Objectives

In this chapter, you will learn the following:

- overall context and process for designing a logistics system for managing health products
- basic considerations and guidelines for designing a logistics system
- technical aspects related to system design and implications of design choices.

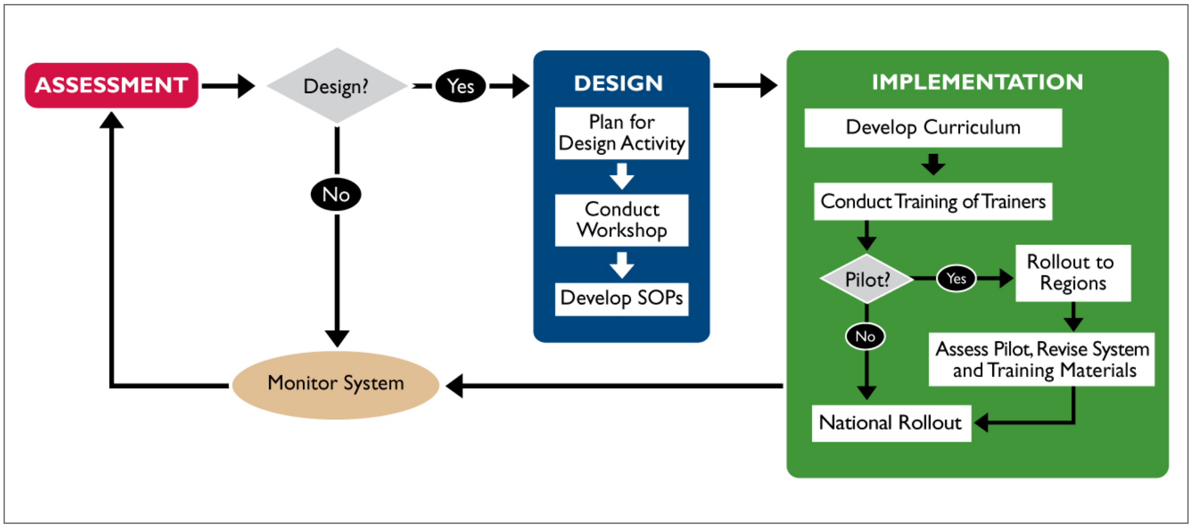
Note: In this chapter, the term *system design* indicates both designing a new system and redesigning an existing system. You would *design* a system if there was no existing system and one was needed, or *redesign* an existing system that needed improvements or changes. In both design and redesign activities, the steps and considerations for designing (or redesigning) the system are almost the same.

10.1 Logistics System Design Process

In virtually all health programs, products move from one place to another. The way the products move may not be rational, the quantities of products that move may not be based on actual data, or the methods used to move the products may not be standard. The purpose of designing a logistics system is to standardize the flow of commodities and information.

The technical design of a logistics system is one part of a larger process (see figure 10-1). The overall process begins with an assessment to determine whether the six rights are being met and if the logistics system needs to be designed/redesigned (see chapter 9 on monitoring and evaluation for more information on how to conduct assessments). After you make your decision, then you plan and conduct the design activity. System managers should develop standard operating procedures (SOPs) to document design decisions and to use as a job reference. As part of the implementation, curriculum is developed based on the SOPs, and the system is rolled out, usually using a training-of-trainers (TOT) approach. After the system is implemented, you will need to continually monitor the system to ensure that the improvements are having the intended impact.

Figure 10-1: Logistics System Design Process



Steps in designing the logistics system

Each step in the process is described below, including key questions that must be addressed at each step. Additional guidance and tips related to the technical aspects of the logistics system design are also provided.

1. Complete an assessment and determine the need for design.

Your first step should be to conduct a formal or informal assessment to identify system strengths and weaknesses and to determine whether you need to design a logistics system, or redesign certain aspects of an existing system. In most cases, a lack of logistics procedures and tools and poor functionality is obvious; however, an assessment is still necessary to inform the design of the new system. Designing (and implementing) a system requires significant resources, both time and financial; therefore, *if it's not broken, don't fix it.*

Before beginning a system design, you need to understand the context in which the system operates/will operate. This enables you to understand what you can and cannot include in your system. For example, if the government requires you to use a certain form, then do not spend your time designing a different form that would serve the same purpose.

