not be concerned about "failure" to meet a target. The purpose of making process changes is to determine if the proposed change is valuable. A change that is determined to not be valuable can be reversed and a different action taken.

The ultimate goal in a warehousing and distribution operation is **efficient throughput**. The throughput for each operational activity will vary from day to day because of several factors, including which workers are active on any particular day, the way trucks are packed (and, therefore, unpacked), the types of units being handled, and the way units are counted. Over time, however, by using the daily planner, supervisors can establish a **throughput performance benchmark** (e.g., 200 units picked per person per hour or 800 units put away per person per hour) for each activity.

Warehouse in Mozambique. PHOTO CREDIT: Mickael Breard | GHSC-PSM.

CONTINUOUS IMPROVEMENT
The PDCA Cycle



Source: American Society for Quality

Measuring throughput daily can build the diagnostic capability of the supervisor over time in understanding what causes throughput to go up or down. This knowledge can then be used to make **small but significant improvements** to warehouse operations that result in higher throughput.

From day 60, supervisors should complete the daily planner each day and collaborate with workers to discuss results, make needed adjustments, observe the results of these changes, and make any further adjustments. This is when the real shift into activity-based management should take place.

Use of the daily planner can be understood as a **plan-do-check-act (PDCA) cycle**.[2] PDCA is a well-known and commonly used four-step continuous quality improvement process. By conducting these four steps daily, guided by the data from the daily planner, supervisors and workers gain visibility into what is and is not working and can take iterative steps to improve processes and achieve efficiencies.

The four steps can look like this:

1. **Plan.** At the end of each business day, supervisors for each operational activity meet and use the data from the daily planner to plan for the next day, taking into account the number of units that are expected to move through the warehouse and the number of workers that will be needed to complete these tasks.

   The next morning, supervisors again meet to ensure the plan from the previous day is still in place (e.g., that inbound deliveries are still going to arrive as planned), and workers are then allocated to conduct tasks according to the day's plan. These are agile check-in meetings that should not last more than about 10 minutes. Quick check-ins throughout the day can also take place to monitor progress.
2. **Do.** Workers receive, put away, pick, pack, and load for distribution as assigned. Supervisors will determine the number of basic units received using receiving documents, the number of units picked using pick slips, and the number of units packed and loaded for distribution using issuing/shipping documents.
3. **Check.** At the end of the day/shift, supervisors meet again to analyze and discuss how well that day's plan worked and calculate throughput. Posting the daily results in an area where all workers can observe them can be a motivational tool that leads to improved performance.
4. **Act.** If something did not work as planned—for example, if a shipment that was scheduled to arrive that day did not arrive, resulting in workers assigned to receiving not having the expected level of work—supervisors can identify this inefficiency and determine a solution for the next day, such as strategizing how to reallocate staff with unexpected free time to another area where assistance is needed.

Workers can be asked for their input on how to improve performance. They may suggest, for example, that too many of them were assigned to one activity, resulting in them continually bumping into each other, and that reassignment would reduce congestion.

As the PDCA cycle is conducted over time using data from the daily planner, managers will begin to understand the interactive nature of activities and how to operate more as a team. The team will learn to identify, respond to, and even anticipate inefficiencies, continually improving processes over time.

This is where the power of ABC truly begins to manifest—in the ability to get immediate feedback on daily decisions and allocations, enabling better orchestration and balance of resources.

PDCA RESOURCES

For more information on PDCA, click here to read "What is the plan-do-check-act (PDCA) cycle?" on the American Society for Quality website, which includes a list of additional resources.

[2] What Is the Plan-Do-Check-Act Cycle? Online: https://asq.org/quality-resources/pdca-cycle

PHASE 3:
Develop a Daily Planner Summary and Direct Labor Report for Warehousing | Review Results and Take Necessary Action

Step 1. Create a Warehousing Daily Planner Summary Each Month

Once daily planners have been completed for a month, managers enter data from each daily planner into a spreadsheet program, such as Excel, and summarize for the month. This summary is a simple **aggregation of each daily planner**—for example, it will show the total of the number of units handled in each activity and the total of the number of hours worked in each activity. Managers would use it to see the evolution of throughput across a month by operational activity.

See Annex D for an example daily planner summary.

Step 2. Create a Warehousing Direct Labor Report Each Month

The next step is to create a monthly direct labor report. This report takes **data from the daily planner summary** for the month on workers assigned to activities and the hours they worked, and adds in the labor costs. Managers will need to obtain **aggregated wage information** (not individual wage information to protect confidentiality) for the relevant staff and calculate labor costs for each activity for the month.

The daily planner summary and monthly labor report are intended to produce meaningful data to inform supervisors and managers in making daily and long-term decisions. Because the data are collected in real time, they represent what is truly happening in the warehousing and distribution operation.

See Annex E for an example direct labor report.

Step 3. Review These Reports and Identify Action Steps

The supervisor or manager may use the data from these reports to **observe data and performance** over a longer period and **take action** in different ways. Some **examples** are as follows:

Observation: Throughput for picking is low and has become a bottleneck.

Potential actions:

- Assign additional workers to picking, as this is the most resource-intense activity in warehousing and distribution.
- Add equipment such as bins for picking units, and replenish bins frequently for items that are picked at the unit level.
- Move the most frequently picked items to a fixed location on the floor level in the warehouse, reducing travel time to get to these units.
- Move from unit-level picking to picking by the inner box or by case for some items. Although they can be issued as units, they can be picked as box/case. For example, an order for 2,700 condoms can be picked one time as a case of 3,000 condoms instead of picking 27 boxes of 100 condoms. Consider recommending different pack sizes to procurement agents to make this more efficient.

Observation: On given days, workers for one activity or location are not busy or have completed all expected work before the day's end.

Potential actions:

- When meeting with other supervisors at the end of each day, make a plan to reallocate workers among activities, even during the day when possible.
- Begin to set targets and learn to allocate the appropriate number of workers to each activity daily.
- Remind workers that warehouse throughput is more important than the input of any one worker or team.

Observation: Commodities received one day are not put away the same day, or commodities picked are not dispatched and loaded the same day.

Potential actions:

- **Reallocate** staff so that, by the end of the day, all receipts are put away or all picks are packed and loaded for distribution.
- Reallocate materials handling equipment (e.g., forklifts and pallet jacks) as appropriate to remove the bottleneck.

Observation: Based on the understanding of what the throughput range should be for each warehousing and distribution activity, managers or supervisors determine that throughput for one activity is imbalanced compared to other activities.

Potential action:

- Identify the non-value activities in the environment that are affecting the throughput adversely, such as a congested work area, equipment that is not functioning or not well maintained, or a poor layout.

Observation: Throughput for one activity is nearly non-existent during some periods of a month—for example, receiving happens only at the beginning of the month; picking, packing, and loading for dispatch only at the end of the month.

Potential action:

- Work with suppliers or donor procurement staff to schedule deliveries throughout the month or week, rather than all together. Work with recipients (smaller warehouses, health facilities) to stagger distributions. The goal is to balance activities to be able to fully leverage all resources.

Observation: Planned throughput (based on daily planner input once targets are set and supply chain managers are finetuning) does not reflect actual throughput.

Potential actions:

— As managers and supervisors gather and observe data over time, they will become better at adapting processes and resource allocations and setting appropriate targets. When they identify targets as being off, managers can assess what was wrong with the predictions, learn from that, and make continuous improvements in projections.

— If planned receipts or issues are rarely or never timely, consider what might be done to manage inbound and outbound shipments.

Observation: Throughput does not seem to be improving.

Potential actions:

— As noted, throughput may increase from workers being aware of performance data from the daily planner. Consider sharing throughput data with them, possibly on a large, visible board. Recognize, reward, and celebrate improvements with, for example, an office celebration or an extra monetary bonus.

— Consider that performance will, after some time, plateau, unless changes are made—for example, providing additional staff, changing team composition, and reviewing processes to make the work easier.

Observation: The labor cost per commodity unit appears high.

Potential actions:

— Review the value of the commodities being managed.

Receiving and dispatching are two key activities of activity-based costing. PHOTO CREDIT: GHSC-PSM

— Move from unit picking to box/case picking for low-value, high-volume, or high-weight products (e.g., gauze, gloves, IV fluids).

— Consider the number of staff allocated to this activity and their skill level/wage adequacy to their scope.

Three ABC tools have now been developed that look at activities, costs, and performance daily and monthly:

— The **daily planner**

— The **daily planner summary**

— The **direct labor report**

Supervisors will need to implement regular use of these three tools to build a picture of the performance of the warehouse. Only with sufficient data can they decide what actions to take to improve throughput, which may include moving workers within teams, adding (or even subtracting) workers, adding (or even subtracting) materials handling equipment, moving commodities or restructuring the flow of commodities to reduce time to put away or pick the most commonly requested items, providing training, and many other potential process improvements.

PHASE 4
Collect Initial Data on Distribution Costs

Step 1. Collect Initial Data on the Costs of Distribution

Warehouses may **own and operate a fleet of vehicles**, or they may **contract transportation for distribution** to a private-sector transportation service provider (sometimes referred to as a third-party logistics provider or 3PL). Some warehouses will use a combination of sources. When a transportation provider is contracted, the financial records and sub-accounts should include the costs of the provider for the period separately from the cost of the owned fleet.

For an owned fleet and employed drivers and driver helpers, the **direct labor** (and therefore direct costs) of distribution are the driver's and driver helper's hours and wages to drive product orders to distribution destinations and unload orders from the vehicle at the destination. **Other direct costs** for transportation include fuel, tolls/ferries and other costs during transportation, and include per diem for drivers and driver helpers.

The longer the new ABC processes are practiced, the better supply chain operation will get.

When transportation for distribution is outsourced, the cost paid to the transportation service provider is considered a direct cost. But a warehouse may still employ a transport manager and distribution planner, which would be considered indirect labor.

While data for warehousing are collected and reported daily through the daily planner, data for transportation and distribution are generally reported monthly. Daily data collection would be difficult because routes for delivery may take more than one day to complete, and decisions affecting distribution are difficult to make once a vehicle is loaded and dispatched. Also, disruptions to delivery may occur—such as breakdowns, accidents, unexpected traffic delays, and delays in off-loading—that are best handled as individual cases rather than through daily data collection through a form like a daily planner.

Further, labor for transportation and distribution is not as flexible and fluid as labor for warehousing. In a warehouse, allocation of labor can be adjusted daily among the operational activities as needed for efficiency. But for transportation and distribution, buying more vehicles and hiring more drivers for an unexpected or larger-than-expected distribution is usually not feasible or recommended. In cases of an urgent need for additional distribution resources, supply chain managers often hire temporary transportation and distribution services.

