TRAINING EVALUATION

for the
Public Health Supply Chain

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By

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On behalf of the People that Deliver (PtD) Initiative
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### Abbreviations

<table>
<thead>
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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>HR</td>
<td>Human Resources</td>
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<td>HRD</td>
<td>Human Resources Development</td>
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<td>HRM</td>
<td>Human Resources Management</td>
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<td>ISC</td>
<td>Immunisation Supply Chain</td>
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<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>PtD</td>
<td>People That Deliver</td>
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<td>SC</td>
<td>Supply Chain</td>
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<td>SCM</td>
<td>Supply Chain Management</td>
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<td>TNA</td>
<td>Training Needs Assessment</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<td>WHO</td>
<td>World Health Organization</td>
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1 THE PUBLIC HEALTH SUPPLY CHAIN

1.1 Supply Chain Management

Well-functioning supply chains are the backbone of the public health system. A supply chain (SC) is the collection of steps that ensures that commodities are readily available to the end user in the right quantity and quality. Supply chain management (SCM) refers to the process that ensures that supply chains are efficient and cost-effective. Supply chains are critical to the provision of health services.

![Typical Pharmaceutical Supply Chain](image)

FIGURE 1 TYPICAL PHARMACEUTICAL SUPPLY CHAIN

Public health supply chains are under increasing pressure to operate efficiently. With large-scale investments in health programs, a widening portfolio and volume of commodities, and expansion of services to new populations, supply chains must be flexible and responsive in a changing global environment. Increasingly, donors and policymakers look for accountability from each link in the supply chain and improvements that can be sustained without indefinite external funding.

1.2 The Supply Chain Workforce

The Public Health Supply Chain requires a mix of professional expertise. The workforce usually consists of pharmacists, logisticians, supply chain managers, data managers, warehouse and transport personnel – all of whom collectively are tasked with ensuring the appropriate commodity selection, forecasting, procurement, storage, distribution and use of health commodities. Key personnel such as doctors, nurses, and other clinical and administrative staff also contribute a portion of their time and function within the system to provide the appropriate medicines and commodities to improve health. Health SC workers typically are designated to one of these levels of the SC:

- **National Level**: Planners, Managers, Administrators
- **Central Store**: Manager, Store Workers, Drivers
- **Intermediate Stores**: Manager, Store Workers, Drivers
- **Health Facility**: Pharmacists, Nurses
- **Service Point**: Nurses, Community Health Workers

The lack of suitably qualified human resources in adequate numbers is often quoted as being one of the root causes of poor performance of the health supply chain.
1.3 The Role of Training

Effective human resources management results in higher productivity. Studies of companies and organizations have consistently found a strong correlation between structured training and organizational results. But even though the development of human resources represents a major operational cost component, it is often the most misunderstood and underutilized asset.

Training is the process of enhancing the skills, capabilities, and knowledge of staff. The thinking and behaviour of staff is moulded by the training process. One of the most important things that can be done to ensure that the supply chain is operating at its peak, is to train staff in all aspects of the supply chain. There is often a feeling that staff involved in the supply chain only need to know the exact duties that they need to perform. Rather, staff need to be trained to see the ‘bigger picture’.

A structured training programme, designed with clear objectives in mind, provides staff with opportunities to develop holistically, preparing the way for an improvement in their performance. With a proper training and development program in place, in line with internal strategies of the organization, staff will be tuned into overall organizational objectives, thus ensuring optimum productivity.
2 THEORY OF CHANGE

2.1 Pathway of Change

The term Theory of Change (TOC) finds its origins in a considerable body of theoretical and applied development in the evaluation field. Its development has been influenced by Freirean thinking on how to create social change by empowering individuals. TOC may be seen as a way to describe the set of assumptions that explain both the mini-steps that lead to the long-term goal and the connections between program activities and outcomes that occur at each step of the way (Weiss, 1995). The application of TOC principles will help us understand and assess impact in hard-to-measure areas, such as capacity strengthening and institutional development.

TOC uses *backwards mapping* requiring planners to think in backwards steps from a long-term goal (impact) to the intermediate (outcome) and early-term changes (outputs) that are required to cause the desired change (impact). This creates a set of connected entities, referred to as *pathway of change*. The pathway of change graphically represents the desired change process.

2.2 SC Training

TOC principles may be applied to training interventions for capacitating the workforce of the Health Supply Chain, mapping out the pathway of change through six discrete stages:

1. Define basic assumptions about the context (which preconditions need to be in place)
2. Define the desired long-term impact of the training intervention(s)
3. Define indicators to measure the impact
4. Backwards mapping to determine intermediate outcome indicators
5. Backwards mapping to determine the required training outputs
6. Backwards mapping to determine the appropriate training process (methodology, etc.)
2.3 The PtD Approach

The People that Deliver (PtD) Initiative aims at developing a holistic and practical approach to formulating strategies for strengthening public health supply chain systems in a sustainable manner. PtD is in the process of developing a TOC framework that will enable supply chain practitioners to capture and understand the pathway of change that connects investment in human resources to public health supply chain performance improvements and ultimately to improved health outcomes. Skills development is a key element contributing to optimizing workforce performance.

FIGURE 3 PTD HR FOR SCM THEORY OF CHANGE (OUTCOMES FRAMEWORK)

It is envisaged that this tool will guide and monitor future investments and will be used as the basis for developing a business case for investing in human resources for supply chain management.
3 MAPPING THE TRAINING PROCESS

3.1 A Systematic Approach

Training is commonly defined as an organized activity aimed at imparting information and/or instructions to improve the recipient's performance or to help him or her attain a required level of competence. Without a systematic approach to training, supply chain workers will be trained arbitrarily and haphazardly. Mapping the training process is a methodology for managing workforce development through training. It is a systematic approach to determining the training needs of individuals with the objective of ensuring that these individuals are equipped to carry out their duties effectively by having the necessary knowledge, skills, and attitudes to perform.

The training process begins with identifying people’s work-related needs. Critical questions need to be asked, such as what are the performance gaps of the organization and can these gaps be addressed by training? Is poor performance caused by people not having the necessary skills, or is there a lack of equipment or are there no set procedures for staff to adhere to? Analysis and design are the decision-making phase. What must be learned? What will we teach? These are critical questions. In reality, these questions are not always asked and the assumption is made that training is a panacea for poor organizational performance.

Once the decision has been made that training is indeed appropriate, individuals need to be evaluated as to which competency areas need to be addressed. This is best done by way of a training needs assessment, the content of which is based on a relevant health supply chain competency framework.

Following the design phase is the development and implementation, or delivery, of training content. There are many training delivery methodologies to choose from (Annex 1). Depending on whether the predominant objective of the training concerns ‘knowledge’, ‘attitudes’, or ‘skills’, a suitable training method will be selected.

