

Supply Chain Management of Health Commodities and Logistics: Fundamental Components of Booming Medical Laboratory Services

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ABSTRACT: *The importance of quality laboratory services is unquestionable. The growth of programs for Human Immunodeficiency Virus (HIV) and Acquired immunodeficiency Syndrome (AIDS), tuberculosis (TB), and malaria requires strong and supportive laboratory services. For antiretroviral therapy (ART) in particular, there has been a growing recognition of this importance, given the number of laboratory tests required to effectively and efficiently monitor treatment. Well functioning supply chain will enhance the availability of the commodities (commodity security) required to provide necessary laboratory services. In addition, an effective and efficient laboratory supply chain can promote common approaches on policy, laboratory procedures and information system.*

KEYWORDS: Supply Chain, Management, Commodity, Laboratory Services

INTRODUCTION

Supply Chain Management and Logistics

Over time, the profession of supply chain management has evolved to meet the changing needs of the global supply chain. According to the Council of Supply Chain Management Professionals (CSCMP) — “Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.”

The CSCMP also defines logistics management as— “The part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirement. Logistics management is an integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales manufacturing, finance, and information technology.” (CSCMP, 2011)

Logistics activities as the operational component of supply chain management, including quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting. Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and functions. The supply chain includes global manufacturers and supply and demand dynamics, but logistics tends to focus more on specific tasks within a particular program health system.

This article focuses on specific logistics activities that are undertaken within the context of an integrated supply chain model. This model promotes collaboration and seamless linkages between the activities, levels and people responsible for managing the supply chain. Note that throughout the article, the terms *logistics* and *supply chain* are used interchangeably.

Why Logistics Matters

In the past, logistics was considered a custodial activity. Storekeepers were the custodians of supplies stored in small storerooms and large warehouses. Consequently, the science (and art) of logistics, and the people who make the health logistics system work, were not considered an important part of family planning, HIV and AIDS, or vaccination programs—to name only a few. Fortunately, as time passed, more and more program managers have come to understand how important logistics is to a program's success.

The goal of a health logistics system is much larger than simply making sure a product gets where it needs to go. Ultimately, the goal of every public health logistics system is to help ensure that every customer has commodity security. Commodity security exists when every person is able to obtain and use quality essential health supplies whenever he or she needs them. A properly functioning supply chain is a critical part of ensuring commodity security—financing, policies, and commitment are also necessary (Figure 1).

Effective supply chains not only help ensure commodity security, they also help determine the success or failure of any public health program. Both in business and in the public sector, decision makers increasingly direct their attention to improving supply chains, because logistics improvements bring important, quantifiable benefits. Well-functioning supply chains benefit public health programs in important ways by;

- increasing program impact
- enhancing quality of care
- improving cost effectiveness and efficiency.