Questions that will help you understand the context include—

- What is the MOH vision for the supply chain for health commodities? What are the MOH goals, objectives, and requirements for the system design or performance?
- What is the current situation for commodity management? Does a system already exist, or is there no system at all?
- If you are working within an existing structure (especially for a redesign), can certain elements be changed or modified? What, if anything, must be used as is? Do you have the option to propose or create a new structure?
- What products are involved? How many? Do you need to consider any product-specific requirements?
- What are the number, type, and location of the facilities that will be managing the products?
- Will any government regulations impact the system design?
- What is the structure of the MOH? What is the structure of the health care system?
- What is the availability of human resources at each level in the system?
- What financial resources are available for on-going system operations costs?

These types of issues must be clearly understood before you begin the design process. You do not want to spend time designing a system that will not be acceptable to the stakeholders.

You can use these tools to assess the system:

- Logistics Indicators Assessment Tool (LIAT)
- Logistics System Assessment Tool (LSAT)
- Assessment Tool for Laboratory Service (ATLAS)

See chapter 9 for more information.

Determining the need to redesign the logistics system

A country had a high rate of stockouts throughout the health system. One idea to address the problem was to redesign the existing logistics system. After an assessment activity, however, it was determined that the main cause of the stockouts was the country's lack of financial resources to procure enough products to meet client demand. In this case, the logistics system delivered all the products the country procured to the clients. The real problem was that too few products were being procured. Designing a new logistics system would not have been an effective use of time or resources.

After you determine that the logistics system (or lack of a logistics system) is the cause of an existing problem, then it is time to design a system; if not, continue to monitor the system using the process in figure 10.1.

Important questions at this stage include—

- How did you arrive at the decision to begin a system design (or redesign)?
- What system are you being asked to design?

2. Plan and conduct the system design activity.

You should conduct the system design in an organized and participatory manner, preferably during a workshop. Perhaps most critical to the success of the design is identifying the appropriate people to participate in the design process. The system should be designed, at least in part, by the customers of the system—everyone involved in implementing the system, as well as those who will contribute resources to operating the system. Designers should come from every level of the system: ministry officials and other partners at the central level, as well as personnel from intermediary levels (region, district) and health centers. To achieve the goal of implementing the system, you must engage the users of the system in the design process. Typically, a system design requires about 15 to 20 participants; the workshop should last approximately five days.

In some cases, it can be appropriate for a small group of people to do a preliminary design, and then present options for the design to a larger group of stakeholders.

Types of participants in a system design workshop

- Program-level staff: logistics officers, data managers, monitoring and evaluation staff, clinical staff
- Central-level staff: procurement officers, pharmacy or laboratory division of the MOH
- Warehouse or storekeepers: from central-, medium-, and lowest-level stores
- Health providers: from all facilities that store the commodities, such as hospitals, health centers, and dispensaries.

After you identify the members of the system design team, you will need to address other issues:

- What format will you use for the design activity—a series of focus groups, one large workshop, or a combination of the two?
- When and where will you conduct the system design activity? What arrangements do you need to make?
- How much of the design will you complete during the actual activity?
- How many or which elements of the system design will you finish after the activity?

During a typical system design workshop, you will make decisions about all the major technical components of the system, specifically the LMIS, ICS, and storage and distribution. Basic elements covered in the design activity include the following:

Review basic logistics principles. Start with a review of basic logistics principles; this will ensure that all members of the design team have a common understanding of the logistics principles they will apply during the design activity, and they will have a common vocabulary. After logistics basics, give participants time to apply their new knowledge in describing their own system.

Agree on system parameters and boundaries. This includes reaching an understanding on any already existing elements that could be opportunities for the new or redesigned system, parameters that can or cannot be changed, and any other parameters that need to be considered during the design process.

Design the pipeline. Ensure that the pipeline shows the levels in the system and the flow of information and commodities.

