

Ghana

Process Mapping

First Step to
Reengineering the
Health Supply Chains of
the Public Sector System

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REPUBLIC OF GHANA



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DELIVER

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Abstract

Health service delivery systems require effective and efficient logistics systems. Process mapping can be used to assess supply chains and identify potential areas for improvement through reengineering or other work process improvement activities. This methodology was used to evaluate four supply chains of the public sector health logistics system in Ghana: essential drugs, non-drug consumables, contraceptives, and vaccines.

A convenience sample of a cross-section of 16 national, regional, district, and service delivery facilities in the Ministry of Health (MOH) system was selected from two areas (regions) of the country. A nine-step reengineering plan was used to complete the process mapping.

The major findings from the exercise of the four supply chains show—

- The system is highly complex. There are hundreds of steps involved in moving a product across all tiers in the supply chains.
- The system has many required but non-value added steps. Approximately half of all activities do not improve the satisfactory delivery of the product to the customer.
- Those working with the supply chain, in general, understand their customer's needs, but the workflow is designed and operated to accommodate the administration of the MOH, not the customer requirements.
- The system does not have measurable standards. Presently, MOH staff can quantitatively determine system efficiency and effectiveness.



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Acronyms

CMS	central medical stores
DANIDA	Danish International Development Assistance
DFID	Department for International Development (British Agency)
DHMT	District Health Management Team
DMS	district medical stores
FEFO	first-to-expire, first-out
HI	health institutions
JSI	John Snow, Inc.
LMIS	logistics management information systems
MOF	Ministry of Finance
MOH	Ministry of Health
MTHS	Medium Term Health Strategy
NGO	nongovernmental organization
PU	Procurement Unit
RCH	reproductive, child health
RHA	Regional Health Administration
RMS	regional medical stores
SDP	service delivery point
SSDM	Stores, Supplies and Drug Management
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development

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This report is dedicated to all the MOH staff who continue to seek to serve their customers better.

Executive Summary

A work process mapping assessment of the Ghana MOH drug supply chain system in the country was conducted to determine its overall logistical process efficiency and effectiveness. The assessment provided quantitative and qualitative data on the capacity of the present system to meet the Ministry's objectives and to satisfy customers' pharmaceutical requirements. Analysis of this data has yielded specific recommendations for the design of a strategic approach to integrating the functions, processes, and product delivery of three chains: drugs, non-drug consumables, and contraceptives.

Recommendation

1. First to reengineer (reconfigure the flow of work activities and decision-making points along established business efficiency and effectiveness principles) each of the three supply chains before steps are taken to integrate them functionally and in other ways.
2. Streamline each reengineered supply chain with a focus on ensuring that all activities and decisions add value to the Ministry's objectives to meet the primary needs of pharmaceutical users: availability, assured quality, and lower cost.
3. Integrate the three supply chains, beginning with process (the particular flow of work activities from the time the product enters the MOH system until it is dispensed to customers) and measuring workflow performance. Use the results to further guide function and product integration in the system.

Approach Used

The assessment plan was developed with input from key supply chain stakeholders: especially MOH and international donors. Taking the concerns and levels of commitment into consideration, the plan was revised.

- Selection of regional medical stores (RMS), district medical stores (DMS), and health institutions (HI), sites were reviewed and finalized with Stores, Supplies, and Drug Management (SSDM)/MOH.
- The mapping was conducted in two southern Ghana regions by a team of DELIVER consultants and MOH/financing specialists.
- Mapping was completed for all tiers of the three supply chains; in addition, the vaccines supply chain was also included.
- Preliminary findings were reviewed with MOH and U.S. Agency for International Development (USAID), and then presented formally at the MOH director's meeting on August 10, 2001.

Major Findings and Assessments

1. The system is highly complex. There are hundreds of steps involved in moving products across all tiers, in the four vertical supply chains.
2. The system has many non-value added, required steps. Approximately half of all activities do not involve work to ensure that the customers satisfactorily receive the products. Many other activities have been added to address control or other repetitive system breakdowns.

3. Those working the supply chain, in general, understand the needs of their customers, but the workflow is actually designed and operated to accommodate MOH administrative needs rather than customer requirements. In some supply chains, consequently, customers are circumventing or bypassing some steps or entire tiers of the MOH supply chain because of the frequency of system breakdowns and perceived poor service.
4. The system lacks measurable standards. MOH employees are presently unable to determine system efficiency and effectiveness quantitatively. They do not have the tools to determine the root of problems and how to improve system performance in a progressive way to meet MOH objectives.

Overall, as indicators of efficiency and effectiveness, the system cycle-time and its relationship to the cost structure of running the system together, significantly impact the capacity of the current system to meet its objectives, particularly sustaining availability, ensuring high-quality product, and providing high-quality products at lower costs. It requires more than a month's work, for instance, in the case of essential drugs, to complete all their activities; more than two and one-half years to move products through all four tiers to the point of service delivery. The present approach of the system is to put into place additional steps to address new or old breakdowns. As presently structured and focused, it is highly unlikely that the system is capable of effectively integrating the three supply chains into a more efficient, effective system.

Proposed Strategy

Redesign the supply chains' functions to produce streamlining and other breakthroughs critical to achieving integration, including transport, inventory control, and logistics management policy and communication. All four tiers must be involved in the redesign, with specific changes to include, for example—

- Reengineer the supply chain so it can become customer focused.
- Automate the logistics management information system (LMIS) system at the regional level and above.
- RMS: Modify RMS's role to take full responsibility for managing product distribution to the service delivery point (SDP).
- DMS: Change the emphasis from warehousing to HI management support and supervision services.

Anticipated Results During the Next Several Years

These include but are not limited to—

- Reduction in excess inventory, which reduces cost and leakage.
- Increased availability of quality product at lower system levels.
- Efficient and measurable system in place.
- A more knowledgeable and motivated workforce, oriented to customer service.

1. Background

The Ministry of Health (MOH) of Ghana currently operates four or more vertical supply chains for the management and distribution of health commodities to its public sector health institutions (HI). While the Five-Year Programme of Work clearly identifies the need to provide integrated services, it has been difficult to turn the policy into action, for many reasons. To support the MOH's goals and objectives, DELIVER, funded by U.S. Agency for International Development (USAID)/Ghana, developed a proposal that provides a strategic vision for how each of the logistics functions, such as procurement management, storage, distribution, etc., of three supply chains (contraceptives, non-drug consumables, and essential drugs [ED]) can be integrated (see appendix A). However, as a first step, DELIVER recommended process mapping of all four supply chains to determine the best critical path for integration. This report provides the findings and recommendations to reengineer the supply chains so that all processes, functions, and products are integrated.

Need for Mapping

To achieve the broader goals of a strong drug supply system in the country through greater logistics efficiency and effectiveness in the MOH's four vertical supply chain system, the current system must first be well understood. Before embarking on reengineering system functions, products, and processes that may involve complex changes for streamlining or integration, a description and mapping of the actual flow of work of the current supply chains is highly desirable. Process mapping assesses current system efficiency and effectiveness to help plan and guide proposed changes.

Work flow or process maps are a graphic representation and narrative description of all significant activity approaches currently used to meet the system's purpose and the requirements of its customers. The maps and descriptions indicate the current capacity and costs of the system to achieve its specific objectives. Where requirements are not being met, the maps help identify the source and nature of significant breakdowns in processes and quantify their cost in not achieving present system requirements. Because mapping is conducted with employees, as well as suppliers and customers of the system, the results are generally viewed as part of a credible basis for planning change. At that point, the process maps serve as a baseline of data about the systems processes for weighing options and designing new processes to achieve measurable supply chain improvements.

2. Methodology

The MOH logistics supply chain assessment team used a nine-step reengineering outline to guide the activity of process mapping.

1. Identify boundaries of the system work processes.

For each of the four logistics vertical supply chains, determine the starting point, where supply enters into the MOH sphere of responsibility; and the end point, where supply is dispensed by MOH to external customers.

2. Identify key product or service outputs of the processes.

Each process mapping effort begins by identifying a clearly defined current supply chain output or result that maps activities and decisions taken to achieve that result. It begins at the end point and works back to the starting point of the supply chain. This approach is used for each of the four supply chains to ensure that all supply outputs and work processes used to provide drugs and other pharmaceuticals to service points can be accurately followed across various MOH agencies and their functions, and then measured for efficiency and effectiveness. Each output of the supply chains has a formula to promote common understanding across different elements of the complex MOH. That formula uses the form of a noun and an action verb to describe what happens to that product or service. For example, “contraceptive dispensed” is one of the supply chain outputs.

3. Identify most significant output customers.

For this mapping work, a customer is the immediate recipient of a supply chain output whether internal or external to MOH. For instance, an HI medical assistant would be an internal MOH customer of the district health administration (DHA); an HI patient diagnosed with malaria would be an external customer of the medical assistant. Customers are identified for all supply chains.

4. Determine customer requirements.

A major workflow mapping principle is that decisions about how an organization can effectively and efficiently provide services or products to customers should be based on accurate, in-depth knowledge of what the customer needs and wants. When customers consistently receive what they want and expect, they tend to continue using that organization’s services or products. When they do not, they search for alternative sources or attempt to work around the current system.

From this perspective, it is then important for institutions to examine how they organize work. Work organized around unverified or outdated ideas of what the customer wants or needs, or organized only on what is most efficient and effective for their internal work structure, may not be meeting customer needs. In this case, the organization may be doing inefficient work (e.g., from the customers’ point of view, taking too long to provide a good service or product), or working ineffectively (e.g., not providing the quality of service or product expected). Over time, organizations that cannot meet customer needs, expectations, and perceptions of quality products and services tend to become irrelevant to customers, if customers have alternate sources for the service or product.

