CASE STUDY

UNDERSTANDING TRUE COSTS

How activity-based costing brought efficiencies to Lesotho's National Drug Service Organization

BACKGROUND

Reviewing warehouse paperwork.
Photo Credit: GHSC-PSM

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.

A parastatal organization, the NDSO is financially autonomous from Lesotho's Ministry of Health (MOH). To cover costs of its monthly deliveries to 10 districts and five principal hospitals, the NDSO established markups on donor-funded products and essential medicines. Health districts and principal hospitals were responsible for delivering the medicines the last mile to service delivery points.

Challenges: How to make last mile delivery viable financially?

In 2016, due to ongoing challenges at the health district–facility delivery link, the MOH tasked the 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. Intuitively, the additional costs associated with last mile delivery would require NDSO's markups to be revised. An increased markup, however, would likely upset the NDSO's customer base, which might look for cheaper alternatives.

NDSO senior management was also concerned that the handling fee for donor-funded products was insufficient in covering their actual handling, storage and transportation costs. They were further concerned that the margin for essential medicines had been set too low to ensure financial stability.

NDSO's financial cost models lacked the ability to accurately track actual operating costs by functional cost center or 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 90-90-90 HIV/AIDS program targets, with its 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 products flowing through the system. Until supply chains adjusted, the new strategies stretched resources at many levels, including in Lesotho.

SOLUTION STAGE 1: UNDERSTANDING CURRENT PERFORMANCE

Before making potentially significant changes to a supply chain, it is necessary to first gain an understanding of current performance.

NDSO Category Definition
Category A: donor-funded products

Category B: essential medicines

In 2016, the NDSO, with the support of the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project, began a multi-year initiative to better understand overall operating expenses and the cost differences in product handling, storage, and last mile delivery requirements between donor-funded products (referred to at NDSO as Category A) and essential medicines (referred to at NDSO as Category B). The goal was to identify opportunities to streamline processes, achieve cost efficiencies and enhance performance.

To do so, NDSO and GHSC-PSM applied the **activity-based costing (ABC) model.**

ABC validates how the existing supply chain operates and captures critical information such as throughput by warehouse function, cost per kilometer for last mile delivery and other

performance benchmarks. This information is used as a baseline to monitor current performance and understand how future strategic and tactical decisions could impact performance.

To collect this baseline information, in fall 2016, GHSC-PSM:

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

SOLUTION STAGE 2: UNDERSTAND TRUE COSTS USING ABC

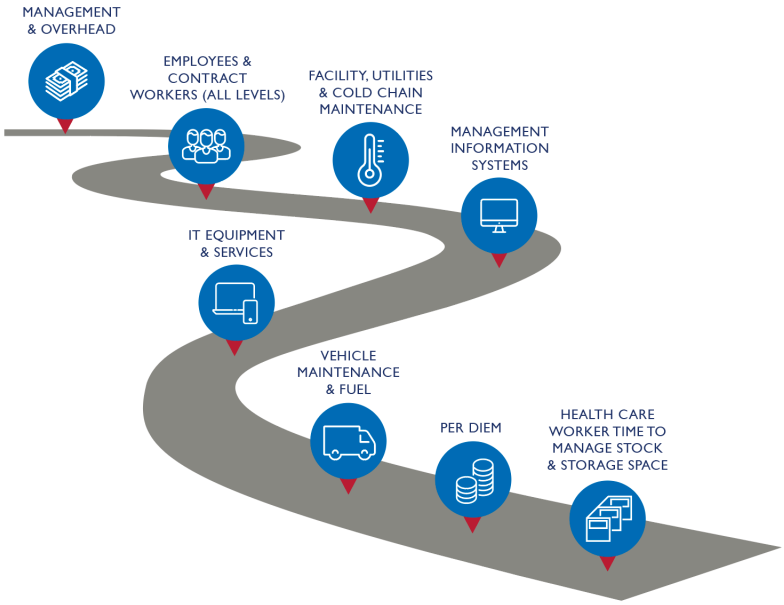
WHY CONDUCT A COSTING ANALYSIS?

