Barriers in the Supply Chain Management of Essential Medicines in the Public Healthcare System in Malawi

FESTON KAUPA
University of KwaZulu-Natal
fkaupa@cmst.mw

MICHELINE J NAUDE
University of KwaZulu-Natal
naudem@ukzn.ac.za

Abstract

The role of the public healthcare sector in improving the availability of medicines and medical supplies at all levels of the public health delivery system has never been so important. This paper investigates the barriers in the supply chain management of essential medicines in the public healthcare delivery system in Malawi. The exploratory and descriptive study followed a qualitative case-study approach. Data were collected by means of semi-structured interviews with 12 participants based on a non-probability purposive sample from suppliers of essential medicines, regulators, donors, and logistics companies in Malawi. Data was analyzed using thematic analysis. The findings revealed barriers that negatively influence the performance of supply chain management. The barriers identified center around the selection, planning, and sourcing of essential medicines. No previous studies that deal with the identification of barriers in the Malawian pharmaceutical supply chain were found. Therefore, this research makes a twofold contribution to the body of knowledge in the field. Firstly, it identifies the barriers; secondly, it could assist stakeholders in the public healthcare service delivery system in Malawi with regard to how they can improve the supply of essential medicines.

Keywords: Malawi, Supply chain management, Pharmaceutical supply chain; Public healthcare delivery system.

Introduction

The goal of any supply chain is to meet demand, create value for the customer, improve responsiveness, build a good network, and facilitate financial success (Lysons & Farrington, 2016, p.87). In order to achieve this goal, organisations must integrate their internal and external processes with supply chain partners (Monczka, et al., 2015, p.15). Supply chain partners succeed if they identify, evaluate, and manage barriers in their supply chains. If they do not, the barriers may prevent the supply chain from achieving its performance benchmark and may ultimately affect overall performance (Parmar & Shah, 2016, p.27; Parmenter, 2015, p.103). Barriers can arise from the nature of the organisation itself and from the human resources that make up the organisation. Incompatible information systems and technology, conflicting organisation structures and culture, and inadequate performance measurement systems are barriers to successful supply chain management (Ainapur et al., 2011, p.163; Christopher, 2016, p.228).

Most companies are organised through creating divisions of responsibilities by function. Such functional boundaries impede end-to-end process integration and management, and present multiple organisational faces to the customer. Barriers can interrupt external process integration along the supply chain, causing information distortion, longer cycle times, stock-outs, and the bullwhip effect. This would result in high overall costs and reduced customer service capabilities (Wisner et al., 2018, p.460). The focus of this study is the barriers experienced by the public healthcare service delivery system in Malawi in the supply chain of essential medicines.

Governments have a social responsibility to provide healthcare to their citizens (Kraiselburd & Yadav, 2012, p.5). In order to achieve this, an effective and efficient national supply chain system needs to be in place. The Government of Malawi attaches great importance to the provision of quality healthcare services, namely, the availability of essential medicines and essential medical supplies (Ministry of Finance and Economic Planning Development, 2017, p.48; Nabbuye-Sekandi et al., 2011, p.4). However, regular stock outs of essential medicines at the Central Medical Stores Trust (CMST) and in public health facilities remain a constant challenge (Central Medical Stores Trust, 2014, p.6). Some of the causes of stock outs include insufficient and variable financing, poor procurement management systems, weak logistical information management systems, inadequate storage and transport infrastructure, pilferage and theft of supplies in warehouses and during transportation, receipt of unnecessary medicine donations, and receipt of donations of near-expiry date medicines (CMST, 2014, p.8; Kanyoma et al., 2013, p.20). Stock-outs of essential medicines can lead to high incidences of diseases and premature deaths, thereby compromising the strengthening of the public healthcare system in Malawi. Against this background, the problem statement is as follows:

Unless the barriers in the supply chain of essential medicines experienced by the public pharmaceutical supplies system in Malawi are identified and successfully addressed, healthcare services' efficiency and effectiveness will be negatively affected.

A search conducted on the Nexus database of South Africa revealed three related studies that dealt with supply chain management (SCM) challenges in public service delivery in southern Africa (Dzuke, 2015; Lewis, 2005; Ndlovu, 2012). One study by Gomera and Mafini (2020) investigated the supply chain management enablers, barriers, and disruptions in the animal feed industry in South Africa. However, no studies were found that identify the barriers in the supply chain of essential medicines in Malawian public health sector. Accordingly, the following research objectives guided the study:

- to identify the barriers in the supply chain of essential medicines experienced by the public healthcare service delivery system in Malawi; and
- to identify and propose recommendations that may be adopted to manage the identified barriers.

The article first reviews available literature on the Malawi healthcare sector, the pharmaceutical supply chain and barriers in supply chain management. This is followed by a description of the research design and methodology, a report of the findings, recommendations and finally the conclusion.

The Malawi Healthcare Sector

Healthcare in Malawi is provided by the private and the public sector. Services provided by the public healthcare are free of charge, whilst private sector providers charge user fees for their services. The private sector consists of for-profit and faith-based organisations. For-profit healthcare is provided by private hospitals, clinics, laboratories, pharmacies, and traditional healers. Faith-based organisations include the Christian Health Association of Malawi, non-governmental organisations, statutory corporations, and private organisations who provide the private-not-for-profit healthcare (Chana, 2011, p.2; Ministry of Health and Population, 2016, p.5).