A customer requirement is a description of all the characteristics and features of the product or service needed to meet their needs. There are typically two steps involved in identifying customer requirements:

- From their experience, employees first offer what they currently understand about their customer requirements.
- The organization uses independent means to determine actual customer requirements.

When the second step cannot be done at the time of the mapping, the employees' determination is used as a baseline until customer feedback is obtained and compared.

5. Translate customer requirements into agreed-upon supplier specifications.

For each customer requirement, specifications need to be identified that describe with enough detail and specificity what performance is needed by the organization in its work process activities to consistently meet the requirement. In this way, it is possible to analyze the current process to see how efficient and effective it is, because work can then be measured activity by activity. For example, the district medical stores (DMS) requirement of the RMS that "product has adequate shelf life" could be translated by the RMS into "Product dispensed has shelf life of six-months or more." The best way to measure the current work process would be to identify indicators, standards, and targets. For example, one indicator of the above specification would be to check the expiration date of the product. If the customer's requirement also is that the product is "always available," the organization's standard might be to provide 100 percent or negotiate a more reasonable target with their customers.

6. Define and agree on existing steps in the work process.

A flow chart is developed for the current process, which leads to each logistic system output. The diagram illustrates all the significant steps, including all process steps, inputs, outputs, and decisions. All departments or functions included in the processes are represented and involved in developing the flow chart (see appendix B).

7. Determine capability of current process to meet customer requirements.

Determining capability involves comparing the results of actual outputs of the logistics supply system processes to the identified customer requirements. Process activities and outputs are then timed or otherwise measured, as appropriate. If the system consistently produces outputs that meet customer requirements, its processes are considered "capable" and only monitoring is needed. If the system is not capable, then the analysis continues by identifying obvious problems that can be resolved. Typically, after simple improvements are made, measures can be developed for a team to better identify the source and nature of the remaining problems, which may be from eliminating unnecessary complexity to the need to design a better process. If the problems are significant, a larger reengineering of the supply chain system may be warranted.

8. Reengineer the work process to ensure it meets customer and stakeholder requirements.

When an organization's supply chain process needs major transformation to meet customer requirements, the cross-functional group steering this work help the organization develop a vision of what results are expected—both the desired outcomes for customers and the impacts on the work system has on employees. The group may also develop the design to achieve the process vision.

9. Develop an implementation plan, including a monitoring program.

After the design work is complete, the same or a reconfigured team will lead the preparation of an implementation approach that includes the means to monitor and adjust the new process.

Approach Used

A supply chain assessment team—DELIVER consultants, MOH, and financing unit representatives—visited and mapped two southern Ghana regions (Ashanti and Eastern), including the two RMSs, and at least one DMS and one HI in each region. The consultants also visited and mapped the CMS, the Korlebu Cold Room, and the MOH Procurement Unit.

The team determined how the two regions represent the national product distribution system (i.e., comparing different methods for picking up product at sub-district institutions or hospital dispensaries). As appropriate, they conducted future comparative assessments in the mid-portion of Ghana and, finally, the northern portion of the country

Each working map was entered into computer software (AllClear 5.1), which produced a diagram and separate activity-based data fields for analyzing the strengths and problems of the current workflow. Data fields included, for example, the frequency of the activity; the average time, or range of time, needed to do an activity; the number of people involved in the activity; the functional areas the people represent; and the direct cost of people's time and costs, such as fuel for transport.

The team prepared four supply chain work process maps, one each for essential drugs and non-drug consumables, contraceptives, and vaccines. Each map started with forecasting from the Procurement Unit (PU) or other starting point, moved to the central medical store (CMS) (or Korlebu Cold Room for vaccines), and then to the RMS, the DMS, and, finally, the HI. Each map represented the total activity and direct effort of involved employees and others required to identify the need for a product, to order a product, and to deliver a product through the supply chain to the SDP.

To determine the overall applicability and value of the work, the consultants, before they left Ghana, wrote a preliminary report of findings and analysis for presentation to the Director of SSDM, and then to other MOH stakeholder officials.

10. Implement the methodology.

- Ensure understanding of the work effort among key stakeholders, MOH and Ministry of Finance (MOF) officials, and donors. Determine the level of commitment.
- Design the interview approach and questions to test for commitment for meeting formats for interview questions (see appendix C).
- Use the “2-squared 4-squared Process Reengineering Decision Matrixsm Ballot” tool.¹
- Interview key MOH officials and staff stakeholders to review the intent of the mapping effort and to ascertain their interests, concerns, and commitment to supporting possible changes, i.e., an integration of supply chains.
- Conduct similar interviews with key donor organizations: USAID, United Nations Population Fund (UNFPA), Danish International Development Assistance (DANIDA), etc.

¹ 2²4² Process Reengineering Decision Matrix Methodologysm developed by Alan G. Dunn, Gerald E. Dunn, Inc. 1999.

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- Prepare written summary and share results with the Director of SSDM (see appendix D), and make final adjustments to mapping strategy.
- Establish an inter-agency work team able to give the assessment credibility in the field by learning to conduct the mapping with health officials and assist in the analysis.
- Design and conduct logistics mapping team building session, and review mapping procedures with team members (see appendix E).
- Design a boilerplate mapping session agenda and format (see appendix F).

Note: While it is desirable to include HI patient exit interviews to determine a baseline for customer requirements and satisfaction after dispensing of product, the team decided that they did not have time and resources to adequately complete this task.

- Conduct protocol meetings to brief Regional Health Administration (RHA) directors and key staff in two regions on the mapping work plan and approach; assess their understanding, interest, and level of support; and review selection of districts and HIs for appropriateness of supply chain characteristics and staff availability. Request RHA to confirm the schedule with districts and HIs.
- Conduct mapping work sessions in Ashanti and Eastern regions.
- Meet with district and HI representatives and conduct mapping interview sessions (see appendix G).
- Conduct follow-up meeting with Ashanti and eastern region RHA directors and staff to review combined regional, district, and HI workflow maps of all four supply chains (see appendix H).
- Complete tier mapping work in Accra with CMS, Procurement Unit, and Korlebu National Cold Room.
- Input work maps and data into computer software program.
- Assemble integrated maps for all tiers of the four current supply chain systems.
- Consultants produce draft report with preliminary findings for streamlining and possibilities for supply chain integration.
- Review draft maps and preliminary report with the director of SSDM, incorporating outcomes in revised draft.
- Hold draft report debriefing meeting with USAID.
- Consultants prepare PowerPoint presentation of preliminary findings.
- Assessment team presents findings and conducts debriefing at MOH directors monthly meeting, August 10, 2001.

Sample Sites

Sample sites were chosen based on a purposive selection:

National

Central Medical Stores (CMS)
Korlebu National Cold Room
Procurement Unit (PU)

Regional

Ashanti RMS
Regional Cold Room
Eastern RMS
Eastern Regional Cold Room

District

Seckyer West DHA Medical Store and Hospital Dispensary
Kwaha South DHA Medical Store and Hospital Dispensary
Adawso North DHA Medical Store and Hospital Dispensary

Service Delivery Points

Obo Health Center
Adawso Health Center
Kofiase Health Center

Analysis

The analysis of the supply chain was guided by these principles:

Characteristics of a High Performance Supply Chain Evident through Process Mapping

In a high performance supply chain, the following characteristics would be evident in its workflow:

- Activity moves once or only infrequently across different functions (i.e., rather than back and forth across receiving, accounting, auditing, inventory, etc.).
- There are few return “loops,” indicating established steps are in place to handle breakdowns (i.e., mistakes, incomplete work, duplication of effort, extra accountability, and verification, etc.).
- There are few non-value-added activities beyond what is required to meet customer needs (i.e., governmental procedures and policies required of all agencies but not essential to the supply chain work flow).
- System readily adapts to change: increase or decrease in volume, add or subtract product items, etc.

The findings and analysis of the four products supply chains were conducted using the general perspective in the following section.

3. Results

Process Maps for Essential Drugs/Non-Drug Consumables, Contraceptives, and Vaccines

The major findings show—

1. The overall four supply chain systems are highly complex.
2. The system has many non-value-added steps some required and some established to handle breakdowns in performance.
3. The system is supplier-driven rather than customer-driven.
4. The system lacks measurable standards for determining its capacity to meet supply chain objectives and customer requirements.

Output Requirements for Suppliers and Customers

For the basic supply chain output of “dispensed product,” *HIs, the point of service deliverer, perceive that customer requirements fall into two categories: availability of product and knowledgeable use of the product (i.e., the product will be curative). In terms of their suppliers, HIs expect that the DMS or other suppliers would provide product on demand, the product would be of assured quality, and the HIs would receive information on appropriate drug use.*

To be effective and to achieve customer expectations, work process mapping principles call for all work activity to be aligned. An indicator of whether a process is customer-driven and customer-oriented is the extent to which all supply chain internal suppliers and customers have the same understanding or perception of the point of service requirements. In the four systems, internal customers are clearer about their own product needs (what they expect from their suppliers) than their customers’ needs (see appendix I).

In all four supply chains currently operational in the MOH, the internal customers identified three common product requirements they expect from their suppliers: availability on demand, assured quality, and low cost. Because a supply chain customer analysis has not been done, it may or may not be assumed that clinic patients also have these expectations. CMS, RMS, and DMS, in particular, perceived their customers’ requirements: some of them identified a few or all of the above needs but others did not. In addition to this mixed understanding of customers’ requirements, interviews about the breakdowns in work flow showed that most employee remarks were focused on satisfying their own needs, with few concerns expressed about how to meet their customers’ needs. For example, when the issue of non-availability was discussed at medical stores, staff attention was more focused on the problems employees experienced with their supplier than the consequences to their customers, including repeated trips, extra paperwork, etc. It was also observed that performance of the supply chain is not measured around the three customer requirements. These points are backed up by the analysis of the process map activities. For these reasons, the logistics supply chain can be characterized as a supply-oriented rather than customer-oriented system.

