



Technical Brief

Procurement & Supply Chain Management

Allocation Period 2023-2025

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Contents

Introduction	3
Current Context and investment priorities	3
1. Strategy & Governance	5
1.1 Connected supply chain and programmatic challenges	5
1.2 Examples of key activities	5
1.3 Investment approach	8
2. Forecasting, Supply Planning and Procurement	9
2.1 Connected supply chain and programmatic challenges	9
2.2 Examples of key activities	12
2.3 Investment approach	12
3. Storage & Distribution	13
3.1 Effectiveness enhancer: Supply Chain Design & Operations	13
3.1.1 Connected supply chain and programmatic challenges	14
3.1.2 Examples of key activities	15
3.1.3 Investment approach	21
3.2 Effectiveness enhancer: Outsourcing of Logistics Services	22
3.2.1 Connected supply chain and programmatic challenges	22
3.2.2 Examples of key activities	25
3.2.3 Investment approach	32
4. Information Systems & Data Use	34
4.1 Connected supply chain and programmatic challenges	34
4.2 Examples of key activities	35
4.3 Investment approach	40
5. List of Abbreviations	46

Introduction

The purpose of this technical brief is to guide countries preparing Global Fund funding requests that include interventions related to procurement and supply chain management. It outlines the Global Fund's approach, examples of various types of investments that may be prioritized and supported, in addition to some considerations on how to select the most impactful investments for a given country context.

Applicants, including country stakeholders, members of the Country Coordinating Mechanism (CCM), Principal Recipients (PRs) and partners are encouraged to review this document in parallel with the resources available for each allocation period, including the HIV, TB, malaria and resilient and sustainable systems for health (RSSH) Information Notes, related technical briefs and the [Global Fund Applicant Handbook](#).

Efficient and reliable supply chains are an essential component of any resilient health system and central to achieving the core mission of the Global Fund to end AIDS, tuberculosis and malaria. They yield broader health outcomes, delivering health services in a sustainable, equitable and effective way. High performing supply chains also support pandemic preparedness (PP) and enable a rapid and appropriate response. Efficient procurement and supply chain management (PSM) systems also serve as a backbone and catalyst for the effective delivery of health programs, in addition to contributing to the attainment of universal health care (UHC).

Advocacy at the highest level of governments will be key to encourage more effective supply chain investments, driven increasingly through domestic financing and stronger oversight to trigger increased performance accountability. Aligning and converging on the enabling role of supply chains with national decision-makers is critical to achieving increased attention of supply chain issues into national health agendas and funding priorities.

This technical brief aims to support the above advocacy goals and allow decision-makers identify the right supply chain investments to improve the performance of their supply chains.

Current Context and investment priorities

In the recent past, several sources of data have pointed to a few recurring core sets of issues impeding the performance of national supply chains, despite the numerous investments and remarkable efforts implementing countries have made to improve them. The following chapters cover investments to alleviate the issues and address underlying driver areas that emerge as repeated themes. These issues have also been prioritized as key focus areas through various country consultation efforts. They include challenges such as:

- **Strategy & Governance** challenges including lack of effective accountability, oversight, monitoring and political support, as well as inadequate workforce in supply chain functions.
- **Forecasting, Supply Planning and Procurement** challenges including lack of coordination for demand quantification, long procurement processes with extensive

delays, increased manufacturing lead times coupled with long importation and inbound distribution times and increasing freight rates.

- **Storage & Distribution** challenges with insufficient capacity (storage & equipment), lack of manpower, subpar operations including warehouse management and inadequate controls for stock keeping, poor order fill rates, late deliveries and lack of adherence to good distribution practices.
- **Information Systems** challenges including inadequate functionality and usage limitations, particularly in the areas of track & trace, inventory visibility and interoperability.

There is often a myriad of issues that drive the root causes of supply chain underperformance. The identification of root causes and the appropriate sequencing of interventions is often context specific. This guide provides some general tools and principles to support countries with the identification of appropriate interventions for the most common PSM related challenges.

For each investment focus area, we include a section on “**Examples of Key Activities**” to alleviate your challenges. We consider some examples of supply chain underperformance and suggest some tools to help identify priority investments to continually improve supply chain performance. Overall, we suggest using an approach (e.g., “Five Whys”¹) for root cause analysis to dig into the origin of supply chain underperformance. Digging below a surface-level cause of a problem may lead applicants to different focus areas because the drivers of supply chain challenges are interlinked.

¹ [Five Whys tool for Root Cause Analysis - CMS](#)

1. Strategy & Governance

The most effective in-country supply chain strategies result from detailed planning processes that are consultative with various stakeholders. These plans which are often termed “national supply chain master plans” or “pharmaceuticals management strategy”, outline a set of activities over a five-to-ten-year horizon to address the most pressing and long-term supply chain needs.

To be effective, each strategy needs to be supported by efficient governance systems and structures that guide, control and lead supply chains to effectively implement core supply chain priorities and functions. Effective governance also entails coordinating functions and relationships across each node of the supply chain to drive accountability and performance.

1.1 Connected supply chain and programmatic challenges

It is not uncommon for supply chains to underperform, stagnate in their improvement and/or have ad-hoc decision-making processes that do not sufficiently or systematically address challenges such as: unclear vision or direction for supply chain transformation; insufficient political advocacy for supply chain priorities at senior leadership levels; narrow or inexistent supply chain strategies; ineffective governance structures, coordination mechanisms and planning systems; weak and unmotivated supply chain leadership, management or insufficient operational capacity.

While there may be individual issues which contribute to one or part of these challenges, often the root causes are tied to ineffective strategies and/or governance related challenges.

These core areas of strategy and governance need to exist, be robust and interlinked with each other and foundational for any high performing supply chain. The subsequent sections cover the importance of the design, resources, systems and processes required for effective strategies and governance systems.

1.2 Examples of key activities

a) Creation of supply chain strategic plans (master plans)

Countries should develop consultative, holistic and costed national strategic plans supply chain systems. These should be endorsed by relevant national authorities, development partners and other concerned stakeholders. The goal is to support a country in their journey towards self-reliance. The developed plan should explain how the capacity of a country will be strengthened to plan, finance and effectively manage national health product management systems independent of donor support in the coming years.

Examples of systems strengthening areas included in such strategic plans include, but are not limited to:

- Quantification and forecasting.
- Procurement and planning.
- Warehousing, storage and inventory management.
- Distribution and transportation.
- Waste management.
- Information systems.
- Financing.
- Human resources.
- Policy and regulatory.

Recent examples include Uganda’s 10-year Roadmap for Health Supply Chain Self-Reliance (2021/2022 – 2031/2032)² and Malawi’s Supply Chain Transformation Plan from 2020³.

The development of national supply chain transformation strategies should drive the performance and efficiency of supply chain systems to ensure uninterrupted availability of and equitable access to health products.

b) Logistics management units

A logistics management unit (LMU) is a supply chain management structure that serves both strategic and operational needs. It is often used to monitor, organize, support and enhance all activities within the public health supply chain. LMUs serve as a core governance unit to strengthen systems, improve accountability and provide oversight over key supply chain functions, as well as coordinating response to identified bottlenecks. A LMU also plays a key role in supply chain oversight and governance, supportive supervision of health facilities and routine analysis and use of data for monitoring and enhancing supply chain performance. El Salvador’s example⁴ highlights what it takes to establish a LMU in specific local context.

c) Human resources for supply chain

1) Leadership development – Strengthening leadership for supply chain

Effective supply chain leadership is key to maintaining high levels of performance or driving supply chain vision, strategy and transformation in any country. An example of a supply chain leadership development program is the Strategic Training Executive Programme (STEP 2.0) program. STEP 2.0⁵ is a partnership program between the Global Fund, Gavi, the United States Agency for International Development (USAID) and People that Deliver (PtD) – a coalition acting as the hub for the program and quality assurance. This leadership development program combines traditional learning with on-the job training, allows participants develop their problem-solving skills and foster effective team building approaches. To ensure learning extends beyond the classroom, course participants are paired up with mentors from the private sector to put their new skills into practice and build a network of contacts to share knowledge.

² [10-Year Roadmap for Government of Uganda's Health Supply Chain Self-Reliance 2021/2022- 2031/2032](#)

³ [Malawi's Supply Chain Transformation Plan from 2020](#)

⁴ [Establishment of El Salvador's New Health Logistics Management Unit](#)

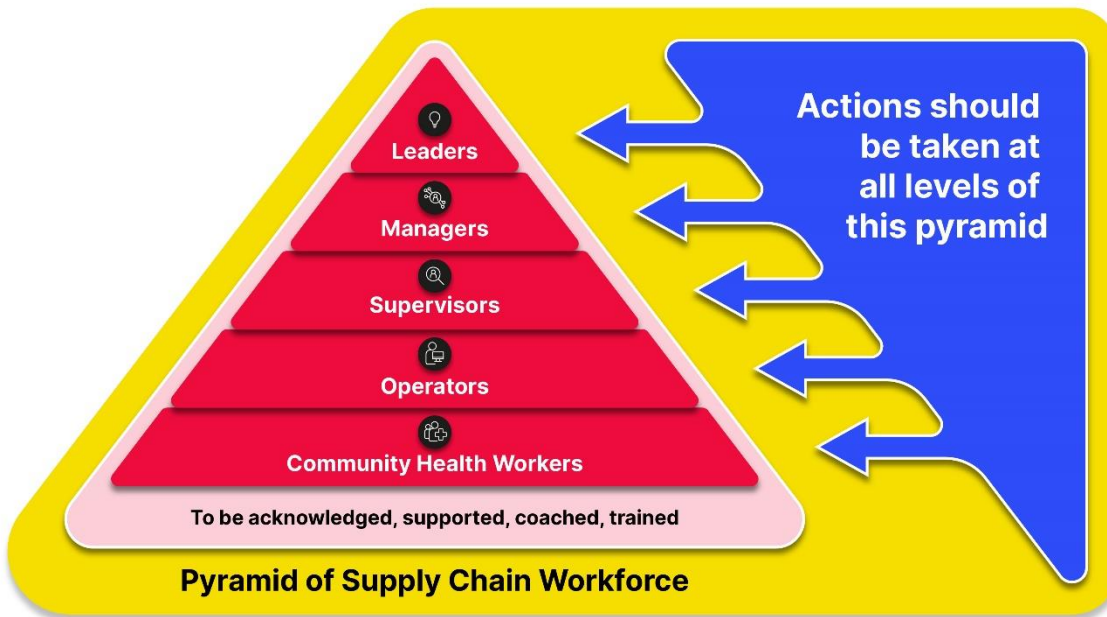
⁵ [Strategic Training Executive Programme \(STEP 2.0\)](#)

In addition to STEP, there are other supply chain leadership development and skills enhancement programs for supply chain programs⁶.

2) Supply chain workforce development plans

Structuring, developing and professionalizing capabilities of human resources through fit-for-purpose organizational design is a critical supply chain enabler often facilitated through workforce development plans. In addition to defining career progressing pathways, these plans also detail required roles and appropriate recruitment, retention and motivation practices. The high-level result or outcome for such initiatives should include adequately staffed organizations and an appropriately skilled supply chain workforce.

Figure 1: Pyramid of Supply Chain Workforce



The workforce development plans should also detail incentives and recognition programs linked to learning and continuous development to improve staff performance.

Key investments in strategy and governance include the creation of an overall national strategic plan, strengthening oversight of key supply chain functions and the creation of governing bodies for supply chain. They also include human resource strengthening activities such as leadership development and professionalization of the supply chain workforce.