The Malawi healthcare system is divided into four levels, namely, the community, and the institutions at a tertiary, secondary, and primary level (Chana, 2011, p.2). These levels are interlinked through a referral system. Community, primary, and secondary levels of care fall under the District Health Officer within district/town/city council systems that are under the overall supervision of the District Commissioner. Health surveillance assistants at dispensaries, village clinics, and maternity clinics provide community level healthcare. These assistants mainly promote and provide healthcare through door-to-door visitations, village outreach, and mobile clinics (Henry et al., 2015, p.986; Ministry of Health and Population, 2017, p.2).

At the tertiary level, health care is delivered through central hospitals. There are five central hospitals in Malawi, which provide specialist health services at a regional level and referral services to the district hospitals within their regions. In addition to referral services, they also provide essential health package services (Chana 2011, p.2; Ministry of Health and Population, 2017, p.2).

The secondary-level health service providers are the district and Christian Health Association of Malawi hospitals. These hospitals provide general services and primary health care services to outpatients, inpatients, and the surrounding community. In addition, they provide training and support to community-based health programmes and are managed by a district health management team (Chana, 2011, p.2; Henry et al., 2015, p.986).

Features of the primary level are health surveillance assistants, community-based distributing agents, community health nurses, and other volunteers within community and institutional settings who undertake healthcare or community care provision. Institutional settings consist of community initiatives, health posts, dispensaries, maternities, health centres, and community and rural hospitals (Chana, 2011, p.1; Henry et al., 2015, p.986).

Within this system, the Ministry of Health is the policyholder, setting the standards of healthcare and providing technical support as well as monitoring and evaluating services. In addition, the Ministry of Health mobilises resources and develops strategic plans for the whole health sector (Ministry of Health and Population, 2017, p.3).

Pharmaceutical Supply Chain of Essential Medicines in Malawi

The supply chain for essential medicines follows a rigid process that ensures compliance with the Malawi Public Procurement Act (2003) and the Malawi Public Procurement Guidelines (2004). This process comprises: (a) selection of essential medicines; (b) demand, forecasting and planning; (c) procurement; and (d) warehousing and distribution. Each of these processes is briefly described.

Selection of essential medicines

The World Health Organisation (WHO) defines essential medicines as those that satisfy the needs of the majority of the population and that should be available at all times. The essential medicines list of the WHO serves as a model for country-specific national essential medicines (Mahmic-Kaknjo et al., 2018, p.5). The process of selecting essential medicines begins with defining a list of common diseases. The treatment of first choice for each health problem should be the basis for the list of essential medicines (Mahmic-Kaknjo et al., 2018, p.5). The selection involves choosing high quality essential medicines in appropriate dosage forms and strength. The selection and use of a limited number of

essential medicines leads to an improved supply of medicines, more rational prescribing, and reduced costs in healthcare delivery (Laing & Tisocki, 2017, p.7).

Demand forecasting and planning

Demand forecasting and planning entails an understanding of the market requirements to ensure that products are made available at the right time, in the right quantities, and at the right place and time (Christopher, 2016, p.312; Stevenson, 2018, p.555). The CMST relies heavily on forecasts prepared by the Ministry of Health to estimate and plan for customer demand. Forecasting uses data that provides an estimate of past and future consumption of medicines. Data used for forecasting includes consumption data, service data, and demographic/morbidity data. Consumption data represents an estimate of the total consumption of all health facilities at all levels in the country. Service data includes data from a variety of sources related to specific services and the number of visits or treatments for various illnesses or conditions. Demographic data includes population census data and data from other demographic and health surveys (Ministry of Health and Population, 2018, p.8).

Procurement

Procurement involves sourcing products and services from a wide range of suppliers through competitive bidding processes and quotations. It involves the following: identifying and selecting suppliers; buying, negotiating and contracting; conducting supply market research; and managing and improving suppliers (Lysons & Farrington, 2016, p.5; Monczka et al., 2015, p.11).

The CMST sources medicines and other health commodities in accordance to the policies and guidelines of the Office of the Director of Public Procurement. The trust uses various procurement methods that include single sourcing, request for quotations, national competitive bidding, and international competitive bidding (CMST 2015-2020 Business Plan 2015, p.15). An alert is transmitted to the procurement unit when health commodities are not available from existing stock or when stock reaches re-order levels and needs replenishing.

Warehousing and distribution

Distribution involves delivering commodities to customers at the right time and quality, and in the right quantity , requiring high levels of planning and co-ordination between the organisation, its customers, and other components of distribution such as transportation, warehousing, and repackaging services (Naude, 2009, p.105; Wisner et al., 2018, p.349).

Essential medicines are distributed from a central warehouse to the three regional medical stores, namely, the Region Medical Stores South, the Region Medical Stores Centre, and the Region Medical Stores North. The medicines are redistributed from the regional stores

to the five central hospitals, 28 district hospitals, and over 700 health centres throughout the country (CMST 2015-2020 Business Plan, 2015, p.16).