Major Findings and General Analysis for the Four Supply Chains

Action steps required to move supplies through the system number in hundreds.

Hundreds of steps are currently part of the flow of product, beginning with forecasting and continuing with ordering, transport, storage, and, finally, point of service delivery and dispensing for each of the four commodity supply chains.

- For essential drugs and non-drug consumables, the work flow map consists of more than 700 different action steps or decisions, beginning with identification of need at the national level and ending with dispensing to customers at health clinics and sub-district hospitals.
- For contraceptives, there are just over 200 steps.
- The vaccine supply chain has the fewest number of steps involved, about 100.

Generally, the more numerous the steps the greater the complexity of each sub-process, which, in turn, typically lengthens the time required for product to move through the cycle. The team estimated that it takes more than two and one-half years to complete the cycle for drugs. This situation also provides more opportunity for mistakes and other system breakdowns that affect satisfaction at the SDP.

More than half the steps are administrative.

Fifty percent or more of the administrative steps involved in the four supply chain work processes are activities that do not add value to moving products through the supply chain. The steps themselves do not involve work activity that helps meet customer satisfaction but are duplicate work to reassure, for instance, managers that previous steps taken were carried out appropriately or to correct mistakes and other problems arising from the way work is normally conducted.

Between two-thirds and three-quarters of all supply chain activities identified across the four tiers of government (national to local) fall within the administrative function of MOH. Therefore, the occurrence of and need for these multiple actions could be reconsidered. Within this group of activities, two types of non-value-added actions are predominant in the maps:

- Review and approval by higher administrative officials of lower employees actions.

This type of step is also used in the product supply chains before action can cross boundaries to a different administrative unit, such as from requisition assessment to payment in accounting. This occurs primarily at the district and regional levels. This type of activity is usually intended to ensure adequate control in important areas, such as following protocol, adherence to laws and policies, and monitoring the exchange of money. Because it is a step added after the action is initially decided, it is frequently justified because subordinates are considered unable and/or unwilling to do their job appropriately, or they cannot be trusted to do their job appropriately. In these cases, managers are doing the work for their subordinates.

- Redoing steps because of mistakes in completing tasks: incomplete, late, or missing paper work, and lack of coordination.

For example, representatives from regions, districts, and HIs make trips to obtain product from the level above without the knowledge of availability, frequently resulting in a second or third trip.

This often occurs under several scenarios—

1. When work process steps are put into place without adequate consideration to their impact on the overall supply chain flow, especially to point of service delivery.
2. Building on the first scenario, when coordination of product movement at one location must pass back and forth numerous times across different functions (such as auditing, storekeeping, accounting, and receiving) instead of passing one time through each.
3. Attempting to solve problems at the point where they appear, which generates problems elsewhere in the system rather than finding and eliminating the source of the underlying condition.
4. A general breakdown of communication across the system sufficient to force employees to make decisions at upstream or downstream steps without giving them reliable information to correctly perform their work the first time.

Supply chain is supply-driven instead of demand-driven.

The four supply chains' customer product pick-up sub-process is estimated to account for more than half of the significant, typical breakdowns identified, including unavailability, wasted travel time, and problems with paperwork. The number and frequency of breakdowns at the customer exchange point would indicate that the chain is supply- rather than demand-driven. When the orientation of work is supply-driven it means the flow of activities is designed and organized primarily to support the supplying agency's needs rather than that of its customers. This, in turn, influences the workflow in several major ways:

- Regional, district, and HI customers sometimes or generally circumvent or ignore parts of the MOH-prescribed process. Interviews found that these pick-up breakdowns result in frustration with the system because customers expect consistent availability. Stockouts or delays over time are "forcing" customers to find alternative ways to obtain product. This results in staff spending time obtaining products rather than servicing customers.
- Customers at the regional, district, and local levels are also increasingly circumventing the entire system for certain product, taking advantage of their access to competitive private suppliers for products to meet situations where products are unavailable. Also, with the role of the national, regional, and DMSs perceived by some customers as primarily warehousing instead of providing service, more customers are making private sector purchases based on cost and service comparisons.

There is a reengineering theory that if systems in a competitive market place, including government systems, do not continually show their customers that they are relevant, sooner or later they become irrelevant and are bypassed. The earlier scenarios illustrate signs of this condition.

No indicators in place to measure effectiveness or efficiency.

Interviews with supply chain institutional representatives indicate that, at present, they are unable to determine effectiveness or efficiency in moving product from their supplier to their customer.

Employees responsible for various steps in the system are usually knowledgeable about their roles and responsibilities within their areas of operation and, generally, informed about how their organization functions. Some institutional office walls even have illustrations of their performance around specific MOH program goals. However, no performance measures or indicators, at any institutional level, were being followed by employees to show how efficient or effective that organization's operations were in meeting its customers needs or overall pharmaceutical supply objectives.

Without an objective method in place to measure performance, a more subjective, self-sustaining focus typically drives a work process (“We do it this way because this is the way we are used to doing things.”). It can apply to individuals, units, and whole organizations. From this perspective, assessments may differ widely in how well that system is performing. In the MOH supply chain system two relevant perspectives were noted:

1. Almost all supply chain representatives participating in the mapping initially indicated that any significant problems in the system resulted from ineffective operations of higher levels—their supplier or above—and not theirs. This perspective somewhat altered their review of the working map for their own system.
2. One particularly difficult aspect of the mapping was openly discussing the issue of significant product inventory loss. Informally, it is acknowledged to be a serious problem in the overall system. In the mapping process, however, few institutional representatives acknowledged difficulty reconciling physical counts with paper inventory; all others stated it is a rare occurrence. Some explicit and/or implicit rules or policies appear to be behind this significant problem.

System breakdowns occur when products move from one tier to another.

A number of system workflow breakdowns were identified across the tiers—problems that frequently and significantly affected the movement of product to point of service delivery. They were worth examining for their short-, mid- and long-term implications in supply chain management improvement:

- Completing and submitting timely reports upstream.
- Product shortfalls and stockouts.
- Ineffective and inefficient inventory stocking and control systems.
- Lack of transport to pick up product.
- Lack of adequate means to store cash safely.
- Inability to process paperwork quickly and accurately, i.e., purchase vouchers and Certificates of Non-Availability.
- Inability to forecast supply availability.
- Equipment problems at the vaccine cold rooms and large storage areas.
- Communication of timely information upstream and downstream, especially the lack of advance notice of availability and supply shipments.
- Problems not handled at the point of breakdown.

- Small breakdowns causing larger downstream breakdowns—especially the time wasted going for picking up product.
- Debts mounting from uncollected credit loaned to customers.
- Time required to obtain purchase orders from the bank.
- Suppliers not responsive to their customers' expectations or needs.

System cycle-time and costs significantly impacts capacity, especially product availability.

The mapping work revealed an estimated cycle time for moving products through the supply chains. It typically takes about one month, a total of 31 days in total, for the system to process one order from CMS to the patient. It takes more than two and one-half person years to accomplish the work for the 31 days, in addition to their other duties. When the average number of shipments of product per year is considered, approximately \$8,500 in other direct and labor costs is spent getting one order of essential drugs and non-drug consumable commodities to the patients in one region. For every dollar of drugs or non-drug consumables, approximately 0.02 cents or 2 percent is spent in order processing.

These facts suggest an important relationship between time and cost in the supply chains. In comparing the relationship, the direct costs, especially for staff, to complete MOH's supply chain activities are low. However, the time required to move products to customers is, by comparison, lengthy and inefficient. Interviews indicate that system process problems are typically handled by adding additional checks or other actions. The low administrative costs probably enabled staff to add steps to the system rather than to find the root cause of system breakdowns. The lack of product availability is an important example of these systemic problems.

An earlier study conducted by the MOH on product availability showed that most of the public health facilities had less than 25 percent availability of key drugs.² Interviews with key people in the system confirmed that the drug supply situation has worsened. Mapping interviews revealed that little to no early logistics planning or problem solving steps around availability takes place across functions, within MOH, even though availability is the customers' number one requirement. Early planning and problem solving mechanisms are typical steps in most efficient, effective process systems. The current MOH processes instead emphasize redundant steps to address breakdowns after availability occurs. With this process approach, while the financial costs are not high to maintain the current system of general availability, it is highly unlikely that the system can achieve and sustain the goals of availability, lower costs, and ensure quality.

² Ghana National Drugs Programme, Ministry of Health (MOH). 1999. *Baseline Study on the Pharmaceutical Sector in Ghana*. Accra: MOH.

Similarities and differences in the system could affect integrating the supply chains.

There are both significant similarities and differences in the work flow approaches to the three commodity supply chains that affect the possibility of integrating two, three, or all four supply chains in the future:

Similarities

- At the regional levels, warehousing essential drugs, non-drug consumables, and contraceptives in the same stores.
- Basic paperwork flow of reporting and processing of new orders.
- Essential drugs and contraceptives involve cost recovery systems.
- Common breakdowns in non-accessibility of product, product pick up, and information management.

Differences

- Fragile vaccine commodity has influenced the development of a reasonably efficient supply process:
 - Few non-value-added administrative steps.
 - Breakdowns are frequently handled at the point where the problem occurs rather than passed on to others.
- Generally high trust level among employees; they trust the system to continuously supply quality product to point of service providers, over time.
- Storage integration is challenging because of vaccine cold room requirements.
- Vaccine supply is a non-cost-recovery commodity; essential drugs and contraceptives cost recovery processes differ significantly.