Evaluation tends to be the weakest link in the chain, i.e. the one given the least attention to. Training is usually followed immediately by a test. Such a test measures immediate outcome of the training. What that does not tell us is whether the trainee will be able to perform his tasks better, so that organizational performance will improve and be impacted.
3.2 Training Needs Analysis (TNA)

Outcomes from formal and informal training activities are enhanced by first assessing the needs and the level of competence of trainees. Knowing the principle job responsibilities and functional tasks of individual staff facilitates tailoring training activities to the needs of the individual trainees. Furthermore, it will be easier for the training provider to identify who should participate in specific training interventions (and who should not).

The absence of a proper staff structure, such as commonly exists for doctors, nurses and engineers, makes the application of a TNA rather difficult. As mentioned above, a TNA requires a clear definition of functional or operational job areas for which specific health workers with a specific job title are responsible. In the absence of such a structure we will need to define a generic set of functional areas that can be applied to any given country situation. Health workers within the SC need to decide for which SC functional area(s) they are responsible, regardless of their actual job title.

3.3 Training Methodologies

Depending on whether the predominant objective of the training concerns ‘knowledge’, ‘attitudes’, or ‘skills’, a suitable training method must be selected.

These methodologies are suitable for teaching ‘knowledge’:
- a. Formal lecture (unidirectional monologue)
- b. Mini lecture
- c. Interactive lecture with active breaks (bilateral exchange)
- d. Reading
- e. Audiovisual materials (e.g. online videos)
- f. Case studies
- g. Individual research (e.g. internet libraries, literature review)
- h. Group discussion
- i. Field work (observations, discussions, etc.)

These are suitable for teaching ‘skills’:
- a. Simulations (role plays, games, etc.)
- b. Practical exercises with evaluation
- c. Study guidelines for good practice (including check lists and handouts)
- d. Group discussion
- e. Field work (observations, discussions with experts, etc.)

These are suitable for learning about ‘attitudes’:
- a. Group discussion
- b. Exploration of personal attitudes
- c. Focus groups
- d. Promotion of attitudes such as ‘openness’ and ‘introspection’
- e. Field work (observations, discussions, etc.)
3.4 Training Methods

3.4.1 External Training
Training of supply chain workers should be two-pronged, whereby the workforce is developed through short term training courses, while some individuals will benefit more from long-term training for re-professionalization. Short term training is typically up to one month in length, while long term training has a minimum duration of three months.

3.4.2 In-Service Training
Training staff in-house has distinct advantages. Technically, in-house training is any training that is held within the agencies’ premises in order to educate, develop or improve staff’ competence. Internal training uses real life examples, problems and challenges that trainees encounter every day at work. Successful internal training identifies the exact skills and knowledge that trainees need to succeed in their jobs. A distinction is made between mentoring and coaching (Heathfield, 2016).

3.4.3 Mentoring and Coaching
Mentoring requires a trusted environment where the mentee shares whatever issues affect his or her professional and personal success. Although specific learning goals or competencies may be used as a basis for creating the relationship, its focus goes beyond these areas to include work/life balance, self-confidence, self-perception, and how personal well-being influences professional performance. Mentoring is typically long term.

Coaching focuses on concrete issues, such as managing more effectively, speaking more articulately, and learning how to think strategically. This requires a content expert (coach) who is capable of teaching the coachee how to develop these skills. Coaching is typically short term. A coach can successfully be involved with a coachee for a short period of time, even just a few sessions. The coaching lasts for as long as is needed, depending on the purpose of the coaching relationship.

3.4.4 Online e-Learning
E-learning comprises learning activities based on any electronic format. E-learning is a flexible process for professional development, whereby the learner makes use of Information Communication Technology (ICT) as a real-time, offline or blended learning methodology. An example of an e-Learning application is the recording of key work situations. These recordings can be used as a teaching tool and is especially good for stimulating dialogue about good and bad practices.

3.5 Training Delivery

3.5.1 Competency-Based Training
A competency is defined as being the blend of knowledge, skills and abilities, needed to perform a specific task. Worldwide, the traditional approach to training has been for trainers to determine what content needs to be learned, teach it, and then test to see whether the content was learned. Traditional teaching and training methods usually rely on passive memorization from lectures as the dominant learning method for trainees. This approach, though long established, does not guarantee sustainable learning outcomes. Educational reforms support the application of competency-based approaches, i.e. defining, teaching, and assessing competencies and subsequently evaluating trainee performance in relation to these, focusing on
the outcome of the training, rather than on the process (i.e. applying knowledge and skills rather than merely gaining knowledge).

3.5.2 The PtD Competency Compendium

The PtD Competency Compendium is a comprehensive catalogue of competency areas with associated behavioural competencies compiled from several frameworks. The term ‘competency’ may be defined as a cluster of related knowledge, skills and abilities that affects a major part of one’s job. The PtD Competency Framework for Managers and Leaders distinguishes between technical and managerial competencies.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Competencies</th>
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<tbody>
<tr>
<td>Technical Domains</td>
<td></td>
</tr>
<tr>
<td>Selection &amp; Quantification</td>
<td>Select and quantify the correct supplies</td>
</tr>
<tr>
<td>Procurement</td>
<td>Procure supplies</td>
</tr>
<tr>
<td>Storage &amp; Distribution</td>
<td>Store and distribute supplies</td>
</tr>
<tr>
<td>Use</td>
<td>Using the supplies</td>
</tr>
<tr>
<td>Managerial Domains</td>
<td></td>
</tr>
<tr>
<td>Resource Management</td>
<td>Manage money, people, etc.</td>
</tr>
<tr>
<td>Professional &amp; Personal</td>
<td>Manage day-to-day responsibilities, career development</td>
</tr>
</tbody>
</table>

With reference to this framework, developed by PtD in 2015, competency areas are not outlined by particular cadres or job titles (i.e. warehouse manager, dispensing officer, etc.), but rather they are listed by particular supply chain functions. This enables users of this framework to consider job functions, rather than job titles or professional titles. Functional areas typically reflect a defined task or set of tasks for either one person or a dedicated team of persons. Increasingly, within the public health sector, stakeholders are beginning to focus on workload modelling to determine the number of staff required within a system design approach (Village Reach, 2014). This approach can lead to a rethinking of the types and numbers of staff needed to manage logistics tasks.
4 TRAINING OUTCOMES

4.1 Transfer of Learning to the Workplace

One of the objectives of training interventions is to support enhanced individual through the application of new skills in their roles. It is critical therefore that the organization encourages a supportive environment to enable newly acquired skills to be nurtured and to enable the transfer of learning to the workplace. This could include mentoring and coaching arrangements as part of the managers’ normal responsibilities. Staff should be encouraged by providing opportunities for them to test and develop new skill while reinforcing or clarifying any learnings that are critical to the organization’s performance. Critical to this process is the allocation of suitable tasks relevant to the training intervention while providing regular timely informal feedback to staff, as well as formal when required through the organization’s performance management system.