Research Methodology

This study adopted a qualitative case study approach, and data was collected through in-depth interviews. The target population comprised 134 organisations from the public and private sectors in Malawi. These organisations are the 120 suppliers of essential medicines provided by the CMST database of suppliers, the national medicines regulatory authority, the national procurement regulatory authority, the 12 members of the health donor group, and the two pharmaceutical logistics companies that distribute medicines to public health facilities.

A non-probability purposive sampling technique was adopted. Personal judgement was used to choose 12 participants based on their expertise and knowledge in pharmaceutical supply chains. Face-to-face interviews were conducted with the participants, using a semi-structured interview guide. The interview guide was checked for content and face validity by a number of academics during the ethical clearance process and pre-tested by a supply chain specialist in the public healthcare system in Malawi. The purpose of this pre-test was to refine the questions so that there was s no ambiguity and the participants would be able to answer them without any difficulty.

During the interviews, the participants were given the opportunity to ask questions and seek clarity, before answering the questions. Thus, consistency was maintained during the interviews, which contributed to the trustworthiness of the results of the study. In order to ensure conformity, the interviews were recorded using a digital voice recorder. The recorded interviews were transcribed verbatim and checked against the recordings for accuracy. This 'data cleaning' was done to identify and correct errors. The data cleaning process was carried out twice by the authors of this article to ensure accuracy of the transcribed interviews. Table 1 provides the profile of the participants.

Table 1: Profile of participants

Participant	Gender	Age group (years)	Designation	Management Level	Organisation	Years of experience in organisation
P1	Male	30-39 years	Supply Chain Advisor	Senior	Donor	5- <10 Years
P2	Male	40+ years	Senior Logistics Officer	Middle	CMST	5- <10 Years
P3	Male	40+ years	Supply Chain Advisor	Senior	Donor	5- <10 Years
P4	Male	40+ years	Director of Pharmaceutical Operations	Senior	CMST	5- <10 Years
P5	Male	40+ years	Director of Finance and Administration	Senior	CMST	5- <10 Years
P6	Male	40+ years	Logistics Manager	Middle	Logistics service provider	5- <10 Years
P7	Male	40+ years	Registrar	Senior	PMPB	10- <15 Years
P8	Male	40+ years	Hospital Director	Senior	Kamuzu Central Hospital	10- <15 Years
P9	Male	40+ years	Quality Assurance Manager	Middle	CMST	5- <10 Years
P10	Male	40+ years	Deputy Director, Pharmaceuticals	Senior	MOHP	20+ Years
P11	Female	40+ years	Procurement Manager	Middle	CMST	5- <10 Years
P12	Female	40+ years	Supply Chain Advisor	Senior	Donor	5- <10 Years

Source: Compiled by the authors

Discussion of the Findings

Data was analysed using thematic analysis. The data was grouped into specific themes, categories, and codes. The initial codes were derived from the actual terms and key words used by the participants in describing the barriers of the four processes in the supply chain of essential medicines in Malawi. The four processes provided the context for the participants' words that generated the themes and sub-themes. A thematic map of barriers was then developed so as to be able to discuss the barriers for these four processes. Table 2 reflects the thematic map that was established from the transcribed interviews and the field notes.

Table2: Thematic map of the interviews

Theme	Sub-themes	Code
Theme 1 Selection	Lack of knowledge of the pharmaceutical market	Training; capacity building
	High cost of medicines and treatment	Generic medicines; policy on medicines
	Outdated standard treatment guidelines	Essential medicines; stock outs
	Narrow range of registered products	Restricted to registered products; resource constraints
Theme 2 Demand forecasting and planning	Poor quality of consumption data	Data accuracy and reliability; collaboration
	Lack of skilled human resources	Lack of capacity; demand planners
	Insufficient financial resources	Budgets; availability of finances; fund procurement.
Theme 3 Procurement	Lack of a robust procurement system	Lead times; lack of planning
	Lack of financial resources	Budget allocation; reliable budget; unavailability of funds
	Lack of human resources and skills	Supply chain skills; inadequate human resources
	Poor specification and quantification	Accurate data; stakeholder involvement
	Weak governance and accountability mechanisms	Autonomous institution; reliance on government; trust
	Inadequate capacity of suppliers/manufacturers	Manufacturing capacity; local manufacture
Theme 4 Warehousing and Distribution	Inadequate Storage	Warehouse; movement of materials; expiry of medicines
	Lack of inventory management system	Robust warehouse system and processes
	Lack of human resources	Lack of skills; lack of accountability
	Challenges with distribution infrastructure	Poor road infrastructure
	Lack of collaboration	Overstocking, out of stock

Source: Compiled by the authors

Theme 1: Selection of essential medicines

The selection of medicines ensures that medicines can be sourced and then distributed to the right health facilities through the use of proper specifications, thereby reducing excessive inventories across the supply chain, avoiding stock-outs, and improving customer service (Wisner et al., 2018, p.157). The CMST uses a product catalogue to guide the specifications of medicines to be sourced. The catalogue was developed in 2015 and is reviewed regularly to take cognisance of new medical developments as well as new disease occurrences. In practice, however, there are barriers that prevent the efficient selection of medicines.

Theme 1 presents the barriers identified by the participants in the selection of essential medicines in Malawi. The findings revealed four sub-themes: lack of knowledge of the pharmaceutical market; the high cost of medicines and treatment; outdated standard treatment guidelines; and a narrow range of registered products.