- To advocate and plan for funding
- To better design and plan systems
- To inform policy and financing decisions
- To identify appropriate stakeholder margin and markup fees

Identifying the true costs for operational activities establishes a "You are Here" benchmark on the roadmap to a self-sustaining supply chain. Best-in-class operations know their baseline financial activity costs at the activity level to vector their current performance. Simply put, they need to know where they are to know where they need to go.

To understand the NDSO true costs, GHSC-PSM applied ABC performance and accountability tools at the financial, warehouse, transportation and customer service levels, ensuring capacity building and true ownership of the operator. Using ABC methodologies allowed for the supply chain to charge customers for the actual activity and not a product value-based "tax."

DIFFERENT POINTS IN THE SUPPLY CHAIN WHERE ABC CAPTURES ACTIVITY COSTS



WHAT IS ABC?

Activity-based costing is a methodology that identifies activities in an organization and assigns the cost of each activity associated with a specific commodity per the actual related consumption costs. The ABC model assigns indirect costs (overhead) combined with direct costs to determine the true cost of receiving, storing and transporting products per each specific category. These costs are then normalized per the actual volume of product handled, stored and shipped. This per unit cost is then expressed as a percentage of the total cost of goods and the resulting margin is thus calculated.

Health supply chains that are still developing often depend on symptomatic key performance indicators such as stockouts at the facility level. Unfortunately, these data illustrate only the effect of a breakdown somewhere in the supply chain but not specifically where.

The **ABC model** assigns indirect costs (overhead) combined with direct costs to ascertain the true cost of receiving, storage, selection and transportation. Benefits of ABC include:

- Transparent real costs over traditional value-based accounting.
- Continuous improvement plans.
- Helps stakeholders understand true cost of goods to inform pricing and purchasing policy.
- Reveals unnecessary costs to eliminate.

Indirect activity costs can include:

- **Customer Orders.** Assign costs of resources that are consumed by taking and processing customer orders.
- **Procurement and product setup charges.** Assigned costs of product setup and procurement.
- **Order Size.** Assigned all costs of resource consumed due to the number of units produced.
- **Customer Relations.** Assigned costs associated with maintaining customers service departments.
- **Other.** Assigned all organization-sustaining costs and unused capacity costs.

ABC provides diagnostic key performance indicators that reveal true root cause issues and opportunities. ABC also provides supply chain operators with something they have not had before: true landed costs from the supplier to the recipient.

The four main activities to perform in any activity-based costing study are:

- **Identify activities.** What activities are required to handle the product (e.g., procurement, storage, shipping)? Every activity has a cost associated with it.
- **Assign resource costs to the activity.** What are the costs related to the cost object? Costs related to a single activity measure are assigned to the same "cost bucket." The cost bucket is then monitored and measured as a KPI.
    - o **Direct labor cost** – Warehouse employees that are responsible for receiving, picking, packing, loading, etc.
    - o **Indirect labor costs** – Costs that cannot be specifically allocated to an individual output such as procurement, inventory control, customer service, general administration, management, etc.
    - o **Fixed cost versus variable cost** – Insurance, depreciation, etc.
- **Identify all outputs for which an activity segment performs activities and consumes resources.** Outputs may be products, services, warehouse storage costs, or customers. Key outputs are:
    - o **Function:** Procurement, order entry, warehouse operations, transportation, management and administration.
    - o **Labor:** Related to each function.
    - o **Actual costs per unit:** As a percentage of total commodity value; actual cost per unit, volume, per kilometer transported.
    - o **Supply chain tier:** Such as central, region, clinic or urban versus rural.
- **Assign activity costs to outputs.** Activity drivers (unique product characteristics) are used to assign activity costs to objects/outputs.

