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GAVI Study

On

Cold Chain Equipment (CCE) Country Landscape Analysis

For

The Democratic Republic of Congo (DRC), Kenya and Malawi

Prepared by:

IMPERIAL GROUP LIMITED, Trading through its division Imperial Health Sciences and Strategnos CC

CONTENTS

Country landscapes

1. Background

During January, consultants were deployed to three GAVI countries to review the current Cold Chain Equipment (CCE) maintenance **strategies, operational models and resource capacity** across industries and sectors. The purpose of the in-country analysis was to determine the decision making approach, best practices, asset management and performance management of current private and public sector operations across the four main areas of CCE maintenance: **delivery, installation, training and maintenance**.

The Cold Chain Equipment (CCE) maintenance programs were investigated across multiple industries in

- **Democratic Republic of Congo** (DRC) in two major city centers: Lubumbashi and Kinshasa
- **Kenya** in and around Nairobi, the country's capital city
- **Malawi** in the two cities of Lilongwe and Blantyre

The companies chosen for investigation represent **local, national and international organizations,** in an attempt to provide a well-rounded view of the private sector landscape. Therefore, through this analysis, it may be possible to understand the private sector landscape for CCE maintenance from a local, regional and international perspective. In addition, the review may indicate how the private sector may be able to engage with the public sector to transfer knowledge and skills, supply chain organization models, reliable contacts and sources of supply.

For the purpose of this report, the following categories were used to **classify company size**:

- Small companies – 10 or less employees,
- Medium companies - 11-50 employees,
- Large companies – greater than 50 employees.

For the purpose of this report, the following categories were used to **classify cold chain equipment**:

- Small storage/equipment – domestic refrigerators,
- Medium storage/equipment - chest freezers, commercial refrigerators,
- Large storage/equipment – cold rooms, commercial HVAC.

In addition to the investigation and review of CCE maintenance strategies, this review may also show ways in which the public sector may be able to successfully engage with the private sector.

In order to devise a meaningful way to **classify spare parts** for CCE, two refrigeration services organizations were contacted within South Africa:

- The first was Robust Air Solutions, which deals with electrical refrigeration appliances, selling, installing and maintaining air conditioning and refrigeration equipment.
- The second was Zero Appliances, who manufactures sells and maintains electrical, gas adsorption and solar direct drive refrigeration appliances. Several Zero appliances have been pre-qualified by the World Health Organisation. Zero currently distributes SureChill® technology to several countries within Africa, although not currently in the DRC.

Following the review with the two refrigeration services organizations spare parts were categorised as **critical and non-critical** components of cold chain equipment:

Critical	Non Critical
Unit will not function without part/s; stock of these parts must be readily available to prevent breaks in the cold chain	Unit will continue to run without part/s but will be less efficient and will eventually break, leading to the replacement of the unit
• Cooling coil and fan	• Oil
• Compressor	• Refrigerant gas
• Evaporator	• Seals
• Condenser	• Thermostat

Note:

- Solar direct drives require compressors as critical components. These compressors are unique to solar direct drive units and are not interchangeable with compressors from electrical units. Solar direct drive units require seals and thermostat as non-critical spares.
- It is noted that gas adsorption units require the same spares as electrical units.

As a final activity, an **additional list of suppliers** identified by the Gavi PSWG was engaged after the in-country visits. This list encompassed organisations that have previously performed work with Gavi, or have been identified to operate in the country. These organisations were contacted telephonically or via email, however the responses were poor, with little or no information being collected. A summary of these findings may be found in Tables 1-3.

2. In country overview of cold chain structure and service

A list of preferential suppliers from private sector entities across multiple industries was contacted prior, during and after the in-country visits, to analyse strategies, models and capacity.

The following section summarizes the high level findings from the in-country visits performed for DRC, Kenya and Malawi.

2.1 Summary of findings – DRC

Lubumbashi:

Lubumbashi is the second largest city in the DRC and is situated in the southeastern part of the country, in the Katanga province, bordering Zambia. Lubumbashi is rich in mineral resources and is therefore mined extensively. Despite this activity, Lubumbashi displays a relatively provincial landscape with an underdeveloped infrastructure and poor economic condition. Consistent electrical power from the local municipal source (SNEL) is not available, prompting local businesses and private homes to utilize power from generators. It is common for businesses to be established in the numerous buildings which are refurbished to the best of the occupant's ability and available funds.