4. Recommendations

Reorganize the Supply Chains to Become Demand-Driven and Customer-Focused

First, to meet current customer requirements, reengineer the flow of work activities and decision making points to orient the system at each tier and within each function:

1. One-hundred percent *availability* of products on demand throughout the system.
2. Assured *quality* product, as determined by government standards and public opinion.
3. Products available at lower *cost*.

Second, continue the reengineering to produce breakthroughs in system capacity to better meet current customer requirements, eliminating, wherever possible, non-value-added activities and decision points, sources of chronic breakdowns, duplication of effort, and lack of coordination.

Third, to the extent possible, integrate the four supply chain processes into the system. Integration decisions will be largely based on the results of workflow process knowledge and performance outcomes gained from reengineering efforts in steps one and two above.

Proposed Strategy for Reorganizing the Logistics Supply Chain Systems.

Redesign the supply chain system.

Redesign the following functions and tiers of the current system to produce the breakthroughs in performance critical to achieving the customer service objectives above:

Transport

- Convert the essential drugs/non-drug consumables supply chains from a pick-up to a scheduled delivery system. The system would deliver directly from the RMS to the SDPs. (Initial estimates show that the Ghana contraceptive pipeline can be reduced from 17 to 8 months if deliveries are made directly to regions and regions deliver directly to clinics once a month.) Using this arrangement, the District Health Management Team (DHMT) role would shift to a supervisory and management role.
- Include contraceptives as part of the monthly scheduled delivery system of ED/non-drug consumables directly to the SDPs.
- Particularly for contraceptives, conduct a cost comparison and feasibility of direct delivery to the 10 RMSs rather than through the CMS.
- Review the option of outsourcing transport to support a scheduled monthly delivery system.

Inventory Control

Institute inventory control methods to the following. The changes include—

- Ascertain MOH's current country-wide stock situation.
- Integrate inventory management into daily logistics activities.
- Reduce the need for redundant control activities through the supply chains.

The changes would specifically include:

- Shift from an end-of-the-year physical inventory count system to a cycle count system, where product is continually inventoried all year, using smaller blocks of available time.
- Install an automated inventory control and stock management system at the RMS and CMS level.
- Change the current alphabetical stocking system to a system that organizes stock to enhance warehouse productivity.
- Change the policy of no-tolerated leakage (employees pay for any unaccounted for product) to an appropriate percentage, making it possible to discuss and address leakage issues.

Logistics Management Policy and Communication

Identify and revise the policies and communication patterns that, in the workflow processes, undermine the effective, efficient movement of product to the SDPs. Examples of possible revisions in each tier of the chains include—

Procurement Unit:

- Make adjustments to procurement planning by involving the Finance Unit and the CMS at an earlier stage to minimize later delays associated with not addressing their concerns or not including their pertinent information.
- Implement World Bank pre-qualified vendor status to expedite ordering.
- Make financial controls more effective by placing them at the source of the needed action and using automated systems to improve communication between the three units.
- Inform in-coming shipment information to CMS, if known.

Central Medical Stores:

- Support the proposed DANIDA plan of action for improving the management and capability of the store to warehouse and supply product, in keeping with the objective of this report.

Regional Medical Stores:

- Modify RMS's logistics role to take full responsibility for managing the supplying of quality product on demand to the local HIs to enable the DMS to carry out a needed, complementary support role to the HIs.
- Change the financing of product from an up-front payment to invoicing and 30-day credit payment.

District Medical Stores:

- Change the emphasis of the DMS from that of another warehouse for product to providing management-level support to local HIs.
- Shift the roles of technical staff from supplying product to working more closely with HI staff, thus increasing their knowledgeable use of essential drugs and other products that currently are not regularly provided countrywide.

- Continue the current product mark-up to DHA to underwrite the cost of providing supervision and management services to the HIs.
- Implement a LMIS system.
- Develop procedures for better management communication between levels, working from the non-value added activities identified in the work flow analysis maps of the four systems.
- Put in place customer-focused operational performance measures to help managers assess performance under the redesigned process, on a regular basis.

Service Delivery Points:

- Encourage staff to know their customers' needs better by conducting rapid customer segmentation studies. Use the results to redesign a more customer-oriented supply chain. Put in place a system to enable customers to assess and provide feedback on HI performance.

Continuous Improvement of the Supply Chain System

Enlist those who participated in this assessment to initiate activities that will enable each agency involved in the system to begin making improvements in efficiency, quality, and productivity, and customer service where breakdowns have already been identified.

- *Implement “Immediate Implementables.”* Work with established units or teams at each level (i.e., RMS, DMS) to pursue changes identified by the assessment mapping and debriefing sessions.
- *Initiate on-going process improvement as part of current work plans.* Work with established units and teams or new, cross-functional groups, to further assess the activities in the process maps that do not add value and actions but are required. A suggested approach would be to—
 - Agree on the “owner” of the process—who takes responsibility for overseeing that continuous improvement occurs?
 - Clarify and agree on internal/external customer requirements and current capacity of the system to meet those requirements.
 - Analyze sources of breakdowns and their consequences using proven process improvement tools.
 - Redesign process activities involving those affected (suppliers and customers or other stakeholders): test, refine, implement, and monitor.
 - Share results across the system for benchmarking and other learning purposes.

Why Is This Strategy Different?

The strategy proposed for reengineering has been proven in the commercial and public sectors to have dramatic success in improving customer satisfaction with products and services, and providing for efficiencies in supply chain management. Focusing on the supply chain work flow improvement will lead to more timely availability of public sector drug supplies and a decrease in leakage. An incremental organizational improvement approach is unlikely to overcome the cumulative breakdowns of the current system. Reengineering offers a high probability of success because it is based on new, proven approaches and breakthrough methodology, including—

- Bringing supply chain management improvement into the day-to-day responsibility of affected employees at all levels by involving them in mapping and assessing their work operations, and then participating in redesign work and implementation. This significantly reduces the problems of resistance to change because organizational changes are better understood by everyone in the same

way, and those affected can directly influence the change through involvement in needed decisions at their level.

- Establishing a practical understanding of the current system's capacity to meet its purpose for efficiency, productivity, quality, and cost at all levels and in every function. This information helps in two ways:
 - Builds a sense of urgency by demonstrating with numbers and graphics the gap between current system capacity and needed capacity.
 - Contributes a baseline for generating streamlined and breakthrough solutions to seemingly intractable problems for complex systems, which have evolved over long periods of time.
- Applying proven automated and other systems to manage inventory and the ordering process, resulting in timely, accurate information for management.
- Focusing system change on understanding and meeting the needs of the key customers who sustain the supply chain operation. This is a demonstrated method of learning in the commercial and public sector and it typically leads to successful innovation.
- Quickly developing more flexible, responsive sub-process systems in critical supply chain functional areas, particularly the transport system, by researching outsourcing and other options.
- Instituting preventative versus reactionary control actions in the system by moving control mechanisms closer to the source of the action.
- Instituting mechanisms to continuously measure and illustrate performance results and improvement (or new breakdowns) of the system, enabling key system leaders and stakeholders to evaluate system success and, therefore, their commitment and future national investment in the system.

What Will You Get in Two to Three Years?

Implementation of these strategies should result in—

- Reduction in excess inventory, resulting in reduced cost and leakage.
- Availability of quality product at lower supply chain levels.
- An efficient, measurable system in place that integrates products, processes, and functions.
- Strategic decision making at regional and national level based on supply chain management principles.
- Financial systems that no longer hinder logistics supply work.
- A more knowledgeable, motivated work force oriented to customer service work methods.
- Increased private sector approaches.

5. Conclusions

The original objective of the process map was to determine the best critical path to integrate the three supply chains—essential drugs, non-drug consumables, and contraceptives. The evidence is clear that prior to integrating any of the functions of the three supply chains, a reengineered supply chain must be put in place. This supply chain should be demand-driven, streamlined, effective, and robust, and continually measured and improved. Future work in the improvement of the supply chain needs to change from product and functional integration to process integration and the development of a demand-driven supply chains.

Appendix A

Integrated Pharmaceutical and Reproductive Health Logistics Systems in Ghana: A Concept Paper

Background

As documented in the GHANA VISION 2020, the government of Ghana aspires to become a middle-income country by the year 2020 by focusing its efforts on human development, economic growth, rural development, urban development, and an enabling environment. The Vision 2020 further specifies the health objectives of reducing rates of infant, child, and maternal mortality; controlling risk factors that expose individuals to major communicable diseases; establishing a health system toward delivery of public health services; and strengthening an effective and efficient management of the health system.

Inspired by the vision, the MOH developed the Medium Term Health Strategy (MTHS), which provides strategic guidelines to achieve the long-term vision. Given the policies, priorities, and targets, a Five-Year Programme of Work (1997–2001) was developed and a series of reforms are being implemented to improve the capacity to deliver effective and efficient health services.

The Five-Year Programme of Work clearly recognizes provision of drugs and strengthening of logistics systems as key components to improving access, improving allocation of resources, strengthening institutional capacity, and analyzing policy and monitoring performance. During the decade, much has been achieved in strengthening the drug supply system in the country. This includes implementation of a nationwide drug cost recovery system, establishment of the Ghana National Drugs Programme, and the procurement unit, among others. However, due to donor requirements, there are several vertical logistics systems still operational in the public sector, which results in wasted resources. This has the potential of leading to the failure of fulfilling the vision of both the MOH and the GHANA 2020.