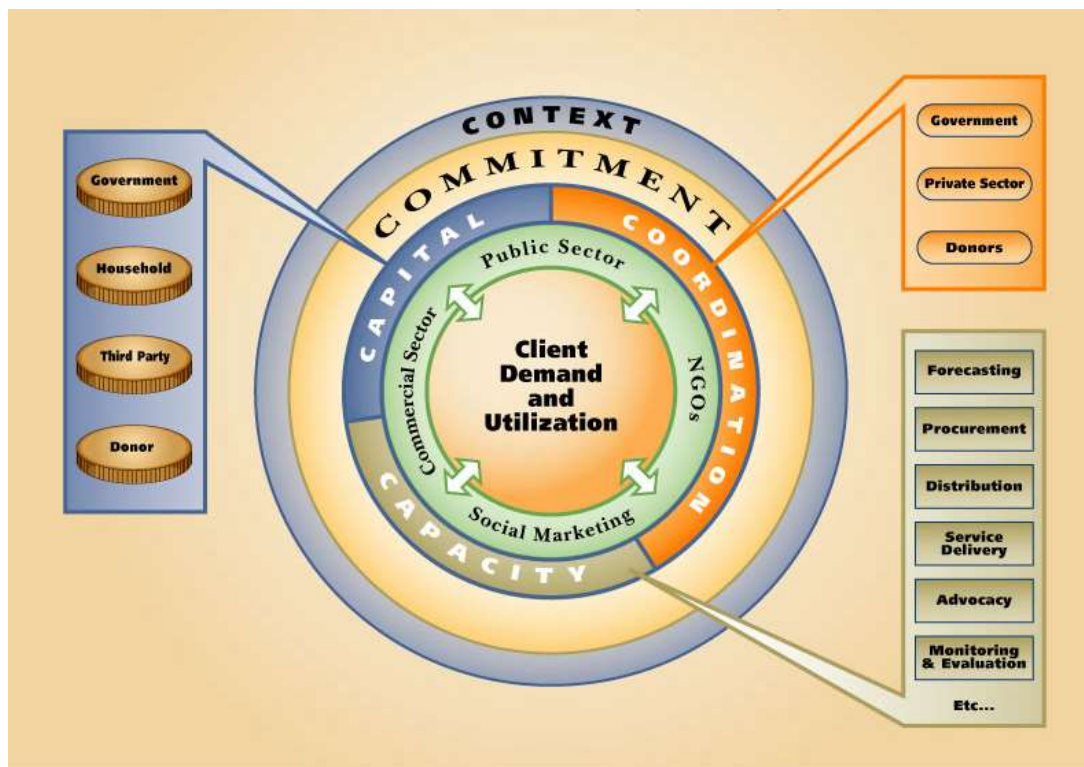


Figure 1: Commodity Security Framework

Logistics Increases Program Impact

If a logistics system provides a reliable supply of commodities, more people are likely to use health services. Customers feel more confident about the health program when they have a constant supply of commodities—it motivates them to seek and use services. Figure 1-1 shows the impact of improved product availability. Notice that, as the availability of a mix of contraceptive methods improves, the contraceptive prevalence rate (CPR) for the public sector increases. When a choice of contraceptive methods is available in health facilities, more women use contraception. When more women use contraception, it impacts a number of key reliable, continuous supply of health public health indicators: maternal mortality, infant mortality, and total fertility rates all decrease.

Logistics Enhances Quality of Care

Well-supplied health programs can provide superior service, while poorly supplied programs cannot. Likewise, well-supplied health workers can use their training and expertise fully, directly improving the quality of care for clients. Customers are not the only ones who benefit from the consistent availability of commodities. An effective logistics system helps provide adequate, appropriate supplies to health providers, increasing their professional satisfaction, motivation, and morale. Motivated staff are more likely to deliver a higher quality of service.

Logistics Improves Cost Efficiency and Effectiveness

An effective supply chain contributes to improved cost effectiveness in all parts of a program, and it can stretch limited resources. Strengthening and maintaining the logistics system is an investment that pays off in three ways. (1) It reduces losses due to overstock, waste, expiry,

damage, pilferage, and inefficiency; (2) it protects other major program investments; and (3) it maximizes the potential for cost recovery.

Logistics System

During your lifetime, you will encounter hundreds of logistics systems—in restaurants, stores, warehouses, and many other places. This article describes logistics systems for health programs; however, if you understand a simple example of a logistics system, you will be able to understand almost any health logistics system.

Logistics Cycle: Organizing Logistics System Activities

Logistics management includes a number of activities that support the six rights. Over the years, logisticians have developed a model to illustrate the relationship between the activities in a logistics system; they call it the logistics cycle (Figure 2). An effective laboratory logistics system meets the following six RIGHTS:

- **RIGHT** reagents in the
- **RIGHT** quantities in the
- **RIGHT** condition delivered... to the
- **RIGHT** place at the
- **RIGHT** time for the
- **RIGHT** cost.