- *Lack of knowledge of the pharmaceutical market.*

The findings revealed the importance of employees in the public health supply chain who have the appropriate training, knowledge, and skills:

> *"There is a need to have the right people who are well trained. There is need to train personnel through training and capacity building"* (Participant 3)**.**
> *"The training of staff is very important."* (Participant 4).

Syazwan et al. (2014, p.22) identified lack of recruitment, staff retention policies, capacity development programmes, lack of employees' commitment and lack of, or inadequate, resources as barriers in human resources management. Consequently, continued learning and capacity development is important in human resources management and development.

- *High cost of medicines and treatment.*

Five of the 12 participants observed that the high cost of essential medicines and the associated treatment costs are a barrier to the attainment of excellence in the management of the essential medicines supply chain in the public healthcare service delivery in Malawi. This can be attributed to a lack of local manufacturers who are able to manufacture high quality, affordable, essential medicines:

> *"There is need to build capacity for local industry. This should ensure the local industry is able to produce quality but affordable medicine"* (Participant 4).

In addition, there is no hospital policy on medicines, which creates a problem of diversity of treatment and lack of compliance with standard treatment guidelines, leading to a high cost of treatment:

> *"So now that's where the challenge is, we need a hospital policy on drugs. For this disease, these are the drugs and these are the alternatives"* (Participant 8).

Consequently, a premium is paid for patented pharmaceuticals, designed to support research activities (Bouchard et al., 2009, p. 1487). Premiums lead to the increased price of branded medicines and reduce access to lifesaving medication, whilst lower priced generic medicines could be used.

- *Outdated standard treatment guidelines*

In Malawi, outdated standard treatment guidelines are a barrier when determining which medication is to be prescribed to patients:

> *"In the past, the district of health offices had a local disease formulary which included other diseases that occurred. A Lack of disease formulary is a big problem to determine the medication hence a problem in forecasting and selection"* (Participant 6).
> *"There are always delays in updating standard treatment protocols and guidelines"* (Participant 9).

One participant made a comparison to Rwanda. The participant indicated that there is lack of enforcement of the essential medicines list and standard treatment guidelines in Malawi. This results in doctors, nurses and clinicians using different medicines from those on the list:

> *"If you go to Rwanda, there is an essential medicines list. Any foreign doctor will be told that this is what we use. And it ends there. Nobody will go around asking for this and that. But here we allow people to do that."* (Participant 4).

The prescription of medicines that are not on the essential medicines list and the standard treatment guidelines lead to superficial stock-outs because of a mismatch between the medicines that health facilities order and the stock on hand that is not used. Variations in prescriptions also contribute to essential medicines expiring:

> *"This brings in the problem of foreign doctors who are trained in different countries, each one coming in with his own needs"* (Participant 4).

This is in line with the findings by Penner, Penner, and Keck (2004, p.90), who observed that in healthcare pharmaceutical supply chain management, policy makers are faced with dilemmas as they plan healthcare provision and delivery. Pibernik (2006, p.721) found that one such dilemma is stock-outs and argues that rates of stock-outs, which are already high in the public and private sectors in the developing world, may worsen as demand grows, unless systems and resources improve.

- *Narrow range of registered products*

The findings revealed that the procurement of medicines is restricted to registered medicines. Generally, properly assessed, registered, and licensed medicines will have very few quality and safety issues as it moves down the pharmaceutical supply chain:

> *"The entrance point of a product into the market is very important. The entrance is the registration. And registration is a process and we must be able to trust that process"* (Participant 7).

However, resource constraints limit the capability of the Pharmacy, Medicines and Poisons Board to assess product registrations from the manufacturers:

> *"In general, control the source. But we can't control much because we are limited in resources so will still get from the Indian and Chinese market"* (Participant 7).
> *"When I compare Malawi with other countries in the region, the number of registered products is low. Now that limits us in terms of the products that we are going to plan for and the products that we are able to procure. Because we limit ourselves to a small range of registered products. This is why we don't have cancer medicines. There are very few registered here, because manufacturers are saying it doesn't make sense to register these products in Malawi. There is no business sense because the quantities that we require are very small"* (Participant 9).

The choice and range of essential medicines that can be selected and quantified for procurement is limited by the low number of registered products.

Theme 2: Demand forecasting and planning

As indicated in the literature review, good planning is essential for organisational performance. The CMST relies heavily on forecasts prepared by the Ministry of Health to estimate and plan for customer demand. Theme 2 presents the barriers identified by the participants when forecasting demand and planning for the procurement of essential medicines in Malawi. The findings revealed three sub-themes: poor quality of consumption data; lack of skilled human resources; and insufficient financial resources.

- *Poor quality of consumption data*

Eleven participants commented on the factors surrounding the poor quality of consumption data for essential medicines. The lack of data accuracy and reliability is a barrier in demand planning and forecasting. During the demand planning and forecasting stage, some health workers do not pay attention to detail. This impacts on the quality of data that they present. The reason given is that health workers are of the opinion that demand planning and forecasting should be carried out by the donors:

"Many people are not able to come up with quality data. There is no evidence that data is really quality data. People just throw in stuff and then they present this because it is an activity that has been called for, usually by the donors" (Participant 9).