John Snow, Inc., through the support of USAID/Ghana, has worked for the past decade in Ghana, strengthening the contraceptive logistics system, studying the implication of health sector reform on contraceptive logistics, and estimating the costs of delivering the supplies to the clinics. While the contraceptive logistics system achieved product availability at the lowest level, an effective logistics management information system (LMIS), and resource mobilization, it is time to integrate if the broader goals of the MOH are to be realized.

Situation Analysis

The current logistics system in the health sector is composed of three or more vertical systems. These vertical systems lack the optimal levels of efficiency and effectiveness. The implementation of health sector reform and decentralization has led to some improvements, but more is needed. Analysis of the situation indicates that there are distinct strengths and weaknesses, as well as opportunities and threats to the logistics system, some listed below. The implementation of a carefully selected set of interventions will lead to a successful reengineering of the system into an efficient integrated logistics system.

Strengths and opportunities:

- A current momentum supports the effort of integration.
- Stakeholders have shown a high level of commitment.
- Integration will streamline processes, resulting in potential time and cost savings.
- Removal of non-value-added tiers would reduce inventory.

Weaknesses and threats:

- Resistance from staff from all levels and functions.
- If not properly implemented, systems may break down.

Some of the key findings in specific areas of the current logistics system are catalogued below:

Forecasting

Forecasts are developed on a yearly basis. In the case of reproductive health commodities (contraceptives), the Reproductive, Child Health (RCH) Unit has managed this process with outside assistance and now the Procurement Unit is taking an increasing role.

Procurement

The technical units currently carry out procurement of some products. In the case of contraceptives, the RCH unit negotiates with the donors directly, prepares final orders, and ensures continuing communication until the order is received in the country.

Storage

In the current system, stocks are mostly managed in the same place but by different units or personnel

Transport

Currently, products are collected in various ways. In some cases, one vehicle is used to collect all supplies; in other cases, they are picked up separately using different modes of transportation.

Ordering/Reporting

Currently, there are different forms and systems used to order and report on products.

Proposal

Businesses and programs around the world are littered with failed improvement and reengineering programs, the result of many factors. Our operational research on implication of health sector reform and a literature review of successes and failures of implementing improvement programs or integrating systems showed that key factors should be considered.

Embarking on an improvement program:

- There should be a deliberate, clear, and explicit mapping of the outcomes or optimization expected from an improvement program. This requires planning, systematic methodology, and implementation.
- All resources dedicated to each current specific process should be clearly identified and quantified.
- Reengineering must be done rapidly. Improvement programs will inevitably fail if they take too long to produce a result.
- The results of the improvement programs must be notable, even remarkable.

Planning integration:

- Recognize that pre-existing vertical logistics systems are often effective at ensuring product availability.
- Recognize that integrated systems must handle three types of supplies: those in full supply, those in short supply, and those that require special handling.

Goal

To realize the objectives of the MOH as defined in the Five-Year Programme of Work, John Snow, Inc., proposes reengineering and transforming the logistics system. *This will result in a system that integrates products, processes, and functions to achieve better efficiency, productivity, and quality.*

Taking into account the lessons in the next few pages, JSI outlines the current state of each of the logistics functions and provides a vision for how these functions can operate under an integrated system.

Forecasting

Forecasts are developed once a year. In the integrated system, this function will still be primarily conducted by the technical unit, such as RCH, as they are more aware of the program's needs, etc. However, a procurement unit will also be involved in the review of forecasts.

Procurement

In the integrated system, the procurement unit will be responsible for the procurement process. SSDM will be responsible for negotiation with donors, donor coordination, and order management. The RCH Unit will be responsible for (1) advocating for contraceptive security through donor coordination, (2) resource mobilization, and (3) making the health community aware of the current and future unmet need and its impact on the lives of women and families.

Quality assurance

Under the integrated system, monitoring consumer product complaints will continue to be primarily the responsibility of the technical units.

Storage

In the integrated system, all stock would be managed under one roof, using one process, by one team. Ordering mechanisms will be uniform. Inventory levels will be based on whether the products are in full or short supplies. Flows of contraceptives and essential drugs will follow the same distribution.

Transport

In the integrated system, all products, such as contraceptives and essential drugs, will be collected at the same time. There will be no differentiation made by product; instead, decisions will be based on need. Pickup of supplies will be systematized.

Ordering/Reporting

In an integrated system, a standard system would be in place. The same ordering forms would be used for all products. Personnel responsible for essential drugs would also be responsible for the order management of contraceptives. To ensure that the technical units are aware of the supply situation in the

country and to help them programmatically plan for the future, data collection and reporting would be channeled to the appropriate units for program and logistics decision making.

Cost recovery

Currently cost recovery mechanisms are operated and managed differently for contraceptives and essential drugs. In an integrated system, the family planning cost recovery should be aligned with the essential drug system and operated in similar ways, except with one difference family planning would not be full cost recovery and their subsidized nature should be considered.

Management and supervision

In the integrated system, the technical units should continue to play the role of clinical and technical management and supervision of the program. However, units primarily responsible for the logistics of the product, such as the SSDM, RMS, etc., will primarily become responsible for the management and supervision of the logistics activities.

Methodology

A carefully selected methodology will be applied to the proposed reengineering to ensure that the process successfully delivers the desired objectives. To ensure success of implementing these changes, threats need to be seriously considered. It should be noted that most senior executives in business lose interest if reengineering activities have not resulted in breakthrough performance in 8–10 months. The plan should include strategies, including the following:

- Ensure senior management sponsorship.
- Involve stakeholders from the start, especially those being impacted, such as the RCH unit.
- Involve regional and district administration from the start.
- Assure staff that the streamlined changes will not result in redundancy.
- Use the data-gathering phase to mobilize staff.
- Consider a phased-in approach.
- Be clear about the vision and outcomes, and use it to motivate staff.
- Be consultative in the process and radical in change.
- Use technology and empower people.
- Keep a sense of urgency for the process.

Work plan

With USAID/Ghana funding, John Snow, Inc./DELIVER could help implement these strategies to achieve an integrated logistics system for the management of public sector commodities. To build a base, JSI/DELIVER proposes the following activities:

1. MOH needs to identify a transition team to work with DELIVER on the reengineering plan.
2. Conduct a process mapping of the essential drugs and contraceptive systems.
3. Assess the senior level buy-in to the integration plan, and clearly define the vision and expected outcomes.

4. Hold a series of consultative meetings with the stakeholders, including all levels, to obtain insight.
5. Develop an implementation plan.
6. Implement the plan.

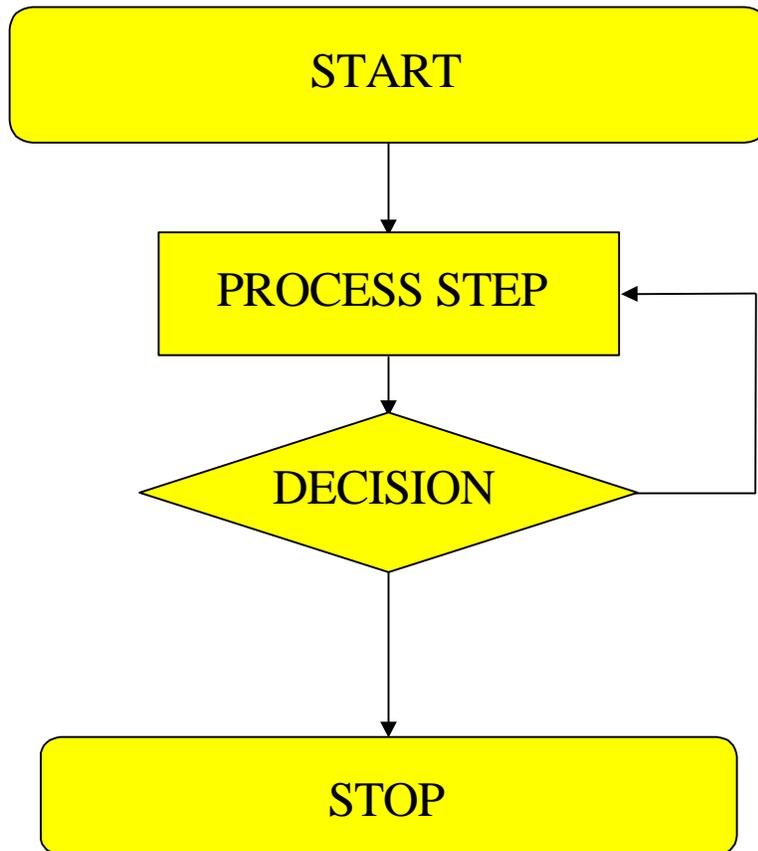
Timeline

The process of integration will take one–two years using the following timeline:

July–August 2001	Process mapping and staff mobilization.
September–December 2001	Presentation of the reengineering plan and series of consultative meetings.
January–December 2002	Phase-in implementation.

Appendix B

Example of a Flow Chart



Appendix C

Interviews with Stakeholders Questionnaire

Interview Format

1. Introductions.
2. Purpose: Announce start of work in the field; assure understanding of/clarify, as necessary, the SOW, approach and outcomes; gauge expectations and/or concerns affecting level of commitment; and identify future meeting and communication points and their significance to the major stages of the project.
3. Review SOW, provide overview of reengineering approach (what it will and will not accomplish) and deliverables—timetable for key stages of project.
4. Using interview questions designed (see below), and ask questions to help consultants assess level of interviewee's commitment to the project.
5. Close interview with reference to presentation to directors of MOH on August 10, 2001.