4.2 Evaluating Training Results

Training is key to achieving the goal of the organization as it increases the efficiency and effectiveness of staff and thus adds value in terms of organizational performance. The question arises as to how we can reliably measure the contribution that training makes to improved organizational performance. This question will be addressed in section 6.
5 OUTSOURCING SUPPLY CHAIN FUNCTIONS

5.1 Supply Chain Models

There is a wide array of structural and institutional variations in how supply chains for health commodities can be organized. While the exact structure of pharmaceutical distribution varies from one country to another, some structural commonalities exist (Yadav, 2015). One variable is the number of intermediate storage points for commodities between the central or national level and service delivery points. Another important characteristic is the type of ownership and management structure of the supply chain organization, whether this is publicly or privately owned, or a combination of public and private, i.e. semi-autonomous or parastatal. The management of a national supply chain is also influenced by the type of health financing and the structure of pharmaceutical regulation in a particular country. Eligible countries derive part-funding for procurement of pharmaceuticals from international donor agencies (e.g. Global Fund, PEPFAR) in which case procurement is typically done through the agency concerned or through a specialised agency (e.g. UNICEF).

Many low- and middle-income countries opt for a supply chain model whereby the government procures pharmaceuticals, stores them nationally and distributes them to health facilities at community level, usually through intermediate storage points. Governments in more advanced economies often outsource many of the supply chain functions to specialised for-profit agencies.

One important feature of a pharmaceutical supply chain is whether a country adopts a so-called push or pull system for distribution of commodities. A push system is a distribution system whereby the issuing store determines the quantities to be issued. This is also called an allocation system. A pull system is a distribution system whereby store managers who receive the supplies determine the quantities to order. This is also called a requisition system. The main difference between the two systems lies in who makes the decision concerning the distribution of immunization supplies.

5.2 Outsourcing Options

One important parameter in determining training needs is the degree to which elements of the supply chain are sub-contracted or outsourced to partner agencies or the private sector. Due to rising costs in the healthcare sector, governments are experiencing increasing political pressure to control costs and improve efficiency, making the need for optimization of supply chains more urgent. There is also increasing political pressure for improving quality of care and patient safety. Outsourcing supply chain functions is seen by many as a possible venue towards achieving some of these objectives.

Outsourcing allows a government agency to redirect its attention to its own competencies and hire outside resources to handle other tasks. Options for outsourcing are many, for example: human resource management, facilities management, accounting, customer support and service, IT services, research and legal documentation. There are potential benefits associated with outsourcing (PATH, 2012):

- Increased efficiency: If a specialized agency is contracted to perform specified tasks, managerial efficiency can be improved.
- Focused specialization: By transferring responsibility for specified tasks, the MoH can better focus on defining policies and strategies to provide high-quality health services.
- Reduced costs: Cost savings may be achieved when the outsourcing contract is properly managed.
<table>
<thead>
<tr>
<th>Level of outsourcing</th>
<th>Key competencies of outsourcing agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>No outsourcing/Government</td>
<td>Emphasis on the entire range of technical competencies, from acquisition of commodities to use at service level</td>
</tr>
<tr>
<td>Partial outsourcing</td>
<td>Competencies needed in all managerial and technical areas</td>
</tr>
<tr>
<td>Fully outsourced/Parastatal</td>
<td>Emphasis on managerial competencies, including contract management and relationship with suppliers and contractors</td>
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For the vaccine supply chain, there are various functions that lend themselves for outsourcing, depending on individual country contexts, including:

- Vaccine procurement
- Vaccine arrival and importation
- Vaccine storage and transport
- Maintenance of Cold Chain equipment
- Waste collection and disposal

In Ethiopia, for example, the parastatal PFSA increasingly takes overall responsibility for the procurement, storage and distribution of pharmaceuticals, including immunization supplies. One of the reasons behind this development is that the Federal Ministry of Health will be able to focus more on their core business, which is delivering health care to the people.

### 5.3 Implications for Training

The type of supply chain model that a country adopts and the degree of outsourcing of supply chain functions does affect the staffing structure, but does not affect the need for and the importance of training of supply chain staff. What will vary are the competencies required and thus the training content that applies to staff in the different functional areas of the supply chain.

The reality of having many supply chain models highlights the importance of adopting a competency framework for the supply chain workforce that is comprehensive in that it encompasses all managerial, technical, administrative and personal competencies that may apply in any given situation.

### 6 TRAINING EVALUATION MODELS

#### 6.1 Purpose

- Provide a recommended model for evaluating training within the public health supply chain sector in low and middle-income countries.
- Develop and provide a set of evaluation indicators with focus on assessing the impact of training on organizational performance.
6.2 Key Developments in Training

Training is a critical process for enhancing productivity and organizational performance. The management of these training processes is central to their effectiveness. Research shows high-performing organizations share certain features in relation to training as follows:

- They align and integrate their training initiatives with organizational planning by reviewing existing activities and initiating new training programs to support strategic outcomes.
- Their managers invest in, and are accountable for, training.
- They focus on the organizational application of training rather than the type of training, and they consider appropriate learning options – de-emphasising classroom training and allowing staff time to process what they have learned on-the-job consistent with adult learning principles.
- There is increased emphasis on performance improvement and accountability for the effectiveness of training outcomes and expenditure.
- They evaluate training formally, systematically and rigorously.

Although organizations particularly in the private sector has focused on evaluation, the scope and emphasis of evaluation has shifted significantly from the evaluation of training programs to the impact of those programs. Many organizations now take a more systematic, logical, and strategic approach to their evaluation processes. Before closing its operations in 2009, Nortel, a large global telecommunications company developed a comprehensive evaluation process. Every program included a plan to determine a specific level of evaluation. Routine impact analysis was undertaken on important and critical programs and the results were reported regularly to senior managers. All training staff members were trained in the evaluation process. Line managers were included in all phases of the process, beginning with the needs assessment and concluding with review of the impact analysis.

6.3 Training Evaluation in the Public Health Supply Chain Sector

Training is a key strategic approach to address the shortage of public health supply chain workers in many countries, however there is a lack of evidence linking these interventions to improved organizational performance. Given the importance of in-country supply chains to public health system, assessing the contribution of training to overall supply chain performance is critical.

6.3.1 Challenges

The outcomes framework in the PtD TOC is designed to ensure that that staff apply their skills at every level of the supply chain resulting in the optimization of the workforce and as such training encompasses a wide range of activities designed to improve the capabilities of people. Although public health supply organizations have made significant efforts to ensure that their training strategies are aligned with organization performance and improved health outcomes, they are still unable to demonstrate the efficiency and cost-effectiveness of their investment in training and its contribution to organizational outcomes. In particular, there is a lack of supporting management information and performance measures. Where performance indicators do exist they are, generally measures of training activity (i.e. the number of training days per staff member) rather than effectiveness. Therefore, public health supply organizations are not evaluating training strategies, in part because of the lack of appropriate performance targets and data.
In the publication, Linking Human Resource Investments to the Global Health Supply Chain: Lessons from the USAID|DELIVER Project and Other USAID Investments. 2016, training is acknowledged as a key aspect of all of DELIVER’s projects when it comes to health systems strengthening and making supply chain improvements. The report noted however that there is a need to establish a link between capacity development interventions and supply chain system performance such as commodity availability. Within the public health supply chain, addressing the question of how far training has achieved its objectives is difficult because it is often hard to set measurable objectives. In addition, many organizations are challenged to collect the information on the results or to decide on the level at which the evaluation should be made. Therefore, training evaluation is the weakest and most under developed aspect of training.