Forecasting uses the projective method, which bases quantification on past consumption adjusted for stock-outs, seasonal variations and specific observations by health workers. However, little effort is made to establish the actual requirements of essential medicines. Because of the lack of actual data, wastage and other losses are seldom factored in to establish the actual requirements:

"Have we factored in all the misuse taking place, all the mismanagement, all the pilferage which is now proven and so on and so forth? Normally we need to be able somehow to factor in the part of pilferage and so on." (Participant 4).

It can be concluded that good forecasting and quantification depends on the quality of the data and needs collaboration. This is in line with Hearnshaw and Wilson (2013, p.450), who observed the importance of co-ordination and collaboration in SCM. This approach would require organisations to collaborate and share information on production capacities and schedules, demand projections, delivery quantities, and dates.

- *Lack of skilled human resources*

The findings of this study reveal the importance of capacitating the people that undertake forecasting and quantification. Capacity gaps exist in all the stages of the supply chain that are required to collect data for demand planning:

"There have been issues of lack of capacity at the health facility level in terms of human resources that can collect information in the right format" (Participant 10).
"Currently I am not very sure whether enough has been done in that area to ensure that everyone who is supposed to be collecting data is conversant with what they are doing. So the two go together, the data itself and the capacity building and the number of the people that are collecting the data" (Participant 12).
"We have been pushing for demand planners, but it has been viewed negatively by colleagues within the organisation. People think it is not important. But it is very important because we are the people who distribute medicines. We need to know what our clients want" (Participant 9).

It was found that within the CMST staff structure, no one is responsible for demand planning. As a result, the CMST attempts to stock everything in an attempt to make sure there are no deficiencies. However, this results in either overstocking or understocking:

"In a supply chain arrangement, you need to have a planning unit that will do nothing but plan demand, plan the whole supply chain. So, we are missing the demand planning" (Participant 2).

This is in line with Gibson et al. (2016, p.477), who suggest that companies must spend a significant amount of time increasing the capabilities of their own employees, in this case demand planners.

- *Insufficient financial resources*

One participant noted that the non-availability of adequate financial resources is a barrier because, if government does not pay for the medicines, then the CMST will not be able to procure them, and results in stock-outs:

"Currently there are not enough resources. Government still owes CMST a lot (of money). It's a vicious circle because if government doesn't pay then CMST won't be able to procure, then stock-outs will happen" (Participant 12).

Other participants observed that demand forecasting and planning is affected by budgetary uncertainties. Drug budgets must match with the available finances to fund procurement:

"If you successfully budget, that will be taken as a success factor because whatever will follow will hinge in the budget that is done at this stage" (Participant 11).
"You need to be able to come up with a very realistic figure that is based on your needs." (Participant 3).

Theme 3: Procurement of essential medicines

As indicated in the literature review, procurement involves sourcing products and services from a wide range of suppliers through competitive bidding processes and quotations. The CMST sources medicines and other health commodities through various procurement methods such as single sourcing, request for quotations, national competitive bidding, and international competitive bidding. Despite this, conflicts and interference arise as a result of the absence of collaboration among supply chain partner organisations.

Theme 3 presents the barriers identified by the participants in the procurement of essential medicines in Malawi. The findings revealed six sub-themes: lack of a robust procurement system; lack of financial resources; lack of human resources and skills; poor specifications and quantification; weak governance and accountability mechanisms; and the inadequate capacity of suppliers/manufacturers.

- *Lack of a robust procurement system*

One of the participants noted that the lack of procurement planning results in emergency sourcing by CMST, which negatively affects cost:

> *"CMST is usually engaged in emergency procurement. As a result, there is limited time to make price comparisons"* (Participant 1).

Even though there are procurement systems in place at the CMST, these need improvement. One challenge is that lead times are too long. Emergency sourcing through requests for quotations (RFQs) are usually carried out to close stock gaps that are created by long lead times:

> *"A lack of planning, that becomes a barrier because you are forced to engage in emergencies, maybe because you did not plan your purchases well."* (Participant 11).

Another participant noted that the CMST procurement unit is complacent. It waits for the user units to place orders, instead of demanding that they submit their requirements within prescribed timeframes so that there is ample time to compile the requirements, source them, and negotiate for better pricing and contracts. Furthermore, the lack of demand planners and the underutilisation of pharmacists in product selection leads to procurement being undertaken 'in emergency mode':

> *"What is happening at the moment is that procurement is sitting, waiting. Procurement is not proactive. It is there waiting to provide a service"* (Participant 2).

Another participant remarked that the prequalification process, which on average takes two years, restricts the entry of new pharmaceutical companies that could participate in supplying CMST with essential medicines.

> *"The prequalification process is time-bound to two years, which means that if any new players come in between, they will not a have a chance. In our case, the way we do it, we sit and then nearer the two years we start the prequalification process"* (Participant 9).

- *Lack of financial resources*

The Malawi public procurement legislation states that a procurement entity can only commence the actual procurement after ensuring that there are sufficient budgetary allocations to fund the purchase (Ministry of Finance and Economic Planning Development, 2004, p.14). However, even though funds are allocated in the budget, they may not be available when the actual purchase is being instituted.

"Currently there are not enough resources. Government still owes CMST a lot of money" (Participant 12).
"From the time we started national forecasting, we have never had one reliable budget" (Participant 1).
"Unavailability of funds to finance purchases is a barrier." (Participant 11).