Drivers should already be collecting data through existing mechanisms, including:

- Day/time and odometer reading at the start of the day
- Day/time and odometer reading at each stop on the route
- The number of the door seal broken at the stop, and the name and signature of the witness to the breaking of the seal
- Receipts for any fuel, oil, coolant, or other material purchases
- Receipts for any road fees, such as tolls, ferries, or even traffic fines
- Day/time and odometer reading at the end of the day, including the location of the stop

To calculate the costs of transportation, the manager will need to obtain information from the driver logs, distribution records (e.g., proof of delivery forms, packing slips, or reports from the WMS). (See Annex F). **This information should include the:**

- Number of kilometers driven during the month for purposes of distribution
- Total aggregate wages for all drivers and any other worker directly paid by the warehouse for direct operational costs (e.g., a laborer who rides in the vehicle to unload commodities, any security personnel who ride in the vehicle to provide protection)
- Total cost for fuel for the fleet during the month and the number of liters purchased (this should not include fuel for administrative vehicles, such as a vehicle the executive director may use to attend meetings)
- Per diem paid to drivers

Additional information will be needed from the detailed financial records, such as driver salaries, maintenance costs, insurance costs, and vehicle depreciation.

In some countries, vehicles intended for distribution may be used for other purposes, such as driving staff to supervisory visits. Or, conversely, vehicles not intended for distribution, such as an ambulance, may be used to distribute medicines and supplies. In these cases, ABC analysis makes it clear that these are non-value-added activities and not economical. Particularly for an ambulance and highly skilled ambulance personnel being diverted to distribution, ABC can demonstrate t hat purchasing a dedicated distribution fleet and hiring drivers, or hiring a 3PL, is more economical.

Step 2. Aggregate Data on Direct Costs for Distribution Into a Monthly Report

At the end of each month, data on direct costs for distribution should be aggregated from the various sources mentioned above—driver logs, distribution records, and financial records—into a **monthly dispatch log summary**. (See Annex G.)

Like the monthly labor report for warehousing, the monthly report for distribution is intended to produce meaningful data to inform supervisors and managers in making daily and longer-term distribution decisions. Distribution data over the course of several months can be examined to identify challenges or observe trends. And these monthly data also provide input into the executive dashboard to highlight high-level distribution for the year and inform longer-term supply chain decision-making and strategic planning.

PHASE 5: Calculate and Allocate Indirect Costs | Determine Complete Costs (Direct + Indirect)

Step 1. Analyze and Calculate the Indirect Costs of Warehousing and Distribution

The ABC analysis up to this section has covered the direct costs of warehousing and distribution, but these are not all the costs. The remaining costs are the indirect

costs of operation. These are some of the ways that you may categorize some of your indirect costs; your list may be longer and more detailed:

- **Administrative costs.** This includes staff in management, finance, customer service, clearance, reception, quality control, and other such administrative functions. It also includes information technology costs, such as computers, software, and internet connection.
- **Procurement costs.** In some supply chains, the central medical store that operates the warehouse is also responsible for executing procurement. In others this function might be assigned outside the CMS, possibly to a pharmacy department or other procurement agent used by the MOH. When CMS staff do conduct procurement, the labor cost associated with procurement of non-donated products, such as essential medicines, would be an indirect cost.
- **Building costs.** This includes rent, utilities, security, maintenance, sanitation, insurance, and depreciation.
- **Transportation and distribution.** This includes costs for staff who process and record proof of delivery verification and filing, distribution planning staff, transportation management staff, as well as maintenance, insurance, and depreciation of vehicles.

For ABC implementation, indirect costs will generally be obtained from the warehouse's **financial system in which all revenues, costs, and expenses are recorded and balanced**, as in an accounting ledger (in the private sector, this is often referred to as the profit and loss statement, or the P&L).

Financial records may vary in the level of detail of information shown. What is documented in financial records may be determined by the organization's requirements, local laws and regulations, and the audience for whom the report is intended. Depending on the design of the warehouse's financial system, the number of accounts and sub-accounts in the financial records may be limited or extensive. An example of a main account in the financial system would be insurance; the subaccounts under insurance would be types of insurance, such as flood or fire.

For ABC implementation, all indirect costs must be accounted for to eventually calculate the complete costs (direct + indirect) of the warehousing and distribution operation. Therefore, warehousing and distribution managers and the finance department must work closely with the ABC implementation team to analyze the financial records and determine if all indirect costs are being documented and tracked.

If not, the financial records would be expanded to incorporate those costs from other existing documentation or tracking systems. If any costs have not been tracked—which may be more likely with transportation costs—a process for tracking those costs for ABC would be deployed. A process for tracking transportation costs is proposed below.

In a warehouse, the day's work plans often change if shipments arrive earlier or later than expected.
PHOTO CREDIT: Tafadzwa Ufumeli | GHSC-PSM

Step 2. Allocate Indirect Costs to Warehousing and Distribution Operational Activities

Next, the indirect costs obtained through the financial records and any further data collection will be **allocated to each operational activity**. To accomplish this, the ABC implementation team works closely with warehousing and distribution managers and the finance unit to determine what these allocations will be. (See Annex H for a sample worksheet for allocating indirect costs.)

To determine **allocations for indirect labor**, the ABC implementation team conducts interviews with managers and staff about their jobs or their direct reports' jobs to make allocation decisions. If there is discrete accountability for a

staff member's job, that job's hours and costs (wages) are allocated to operational activities accordingly. For example, a transportation manager would be allocated entirely to driving and unloading.

For administrative or management functions that do not have as clear of a connection to operational activities, managers can determine—based on knowledge of staff members' jobs and existing data on how they account for their hours—what percentage of time each staff member devotes to supporting each warehousing and distribution operational activity, and then allocate their job accordingly.

For other types of support functions that support all warehousing and distribution personnel—such as kitchen or custodial staff—their hours and wages can be split evenly among each operational activity.

The interviews with managers and staff to inform allocation decisions are thorough. The ABC implementation team follows up on interview responses to ask more detailed questions to ensure as much information is gathered as possible. The team also reviews existing data/records to confirm the information provided in interviews as much as possible. This due diligence helps ensure that decisions on indirect labor allocations are based on all available information.

Once all indirect labor cost allocations are determined, a database of these costs is created and connected with job codes (existing or newly created ones) in the organization's financial/payroll system to create customized hours-tracking reports by operational activity. The financial/payroll system may be part of a warehouse's ERP. If the financial/payroll system and ERP are not linked, the ABC implementation team can create the link or enable the operation to do manual entry in an Excel report to link payroll information and job codes. The solution is appropriate to the level of technology at the warehouse. Either way, the key is establishing indirect labor allocations and indirect labor job codes to categorize indirect labor payroll expenses.

The same types of **allocation determinations are made for non-labor indirect costs** through interviews with managers. For example, a warehouse building's electrical and maintenance costs can be allocated evenly among warehousing and distribution operational activities. Materials or equipment purchased for picking would be allocated to picking only.

This activity is a **critical point for ABC implementation** because it is when all warehousing and distribution staff—both direct labor, which is now documented in the monthly direct labor report, and now indirect labor—are assigned to specific operational activities.

Step 3. Calculate the Complete Costs of Warehousing and Distribution

Once all indirect costs (labor and non-labor) are allocated to each operational activity, supply chain managers add these costs to the direct costs already determined for each activity to calculate complete costs for each activity.

This knowledge of complete costs through ABC implementation is the fundamental, powerful information that enables a supply chain institution to transition into the continuous quality improvement approach of activity-based management.

Understanding complete costs allows supply chain managers to benchmark their throughput against their own history. If throughput increases, processes are working well. If it decreases, this alerts managers to determine the cause. It may be something that could not be controlled, such as a donor delivering multiple containers of products on the same day the previous month, or receipt of a product that was particularly difficult to handle. But if a process inefficiency is causing throughput to decrease, supply chain managers can make adjustments.

Supply chain managers can also benchmark against the broader field by learning how other countries have brought about improvements and successes through ABC and ABM.

As a country's supply chain institution learns from its ABC implementation and ABM transformation, it can provide donors with information on high-level numbers, such as the cost of goods and distribution numbers. This keeps donors informed of the true costs of warehousing and distribution.

Supply chain leadership can make informed decisions, based on monitoring of performance and cost data, in such areas as the need to hire more staff or procure additional trucks or add distribution points. They can modify or eliminate non-value-added activities.

ABC also gives supply chain managers a way to validate past or ongoing supply chain initiatives, because now they have the data on how successful those initiatives were/are.

One of the most impactful results of ABC and ABM is that rather than seeing and analyzing supply chain data infrequently (e.g., once a year) and perhaps being caught off guard by performance and cost data, you get feedback on performance and costs daily and monthly and can make ongoing improvements.

PHASE 6: Apply ABC Findings: Consider Whether Outsourcing Is an Option | Calculate Costs by Program or Donor | Determine a Service Fee

Consider Whether Outsourcing Is an Option

With this understanding of complete costs, supply chain managers can **consider whether outsourcing** warehousing and distribution services to private-sector vendors is an option to reduce costs.

For example, if warehousing and/or distribution needs are expanding, the knowledge of costs through ABC may show that outsourcing a portion of warehousing or distribution services could improve supply chain performance and/or save costs. If a supply chain institution has already had to rent additional warehouse space, the understanding of costs through ABC can help supply chain managers compare the cost to keep the extra building versus outsourcing warehousing services.

For distribution, supply chain managers could now compare their own distribution costs per kilometer or per cubic meter with that of a distribution services provider. If distribution needs have increased and/or products need to be distributed faster, supply chain managers can now compare the costs of buying more vehicles, hiring more drivers, and paying for maintenance, versus the costs of outsourcing. Supply chain managers could also examine annual vehicle maintenance costs and decide that it's more economical to outsource maintenance. ABC could also reveal to supply chain managers that delivering to every facility once per month is not necessary when most remote facilities might only need deliveries every two months.

If warehousing and/or distribution services are outsourced as a result of this informed decision- making, managers now have a reference point of their own costs and performance and can **better manage vendor contracts** accordingly to ensure expectations for cost and performance are met.

If distribution needs have increased and/or products need to be distributed faster, supply chain managers can now compare the costs of buying more vehicles, hiring more drivers, and paying for maintenance, versus the costs of outsourcing. PHOTO CREDIT: Mickael Breard | GHSC-PSM

Calculate Costs by Program or Donor

Public health supply chain warehouses often manage commodities based on the health program they are serving. Health programs can include HIV, malaria, TB, family planning, vaccines, laboratory, and essential medicines. Often, central warehouses also manage commodities on the basis of goods provided by donors (e.g., USAID, PEPFAR, the Global Fund, UNICEF) and goods that are procured by the country government.

While ABC analysis should be used on all commodities in a warehouse, it is important to be able to determine **complete costs by program or by donor** and the **percentage of total storage volume** each donor's products consume in the warehouse.

Also, governments wanting to **demonstrate a local contribution** to overall health commodity management may find ABC useful to determine the cost to the public health system to receive, store, and distribute donated commodities as a percentage of the cost of the commodities themselves.

Determine a Service Fee

In some environments, different donors or different programs may provide funding for supply chain services associated with the products they provide or support. In these systems, the appropriate percentage of costs should be based on the actual usage of resources. ABC implementation allows public health warehousing and distribution operations to define complete costs and calculate storage volume consumed by each commodity category. It enables warehouses to determine a reasonable **service fee which donors or programs should pay in return for the handling, storage, and distribution of their products**.