A rapid exploration of some of the literature on this topic confirms that assessing the impact of training is no easy task:

- There is a general assumption that, after a training programme, there is usually a boost in trainees’ work performance. But how much of the improvement is a direct result of training?
- It is difficult to show a cause-and-effect relationship between training and performance.
- Performance improvements may be linked to training, but usually non-training factors have also contributed.
- Training evaluation is seen by most training practitioners and HRD managers as the most difficult part of their job.
- Many trainers see the development and delivery of training as their primary concern, and evaluation something of an afterthought.
- Evaluation is poorly defined, having different meanings for different people in different contexts.

6.4 Benefits

Notwithstanding these challenges, a well-defined evaluation process within the health supply chain serves two important purposes. Firstly, it is an assessment of whether funds have been appropriately spent, and secondly it is also part of the ongoing process of refining strategies and improving organizational performance.

Key considerations within the training evaluation process include:

- Assessing how well proposed training interventions address organizational needs, capability needs, and individual needs within the organization.
- Assessing the extent to which the training activity is aligned with priorities that are identified in the organization’s strategic plan, workforce planning and performance management systems.
- Assessing the extent to which it addresses current and future capabilities.

6.5 Process indicators

Most organizations use input, output, efficiency or process indicators as a starting point in tracking training, however they are less vital from the organizational point of view but can be helpful from the training manager perspective.
A comprehensive study in 2017, sponsored by PtD reviewed the capacity development practices in the Sudan National Medical Supplies Funds (NMSF). The study identified the use of a broad range of training process indicators including:

- **Training days per staff.** Total number of training days of all staff combined, divided by the total number of staff, gives average number of training days per staff.
- **Internal training ratio.** The total number of internal training courses relative to the total number of training courses (internal plus external).
- **Training implementation rate.** Number of training events implemented divided by total number of training courses planned.
- **Trainees committed.** Total number of trainees trained, divided by total number of trainees planned to be trained.
- **Continuous Professional Development activity.** Number of active accounts, divided by total number of accounts (active plus non-active combined).
- **Training budget of total budget.** Percentage of total budget allocated to training.
- **Training cost per day.** The total annual training budget divided by the total number of training days (of all trainees combined), gives the average cost of training per day of training.

However, in order to assess whether workforce performance is being optimized, measurements of the outcomes and impact or effectiveness of training are more relevant. These range from indicators that measure the extent to which staff are applying their learning in the workplace through to the more valuable, and harder to measure, impact on organizational performance.

### 6.6 Evaluation Models

Although there is general recognition in the literature that training improves a firm's performance, training does not actually have a direct effect on performance but rather an indirect effect by improving intermediate organizational outcomes (Aragon, 2013). Birdi proposes a training evaluation model, Taxonomy of Training and Development Outcomes (TOTADO), which attempts to give a broader perspective on types of outcomes beyond individual learning of knowledge and skills, work evaluation approaches (Birdi, 2010).

Donald Kirkpatrick (1994) developed his Training Evaluation Model during the 1950s. The model, last updated in 1994, is today the most recognized and established method of evaluating the effectiveness of training programs. According to a survey by the American Society for training and development (ASTD), the Kirkpatrick four level evaluation approach is still the most commonly used evaluation framework among Benchmarking Forum Companies (Bassi & Cheney, 1997). The main strength of the Kirkpatrick evaluation approach is the focus on behavioural outcomes of the learners involved in the training (Mann & Robertson, 1996).

His model consists of four levels: (1) Reaction, (2) Learning, (3) Behaviour, and (4) Results. The highest level (results evaluation), appraises the impact of training on an organization. The ‘result level’ of Kirkpatrick’s model seeks to determine the tangible results of the training such as: reduced cost, improved quality and efficiency, increased productivity, staff retention and higher staff morale.
The weakness with the model, which Kirkpatrick himself acknowledged, is that ‘there are so many complicating factors that it is extremely difficult, if not impossible, to evaluate certain kinds of programmes in terms of results’. The literature review provided no evidence of widespread use of any other models, which suggests that both researchers and organizations believe that Kirkpatrick’s work remains relevant particularly where the potential limitations are understood and acknowledged within the evaluation design process.

These limitations, however were addressed in a model developed by Dr Jack Phillips, referred to as Return on Investment (ROI), in he adds a 5th level of evaluation to Kirkpatrick’s model. Dr. Phillips outlines his approach in his book Return on Investment in Training and Performance Improvement Programs (1997). His methodology is designed to evaluate training and to calculate its ROI, in doing so Phillips pioneered efforts to develop, systematise, and improve the practical evaluation methods used by training professionals and managers in the field. The methodology applies a range of unique tools and techniques that enable the practitioner to identify business results of training and then convert them into monetary values. This enables the isolation of the effects of the training from other factors that could have contributed to the results and identifying intangible benefits.

That is done through a lengthy evaluation process, such that before the final calculation of ROI, the impact of learning is isolated from gains in revenue, performance or productivity that might have accrued because of outside circumstances such as seasonal sales variation, for instance. Phillips established a set of guidelines so that results are standardised and these formulas are used extensively in private and public-sector organizations globally.

In recent years organizations have developed approaches to isolate the effects of training from other variables when considering organizational performance. The studies demonstrate that where the correct information is identified, gathered and analysed that a link between training and organizational performance can be established.

This model was tested by Skills nets in 2004, Measuring the Impact of Training and Development in the Workplace. A pilot project was established involving 18 companies to determine whether the Kirkpatrick/Phillips models were applicable and readily usable in Irish enterprises. The participating companies worked through the process with the support of consultants in order to establish that a specific training event "caused" a specific organizational result.

The pilot project demonstrated that:

- The isolation of the effects of training based on before-and-after comparison was not possible without the availability of accurate baseline data
- Depending on which performance variable one decides to measure - improvements in work output, sales turnaround, costs savings, increases in sales, quality and so on - evaluating results can be time consuming
- Returns to training are dependent upon several important factors and that training is best understood in the larger context of a firm’s entire set of managerial and production strategies, functions and practices
- The models are usable, given the right training and support
In a commercial setting, the ROI is intended to assess whether the training was worth doing financially – i.e. did it lead to savings or additional income that are greater than the cost of the training? However, in the public health supply chain these factors are not relevant unless an outsourced supply chain model is applicable. Achieving public health supply chain goals such as increasing the availability of essential health supplies in this context represents a return on investment. Additional indicators that may be useful for the health supply chain include other quantifiable aspects of organizational performance, such as: number of complaints, staff turnover and wastage of commodities.