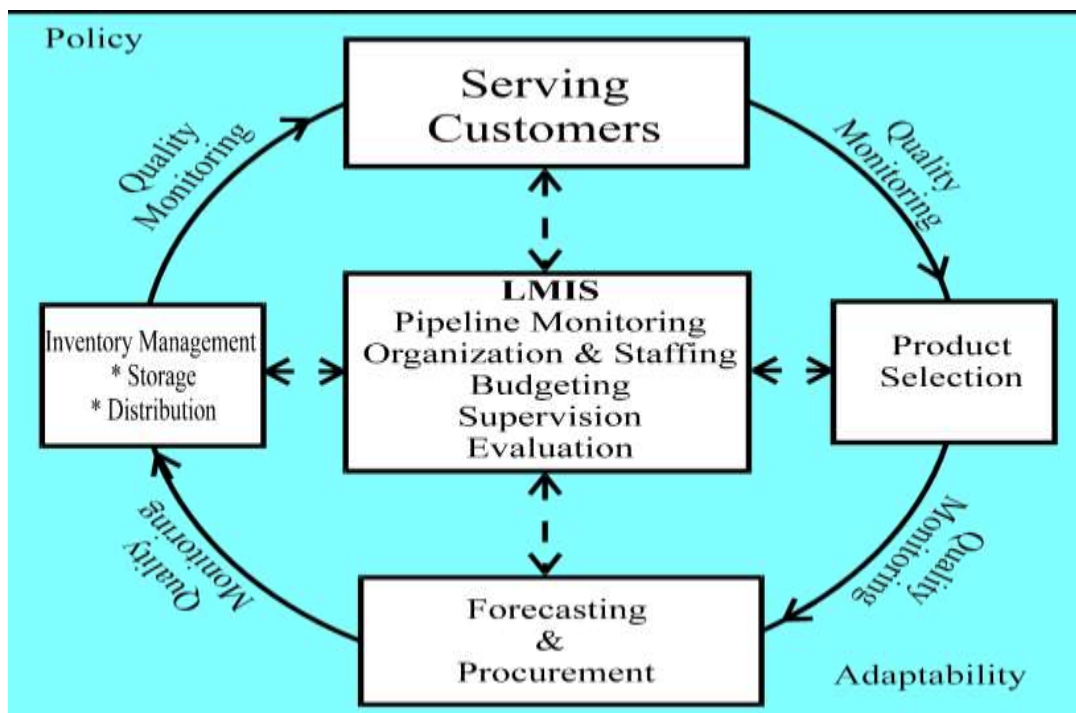


Figure 2: The Logistics Cycle

Major Activities in the Logistics Cycle

Let's briefly review the major activities in the logistics cycle:

Serving Customers

Everyone who works in logistics must remember that they select, procure, store, or distribute products to meet customer needs. Storekeepers in Medical Laboratory stores do not store laboratory reagents just for the purpose of storing; they store them to ensure that commodity security exists for every customer to obtain the health commodities when they need them. In addition to serving the needs of the end customer—the customer seeking health services—each person in the process is also serving the needs of more immediate customers. Storekeepers provide customer service when they issue commodities to the health facility, and the central stores provide customer service when they issue commodities to the district. The logistics system ensures customer service by fulfilling the six rights. Each activity in the logistics cycle, therefore, contributes to excellent customer service and to ensuring commodity security.

Product Selection

In any health logistics system, health programs must select products. In medical laboratory logistics system, Medical Laboratory Scientists may be responsible for product selection. Products selected for use will impact the logistics system, so the logistics requirements must be considered during the product selection.

Quantification

After products have been selected, the required quantity and cost of each product must be determined. Quantification is the process of estimating the quantity and cost of the products required for a specific health program (or service), and, to ensure an uninterrupted supply for the program, determining when the products should be procured and distributed.

Procurement

After a supply plan has been developed as part of the quantification process, quantities of products must be procured. Health systems or programs can procure from international, regional, or local sources of supply; or they can use a procurement agent for this logistics activity. In any case, procurement should follow a set of specific procedures that ensure an open and transparent process that supports the six rights.

Inventory Management: Storage and Distribution

After an item has been procured and received by the health system or program, it must be transported to the service delivery level where the client will receive the products. During this process, the products must be stored until they are sent to the next lower level, or until the customer needs them. Develop guidelines for appropriate storage for each level of the system, taking into account any variations that will exist in the types of products at each level of the laboratory network.