⁶ [People that Deliver – Resources](#)

Table 1: Key investments in strategy & governance

Activity	Description
Creation of Supply Chain Strategic Plans (Master Plan)	Support the development or refreshing and implementation of costed long-term national supply chain transformation strategies.
Supply Chain Oversight	Routine financial reviews ⁷ of central medical stores (CMS) to inform, progress monitoring including risk mitigation actions, investment planning and updating of established masterplans.
Maturity and Risk Assessments of National Supply Chains	Assessments and diagnostics that evaluate supply chain maturity levels, risks and governance systems.
Logistics Management Unit	Support to develop, re-structure, implement a logistics management unit or equivalent supply chain governing body. Where existent, identify and address gaps in existing LMUs and optimize performance.
Leadership and Workforce Development	Accelerate supply chain leadership development such as STEP 2.0. Support to professionalization supply chain workforce.
South to South Collaboration and Continuous Learning	Support experiential learning through study tours, short-term work placements, knowledge exchange programs, webinars and creation of learning platforms.

1.3 Investment approach

Targeted activities in strategy and governance provide critical capacity building tools and approaches to facilitate the establishment of governance frameworks, avenues to consistently monitor supply chain performance and drive increased accountability, education and policies needed for improved national supply chain management.

It is therefore critical to support Ministries of Health, PRs and other key players in the health supply chain, to structure, develop and systematize capabilities to operate their supply chains – a key foundational element for efficient in-country supply chains.

Systematizing capabilities along the core areas through the activities mentioned above is key for countries to operate agile yet well-functioning supply chains, supporting an increased availability of medicines. This can be done by systematically developing and understanding of national supply chain challenges and priorities, by reviewing national strategic plans, as well as engaging in stakeholder coordination and planning activities.

⁷ Examples: [Malawi CMST's Annual Report](#), [Uganda NMS's Annual Report](#), and [UK NHS Supply Chain Business Plan](#)

2. Forecasting, Supply Planning and Procurement

The Global Fund plays a leading role in global markets for medicines and technologies that prevent, diagnose and treat HIV, tuberculosis and malaria. Every year, roughly half of the Global Fund's investments – about US\$2 billion – is used to procure these key medicines and health products, ensuring they are available to those who need them most and accelerating the end of the epidemics.

The procurement and supply management of health products are fundamental to the performance of Global Fund-supported programs. Our approach to supplying critical medicines and health products focuses across the entire supply chain, including sourcing and procurement. The Global Fund is committed to ensuring that our partners managing Global Fund-financed programs achieve the best value for their investment and have the tools and information to:

- Access optimal, quality-assured medicines and health products.
- Obtain the best prices and conditions available.
- Adequately plan and manage the selection, purchase and delivery of products.

The Global Fund includes in its [Guide to Global Fund Policies on Procurement and Supply Management of Health Products](#) detailed descriptions of standards and principles for health product procurement, covering areas such as value for money, efficiency and effectiveness, transparency and ethics and intellectual property, including trade-related aspects of intellectual property rights (TRIPS).

2.1 Connected supply chain and programmatic challenges

Many countries already successfully procure and deliver quality-assured health products. However, certain challenges exist especially in the context of co-financing including: inadequate financing or misalignment of domestic financing with the procurement cycle; legislative or regulatory barriers; weaknesses or gaps in country quality standards; outdated procurement or national guidelines that may create barriers for new products to enter the market or slow uptake of new products; limited registration and reliance on waivers for products purchased with external financing.

To mitigate challenges to access critical health products, the Global Fund strongly encourages countries to identify and address these barriers as they assume a greater role in financing health products. This may include strengthening the capacity of national procurement systems and national stringent regulatory authorities, using international pooled procurement mechanisms (PPM) including PPM/Wambo.org or the Global Drug Facility for TB health products.

To think about challenges and key considerations in health product management, it is helpful to understand and consider the following areas which impact the ability of a health system to regulate, procure and manage quality-assured health products to those who need them:

- **Policy, legislation and regulation:** This is the national regulatory, legal and policy environment that applies to and regulates management of health products and as such, may have impact on access to health products in a given country. The objective is to improve access to affordable, quality-assured products that may face market entry barriers due to regulatory constraints, protective procurement legislation, public procurement regulations, weak governance or lack of transparency.
- **Selection and rational use:** These encompass the existence of modern and updated treatment and diagnostic guidelines that are aligned with the most recent World Health Organization (WHO) or internationally recognized norms and standards. Selection of products as per the applicable guidelines and existence of systems to ensure right prescription and rational use are also addressed in this topic.
- **Procurement and sourcing:** These include products procured efficiently and supplied reliably, ensuring evaluation beyond unit price (i.e., best value for money), employing the total cost of ownership and ensuring service and maintenance provisions where applicable (e.g., health equipment, including laboratory technologies and devices or other supportive equipment).

The following content is not intended to be exhaustive or comprehensive. Rather, it is intended to highlight potential challenges that could negatively impact the sustainability of a country's national disease response, as well as key considerations that countries are encouraged to consider during the development of Global Fund funding requests, grant-implementation and national planning.

It is also essential to note that both the challenges and considerations to meet them are heterogeneous, and there will be strong differences between countries and regions based on country and regional contexts. The outlined challenges and considerations may not be applicable to and relevant for every context. Instead, they are designed to help drive increased dialogue on key thematic areas that may hinder efforts to strengthen sustainability, as well as useful considerations as countries and country stakeholders develop their specific responses to address those challenges.

a) Challenges in policy, regulation and legislation

Significant challenges can arise with respect to:

- **Products of public health interest:** Key products for HIV, TB and malaria programs are not always prioritized for funding and/or included in a national essential medicines lists, which may negatively impact proper procurement, registration and tax exemption.
- **Regulatory framework / quality:** Greater use of country systems is essential to long-term sustainability. In certain contexts, however, increased reliance on country quality standards and limited or no alignment with internationally recognized stringent quality standards could impact quality and safety of procured products. Weaknesses and gaps in some country systems enforcing quality and safety of health products may be insufficient, or implementation of those systems may be ineffective. This may impact a country's ability to acquire quality-assured health products.

- **Procurement legislation – Outdated:** Procurement legislation and regulations, or those with protective provisions, may unintentionally limit access to affordable and quality-assured health products by creating barriers for products to enter a local market. Furthermore, legislation may require national procurement. This is particularly true for “small market” countries with low demand or for low-volume limited use products.

b) Challenges in selection and rational use

Optimal products to ensure maximum disease impact and prevent/minimize chances of development of resistance to medicines may not be adopted or used in national guidelines and/or the uptake or adoption of these products may be slow. Challenges may include:

- **Outdated guidelines:** If treatment and diagnostic guidelines are not updated regularly and in line with WHO or other international recognized clinical standards, this may lead to selection and use of sub-optimal products that may lead to undesirable treatment outcomes.
- **Outdated guidelines:** May also lead to unnecessary prescriptions and hence encourage the unrequired use of products.
- **Financing:** There may be a lack of financing to introduce or expand access to new and modern diagnostic products and technologies.

c) Challenges in procurement and sourcing

- **Procurement processes and practices:** These may be restrictive, inefficient and/or outdated, which may lead to suboptimal procurement outcomes, for example higher prices or an inability to source the full range of the needed products. Specific challenges may include: 1) Barriers for manufacturers to participate in national tenders including, but not limited to, the need for local agents, the submission of bids in local languages, the submission of bank guarantees issued by local banks, the short submission deadlines of bids, the mandatory denomination of bids in local currency and unrealistic aftersales service obligations; 2) Procurement rules, regulations and processes may not consider aspects specific to health products procurement and may not allow purchasers to procure products from the international market or through pooled procurement mechanisms. This is particularly problematic for “small market” countries and for low volume and/or limited use products.
- **Financing:** There may be a lack of alignment between fiscal and procurement cycles, preventing adequate and timely budget allocation for the procurement of health products leading to a risk of stock-outs. In addition, funding may be centralized but procurement may be de-centralized, with discretion by sub-national authorities in how budgets are spent.
- **Information:** There may be limited access to market knowledge and intelligence to inform the procurement strategy, including the identification of reliable quality-assured sources, reference prices to benchmark the procurement outcomes and other relevant information.

2.2 Examples of key activities

Table 2: Activities to address forecasting, supply planning and procurement challenges

Activity	Description
Strengthening National Regulatory Authorities	Investing in strengthening national regulatory authorities (NRAs), specifically the capacity of NRAs to ensure that there is an adequate process for registration, use of registration waivers when applicable, market authorization of health products, donations and waste management. Investing in strengthening NRA capacity to issue, implement and monitor national guidelines for quality assurance, quality control and pharmacovigilance to ensure that only quality-assured products circulate in the market and reach end users.
Market Research for Health Products	Conducting market research, with special consideration of what is available locally vs. on international market. Encourage the active use of available international market knowledge and intelligence to inform procurement decisions at the national level, including the benchmarking of prices, experience of other disease programs, as well as experience from neighboring countries etc.
Update Procurement Systems, Processes and Requirements	Ensure procurement systems and processes consider quality and reliable on-time supply in addition to price. Ensure procurement requirements and specifications are non-restrictive and responsive to market conditions.

2.3 Investment approach

First and foremost, it is essential to ensure adequate financing is available for health products to meet the needs and targets of national strategic plans, and to align the timing and distribution of that financing with the procurement cycle. Ensuring sufficient financing and strong public financial management of available resources can help strengthen availability and distribution of health products, reduce the likelihood of stock-outs and increase long-term sustainability.

In addition to the specific activities outlined above, some general principles and guidelines may help to address challenges.

To address policy, legislation and regulation challenges, countries may consider:

- Mapping and/or analyzing access issues and agreeing to a country-led response. This may include reviewing outcomes and limitations of the previous procurement processes.
- Promoting that WHO-recommended optimal products are used by disease programs, including development or update, use of clinical guidelines and national essential medicines lists. These products are also generally easier to procure.
- Leveraging global and regional quality assurance mechanisms and standards, including the WHO collaborative procedure for accelerated national registration.

To address selection and rational use challenges, countries may:

- Ensure WHO-recommended optimal products are used by disease programs. This will also improve the ability to procure these products, even in small volumes (please refer to the **procurement section**).
- Work towards the alignment of national treatment guidelines and essential medicines' lists (EML) with WHO guidelines, optimal regimens and EML.
- Support the procurement of optimal regimens and fixed-dose combinations (FDCs) (where applicable) regardless of funding source.
- Advocate a government committee or a working group to be tasked with regularly reviewing and updating guidelines, diagnostic algorithms and medicines lists as well as monitoring prescription practices and rational use, including compliance with treatment guidelines. In countries where guidelines are outdated and/or the EMLs requires revision or updating, this is a key step to begin planning and quantifying what products will be needed and when.
- Consider using external financing, where available, to strengthen the capacity and capability of implementing and monitoring the rational use of health products.

To address sourcing and procurement challenges, countries may explore opportunities to update national legislation that enables local purchasers access to and acquisition of products from the international market and/or through pooled procurement mechanisms. This is particularly critical where products' volumes are low or there are specialized products.

3. Storage & Distribution

Storage and distribution improvements are discussed in detail through two lenses that could potentially enhance the effectiveness of these critical supply chain processes. The two lenses, labeled as "effectiveness enhancers", are "Supply Chain Design & Operations" and "Outsourcing of Logistics Services".

3.1 Effectiveness enhancer: Supply Chain Design & Operations

Supply chain design and operations investments can be undertaken to improve the performance and effectiveness of storage and distribution infrastructure and reduce overall operational costs. These investments aim to obtain the highest possible performance out of existing resources. These investments also point to key capacity bottlenecks which need to be addressed to further increase the performance of the system.