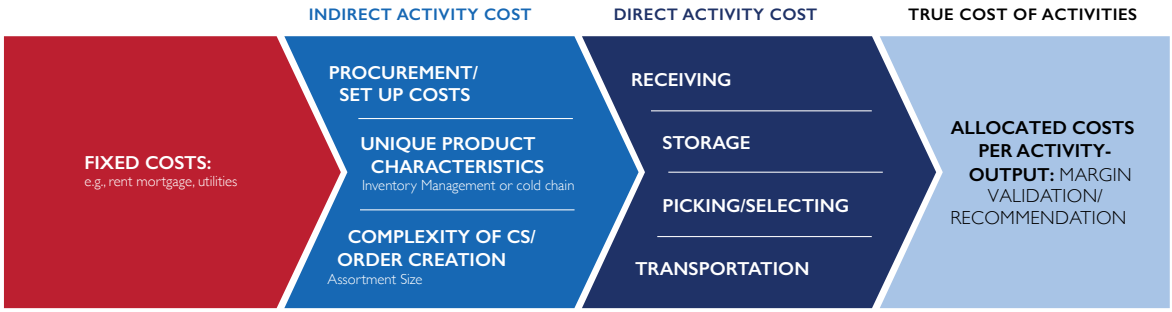
EXAMPLE: Throughput as a KPI. Throughput is the number of units (unit of measurement can be pallets, cartons, or single-selling component) divided by the time required to perform the activity. For example, 200 pallets received divided by 7.5 hours of labor = a throughput of 26.66 units per hour. With an hourly labor cost of $10 per hour at 7.5 hours that's $75. Divide 75 by 200 and the result is .375 cents per pallet to receive the product.

KEY CONSIDERATIONS

ABC is a powerful tool to help an organization understand true costs. However, it is not the optimal solution in every circumstance. Substantial resources are required to implement and maintain an ABC system. It can also be difficult to change an accounting system. A cost-conscious organization may not feel that the ABC benefits outweigh the costs of implementation. Without the commitment and ongoing financial support from stakeholders, an ABC system cannot realize its potential. To counter such barriers to a successful ABC system:

- **Ensure all costs are allocated to products.** A standard management practice allocates all manufacturing costs to products using volume and quantity measures such as direct labor hours and/or machine hours. It allocates costs to several different parts of the operation.
- **Provide guidance on unfamiliar numbers and reports.** ABC produces categories of numbers that are unfamiliar to most managers who work with traditional cost systems. Managers are not accustomed to using new indicators like throughput to manage an operation. Through guidance and training, capacity building is achieved.
- **Potential misinterpretation of unfamiliar numbers.** ABC does not automatically point to a root cause but identifies underperforming activities.
- **ABC does not conform to Generally Accepted Accounting Principles (GAAP).** This is because it can exclude some organization-sustaining costs and include some indirect costs in its calculations. In such cases, two

ABC FRAMEWORK



costing systems may be needed. ABC is used more for identifying areas where improvement can be made as opposed to serving as just a bottom-line financial tool.

ABC IN ACTION: IMPLEMENTATION AT LESOTHO'S NDSO

Tools creation

GHSC-PSM introduced unique tools to measure the costs of all NDSO's 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:
  - o Throughput (movement of goods and the time expended by function)
  - o Expenses per function expressed as a financial value and as a percentage of sales
  - o Impact of overtime on financial performance
  - o All category variances
- **Warehouse Self-Assessment Tool.** This Excel-based tool measures qualitative efforts to follow best-in-class distribution center practices such as 5S ,WHO's good warehouse keeping practices, and quantitative checks against adherence to systems, health and safety, and processes. The tool is applied monthly and self-administered. The self-assessment reinforces best practices and assists the user in developing improvement plans. Following good practices produces improved results.
- **Executive Dashboard.** This tool provides senior management with a monthly snapshot of the following key indicators:
  - o Financial year-to-date trends and averages for all operational costs
  - o Expense as a percentage of sales or cost of goods for transportation and warehousing
  - o Includes NDSO assessment (process, organization, health, and safety)
- **Activity-Based Costing Tracker.** This tool differentiates the true cost per unit by category to receive, store, pick/select, and ship. All activities for Categories A and B are segregated and quantified. The actual costs for both assortments are identified for the fiscal year to date.
- **Draft Handling Fee Calculator with Incentive Structure.** At NDSO's request, GHSC-PSM developed a draft Excel-based calculator using the NDSO ABC model. The calculator is used to demonstrate the actual impact of all warehouse and transportation costs per month with an emphasis on inventory turnover incentives for the customer (donor) and 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 their current cost structure. This can be updated at any moment in 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 (i.e., central, region, clinic, or urban versus rural)
- Costs of labor for procurement, transportation, storage, management