- *Lack of human resources and skills*

The CMST supplies finished products and ensures that the products reach the intended health facilities and beneficiaries. However, the findings revealed that some of the staff that manage the medicine supply chain do not have the appropriate knowledge and skills:

"The other barrier is that some members of staff do not see the CMST as a supply chain and logistics organisation. This a barrier in a sense that people then don't have supply chain skills" (Participant 9).

Inadequate human resources at the District Health Office (DHO) pharmacy is another challenge, leading to some of the requirements of health centres not being submitted or submitted belatedly:

"Some health centre's staff were saying, we send our requirements to DHOs, but for some reason the pharmacists at the DHO level often omit our requirements and submit their own requirements. So they miss out on our targets and then we have stock-outs" (Participant 9).

Two participants suggested that deployment of procurement specialists and recruitment of skilled staff would address some of the human resources barriers:

"There is need for specialist in procurement. *This will help in differentiating the process of procuring medicines and other items"* (Participant 1).
"It's about getting the right people in the right position, properly trained people, so that they can do the right things when they are required to do so" (Participant 10).

- *Poor specifications and quantification*

Crockker et al. (2012, p.15) observed that the efficiency and effectiveness of supply chain management involves the integration of suppliers, manufacturers, warehouses, and stores so that goods are produced or procured in the right quantities and distributed to the right locations, and at the right time, whilst minimising costs and satisfying customers' requirements. The area of specification and quantification plays a vital role in any supply chain. Poor specifications and poor quantification may negatively impact procurement.
The findings revealed that poor specifications and quantification are a consequence of the unavailability of accurate data:

"*Procurement is negatively affected by poor quantification. Quantification relies on the availability of accurate data which is missing in CMST"* (Participant 5).
"Sometimes, lack of information in terms of quantification. When you don't know how much you are going to buy, that is going to affect procurement" (Participant 10).

One participant indicated that stakeholder involvement and the continual review of specifications would address this barrier:

"Involvement of all stakeholders and continuous review of the specifications and our catalogue to be in line with changing times so that all the time the catalogue is up to date" (Participant 11).

Weak governance and accountability mechanisms

The findings revealed that despite having a desire to create the CMST as a self-sustaining and autonomous institution, the Malawi Government still owns the majority of interests in the CMST, both directly and indirectly. The extracts below show how stakeholders, including the government of Malawi, interfere with the operations of the CMST:

"The government interferes in the allocation of resources" (Participant 8).
"Some medicines, which are not on the list of essential medicine, are forced to be included on the list of medicines that are procured. Government accepts that we have some medicines that fall under the category of special medicines" (Participant 1).
"Deciding where to source is a challenge. This is aided by the donor influence as most donors decide where to procure medicines" (Participant 8).

The CMST is mostly reliant on government as a customer and source of funding. Although the CMST is a public trust, over-reliance on government obliges it to supply medicines to public health facilities, without being paid for them.
Because of the dependency of the CMST on the government of Malawi and other partners, stakeholders have been allowed to interfere in the CMST operations. At the same time, the CMST has been denied the level of autonomy and self-sustainability that it was expected to achieve. As indicated by Fawcett et al. (2008, p.37), such interference arises from the lack of trust amongst supply chain partners.

One participant remarked that weak governance and accountability systems provide an opportunity for interference and breeds corruption:

"Political interference, resources and corruption are big issues where government still wants to have a say. In some cases, they want to influence some of the purchases

for their own gain. Corruption can also not be overlooked there and of courses the issues of resources" (Participant 12).

- *Inadequate capacity of suppliers/manufacturers*

Basu et al. (2012, p.19) observe that most of the least-developed nations fail to meet the basic needs of their people for essential life-saving and health-promoting medicines. Most specialised and generic medicines are either manufactured in Western countries, or Southeast Asian countries. In addition, some countries, including Malawi, lack the manufacturing capacity for essential medicines, relying on imports and donations. Inadequate local manufacturing capacity is a barrier for the CMST in the procurement of essential drugs from local manufacturers:

> *"In Malawi, we are not manufacturing. We are importers. So, this is a barrier because lead times are longer. The long lead times are also exacerbated by Malawi being a landlocked country"* (Participant 11).

Another participant observed that the inadequate manufacturing capacity of local industries leads to foreign suppliers and manufacturers monopolising the local pharmaceutical market. Therefore, he suggested that local pharmaceutical manufacturers need support to enable them to produce generic medicines:

> *"Local manufacturers need support to enable them to produce essential products. There are few suppliers which results in too much monopoly in the market by foreign suppliers"* (Participant 9).

Theme 4: Warehousing and distribution of essential medicines

As indicated in the literature review, distribution is defined as the delivery of products to customers at the right time, of the right quality, and in the right quantity. This requires high levels of planning and co-ordination between the organisation, its customers, and the other components of distribution. In Malawi, essential medicines are distributed from a central warehouse to the three regional medical stores. The medicines are redistributed from the regional stores to the five central hospitals, 28 district hospitals, and over 700 health centres throughout the country (CMST 2015-2020 Business Plan, 2015, p.16).

Theme 4 presents the barriers identified by the participants with regard to the warehousing and distribution of essential medicines in Malawi. The findings revealed five sub-themes: inadequate storage; lack of an inventory management system; lack of human resources; challenges with the distribution infrastructure; lack of collaboration.