This service fee will be backed up by data such as real costs and volumetrics captured through ABC; hence, the service fee will be representative of the true costs of service that accurately reflects the specific costs associated with managing services provided by the warehouse for handling, storing, and distributing the donors' products.

While public-sector institutions do not operate to make a profit or earn revenue, a small and reasonable amount of additional funds from country budgets and donor service fees can serve as a buffer against uncertainty or to take advantage of unexpected opportunities. These additional fees should be transparent, auditable, and shared with donors. Donors and supply chain institutions can review additional fees and renegotiate the service fee based on the data annually.

Ultimately, the outcome of warehousing and distribution operations working well and becoming more efficient—combined with the costing information provided by ABC that enables ABM—is a sustainable supply chain that can be fully managed by country governments.

Ultimately, the outcome of warehousing and distribution operations working well and becoming more efficient—combined with the costing information provided by ABC that enables ABM—is **a sustainable supply chain that can be fully managed by country governments**.

A reasonable approach to determining a service fee would be to calculate the **percentage of volume that each donor's products occupies of the total space consumed in each warehouse by all funders**. The percentages of total consumed warehouse space occupied by each funder's products is determined by tracking volumetric data and taking an average over a period of time, such as one year. For example, Donor #1 may occupy an average of 20 percent of total consumed space, and Donor #2 may occupy an average of 30 percent.

Volumetric data for donor products can be analyzed not only for how much space is consumed in the warehouse, but also for how much space is consumed in vehicles for distribution. In vehicles, the same approach applies for calculating the **percentage of volume that each donor's products consume of the total truck space consumed by all donors**.

These warehousing and distribution fees should also be fully transparent, auditable, and shared with donors. Donors and supply chain institutions can review additional fees each year and renegotiate the service fee based on the data annually.

Then, **complete costs (direct + indirect) can be allocated** to each donor based on these volume percentages. This gives a warehousing and distribution operation an understanding of the real costs of providing services to these donors, which informs development of a fair service fee that can be proposed to and negotiated with donors.

Warehouses can also use these service fees to **incentivize donors to lower their own costs (i.e., fees paid) by procuring smaller, more frequent shipments** to keep inventory in the warehouse moving and avoid long-term occupation of storage space. For example, a warehouse can propose that its service fee would increase if products stay in the warehouse longer than three months.

Phase 7: Create an Executive Dashboard | Review Results and Take Necessary Action

Step 1. Create an Executive Dashboard for Annual Performance Monitoring

The final tool in ABC implementation is the executive dashboard, which provides warehousing and distribution leadership with **visibility into high-level cost and performance information** across all units for the previous year. Cost and performance data are taken from the previously developed tools—the daily planners, monthly direct labor report, and indirect cost database. See Annex I for a sample executive dashboard.

The executive dashboard enables historical benchmarking and **informs strategic supply chain decisions** for the whole supply chain. It is typically produced monthly but its value is in revealing broader trends across months or years and showing the performance of the overall supply chain entity.

It also shows how **trends interplay**. For example, the executive dashboard may show that fuel, miles, and worker overtime were higher in a given month than in other months that year. Supply chain managers can examine the correlation of those three trends to determine if there is a common root cause.

In conjunction with the executive dashboard, supply chain managers can create a **monthly quality assessment checklist** of questions to be completed by relevant staff to collect qualitative performance data in addition to the quantitative data in the dashboard. See Annex J for a sample monthly quality assessment checklist.

The executive dashboard provides an opportunity to **take activity-based management a step further** by developing **KPIs** as a component of the continuous quality improvement approach. Using this tool, managers and executives can establish routine meetings—weekly, biweekly, or monthly—to review the KPIs, identify gaps and inefficiencies, and develop and implement solutions. They can monitor solutions for effectiveness and further improve them, as needed. See Annex K for a sample of a completed executive dashboard.

One main KPI is **throughput**, but several **other aspects of warehousing and distribution performance can be assessed for quality,** such as:

— Value of goods dispatched

— Quantity of units delivered

- Cost of warehousing direct labor wages
- Cost of driver wages
- Warehousing direct labor as a percentage of quantity dispatched
- Driver labor as a percentage of quantity dispatched
- Fuel costs
- Fuel usage in liters
- Vehicle maintenance costs
- Kilometers driven
- Cost per kilometer

Step 2. Review the Executive Dashboard and Identify Action Steps

Based on review of the executive dashboard, leadership can work with managers and supervisors to make decisions about how to improve future performance by changing the conditions for workers, processes, equipment, locations, and such. Some examples of this proactive ABM approach are as follows:

Observation: Total commodity units and the value of goods dispatched are declining or increasing significantly during the same months each year (i.e., seasonality).

Potential actions:

- Consider hiring additional temporary workers during periods of increase.
- Encourage full-time workers to make plans to take leave during declining months (and discourage them from taking leave during increasing months).
- Consider the ability to add (or even rent) timesaving materials handling equipment to increase throughput during increasing months.

Observation: Total commodity units and the value of goods dispatched is declining or increasing consistently across the year.

Potential actions:

- Consider reducing or increasing the worker complement for the next planning cycle, if there are no other indications that demand will be affected during the next cycle.
- Consider the need for setting up additional storage space during increasing periods, possibly by re-organizing the current space, adding more racks, adding equipment capable of reaching higher racks, or even obtaining additional storage space.

Observation: Throughput is consistently increasing across the year.

Potential action:

- Consider reward programs for teams or all workers for sustaining performance.

Observation: Throughput has plateaued or decreased.

Potential action:

- Consider conducting a strategic meeting to determine how processes can be improved and whether investing in technology (e.g., gravity flow racking, equipment conveyor systems) is warranted and feasible.

Observation: The cost of labor as a percentage of goods dispatched is high.

Potential actions:

- Review worker salary rates and update these.
- If overtime is contributing to the high cost of labor, adjust staffing to control overtime costs.
- Consider the ratio of supervisors and managers to the number of workers, recognizing that supervisors and managers will have higher wage rates.
- Review process organization and possibly implement fixed bin locations for frequently picked items or move frequently picked items to lower levels of the racking.
- Take the opportunity to determine whether outsourcing is an option.

04.

ABC Case Study

PHOTO CREDIT: Andi Gultom | GHSC-PSM

LESOTHO

Successful ABC Implementation

Since its founding in 1979, Lesotho's National Drug Service Organization (NDSO) has been at the forefront of procurement, warehousing and distribution of essential medicines to health facilities owned by the Lesotho government and those affiliated with the Christian Health Association of Lesotho.

Note: In addition to this Lesotho case study, see Annex A for a second case study that aims to help readers better understand the concepts presented in this guide by demonstrating the calculations behind ABC.

To cover costs of its monthly deliveries to 10 health districts and five principal hospitals, NDSO established markups on donor-funded products and essential medicines. These health districts and principal hospitals were then responsible for conducting last-mile delivery of the medicines to health facilities.

However, in 2016, due to ongoing challenges in medicines being delivered from the health district level to the facility level, the MOH tasked NDSO with monthly last-mile delivery to approximately 220 health facilities. Last-mile deliveries can often be the most difficult and expensive segment in a supply chain due to increased distance, poor infrastructure, lack of paved roads and limited communication.

Challenge: How to Make Last-Mile Delivery Viable Financially

Intuitively, the additional costs associated with last-mile delivery would require NDSO's markups to be revised. An increased markup, however, would likely upset NDSO's customer base (donors), which might look for cheaper alternatives. But NDSO's senior management was also concerned that the service fee for donor-funded products was insufficient to cover NDSO's actual handling, storage and transportation costs. They were further concerned that the reimbursement for essential medicines had been set too low to ensure financial stability.

At the time, NDSO's financial cost models lacked the ability to accurately track actual operating costs by functional cost center or to quantify the effect of unforeseen disruptions in the supply chain. An example of such a disruption that needed to be accounted for in budgetary projections and costing models was PEPFAR's call to action to achieve the United Nations' 90-90-90 HIV/AIDS program targets, with their increased emphasis on laboratory services and the introduction of test-and-treat, an intervention strategy that called for earlier treatment of individuals diagnosed with HIV. Transition to these strategies initially challenged supply chain planning globally by changing the mix and increasing the volume of commodities flowing through the system. Until supply chains adjusted, the new strategies stretched resources at many levels, including in Lesotho.

Understanding Current Performance

With the support of USAID GHSC-PSM, NDSO began a multi-year initiative in 2016 to better understand overall operating expenses and the cost differences in product handling, storage and last-mile delivery requirements for donor-funded products and essential medicines. The goal was to identify opportunities to streamline processes, achieve cost efficiencies and enhance performance.

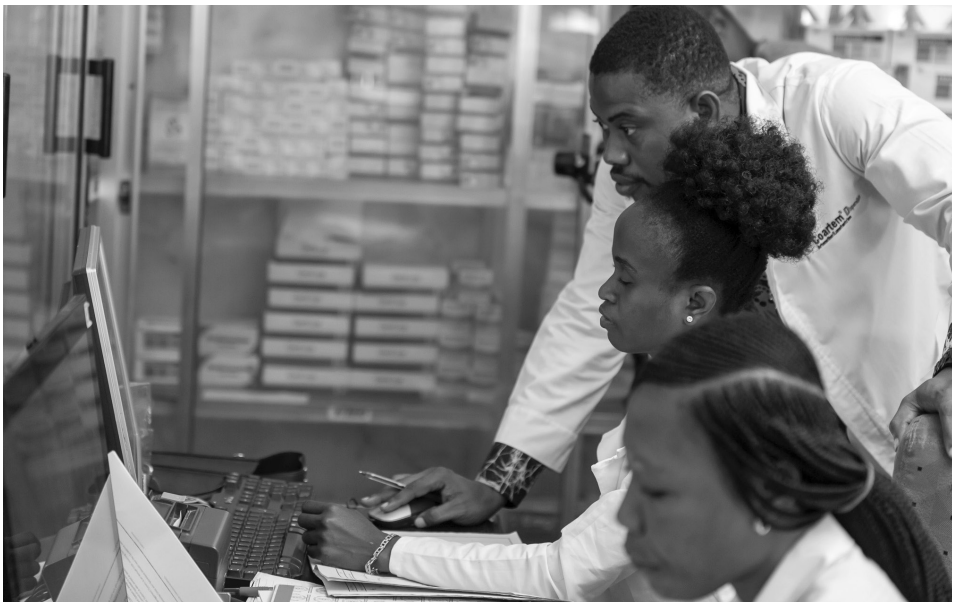
To do so, NDSO and GHSC-PSM prepared for application of the ABC model.