While it is recognized that these indicators are influenced by a wide range of factors, and measuring the specific contribution of training to the public health supply chain goals is difficult, the intention of this report is to develop and provide a set of evaluation indicators in which practitioners are more readily able to isolate the effects of training from other variables when considering organizational performance.

6.7 Proposed Evaluation Model

Figure 5 below outlines a model for evaluating training. It covers evaluation before, during, and after an intervention and can also be used to evaluate the overall training strategy within the organization. The model can be applied to formal classroom training or to less formal on-the-job training, rotations, project work, conferences etc. The model reflects aspects of the training evaluation model developed by Dr. Donald Kirkpatrick and Jack Phillips which identifies five levels at which trainings could be evaluated: Reaction, Learning, Behaviour, Results and Return on Investment.

It also draws on the following publications:

- Training Evaluation Framework and Tools (TEFT) developed by Human Resources for Health in 2013 which provides a set of resources designed to help evaluators, implementers, and program managers at all levels plan successful evaluations of in-service training program outcomes.

- Evaluating Training in the World Health Organization (WHO), 2010 which provides a comprehensive approach to evaluating training using Kirkpatrick’s model of four levels of evaluation.
The first blue arrow on the model relates to the training intervention (the activity that we should be assessed), followed by the outcomes that are possible at the individual level.

The orange arrow shows that providing training to staff leads to improvements in their content knowledge, skills, and abilities.

The next outcome would be that the trainee applies their new learning on the job; these are individual performance outcomes. In this framework, performance outcomes are shown in green.

Finally, the red arrow shows improvements at 2 levels, firstly in the departmental outcomes resulting from the improved performance of the newly-trained staff member and secondly in organizational or overall supply chain performance.

The five levels of evaluation are: (1) the reaction of the individual and their thoughts about the training experience; (2) the trainee’s resulting learning and increase in knowledge and competency from the training experience; (3) the individuals’ behavioural change and performance improvement after applying the skills on the job; (4) the results or effects that the individual’s performance has on the department; and (5) the results or effects on organizational performance.

### 6.8 Evaluation Levels

Each of the five levels is explained below.

#### 6.8.1 Level 1 - Reaction

The main purpose of reaction evaluation is to enhance the quality of training programmes, which in turn leads to improved performance by measuring the trainee’s reactions to training programme. This level therefore, assesses the reaction of trainee and measure the immediate reaction to aspects of the intervention such as topic, speakers, format, schedule, relevance, appropriateness of placement. Typical questions concern the degree to which the experience was valuable (satisfaction), whether they felt
engaged, and whether they felt the training was relevant. Did the trainees feel that the training was worth
their time? Did they think that it was successful? What were the biggest strengths of the training, and the
biggest weaknesses? Did they like the venue and presentation style? The reaction of facilitator is also
assessed and considers the quality and value of the intervention (include attendance, trainees’
commitment, format, learning transfer). Questions for the facilitator concern whether they felt the training
went well. Training departments and organizations use that feedback to evaluate the effectiveness of the
training, students’ perceptions, potential future improvements, and justification for the training expense.

An example of such an evaluation supply chain management program designed and implemented by HELP
Logistics and Argusi started in 2015. Three workshops were organized in Malaysia, Rwanda and Myanmar,
with 40 participants representing several UN agencies, international NGO’s and the Ministries of Health
from participating countries. Following the workshops, the program was evaluated thoroughly with the
goal to optimize the program based on participant’s needs and expectations. All participant and facilitator
feedback was processed and developed into an improvement plan for the program.

6.8.2 Level 2 - Learning

Evaluation at this level differentiates between what trainees already knew prior to training and what they
learned during the training program. It measures the degree to which trainees acquired the intended
knowledge, skills and abilities as a result of the training in the short term. This level is used by facilitators
and training managers to determine if training objectives are being met. Only by determining what trainees
are learning, and what they are not, can organizations make necessary improvements. Level 2 can be
completed as a pre- and post-event evaluation, or only as a post-evaluation.

A study, at London Business School, was designed to assess the impact of interpersonal skills training on
senior managers. The evaluation of training was based on subordinate feedback conducted before, and six
months after training programme took place. The result indicates significant impact on some but not all of

6.8.3 Level 3 - Behaviour

Behaviour evaluation measures the degree to which trainees’ behaviours change as a result of the training
– and assesses individual performance on the job, immediately and several months following training
interventions and is a medium-term measure. Level 3 evaluation involves both pre- and post-event
measurement of the trainee’s behaviour. These processes include supportive supervision and coaching and
formal performance management processes. The performance management process acts as a regular
benchmarking exercise and aids in focusing managers on the effective management of training in the
organization, and of the contribution training makes to the achievement of supply chain outcomes.

In the publication, Linking Human Resource Investments to the Global Health Supply Chain: Lessons from
the USAID|DELIVER Project and Other USAID Investments. 2016, it was noted that routine practices like
monitoring of stock and scheduled supervisory visits and performance management initiatives are
necessary to increase the effectiveness of training along the various levels of the supply chain.
6.8.4  Level 4 - Departmental Results

Evaluation at this level assesses the effect of the training on the team or department and therefore assesses how the training affects the trainees’ broader area of work. This assessment determines the tangible results of the training in the medium term at an operational level such as: improved quality and efficiency, increased productivity and increased customer satisfaction.

The following is an example of results evaluation at a departmental/operational level and is specifically linked to improvements in Pharmaceutical practices.

**VillageReach Pharmacy Assistant Training Program in Malawi**

Malawi, like many low- and middle-income countries, has a critical shortage of pharmacy personnel. Currently government health centers have no trained pharmacy personnel on staff. This leads to unqualified personnel managing medicines and supply chain and dispensing to patients, which impacts patient care and medicine availability.

In 2012, in collaboration with our partners, and with support from the Barr Foundation, USAID | DELIVER PROJECT, and Vitol Foundation, VillageReach launched a two-year Pharmacy Assistant Training Program at the Malawi College of Health Sciences with a strong emphasis on supply chain management and hands-on, experiential learning designed to:

- Provide immediate benefit to the hospitals and health centers to address imminent human resource constraints and
- Prepare students for the reality of the environments in which they will work after completing their training

The intervention is the 2-year certificate program to train and deploy a new cadre of PAs established in 2012. A partnership between the Malawi College of Health Sciences (MCHS), Malawi Ministry of Health (MoH), and the VillageReach, with technical assistance provided by the University of Washington, the program seeks to train and deploy at least 150 PAs to improve pharmaceutical management in rural HCs in Malawi. The intervention is being implemented in 18 districts selected from the three regions of the country where a motivated and knowledgeable pharmacy technician at the district hospital indicated a willingness to provide mentorship and technical support to PA trainees during their training at hospitals and at the HC.