Supply chain systems design analyses are about asking "what if" questions. What if key supply chain inputs changed in a certain way? What then would be the effect on the supply chain outcomes that we care about? Through these analyses, the goal is to identify the best possible configuration of supply chain inputs under the control of the responsible entity to achieve high performance on supply chain outcomes. A supply chain system design analysis can take many forms or names and focus on different parts of the supply chain system. The analysis may take the form of a network optimization study, route optimization study,

inventory optimization study, product flow path study, fleet optimization analysis, last mile delivery analysis or more. For details on which supply chain inputs can be examined for their effect on which supply chain outcomes and how a design study should be scoped, please see the table **Examples of key activities on Section 3.1.2** below, which provides some detail on design activities.

At their core, operations improvement projects are about mapping and breaking down processes into their component parts, measuring the current performance of existing processes, making defined adjustments with the goal of improving performance and measuring the performance of the adjusted processes. This process improvement is an iterative loop and can be described as a Plan-Do-Check-Act loop (PDCA) loop, an Observe-Orient-Decide-Act (OODA) loop, or a Define-Measure-Analyze-Improve-Control (DMAIC) cycle. Supply Chain operations improvement can focus on different parts of the supply chain system. A project can focus on storage operations and may take the form of a warehouse operations improvement or an inventory tracking and reduction Initiative. It may focus on distribution operations and take the form of a first-mile, middle-mile or last-mile delivery tracking and improvement initiative.

Operations improvement projects also may be referred to using terms such as lean operations, six-sigma operations, business process reengineering or process improvement initiatives. For details on how operations improvement projects can be scoped, please see the table **Examples of key activities on Section 3.1.2** below which provides some details on operations improvement activities.

3.1.1 Connected supply chain and programmatic challenges

Many in-country health product supply chains are afflicted with some or all of the following challenges:

- Frequent stockouts at lower levels of the supply chain due to delayed deliveries (related to shortage of transport capacity).
- Expiries and loss of product at the central, regional and peripheral levels, because large batches are received and stored for a long time.
- Excessively high spend on storage or distribution, even though the system is not performing well in terms of ensuring on-time-in-full deliveries.

These supply chain challenges directly translate to programmatic shortcomings. Stockouts result in treatment disruptions due to unavailability of medication (e.g., the lack of the required ARV for treatment of people living with HIV/AIDS), lack of diagnosis due to unavailability of rapid tests (e.g., self-test kits for HIV) or the reagents/cartridges needed to run required tests (e.g., GeneXpert cartridges for MTB-RIF diagnosis). Expiries of product and excessively high spend on distribution (e.g., excessive spend on distribution of long-lasting insecticidal nets (LLINs) for malaria prevention) represent wasted resources which could potentially be invested elsewhere in the health system to improve short- to long-term health outcomes.

Examining the key factors driving this underperformance, starting with a root cause analysis, often may lead a PR to conclude that key factors are either: a) Shortage of storage capacity

at central, regional or peripheral levels or b) Shortage of transport capacity to distribute health products.

In some cases, these challenges certainly require investment in additional storage or distribution capacity to alleviate the pain. But in many cases the challenges can be addressed by increasing the **effectiveness of the storage and distribution systems** through improved **design** of the existing system and/or improved **operations**.

Supply chain **systems design analyses** and **operations improvement projects** are usually lower cost interventions compared to additional infrastructure capacity, that can be delivered relatively quickly (timelines are in months not years). Even in those cases where additional capacity is needed, systems design analyses and operations improvement projects are very useful to understand exactly *how much* additional capacity is needed and exactly *where* in the system that additional capacity should be added for maximum benefit.

As a result, we recommend considering systems design analyses and operations improvement projects if your country's health product supply chain is facing the challenges listed above, and especially if you are considering the addition of storage or transport capacity to address the challenges.

3.1.2 Examples of key activities

As described above, system design analyses can focus on different areas of the supply chain, take different names and vary different inputs.

Table 3: Example of recommended focus activities in supply chain design

Activity	Description
Storage & Distribution Network Design and Optimization	Strategic needs assessments of the current storage and transport capacity, including future needs, key “what-if” scenarios and efficiency evaluation. Analysis, optimization and redesign of product flow paths and layers. How much storage capacity and where should it be located?
Inventory Norms Review	How much stock of each product is carried at each layer in the system? What portion of that stock is necessary to cover the defined delivery frequency? And what portion of that stock is present to serve as a buffer against variation or uncertainty? How do inventory norms compare against existing storage capacity?
Route Design & Planning	Plan delivery routes including choice of point-to-point vs multi-stop routes for individual locations and health products. If routes are used, what is the exact route followed from each location? With what set of delivery locations, sequence and duration? Enable transport mode selection, transport fleet sizing (how many vehicles) and optimization (e.g., what is the right mix of sizes of vehicles) and location of transport fleet.

Activity	Description
Frequency & Cadence	Support supply chains to increase replenishment frequencies and operate at faster cadence. Faster cadence (shorter cycles) enables better matching of supply and demand through better forecasts and orders for shorter time periods, which will reduce both stockouts and expiries. Faster cadence also reduces cycle stock, which reduces the need for excess storage capacity for large batches of products at all levels. Faster cadence also enables rapid introduction and scale-up of new products and supports pandemic preparedness.
Smart Segmentation and Integration	Are different products or product families following different product flow paths, frequencies, inventory norms and transport modalities? Or do some products get bundled together (“integrated”) and follow the same system design? Support segmentation of health products and integration of systems using key supply-chain-relevant variables including quantity, financial value, volume, necessary storage conditions, health value, demand unpredictability, health value or criticality and more.
Differentiated / Alternative Distribution Models Including Beyond the Facility and into Communities	Design appropriate distribution models for health products such as condoms, Pre-Exposure Prophylaxis (PrEP), self-tests, TB diagnostics and care and more, to improve product availability and accessibility at locations beyond the health facility and into communities. Design distribution models for LLINs, including delivery to households (routine and campaign distribution models). Plan supply chains to serve community health workers and private sector outlets. Design SCs to support multi-month dispensing where applicable.
Waste Management Planning	Map waste. Design and optimize waste management networks, such as installing small-scale incinerators at public hospitals ⁸ and/or off-site transport and storage ⁹ to enable safe, effective and efficient handling of health product waste.
Operational Sample Referral Networks	Support optimization of diagnostic network design (see Technical Brief: Laboratory Systems Strengthening for more detail) and design efficient sample transport systems. Explore uses and limits of alternate delivery approaches for sample transportation (e.g., UAVs, motorcycles, trained postal service).

Some variables may have an important effect on the operation of your supply chain but may not be under your control. These are important to consider at different values for your system design scenarios. Examples of such variables include fuel and labor prices, product demand and seasonal fluctuations. Supply chain outcomes that we care about and could be in-scope as outcomes of a system design analysis include cost, service level and risk.

What is required to undertake a system design analysis?

To help understand the size of such an intervention, a system design analysis can usually be completed in the time range of one to six months. The time range depends on the size and complexity of the system to be analyzed, the detail level and breadth of questions being asked and the number of different scenarios to be addressed. The cost of the analysis is driven by the time effort of the engaged consultant and is largely driven by the same factors above, in addition to their daily rates.

⁸ Examples: [Senegal and Madagascar's](#) small-scale incinerators at public hospitals

⁹ WHO training in health care waste management: [MODULE 14: Off-site Transport and Storage of Healthcare Waste](#)

Additional steps which are not included in the above estimates include implementation of the recommendations from the system design analysis, monitoring the results of the changes and iterating the analysis in response to the learnings from the implementation.

Operations improvement projects

As described above, operations improvement projects can focus on different areas of the supply chain (e.g., storage or transport) and take different names. We include below a table of some recommended key focus activities for operations improvement. We also include a short description of the activity and the area of the supply chain it focuses on.

Table 4: Recommended key focus activities for operations improvement

Activity	Description
Warehouse Process Improvement & Inventory Management and Optimization	Improve warehouse operations by making best use of existing storage facilities. Implement operational best practices in warehouse and inventory management to reduce expiries and loss.
Warehouse Facility & Equipment Enhancement	Assess warehouses for compliance, capacity, suitability for storage of pharmaceutical products ¹⁰ and identification of required improvements. Improve warehouse equipment by enhancing stacking, racking, warehouse handling equipment and temperature monitoring systems.
Transport Operations	Support transport operations including fleet management, vehicle tracking, route execution and proof of delivery supported by use of appropriate transport management systems (TMS). Ensure use of appropriate operating and monitoring systems for time and temperature sensitive pharmaceutical products.
Laboratory Sample Referral Operations	Oversee implementation of operational sample referral networks including performance management and update of system design.

In storage operations improvement projects (such as warehouse operations improvement and inventory management optimization), one may look at changes such as:

- Adjusting **layout** of storage locations.
- Improving the **organization** of storage locations (for example using 5S methods¹¹).
- Improving **visibility** through labelling.
- Improving **safety, security and fire prevention**.
- Training staff to improve compliance with processes.
- Improving use of a **warehouse management system** to improve data quality and completeness (this is linked to **Section 4 - Information Systems & Data Use**).
- Modernizing and/or digitalizing monitoring systems, such as temperature control systems (this is linked to **Section 4 - Information Systems & Data Use**).
- Improving **inventory count** accuracy and frequency.

A critical area of current relevance for many PRs is the improvement of **safety, security and fire prevention**¹². Conducting facility risk assessments, the creation and rollout of

¹⁰ [Guidelines for Warehousing Health Commodities](#)

¹¹ [5S: One of Lean Six Sigma's Finest Tools](#)

¹² [Urban Fire Regulatory Assessment and Mitigation Evaluation \(FRAME\) diagnostic](#)

safety plans and protocols, the installation of specialized equipment to mitigate risks (e.g., commercial fire protection equipment such as sensors, alarms, sprinklers, extinguishers and more) and the purchase of insurance with adequate coverage against key risks are an essential set of practices to safeguard against potential loss of life, destruction of property, loss of health products and disruption of health services.

The specific sub-focus for a storage operations improvement project will depend on the result of a process mapping exercise and the identification of the key problem areas to tackle within the storage location.

It is important to recognize that a storage location should look at the full set of processes, from receiving to put away, to storage, to picking, to packing, to dispatch in order to address issues in a comprehensive manner (and not only focus on storage).

The table below lays out the goals of each warehouse sub-process and some ways in which they may potentially be improved.