Design the LMIS. Ensure that the LMIS includes drafts of all records and reports, including feedback reports already in the system. The design of the LMIS is integrally linked to the design of the ICS. After deciding on the ICS, it is important for you to go back to the LMIS that was designed and ensure that the two aspects of the system still work well together.

Design the ICS. The ICS should include max-min stock levels, emergency order points, and review periods for each level in the system. You should decide on which levels in the pipeline will requisition (pull) and which will allocate (push) products. To assist in this design, you should do some analysis of typical lead time in advance using key informant interviews and a review of stock cards and transaction records.

Identify storage and distribution requirements. Ensure that the storage and distribution recommendations conform to the suggested LMIS and ICS.

Identify roles and responsibilities. Ensure that everyone involved in the health system has clearly defined roles and responsibilities.

Develop an implementation plan. The workshop design team should provide input about the appropriate timing for implementation, as well as the required preparations. The implementation plan should consider the points noted in step 3 below.

Undoubtedly, outstanding issues will not be resolved during the workshop. Document these and follow up, as appropriate. If any issues might prevent the system from working, you must highlight and address them.

As part of the design step, you should develop an SOP manual that documents all the steps in the system. It should be drafted immediately after the system has been designed. After the SOPs are developed, they are reviewed by stakeholders, changes are made, and final approval is sought. This approval process involves convening stakeholder meetings to ensure the approval of all stakeholders; the ministry of health should own and endorse this document.

For more information, go to the USAID | DELIVER PROJECT's *Quick Reference: Logistics System Design and Implementation.*

3. Implement the system.

Implementing a logistics system is a dynamic process that requires ongoing training, monitoring, and evaluation. The success of a system design is defined by how effective and efficient the system is in practice. No matter how well it is designed, the system will fail without a well-planned, properly resourced implementation plan. To maintain the momentum created in the workshop, the implementation phase should begin immediately after the system design is complete. An implementation plan includes key activities, timelines, and roles and responsibilities. It should also include answers for the following questions:

- What model of training will be used?
- How many sites need to be trained? How many individuals need to be trained?
- How many trainings, in total, are needed?
- How will the trainings be scheduled (i.e., what region/district/state/province should you start with)?
- Who will conduct the trainings?
- Will the system be implemented *all at once* or through a pilot/phase-in period?
- What resources are needed to implement the system (new LMIS forms, computers, training of staff, etc.)?

Steps in implementing the system include the following:

1. *Develop training materials.* Using adult learning methods, these materials are designed to teach the staff how to use the SOP manual and job aids; and how to use the corresponding forms to order, monitor, and manage their health commodities.
2. *Training-of-trainers (TOT).* The TOT teaches the participants how to apply adult learning theory to train health facility staff in how to order, monitor, and manage health commodities according to the SOP manual. Printing of materials and forms must be done prior to this stage, because the official forms must be used during the trainings. The group that completes the TOT is responsible for training the rest of the appropriate staff.
3. *Roll-out trainings.* After the TOT is complete, the trainers should develop a schedule to train all relevant staff during a specific number of weeks or months.
4. *Mop-up trainings or other OJT training activities*. After the system has been rolled out, be prepared to continue training staff. New staff are constantly being hired; they will need to be trained and other staff will need refresher trainings. You can include these training as part of an annual workshop, or ongoing OJT, to ensure that the system continues to function. In addition, you should incorporate technical information on managing the system into the routine supervision of the logistics personnel.
5. *Monitor the system.* A logistics system is dynamic and needs to be flexible to accommodate changes that occur within the program or system. Continuous quality monitoring, re-evaluation, and improvements to the system must be fixed processes. To ensure that the system can be adapted to accommodate changes with minimal disruptions to the supply chain, early identification of issues or changes is essential. You should note:
   - How is the system performing?
   - What problems or issues that arise need to be resolved?
   - Is the problem or issue a fault of the system design, or a fault in implementation or operations?
   - How can problems be resolved?
   - What resources are available to adjust the system?

Should the system be piloted?