During the first year of training, students undergo 10 weeks of class-based instruction at MCHS. At the end of this time period, half the students are deployed to district hospitals for a 5-month period of field training supervised by a pharmacy technician, and the other half of the students remain at the MCHS for additional didactic training; the students then change places for another 5 months. In the second year, half of the trainees are deployed to HCs in the intervention districts for 5 months while the other half will remain at the MCHS for class-based instruction; the students then change places for another 5 months. Therefore, during the second year, HCs in intervention districts have a trainee PA on-site for 10 of 12 months.

Members of the teaching staff from MCHS conduct routine supervisory visits at both district hospitals and HCs to provide on-site mentorship and assess student progress. Baseline surveys were conducted in March 2014 prior to PA deployment to HCs. Additional surveys are planned at 12 and 24 months after PA trainee deployment to the intervention sites. The post-intervention surveys are timed to occur after a PA trainee has been consistently available at the HC for at least 6 months. We assume that over this period, the trainee will have had sufficient time to settle into a working routine and will have had an impact on routine functioning of the logistics system and dispensing practices, and hence an impact on availability and use of medicines at the HC.

**Results**

The following data represents preliminary results based on M & E data collected on a monthly basis.
• **Pharmaceutical Practice**: The average score for appropriate dispensing—including giving proper instructions on how to take medication and possible side effects—increased by 19 percentage points (from 41% to 60%).

• **Data Quality**: The accuracy of stock on hand and consumption data reported increased by 17 percentage points (from 55% percent report accuracy to 73%).

• **Storeroom Management**: The average score for appropriate health center storeroom management—including organizing medicines by “First to Expire, First Out”—increased by 7 percentage points (from 72% to 79%).

• **Time Spent on Logistics**: Clinical staff time at health centers spent on logistics tasks decreased by an average of 39 hours per month (from 48 hours to 9).

### 6.8.5 Level 5 – Organizational Results

Result level evaluation is the effect on the business or environment resulting from the improved performance of the trainee and determines the tangible results of the training in the long term, such as: reduced cost, improved quality and efficiency, increased productivity, staff retention, increased customer satisfaction and higher morale. It is universally agreed that these benchmarks are not always easy to quantify, however doing so is the only way organizations can determine the critical return on investment of their training expenditures.

An example of level 5 evaluation is provided by Bosman A, Schimmer B, Coulombier D in 2009 which showed the results of an analysis of the activities and outputs of fellows of the European Programme for Intervention Epidemiology Training (EPIET). The study measured the effect on this training on the public health workforce in the European Union and Norway resulting in high levels of staff retention. 90% of the fellows took up positions and remained employed in public health organizations.

Although as mentioned previously, it is difficult to identify whether specific outcomes are truly the result of the training, this report will focus on identifying the public health supply chain performance indicators that are most closely impacted by training and individual performance improvement.

### 6.9 Evaluation Trends

Each year the American Society for Training and Development ATD surveys businesses across the United States to look at trends in training and development. The state of the industry report is a good indicator of what is taking place in the workplace learning and performance field and shows the increased focus on training evaluation.

A study of U.S. business and industry organizations Twitchell (1997) showed that 72.74% of respondents evaluate their programs at Level 1; 47.05% at Level 2; 30.54% at Level 3; and 20.82% at Level 4. Twitchell included ROI with Level 4 in his study.

A slight increase was noted in a study of the healthcare industry (Hill, 1999) which showed that 80.58% of respondents evaluated their programs at Level 1; 52.59% at Level 2; 30.77% at Level 3; 16.70% at Level 4; and 3.73% at Level 5.
In 2005 organizations reported evaluating programs 91.3% at Level 1; 53.9% at Level 2; 22.9% at Level 3; 7.6% at Level 4; and 2.1% at Level 5, ROI (Sugrue & Rivera, 2005).

At the time of writing, the authors were unable to access more recent surveys however, it is expected that the trend towards increased levels of evaluation.

7 RESULTS INDICATORS - ORGANIZATIONAL

7.1 Data Collection and Analysis

This report draws primarily on two sources: a) notes from a limited number of key informant interviews with both supply chain and monitoring and evaluation experts conducted in summer 2017 and b) a desk review of literature on training evaluation and indicators. This approach enabled the identification of several indicators that can be applied universally across all public health supply chain models outlined in section 5 whether government run, partly outsourced or fully outsourced.

7.2 Supply Chain KPI’s

Many supply chain organizations assess their performance based on several defined key performance indicators with the level of sophistication varying depending on the supply chain model adopted. These supply chain indicators measure the performance of a health supply chain at both the outcome and process levels, addressing overarching performance and the performance of specific functional areas. For example, NMSF which is a as a semi-autonomous organization tasked with the selection, procurement, storage and distribution of medical supplies for the public sector in Sudan. For the purposes of this report NMSF’s supply chain model is described as fully outsourced/parastatal.

Consistent with the guidelines provided by USAID|DELIVER Project in the publication Measuring Supply Chain Performance: Guide to Key Performance Indicators for Public Health Managers, May 2010, NMSF has identified several key performance indicators which guide their supply chain strategy as demonstrated below.

<table>
<thead>
<tr>
<th>Indicator Domain</th>
<th>Description of Indicator</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection</td>
<td>% of items received that are on the national essential medicines list</td>
<td>100%</td>
</tr>
<tr>
<td>Availability</td>
<td># of items available/total number of items on the national essential medicines list x100</td>
<td>95%</td>
</tr>
<tr>
<td>Procurement</td>
<td>Ratio between median price of commodities procured and the international median reference value</td>
<td>100%</td>
</tr>
<tr>
<td>Emergency Procurement</td>
<td>% of emergency orders issued in the past 12 months</td>
<td>Less than 5%</td>
</tr>
<tr>
<td>Indicator</td>
<td>Description</td>
<td>Target</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Clearance</td>
<td>% of orders cleared from the port before the deadline</td>
<td>100%</td>
</tr>
<tr>
<td>Supplier</td>
<td>% of orders received in full and on time from total no of orders in a defined period</td>
<td>100%</td>
</tr>
<tr>
<td>Expiration</td>
<td>Total value of expired items/average inventory value x 100</td>
<td>3 to 5%</td>
</tr>
<tr>
<td>Quality</td>
<td># of medicines that meet the national quality control standards/number of items procured on a defined period x 100</td>
<td>100%</td>
</tr>
<tr>
<td>Shelf life</td>
<td>% of medicines received with a shelf life of less than 75% at the time of arrival</td>
<td>0%</td>
</tr>
<tr>
<td>Inventory control</td>
<td>% of quantities of each product lost per total quantities available for use in the past year</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>Service</td>
<td>% of treatment sites that received all orders on time and in full during a defined period</td>
<td>100%</td>
</tr>
</tbody>
</table>

**FIGURE 6 NMSF KEY PERFORMANCE INDICATORS**

### 7.3 Insights from Research and Key Informants

Within the public health supply chain, commodity availability and patient coverage are the key goals. This was highlighted in the publication Measuring Supply Chain Performance: Guide to Key Performance Indicators for Public Health Managers USAID|DELIVER Project, 2010. “Positive health outcomes are highly dependent on how well the health delivery system, that is health information, financing, personnel and supply chain is performing. The importance of having medicines and other supplies available at the health facility cannot be overstated and their availability often depends on how well or how poorly the supply chain is performing.”