First, GHSC-PSM needed to collect baseline information. The project:

- Reviewed warehousing standard operating procedures
- Identified, implemented and mentored NDSO staff in warehousing best practices
- Developed KPIs to monitor distribution center performance
- Reviewed the NDSO cost recovery scheme and prepared options to achieve financial sustainability
- Analyzed data that included distribution center activities for ABC and data collection for distribution network optimization
- Carried out foundational work for the distribution network optimization and cost recovery assessment
- Helped NDSO prepare for implementation of a systems-strengthening strategy, including a modified push model, last-mile delivery and biweekly deliveries
- Created a roadmap for ABC implementation with next steps and suggested interventions
- Reviewed the existing enterprise resource planning (ERP) tool and identified gaps in its use
- Built NDSO capacity by:
  - Providing the operators with a suite of tools to manage distribution center and transportation performance in conjunction with existing ERP and payroll systems
  - Teaching them how to take financial ownership of the supply chain

Implementing ABC to Determine True Costs

Next, to understand NDSO's true costs, GHSC-PSM applied ABC performance and accountability tools at the financial, distribution center, transportation and customer-service levels, ensuring capacity building and true ownership of the operator. Using ABC methodologies allowed for the supply chain to charge donors a service fee for the actual activity and not a commodity value-based "tax."



Pharmacists entering consumption data. PHOTO CREDIT: 5Fifty Production | GHSC-PSM

GHSC-PSM introduced unique tools to measure the costs of all NDSO activities:

Labor Reporting Tool

This tool is used for reporting throughput performance by period (monthly) for the fiscal year and can be used as a forecasting tool for future years. GHSC-PSM trained the NDSO finance manager and other key staff to accurately track:

- Throughput—the movement of goods and the time expended by function
- Expenses per function, expressed as a financial value and as a percentage of the service provided
- Impact of overtime on financial performance (if applicable)

Warehouse Self-Assessment Tool

This is an Excel-based tool that measures qualitative efforts to follow best-in-class warehouse practices; WHO's good warehousing practices; and quantitative checks against adherence to systems, health and safety, and processes. The self-administered tool is applied monthly, reinforcing best practices and assisting the user in developing improvement plans.

Executive Dashboard

This tool provides senior management with a monthly snapshot of the following KPIs:

- Financial year-to-date trends and averages for all operational costs
- Expense as a percentage of the service provided or the cost of goods for transportation and warehousing
- Results of a monthly NDSO assessment of all aspects of operations (process, organization, health and safety) that identifies challenges and enables staff to determine and implement solutions, fostering continual improvement

ABC Tracker

This tool differentiates the true cost per commodity unit by category (donor-funded products or essential medicines) to receive, store, pick, pack and ship. All activities

Activity-based costing gives managers a new perspective on how best to utilize human and financial resources. PHOTO CREDIT: Mickael Breard | GHSC-PSM

for donor-funded products and essential medicines are segregated and quantified.

The actual costs for both commodity categories are identified for the fiscal year to date.

Draft Service Fee Calculator with Incentive Structure

At NDSO's request, GHSC-PSM developed a draft Excel-based calculator using the NDSO ABC model. The calculator demonstrates the actual impact of all distribution center and transportation costs per month, with an emphasis on incentives for the donor to optimize procurement schedules to help improve the rate of inventory turnover and mitigate the adverse impact of long-term, slow-moving inventory storage on performance and costs.

Compiling and Leveraging the Data

GHSC-PSM taught NDSO operators how to continue to collect and compile the data using the above tools. By continuing to track all direct and indirect costs, the reporting output allows NDSO leadership to fully understand the current cost structure. This reporting can be updated at any time by local staff and provides:

- Costs by function—procurement, receiving, storage, selection, transportation
- Management costs as a percentage of total supply chain costs
- Costs by unit per commodity
- Costs as a percentage of the total commodity value
- Per dollar (local currency) of value, volume or weight of commodities
- Per kilometer transported
- Costs by supply chain tier (central level, regional level, clinic, or urban vs. rural)
- Costs of labor for procurement, transportation, storage and management

With the above processes and tracking tools implemented in Lesotho, NDSO management tracked costs at the activity level. The model gave insight into donor-funded products and essential medicines, and the total volume of the mix of both product categories.

With this knowledge, NDSO moved from a reactive state, in which it lacked visibility into the drivers behind its financial performance, to a proactive state, understanding the impacts of its markup decisions on future performance. ABC provides the foundational work to understand what is happening and why.

Lessons Learned and Recommendations

A successful and sustainable transition to ABC requires commitment from local leadership, buy-in from all stakeholders —especially employees—and a change management strategy.

Early on, a focus on quick wins during the initial work with the ABC advisors helped gain employee trust. However, that did not allay NDSO employee suspicion that the ABC effort would be used as pretense for staff reductions. Senior management worked hard to explain and assure staff that this was not the intention, but rather that improving patient outcomes was and is the drive for ABC. That has been proven over time by senior leadership's commitment to retaining current positions and promoting from within.

Strong in-country GHSC-PSM leadership and collaboration with NDSO's senior management, driven by the NDSO general manager, were key factors in the initiative's success. The general manager's buy-in also meant GHSC-PSM was granted access

Strong GHSC-PSM leadership and collaboration with NDSO's senior management, driven by the NDSO general manager, were key factors in the initiative's success.

RESULTS OF ABC IMPLEMENTATION IN LESOTHO

TIME SAVING
NDSO reduced its internal distribution center order entry to dispatched cycle time from two weeks to four days.

SELF-RELIANCE
NDSO transitioned to true activity-based management, exercising full control of its supply chain and operating in a state of continual improvement, requiring no outside intervention.

TRANSPARENCY
NDSO routinely monitors the costs of every aspect of its operations and better monitors and controls its expenses, resulting in a threefold improvement in financial performance.

EFFICIENCY
By gathering, measuring, reporting and analyzing true costs generated, NDSO became more resilient and efficient.

STAFF MORALE
NDSO staff became more engaged in process changes, worked together as a team and had direct input into the evolving processes, boosting morale.

to sensitive financial data and existing system information. If the general manager or other senior managers were not forthcoming with information, the ABC study would not have realized the success that it did.

Results

ABC implementation in Lesotho led to a number of results:

Time Saving

Over the ABC initiative's duration, NDSO reduced its internal distribution center cycle time for order entry to dispatch from two weeks to four days. Its year-over-year financial performance and stability also continue to improve.

Shift to Self-Reliance

Completion of the ABC work saw NDSO transition to true activity-based management. The senior leadership was empowered to operate the supply chain with full knowledge of how decisions they made immediately affected service for the end recipient. By using ABC/activity-based management, NDSO executive leaders exercise full control of their supply chain and operate in a state of continual improvement, requiring no outside intervention.

Operational and Financial Transparency

Before ABC adoption, NDSO lacked visibility into exactly which distribution center functions accounted for what portions of its recurring expenses. Like many developmental logistics supply chains, NDSO only had access to top-line annual costs totaled for all functions. Now, NDSO routinely monitors the costs of every aspect of its operations and better monitors and controls its expenses. The fiscal year ending 2017 saw a very positive outcome in bottom-line financial performance. By the end of 2018, NDSO's more efficient processes and reduced costs resulted in a threefold improvement in financial performance.

With visibility into operating costs, NDSO senior managers could improve efficiency and curtail costs to the point that they "broke even" while maintaining the same markups. They could also contemplate establishing a strategic capital investment fund to become more autonomous in the future and fund infrastructure expansion improvements. (A capital investment strategy for a supply chain uses some of the money available at end of the fiscal year, due to the high-level performance against past actual outcomes, to sustain and improve the facilities.)

Resiliency and Efficiency

By gathering, measuring, reporting and analyzing true costs generated, NDSO became more resilient and efficient. Overall, reduced operational costs allowed limited donor and MOH monies to be spent on other areas to help further improve supply chain performance and ensure greater access for patients.

Staff Engagement and Morale

Once staff understood the intention and benefits of ABC implementation and bought into the change, they became more engaged in the process changes, worked together as a team and had direct input into the evolving processes. This made staff feel empowered and improved morale.

National Drug Service Organization (NDSO) staff in Lesotho conduct daily planning of distribution center activities as part of ABC implementation. PHOTO CREDIT: GHSC-PSM

05.
Conclusion

PHOTO CREDIT: Jennifer Moffatt | Chemonics

Understanding of Operational Costs through ABC Leads to ABM, a More Effective, Informed Approach to Supply Chain Management

In public health supply chains, implementing ABC in warehousing and distribution establishes the complete costs of operation, which enables a more informed, proactive management approach to be built on this essential knowledge. Improved costing and management practices tie directly to improved supply chain management and performance overall.

Benefits of the ABC model are that it:

- Determines complete costs of warehousing and distribution
- Drives operational improvement and cost savings
- Enables cost transparency
- Increases staff collaboration and engagement, thereby helping improve morale
- Builds country ownership of warehousing and distribution operations, enabling more agile and informed decision-making

Challenges and considerations of ABC include the following:

- The change management required to effectively implement the ABC model takes time and planning and requires the commitment of leadership and buy-in of stakeholders.
- Costing data and information produced in ABC may be unfamiliar to warehousing and distribution managers and may require ongoing guidance and capacity building.

As mentioned above, ABC is intended to be a long-term, iterative process. As supply chain managers and staff become more comfortable practicing ABC and see the benefits emerge, they can get more specific about how costs and performance are measured. And they can measure additional data points to make the overall cost and performance data more robust.

Appendices

Section 06.

PHOTO CREDIT: Cwesi Ofori | GHSC-PSM

ANNEX A | Sample Case Study

To better understand the concepts presented in this guide, readers may find it useful to work from a sample case study that demonstrates the calculations behind activity-based costing. In this sample case study, all sample data are taken from the same dataset. The sample data are intended to show how a manager can complete the calculations using a single period of data—in this case, one quarter.

In this example, as noted in the main part of this guide, the cost drivers are the most important elements to record and capture. As noted, labor inside the warehouse—the workers who actually handle the commodities—are the single most important driver of costs. The sample case study includes 30 warehouse workers. They each work eight hours per day (not including breaks) and are assigned to one of four tasks: receiving, put-away, picking/packing (considered together as one activity for the sample case study), and loading/dispatch. Because these workers handle commodities, they are the "direct labor." The administration of the warehouse—including directors, administrative staff, financial staff, procurement staff, building security, cleaners, and others—are not included in the throughput calculations because they do not handle commodities.

Calculating Throughput Using Information from the Daily Planner

As noted in the guide, the most important calculation is throughput by activity. Using information from the daily planner, calculate the throughput as shown in TABLE 1.

To understand the math, the number of workers (row 1) is multiplied by the number of hours worked each day (row 2) to determine the number of work hours (row 3). The number of units handled (row 4) is divided by the number of work hours (row 3) to calculate the throughput, resulting in the number of units per worker per hour.

Throughput Calculation by Activity

Activity Throughput *(units/person/hour for each activity)* = Total Number of Units Handled ÷ Total Number of Person-Hours

The data also show that the units that arrived in receiving were all put away during the day and that four workers doing put-away moved the same number of units as eight workers in receiving. Does that make sense? It probably does, assuming the warehouse is well laid out. If units arrived in 40-foot containers and were not palletized and were mixed goods, the receiving team would have had to remove the units by hand and palletize the same goods together. The put-away workers would then need to use pallet jacks and forklifts to move the pallets to their assigned locations in the warehouse. Put-away in this situation is faster than receiving.