Table 5: Warehouse sub-process and potential ways to improve

Warehouse sub-process	Potential ways to improve
Receiving	<p>Can the warehouse verify it has received the right product, in the right quantity, in the right condition and at the right time? Aim is to receive cargo efficiently and correctly, to review quality documents and to avoid accumulation in the receiving area. Specialized equipment can allow one to unload cargo and clear dock areas faster and more efficiently. Dimensioners can automate the capture of weight and dimensions of parcels and pallets to accelerate receiving processing and obtain certified measurements. Clear plans for labor management and dock scheduling allows one to properly allocate the right amount of personnel by planning for upcoming receipts.</p>
Put-Away	<p>Put-away is the movement of product from the receiving dock to the optimal warehouse storage location. When products are put away properly: health products reach storage faster saving time and increasing efficiency; health products are stored in their appropriate storage conditions (e.g., temperature control); warehouse space utilization is maximized; health products are easier and faster to find, track and retrieve; and safety of employees is ensured.</p> <p>Aim is to move goods for storage to their optimal location in a fast, efficient and effective manner. Is the layout of the warehouse, racking and shelving appropriate to support put-away and storage? Are the racks and shelves clearly labeled? Are the staffs aware of the layout of the warehouse and know where each batch of incoming health products is supposed to go? Is there sufficient equipment (e.g., forklifts)? Is there a “quarantine area” where products can wait during verification of quality documents and in case samples need to be taken for quality testing?</p>
Storage	<p>When done properly, the storage sub-process fully maximizes the available space in the warehouse, increases labor efficiency, ensures integrity and reduces loss of the health products.</p> <p>Are storage KPIs tracked? Having processes and systems that calculate warehouse storage utilization, storage dwell time, inventory count accuracy and more, is important to determine how efficient each aspect of the storage subprocess is. Is the warehouse storage system (e.g., racking and shelving) appropriate for the size of your facility, product volumes and product mix? Does it allow one to maximize horizontal and vertical spaces and improve warehouse efficiency? Are the location and set up of the temperature-controlled storage areas adequate?</p>
Picking	<p>Picking is the sub-process to collect products in a warehouse to fulfill orders. Picking can often be the most labor-intensive and thus costliest operational process in a warehouse. Improving this subprocess is thus an important lever to increase warehouse efficiency. Streamlining picking should also focus on achieving higher accuracy to reduce errors in orders sent for packing.</p> <p>Potential improvements include conducting an ABC analysis to improve warehouse layout, including consideration of expiry timing in product placement on racking and shelves, ensuring appropriate and visible labeling, selecting the right picking methodology (e.g., pallet picking, case picking, order picking or batch picking) and using software and technology to guide warehouse staff in properly executing the picking process.</p>

Packing	Packing consolidates picked items in an order and prepares them for dispatch. Proper packing ensures that damages are minimized from the time health products leave the warehouse. Ideally, packaging needs to be enough to ensure product integrity, but not excessive to increase packaging costs, package size and waste. Selecting appropriate packaging (e.g., standard cartons) and training workforce for packing of orders including for “special products” (e.g., temperature-controlled products) are potential improvements for this process.
Dispatch	Dispatch is considered successful only if the right order is sorted and loaded, sent to the right target location and is delivered safely and on time. Improvement opportunities in this subprocess include having loading systems and schedules to plan workforce and schedule adherence, communications processes for the arrival of trucks ready for loading, time tracking for loading process and guides and training that clearly instruct how to load health products safely and efficiently.
Stock Counts	Periodic stock counts are important to reconcile with data systems to ensure accuracy of data, improve accountability and reduce loss and wastage. Improvement opportunities for stock counts include establishing frequency and processes for stock counts, having stock counts (or at least partial cycle counts) more frequently, doing an ABC analysis to determine appropriate frequency of cycle counts for different products, having technology assistance for stock counting (including machine vision systems), having clear processes and next steps for any discrepancies identified in the stock counts, feeding results and lessons from stock counts back into any warehouse management system being used.
Safety, Security and Fire Prevention	Facility risk assessments and safety plans, installation of commercial fire protection systems (e.g., sensors, detectors, alarms, sprinklers, extinguishers, signage etc.), regular maintenance of equipment, especially electrical and fire safety equipment. Development of a well-functioning control system such as regular fire safety inspections, with changes instituted as a result of findings. Restriction of regular entry and exit to controlled points. Purchase of insurance with adequate coverage against key risks.

In Distribution Operations Improvement projects, we may look at levers such as:

- Improving **tracking** of transport.
- Improving **compliance with planned delivery routes and timings**.
- Improving use and quality of **proof-of-deliveries**.
- **Improving the integrity and quality of products delivered i.e., products not damaged, maintained at the right temperature and more.**

Supply chain outcomes that we care about and that would be affected by an operations improvement project include **cost, service level, risk and accountability**.

What does it take to undertake an operations improvement project?

Operations improvement projects are larger scope and longer term than system-design analysis projects because by their nature, operations improvement projects involve implementation and observation of results. Operations improvement projects should typically be planned for a duration of six months to one year, but a critical piece of the project should be ensuring that there is a base for ongoing and iterative improvement even beyond the end date of the formal project or initiative. Operations improvement projects are also typically larger in scope and involve direct observation of more operations in the supply chain.

3.1.3 Investment approach

Supply Chain system design investments are valuable precursors to infrastructure investments to help appropriately target and size any necessary capacity additions. If any infrastructure capacity additions (e.g., warehouse space, trucks, equipment) are being considered, it is very valuable to first do a supply chain design analysis. Design analyses are not *only* useful before infrastructure capacity additions, but are also very valuable in ongoing operations to continually improve the configuration of the supply chain to obtain the highest possible performance. In fact, most leading private sector companies have moved from doing supply chain design as periodic one-off exercises to a mode of ongoing, continuous design. This is because today's supply chains are constantly changing – we have new health products to introduce, changing demand, changing costs, and changing resources available for investment. The best way in which to proactively face that continuous change is to be ready to continuously redesign your supply chain.

Companies are building “digital twins” of their supply chains, so they have a digital model representation of all infrastructure, stocks and flows in their system which can be quickly updated when faced with a new situation to decide how to adapt. Our health product supply chains may still be some ways away from having high-quality digital twins to aid decision-making, but we should still take to heart the idea that supply chain design is better thought of as a frequent exercise than a rare, one-off exercise. Finally, a supply chain design exercise is not only needed when infrastructure changes are being considered, but is also useful as a precursor to decisions on outsourcing operations. A design analysis will help one understand the current state and opportunities for improvement and hence lead to an informed decision on outsourcing (see **Section 3.2, Outsourcing of logistics services**).

Supply chain operations investments are useful to maximize performance and throughput of existing capacity. Ideally, operations improvements systems are embedded, so that operations improvement is a continuous ongoing exercise. But until that continuous improvement is embedded in the processes and culture and is self-sustaining, we may need discrete interventions in the form of time-bound operations improvement projects. Even in that case, an important deliverable of any operations improvement project should be to build the culture and systems to enable the embedding of that self-sustained operations improvement.

3.2 Effectiveness enhancer: Outsourcing of Logistics Services

Outsourcing logistics services is when an organization uses an external provider, referred to herein as logistics service providers (LSPs), to manage various logistics functions, such as distribution, warehousing and customs clearance. It also includes outsourcing the management of LSPs.

Outsourcing has been utilized in public health beyond logistics, for improving access to and equity of health service delivery. The utilization of private providers in these areas has supported programmatic objectives for HIV, TB and malaria including increasing the access to HIV self-tests at private pharmacies, accelerating TB case notification by leveraging private TB testing centers to support national efforts and malaria care at private facilities.

Similarly in supply chain, many central medical stores leverage external providers, often referred to as logistics service providers (LSPs), to manage various logistics functions such as distribution, warehousing and customs clearance. In certain instances, these entities also manage LSPs on behalf of PRs.

3.2.1 Connected supply chain and programmatic challenges

a) Programmatic needs are not adequately met by the insourced logistics operations

Programmatic needs are always evolving, from the number and types of delivery sites to the types of products, to the frequency, to changing patient needs. Some requirements change gradually and some are more sudden such as pandemics, which may create significant needs that should be addressed quickly. There are several supply chain elements which must be at a sufficient level to meet these needs, including the in-country logistics operations.

For a variety of reasons, programmatic needs may not be adequately met by the insourced logistics operation. Such as when:

- A LLIN campaign requiring additional human resource, warehousing and distribution capacity.
- New capacities are required due to the introduction of a new product, such as the need for the transport of oxygen cylinders during COVID-19.
- The number and location of distribution points changes due to decentralized distribution through pharmacies or other non-traditional locations, putting pressure on the existing warehousing and distribution resources.

- The number of people served grows quicker than the capabilities of the supply chain, either through continued population growth, change in health policy, from an emergency causing increased needs or population movements.
- The cost of technology solutions, such as for tracking and tracing health products, becomes too costly for a PR to invest in, maintain or attract a workforce with the right skill set to manage these technical areas.
- There is a creation of or change in the supply chain strategy, which may set out goals of better customer service, improved flexibility and resiliency, reduced costs, etc., and the speed of changes needed is not matched by capacity of or funding available to the PR.

The reasons can fall into two broad buckets, either the logistics services are not at a scale to match the needs and/or they are not at an adequate level of service which is needed or preferred. In both cases the decision will need to be made as to whether some or all services should be outsourced. If it is the latter, the question will be if the capabilities of those responsible for the logistics services should be improved and/or the assets adjusted, or if some or all should be outsourced. Often the issue has to do with the quality of the service not being at the desired or needed level, which is the challenge that will be addressed in this section.

As also mentioned in **Section 3.1** regarding unnecessary consumption of funds, poor management of logistics directly impacts the ability to deliver needed health products, samples processed or waste collected, impacting the delivery of health services and reducing positive outcomes. Additionally, poorly managed logistics increases costs of the logistics activities, unnecessarily consuming funding that could have been spent for other programmatic priorities.

The logistics activities supporting the delivery of health services by a PR requires competencies in several areas. Ideally, these services are managed efficiently and effectively and with the required assets, so they can be provided at the right level and costs. For the logistics activities insourced by the PR, they will seek to continually assess their core competencies, performance and costs, which will inform decisions to outsource some or all logistics activities.

When an organization insources, they need to determine whether it is more beneficial to continue as is or to outsource to logistics service providers (LSPs), either directly to logistics operators known as 2nd and 3rd party logistics providers (2PLs and 3PLs), or through a firm which manages logistics operators on their behalf known as 4th party logistics providers (4PL).

2PL: Small scale LSP that could be single vehicle operators, or a limited number of vehicles and/or small warehouses. A 2PL manages and executes a particular logistics function, using its own assets/resources, on behalf of another company.

3PL: A 3PL is similar to a 2PL but with more customized offerings, encompasses a broader number of service functions and is longer-term. 3PLs are larger and have more resources than a 2PL and are more likely to be involved in strategy discussion. They are also expected to be more proactive and innovative.

4PL: A 4PL takes third-party logistics a step further by managing resources, technology, infrastructure, and even manages external 3PLs to design, build and provide supply chain solutions for organizations. According to Accenture who coined the term: "*A 4PL is an integrator that assembles the resources, capabilities and technology of its own organization and other organizations to design, build and run comprehensive supply chain solutions.*" 4PLs can consist of 4PL companies, divisions of 3PLs, logistics consultants and IT vendors.

Outsourcing allows PRs to access competencies, knowledge, experience, systems and technology which they currently lack, and often are not possible, feasible or economically viable to invest in. LSPs, and especially 4PLs, may also utilize more sophisticated and specialized software and technology products for better management of the outsourced function(s). They can also take advantage of economies of scale that the LSP is able to achieve from having multiple customers.

b) Outsourced logistics services are not being provided as expected

Inadequate provision of logistics services by an LSP may be caused by a variety of reasons, such as a lack of understanding by the customer of their needs and/or requirements, limited or inaccurate information in the request for proposal (RFP), the selection of an unqualified provider, insufficient contract language and structures, insufficient contract governance and insufficient performance management.

Typically, there are multiple reasons why the LSP is not meeting the needs of the PR, meaning that it is critical to develop processes that are outcome-based, comprehensive, proactive, systematic and strategy-driven. An overall approach to outsourcing which addresses all the causes of poor services will be described in the next section, but here we will focus on the link to insufficient performance management.

Outsourcing is undertaken to improve the performance of the activity, and therefore the importance of consistently evaluating its performance is critical in determining if the objectives are being achieved, and whether the outsourcing should be continued in the same manner or at all. Effectively implemented performance management drive the behaviors desired and result in the performance needed, while at the same time making the overall management of the contract easier.

The comprehensive and consistent measurement of performance is at the root of performance management. Performance measurement helps a PR assess the performance of providers who have been delegated responsibility for an activity, typically done using standard metrics and KPIs, examples of which are presented in **Table 1**.