In the publication, Linking Human Resource Investments to the Global Health Supply Chain: Lessons from the USAID|DELIVER Project and Other USAID Investments. 2016, it was noted that the areas that HR for SCM interventions targeted most directly were forecasting and supply planning, procurement, inventory management, LMIS and risk management.

In order to ensure applicability across all supply chain models the core supply chain processes underpinning this research are therefore as follows:

- Product Selection/Forecasting/Procurement
- Warehousing/Storage/Inventory Management
- Distribution/Transportation
Using these core processes and SCM indicators as a guide, emergent themes were then categorized around the interrelated research questions:

- What are the organizational indicators used to determine Supply Chain performance?
- In which areas can training and skills development activity directly impact on Supply Chain performance?
- Which measurable indicators relate to public health outcomes?

The interview participants highlighted with some level of consistency that the core areas that senior managers in the private, public and parastatal sectors use to determine achievement of the goals and therefore effectiveness in the supply chain as:

1. Commodity availability
2. Working capital/Finance
3. Operating/Distribution costs

In this context many other performance indicators impact on and therefore form a subset of these 3 core KPIs and for the purposes of this report these 3 areas were selected as a basis for assessing the link between supply chain performance and skills development. The areas are discussed in detail below.

### 7.3.1 Commodity Availability

Core Supply Chain process area: Product Selection/Forecasting/Procurement

PtD’s TOC framework connects investment in human resources to public health supply chain performance improvements, commodity availability and ultimately to improved health outcomes. Skills development is therefore a key element contributing to optimizing workforce performance impacting on commodity availability as shown in the figure below.

![Figure 7 Link between Skills Development and Commodity Availability](image)

This indicator measures the percentage of those products that listed on an National Essential Medicines List (NEML), or other approved product list, or standard treatment guidelines (STG), using the following formula:

\[
\text{Percentage of items available} / \text{total number of all items on national essential medicines list (NEML)}
\]

Many factors or sub indicators such as forecasting, stocks outs, order fill rates and inventory accuracy impact on commodity availability and are more easily measured in the context of skills development and are relevant at department level. It follows therefore, that where staff are trained to correctly adhere to supply chain processes and these changes are implemented in day to day work practices, a corresponding increase in work performance and organizational performance can be measured. The link between the
purpose or use of the indicators and focus of corresponding training programs to improve performance are shown below.

Using this framework training and skills development interventions can lead to measurable improvements in product selection, inventory accuracy rate, stock out rate, order fill rate and forecasting accuracy. This in turn can lead to improvements in commodity availability and ultimately better health outcomes.

<table>
<thead>
<tr>
<th>Sub Indicator</th>
<th>Purpose and Use</th>
<th>Focus of Training Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity Selection Based on the Essential Medicines List</td>
<td>Establishes whether commodities that are regularly procured are essential products</td>
<td>Maintaining up to date EML lists</td>
</tr>
<tr>
<td>Inventory Accuracy Rate</td>
<td>Measures the accuracy of data on commodity stock levels and provides information on how accurately inventory is tracked</td>
<td>Correct recording of stock received, picked and issued</td>
</tr>
<tr>
<td>Stock Out Rate</td>
<td>Measures commodity availability/or absence over a period of time; it represents the overall ability to supply a full range of products</td>
<td>Maintaining accurate stock records</td>
</tr>
<tr>
<td>Order Fill Rate</td>
<td>Determine how effective a distribution facility is in satisfying customer orders.</td>
<td>Inventory management, picking and shipping procedures</td>
</tr>
<tr>
<td>Forecasting Accuracy</td>
<td>Accurate forecasting helps reduce the likelihood of wastage or shortage, and increasing the likelihood of meeting customer needs with available commodities</td>
<td>Analyzing historical consumption data, estimating future trends Maintain accurate consumption data</td>
</tr>
</tbody>
</table>

FIGURE 8 LINK BETWEEN COMMODITY AVAILABILITY SUB INDICATORS AND TRAINING INTERVENTION

7.3.2 Working Capital/Finance

Core Supply Chain process area: Warehousing/Storage/Inventory Management

The availability of finance and work capital while an important factor is often limited to the finance function, however the activities and work performance of staff in this area are too specific to be used as an indicator. The focus is therefore to identify broader supply chain processes such as inventory and more specifically the storage and retrieval of goods, which if not undertaken correctly has a negative impact on working capital.

Since no one indicator applies to this factor several related indicators have been identified such as value of unaccounted for stock, inventory turnover rate and stock wastage due to expiration and damage and value of commodities damaged. All these indicators and the working practices associated with them have a
financial impact which can be improved as a result of specific training activities as indicated in the table below.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Purpose and Use</th>
<th>Focus of Training Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of unaccounted stock</td>
<td>Estimates the losses from missing commodities for reordering supplies. Determines if there is a problem with inventory management</td>
<td>Record keeping</td>
</tr>
<tr>
<td>Inventory turnover rate</td>
<td>Measures low inventory turnover which could indicate that commodities have been overstocked. Focus on increasing inventory turns to reduce inventory holding costs and working capital</td>
<td>Forecasting accuracy</td>
</tr>
<tr>
<td>Value of commodities damaged</td>
<td>Measures the value of commodities lost due to inappropriate warehousing conditions or handling of commodities.</td>
<td>Warehouse practices</td>
</tr>
<tr>
<td>Stock wastage due to expiration and damage</td>
<td>Measures the ability of staff to practice first to expire, first out (FEFO) methods and properly manage commodities. This will result in reduced wastage and saves money.</td>
<td>Warehousing practices including FEFO.</td>
</tr>
</tbody>
</table>

**FIGURE 9 LINK BETWEEN WORKING CAPITAL/FINANCE INDICATORS AND TRAINING INTERVENTIONS**

### 7.3.3 Operating/Distribution Costs

Core Supply Chain process area: Distribution/Transportation

Supply chains are dependent on effective distribution and transportation process which directly affect operating costs or the cost of distribution. In this context a reduction in operating costs due to optimisation of delivery loads, overstocking and management of inventory wastage can be achieved through improved adherence to supply chain processes and individual performance levels. The link between training interventions and service delivery can be established since improvements in workforce performance through adherence to distribution and transportation processes can result in a reduction in operating costs. Since no one indicator applies to this factor several related indicators have been identified as shown below.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Purpose and Use</th>
<th>Focus of Training Intervention</th>
</tr>
</thead>
</table>
| On time delivery and in full            | Measures the percentage of shipments arriving on time for a set delivery date during a defined period of time. | Vehicle maintenance  
Vehicle log keeping  
Distribution scheduling |
<table>
<thead>
<tr>
<th>Container Capacity Utilization/Truck Fill</th>
<th>Monitors container capacity utilization to ensure the efficient use of vehicles and resources in general. Assists in increasing capacity utilization to eliminate waste and reduce costs</th>
<th>Distribution planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total transport cost</td>
<td>Calculating total transportation costs can help make budgetary and operational decisions</td>
<td>Use of vehicles Distribution scheduling and routing</td>
</tr>
</tbody>
</table>

**FIGURE 10 LINK BETWEEN OPERATING/DISTRIBUTION INDICATORS AND TRAINING INTERVENTIONS**

### 7.4 High Level Organizational Results Indicators

Given the analysis above the object of this research is to identify the core indicators to be used in the evaluation of training. The potential indicators are listed below and require further inputs and debate within the supply chain, capacity development and monitoring and evaluation communities.