Similarly, we can see that the pick/pack team had 12 workers on this day and only moved one quarter the number of units of the other teams, yet had more people. Does that make sense? In fact, order picking alone "typically accounts for 55 percent of warehouse operating costs," with 55 percent of time spent traveling, 15 percent

TABLE 1: Calculating Throughput

	Receiving	Put-Away	Picking/Packing	Dispatching	Total
	A	B	C	D	E
# of Workers	8	4	12	6	30
# of Hours/Day	8	8	8	8	
# of Work Hours/Day	64	32	96	48	240
# Units Handled	10,000	10,000	2,500	2,500	–
Activity Throughput Per Worker Per Hour	156	313	26	52	–

searching, 10 percent extracting, and 20 percent paperwork and other activities.[3] When the picking is done at less than the carton/case level, picking can account for as much as 70 percent of time in the warehouse. The dispatching team could dispatch only as many units as the pick/pack team could pick.

The total ***warehouse*** throughput is not the total for all activities. The warehouse throughput is limited to the quantity that is dispatched from the warehouse only and is the total number of units dispatched divided by the total number of work hours for all activities. In this case, the data tell us that 2,500 units were ***dispatched*** and the total labor was 240 person-hours, for a warehouse throughput of 10 units per person per hour. While the volume of work done for each task measures productivity, the value is not in moving goods within a warehouse, but only once they have been dispatched.

Warehouse Throughput Calculation

Activity Throughput *(units/worker/hour)* = Total Number of Units Dispatched ÷ Total Number of Work-Hours for All Activities

Warehouse throughput is an important measure because the warehouse only adds value when it is in passing along the goods to reach the customer. All activities in a warehouse are measured with throughput to understand the total cost for each activity and the ability to manage the flow or coordination of goods through the warehouse.

When looking at the table, one might ask if this level of performance is above or below what might be expected. There is no specific benchmark or expected throughput for either an activity or for a warehouse, making the throughput a relative, not an absolute measure. In fact, throughput, even for the same activity, can and will vary from day to day because of several factors, including which workers are working on any particular day, the way trucks are packed (and therefore, unpacked), the way "basic units" are counted, and the types of units being handled.

Throughput for one activity cannot be directly compared to throughput for others—for example, while we know that picking will have the lowest throughput, we cannot say for certain that picking relative to put-away has a throughput that is X times as much. On any given day, it is also possible that only receiving and put-away occur or that only picking, packing, and loading occur. Over time, however, a throughput performance benchmark will be established. This allows the manager to balance all warehouse activities together and identify which areas are non-value added.

Calculating the Direct Warehouse Labor Report Using Wage Information

As noted in the guide, while the daily planner provides ***performance*** information, managers will need to take the cost of direct warehouse labor from the financial reports to create the direct labor report. TABLE 2 shows data for an entire quarter, January through March (Quarter 1), and it combines information about the number of units received and dispatched with financial data to give us the direct labor cost.

In this example, the CMS has dispatched, $13,200,000 of goods during the quarter, based on its catalog sales price of $22 each. The cost of goods (COG) dispatched is $12,000,000, so the quarter has an operational revenue of $1,200,000.

Using the information about the ***cost of labor*** in the warehouse, managers can calculate the costed throughput per unit and the labor cost as a percentage of the cost of goods.

The formula shows how to calculate the costed throughput per unit.

Costed Throughput Per Unit

Costed Throughput Per Unit = Cost of Labor by Activity ÷ Total Units Dispatched

Based on the data from TABLE 2, the cost of each unit that flows through the warehouse and is dispatched will be $0.36 more than the cost of the item itself. The cost of depreciation of the warehouse and the cost of supplies (e.g., tape, boxes) increase the total warehouse cost to $0.37.

The formula below shows how to calculate the labor cost as a percentage of the cost of sales.

Labor Cost as a Percentage of the Cost of Sales

Labor Cost as a Percentage of the Cost of Sales = Cost of Labor by Activity ÷ Total Cost of Units Dispatched x 100

The sample data show that each unit that flows through the warehouse and is dispatched will cost 1.55 percent more than the cost of the item itself. The direct labor, therefore, is 1.85 percent of the 9.09 percent of the operating cost (see TABLE 2).

[3] Warehouse & Distribution Science, Release 0.98, John J Bartholdi, III, and Steve T. Hackman, revise August 28, 2017, pages 24–25. This is a free, downloadable resource, with significant information on how to make warehousing more efficient. That same source notes that receiving is about 10 percent of costs and put-away about 15 percent of costs.

TABLE 2: Calculating Direct Labor Cost

Quarter 1 (January-March)			
	$ or Units	$/Unit	% of COG
Number of Units Received	1,050,000		
Number of Units Dispatched	600,000		
Total Value	**$13,200,000**	**$22.00**	
Cost of Goods Dispatched	$12,000,000	$20.00	90.91%
Operational Revenue	$1,200,000	$2.00	9.09%
Expenses			
Warehouse			
Direct Labor			
Receiving	$36,000	$0.06	0.30%
Put-Away	$36,000	$0.06	0.30%
Picking	$72,000	$0.12	0.60%
Dispatching	$72,000	$0.12	0.60%
Direct Labor Total	**$216,000**	**$0.36**	**1.80%**
Depreciation	500		
Supplies	5,000		
Warehouse Total	**$221,500**	**$ 0.37**	**1.85%**

The sample data below show that each unit that flows through the warehouse and is dispatched will cost 1.55 percent more than the cost of the item itself. The direct labor, therefore, is 1.85 percent of the 9.09 percent of the operating cost.

Calculating the Transportation Cost Using the Number of Kilometers Driven and Financial Information

To calculate the cost of transportation, the total number of kilometers driven is taken from all vehicle logs for the quarter. The number of units dispatched—600,000—is the basis for the transportation calculation costs per unit.

The formulas for calculating transportation costs are not as detailed as for the warehouse, since the driver is associated only with the number of kilometers driven and the math is not a function of how long sub-tasks may have taken.

See TABLE 3, where the sample data shows, in the second column, figures from the daily planners and financial records, and the third and fourth columns are calculations.

Based on the data in the table, the cost per kilometer is:

Cost Per Kilometer

Cost Per Kilometer = Total Cost of Transportation ÷ Number of Kilometers Driven this Month

Managers can also calculate the throughput for distribution, called the "fleet yield."

Fleet Yield

Fleet Yield = Units Delivered this Month ÷ Driver-Hours this Month

Managers can also calculate the cost of labor as a percentage of the cost of goods dispatched (units delivered) and the cost per liter of fuel using the data in the financial reports.

TABLE 3. Calculating Transportation Costs

Quarter 1 (January-March)			
	$ or Units	$/Unit	% of COG
Number of Units Received	1,050,000		
Number of Units Dispatched	600,000		
Total Value	**$13,200,000**		
Cost of Goods Dispatched	$12,000,000	$20.00	90.91%
Operational Revenue	$1,200,000	$2.00	9.09%
Expenses			
Transportation		km driven	25,000
Labor	$250,000	$0.42	2.08%
Fuel	$78,000	$ 0.13	0.65%
Insurance	$12,000	$0.02	0.10%
Maintenance	$20,000	$0.03	0.17%
Depreciation	$17,604	$0.03	0.15%
Transportation Total	**$377,604**	**$0.63**	**3.15%**
$/km		*$15.10*	

Calculating All other Indirect Costs Using Financial Information

As noted in the guide, within the cost of the warehouse are several indirect costs required to run the warehouse operation. These include:

- The cost of warehouse administrative labor
- Other administrative costs
- The cost of procurement labor for any procurement of non-donated products conducted by warehouse staff
- The cost of the operating the building (infrastructure)

These costs must also be taken from financial reports and are included in account or sub-account codes within the financial reporting system. .

Like direct costs, indirect costs are also calculated based on the cost of goods dispatched and number of units dispatched, because these are the only units that have been dispatched and completed the flow through the warehouse. See TABLE 4

The formula for calculating the indirect costs is:

Indirect Cost Calculation

Indirect Cost/Unit Dispatched = Cost of the Account/ Subaccount ÷ Number of Units Dispatched

"Account" and "subaccount" in this formula refer to the accounts and subaccounts in the warehouse's financial system. For example, a main account would be insurance, and the subaccounts would be the different types of insurance (flood, fire, etc.).

Calculating Profit/Loss

Note: For this case study, the terms "profit," "loss," and "revenue" are used. As mentioned in Phase 6 in the discussion about donor service fees, while public-sector institutions do not operate to make a profit or earn revenue, the idea being discussed in the context of ABC implementation is that once supply chain institutions and country governments understand the costs of warehousing and distribution and begin to make informed decisions to improve

TABLE 4. Calculating Indirect Costs

Quarter 1 (January-March)			
	$ or Units	$/Unit	% of COG
Number of Units Received	1,050,000		
Number of Units Dispatched	600,000		
Total Value	**$13,200,000**		
Cost of Goods Dispatched	$12,000,000	$20.00	90.91%
Operational Revenue	$1,200,000	$2.00	9.09%
Administrative			
Labor			
Management Team	$28,500	$0.05	0.24%
Finance Team	$17,000	$0.03	0.14%
Customer Service	$24,000	***$0.04***	0.20%
Clearance (Import)	$6,000	$0.01	0.05%
Other Admin Costs	$5,000	$0.01	0.04%
IT			
Software/Equipment/Internet	$25,000	$0.04	0.21%
Administrative Total	**$105,500**	**$0.18**	**0.88%**
Procurement			
Labor	$30,000	$0.05	0.25%
Procurement Total	**$30,000**	**$0.05**	**0.25%**
Building			
Rent	$50,000	$0.08	0.42%
Utilities	$12,500	$0.02	0.10%
Security	$30,000	$0.05	0.25%
Maintenance	$15,000	$0.03	0.13%
Insurance	$10,000	$0.02	0.08%
Depreciation	$20,000	$0.03	0.17%
Building Total	**$137,500**	**$0.23**	**1.15%**
Total of Indirect Costs	**$273,000**		**2.28%**

The total of all expenses is $872,104, and this is $1.45 per unit and 7.27 percent of the value of the cost of goods. In this quarter, there is a gain of $327,896, representing a gain of 1.82 percent.

supply chain performance and efficiencies, an ideal outcome of this is that they can ensure that operational costs are recouped through country budgets and fair, transparent donor service fees, and any additional funds can serve as a buffer against uncertainty and can be invested back into warehousing and distribution.

For example, warehouse racking and equipment and vehicles used for distribution can be better maintained or upgraded before a full breakdown occurs and interrupts operations. By investing to keep supply chain operations functioning and up to date, supply chain institutions and country governments can save operational costs because the supply chain becomes more efficient. Ultimately, the outcome of warehousing and distribution operations working well and becoming more efficient—combined with the costing information provided by ABC that enables ABM—is a sustainable supply chain that can be fully managed by country governments.

To understand the complete costs for a central warehouse, managers must gather data from all tables that appear above. TABLE 5 summarizes the tables that appear above and represents the total costs of operating the warehouse for the sample data. From the Quarter 1 (January–March) table above, the total of all expenses is $872,104, and this is $1.45 per unit and 7.27 percent of the value of the cost of goods. In this quarter, there is a gain of $327,896, representing a gain of 1.82 percent.