Interview Questions

Name:

Title:

Organization:

Time start:

Time end:

Date:

Objective: To ensure an accurate understanding of the current level of support of key MOH and influential donor and policy holders toward reengineering the three product supply logistics chains, including the possibility of integrating or removing tiers.

1. At what capacity is the current logistics system operating (personal evaluation)?
2. Can the system ever become highly efficient or effective? If so, how?
3. What do you think of integration or other approaches to improve availability at the clinic level?
4. What will happen if the supply chains are not integrated or improved?
5. What will happen if there is partial improvement or no improvement under change efforts?
6. Given the need to fulfill the GHANA 2020 vision and the need to move forward in some way, how much can we change the system?
7. What outcomes do you believe are most important from the perspective of the public? For example:
 - Increased accessibility
 - Increased efficiency
 - Increased quality
 - Improved productivity
 - Increased accuracy
 - Increased speed of delivery/volume
 - Decreased cost

Ghana: Process Mapping

8. How long will it take before policymakers and employees become impatient or lose interest?
9. How would you rank obstacles to a successful change process? Rank each item on a scale of 1–10, with “10” being “high level of willingness.”
 - ___ Organizational impact
 - ___ Lack of senior level support
 - ___ Staff resistance
 - ___ Time taken to integrate
 - ___ Cost of the exercise
 - ___ Risk of losing a semi-functional system
 - ___ Risk of losing momentum

Rank each item on a scale of 1–10, with “10” being “high level of willingness.”

1. What is your personal willingness to participate in the specific change towards an integrated logistics system?
On a scale of 1–10, with “10” being “high potential.” _____
2. What is your perception of the potential for successful implementation of the change effort?
On a scale of 1–10, with “10” being “high level of benefits.” _____
3. What is your perception of the magnitude of benefits?
On a scale of 1–10, with “10” being “high level of costs.” _____
4. What is your perception of the magnitude of costs?

Appendix D

Summary Results with Interviews of Stakeholders

Current Assessment of the Logistics Systems

General

- The vaccines are sent to the disease control unit and consumables are kept at CMS.
- Lower down the chain, everything is vertical vaccines and consumables. Integration is possible but least likely including in information sharing.
- Building systems will be difficult.
- The current work is Balkanized.
- It is unclear what the customer demands are; demand analysis is not understood by MOH.
- There are two systems: one driven by health and one driven by customer demand.
- Certain structures are weak.
- RCH is hesitant to move forward; they are worried that performance will drop.
- There are weakness between RMS and CMS.
- Currently, there is no logistics function; it is spread across several units with different bosses; it is not being managed professionally.
- A lot needs to be done in capacity building, the central procurement is adequate but there is concern about record keeping.
- There is a need to minimize emergency orders and establish reorder levels.
- Have pushed for an audit of medical stores and, to date, have not received one.
- Procurement process does not currently tie into planning process.
- MOH has no capacity to run CMS.
- There is a delay at the port due to a delay in customs, UNFPA has UN exemption and is able to clear faster (2–3 weeks versus 2–3 months).
- Capacity needs to improve because of inadequate staff. Documentation not uniform, system defined.
- System is fragmented. Where integration occurs, it is at the planning and procurement levels but that is not working well.
- At the clinic level, some things are working. It is not a disaster but it is not efficient performance.
- There is confusion regarding responsibilities.
- The system is hard to control.
- A lot of fine tuning, such as reporting, needs to be done.
- Contraceptive logistics strength is collecting consumption data.
- While data is complete, reporting is delayed and done manually from the lowest level.
- Data is fairly accurate on consumption. The current contraceptive process is fairly good and is continuously improving. Plans are to give computers to regional levels. Good forecast is based on good data. Gave vehicles to RFPs but they cannot access them.

Ghana: Process Mapping

- Availability is compromised due to sporadic uptake of supplies. Unclear how integration can improve this situation.
- Motivation is a huge problem but no system is perfect.
- The human factor (because of low wages) is the weakest link.

Performance

- Not able to measure our performance. Indicator used is “percentage of availability” as to how it should be calculated.
- Currently at SDP, availability is only 60 percent. CMS is not meeting the availability. However, SDPs are achieving availability through private sector and CMS purchases.
- Unclear whether 100 percent availability achieved at SDP is only for essential drugs.
- RCH performance works already and has a system with no stockouts.
- MOH is not pushing efficiencies because there are no strategic discussions between MOH and suppliers on how their performance is being measured, and there is no investment to build relationship.

Cost

- A study shows increased outpatient usage due to relaxed cost recovery exemptions.
- Clinics are buying from the private sector.
- The role of RMS (adding a mark-up; the issue is every tier becomes a pricing mark-up).
- There is a mixture of mission and government facilities with the mission having much more flexibility in their supply chain.
- Linkages between purchases and finance have not occurred.
- Pricing mark-ups are making it too expensive for the consumer.
- If bed nets are not taxed, a price differential between the government and the private sector is possible. Fear of linking these supplies to the contraceptive logistics because of its bulkiness.
- Current system has had some pilferage.
- Pilferage is a big problem.
- In the past it was centralized but districts were not receiving supplies. Now with budgets decentralized the availability of drugs has improved.
- District autonomy has been a plus and a minus.
- CMS is only able to supply 40 percent of the supply required; the rest is coming from the private sector. Pricing of drugs is high; systems are weak. Relationship between CMS and procurement unit is unclear.

Transportation

- Vehicles provided to take supplies to distribute contraceptives to each region have been taken away from this task and reallocated for other purposes. Many areas are not getting contraceptives to the

lowest level; it is dependent on the Regional Health's interest. Contraceptives and drugs now go downstream through regular MOH means.

- RCH has requested three bigger trucks to deliver supplies to regions. To prevent these trucks from being used for other purposes, larger trucks have been requested.

There is a WHO/United Nations Children's Fund (UNICEF)/UNFPA initiative to piggy-back the malaria effort and HIV supplies onto the contraceptive logistics system. It's expected that one million bed nets need to be distributed nationwide. The transportation for this is unknown.

Making the System Effective and Efficient

- Customer service benefits through improved uses of resources.
- All levels can be integrated but it requires effective consultation. The lowest level needs to understand the need for integration, and it needs to start by unifying the stores.
- We should be very clear about the mission, especially the delivery of services.
- We are not clear on how to look at customers and change our business. In the next five-year program the emphasis will change from supply side to demand side.
- Look for alternate distribution systems.
- Suppliers should have standards that they are expected to follow, with negative consequence if they do not.
- Effective systems can reduce stockouts and expires.
- The goal is one integrated system. However, with the status of CMS autonomy is still undecided.
- Integration will be better and makes more sense.
- Will need champions, such as the minister, to achieve success.
- Contraceptives should take the same route as other drugs; by adding contraceptives to the MOH system there is an increase of 12–15 products.
- (Specific approaches are offered; District stores are an absolute.)
- Improve it! Better integration of finances and stores, reduction of wastage, pilferage, and expires and lead time. Reduce emergency procurement.
- Systems can be made more efficient and effective if they are given technical guidance and political commitment.
- How can improvements be made? Contraceptives can convert to a cash-and-carry system like the drug system. This will clean up products, giving them a value for every level, i.e., the region pays for what it needs. The money paid for contraceptives is shared up the supply chain.

Viability of Integration

- Some integration of national procurement and country clearances has already taken place.
- Infrastructure is in place, and operational systems are in place so there is a scope for possible change.
- We are at the point where we agree in principle on integration; however, professional and human elements need to be considered.
- Integration can only work if the CMS question is resolved.

Ghana: Process Mapping

- Integration needs to happen, but we are not sure of the ED system. MCH is marginalized throughout the system. The amount of money collected is miniscule. The system has been run in a non-transparent way that has led to questions.
- Integration can achieve effectiveness but it should be incremental. Do not favor a pilot approach. There is an emotional connection by service providers to commodities. Change should be managed well.
- Service will diminish. Utilization of services will decrease if integration is not achieved.
- With integration, family planning will become a second priority.
- MCH supports integrating the financing into the mainstream to get support for the program. This will enable FP coordinators to access some funds. Integration could lead to better storage at the district level.
- There is a risk of FP supplies not being collected in an integrated system. It is unknown if all supplies will be treated equally in an integrated system. The current drug transportation system is questionable; things may disappear. Currently, cooperation is low because of gender dynamics. Availability could be achieved if contraceptives are treated as an equal commodity.
- Integration should take into consideration—
 - Cooperation between service providers and stores.
 - Patients ensured privacy.
 - Staff sensitized to make FP a priority.
 - Reporting channels and conflict resolution clear.
 - Transparency and cross-check systems in place.
 - Supplies collected.
 - Consumption data ensured.
 - Monetary tracking systems in place.
- Integration is not advisable, especially for vaccines.
- The goal is to simplify by using better tools. Improve skills by better training. Hard to overcome leakage.

Consequences of Not Integrating the Supply Chains

- Target will remain the same and will work, but if service increases we will not be able to manage.
- Consumers are demanding integrated services. Customers are frustrated with having to pick up commodities from more than one place. The medium term strategy focused on integrated services and logistics needs to be aligned.
- To support procurement, information needs to be consumption-based. The consequences are that donors will continue to do vertical procurement.
- The private sector market share will increase, increasing the cost to the patient, as there are no economies of scale.
- Unable to satisfy our customers.
- If prices stay high due to inefficiencies, people will not be served or only partially served.