There are advantages and disadvantages for including a pilot. Pilots can be extremely helpful in ensuring that the newly designed system works well before it is rolled out to the entire country. However, pilots increase immediate costs and delay national implementation. To properly evaluate the pilot, it is important to manage it for two to four reporting and ordering cycles.

10.2 System Design Elements

When designing or redesigning a system, the key elements to evaluate are: the overall pipeline, LMIS, ICS, storage and distribution, and roles and responsibilities. Many of these components have been described in detail in previous chapters. This section describes specific design considerations for each element.

Pipeline: Flow of commodities and information

One of the first steps in the design process is to draft an overall pipeline, i.e., the system through which the commodities will flow down from the upper levels to the clients and the information will flow throughout the system. In general, the fewer the number of steps in the resupply process and the fewer levels in the pipeline, the better. The movement of commodities down through the system should be based on good commodity management practices, not political or other considerations. However, if you are working in the context of an existing system, the flow of commodities must take into account any elements that you cannot change; even if, from a commodity management perspective, the resulting flow is not the most efficient.

Shortening the pipeline in Ghana

In Ghana, the government specifically instructed the system design team to find the most efficient system, without tying them to the existing structure. Thus, the district-level distribution facilities—which in the past were resupply points based on the country's political boundaries—were removed from the distribution system. This shortened the overall pipeline and resulted in overall efficiencies in the system as a whole. While the district level is no longer part of the product pipeline, it does remain part of the information system; and district managers play a part in supervision and monitoring.

Logistics Management Information System (LMIS)

When you design a logistics system, you must collect the right data that are needed to make logistics decisions and you must get that data to the people making those decisions. Furthermore, you do not want people spending their valuable time collecting and reporting information that will *not* be used for making decisions.

As discussed in chapter 2, you know that the system will require the following types of records:

- *Stockkeeping records* keep information about products in storage (collect stock on hand and losses and adjustments data).
- *Transaction records* keep information about products being moved through the system.
- *Consumption records* keep information about products being consumed or used (collect consumption data). If consumption records will not be used, system designers must ensure that consumption data is collected and reported up the system.

In addition to the records used to collect logistics data, the LMIS must also receive summary reports to report consumption, stock on hand, and losses data to the higher levels of the system. The LMIS should also produce one or more feedback reports, which will communicate information up and down the supply chain—from facilities through to central-level stakeholders.

Some of these records and forms may already be available; if so, you need to verify that they can be used *as is*. Other records and forms may exist but they may need to be revised. And, you may need to create new records or forms for the first time.

When designing the LMIS, you should consider the following points:

- What data are needed for commodity management?
- What records and reports are needed for commodity management?
- What unit of measure should be used (tablet, piece, bottle, etc.)?
- How will consumption data be collected (on a consumption record?)?
- Who at the facility level will be responsible for reporting data?
- At what frequency should logistics data be reported to higher level(s)?
- How will the report/order get to the higher level(s)?
- Where should reports and requisition forms be sent? What department, division, or unit needs to receive the report or requisition? What will they do with the reports and/or requisitions they receive?
- What approvals, if any, are required for the resupply process?
- Should some or all the commodity names be preprinted on LMIS forms?
- Can any elements of the LMIS be automated? If so, which ones? If using automation, how will information be transmitted from one level to the next?

Review all LMIS forms currently in use in the country to see if the forms that you need already exist.

- Can they be used as they are?
- Do they need revision?
- Do any new or missing LMIS forms need to be designed?

After the initial LMIS is designed, you can create a map of the flow of information, indicating which LMIS forms are used at each level of the pipeline, where the forms move, and who is involved in the flow of information. Verify that the flow of information supports logistics decisionmaking.

Inventory control system (ICS)

When designing a logistics system, the type of max-min inventory control system that you choose will dictate how and when commodities will be resupplied throughout the system. The ICS and the related max-min stock levels for the commodities will also have a direct impact on the resources needed to implement the system, including *what* resources will be needed (storage capacity, vehicles, human resources, time), as well as *when* and *where* these resources will be needed and *how* they are used. The type of max-min system you choose will also dictate some of the LMIS requirements.