Table 6: Examples of metrics

<p>Warehousing</p>	<ul style="list-style-type: none"> - Average cubic meters (CM) stored monthly. - Warehouse cost as percentage of product value. - Peak CM stored monthly. - Lost stock value (damage, theft, avoidable expiry). - Price per pallet per month. - Price per pallet inbound/outbound. 	<ul style="list-style-type: none"> - Average price per CM/month. - Complete and timely data reporting - Order accuracy. - Internal order cycle time. - Order picking accuracy. - On-time shipping percentage. - Dock to stock cycle time in hours.
<p>Transportation</p>	<ul style="list-style-type: none"> - Percentage of late deliveries. - Percentage of in full deliveries. - Correct documentation. - On-time collection. - Transport costs as percentage of cost of goods. 	<ul style="list-style-type: none"> - Value of units lost/damaged. - Cycle time from request to pick up - Correct paperwork. - POD submitted on time.

All contractual relationships should have some form of performance measurement. If it is a basic contract for the movement of a single truck on an ad-hoc basis, then basic contract management and an on-time delivery target will suffice. If on the other hand it involves the management of repeated shipments for the distribution of supplies or a dedicated warehouse operation, then there is a requirement for a comprehensive supplier relationship management program.

PRs measure performance to:

- Ensure satisfaction through agreed service delivery and if possible, improvement.
- Foster a partnership, not an adversarial relationship.
- Ensure a culture of continuous improvement within the operation.
- Discover potential issues before they become major problems.
- Support your company’s overall strategic goals.
- Reward staff and logistics service providers (LSPs) where appropriate.
- Enable management on strategic issues and outcomes, not processes, practices, procedures or methods.

If PRs do not measure the performance of their LSPs accurately, they will not be able to make corrections, introduce penalties if the service is below expectations or reward the provider if expectations are exceeded.

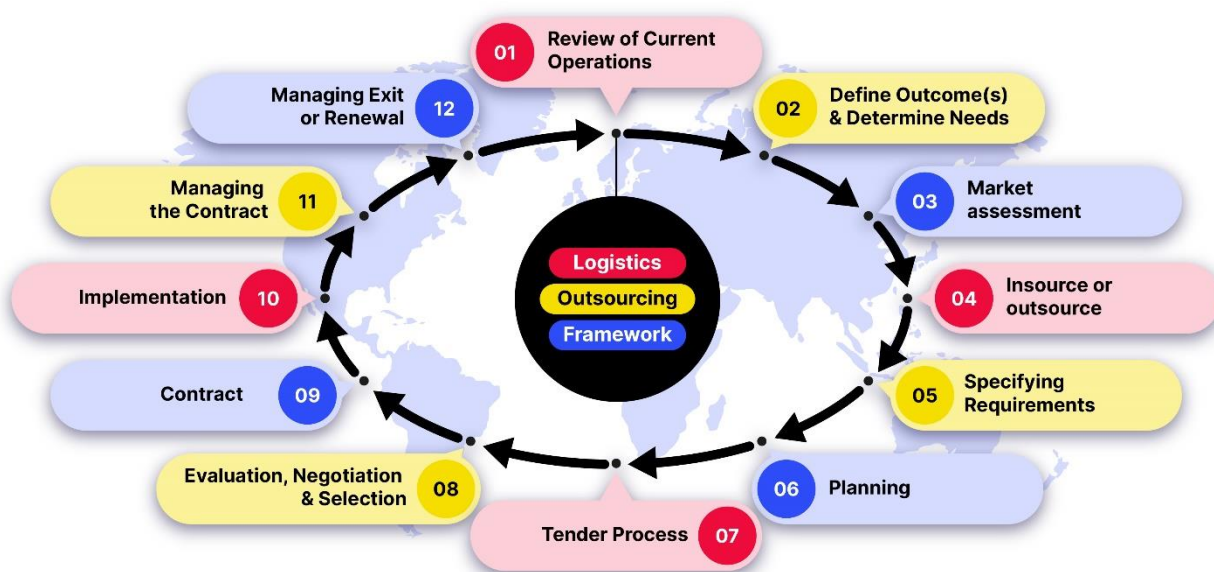
3.2.2 Examples of key activities

The decision to outsource needs to be undertaken with robust requirements, technical rigor, standards or approach that provides best value for money. When outsourcing decisions are reactive and ad-hoc, and involve limited-strategy-driven processes, often outcomes are not met, level of service is poor, prices are inflated and fraud often occurs. Poorly managed outsourcing increases costs of logistics services, unnecessarily consuming funding that could have been spent elsewhere.

To achieve improved decision-making around outsourcing, as well as sound management of the outsourcing process, a Logistics Outsourcing Guidance (LOG) has been developed. The LOG is a sequential process with providing guidance on the “what” and the “how”. In many ways it is a “fire code” for outsourcing of logistics services and is intended to reduce the number of “fires” that commonly occur.

The content in this section includes the Logistics Outsourcing Framework and an abridged version of the LOG. The full version will be made available to the public as a “global good” and will be a living resource, meaning that it will regularly be improved and updated, with additional resources being developed.

Figure 2: Logistics Outsourcing Framework



Step 1: Review of Current Operations

Whether none, some or all logistics activities are outsourced, it is critical for a PR to be familiar with the configuration, processes, costs and performance of their logistics activities. This type of information is necessary for management, evaluation, planning and improvements, and allows for objective decision-making in determining if current operations are meeting programmatic priorities. In the often used saying coined by Sink and Tuttle, “*you cannot manage if you cannot measure. If you do not measure, you do not know what you have achieved and where you are headed*”.

The information needed to assess the logistics operations falls into four buckets including costs, product demand, system performance and design of the supply chain, including all assets.

Step 2: Define Outcomes & Determine Needs

As part of the review process for determining what aspects of the supply chain should be insourced or outsourced, identifying desired outcomes will inform this decision-making. Having clear outcomes identifies the destination(s) trying to be reached by the PR over the next five to ten years will ensure the path taken has a clear direction and prevents getting too far off course. Additionally, this step involves determining the needs of the PR and what it would take to achieve them. The PR should also determine the delta between the performance and needs, and consider what changes are needed to reduce the delta.

Setting outcomes and using them as a focal point is beneficial for both the PR and relevant partners to be on the same page and provide a focus for which efforts can be prioritized and how their impact is measured. Clear outcomes, along with the identification of needs, will allow the PR to determine if outsourcing some or all the logistics activities is necessary. It will also allow the PR to determine if they are making progress, and if the decision to outsource or insource is resulting in the intended outcomes.

Step 3: Market Assessment

A market assessment will determine the depth and breadth of the private sector capabilities. Depending on the needs of a PR, the assessment may include local and international providers. There are multiple angles to approach this effort: all are recommended to triangulate information and obtain the needed resolution. An assessment of the logistics market can be made through:

- Providers who have previously provided services or responded to an RFI or RFP in the past.
- Desk study.
- Interviews with donors, international organizations and non-government organizations (NGOs) or International non-government organizations (INGOs).
- Interviews with private sector firms who require similar services.
- Holding of an industry day.

It is likely that several, if not all, of these methods will be used when assessing the market. The scope and scale of the activities being outsourced will influence which approaches are undertaken.

Step 4: Insource or Outsource?

In this step, decisions will be made regarding which logistics activities will be outsourced. The below sub-steps provide the necessary information to make an informed and objective decision on outsourcing. The sub-steps within this step include:

- **Determine policy environment and acceptance:** The ability and ease of a PR to outsource will be impacted by the national policies in place that are related to what is able to be outsourced. In addition to policies, it is important to know what sensitivities should be managed and what communications are required for each stakeholder group.
- **Determine if logistics is a core competency:** A PR needs to determine their core competencies, which will inform the decision to outsource some or all logistics

activities. Depending on the PR, a core competency in logistics may be determined generally or for each type of logistics activities the PR is responsible for.

- **Determine configuration and demand moving forward:** The PR will need to determine if the configuration and demand of the logistics operations are currently sufficient, and if it will need to change significantly in the next five to ten years. The estimates for both outsourcing and insourcing will need to be based off the same configuration and demand assumptions.
- **Costing and performance estimates of insourcing vs outsourcing:** To reach an objective decision on what, if any, activities will be outsourced versus insourced, the logistics activities will be assessed against an estimate of cost and performance. The estimates for insourcing will largely be based on historical information, and estimations will be used if there is an expected change in configuration or demand.
- **Determine if activities should be outsourced (or continue to be outsourced):** A LSP can mitigate or improve poor performance of logistics activities. However, it is important to understand the root causes of existing issues. It is also critical to objectively assess performance, costs, needs and strategic importance of the operations when deciding to outsource.
- **Is a 4PL necessary:** After a determination is made to outsource some or all of the logistics activities, or if an LSP(s) is currently being utilized, it should be assessed whether the services of a 4PL would benefit the PR's operations. This should be done after a supply chain management strategy is established. It will also need to determine if there are internal processes in place and experienced staff that can manage this type of contract. This is expanded on in the **activity on workforce development in Section 1**.

A relevant example of such a decision is when additional warehouse capacity is needed. To determine how best to address that need, a PR could walk through the following steps, which include within them several key decisions on whether to insource or outsource, and to what extent.

If additional warehouse capacity is requested, the PR can first determine (through a **storage design & operations approach**, see **Section 3.1**) if existing storage space is being used appropriately and how much space is needed now and in the future by type of product (ambient, cold storage, quarantine, etc.). If additional space is needed, then there are still many options for how to address the need. The PR can determine if the need can be met within the existing network (**insourced**), for example if capacity be found within warehouses in the organization's network, or if existing warehouse(s) can be refurbished to increase capacity. If that is found not to be the case and new capacity is needed, then the PR can determine if the capacity can be found for rent or purchase (**outsourced**) or if a company would be willing to build a warehouse for a long-term lease (**outsourced**).

If the PR wants to construct a warehouse to their needs, then they must determine what bundle of services they need. In addition to constructing a warehouse, they will also need to address racking and equipment, security and fire systems, a warehouse management system (WMS) and training of staff. Depending on the exact bundle of services they need, they can outsource different aspects to providers or choose to outsource to one provider for

all needs. If such a need is likely to recur in the future, then the PR could work with the Global Fund to consider establishing framework agreements with suppliers and/or developing a standard, reusable set of engineering plans and specifications for different standard sizes of warehouses.

In the above example, we see that insourcing versus outsourcing decision can be quite complex and when an overall need is broken down into its sub-components, it may be wise to insource or outsource different sub-components of the need.

Step 5: Specifying Requirements

Regardless of whether the logistics service is simple or complex, quotations received from potential suppliers will be more accurate and are likely to be more competitive if the requirements in the RFPs are well written and provide a clear understanding of what services are needed. RFPs should also state how a PR will measure supplier performance before agreeing to a contract.

Therefore, requirements need to be clear and accurately define what is expected from an LSP regarding the outputs or the functional and performance requirements. When LSPs understand the customer's performance metrics while responding to a tender, they will be able to adequately plan for resources needed to achieve baseline service levels. Also, the customer will be able to leverage this information during the contracting process with the selected provider(s).

Step 6: Planning

Prior to this step, determinations were made for which services are to be outsourced (or continue to be outsourced) and the key deliverables of those services. From the previous steps, the current marketplace is known, and the potential risks have been identified. In this step, the following activities will occur:

- Collecting existing data connected to the specified requirements.
- Determining the type and length of contract needed, the terms and conditions required and how the contracting process will be undertaken.
- Designing the procurement project plan.
- Creating a communications plan.
- Designing the implementation plan.
- Determining what resources are required.