In terms of CCE maintenance structures, overriding trends included small businesses that utilize an outsourced maintenance strategy. However, the perception is of a low skill base for repairs, as well as limited availability of replacement equipment and parts. This has two effects: the first is that adequately skilled technicians are retained at great cost to private businesses (however, technicians may moonlight independently), and the second is that spare parts are brought into the country by private networks or new equipment is bought immediately to replace the entire unit. A repair or reactive maintenance philosophy was prevalent over a preventative maintenance strategy.

Information was gathered from 16 organizations in Lubumbashi, Democratic Republic of the Congo. This information is presented in detail in Annexure DRC-01 (this is supplemented with an attached document Annexure DRC-01-01). These companies were visited between the 18th and 21st of January, 2016. Companies from the following industries are summarized in the table below:

Companies visited in Lubumbashi

Industry	Percentage of organizations visited	Typical size of organizations	Equipment classification	Level of skills
Refrigeration	6%	Small	Small/medium	High
Hospitality	13%	Large/ medium	Small/medium	Varied
Entertainment	13%	Small	Small/medium	Moderate
Retail	25%	Medium	Medium/large	Varied
Banking	6%	Large	Air conditioning units	Moderate
Food Service	13%	Small	Small/ medium	Moderate
Education	6%	Medium	Small	Low
Private Medical and Pharmaceutical	18%	Small	Small	Moderate

Kinshasa:

Kinshasa is the DRC's capital and largest city. It is situated on the Congo River, in the northwestern part of the country, close to Brazzaville, the capital of the neighboring Republic of Congo. Kinshasa has a vast city center and serves a larger population than Lubumbashi. An extensive road network is maintained in Kinshasa; however, travel is slow because of population density and the number of vehicles on the road. Head offices and agencies for international organizations are also more numerous. In contrast to Lubumbashi, there are more private businesses dealing in specialized electrical or refrigeration-specific skills, offering a more accessible and professional service structure.

In terms of CCE maintenance structures, prominent trends include medium businesses that utilize a hybrid maintenance strategy. Lower skilled workers are employed to perform inspections and general cleaning tasks, whereas scheduled preventative or on site predictive maintenance tasks are outsourced to local contractors (mostly through monthly contracts or SLAs). The relative availability of essential small and medium CCE equipment often prompts private businesses to not retain spare parts. Refrigerated vehicles are present (but rare) in Kinshasa.

Information was gathered from 19 organizations in Kinshasa, Democratic Republic of the Congo. This information is presented in detail in Annexure DRC-02 (this is supplemented with an attached document Annexure DRC-02-01). These companies were visited between the 25th and 28st of January, 2016. Companies from the following industries are summarized in the table below:

Companies visited in Kinshasa

Industry	Percentage of organizations visited	Typical size of organizations	Equipment classification	Level of skills
Refrigeration	26%	Medium	Small/medium/large	High
Hospitality	5%	Large	Large	Varied
Retail	26%	Medium	Medium/ large	Varied
Banking	11%	Large	Air conditioning	High
Food Service	11%	Large/medium	Small/medium	Varied
Education	5%	Medium	Small	Moderate
Private medical and pharmaceutical	16%	Small	Small	Moderate

2.2 Summary of findings – Kenya

Nairobi:

Nairobi is the capital city of Kenya and also its largest city. Kenya is a founding member of the East African Community (EAC) and Nairobi serves as a regional commercial hub. The economy in Kenya is one of the largest in east and central Africa, with service and agriculture being major economic drivers. Despite it being one of the largest portions of the Kenyan economy and employing a majority of the Kenyan workforce, agriculture is one of the least developed sectors. The government has started to turn to the privatization of state corporations as a way of boosting the economy. The Kenya Power and Lighting Company (KPLC), which handles the transmission and distribution of power is slated for privatization, though the generation of electricity by Kenya Electricity Generating Company (KenGen) will remain state-owned. Power within the capital city, is mostly consistent, but becomes sparse once leaving Nairobi. There are still large areas of the country without national grid power. There are frequent power outages, especially during drought periods, when water flow is decreased, which is a large barrier to increased economic activity. The government does plan on offering tax and other concessions to encourage private sector investment in geothermal energy.

During the interviews it was established that successful private sector organization's CCE maintenance programs have a few key components in common:

- There is typically a well-structured maintenance plan with relevant deliverables, preferably with a set of standard operating procedures (SOPs) and work Instructions are in place.