- *Inadequate storage*

Inadequate storage space was noted as a barrier. Sufficient storage space for essential medicines that would cater for the current and future needs is important:

"Even where you have a very good warehousing system, whether a computerised or otherwise, it will not work if you don't have enough space because you will end up piling up things because you don't have adequate space" (Participant 10).
"We need to think about sufficient space to meet the current need and future needs. Our warehouses were built a long time ago. The population is increasing at the rate of 3% annually and we still maintain the same warehouses. So, we need to look at those things" (Participant 9).

One participant observed that adequate space should not only be for storage but also for the movement of materials, as well as for warehousing handling equipment for picking and packing commodities:

"Creation of space for easy material flow within the warehouse. This is an issue. Sometimes an item is left in the warehouse just because it is very far, and you cannot move it. It is wanted but you look at how you have stacked it. You fail to get it and say we 'don't have it' and you just requisition for another procurement. These are the items that expire" (Participant 11).

- *Lack of inventory management system*

The participants indicated that there is no warehousing inventory management system in place at all levels of the CMST. Even though space is available, this would have to be supported by robust warehousing systems and practices that will ensure the security and quality of the medicines:

"In all the storage facilities at the lower level, there is no warehousing system which is currently in use. All the systems in place are not warehousing systems" (Participant 1).
"Inventory is not being managed the way it should. We need systems in place. At the moment we are using a 1980 warehousing system, but nobody is managing it." (Participant 2).
"There should be a system in place to strengthen the information management system and also see how it relates to other systems" Participant 3).

The findings further reveal that Internet connectivity poses a challenge. In some circumstances, especially emergencies, when a health facility would want to get commodities urgently, the warehousing system would fail to produce proof of delivery documents (PODs) due to internal processing inefficiencies and systems failures:

"The only barrier for us are the systems delays. We experience delays in sending the commodities to recipients because of system issues" (Participant 6).

- *Lack of human resources*

The CMST is faced with a shortage of skilled human resources in the warehouse who would be responsible for inventory management. The people assigned to manage stocks do not prioritise inventory management in their job. Instead, the warehousing managers and even the class holders place inventory management as the last job on their work list. They are never concerned with the stock levels, as explained below:

> *"When you go to the warehouse at CMST, you don't see the warehouse managers doing inventory management. Even our class holders don't manage the inventory. They are not affected by the levels of the inventory in their class"* (Participant 2).

The study found that, although some personnel are transferred from other departments to the warehouse, the challenge remains that these personnel lack knowledge of inventory management. As a result, their presence in the warehouse does not improve efficiencies in inventory management:

> "*In district hospitals, there is shortage of personnel to manage the warehouses. As a result, some personnel from other departments manage the warehouses"* (Participant 8).
> *"One of the barriers in warehousing is the knowledge of staff who are doing the warehousing and of course the quality of storage"* (Participant 1).

Another participant observed the lack of accountability in health centres due to a shortage of staff:

> *"The challenge that we have seen when we go to the districts, especially the health centres, the same person who receives the medicines, is the same who keeps them, is the same person who issues out medicines – no accountability" (*Participant 8).

- *Challenges with distribution infrastructure*

One of the challenges faced by CMST in the distribution of medicines is dependence on the road transport system. One participant noted that the poor road infrastructure in Malawi is a barrier in the distribution of essential medicines:

> *"I would say a major challenge is the road infrastructure. Just recently, this week some of our contractors were threatening to withdraw their vehicles. They were complaining about the road infrastructure whereby on one trip the vehicle would have the tyres blown or sometimes bridges are washed away"* (Participant 6).

Another participant explained that the poor road infrastructure in the country has led to the utilisation of unconventional means of transportation for essential medicines such as

the use of oxcarts to transport medicines to hard-to-reach areas. Although such unconventional means allow the delivery of medicines to the service delivery points, they compromise quality management of the medicines in distribution:

> *"Bad road network! Our truck was stuck somewhere. It couldn't go and the villagers had to come and offload, using an ox-cart"* (Participant 11).

In order to access health facilities that are connected by poor road networks, it would be worthwhile to invest in appropriate types of vehicles and collaborate with other transport service providers so that they can also provide appropriate types of vehicles that can get to the difficult-to-reach and the most rural health facilities. Good distribution practices (GDP) demand that medicines are obtained from licensed supply chains and are consistently stored, transported and handled under suitable conditions as required by product specifications (Singh et al., 2016, p.10).

- *Lack of collaboration*

Poor collaboration amongst supply chain partners arises due to multiple players in the health commodities supply chains. As a public trust, CMST is responsible for procurement, warehousing, and distribution of health commodities. Parallel supply chains distribute their own commodities to the same health facilities, while CMST delivers essential medicines:

> *"Lack of co-ordination results in supply chain partners sourcing and distributing the same products. At the end of the day we either have an overstock of one product and zero stock of another product"* (Participant 1).