Logistics Management Information Systems

Information is the engine that drives the logistics cycle; without information, the logistics system would not run smoothly. In the beginning of the cycle, managers gather information about each activity in the system and analyze that information to make decisions and coordinate future actions. For example, information about product consumption and inventory levels must be gathered to ensure that a manager knows how much of a product to

procure. Consider two ways of capturing consumption data for laboratory commodities: issues from stock as a proxy for consumption data (stock issues from stores to the bench) or actual consumption of products (by the piece, gram, milliliter) as recoded through a daily register. Routinely report stock levels, issues, losses and adjustments, and stock outs. Link reporting with resupply as data are required to make supply chain decisions at all levels of the system.

Organization and Staffing

A logistics system can only work if well-trained, efficient staff monitor stock levels, place orders, and provide products to clients. Health programs assign the appropriate resources to staff (for example, supervision authority and technical knowledge) to complete logistics activities. In fact, some countries have established national logistics management units that analyze logistics data and provide feedback throughout the system. Organization and staffing, therefore, are important parts of the cycle. For a logistics system to work correctly, logistics staff must make the six rights a top priority.

Budget

Allocation and management of finances directly affect all parts of the logistics cycle, including the quantities of products that can be procured, the amount of storage space that may be available, the number of vehicles that can be maintained, and the number of staff working in logistics. Mobilizing resources and securing a budget line item for health commodities and logistics activities is extremely important to ensure that products are available and that the logistics system operates effectively. To determine the resources needed to scale up, supply chain managers first need to assess what the expected costs are at different levels of the logistics system. When determining supply chains costs, managers should consider the cost of storage, transportation, and management; and determine what share of these costs each group will cover (i.e., Ministry of Health, donors, nongovernmental organizations [NGOs], etc.).

Supervision

Supervising the staff who works within the logistics system keeps it running smoothly and helps to anticipate needed changes. Routine, effective supervision, coupled with on-the-job training in logistics, helps to both prevent and resolve supply problems and human resource constraints.

Monitoring and Evaluation

Routine monitoring and periodic evaluation of the pipeline and logistics system activities help demonstrate how well the system is performing, the areas that can be improved, as well as the system's impact on service provision.

Quality monitoring

It is important to understand the role of quality monitoring in ensuring an efficient and effective logistics system. In the logistics cycle, notice how *quality monitoring* appears between each activity of the logistics cycle. Quality monitoring plays an important role in quantifying and procuring the right products, based on the appropriate product selection and use. Procurement decisions should be based on the supply plan that is developed during

quantification. To ensure product quality, procurement documents must include detailed product and packaging specifications, and the expectations for quality at the time of receipt. After procurement, program managers must check the quality of health commodities before they enter the distribution system. Products that are procured should be quickly cleared through customs, or other inspections, before being distributed to facilities. While products are received, stored, and distributed (and when customers receive them), it is important to monitor their quality. Furthermore, the quality of the storage conditions and transportation mechanisms should be monitored. Programs must determine if patients are satisfied with the quality of the laboratory tests and whether the patients are satisfied with the service they received. Medical Laboratory Scientists must adhere to standard operating procedures when serving clients; they must also conduct quality control tests. Quality monitoring of both the product and the service is critical to the success of efforts to promote the appropriate use of products.

Policy and Adaptability

In addition to the elements in the logistics cycle, two additional factors—policy and adaptability—directly relate to the logistics system.

Policy

Government regulations and procedures affect all elements of the logistics system. Many country governments have established policies on the selection of medical products, how items are procured (for example, international competitive bidding or using prequalified manufacturers); when items are distributed; where and how items are stored; and the quantities customers receive. Fiscal and budget policies are often some of the most influential policies affecting a logistics system, whether related to securing funding for product procurement; or to pay for critical infrastructure, such as storerooms and transportation. Health program managers and other personnel dedicated to logistics can influence these policies, but they may face great challenges when trying to implement or change them. These managers and personnel should stay up-to date on current policies and complete them, as specified.