- A set of service level agreements (SLAs) are in place to contractually management the level of expectation, with consequences for failure, as well as a service level standard.
- A set of key performance indicators (KPIs), to measure the effectiveness of the maintenance plan and collect data for implementing improvement initiatives.

The work instructions also define output needed to measure success, which can be crafted into the SLA. The SLA formally defines the service required and outputs expected, with clarity on the scope or definition of services, quality and performance measurement, and responsibilities. The SLA's typically contain a contracted delivery period of performance.

It was noted that there appear to be a considerable number of CCE maintenance companies based in Nairobi. There are indications that the quality of service levels may fluctuate considerably and extensive investigation would be needed to establish competence and performance.

Information was gathered from nine organizations in Kenya. This information is presented in detail in Annexure Kenya-01 (this is supplemented with an attached document Annexure Kenya-01-01). Companies from the following industries are summarized in the table below:

Companies visited in Nairobi

Industry	Percentage of organizations visited	Typical size of organizations	Equipment classification	Level of skills
Warehousing & distribution	22%	Large	Large/medium	Moderate
Refrigeration	45%	Medium/Large	Small/medium/large	High
Retail	22%	Medium/Large	Medium/large	Varied
Hospitality	11%	Medium	Small	Low

2.3 Summary of findings – Malawi

Lilongwe is the largest city in Malawi, and is situated in the central region of the country. It is the capital city of Malawi. Most of Malawi's manufacturing industries are situated in Blantyre, the second largest city. Located in the southern region, Blantyre serves as the commercial center and is home to two of the four pharmaceutical companies manufacturing in Malawi. Malawi's economy is heavily rooted in agriculture, with a mostly rural population. Infrastructure is underdeveloped, with paved roads being non-existent in the rural areas, making travel difficult during the rainy season. Inflation and a devalued

currency have also led to poor economic conditions. This has created very high unemployment and as a result cheap manual labour. As such there have been difficulties building and expanding the economy, leading to lack of development and poor infrastructure, particularly for power, water and telecommunications. The sole source of power in Malawi comes from the state owned Electricity Supply Commission of Malawi (ESCOM), with about 10% of the population connected to the national grid. ESCOM generates power using hydroelectric plants, however the national grid is underdeveloped and the power generated is more than the grid can distribute, leading to rolling blackouts.

The site visits indicated a trend where the private sector is utilizing appropriate cold chain equipment for the storage and/or distribution of its products and is managing the maintenance of the equipment effectively. The environment is part of this success, with three or four major CCE installation and maintenance companies having a presence in Malawi, together with a number of smaller companies.

Larger companies utilize the presence of these CCE maintenance companies to set up service level agreements (SLAs) and contracts to have their equipment inspected regularly. Several companies did indicate a reactive maintenance approach based on the theory “don’t fix what isn’t broken”. Due to this approach, many companies implement a replace maintenance approach rather than repair parts when equipment is not functioning correctly.

There is a high availability of spare parts due to the presence of the necessary suppliers, so components are sourced locally. It was noted that where those items were not available in country, the lead times were long, anywhere from one or two days up to two to four weeks, depending on the original manufacturer. As some of the CCE is more than 20 years old, it is more efficient and quicker to replace rather than repair.

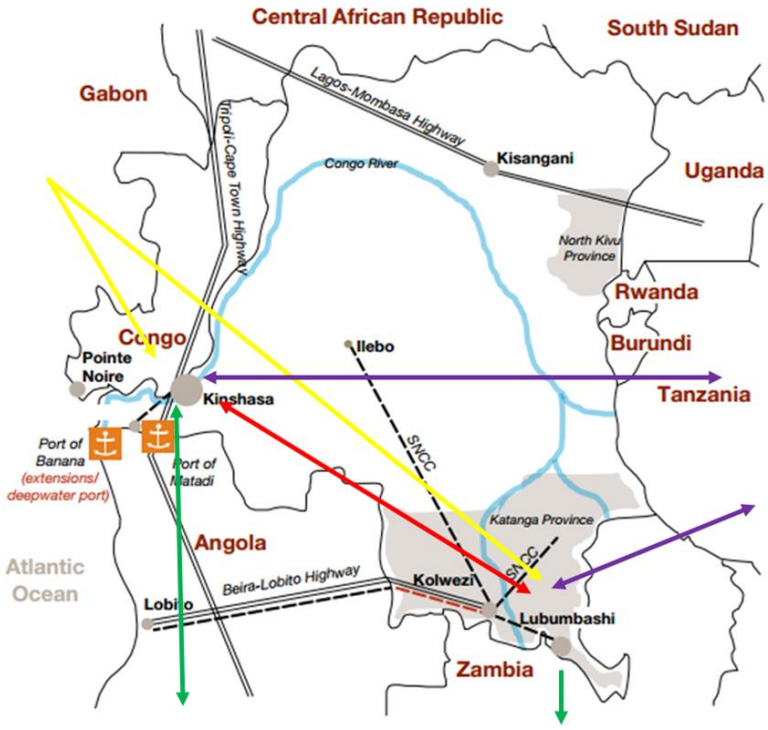
Information was gathered from 10 organizations in Malawi, in two different cities, Lilongwe and Blantyre. This information is presented in detail in Annexure Malawi-01 (this is supplemented with an attached document Annexure Malawi-01-01). Companies from the following industries are summarized in the table below:

Companies visited in Malawi

Industry	Percentage of organizations visited	Typical size of organizations	Equipment classification	Level of skills
Warehousing & distribution	20%	Large	Large/medium	Moderate
Maintenance	10%	Small	Small/medium/large	High
Food processing	30%	Medium/Large	Medium/large	Varied
Transport	20%	Medium	Small/medium	Moderate
Retail	20%	Medium/Large	Medium	Moderate

3. Key challenges related to implementing CCE maintenance

Transportation infrastructure may be the largest limiting factor in a country, significantly impacting cold chain equipment maintenance. In the example of the DRC, the country is very large (the second biggest in Africa) and road travel is not possible through large portions of the country because of the extensive tributaries of the Congo River and its associated vegetation. The transport network in the DRC is shown in the figure below, where air may represent a preferred method of travel and distribution between regions as well as other countries.



Routes into the DRC: Highways are shown in black. Air routes within the country are shown in red (the distance from Kinshasa to Lubumbashi is 1 505 km). Air routes from Europe are shown in yellow (the

distance from Kinshasa to Paris is 6062 km). Air routes to South Africa are shown in green (the distance from Kinshasa to Johannesburg is 2 774 km). Air routes to Kenya are shown in purple (the distance from Kinshasa to Nairobi is 2339 km). Major waterways are shown in blue. *This figure adapted from Price Waterhouse Coopers.*

The **spread of locations, climate and number of equipment units** requires the organization to determine a maintenance model which is both efficient and effective to fix or replace units. Seasonal impacts also need consideration; hot summers raise temperatures, which can impact equipment operational need, while rainy seasons may delay the response time to get to the more remote locations.

Without the **implementation of maintenance planning** which enables structured planning cycles for maintenance service providers and regular payment cycles, service providers' performance is impacted.

An independent refrigeration contractor mentioned that contractors are not generally interested in taking on work from the public sector because **payment does not take place within a reasonable time** period.

Power is a major issue of concern. For the DRC, specifically outside of major cities, there is very little access to power and even in cities like Kinshasa and Lubumbashi, power is intermittent.

This situation requires innovative strategies such as **solar, which is not used in the private sector**. Currently, organisations report that the majority of repairs made to refrigeration equipment is electrical in nature due to surges when the power supply returns. This requires that refrigeration technicians have skills as electricians. According to a contractor in Kinshasa, many refrigeration technicians in the country start out as electricians who become specialised in refrigeration repair. Additionally, there are problems with the implementation of solar in the DRC. A contractor reported that "inspectors" arrive unexpectedly at sites with solar panels to demand a "tax" for the solar panels. This hurdle may prevent the switch over to "next generation" technologies such Solar Direct Drive.

It is important to note that **solar power tends not to be a common option** in all countries, as was found in the Malawi example when looking for alternate power sources. Companies generally have backup generators for their CCE, and with diesel being relatively cheap, there is no cost benefit to solar power. The cost of solar power is more expensive than the mains power and even when excess power is generated, the national electric company will not pay for it as the Malawi grid can already generate more power than it is able to distribute.

L**anguage may prove** to be a barrier when dealing with Anglophone international companies. In Kinshasa, very little English is spoken; French is used exclusively. This appears to limit the source of supply for parts and skills to Francophone countries, such France and Belgium. In contrast, Lubumbashi

is situated in the southeast, near the Zambian border. As a result, many people there speak conversational English, allowing for communications with international stakeholders. Lubumbashi, however, lacks the infrastructure of Kinshasa, as previously mentioned.