- Cost will not be contained.
- Perpetuates the idea that RCH unit is special.
- Mainstream MOH does not take ownership of RCH problems.
- UNFPA currently financially supports the RCH unit, so it risks being donor dependent.
- RCH will continue to be a vertical unit and continue to be side-tracked; also perpetuates power to the few.
- Service improved but consumer not sure if they are receiving the whole package.
- Need a clear definition of what is meant by integration—does this mean that supplies are picked up at one point, such as the pharmacy. This impacts on the patient’s privacy, especially for family planning. Any integration exercise should consider the patient’s perspective.
- Consequences include maintaining the status quo. Workload will remain the responsibility of the RCH unit.
- Will integration really answer the questions that bother us in the present system?
- Integration will take away power from some; not managing integration well can lead to problems.
- In principle, it sounds good.
- Donors may want to decrease contributions.

Benefits of Integration

- If change does not take place, the government will always bail out the system, but it will be costly.
- The system will continue as status quo.
- Increased transparency; FP taken seriously; system in place that works; lessen the burden of RCH unit to no longer manage a vertical system; client will get commodity at all times. Good storage. Quality will be better.
- Greatest change is expected by the user, including whole service package from one clinic and in two to three days restored back to full health. Good quality supplies are available.
- Expect integrated logistics and planning processes, especially at the district level.
- Will be increased cost to patient, but quality and amount of services will be better.
- There will be costs for negotiation, education, retraining, and advocacy.
- Will lower costs availability as SDP—less wastage; increased utilization, and more efficient system.
- Performance breakthroughs—change from supply to demand driven; no stock outs; predictability and reliability and improved planning.
- Family planning service will become part and parcel of the total health service package.
- Will enhance UNFPA’s part to be an active member of the health reform team.
- Reports from the store system; reorder quantities known; stock situation known; reporting beyond central level; and how much usage and efficiency, especially in hospitals. Who used the items? Potential to cross-check forecasting. A good system is required, especially data.

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- Doing the forecast better. Timing arrival of shipments. Improved storage at the national level, especially first-to-expire, first-out (FEFO). Shortage of labor in the system needs to be changed to ensure success.
- Items become available whenever the consumer wants them.
- Coverage of EPI and ED supplies at SDP. Consumables available. Overall supply chain improved. Integration may not be the answer.
- Will support the SWAP and will no longer be the donor driver. Will support strong government systems. Short-term costs will be high; long-term costs will be low.
- Better access for clients to contraceptives. Less waste and more for less. More timely delivery. Getting a little more for a lot less cost.
- The process requires appropriate benchmarks, such as satisfaction by customer and usage of better resources. Needs indicators and policy decisions at each level.
- Must be gradual. Six to eight performance measures identified within a year that will enable sensitization on the benefits on integrated systems.
- Integration can take approximately two years.
- It is a good time, as the program of work is currently being prepared. Will take two to two and one-half changes.
- Good time as new government is in place.
- Take time to integrate.
- One year for transition period. Will go faster if the fleet is restricted to integration uses.
- Needed yesterday. Depends on quality of recommendations. However, by end of this year should be transition.
- Up to two years. Will take time to let go of power; needs to happen in gradual steps and depends on cooperation of the parties. There is more integration at the national vs. the local levels. Stakeholders need to be sensitized and educated. Roles need to be clarified and checks and balances in the system need to be in place. Should be a real consensus, especially taking gender into consideration.
- The other group should be ready to take on the additional role.

Obstacles to Change

- Loss of power base.
- Resistance, especially from RCH unit. Will take education to redirect.
- Family planning still seen as second-hand MOH priority; not taken seriously.
- Will require Director General to be supportive of integration.
- Lower levels not very supportive to family planning, so it will become a second priority.
- Systems need to be automated and staff trained to operate it. Approach must be right. Consultants need to be right and use the right tools. People are willing and that is a good starting point; can make changes.
- Define integration. All parties should buy-in to improve the system. People will be worried about their work unless their interests are considered.

- MOH capacity weak and unable to sustain any change. Integration of system was not even an issue at the policy level; not mentioned in the Health of the Nation Report.

General Issues

- Outsourcing: The function of distribution and storage can be outsourced at any level if there is a system for monitoring.
- Removing tier: Regional level is only a political level and does not add value to the outcomes of health. Services are being given at districts. However, analysis needs to be done to determine the trade-off for removing a tier, especially in the area of cost.
- Need opportunity to meet together in a forum.
- It is feasible to make change to the system, however, it is a revolution, and timing is the critical factor. Will require many activities to carry out.
- Should have a vision of a medium- to long-term plan.
- Outside consultants should be facilitators.
- Change should be internally energized.
- Need for system-wide change and should involve more than the national level.
- Change would come from the lowest level.
- Policymakers express the need to change; however, the change will come from the lowest level.
- Dispensing at one level is not feasible.
- Currently support the sector program, putting all funds in the basket; particularly interested in financial and procurement systems. Taking a lead on procurement planning and supporting the public procurement reform. Have built procurement capacity, and manuals and procedures in procurement.
- Whatever the recommendations, this activity should have an operational plan and finances to back it.
- Outsourcing very difficult because government wants authority and control. The fear is that the cost to consumers may be unreasonable.
- Removing tiers can only work if procurements are scheduled and they don't require a lot of storage— goes back to planning.
- The region does not add value.
- Needs to be a network in place before any removal of tier is considered.
- Fast moving items could be moved directly to districts by the manufacture/distributor.
- Performance breakthrough would be to ensure that contraceptives are there.
- Outsourcing: 10 percent probability to do it; only CMS can be outsourced. Five percent probability for outsourcing transport other than for ambulance service. Remove a tier only if ideal condition is possible; must have efficient system, transportation in place, and meet the requirements of the lowest level.
- Integration is already taking place through coordination and advocacy. There is a plan to build a contraceptive store in the northern part of the country.

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- Outsourcing is possible; however, cannot see it in the near future. If we outsource, MOH might as well give up, and the average person will not be able to afford the products.
- Removing tiers: If management and supply can be separated, it is possible. Remove region but information flow must include all groups. District capacity must be enhanced. Needs to be done with care. Removing districts may lead to non-commitment of district assemblies and councils. Should be based on proximity, not levels.
- Integration can achieve effectiveness but should be incremental. Do not favor pilot approach. There is an emotional connection by service providers to commodities. Change should be managed well.
- Outsourcing—there is a policy to include the private sectors more. However, this is a very sensitive area.
- Removing tier: Radical and unlikely for government to make a decision.
- Other: Before integration is considered, need to clearly define CMS's role and ensure quality drugs are available at CMS.
- The role of FDB needs to be defined. Question the quality of the private sector drugs.

Appendix E

Process Mapping Assessment Team—Team Building Design

Team Charter

- Come together as a team.
- Committed to stay together.
- Assess current logistics system from the lowest level up.
- Lead communication for the work flow and paper flow analyses.

Team Ground Rules

- Can add to and build on other's ideas.
- No question or idea is "stupid."
- Our work is not about making anyone bad, dumb, or wrong.
- We listen to one another... "Seek, first, to understand."
- One conversation at a time.
- Decisions, whenever possible, by consensus.
- In communicating with others outside the team, be clear on facts.

Team Training Session

Activity	Tasks
Get Acquainted	<ul style="list-style-type: none"> • Meet everyone on the team. • Share appropriate histories.
Purpose	<ul style="list-style-type: none"> • Clarify the mission/purpose of the team and its tasks. • Provide an overview of reengineering, work flow, and paper flow analysis, system design and other key project principles, concepts and elements; agree on reengineering steps; do a simple simulation. • Clarify the lines of authority—to whom does the team report? • Clarify the team's decision-making authority. • Allow time for discussion and buy-in to the task by team members.
Planning	<ul style="list-style-type: none"> • Establish ground rules and operating procedures. • Decide meeting arrangements. • Make arrangements for use of materials and supplies. • Decide how records will be kept; review worksheets.
Clarify Roles	<ul style="list-style-type: none"> • Clarify the required team functions and existing roles (e.g., consultants). • Decide how other roles and functions will be filled.
Identify Resources	<ul style="list-style-type: none"> • Identify teamwork skills represented among team members. • Identify content expertise relating to the project. • Identify important internal/external connections, contacts that may be helpful during the project. • Assess team make-up: different work styles, personality types, strengths, and diversity as it may impact the project.

Appendix F

Basic Process Mapping Work Session Agenda and Methodology

Process Mapping of Essential Drugs, Non-Drug Consumables, Contraceptives, and Vaccines Supply Chains With Staffs of National, Regional, District, and Local MOH Institutions.

1. Welcome—Introductions—Review Purpose and Objectives.
2. Short overview of purpose and relevance for mapping, session objectives, and desired outcomes.
3. How we would like to work—we facilitate your teaching us how the region/district/Hi logistics system process works.
4. Assurances from MOH—contribute freely to help improve the system; no jobs at stake although some changes will probably occur.
5. Why this approach—basic idea of demand (customer) versus supply (organization) driven supply—upside down pyramid of the MOH—customers and direct service providers at the top. Everyone helps meet customer needs and public objectives.
6. Review mapping approach, and then conduct mapping interviews in teams of two, where possible. Use flip charts and markers to create wall maps. Collect additional data in notebooks or on wall maps.
7. Work separately with key staff responsible for ED/Non DCs, contraceptives, and vaccines.
8. Identify outputs of their product supply chain (i.e., dispensing condoms).
9. Identify the customers and understand the customers' requirements and expectations (i.e., MA as customer of DMS who expects drug supply received has not passed expiration date).
10. Identify suppliers of output products and their requirements and expectations of their suppliers (i.e., RMS as supplier to DMS, and DMS expecting to receive full shipment of requisitioned contraceptives when reporting to RMS).
11. Identify all steps taken and decisions made, with what happens if problems or other process breakdowns occur, from the time product is received from supplier until it is passed on to customer (forecasting, ordering, receiving, transport, storage and inventory, shipping or dispensing, and cost recovery, where applicable). (See attachment for list of questions.)
12. Review all activities for frequency, average time (or range of time), number of people involved and their functional role, and direct cost of labor and resources used.
13. As appropriate, identify performance measures, indicators, and standards for meeting customer requirements under current work flow processes.
14. Close work session with review of next steps:
 - Completing work sessions with other institutions involved in the supply chain.
 - Presentation of preliminary summary to the RHA in their region.
 - Copy of completed map and data charts sent to their institution.
 - Report to MOH on August 10, 2001.
 - If sufficient support, move toward design of implementation approaches.