A number of factors should be considered when you select an inventory control system and when you define the details of that system. As described in chapter 4, considerations include—

- What type of max-min inventory control system works best for your program (i.e., forced ordering, continuous review, or standard)?
- At each level of the system—
  - What is the longest lead time for resupplying commodities to the next level down?
  - How often should the level be resupplied with commodities (review period)?

  - What is the estimated safety stock level?
  - What is your calculated minimum stock level?
  - What is your calculated maximum stock level?
  - What is the longest lead time for an emergency order? What is the corresponding emergency order point?
  - Will the system use delivery or pick-up to get the products from the supplier to the recipient?

- Based on the expected lead times, review periods, and safety stock levels, is the total length of the in-country pipeline too long for the product with the shortest shelf life? Can it be shortened?
- Who should determine the resupply quantities at each level of the pipeline (allocation/push or requisition/pull)?
- Can one ICS serve all products, or are different systems needed, depending on the characteristics of the products or geographical diversity of the country?
- Can the budget support the quantities of commodities that are required to maintain the established max-min stock levels?

After you design the initial ICS, map the flow of commodities throughout your pipeline, including the max-min stock levels. Ensure that the overall length of the total pipeline does not exceed the shelf life of the products managed by the system. You should also verify that the lead time, safety stock, and review period stock levels are correctly calculated for the max-min stock levels.

Storage and distribution

The inventory control system that you choose for your system will dictate the volume of commodities that will be stored and distributed through your supply chain. If you have shorter review periods, then the storage space needs will decrease, but the transportation needs will increase because you will be moving smaller quantities of products through the system more often. If you have longer review periods, then the storage capacity requirements will increase, as will the amount of money being tied up in inventory; you will need larger vehicles to move larger volumes of stock, although deliveries will not occur as often.

As detailed in chapter 8, when determining your storage and distribution resource requirements, you should consider the following elements:

- For each storage facility at each level, consider the following questions:
  - Do you have sufficient storage space?
  - Do you have cold chain storage capacity, if required?
  - Do you have a sufficient number of staff? Are these staff skilled in commodity management?
  - What role will warehouse staff have in reports/data management (i.e., processing orders, picking, packing labeling, loading supplies on trucks, etc.)?

- How will commodities move from higher levels to lower levels (i.e., distribution or pick-up system)?
- Are vehicles available to distribute or pick up commodities between each level of the system?

Storage space requirements must be determined for each facility, at each level, of the system; facilities must have the storage capacity to store up to the maximum stock level set for that level. Transportation resources must be available at whichever level is responsible for physically moving the products: thus, higher-level facilities will need vehicles if they are to deliver commodities to the lower levels; lower-level facilities will need vehicles if they are to pick up commodities from the resupply facility at the higher level.

Roles and Responsibilities

After an initial system design is drafted, make a list of each position that will be involved in the logistics system; identify the various roles and responsibilities for each person, by level, if possible (i.e., start with all staff at the facility level that have logistics responsibilities, then move up the system, level by level, to the central level). You will need to clarify the skill set needed to fulfill those responsibilities and to ensure that all roles and responsibilities needed to operate the logistics system are assigned to a specific job title or job function.

For the LMIS, specifically, roles and responsibilities will include those related to—

- collecting logistics data
- reporting logistics data
- aggregating logistics data, if applicable
- analyzing logistics data, including quality check
- managing computerized data management system, if applicable
- generating and disseminating feedback reports.

For ICS, specifically, roles and responsibilities will include those related to—

- determining resupply quantities
- approving resupply quantities
- conducting physical inventories
- monitoring stock levels.

For storage and distribution, specifically, roles and responsibilities will include those related to—

- receiving orders from the lower level
- physically receiving the products at the storage facility
- processing commodity orders (picking, packing)
- maintaining adequate storage conditions
- maintaining cold chain equipment, if applicable
- processing emergency orders, if applicable
- scheduling commodity deliveries, if applicable
- monitoring storage capacity
- maintaining vehicles in working order.

In addition to the specific areas mentioned above, roles and responsibilities should also be defined in other areas:

- monitoring logistics system performance (for example, stockout rates and reporting rates)
- supervision and on-the-job training
- production and distribution of logistics tools (forms, records, reports)
- role of program staff (family planning, HIV and AIDS, malaria, etc.) in monitoring commodity availability and supporting the logistics system.