Adaptability

Adaptability is a characteristic of all successful logistics systems. Logistics systems must be designed to be flexible and adapt to constantly changing circumstances, such as changes in demand for a product, or changes in funding policies for logistics activities. You cannot redesign the logistics system every time a new product is introduced, or when consumption increases. In one sense, adaptability speaks to the logistics system's ability to successfully obtain the resources that are necessary to address changes in demand. For example, as demand increases, the logistics system needs to be flexible enough to respond to the increase in the quantities of products that will move through the system. This may mean building more warehouses and purchasing more vehicles, or increasing the frequency of resupply to avoid the need for larger storage facilities. The system's ability to meet these needs—its adaptability—will impact commodity availability. As governments continue to propose ways to reform the entire health sector—such as decentralization, integration, or cost recovery—the logistics system must continue to function when reforms are implemented. To function, a logistics system must be adaptable.

Definitions of Key Logistics Terms

Many of the terms in this article have a specific meaning for logistics. The key logistics terms used throughout the article are defined below.

Supplies, commodities, goods, materials, products, and stock: These items flow through a logistics system. The terms are used interchangeably throughout this handbook.

Users, clients, patients, and customers: The people who receive or use supplies. The terms are used interchangeably throughout this article.

Users: is familiar to anyone who collects information about *new* or *continuing* users, such as in family planning programs. *Users* can also refer to people who use a product that is not given to a client or patient but is used for them, such as an HIV test kit or a laboratory reagent. In those examples, the Medical Laboratory Scientist is the *user* of the product.

Clients: usually refers to someone who receives a treatment or service. For example, they could be a family planning client and receive contraceptives; or they could be a client and receive a service, such as a test for malaria or TB.

Patients: is a term often associated with clinic patients receiving treatment for an illness, such as those in an antiretroviral therapy (ART) program.

Customers: is a term typically used by the private sector; it helps reinforce the concept of *customer service*. In public health programs, all users, clients, and patients are considered to be *customers* in the same way a commercial business thinks of its customers: the service provider, health center, and laboratory are there to serve the customer.

Consumption, dispensed, dispensed to user, usage data: Data on the quantity of goods given to or used by customers. The terms are used interchangeably throughout this article.

Service delivery point: Any facility where users receive supplies related to health services. Service delivery points (SDPs) are usually hospitals and health centers, but may also include mobile units, community-based distributors, laboratories, and health posts.

Lead time: The time between when new stock is ordered and when it is received and available for use. When logistics managers evaluate how well a logistics system is meeting the six rights, they measure the lead time and try to reduce it. Goods should be available to customers at *the right time*—before the customer asks for the product. Lead time can be calculated within the entire in-country system, from arrival in port to the end user, between specific levels of the system, or even the procurement lead time from when a product is ordered with the manufacturer until it arrives in port.

Pipeline: The entire chain of physical storage facilities and transportation links through which supplies move from the manufacturer to the user, including port facilities, central warehouse, regional warehouses, district warehouses, all SDPs, and transport vehicles, including community-based distribution networks (Figure 3)