4. Maintenance management success factors

From the in-country investigation it was found that successful CCE maintenance strategies within the private sector all share the following key features:

- ✓ An International stakeholder, supporting the source of supply of either critical or non-critical parts;
- ✓ A provincial hub, where spares and skilled technical knowledge (electrical-specific and refrigeration-specific) are supplied; and
- ✓ A local technician presence (either employed or contracted by the organization), who has access to small to medium spares, and the ability to contact the regional hub for advanced support on large repairs. This hybrid model is illustrated in Figure 1.

Organisations which have adopted these types of CCE maintenance strategies were found mainly in the food retail and hospitality sectors, for example: Shoprite, Jumbo Mart, Manoa, Grand Karavia Hotel, Memling Hotel, City Market, Hassans and Freres.

Private sector hybrid model

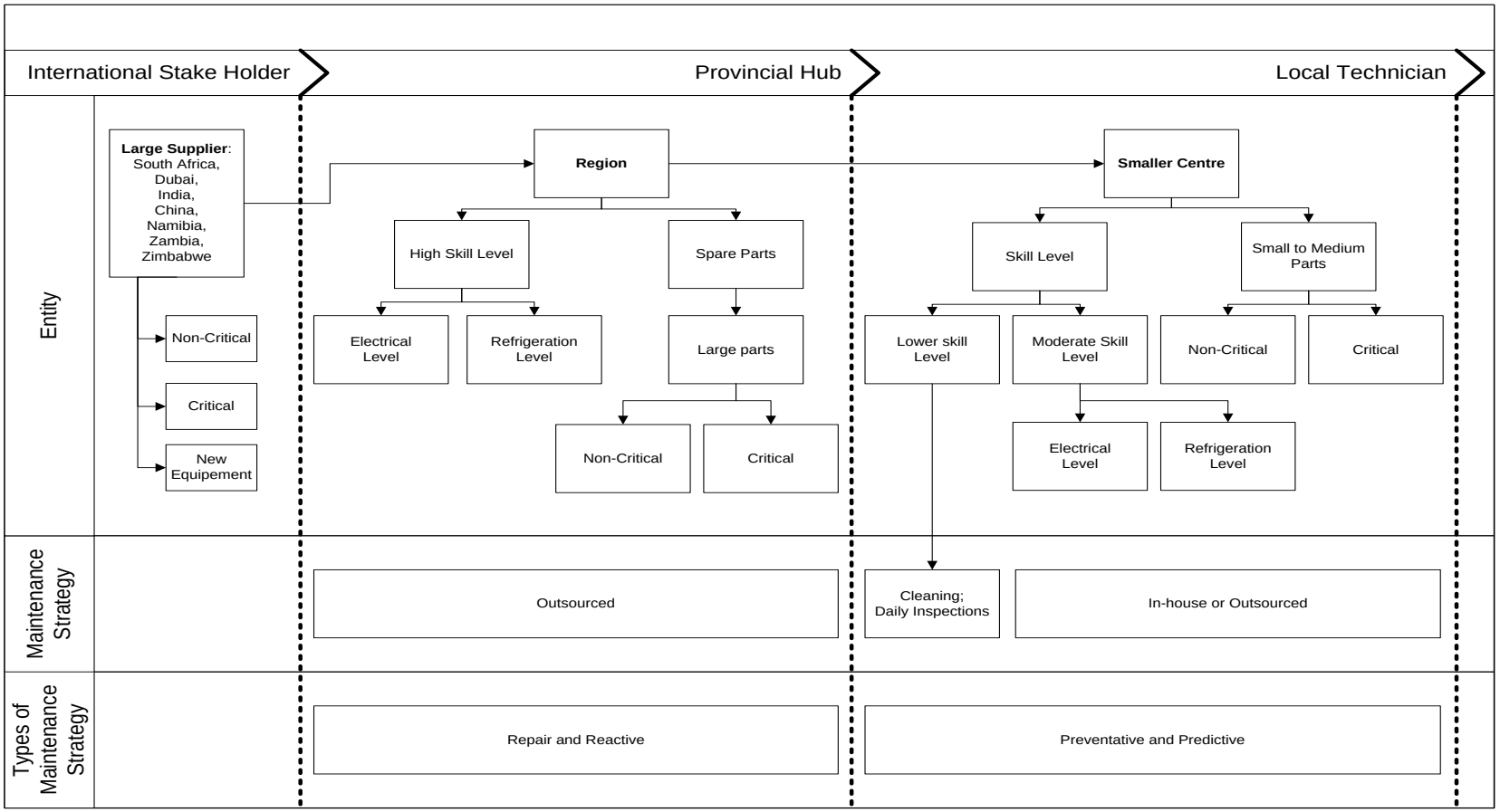


Figure 1: Proposed consideration for a Best Practice Hybrid CCE maintenance model from private sector investigations