After you assign the roles and responsibilities, double-check your lists to ensure that the roles and responsibilities are assigned logically, all functions within the logistics system have been assigned appropriately, and there is no redundancy.

10.3 Other Design Considerations

In addition to the key elements described in section 10.2, there are a few general considerations that you should think about when preparing for and undertaking a system design activity. Discussing these concerns with key stakeholders can help you select the most appropriate design options, based on the country's characteristics, the products being managed, and the type of health programs served by the system.

System design is a process

The system design process outlined above is iterative: you will need to verify each technical decision, made at any point during the design activity, with the other elements that have already been proposed. For example, if you decide early in the process to have a push system, and later decide to add another level to the pipeline, you will need to reassess the decision to use a push system in order to ensure that the push system can still function with the additional level in the pipeline. If you design the LMIS forms, and then later change the max-min stock levels, you will need to revisit the LMIS forms to ensure that the forms reflect the new max-min stock levels.

The last step in the design process is to look at the system as a whole and verify that all parts of the system will work and interact, as designed. Any potential problems will need to be addressed through additional redesign and before the system is (fully) implemented.

System design is based on assumptions

Every time you make a decision about an element of the logistics system, the decision is based on certain assumptions. If you design a pull system, then your assumption is that people at the lower levels can be trained to calculate their order quantities correctly. Therefore, if you implement a pull system when you know that people cannot be trained, then the system will not work as designed. Similarly, if you design a system based on a lead time of two weeks; but you know that, in the past, orders were rarely processed in less than a month, then the system will not work because you are basing the lead time on a false assumption.

As you go through the system design process, it is critical to document the assumptions that you make and to verify that the assumptions are reasonable; in other words, the design element has a good chance of succeeding when the system is implemented. You can increase your likelihood of success by verifying your assumptions and designing the system based on how you *know* the system will actually be put into practice, and not based on what you *think* (or hope) will happen.

What products? What systems?

When designing a logistics system, you must outline the scope of the system, including the products that will be part of the system. Historically, there have been program-specific logistics systems, such as family planning, malaria, HIV and AIDS, etc. Many countries have been moving toward merging the management of some or all logistics functions for different commodity categories. The most common is to merge the functions of storage and distribution.

When determining what commodities should be included in what systems, it is helpful to conduct a segmentation analysis. Segmentation is the process of reviewing and analyzing product and customer (facility) characteristics to identify commonalities, then organizing the supply chain to best respond to customer needs or product requirements.

Commodity characteristics include—

shelf life. Short shelf life products need to move quickly through the system and require low max-min stock levels.

temperature sensitivity. Cold chain products require appropriate storage and distribution throughout the system. Capacity for cold chain storage will also factor into the determination of max-min stock levels.

pack size and units. Large pack sizes of products will require you to lower the max-min stock levels, and may impact the frequency of reporting/ordering. Imagine a liquid that is packaged in a 20 liter bottle, but a facility only uses 1 liter per month. In a forced ordering system, the facility would be ordering up to the max at the end of every reporting period, even though it takes a considerable amount of time to get through one unit.

fast moving or slow moving or seasonal demand. Consumption can vary across products and across facilities. If malaria is endemic in only part of the country, this could influence your decision to manage those products differently in different parts of the country. In addition, if antimalarials are only needed at certain times of the year, this could indicate that a product should be managed differently (continuous review rather than forced ordering, for example).