Step 7: Tender Process

The tender process makes it relatively easy to gain an insight into potential LSPs and compare their respective competencies. The appropriate tender process will vary depending on the type of service being procured, the experience the procurement team has and the marketplace. In some cases, when only one provider is qualified due to the service needed being unique, this step will consist of negotiations with a single supplier supported by benchmarking of cost elements, rather than a tender. Most logistics services will be procured through one of the following processes: Request for Quotation (RFQ), Request for Proposal (RFP) and Request for Tender (RFT).

Step 8: Evaluation, Negotiation and Selection

The selection of the successful logistics service provider(s) will require the following:

- A set of criteria on which decisions will be based. These should have been agreed upon at the requirements development stage in **Step 5** and ideally shared with the bidders.
- Expert evaluation of the technical elements of the bids.
- Consistent cost evaluation.
- An agreed process for making the decision, including meeting shortlisted bidders and getting internal sign-off for the decision.
- A cross-functional team involved in the evaluation process. Try to include managers from all key functions impacted and have them empowered to make the decision.
- The support of the cross-functional team should be involved from the earliest stages, agree on the process and provide support during implementation.

Where government institutions such as Ministries of Health are procuring goods or services, they typically need to adhere to public procurement laws and policies – which in some cases can add additional requirements. To procure logistics services, there may also be additional regulations to follow when utilizing donor funds including those from the Global Fund.

Step 9: Contract

For many logistics services, the contract stage will be straightforward. This is particularly true for routine services purchased under standard terms and conditions, or national or international frameworks. This is also the case where contractual terms were made a condition of the tender and were provided at the RFP stage. For complex, long-term and strategic services with property or investment considerations and/or IT development requirements, the contract negotiation and agreement stages are critical to protecting the interests of both parties and set the foundation for the future relationship, governance and eventual exit or renewal. This process can be extremely time-consuming, even when a draft contract has been supplied by the customer. The contract will include many specific details, including what metrics will be collected, how performance will be managed, and expectations for continuous improvement. Examples of metrics used to evaluate LSPs were listed in the **Table 6** above.

The pricing mechanism should be appropriate for the type of service and relationships being contracts. The pricing mechanism should be determined by the customer before the RFP so that the LSPs understand this when pricing the services. Some flexibility in the processes, however, should allow LSPs to suggest adjustments to the mechanism where they feel it to be beneficial.

Step 10: Implementation

A shared implementation plan and action list should be drawn up by both parties, even for the implementation of routine services. The scope and depth of plans will vary based on the criticality and risk associated with the service, and may range from a short list of communication steps to a complex plan spanning several months where specialist equipment or new processes are required.

Both parties need to understand that their relationship is being built during the implementation phase, and a lack of honesty, alignment or joint risk management during this phase will have repercussions throughout the life of the contract.

Step 11: Contract Governance

Contract governance is the proactive monitoring, control and management of all activities necessary to ensure the services are delivered in accordance with the contract. How a contract is governed is one of the main reasons whether the contract succeeds or fails. Good contract governance relates to the receiving of benefit from the contract, the provision of services is well managed and a good relationship between the customer and the logistics service provider (LSP), with poor contract governance creating the inverse.

An effective governance structure is critical to the success of any contract, and frequently to the business relationships. Contract governance should be multi-tiered, consisting of strategic, management and operational levels that not only ensure effective decision-making but also provide a clear escalation path for issue resolution. Once the contract is signed, the parties need to be actively tracking and reporting on the delivery of contractual obligations to ensure both parties deliver on the commitments in the contract.

There are a variety of activities that underpin an effective contract governance process, such as clear and frequent communication from the outset, risk mitigation throughout the lifecycle and regular performance reviews – particularly as the agreement comes up for renewal or close-out.

Contract governance activities include:

- Defining and implementing a clear and unambiguous structure.
- Tracking and reporting on contractual obligations.
- Actively monitoring and reviewing service delivery performance.
- Considering the IT ecosystem interdependencies.
- Proactively managing operational changes.
- Implementing effective commercial governance.
- Creating and managing a contract risk register.
- Creating, populating and acting upon supplier scorecard.
- Implementing a clear communications strategy.
- Performing regular contracts assessments.

Step 12: Managing Exit or Renewal

An outsourcing contract may end for a variety of reasons, such as:

- The expiry of the fixed term (and the parties being unable or unwilling to agree upon the terms for its renewal).
- Termination by the customer for convenience.
- Termination by the customer because of the service provider's material breach or insolvency.
- Termination by the service provider for the customer's material breach.
- Force majeure.

In the early steps of the cycle, it is easy to ignore the end of a contract, but the actions taken in **Steps 1 to 11** will lay the foundation for managing an exit or a renewal. It is important to realize that personnel on both sides may depart during the life of the contract, so the more that can be clarified and documented, the better. It is critical that the customer focuses on its requirements for exit at an appropriate stage in the negotiations and that the outsourcing contract sets out a clear exit strategy.

A key decision at this stage of the cycle is whether to renew or tender again. There is overlap between Stage 12 and the type of review carried out in Stage 1 and 2 for this decision to be made. However, the amount of analysis will vary depending on the service. Although renewal is often a tempting option, the ease of this option may lead to critical issues with the contract, like changes to requirements and gaps in performance, not being addressed by either party.

The end of a contract needs to be managed in the same way as the implementation of a contract, with a plan and a project manager. These also apply if the service is being brought back in-house. If the services are no longer required, the exit still needs to be properly managed to minimize costs and reputational damage. If the existing provider is not retained, the customer should ensure that the migration of services from the incumbent service provider, either back to the customer or to a replacement service provider, occurs with the least possible disruption.

3.2.3 Investment approach

The Logistics Outsourcing Guidance (LOG) provides a framework of twelve steps which presents an approach from the beginning to end of the outsourcing lifecycle, outlining outcome-based, proactive, systematic and strategy-driven processes. It allows decision makers to take an intentional approach to outsourcing by providing a logical order and practical resources (guidance, tools and templates) to both understand the purpose of and how to complete each step.

This information allows for targeted investments in the areas of outsourcing logistics services that addresses supply chain challenges linked to the provision of logistics. When decision makers have identified the challenges they want to address, they will first determine if it is connected to logistics, and whether it is a question of reassessing those logistics activities currently insourced, or if the outsourced activities are being provided as expected.

Table 7: Activity investments

Stages	When to Implement	Activities
Determination on logistics activities for insourcing and outsourcing	<ul style="list-style-type: none"> - When determining whether to outsource. - When determining whether to continue to outsource. 	<ul style="list-style-type: none"> - Understanding current operations. - Determining needs/high level requirements for now and future. - Assessing the logistics market - Determining the capacity of the PR to manage outsourcing, and what technical assistance may need to be provided. - Deciding if and which activities to outsource. - Determining if a 4PL is necessary.
Procurement of logistics services	<ul style="list-style-type: none"> - After determining logistics activities to outsource. - After determining a logistics activity will continued to be outsourced, and either the contract is going to be renewed or be up for competition. 	<ul style="list-style-type: none"> - Development of specific requirements for logistics services. - Creation of RFP and planning for tendering. - Running tender. - Evaluation, selection and negotiation of LSP(s). - Contracting.
Transition to and management of outsourced logistics services	<ul style="list-style-type: none"> - After contract has been signed. - Prior to beginning of operations. - When existing operations are not being provided as expected. 	<ul style="list-style-type: none"> - Implementation of the contract - Contract management - Performance management

4. Information Systems & Data Use

All national supply chains involve the function of one or more capability areas, and each capability area has well-defined processes that generate and consume data. All modern enterprises including central medical stores or LSPs, deal with large quantities of a variety of data that needs to be computed quickly to allow several processes to proceed smoothly, and managers to make effective and timely decisions.

Management information systems (MIS) are a complex set of interoperable and/or interconnected systems that support enterprise processes and operations, enhance information flow and facilitate the decision-making process.

Given the complexity, supply chain systems bear with multiple endeavors running in parallel, intertwined capability areas with well-defined process that require data-driven decision-making by managers to operate successfully. Management information systems are critical to the success¹³ of all supply chains as they support each capability area processes, promote efficiency by providing information from data gathered, allow collation, analysis and visualization of the data for end-to-end visibility, as well as data-driven decision-making at all levels of the supply chain.

When they are effectively implemented and leveraged, management information systems provide excellent value for money by lowering costs, enhancing performance and efficiency, and increasing customer satisfaction.

4.1 Connected supply chain and programmatic challenges

Public health supply chains and their personnel face many challenges ranging from product availability visibility, health product quality, traceability and evidence-based decision-making, to name a few. These challenges have grave consequences that are not only financial but, in many cases, have potentially negative health effects on the patients and communities consuming the health product. Managers are unable to make good decisions if they lack access to comprehensive and reliable data in a timely manner allowing for increased awareness and decision-making, only possible through the digitalization of the public health supply chains and upskilling the supporting personnel (refer to the **Supply Chain Workforce Development Plans in section 1.2**).

Public health supply chain digitalization will lead to the faster availability of large volumes of a variety of reliable data, which can be analyzed and visualized for data-driven decision-making, enabling the supply chain to be more efficient, leading to better services at lowered costs and build more resilient and sustainable systems for health (RSSH).

Several studies on health product management of ARVs¹⁴ and TB¹⁵ drugs have pointed out the critical role that information systems play to avert stockouts of any of these health

¹³ [Data-Driven Approaches Support Global Health Supply Chains](#)

¹⁴ [The Critical Role of Supply Chains in Preventing Human Immunodeficiency Virus Drug Resistance in Low- and Middle-Income Settings](#)

¹⁵ [Anti-Tuberculosis Commodities Management Performance and Factors Affecting It at Public Health Facilities in Dire Dawa City Administration, Ethiopia](#)

products which can lead to increased prevalence of human immunodeficiency virus drug resistance (HIVDR) and multi-drug resistant tuberculosis (MDR-TB). Crucially, supply chain information systems provide quality data and end-to-end visibility across the supply chain which allows for better demand planning and operations activities including product distribution.

Furthermore, quality data from these systems can be used to correlate to service delivery data from health management information systems to check for supply chain leakages, validate service delivery and identify emerging consumption trends that can be taken into consideration for quantification.

4.2 Examples of key activities

a) Country supply chain information systems strategy, policy, governance, standard operating procedures (SOPs)

For most national supply chains to ensure the consistent availability of quality health products, require the support of supply chain information systems which provide quality data for end-to-end visibility and facilitate multi-layered decision-making. As such, the supply chain information systems strategy, associated policies and governance structures need to be aligned with the broader health information systems (HIS) strategy, policy and governance frameworks (refer to section for HIM strategy and policy). Countries such as Ghana¹⁶, Malawi¹⁷ and Rwanda¹⁸ provide examples of well-defined master plans and digital strategies for health and supply chain.

b) Enterprise architecture

Enterprise architecture is a blueprint that includes business architecture, information architecture, application architecture and technology architecture, and allows to determine how an enterprise and its various organizational units can effectively use existing resources, plan initiatives and guide investments to achieve its current and future objectives in line with the Ministry of Health (MoH) and country strategy. This blueprint allows a comprehensive approach by ensuring that important aspects like master data, data standards, interoperability, business process flow integrity, optimal infrastructure usage and comprehensive support are integral to the implementation of any MIS application. Digitalization of the supply chain is expected to support and align with the national digital health architecture.