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Appendix G

Work Process Mapping Questions

Questions

1. What is the end result (product/outcome) of this work process?
2. What understanding do you have of your customers' needs for you're the outcome of this work?
3. What is the start of this work process?
4. Who supplies you with the product that you work with?
5. What are the conditions you have for the quality, timeliness, etc., of the product you receive?
6. What name is given to the group of work steps that we call a work process, and that is used to achieve that outcome? How do you refer to the product?
7. Beginning with the *start* or *end* of this work process, list each activity and decision used to arrive at the end result. (e.g., beginning at the *start*, "What is the first thing that occurs?")
8. What is the purpose or value of that activity or decision?
9. What resources do you use to do this activity?
10. Typically, how long does it take to do this activity? How do you know that?
11. What can go wrong? What happens if it does go wrong?
12. Why is the activity or decision handled this way?
13. What is your understanding of the source of any problems?
14. How do you determine if the activity is performed correctly?
15. When is that done?
16. Who (function) does it?
17. What happens to the information?
18. What happens after you complete this activity?
19. Who has the overall responsibility (the *process owner*) for ensuring this work process functions effectively?
20. What happens to defective or poor quality product entering or going through this activity? Why is it handled this way?
21. What policies, guidelines, etc., apply to this activity? How do they make this activity work effectively or ineffectively from your perspective? (Ask yourself: What type of activity is this—value-added, administrative, non-value added? Justify.)
22. In what way, if any, is this work activity affecting or is affected by the teaching hospitals?

Appendix H

Agenda of Process Mapping: Debriefing Meetings for Ashanti and Eastern Regional Health Staff

Agenda

1. Review use of process mapping as a tool for demand-driven supply chain management in MOH's national strategic plan.
2. Reaction to RMS map and other maps with regard to current perception of effectiveness and efficiency of their system.
3. Discuss gap between what the map reveals reviews and how the region assesses its added value, institutional goals, and mission in the shift from supply- to customer demand-driven management of the products.
4. Identify possible immediate improvement opportunities, including working with the districts and HIs.
5. Close by reviewing next steps. Present to MOH directors August 10, 2001.

Appendix I

Perceptions of Customer and Supplier Requirements

Drugs		
Tier	Perception of their customers' product expectations	Expectations they have of their supplier's product
Clinic	<p><i>General Public; People Who Are Sick</i></p> <ul style="list-style-type: none"> • Give drugs when needed. • Know what drugs will do. • Will get well. • Pay unless exempt. • Quick pain relief. • Problem will not reoccur. • Can still do what I do. 	<p><i>RMS, DMS</i></p> <ul style="list-style-type: none"> • High quality. • Appropriate information on drug use. • Quantity, as requested. • Report on use.
District	<p><i>Health Institutions</i></p> <ul style="list-style-type: none"> • 100% availability. • Good quality (expiry more than 6 months). • Prompt service (within 2 hours). • One-stop shopping. • Help in delivery. 	<p><i>RMS and Open Market</i></p> <ul style="list-style-type: none"> • 100% availability of drugs. • Good quality. • Prompt service (2–3 hours). • One-stop shopping. • Product delivery. • Price competitive with open market. • Effective communication. • Flexible payment (credit system).
Region	<p><i>DMS and Health Institutions</i></p> <ul style="list-style-type: none"> • 100% availability of drugs. • Quality assured. • Know availability before arriving to collect. • Emergency transportation. 	<p><i>CMS, Manufacturers, Wholesalers</i></p> <ul style="list-style-type: none"> • Quality product. • Long shelf life. • Credit facility. • Regular flow. • 100% drug availability. • Know availability before arriving to collect product. • Reliability/dependability (especially from private sector). • Private sector should have product available at time of bidding. • Delivery. • Competition among private sector suppliers.
CMS	<p><i>RMS and other Health Institutions</i></p> <ul style="list-style-type: none"> • Short time expended getting product. • Credible source of product. • Good packaging. • One-stop shopping. • Delivery. • Know availability before arriving to collect products. 	<p><i>Procurement Unit</i></p> <ul style="list-style-type: none"> • Know availability before arriving to collect product. • Good packaging. • Good standardized palleting. • Product meets specifications. • Supplier responsive to problems.
PU	<p><i>CMS</i></p> <ul style="list-style-type: none"> • 100% availability of drugs. • Timely delivery. • Involvement in quantification and evaluation portions of procurement process. 	<p><i>Donors, Manufacturers, Wholesalers</i></p> <ul style="list-style-type: none"> • Good, quality products at the right time. • No hassles for payment.

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Contraceptives		
Tier	Perception of their customers' product expectations	Expectations they have of their suppliers' product
Clinic	<p><i>General Public Adults</i></p> <ul style="list-style-type: none"> • Privacy. • Confidentiality. • All contraceptive methods. • Product available all the time. 	<p><i>DMS</i></p> <ul style="list-style-type: none"> • All methods are available. • Product available at all times. • Prompt service.
District	<p><i>Health Institutions, Tavern Owners</i></p> <ul style="list-style-type: none"> • Supplies available all the time. 	<p><i>RMS</i></p> <ul style="list-style-type: none"> • Staff available to process order. • Product available on demand.
Region	<p><i>DMS</i></p> <ul style="list-style-type: none"> • 100% availability of drugs. • Quality assured. • Know availability before arriving to collect products. • Emergency transportation. • Treated cordially and respectfully. 	<p><i>CMS</i></p> <ul style="list-style-type: none"> • Quality product. • Long shelf-life. • Credit facility. • Regular flow. • 100% availability. • Know availability before arriving to collect product. • Delivery.
CMS/ RCH Unit	<p><i>RMS and Other Health Institutions</i></p> <ul style="list-style-type: none"> • Short time expended getting product. • Credible source of product. • Good packaging. • One-stop shopping. • Delivery. • Know availability before arriving to collect product. 	<p><i>Donors</i></p> <ul style="list-style-type: none"> • Know availability before stockout situation.

Vaccines		
Tier	Perception of their customers' product expectations	Expectation they have of their suppliers' product
Clinic	<p><i>General Public, Pregnant Women, People With Cuts, People in Epidemics</i></p> <ul style="list-style-type: none"> • Children and women are protected from disease. • Healthy children delivered. • Protection from tetanus. • Decreased deaths. 	<p><i>DMS</i></p> <ul style="list-style-type: none"> • Sufficient quantity available at all times. • Served quickly. • No expired products. • Products stored at correct temperatures.
District	<p><i>Health Institutions and Private Midwives</i></p> <ul style="list-style-type: none"> • Quality good (i.e., color). • Equipment functions regularly. • Product is stored properly. • Timely supply of product. • Cold chain room is maintained. • Right quantity is available on demand. • Reliable transport system. • Product shelf life is sufficient. 	<p><i>RMS</i></p> <ul style="list-style-type: none"> • Quality is good (color, etc.). • Expiry is at least six months. • Product monitor indicators are used. • Appropriate temperature is maintained. • Quantity required is available on demand.
Region	<p><i>DMS</i></p> <ul style="list-style-type: none"> • 100% availability. • Quality is assured (color, etc.). • Product is stored properly. • Timely supply of product. • Product shelf life is sufficient. 	<p><i>Korlebu Cold Room</i></p> <ul style="list-style-type: none"> • Quality is good (color, etc.). • No expiration problems. • Appropriate temperature is maintained. • Quantity required is available on demand.
National	<p><i>RMS</i></p> <ul style="list-style-type: none"> • Short time expended getting product. • Credible source of product. • Good packaging. • One-stop shopping. • Delivery. • Know availability before arriving to collect product. 	<p><i>UNICEF</i></p> <ul style="list-style-type: none"> • Quality is good (color, etc.). • Expiry is at least six months. • There are product monitor indicators. • Appropriate temperature is maintained. • Quantity required is available on demand.

Appendix J

Scope of Work

Background

The government of Ghana has embarked on a full-integrated logistics system for all health commodities, except vaccines. It is envisioned that a system that integrates products, processes, and functions will achieve better efficiency, productivity, and quality. The government of Ghana and USAID/Ghana has requested DELIVER technical assistance and advice on the implementation plan.

Evidence worldwide suggests that lack of a systematic implementation plan could lead to chaos, frustration, and failure. To avoid these pitfalls, but not lose momentum for a need to change, DELIVER suggests providing technical assistance to conduct a work process analysis to determine the best possibilities for streamlining.

Objectives

1. Conduct a work process and paper flow analysis.
2. Identify activities that are redundant, non-valued added, and not required.
3. Provide a map of a more streamlined and integrated supply chain.
4. Provide a road map that ensures successful implementation of the plan.
5. Identify cost and time-saving expected from the future streamlined logistics system.

Timing

July 23–August 10, 2001

DELIVER Staff and Consultants

Sangeeta Raja, Logistics Advisor, John Snow, Inc./DELIVER
Scott Brumburgh, Consultant

Deliverables

- A report that provides a detailed work process and paper flow analysis.
- Recommendations for a streamlined integrated supply chain system.
- Recommendations for follow-on activities to implement the streamlined system in place.