TABLE 5. Calculating Profit Loss

Quarter 1 (January-March)			
	$ or Units	$/Unit	% of COG
Number of Units Received	1,050,000		
Number of Units Dispatched	600,000		
Total Value	**$13,200,000**		
Cost of Goods Dispatched	$12,000,000	$20.00	90.91%
Operational Revenue	$1,200,000	$2.00	9.09%
Expenses			
Warehouse			
Warehouse Total	$221,500	$0.37	1.85%
Administrative			
Administrative Total	$105,500	$0.18	0.88%
Procurement			
Procurement Total	$30,000	$0.05	0.25%
Building			
Building Total	$137,500	$0.23	1.15%
Transportation		km driven	25,000
Transportation Total	$377,604	$0.63	3.15%
Cost/km		*$15.10*	
Total All Expenses	**$872,104**	**$1.45**	**7.27%**
Net Income/Loss	**$327,896**		**1.82%**

Calculating Costs by Program or Donor

As noted in the guide, allocating costs for warehousing and distribution to each health program or donor is often useful. The basic principle is that each donor or program should fund the appropriate percentage of costs based on resource use. For the sample case study, the following are the steps for allocating costs for a single donor:

1. Review each category of expense to determine if the program or donor is involved in the activity. Donors may be unable or unwilling to fund the cost of some expenses of the warehouse. In this example, assuming the donor is donating commodities that have already been procured, the donor does not want to pay any costs associated with the procurement function.

2. Examine the percentage of each warehousing activity that might be attributed to the donor. This is done by reviewing the total units handled and breaking this down by which items were donated and which items were not and calculating the percentage attributable to donated goods. See TABLE 6.

   (Note: While this section presents an example of one quarter, more than one quarter's worth of data is examined to determine costs per program or donor—often a year or more, as agreed to with a donor; see section called Reviewing costs by quarter across a year for more details.)

   Knowing which products were donated and which were not should not be difficult to calculate. Donors often donate uniquely identifiable products by name or brand, and a warehouse should be able to differentiate to the item level. For example, an MOH may have oral contraceptives donated by a donor and those procured by the government. While they may be similar, each should have its own item number in the WMS (or in supply plans or receiving records if a WMS is not in place). By identifying the unique items, separating them into these categories should be relatively straightforward.

   The data suggest that during the quarter, donated products accounted for 71 percent of all units received but 75 percent of all units dispatched. These percentages are then applied to the values and the donated total is calculated. See TABLE 7.

   How was the percentage for "depreciation" and "supplies" determined to be 75 percent? Most public health warehouses have a depreciation schedule in place for capital investments (e.g., forklifts, laptops, buildings), which is tracked in their financial system. Based on the depreciation schedule, a discussion with the finance team would determine how to allocate these costs to the donor, and an agreement between the donor and the MOH about what costs it would be willing to support would be considered in this determination as well.

3. Calculate transportation costs based on the space consumed (volume/cubic meters) in dispatched truck loads apportioned to each program or donor according to total cubic volume dispatched/consumed. For the 600,000 units dispatched, it should not be difficult to obtain the volumes dispatched by item from the WMS. See TABLE 8.

   In this case, donor products account for 69 percent of all of the volume shipped, and as such, the donor should pay 69 percent of all costs associated with transportation to cover the costs. See TABLE 9.

TABLE 6. Donor Percentage by Activity

Activity	Total	MOH	Donated	Donor %
Receiving	1,050,000	300,000	750,000	71%
Put-Away	1,050,000	300,000	750,000	71%
Picking/Packing	600,000	150,000	450,000	75%
Loading/Dispatch	600,000	150,000	450,000	75%

TABLE 7. Calculating Warehouse Donated Total

Warehouse		
Direct Labor	$	Donor %
Receiving	$ 36,000	71%
Put-Away	$36,000	71%
Picking	$72,000	75%
Dispatching	$72,000	75%
Direct Labor Total	**$216,000**	
Depreciation	$ 500	75%
Supplies	$5,000	75%
Warehouse Total	**$221,500**	
Warehouse Donated Total	**$163,554**	**74%**

TABLE 8. Shipped Volume

	Total	MOH	Donated	Donor %
Volume shipped in cubic meters	**18,125**	**5,625**	**12,500**	**69%**

TABLE 9. Calculating Transportation Donated Total

Transportation	$	Donor %
Labor	$250,000	69%
Fuel	$78,000	69%
Insurance	$12,000	69%
Maintenance	$20,000	69%
Depreciation	**$ 17,604**	**69%**
Transportation Total	**$377,604**	
Transportation Donated total	***$260,547***	***69%***

4. Consider that, for indirect labor costs, it is unlikely that the management and financial team costs are divided between donor and non-donor costs on the basis of the inbound and outbound goods. Consequently, we recommend that interviews be conducted to determine the reasonable percentage of indirect labor time to attribute to the donor (see the discussion about interviews and indirect labor allocations under Phase 5 Step 2 in the main text). See TABLE 10.

5. Consider the donor's role. As noted in Step 1, the donor does not want to pay for the costs of procurement since donated goods have already been procured, so no value should be assigned to the donor. See TABLE 11.

6. Determine the cost of the building. A more accurate calculation would be based on the stock on hand at the end of the quarter and determining the actual volume of goods stored by donors and non-donors. In a warehouse with strong data systems, a report by item for volume could be obtained from the WMS. For example, assume the stock on hand by volume shows the following: (See TABLE 12)

TABLE 10. Calculating Administrative Donated Total

Administrative		
Labor	$	Donor %
Management Team	$28,500	33%
Finance Team	$17,000	29%
Customer Service	$24,000	31%
Order Management	$6,000	33%
Other Admin Costs	$5,000	31%
IT		
Software/Equipment/Internet	$25,000	31%
Administrative Total	**$105,500**	
Administrative Donated Total	***$33,259***	***32%***

TABLE 11. Calculating Procurement Donated Total

Procurement	**$**	**%**
Labor	$30,000	0%
Procurement Total	**$30,000**	
Procurement Donated Total	***$ -***	***0%***

TABLE 12. Stock on Hand Donated Total

	Total	**MOH**	**Donated**	**Donor %**
Stock on hand in cubic meters	**19,375**	**6,250**	**13,125**	**68%**

In this case, donor products account for 68 percent of all volume in the warehouse and therefore the donor should pay 68 percent of all costs associated with the building to cover the cost of storage. (See also the discussion under Phase 6) in the main text about apportioning warehousing and distribution costs to donors based on total space ***consumed*** in the warehouse and on trucks by all donors, rather than total space ***available***.) See TABLE 13.

It might be valuable to make the analysis of building costs more detailed by separating out additional buildings that may have been rented to hold donor goods and to break down utilities by estimating cold chain storage costs.

7. Determine the total cost, the donor cost, and the donor percentage for the entire operation. See TABLE 14.

The sample information in this case study shows how these calculations are implemented for a single donor. This process can be repeated for as many donors and programs as is required to appropriately demonstrate the costs.

TABLE 13. Calculating Building Donated Total

Building	$	Donor %
Rent	$80,000	68%
Utilities	$9,500	68%
Security	$14,000	68%
Maintenance	$11,000	68%
Insurance	$10,000	68%
Depreciation	$13,000	68%
Building Total	**$137,500**	
Building Donated Total	***$93,145***	***68%***

TABLE 14. All Costs and Percentage of Costs for Donated Total

Units Dispatched	**600,000**		
	$	Donor $	Donor %
Expenses			
Warehouse Total	**$221,500**	**$ 163,554**	**74%**
Administrative	$105,500	$33,259	32%
Procurement			
Procurement Total	**$30,000**	**$0**	**0%**
Building			
Building Total	**$137,500**	**$93,145**	**68%**
Transportation	$377,604	$260,254	69%
Total all expenses	**$872,104**	**$550,504**	**63%**

Reviewing Costs by Quarter Across a Year

As noted in the introduction to this sample case study, the sample data used are intended to show how a manager can complete the calculations using a single period of data (one quarter, in this case). Managers will find it useful, however, to examine data across more than one quarter to look for patterns. While it is not possible to show all the sample calculations for all the rows in the analysis above that might be seen easily in an Excel spreadsheet, the following sample of data in TABLE 15 may be useful.

What Can a Manager Learn From The Data? Here are Some of the Things that Might Be Occurring:

— Note the way in which the total of all expenses increases and decreases with the quantity of goods dispatched. In the third quarter, expenses are 12.71 percent of the cost of goods. If this is higher than other quarters, for example, it would raise the question of why it is higher and would prompt managers to gather more information and determine a solution. This is the essence of activity-based management—using cost information to identify inefficiencies, ask critical questions, and develop solutions.

— Note that the net income is highest in the quarter with the highest number of goods dispatched. In the third quarter, however, the CMS has actually spent more than it has received in revenue. This could be driven by overtime, for example, which could mean that hiring more temporary labor during busier times is justified. It could also mean that the learning curve for temporary workers is too long, which would signify that more training is needed to ensure workers are prepared by the time busy seasons (e.g., the holiday season, rainy season) begin. It could also mean that the warehouse is receiving a higher quantity of products consistently and needs to spend more on full-time labor to handle the workload.

— The cost of labor increases greatly in the April–June quarter and decreases greatly in the July–September quarter. Managers might consider reviewing why this has happened. This might be the result of stocking up facilities for all goods in preparation for a rainy season July–September or a mass campaign for malaria bed nets. If this is the case, then lowering this seasonal increase in labor cost may not be possible, or managers could determine if training of temporary workers is sufficient to lessen the learning curve and improve operational efficiency and cost savings. If the cause of the labor increases is not seasonal, managers would work to identify the cause and determine a solution.

— In the third quarter, because the number of goods dispatched is lower, the percentage of labor to the cost of goods increases greatly. This is the result of having to continue to pay staff, despite the decrease in goods shipped out.

— Note that the financial value of indirect costs does not change across quarters, but the cost per unit and the percentage of cost of goods goes up or down based on the number of goods dispatched.

Reviews of the financial information across the year can provide valuable insight about the need to schedule and manage inbound goods (receiving), how to manage the number of full-time staff and their overtime, how to manage the need for day laborers, and how to plan and prepare for known seasonal fluctuations.