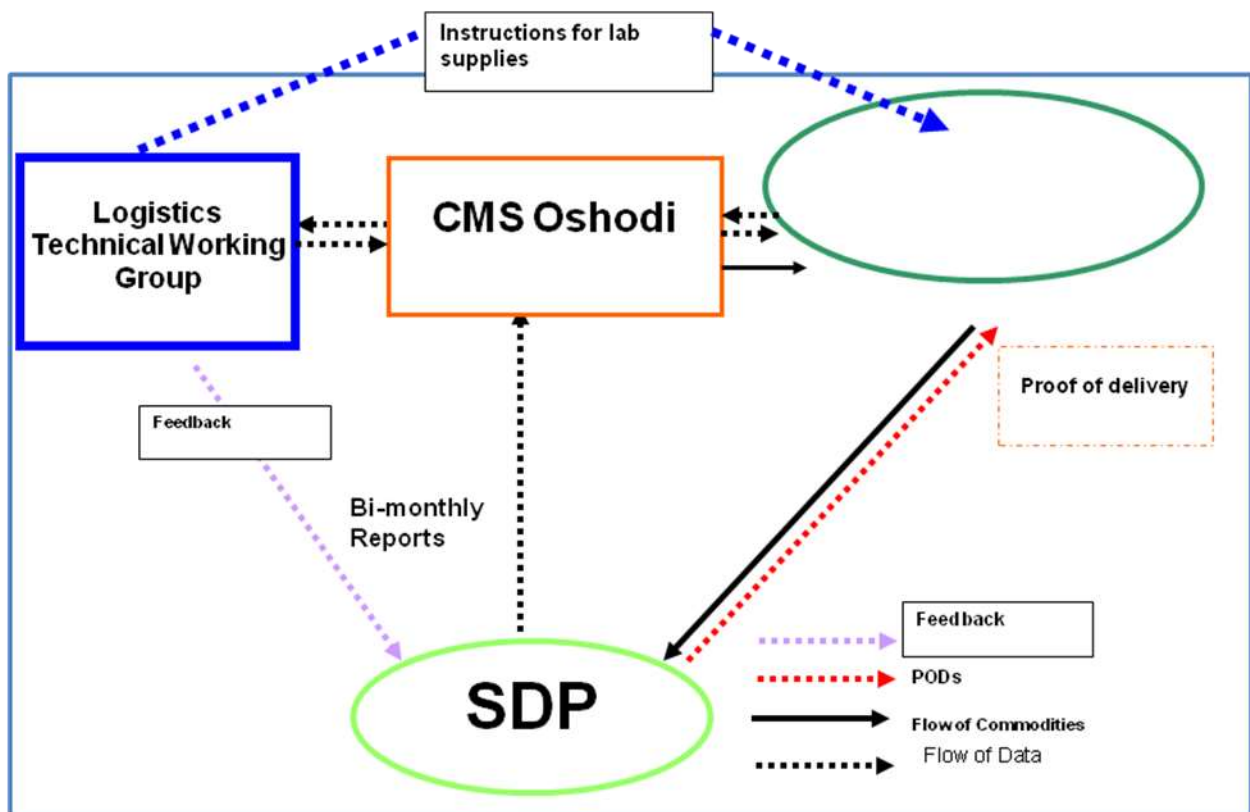


Figure 3: Nigeria pipeline for HIV/AIDS commodities

THE ROLE OF A MEDICAL LABORATORY SCIENTISTS IN HEALTH SUPPLY

Commodity security as it relates to medical laboratory services

Health commodity security exists when every person is able to have access to reliable, basic diagnostic services using quality essential medical laboratory products and equipment whenever s/he needs them. Supply Chain Management deals with logistics activities plus the coordination and collaboration of staff, levels, and functions. This includes global manufacturers and suppliers & demand dynamics, but logistics is program specific. Health programs cannot succeed unless the supply chain delivers continuous supply of health commodities to its customers.

The roles of Medical Laboratory scientists in product selection include; Specification, Identification and Formulation. Their role in Quantification and Procurement include; Data gathering, Assumption building Process and Provide information for supply planning. In Inventory Management and Distribution they perform the following roles; Determination of pipeline because of shelf life, Assigning different maximum and minimum stock levels for slow-moving and fast-moving commodities and Maintain cold chain for laboratory commodities that require it. In Logistic Management Information System, they track the actual consumption. Their other roles include: Routinely report stock levels, issues, losses and adjustments, and stock outs and also Provide Stock on Hand, Rate of Consumption and Losses/adjustment. In policy and adaptability concept, Medical Laboratory scientists advice

government agencies on policy matters relating to product selection, procurement, etc. Also in policy and adaptability concept, they make the cycle to be flexible and adapt to changes.

Benefits of Supply Chain & Logistics to Successful Laboratory Services

- Strengthening the supply chain of laboratory system for efficient health care services delivery
- Integrated approach to supporting all laboratories through supply chain assistance
- Harmonize laboratories commodities supplies for quality monitoring
- Reduce stock-out
- Minimize wastages due to expiries
- Consolidate procurement for cost savings

CONCLUSION

An effective and efficient Laboratory Supply Chain Management and logistics contributes to sustainable Medical Laboratory Services by;

- Ensuring continuous availability of Laboratory Commodities (Commodity Security)
- Promoting common approaches on policy, laboratory procedures and information system.
- Promoting the exchange of technical expertise between institutions involved in laboratory diagnosis and monitoring of disease condition in the region.
- Promoting the exchange of information among members of the network.
- Supporting joint advocacy and resource mobilization for laboratory services.
- Supporting the full utilization of laboratory infrastructures where available.

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