Customer characteristics may include—

demand variability. This is the frequency of use for a specific product, at different periods of time. Because of their needs at a particular time of year, customers may have seasonal demand, high demand, or low demand. This may be related to disease patterns. For example, products needed for outbreak diseases, such as cholera, may not be needed by all facilities, at all times.

communication and distance to resupply. Urban health facilities and regional hospitals usually have reasonable communications and access to transport, allowing for easier distribution of products. A rural health facility, on the other hand, may have very poor communication and fewer transport options. Urban health facilities may be resupplied more frequently, with smaller quantities; compared to rural health facilities that are supplied less frequently, but with greater quantities.

seasonal accessibility. Some health facilities are difficult to access during the rainy season because of the poor road networks that support them. As a result, rainy season deliveries may be in greater quantities and occur less frequently.

storage space. You should consider storage capacity of facilities when determining the max-min stock levels.

level of the health system. Not all health commodities are needed by all facilities. Often dictated by the national essential medicines list (EML), certain diseases are treated at different levels in the system. For example, all health facilities in the system may receive broad spectrum antibiotics; however, second line or salvage antiretroviral treatment may only be distributed at the higher level (district, province) facilities.

Regardless of how many segments are created, all segments are coordinated from a single supply chain strategy framework and; wherever possible, share resources like warehousing, information systems, and transport. Thus, the segments might collect the same data and report the data on similar forms, but some might be managed through a shorter pipeline with different max-min stock levels, or with shorter review periods.

In-house resources or outsourcing

Another consideration in the overall design of the logistics system is the choice to directly manage logistics functions, or to outsource them to a third party through a contract mechanism. For example, rather than operate and maintain a fleet of vehicles and drivers, a transportation company can be hired to transport the commodities from the supplier to the recipient (e.g., from the regional warehouse to the district warehouses in the region). One advantage to outsourcing is that functions are assigned to companies that specialize in that particular function. A perceived disadvantage to outsourcing is that you have less direct control over that logistics function.

Outsourcing can take many forms and involve all or only some commodity management functions. The MOH in different countries have used various models, including—

MOH contracts with an in-country commodity management firm. The MOH provides funding for the commodities; the private firm manages all aspects of the supply chain—from quantification and procurement, to delivery to the health centers, including management of the LMIS.

MOH contracts with an in-country private warehouse/distribution company to store and distribute health commodities. The MOH procures commodities; the private firm physically manages them. The MOH instructs the company on what quantities to deliver to which facilities; the private firm picks, packs, and transports the commodities to the facilities. For example, in Zambia, a private contractor manages the parastatal Medical Stores Limited, which provides storage and distribution for all essential medicines to all public sector facilities.

MOH contracts with a transportation company to distribute products from government-managed warehouses. The government facility obtains and stores the products, and picks and packs the orders. The private company transports the products to the health facilities. For example, in Bangladesh, the Directorate General of Family Planning outsourced 80 percent of the transportation of family planning commodities to the private sector.

MOH purchases products from local wholesalers. The MOH determines what it needs; the private company procures the commodities and delivers them to the MOH. The MOH manages and distributes the commodities through government-run facilities and transportation networks.

Outsourcing can be done using many other models. The exact model a country or program chooses will depend on the country- and program-specific options and requirements. If outsourcing is used, the contract must specify performance criteria and benchmarks. Even if certain functions of the supply chain are outsourced to private or other third-party organization, oversight is still required to ensure that the organization is performing its role adequately, managing performance-based contracts, and fulfilling its designated function(s) within the overall system.

For more information on outsourcing, go to the USAID | DELIVER PROJECT's *Emerging Trends in Supply Chain Management: Outsourcing Public Health Logistics in Developing Countries.*

Effective and efficient logistics system

You know that the purpose of your logistics system is to provide good customer service by ensuring the six rights and ensuring that commodities are available. You should design your logistics system to achieve these goals. When you design your logistics system, you want to ensure that the system is as effective and as efficient as possible. If your logistics system is *effective*, it will produce the results that you want: products will be available when and where your customers need them. If your logistics system is *efficient*, then you can achieve your purpose with a minimum use of resources; including money, time, and effort.

For example, a logistics system can be very *effective,* but it is *inefficient* if products reach their destination at a high cost, or through a great deal of effort. On the other hand, a logistics system may be *efficient*, but it is not *effective* if warehouse staff process a large number of orders in a short time, but make many mistakes. Your goal is to design an effective system that is as efficient as possible.