As part of the digital health and transformation process, Malawi and Rwanda¹⁹ have been supported in the development of their digital supply chain strategy and architecture.

c) Supply chain capability areas

Supply chains have been analyzed and classified into capability areas based on the Supply Chain Operations Reference model (SCOR)²⁰ and the American Productivity and Quality Center (APQC)²¹ models such as forecasting and planning, supplier and contract management, procurement, order management, warehousing and storage, transport

¹⁶ [Enhancing Logistics Management for Ghana's Health Supply Chain \(Chemonics\)](#)

¹⁷ [Digital Supply Chain Strategy and Architecture \(USAID Global Health Supply Chain Program\)](#)

¹⁸ [The National Digital Health Strategic Plan \(Ministry of Health, Rwanda\)](#)

¹⁹ [Develop Digital Supply Chain Strategy and Architecture \(USAID Global Health Supply Chain Program\)](#)

²⁰ [Supply Chain Operations Reference model \(SCOR\)](#)

²¹ [Supply Chain Planning \(APQC\)](#)

supported by foundational capabilities like master data management, interoperability and track and trace. Digitalization supports well-defined processes in each capability area and foundational capabilities that are usually cross-cutting. Depending on the maturity of the processes defined for the capability area, the systems that support them also vary from paper-based systems such as Logistics Management Information System (LMIS), electronic Logistics Management Information System (eLMIS), inventory management system or warehouse management systems (WMS), to complex systems such as enterprise resource planning (ERP). Some systems may combine multiple capability areas of varying complexity and maturity.

d) Master data

Implementing **master data management** (products, facilities etc.) along with **GS1 standards** to promote data quality and increase ease of systems interoperability for end-to-end visibility. Master data provides a “single source of truth” about business entities and context for business transactions. The definition and governance of master data is critical to ensuring the smooth functioning of all related information systems, as well as data quality and promoting interoperability. As the supply chain information systems environment starts supporting more complex processes, there will be a need for independent systems dedicated to master data which can then be used as required by other systems. Having dedicated systems for master data ensures consistency across the enterprise and provides ease of management.

Master data systems can also be used to ensure standards compliance by using data compliant with standards such as GS1 for health product identification. Systems such as a national product catalog allow the national regulatory authority to affect regulatory actions directly in the master data system, the consequence of which can then be felt in all information system using this data. A national facility master list can be used across all public health systems to uniquely identify all locations (and use standardized GS1 location codes) that support the public health supply chain. A supplier master can be used across supply chain information systems that support procurement, contracts, order management, transport and warehousing, among others.

National Product Catalog²² using standards-based product master data efforts are ongoing in countries such as Ethiopia, Malawi and Rwanda.

e) Information systems interoperability, integration and disposal

Initiatives to ensure interoperability of systems to drive availability of critical health product and supply chain process data that will support data-driven decision-making.

Interoperability and Integration: End-to-end visibility in all supply chains is critical to allow informed decision-making and to provide quality and timely service to the beneficiary. End-to-end visibility is only possible when there is uninterrupted flow of quality data across all domains, functions and levels of the supply chain. This flow of quality data requires either a singular information system solution across the supply chain, or that the existing systems can communicate and exchange the required information (interoperate).

²² [USAID Global Health Supply Chain Program: National Product Catalog](#)

Malawi²³ has used an interoperability layer²⁴ to import data from its eLMIS (OpenLMIS) into DHIS2 to facilitate composite analysis of stock and health data to support effective logistics and health services analysis and planning. The MoH Malawi²⁵ was able to leverage this interoperability layer to track COVID-19 case notification information in the country.

f) Retirement

One of the challenges facing information system users and the availability of quality data is the existence of multiple health product information systems which support only a specific health program. The data captured by these systems is usually similar to the data captured by other health product information systems supporting the same supply chain process. Not only does multiple information systems in the same process space become a challenge for the user to enter data, but they are also an additional expense as far as maintenance, user support and data analysis are concerned. The public health supply chain would greatly benefit if there were fewer but more comprehensive and robust health product information systems supporting the same process in the public health supply chain.

g) Data analysis, visualization and use

Enhance **data analysis and visualization** solutions to allow for supply chain visibility using a variety of quality data sources and defined guidelines for analytics and interpretation.

To ensure the equitable availability of quality health products, PR personnel require both situational awareness and data-driven decision-making. As the volume, variety and velocity of quality data from all levels of the supply chain increases and becomes available, data-driven decision-making will need to move beyond dependency on traditional reports and require information systems that support sophisticated analysis and visualization of such data. Additionally, to ensure decision-making uniformity and integrity, PR personnel will need guidance for understanding the data analysis, interpretation to drive decision-making. For example, the MoH in Ghana²⁶ has initiated a “data production management and use” project that aims to collect and analyze data from all levels of the public health supply chain and use it for decision-making and performance monitoring.

h) Innovation

Digitalization presents a unique opportunity to design new products that generate efficiencies or improve services and boost inclusive and sustainable growth. The following are areas which are continuously seeing rapid growth as costs get lower and accessibility increases.

i) Mobile

Due to the increase in penetration of mobile networks and the availability of cheaper and higher quality smartphones, mobile solutions have the potential to support all levels of the supply chain, especially the last mile including the community level. Smartphones are increasingly replacing specialty devices and their use in innovative solutions is only projected to grow.

²³ [Integrating HMIS and eLMIS systems for better decision-making in Malawi](#)

²⁴ [The Kuunika Project Data for Action](#)

²⁵ [COVID-19 National Information Dashboard \(Ministry of Health, Malawi\)](#)

²⁶ [Data production, management and use in supply chain \(Ministry of Health, Ghana\)](#)

The MoH Senegal²⁷ has successfully run a pilot of a supply chain information systems that connects local healthcare workers using their mobile phones which has resulted in stock availability above 95%.

j) Artificial intelligence / Machine learning (AI/ML)

These solutions can analyze large volumes of data from multiple sources over a time period to provide more accurate calculations/forecasts for supply chain such as quantification, consumption which allows optimizing inventory, improve delivery times and reduce costs.

The MoH Sierra Leone²⁸ will implement an intelligent health system index using predictive modelling software to provide visibility across the public health system including the public health supply chain. Similarly, the MoH Côte d'Ivoire will also benefit from the use of similar software for modelling/forecasting health product needs²⁹.

k) Enterprise data warehouse

This is a central repository of integrated historical and current data from disparate operational systems (e.g., eLMIS, HMIS, WMS). This data store allows data cleansing and provides quality data for analysis and reporting. Among the many benefits of a data warehouse, some are availability of the enterprise data in a single location (reduces need to connect systems only for analytical purposes), quality data usually in a common data model and availability of historical data. Business intelligence tools (e.g., Tableau, Power BI) can be used for data mining, trend mapping, market research, cross referencing and data-driven decision support at all levels of the enterprise.

l) Internet of Things (IoT)

More physical devices now have integrated sensors with the ability to process data and exchange data with other devices and systems over the internet or other networks. Such devices can be used in the SC for real time tracking of location and storage condition of health products to promote product safety, SC security and efficiency which is critical to provide effective service to the end user.

Zimbabwe's National Pharmaceutical Company (NatPharm)³⁰ has deployed 104 temperature and humidity cloud-based data loggers to all six NatPharm branches and can now access real-time data by visiting a secure web portal to ensure all health products are managed within prescribed temperature ranges.

²⁷ ["Better tracking is ensuring vaccines get where they're needed in under-resourced regions"](#) (Gavi)

²⁸ ["Macro-eyes to roll-out STRIATA in Sierra Leone and expand in two additional countries"](#)

²⁹ ["Taking stock: How predictive modeling can improve health supply chains"](#) (Devex)

³⁰ ["Improving the Visibility of Warehouse Temperature Data at Zimbabwe's Central Medical Stores"](#) (USAID Global Health Supply Chain Program)

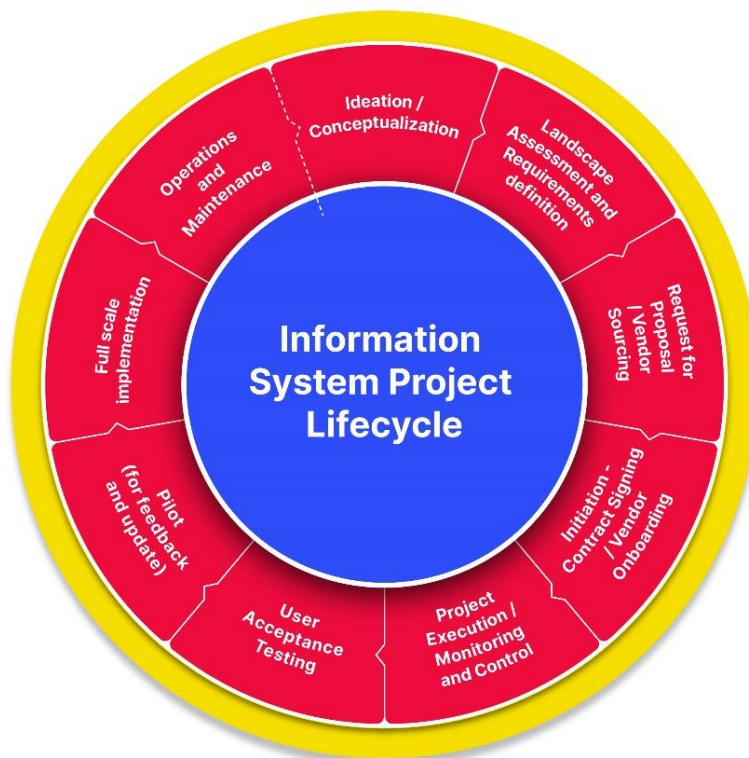
Table 8: Examples of activities related to supply chain information systems

Key Activity	Activity Detail
Digitalization Strategy, Policy and Governance	<p>Subject matter expert assessment of the documentation with recommendations for updating and enhancement.</p> <p>Workshops to review and update SOPs for various supply chain processes for increased maturity and as input towards requirements for an information system.</p> <p>Capacity enhancement drives through end user training and on-site supportive supervision to ensure compliance with SOPs and adoption of systems.</p>
Enterprise Architecture	Development of digital supply chain architecture to support the country digital health architecture.
Supply Chain Capability Areas	<p>Forecasting and planning (e.g., demand planning, supply planning, plan distribution).</p> <p>Supplier and contract management system (e.g., sourcing and contracting, tender management, supplier information management).</p> <p>Procurement management system (e.g., procurement processing, fulfilment visibility).</p> <p>Order management system (e.g., requisitioning, requisition approval, inventory visibility, requisition fulfilment, order visibility).</p> <p>Warehouse management system (e.g. (inbound processing, inventory management, outbound processing).</p> <p>Transport Management system (e.g., route management, transportation execution, freight audit and payment).</p>
Master Data	<p>Assessment of current master data across systems and recommendations for next steps.</p> <p>Master data definition and cleansing workshops.</p> <p>Enhancing master data to support GS1 standards.</p> <p>Capacity building activities for master data governance and management.</p> <p>Implementation of master data systems and enhancement of related systems to use master data and GS1 standards.</p> <p>Activity related to Track and Trace and/or Verification of health products in the supply chain using standards-based (GS1 bar code) labels.</p>
Interoperability, Integration and Disposal	<p>Mapping of existing systems and the data flow, gap analysis and recommendations for interoperability solutions.</p> <p>Interoperability implementation between one or more health product management information systems, health product management and health management information systems or health product management information systems with data warehouses and data analysis and visualization systems.</p> <p>Mapping of similar information systems supporting the same public health supply chain process.</p>
Data Analysis, Visualization & Use	<p>Assessment of data in existing supply chain information systems for use in data analytics and visualizations, gap analysis and recommendations for data quality improvement and dashboards for data analytics and visualizations.</p> <p>Control Tower - Implementation of data analytics and visualization solutions using a variety of data extracted from one or more systems for forecasting and</p>

	<p>supply planning, upstream and downstream visibility for decision-making and awareness.</p> <p>Data interpretation guidelines to allow effective data use for data-driven decision-making at all levels of the supply chain.</p>
Digital Innovation	<p>Feasibility studies for the application of innovative solutions in the SC using one or more of the approaches listed above.</p> <p>Mobile solutions that provide data visibility to and from the last mile, end to end track and trace, inventory management and tracking and service validation.</p> <p>AI/ML solutions that use historic data to predict future trends such as demand (useful for demand planning).</p> <p>Data warehouse and business intelligence tools implementation for data mining, service validation, analytics and visualization for data-driven decision support.</p> <p>Internet of Things – sensors for monitoring temperature, RFID tags for tracking high value products, real time location monitoring using GPS trackers, predictive maintenance for supply chain assets.</p> <p>Independent or interoperable with existing systems, small scale technology demonstrator projects (with potential to scale) that use one or more of the above approaches applied to the health product supply chain.</p>

4.3 Investment approach

Figure 3: Information System Life Cycle (from Ideation to Post implementation)



Maturity-based Management Information Systems

Maturity-based interventions are recommended to support the implementation of best-in-class Management Information Systems (MIS) solutions that are fit-for-purpose to support and enhance the existing maturity assessment³¹ of the country supply chain processes. Health product information systems just like other information systems support a specific capability area and enable its well-defined processes, enhance the capture of valid data and provide reliable and accurate outputs. Health product information system initiatives are typically complex and high budget interventions which need to be planned and implemented with a structured approach to enhance the chances of success and lower any possible risks. Every information system development or configuration and implementation initiative is a complex endeavor and requires personnel equipped with a unique array of skills to enable success from ideation to implementation.