With the above processes and tracking tools implemented in Lesotho, NDSO management tracked costs at the activity level. The model gave insight into Categories A and B and the total volume of the mix of both product categories.

Category Characteristic Differences in Lesotho

CATEGORY A (DONOR-FUNDED PRODUCTS)	CATEGORY B (ESSENTIAL MEDICINES)
Limited assortment (generally less than 20 products make up most of the volume)	Carries more than 2,000 products and many are classified as slow-moving demand
Purchasing, receiving, order creation, picking/selection, loading take less time	Purchasing, receiving, order creation, picking/selection, loading take more time
Represents majority of on-hand inventory when expressed in cubic volume	

With this knowledge, the NDSO moved from a reactive state — wherein 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

Transition from a public health supply chain operation to a commercial supply chain operation can be challenging. It requires commitment from local leadership and total buy-in from all stakeholders, especially employees. **A change management strategy is critical for a successful and sustainable transition.**

Early on, a **focus on quick wins during initial short-term technical assistance 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 was not the case. Their key message was that improving patient outcomes was and is the driver

Successful ABC Implementation Includes:

- Strong executive leadership support
- Credibility and employee buy-in early on
- Link to evaluations and rewards
- Cross-functional involvement

NDSO staff in Lesotho improved operations with ABC. Photo Credit: GHSC-PSM.

for ABC. That has been proven over time by senior leadership's commitment to retain current positions and promote from within.

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

RESULTS/OUTCOMES

Before ABC adoption, NDSO lacked visibility into exactly which warehouse functions accounted for what portions of its recurring expenses. NDSO now monitors all costs to better control and contain expenditures.

Time saving
Over the ABC initiative's duration, the NDSO reduced its internal warehouse order entry to dispatched cycle time 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 the NDSO transition to true activity-based management (ABM). The senior leadership was empowered to operate the supply chain with full knowledge of how decisions they made immediately affected the service for the end recipient. By using ABC/ABM, the NDSO executive leadership currently exercises full control of their supply chain and operates in a state of continuous improvement, requiring no outside intervention.

Operational and financial transparency
Before ABC adoption, NDSO lacked visibility into exactly which warehouse functions accounted for what portions of its recurring expenses. NDSO now 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, profitability increased threefold.

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.

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

ABC Costing Study Requirements

- Cooperation of all stakeholders
- Experience in supply chain and costing
- Intermediate spreadsheet skills (Excel)
- Adequate time to collect data
- Assessment of existing systems/interface for potential ad-hoc solutions
- Access to commodity throughput data, operating costs, as well as vehicle, building, and equipment depreciation information

Glossary

Activity

An event that causes the consumption of overhead resources.

Activity-based Costing (ABC)

An accounting method that identifies activities in an organization and assigns the costs of each activity to all products and services.

Activity-based Management (ABM)

A management approach that aims to maximize value-adding activities (and eliminate those that do not add value) and improve the organization's efficiencies and effectiveness.

Activity cost pool

A "cost bucket" in which costs related to a single activity measure are accumulated.

Activity measure

An allocation base in an ABC system. The term "cost driver" is also used to refer to an activity measure.

Allocation Base

An activity-based costing system.

Cost Driver

An allocation base in an ABC system. Can be used to refer to an "activity measure."