One challenge in designing a logistics system is to determine the resources that will be required at which levels of the system and to achieve what purpose. Imagine a situation where the system designers decide that district pharmacies will pick up their commodities from the region because the regional warehouses do not have enough vehicles or drivers available to manage delivery routes. However, if districts do not have the vehicle and manpower needed to pick up their commodity orders, then the products will not move from the region to the district. Someone must provide the resources for the products to move between the levels of the system.

When designing and implementing a logistics system that will achieve the six rights and ensure customer service, an ultimate goal should be to minimize the overall cost of commodity management, not to push financial responsibility further down the system—unless the lower-level facilities have the resources needed.

Table 10-1 summarizes some of the implications related to various design decisions. When designing the logistics system, the system designers should select the options that are best for the country, based on the characteristics of the country, the commodities being managed, and the type of health programs served by the system.

Table 10-1: Summary of Implications of System Design Decisions

DESIGN CHOICE/DECISION	IMPLICATIONS
Shorter review period (e.g., monthly)	Reports filled out more often; vehicles have more frequent schedule; service personnel take time away from client consultations more often; or dedicated logistics personnel are available to do the frequent reporting and related tasks (physical inventory, etc.); have lower max-min stock levels; less storage required, less potential waste, fewer funds tied up in inventory.
Longer review period (e.g., quarterly)	Reports filled out less often; higher max-min stock levels; more funding tied up in inventory; more space needed for storage; larger vehicles needed for commodity transport; have system capacity to manage larger quantities of products; relatively stable consumption rates.
Requisition (push) system	Lower-level personnel must submit reports to enable the higher-level personnel to accurately determine resupply requirements; the more facilities at the lower level, the more time required at the higher level to determine resupply requirements; higher-level personnel will make decisions based on actual data and will not need to ration or dump products.
Allocation (pull) system	Lower-level staff need time to calculate reorder quantities, which means less time for serving clients (if service personnel perform logistics responsibilities); lower-level staff can be trained to do the calculations; fewer staff at lower level means less time to train all staff.
Higher-level facility delivers commodities to lower level	Lower-level staff can focus on serving customers and not on collecting goods; higher-level facilities have vehicles and related resources (fuel, drivers) available for commodity deliveries when needed; vehicles are not taken for other more important purposes.
Lower-level facilities pick up commodities from supplier	Lower-level facilities have vehicles and related resources (fuel, drivers) available for commodity pickups when they are needed; vehicles not taken for other more important purposes; resupply facility will be open for business when the facility vehicle arrives.
In-house management of system component (e.g., transportation)	Government/MOH has resources needed to procure vehicles and maintain vehicles in good working order; drivers are available; vehicles are available when needed for transport of commodities; staff has skills to develop and implement a schedule.
Management of system component outsourced to a contractor (e.g., transportation)	In-house personnel must be available to monitor contractor performance and take corrective action, as needed; skills exist for developing a service-based contract.
Collect and report actual dispensed-to-user data	Service providers accurately maintain dispensing registers for all products; service providers report data for aggregation; service providers spend time managing data instead of serving clients; collection of consumption data within the facility can be time-consuming, especially if many wards/units use the same products.
Use of lowest-level issues data as a proxy for consumption	All required data is located in the facility storeroom; accurate issues data is available from one level up from the SDP; facility staff do not spend time completing dispensing registers, or aggregating data from registers for LMIS report.

Chapter Summary

In this chapter, you learned the following:

1. The steps in the system design process are to do the following:

- Complete an assessment and identify the need to design/redesign a system.
- Plan and conduct the system design activity.
- Implement the system.
- Monitor the system.

2. Key elements of a system design include the—

- pipeline (the flow of commodities and information)
- LMIS (for more information, see chapter 2)
- inventory control system (for more information, see chapter 4)
- storage and distribution (for more information, see chapter 8)
- defined roles and responsibilities.

3. Important decisions/steps taken during the design of a system include—

- Which products will be managed in which systems?
- Should you directly manage the logistics functions or outsource them to a third party through a contract mechanism?
- After drafting the design, look at the system as a whole and verify that all parts will work together and interact, as designed. Address any potential problems through redesign before the system is fully implemented.
- Document your assumptions and verify that they are reasonable to increase the system's likelihood of success.