TABLE 15. Costs by Quarter Across a Year

	Quarter 1 (January-March)			Quarter 2 (April–June)			Quarter 3 (July–September)			Quarter 4 (October-December)		
	$	$/Unit	%/COG	$	$/Unit	%/COG	$	$/Unit	%/COG	$	$/Unit	%/COG
Units Dispatched	$600,000			$975,000			$300,000			600,000		
Total Value of Goods Dispatched	$13,200,000			$21,450,000			$6,600,000			$13,200,000		
Cost of Goods Dispatched	$12,000,000	$20.00	90.91%	$19,500,000	$20.00	90.91%	$6,000,000	$20.00	90.91%	$12,000,000	$20.00	90.91%
Operational Revenue	$1,200,000	$2.00	9.09%	$1,950,000	$2.00	9.09%	$600,000	$2.00	9.09%	$1,200,000	$2.00	9.09%
Expenses												
Warehouse												
Warehouse Total	$221,500	$0.37	1.85%	$438,500	$0.45	2.25%	$320,500	$ 1.07	5.34%	$221,500	$0.37	1.85%
Administrative												
Administrative Total	$105,500	$0.18	0.88%	$105,500	$0.11	0.54%	$105,500	$0.35	1.76%	$105,500	$0.18	0.88%
Procurement												
Procurement Total	$30,000	$0.05	0.25%	$30,000	$0.03	0.15%	$30,000	$0.10	0.50%	$30,000	$0.05	0.25%
Building												
Building Total	$137,500	$0.23	1.15%	$137,500	$0.14	0.71%	$137,500	$0.46	2.29%	$137,500	$0.23	1.15%
Transportation		km driven	25,000		km driven	0,500		km driven	11,250		km driven	16,500
Transportation Total	$377,604	$0.63	3.15%	$455,729	$0.47	2.34%	$169,271	$0.56	2.82%	$247,396	$0.41	2.06%
		$15.10			$14.94			$15.05			$14.99	
Total All Expenses	**$872,104**	**$1.45**	**7.27%**	**$1,167,229**	**$1.20**	**5.99%**	**$762,771**	**$2.54**	**12.71%**	**$741,896**	**$1.24**	**6.18%**
Net Income	**$327,896**			**$782,771**			**$(162,771)**			**$458,104**		

TABLE 16. Summary of Data for All Quarters

	Quarter 1 (January–March)			Quarter 2 (April-June)			Quarter 3 (July-September)			Quarter 4 (October-December)			TOTAL		
Units Dispatched	600,000			975,000			300,000			600,000			2,475,000		
	$	$/Unit	%/COG	$	$/Unit	%/COG	$	$/Unit	%/COG	$	$/Unit	%/COG	$	$/Unit	%/COG
Total Value of Goods Dispatched	$13,200,000			$21,450,000			$6,600,000			$13,200,000			$54,450,000		
Total All Expenses	$872,104	$1.45	7.27%	$1,167,229	$ 1.20	5.99%	$762,771	$2.54	12.71%	$741,896	$1.24	6.18%	$3,544,000		7.16%
Net Income	$327,896			$ 782,771			$(162,771)			$ 458,104			1,406,000		

Calculate a service fee based on complete costs:

The donor service fee for warehousing and distribution services is reflective of actual costs of operations. The value of the fee should be based on the cost of actual expenses, plus a reasonable service fee, which will serve as a buffer against uncertainty and allow the warehouse to make capital investments to keep the supply chain operational, helping to improve efficiencies and save costs over the long term. The calculation of the service fee should be based on an analysis of financial data on profits and losses.

TABLE 16 is a summary of data from the financial system for all quarters, showing the cost of all expenses and the quarterly percentage of cost of goods.

This data for all quarters show that expenses ranged from 5.99 percent of the cost of goods (Q2) to as high as 12.71 percent of the cost of goods (Q3). In Q3, the CMS actually spent more than its revenue and experienced a loss. For the annual total, the overall expense rate is 7.16 percent.

The sample data are based on the assumption that the CMS charged a 10 percent increase over the cost of goods as a starting point. The sample data show that this 10 percent service fee is 2.74 percent more than actual costs. If this is determined to be a fair and sufficient service fee to recoup operational costs and have a small buffer against uncertainty or to reinvest into the supply chain, the CMS would then propose continuing the 10 percent service fee to public health programs for handling their commodities.

The fee should be updated at least once a year based on actual costs. As noted earlier in Phase 6 of the main text, one factor that drives a higher service fee is too much inventory with low turnover. If the CMS gives donors incentives to turn over inventory faster and donors can change procurement schedules accordingly, the CMS can lower the fee. Also, if ABC/ABM brings costs down over the longer term, the CMS can lower the service fee.

ANNEX B | Sample Daily Planners

Daily Planner Option 1

Daily Planner						
Day of the Week:				Date:		
Activity	Staff Members Assigned	Number of Staff Assigned	Number of Commodity Units Handled	Hours Worked	Throughput *(Number of Units Handled Divided by # Hours Worked)*	Comments
Receiving						
Put-Away						
Picking						
Packing						
Loading for Dispatch						

Daily Planner Option 2

Daily Planner				
Day:		Date:		# Hours/Day:
	# of Units	# of Workers	Throughput	Comments
Receiving				
Put-Away				
Picking				
Dispatch/Load				

Daily Planner Option 3

Daily Planner				
Day:		Date:		# Hours/Day:
	# of Units	# of Workers	Throughput	Comments
Receiving				
1. Supervisor:			**4.**	
2.			**5.**	
3.			**6.**	
Put-Away				
1. Supervisor:			**4.**	
2.			**5.**	
3.			**6.**	
Picking				
1. Supervisor:			**6.**	
2.			**7.**	
3.			**8.**	
4.			**9.**	
5.			**10.**	
Dispatch/Load				
1. Supervisor:			**4.**	
2.			**5.**	
3.			**6.**	
Comments				

Daily Planner Option 4

Daily Planner				
Day:		Date:		# Hours/Day:
	# of Units	# of Workers	Throughput	Comments
Receiving				
Put-Away				
Prog/Area 1				
Prog/Area 2				
Prog/Area 3				
Picking				
Prog/Area 1				
Prog/Area 2				
Prog/Area 3				
Dispatch/Load				

Daily Planner Option 5

Daily Planner						
Day:				Date:		
	# of Units Planned	# of Units Actual	# of Workers	Throughput	Variance	Variance %
Receiving						
Put-Away						
Picking						
Packing						
Dispatch/Load						
Added Activity 1						
Added Activity 2						
Added Activity 3						

Daily Planner Option 6

Daily Planner						
Day:				Date:		
	# of Units Planned	# of Units Actual	# of Workers	Throughput	Variance	Variance %
Receiving						
Put-Away						
Picking						
Packing						
Dispatch/Load						
Comments						

ANNEX C | Job Aid for Completing Daily Planner

Task:	*Completing the Daily Planner*
Completed by:	*Warehouse Manager*
Purpose:	*To track the daily throughput of the warehouse*
When to perform:	*Daily*
Materials needed:	*Daily planner, names and/or count of people working in the warehouse, calculator, and pen*

Steps	Actions	Notes
1	**Day of the week:** Write the name of the day of the week.	*Example: Wednesday*
2	**Date:** Write the date.	*Example: October 20, 2021*
3	**Staff members assigned:** Write the name of the staff members assigned to one of the listed functions that will be carried out that day.	*Example: Receiving: Barry, Steve, Put-Away: Michael, Ralph, Winnie* For casual/day laborers, it may be valuable to capture the names. Leave any functions not used that day blank. For example, if no picking is involved, no staff should be assigned. Leave any functions not used that day blank. For example, if no picking is involved, no staff should be assigned.
4	**Number of staff assigned:** Enter the count of staff members assigned to one of the listed functions	*Example: Receiving: 2, Put-Away: 3* Casual/day laborers should be counted.
5	**Number of commodity units handled:** Write the number of units handled for one function.	The number of units may be found on the receiving schedule and confirmed by shipping documents for receiving and put-away. The number of units for picking, packing, and loading for dispatch may be found on the pick list (often generated by the WMS). Receiving: 12,000 units, Put-Away: 12,000 units
6	**Hours worked:** Enter the total number of person-hours worked for one function for the day.	Multiply the number of hours worked by the number of staff by function. *Example: 2 people x 8 hours in receiving=16 person-hours for receiving. 3 people x 8 hours=24 person-hours* If staff were moved from one function to another during the shift, be sure to record their name again and to split the hours between the two functions (e.g., 2 hours for receiving and 6 hours for put-away). The number of staff would also be updated to 0.25 for receiving and 0.75 for picking.
7	**Throughput:** Divide the number of units handled by the number of person-hours for one function.	*Example: 12,000 units ÷ 16 person-hours = 750 units/person-hour for receiving and 24,000 ÷ 24 = 500 units/person-hour for put-away.*
8	**Comments:** Write any comments that may have had an effect on a function.	*Example for put-away: "Two orders arrived on non-standard pallets and had to be re-palletized, affecting put-away speed."*

The task is complete when:

1. The form is filled in for the day and date.
2. The name and count of staff by function is recorded.
3. The information is confirmed and the data updated to the actual performance for the day. In other words, the form can be used to plan for the day's performance in advance, including assigning staff and the number of staff based on the expected quantities to be received and put away and picked, packed, and dispatched. For this form, it may be possible to generate most of the form the day or even more than a day before the work is completed, based on known inbound and outbound shipments.

Remember that, in general, one objective is to put -away all goods received by the end of the day/shift, so no goods are in the receiving area. Another is that all picked goods should be packed and loaded by the end of the day/shift, so no goods are in the picking area. In that case, the number of units received and put away should be equal. The number of units picked should also be equal to the number of units packed and the number of units dispatched. Commodities remaining in the receiving area or in the picking area at the end of the day/shift represent work in progress and this should be avoided, primarily due to security issues.

When the Actual Throughput for the Day Is Calculated.

When the warehouse manager has considered how the day's throughput compares to the expected throughput and has considered how much staff is needed for the following day (or days) and what functions to assign staff to.

Daily Planner

Day of the Week:				Date:		
Activity	Staff Members Assigned	Number of Staff Assigned	Number of Commodity Units Handled	Hours Worked	Throughput *(Number of Units Handled Divided by # Hours Worked)*	Comments
Receiving						
Put-Away						
Picking						
Packing						
Loading for Dispatch						

ANNEX D | Sample Daily Planner Summary

Daily Planner Summary												
Day of the week:				Date:								
Day	1	2	3	4	5	6	7	8	9	10	…	TOTAL
Receiving												
Units												
Workers												
Hours												
Throughput												
Put-Away												
Units												
Workers												
Hours												
Throughput												
Picking												
Units												
Workers												
Hours												
Throughput												
Dispatch/ Load												
Units												
Workers												
Hours												
Throughput												
TOTAL												
Units												
Workers												
Hours												
Throughput												

ANNEX E | Sample Monthly Direct Labor Report

Sample Monthly Direct Labor Report Option 1

Monthly Labor Report		
Month and Year		
Performance	This Month	Year-To-Date
Total Cost of Goods Dispatched		
Receiving		
Units		
Activity Throughput		
Cost Person-Hours		
Avg Cost/Person-Hour		
Value/Unit		
Cost as Percent of Quantity Dispatched		
Put-Away		
Units		
Throughput		
Cost Person-Hours: Regular		
Avg Cost/Person-Hour		
Cost/Unit		
Labor Cost as Percent of Quantity Dispatched		
Picking		
Units		
Throughput		
Cost Person-Hours: Regular		
Avg Cost/Person-Hour		
Cost/Unit		
Labor Cost as Percent of Quantity Dispatched		
Loading/Dispatch		
Units		
Throughput		
Cost Person-Hours		
Avg Cost/Person-Hour		
Cost/Unit		
Labor Cost as Percent of Quantity Dispatched		
Total		
Units Dispatched		
Cost Person-Hours for All Activities		
Avg Cost/Person-Hour		
Cost/Unit		
Labor Cost as Percent of Quantity Dispatched		