#### 7.4.1 Product Selection/Forecasting/Procurement

**Commodity availability** can easily be measured organizationally and therefore can stand alone as an indicator recognising that the sub indicators all contribute to the achievement of commodity availability. As such commodity availability can be measured at a high level organizationally and the following sub indicators: commodity selection; inventory accuracy rate; stock out rate; order fill rate and forecasting accuracy can be measured departmentally.

**Formula:** Percentage of items available / total number of all items on national essential medicines list (NEML)

#### 7.4.2 Warehousing/Storage/Inventory Management

The 4 indicators that impact on working capital and finance can be utilised at departmental level or organizationally.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of unaccounted stock</td>
<td>Value of missing units / value of total units currently in stock *100</td>
</tr>
<tr>
<td>Inventory turnover rate</td>
<td>Total value of items distributed or sold / average value of inventory</td>
</tr>
<tr>
<td>Value of commodities damaged</td>
<td>Total value of damaged commodities / value of shipped commodities *100</td>
</tr>
<tr>
<td>Stock wastage due to expiration and damage</td>
<td>Total value of expired/damaged items / average inventory value *100</td>
</tr>
</tbody>
</table>
7.4.3 Distribution/Transportation

The 3 indicators that impact on operating and distribution costs can be utilized at departmental level of organizationally.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>On time delivery and in full</td>
<td>Number of orders delivered on time and in full /total number of full loads delivered * 100</td>
</tr>
<tr>
<td>Container capacity utilization/truck fill</td>
<td>Actual load /maximum load possible* 100</td>
</tr>
<tr>
<td>Total transport cost</td>
<td>Sum of all transportation costs during a specified period of time</td>
</tr>
</tbody>
</table>

7.5 Conclusions and Recommendations

7.5.1 Further Research, Validation and Evidence

Currently little empirical data or evidence exists in this field and the results of this research are expected to contribute to a wider debate and the design of an evaluation methodology for public health supply chains. This represents the first step towards quantifying the return on investment or impact of training activities on supply chain improvements.

It is intended to widen the pool of informants to provide inputs on the possible indicators listed in section 6 and gain consensus on the final set of high level organizational indicators.

Thereafter, it is intended that this will lead to the generation of new evidence supporting the application of the proposed indicators across the different supply chain models.

7.5.2 Evaluation Methods and Indicators

A comprehensive listing of the most widely used evaluation methods and indicators. (Levels 1 to 3) for evaluating training in public health supply chain organizations is provided in Annex 1 and draws on best practice. This listing will be updated at the conclusion of the validation process.

The objectives are to:
- Define these indicators in an effort to enhance the consistent use of terms across public health supply organizations
- To promote the evaluation of training by making indicators readily available to organizations
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ANNEXES

Annex 1: Training Evaluation Methods and Indicators

The most widely used evaluation methods and indicators for evaluating training in public health supply chain organizations.

<table>
<thead>
<tr>
<th>Evaluation Level</th>
<th>Methods</th>
<th>Indicators Guidelines</th>
<th>Proposed Indicators</th>
</tr>
</thead>
</table>
| Reaction         | • Completed trainee feedback questionnaire  
                   • Informal comments from trainees  
                   • Focus group sessions with trainees  
                   • Feedback from facilitator | • What satisfaction rating do trainees give to aspects of the intervention such as relevance, suitability of delivery method and quality of the presenter?  
                   • To what extent do trainees believe the objectives of the intervention were achieved?  
                   • What satisfaction rating do trainees and line managers give to the timing of the intervention and the suitability of information provided?  
                   • How highly does the facilitator rate participation and engagement? | • # of courses that achieve outlined objectives / Total # of courses evaluated) x 100  
                   • % of programs that match organizational requirement  
                   • % trainees receiving manager briefing prior to attendance  
                   • % of staff satisfied with training |
| Learning         | • Pre- and post-test scores  
                   • On-the-job assessments  
                   • Supervisor reports | • To what extent are the acquired capabilities demonstrated by trainees to the identified standard after the intervention and an appropriate period after the intervention? | • (# of trainees that have mastered knowledge / total # of trainees tested) x 100  
                   • (# of managers who communicate with the trainee at specified periods post-training (e.g., six months, one year) x 100 |
| Behaviour        | • Completed self-assessment questionnaire  
                   • On-the-job/supportive supervision observation | • What is the level of opportunity to apply capability in the workplace, as perceived by an individual and line managers? | • (# of trainees undertaking activities according to set standards or processes / total # of trainees tested) x 100 |
<table>
<thead>
<tr>
<th>Evaluation Level</th>
<th>Methods</th>
<th>Indicators Guidelines</th>
<th>Proposed Indicators</th>
</tr>
</thead>
</table>
|                  | • 360-degree feedback/reports from customers, peers and trainee's manager  
• Job records and checklists indicating adherence to processes  
• Staff satisfaction surveys and retention levels  
• Performance review scores and assessments | • To what extent do trainees demonstrate the acquired capability in the workplace, as perceived by themselves, colleagues, line managers and customers?  
• To what extent are mentoring and coaching seen as a regular part of managers’ responsibilities and are reinforced through the performance management process?  
• To what extent are managers providing a supportive environment that allows staff to practise new skills? | • (# of trainees in positions where their training is applied in the performance of their duties / total # of trainees) x 100  
• % of workers who received supportive supervision in the past six months  
• # of staff who have completed their annual performance reviews with their supervisors for the last performance period / Total number of staff eligible for an annual performance review) x 100  
• # of individuals applying for membership of professional supply chain networks and bodies  
• # of staff who vacated their positions / # of staff employed by the organization) x 100 |
| Organizational Results | • Organizational performance data (KPIs)  
• Financial reports  
• Quality inspections  
• Interview with departmental managers | • What is the level of satisfaction with improvement/achievement of desired supply organizational outcomes?  
• What is the level of contribution of training interventions to the achievement of supply chain performance indicators? | To be agreed |