This is in line with Jambulingam et al. (2009, p.312), who posit that a lack of trust and knowledge about when, and with whom, to collaborate are potential barriers to successful collaboration. This is because information sharing and communication, mutuality, and openness are major elements of collaborative partnerships in supply chain management. Fawcett et al. (2015, p.645) support the idea of collaborative partnerships, arguing that, when successful, collaborative partnerships lead to a reduction in costs, improvement in service efficiency and effectiveness, increased revenue, and greater flexibility in operations. It is because of lack of co-ordination between stakeholders that parallel systems undermine the sustainability of national systems in already resource-constrained national pharmaceutical systems (Watson & McCord, 2013), particularly in low-income countries such as Malawi.

Summary of Barriers and Recommendations

The primary facets of any supply chain include demand forecasting and planning, procurement, warehousing, and distribution of goods. The CMST has been given the

responsibility of making sure that there is a steady supply of essential medicines to the healthcare system in Malawi. Furthermore, the CMST is required to adhere to good practices of pharmaceutical supply chain management. The findings of this study indicate that there are barriers within the supply chain. These barriers have been presented in terms of the main aspects of pharmaceutical supply chain management in Malawi, namely, demand forecasting and planning, selection, procurement, and warehousing and distribution of essential medicines. Table 3 presents a summary of the barriers identified in this study with suggested recommendations.

Table 3: Summary of barriers and recommendations

Theme	Barriers	Recommendations
	Lack of knowledge of the pharmaceutical market	Continued learning and capacity development of human resources management should be ensured.
Theme 1 **Selection**	High cost of medicines and treatment	The capacity of local suppliers and manufacturers should be developed to ensure that low-cost, but high-quality, generic medicines are readily available and accessible to a large proportion of the population at a lower price.
	Outdated standard treatment guidelines	
	Narrow range of registered products	
Theme 2 **Demand forecasting and planning**	Poor quality of consumption data	Human resources capacity building should take place in demand planning and forecasting.
	Lack of skilled human resources	
	Insufficient financial resources	The security of health commodities should be improved in ways other than increasing financial resources for the procurement of drugs.
Theme 3 **Procurement**	Lack of a robust procurement system	A robust procurement system should be introduced together with strategies such as prequalification, indefinite quantity agreements, and framework agreements with suppliers, in accordance with the Malawi Public Procurement Law.
	Poor specification and quantification	
	Lack of financial resources	Financial resources should be mobilised.
	Lack of human resources and skills	A robust team of procurement specialists should be set up who would offer

	Weak governance and accountability mechanisms	evidence-based guidance to top management, assist in interpreting the laws, and implement the appropriate policy mechanism.
	Inadequate capacity of suppliers/manufacturers	Strategic supplier partnerships should be built.
Theme 4 **Warehousing and Distribution**	Inadequate Storage	Warehousing requirements should be assessed in terms of volume and the processes needed to manage health commodities.
	Lack of inventory management system	A management information system should be implemented. This would improve both the efficiency and effectiveness of CMST.
	Lack of human resources	The capacity of the staff who manage the stocks of essential medicines in the warehouses should be continually developed.
	Distribution infrastructure	Investing in appropriate types of vehicles should be undertaken as well as collaboration with other transport service providers who can provide appropriate types of vehicles that can get to hard-to-reach, mostly rural health facilities.
	Lack of Collaboration	Collaborative strategic relations should be built through collaborative planning, forecasting and replenishment (CPFR).

Conclusion

The purpose of this article was, firstly, to identify the barriers in the supply chain of essential medicines experienced by the public healthcare service delivery system in Malawi. Secondly, it aimed to identify and propose recommendations that may be adopted to manage the identified barriers. This was achieved through semi-structured interviews with 12 participants, who are suppliers of essential medicines, regulators, donors, and logistics companies in Malawi. The qualitative data was analysed using thematic analysis.
The study has identified human and financial resources constraints and a lack of stakeholder collaboration as being the major barriers in the public procurement and supply chain management in Malawi. The research proposes the following as the major solutions that can be recommended to overcome the barriers: capacity building of human resources, mobilisation of financial resources, and stakeholder collaboration The findings have revealed that the identified barriers are significant to the attainment of excellence in the

supply chain management of essential medicines in the public healthcare service delivery system in Malawi.

The value and originality of the study, and therefore the expected contribution to the body of knowledge, lies in the identification and analysis of the barriers in the pharmaceutical supply chain in Malawi. It is envisaged that should the suggested recommendations be implemented; it would assist stakeholders in the public health service delivery sector to improve the delivery of essential medicines and supplies in developing countries. Ultimately, this would reduce the incidence of illness and the occurrence of premature deaths. This study provides a platform for future academic research on barriers in supply chain management as the results could aid researchers in developing the research instrument.

There were a number of limitations in this study. Firstly, the participants for the in-depth interviews were not randomly selected although every effort was made carefully and purposefully to select them. Thus, the findings cannot be generalised to all stakeholders in the pharmaceutical supply chain in Malawi. They can, however, be used as a basis for further research on the topic. Secondly, the barriers were identified from the literature review and from the in-depth semi-structured interviews with participants. The implication of this is that the list of barriers is not exhaustive.

Three areas for further research are suggested, namely, (a) an assessment of the adoption and utilisation of tools for the selection and quantification of essential medicines, (b) determining the real cost of drug pilferage in Malawi, both socially as well as economically, and (c) an assessment of the stakeholders' contribution towards the availability of essential medicines in Malawi.

The research findings support the narrative that the attainment of competitive advantage and supply chain excellence calls for the reversal of barriers into solutions.

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