Sample Monthly Direct Labor Report Option 2

Monthly Labor Report						
Month and Year						
Performance	This Month			Year-To-Date		
	Actual	Forecast	Variance	Actual	Forecast	Variance
Total Cost of Sales						
Receiving						
Units						
Activity Throughput						
Cost Person-Hours						
Avg Cost/Person-Hour						
Value/Unit						
Cost as Percent of Quantity Dispatched						
Put-Away						
Units						
Throughput						
Cost Person-Hours: Regular						
Avg Cost/Person-Hour						
Cost/Unit						
Labor Cost as Percent of Quantity Dispatched						
Picking						
Units						
Throughput						
Cost Person-Hours: Regular						
Avg Cost/Person-Hour						
Cost/Unit						
Labor Cost as Percent of Quantity Dispatched						
Loading/Dispatch						
Units						
Throughput						
Cost Person-Hours						
Avg Cost/Person-Hour						
Cost/Unit						
Labor Cost as Percent of Quantity Dispatched						
Total						
Units Dispatched						
Cost Person-Hours for All Activities						
Avg Cost/Person-Hour						
Cost/Unit						
Labor Cost as Percent of Quantity Dispatched						

ANNEX F | Dispatch Log

Dispatch Log

Vehicle #::			Driver Name:		Start Date:		End Date:	
Date	Origin Name	Destination Name	Odometer at Start	Odometer at End	Kilometers this Trip	Kilometers Cumulative	Quantity of Units Delivered	Comments

	Date Added	Cost/Liter	Total Liters	Other Expenses	Cost	Receipt #
Fuel at Start				Tolls/ferry		
Fuel Added				Per diem		
1				Lodging		
2				Other		
3				1		
4				2		
Fuel at End				3		

ANNEX G | Dispatch Log Summary

Dispatch Log Summary						
Month			Year			
Day	Quantity of Units Delivered	kms Driven	Fuel Consumed in Liters	Other Expense Costs	Per Diem Cost	Lodging Cost
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
TOTAL						

Monthly expenses			
Other (from above)	Per Diem (from above)	Lodging (from above)	Other

ANNEX H | Indirect Cost Allocation Worksheet

Indirect Cost Allocation Worksheet									
Element	Total Cost	Allocation A	Allocation A	Allocation B	Allocation B	Allocation C	Allocation C	Allocation D	Allocation D
		%	Value	%	Value	%	Value	%	Value
Administrative Labor									
Position 1									
Position 2									
Position 3									
…									
Procurement Labor									
Position 1									
Position 2									
…									
Building									
Utilities (elec, water)									
MHE and Maintenance									

Indirect Cost Allocation Worksheet									
Element	Total Cost	Allocation A	Allocation A	Allocation B	Allocation B	Allocation C	Allocation C	Allocation D	Allocation D
		%	Value	%	Value	%	Value	%	Value
Leased Warehouses									
Depreciation									
Building Insurance									
Capital Fund									
Services (e.g., cleaning)									
Security									
Inspections (e.g., safety)									
IT									
Internet/Phone									
Hardware									
Software									
License fees									

ANNEX I | Sample Executive Dashboard

Sample Executive Dashboard 1					
Month	Value of Goods Dispatched	Throughput	Cost of Direct Labor Wages	Direct Labor as Percentage of Quantity Dispatched	Qualitative Assessment

Sample Executive Dashboard 2

Executive Dashboard for Distribution												
Month	Value of Goods Dispatched	Quantity of Units Delivered	Wages	Driver-Hours	Labor as Percentage of Quantity Dispatched	Fuel Cost	Fuel Use in Liters	Maintenance Cost	kms Driven	Cost Per km	kms Per Liter	Through-Put (Fleet Yield)

ANNEX J | Sample Monthly Checklist for Qualitative Assessment

Qualitative Warehouse Assessment

Month/Year:

Completed By/Title:

Observed By/Title:

#	Category/Item	Score (1-4)[4]	Comments
5S			
1	**Sort:** All items eliminated from the workspace that are not required for daily use and stored or disposed of in their appropriate location.		
2	**Set in order:** Arrange remaining items in the appropriate location for quick storage and easy access. Maintain continuity across all identical work functions and spaces.		
3	**Shine:** Everything is clean and in functioning order.		
4	**Standardize:** Are all workplaces organized and have continuity for identical functions?		
5	**Sustain:** Are daily inspections of the tenets of 5S completed and methodology adhered to?		
Loss Prevention			
6	**Exterior doors and perimeter control:** Reinforce proper access/egress by using signage and employee/staff notification. Ensure all doors/gates are locked and checked.		
7	**Unidentified or damaged commodities:** Are all commodities stored off the floor and in its correct location? Is all damaged product promptly processed?		
8	**Dock door control:** Are overhead and exterior doors secured and closed or under immediate observation of a loss prevention officer?		

[4] For scoring, 1 is rarely, 2 is sometimes, 3 is usually, and 4 is always. A score of 0 is never or not applied during this month.

#	Category/Item	Score (1-4)[4]	Comments
9	**Login and computer access:** No evidence of shared logins. Do employees understand current policies?		
10	**Exterior housekeeping:** Receiving pallets sorted and segregated and less than 15 units per stack. Are commodities to be disposed in a "current" status in records? Is all rubbish removed?		
11	**Interior housekeeping:** Are all pallets sorted and segregated and stored less than 15 units per stack in their correct location? Are any pallets left on end? Are all commodities in their assigned location and not blocking aisles? Are commodities correctly identified? Is all rubbish removed? Is all equipment stored in its correct and identified location while not in use?		
12	**Evidence of safety culture:** Are workers operating equipment safely (e.g., traveling forks trailing, forks no higher than 20cm)? Are broken pallets promptly removed? Are pallets stored horizontally? Are safety rules prominently posted? Are employees and visitors following safety rules? Are the building entrance, exits, and pathways free from obstruction and rubbish?		
Receiving and Put-Away			
13	**Vendor receiving:** Are purchase orders arriving on the correct date? Are commodities sorted/segregated and/or palletized as required? Are commodities put away correctly by end of shift?		
14	**Pricing:** Are all pricing adjustments made promptly? Does the pricing log accurately reflect the quantity and description of the physical commodities?		
15	**Put-away:** Are all commodities put away at end of shift? Are staged commodities blocking aisle access for other functions?		
16	**Returns:** Are returns processed and directed to stock or disposed of promptly?		
17	**Transfer:** Are commodities promptly unloaded, transported, and put away in their correct location promptly?		

#	Category/Item	Score (1-4)[4]	Comments
Inventory Control			
18	**Cycle counts/sample:** Are statistical samples taken and published on the monthly executive flash report? If results are <95 percent accurate, is a comprehensive action plan in place to rectify causal factors?		
19	**Inventory integrity:** Are variances adjusted promptly? Do the stock cards reflect the correct quantity?		
20	**Shrink culture/communication:** Are cycle count results displayed and verbalized?		
21	**Quality control/inspection process:** Are all quality holds processed promptly? Are the appropriate decision-makers electronically notified? Is the aging quality report up to date and published?		
Damage			
22	**Product handling:** Is there evidence of commodity damage or incorrectly handled processes (e.g., over-stacking, commodities overhanging the pallet)? Are all commodities stored off the ground on pallets or racking?		
23	**Equipment testing:** Is all MHE maintained and in good condition?		
Storage Areas			
24	**Accessibility:** Are main aisles accessible/open?		
25	**Accountability:** Do workers return promptly from breaks?		
26	**Reporting:** Are reports completed promptly?		
Picking/Loading/Dispatch			
27	**Picking:** Are orders picked completed? Evidence of spot checks? Are orders picked in reverse route order?		
28	**Loading/dispatch:** Are orders staged, inspected, and audited before loading? Are orders staged correctly in the assigned lane? Are commodities left in the respective picking areas?		
29	**Routes audited:** Are orders loaded onto correct vehicles? Are departure times maintained? Is all documentation in order and filed correctly?		

#	Category/Item	Score (1-4)[4]	Comments
Management			
30	**Self-assessment:** Is this assessment completed independently and turned in monthly to executive leadership? Are action plans developed promptly and executed against the plan?		
31	**Internal customer communication:** Is there a regular communication rhythm with internal partners and customers? Is an issue escalation/feedback process in place for their concerns?		
32	**Organizational values:** Do executives, managers and workers adhere to the principal goals and tenets of the organization and MOH?		
33	**Monthly meetings:** Do supervisors and managers meet at least monthly with individual workers to provide performance feedback and receive input?		

Results		
Score	**Score [max is 33 x 4 =132]**	**Percentage [(score ÷ 132) x 100]**
Strengths:		
Opportunities:		

Action Plan		
Action:	**Responsible:**	**Due date:**

ANNEX K | Sample Monthly Checklist for Qualitative Assessment

Executive Dashboard	
Year to Date Sales	
Actual	$229,312,125
Projected	$264,883,524
Variance	$(35,571,399)

	Warehousing					All	Distribution									All
	Monthly Sales	Through-put	Wages	Over-time %	Labor % of Sales	Qualitative Assessment	Wages	Labor % of Sales	Fuel $	Fuel Usage	Fleet Cost	kms	$ Per Kilo	Fleet Yield-U.P.H.	kms Per Litre	Labor % of Sales
August	$15,277,622	297	$222,554	16.23	1.46	68.97	$79,418	0.0052	$53,930	5,897	55,743	41,355	$0.22	258.47	7.01	1.465
July	$8,868,557	142	$235,162	8.58	2.65	67.91	$79,418	0.0090	$43,984	5,102	$55,743	35,495	$0.20	147	6.96	2.659
June	$52,529,348	230	$320,332	8.98	0.61	65.54	$79,418	0.0015	$57,501	6,431	$55,743	49,817	$0.26	204	7.75	0.612
May	$22,709,192	166	$276,775	9.36	1.22	64.88	$79,418	0.0035	$54,086	5,309	$55,743	38,159	$0.20	299	7.19	1.223
April	$8,223,471	154	$260,508	6.25	3.17	59.83	$79,418	0.0097	$53,394	5,608	$55,743	28,833	$0.15	144	5.14	3.180
March	$57,286,900	124	$268,415	7.51	0.47	62.37	$72,515	0.0013	$48,049	5,293	$55,743	25,232	$0.14	194	4.77	0.471
February	$58,667,929	354	$264,047	6.99	0.45	57.92	$60,355	0.0010	$45,351	5,381	$55,743	31,953	$0.20	220	5.94	0.451
January	$5,748,674	68	$299,469	12.65	5.21	53.68	$60,355	0.0105	$22,931	2,731	$55,743	20,182	$0.15	135	7.39	5.220
Average	$28,663,962	192	$268,408	9.57	1.91	62.64	$73,789	0.0052	$47,403	$5,219	$55,743	33,878	$0.19	200.18	6.45	1.91