Such skills include but are not limited to software project management, subject matter expertise (SME), business analysis, business process improvement, enterprise architecture, enterprise solution development and implementation, software development, organizational change management, software quality assurance, contract negotiation and a host of other technical and soft skills.

The following is an intervention guide that lays out the recommended approach to the full lifecycle of a health product information system solution in the public health supply chain. Please do note that not every intervention will be similar and the guidance below is meant to provide a general approach, which can be refined after consultations with those having a better understanding of the situation and knowledge and experience with information system solution implementation in the public health supply chain.

a) Ideation/Conceptualization

At this stage there is a recognition, not always based on hard data, of the need for digitalization of an aspect of the supply chain or an innovative approach to solve one or more existing problems. At this point the end client may find it challenging to articulate the issue and desired outcomes in more technical terms.

b) Landscape Assessment and Analysis

It involves understanding and mapping the related current business processes and data flows, roles of the people involved and the type of data concerned and most importantly, all the stakeholders involved. Interactions with all other business processes or systems should also be captured, although the details of the other system may not be required unless it provides critical input to one of the current business processes. If an information system already exists to support the business process, it is critical to understand how the system supports the current process and is maintained, and how the skillset of the personnel is providing maintenance support. In each case, what needs to be documented is how the end users are trained and supported. An additional aspect is capturing the data analysis currently being performed using the data gathered. Once the landscape assessment is concluded, all the details captured need to be validated with the critical stakeholders to ensure that nothing is missing or incorrect.

³¹ [Supply Chain Information Systems Maturity Model developed by USAID](#)

The next step is business process analysis: it allows understanding current gaps in process, data, personnel skill, personnel support, platform maintenance, data analysis and decision-making. These business process gaps are usually measured against industry standards, if applicable, and provide an opportunity to measure the process maturity of the business. The next step is to chart out various options for business process improvement and associated efforts such as possible information system solution (in general terms), any associated platform and user support with associated personnel implications, user training, interoperability with other information systems and data analysis and visualization for decision-making. The business process improvement proposal should always support the business and technical strategy or roadmap of the implementation environment.

The summary of business process analysis, maturity, gaps, proposed business process improvement and potential solutions need to be presented to all the stakeholders to allow for detailed discussion and alignment on the path forward. This presents an opportunity to discuss the approach towards the information system solution selection from the options of enhance, build or buy.

The build option should only be chosen in a specific and limited set of circumstances e.g., when an innovative solution is required, and no existing solution can either be configured or customized at reasonable cost to deliver the required functionality. The options of building, enhancing, or buying should each be considered against multiple factors and not only consider solving the current gaps, but as the opportunity to support increase in process maturity. The desired result of this stage is to have all stakeholders agree on the information system solution approach. Considering the vast ecosystem of MIS solutions available, utmost care should be taken when selecting a solution considering country ownership and sustainability. Post implementation, ownership costs that need to be considered are Enhancement/Customization, License fees, Operations and Maintenance.

It is highly recommended that in addition to the solution supporting the system requirements, the solution should either be free and open-source software (FOSS) or “commercial off the shelf” (COTS). FOSS solutions have no license fees – they usually have a community that can respond to needs or local skills can be developed. COTS solutions usually have some license fees and have certified partners available and there is a solid support mechanism for troubleshooting. Boutique solutions must be selected only if there is an extremely compelling case with clear criteria and long-term costs considered.

c) Vendor Sourcing

RFP is the industry standard vehicle for vendor selection through open and fair competition. The technical section of the RFP should contain as much detail as possible to allow a well-structured response from prospective vendors. The revised business process that was agreed to in the finalized landscape assessment needs to be converted into functional business requirements, which again should be agreed to by all stakeholders. Additionally, all non-functional requirements to support the implementation of the system are expected to be mentioned in the technical section. Any additional requirements such as system documentation, user training, user support, production support, warranty etc. should all be listed.

After listing the system requirements, a response format needs to be provided to allow for a structured response. The response format for the vendor includes:

- Vendor introduction and brief company history (technical).
- Response to all system requirements to ensure that vendor has understood each requirement.
- Project management approach to be adopted by the vendor.
- List of critical vendor personnel that will support the information system solution implementation.
- Experience of at least three similar projects with details and reference contacts
- Note: each section can be limited to a certain length to avoid overload on the evaluators. For the critical vendor personnel, the resumes should be attached to the response separately.
- For transparency, an evaluation format is also provided so that the prospective vendors understand how their proposals will be evaluated.

Each RFP has a specific timeline for responses and the publisher usually provides the opportunity for vendors to ask questions and clarifications through email regarding the system requirements and for one or more calls for all prospective vendors to ask more clarifying questions. Usually, all questions asked are anonymized and the responses are shared amongst all vendors and the RFP owner personnel.

d) Proposal evaluation

For this intervention guide, the focus is on the evaluation of the responses to the technical section of the RFP. The technical section is distributed for assessment amongst the pre-selected personnel, and each independently assesses, within a specified time, according to the evaluation format provided in the RFP. The evaluation personnel may then convene to finalize a single evaluation for each responding vendor.

e) Contract signing

The contract includes the technical statement of work, deliverables and legal and financial requirements that each party has to fulfil. The technical personnel on both sides negotiate to understand and clarify the high-level project plan and establish milestones and associated deliverables for each phase gate.

f) Initiation and Vendor Onboarding

After the contract is signed and accepted by all involved, the project may be initiated with all stakeholders with the following activities:

- Kick-off meeting involving key stakeholders.
- Establishing the project charter.
- Establishing roles and responsibilities matrix (project sponsor, steering committee, project management office etc.).
- Formation of RACI (responsible, accountable, consulted, informed) matrix to ensure constant and consistent communication.
- Acceptance of detail and high-level project plan.
- Confirmation and documentation of resources required.

g) Project execution

After initiation and onboarding, the vendor should validate the updated business process and the system requirements listed in the RFP with the SME and the beneficiary. The vendor may then update and detail the systems requirements or business process which may then lead to an update of part of the project plan or milestones after discussion and approval from all stakeholders. During this phase, it is critical to ensure that while the business analysts review and update the systems requirements and business process, the quality assurance, organization change management and technical personnel from all sides are involved. This will ensure that the beneficiary is involved from the start and will build capacity of the beneficiary to own and sustain the system after implementation and handover.

h) Monitoring and Control

At this stage, the vendor can get to work on the software solution while keeping the stakeholders updated on progress and seeking feedback from SMEs. The organization change management personnel identify site(s) to pilot the system and users from these sites that need to be trained. Quality assurance personnel ensure software quality as the effort progresses and validate with the SMEs. As milestones are reached, the vendor notifies and obtains approval from the responsible stakeholders. The vendor notifies the stakeholders of software solution readiness for piloting which requires that the software solution be evaluated end-to-end using pre-defined scenarios that cover all possible variations in the business processes. This is usually a combined event, known as User Acceptance Testing (UAT), involving end-users from pilot sites, developers, business analysts, quality assurance and other critical resources from all sides. The pre-determined scenarios are tested using mock data and the outputs recorded and any anomaly is noted for resolution by the developers. Once the pre-determined scenarios can be run end-to-end without issue (or with minor issues with no consequential impact), the software solution is ready to move into a production environment.

i) Rollout

The organizational change management (OCM) personnel work with business owners and other stakeholders to ensure that users are trained, and all resources are available to ensure a wider rollout of the software solution. This includes making sure that there is a user support mechanism to resolve any issues with the software that may arise during this time, and that there is on-site assistance available for end users to start adopting and using the system to support the business process.

j) Closeout

Once the software solution has been rolled out across the enterprise, the vendor begins the closeout process by handing over complete control of the production and other environments to the end beneficiary to make sure that all deliverables have been met.

k) Operations and Maintenance (O&M)

At this stage, the beneficiary is in full ownership of the software solution (unless outsourced to vendor). The software solution is stable in the production environment and used across the enterprise to support the business process. Production environment maintenance is required to ensure that the software solution is secure and highly available, and that users have the required support to resolve and software solution-related issues.

This requires the availability of skilled and trained personnel who will support the deployment platform, maintain the software application and provide user training and support and defect resolution when required. The beneficiary needs to budget for overall O&M costs which would involve personnel, hosting platform, software licenses etc. The beneficiary has a few options to select how to support the O&M of the software solution.

Each of these options needs to be carefully discussed for pros and cons and the budget involved. For instance, the options for O&M may include the beneficiary providing the personnel and resources for this activity, to completely outsourcing all the O&M activity against clearly defined service level agreements, or a combination of these options.

5. List of Abbreviations

2PL	Second-Party Logistics Provider
3PL	Third-Party Logistics Provider
4PL	Fourth-Party Logistics Provider
AI	Artificial Intelligence
CCM	Country Coordinating Mechanism
CMS	Central Medical Stores
COTS	Commercial Off-the-Shelf
eLMIS	Electronic Logistics Management Information System
EML	Essential Medicines List
ERP	Enterprise Resource Planning
FOSS	Free and Open-Source Software
HIS	Health Information System
HMIS	Health Management Information System
IoT	Internet of Things
LLIN	Long-Lasting Insecticidal Nets
LMIS	Logistics Management Information System
LMU	Logistics Management Unit
LOG	Logistics Outsourcing Guidance
LSP	Logistics Service Provider
MIS	Management Information System
ML	Machine Learning
MoH	Ministry of Health
NGO	Non-Governmental Organization
NRA	National Regulatory Authority
PP	Pandemic Preparedness
PPM	Pooled Procurement Mechanism
PR	Principal Recipient
PSM	Procurement and Supply Chain Management
PtD	People that Deliver
RFP	Request for Proposal
RFQ	Request for Quotation
RFT	Request for Tender
RSSH	Resilient and Sustainable Systems for Health
SOP	Standard Operating Procedure
STEP	Strategic Training Executive Program
TMS	Transport Management System
USAID	United States Agency for International Development
WHO	World Health Organization
WMS	Warehouse Management System