Duration driver

A common activity measure that measures the amount of time needed for an activity.

Transaction driver

A common activity measure that is a simple count of the number of times an activity occurs.

Annex

The following data requirements are typical cost drivers that allow the implementer to identify all throughput and financial activities that must be allocated against specific product assortments like cold chain, essential medicines, donor funded product.

Typical Data Requirements

Req. #	Requirement	Description	Necessary/Preferred
1.	Narrative of Programs & Characteristics	Unique handling/storage/transporting/ administrative product or service characteristics	Necessary
2.	Direct Labor Costs	All expenses related to the effort of handling a specific unique product/program based on characteristics	Necessary
2.a.	Warehouse hours per mission (receiving, put-away, retrieval/replenishment, picking/selection, staging, loading, etc. for a specific product by characteristic)	Effort and cost to determine true financial impact by characteristic type	Necessary
2.b.	Fringe Benefits per 2.a.	Value of holiday pay, insurance scheme paid by unit, etc. per all functions listed in 2.a.	Necessary
2.c.	Average wage rates and overtime costs per all functions of 2.a.	Financial costs per specific mission	Necessary
2.d.	Transportation variable costs for a specific product by characteristic: per diem, wages, overtime costs, fuel, vehicle maintenance, etc. *not to include administrative use of fleet for nonproduct deliveries.	All variable costs for specific product by characteristics to transport last mile	Necessary
3.	Indirect Costs	All costs not directly associated to handling or transporting product	Necessary
3.a.	Administrative salaries	All nondirect labor wages (management, inventory control, finance, customer service, etc.)	Necessary
3.b.	Administrative fringe benefits cost	Value of holiday pay, insurance scheme paid by unit, etc. per all functions listed in 3.a.	Necessary
3.c.	% of effort by function to support product specific characteristics for 3.	What amount of effort is split between the specific product types to manage the outcome?	Necessary
3.d.	Depreciation of all capital assets schedule	What is the remaining book value of all capital assets?	Necessary
3.e.	% of cost by Capital Asset to support product specific characteristics.	Example: what % of the cost is spent to use a forklift for a given product characteristic?	Necessary

Req. #	Requirement	Description	Necessary/ Preferred
	% of cost by specific facility to support product specific characteristics	How much of the facility rent should be allocated to a specific product characteristic?	Necessary
3.g.	Utilities (electrical, gas, water, sanitation, etc.)	Self-explanatory	Necessary
3.h.	% of cost of utilities to support product specific characteristics	Example: How much of the electricity usage is expended to support a specific product type?	Necessary
3.i.	Insurance costs for storage and in-transit to support product specific characteristics	Example: Product A requires special insurance coverage that Product B does not	Necessary
3.j.	Transportation costs not associated with product delivery	Self-Explanatory	Necessary
4.	Financial	Specific financial documents	Necessary
4.a.	Income Statement	profit and loss, cost of goods (by specific product), sales, revenue (by specific product), etc.	Necessary
4.b.	Balance Sheet	capital, intangible and tangible capital, current assets and liabilities, etc.	Necessary
4.c.	Overhead	Schedule of Operating Expenses	Necessary
4.d.	Ratio Analysis	Current ratio, acid test ratio, inventory turnover, accounts receivable turnover, accounts payable turnover	Necessary
4.e.	Trial Balance	Detailed Account Level Profit and Loss	Necessary
5.	Data	All information allocated to a specific product characteristic	Necessary
5.a.	Quantity received, stored, picked/selected, shipped by specific product characteristic	Example: Product A has X volume for X activity and Product B has X volume for X activity	Necessary
5.b.	Volumetric information aggregated for specific product characteristics	What is the cubic value of Product A? What is the cubic value of Product B?	Necessary
5.c.	Total kilometers incurred for a specific time frame for the transportation fleet	All kilometers incurred for product-specific deliveries. If product is delivered comingled (all products shipped together, an estimation of the % incurred for all categories will be determined).	Preferred