4.1 Private sector best practice

At each of these levels the successful CCE maintenance strategies within the private sector shared the following best practices:

An international stakeholder	A provincial hub	A local technician presence
The International stakeholder level is an essential foundation for a successful CCE model as they are the source of supply for large spare parts and new equipment. These organizations should ideally have a strong relationship or link to the regional hubs in order to ensure a reliable supply of spare parts and equipment.	At the regional hub level it is essential that adequate stock levels of large spare parts (critical and non-critical) should be maintained. In addition, highly skilled individuals in both electrical and refrigeration installation, in repair and maintenance, should be employed or be available. These types of technicians can be called to perform reactive maintenance and large repairs at a local level. *It is important to note that organizations offering this level of service were not available in all the cities e.g. in DRC they were available in Kinshasa and not in Lubumbashi*.	At the local technician level it is essential that a clear chain of command is present, where employees with low skill levels report to those technicians with moderate skills, who in turn report to a maintenance manager. The types of duties performed by employees of low skill level include daily cleaning and inspection of equipment, whereas preventative maintenance activities are performed by technicians of moderate skill level. Importantly, technicians with moderate skill levels should be adept at both electrical and refrigeration repairs. The maintenance manager provides control over the following processes: scheduling of maintenance activities, contact with the regional hubs for support, detailed reporting, asset management and stock control of small to medium parts.
Examples of organizations at this level include Samsung, Shoprite, Le Club Accor Hotels (who operate the Grand Karavia Hotel).	Examples of these types of organizations include Samsung, Sanadez Electrical and Refrigeration Services, Hitec Techno Cool, Eolia Froid and Climatisation, Electro Cool.	Examples of organizations at this level include Lattelicious Lounge, Le Buche, International Medical Laboratory, UFUK Laboratorie Medical.

4.2 Public sector collaboration with private sector

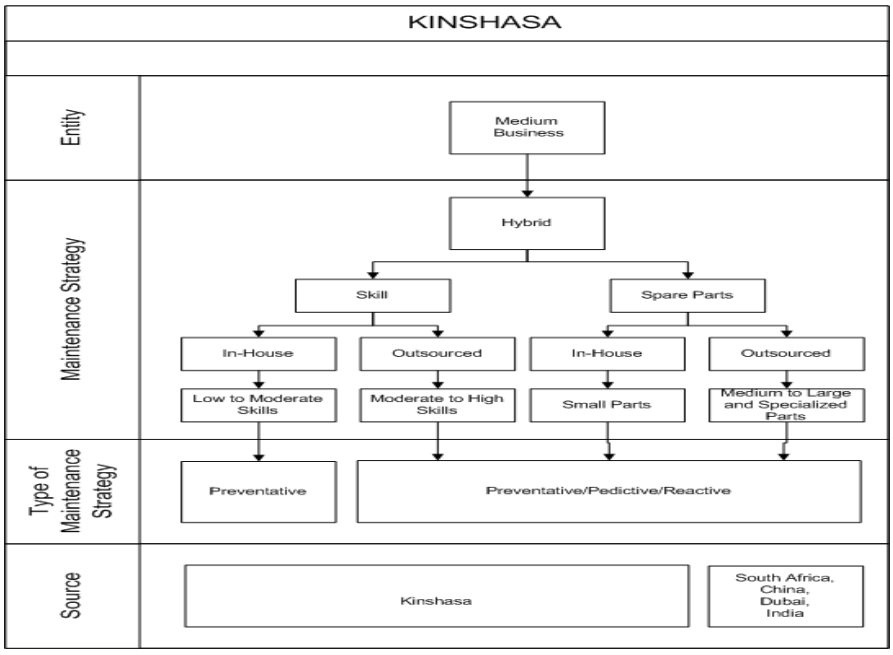
Given the above, opportunities may exist for private sector engagement with public health at the regional hub level to:

1. Facilitate essential relationships with international stakeholders and local technicians, leveraging the crucial capacity of skills and parts within the regional hub level.
2. Access skills, equipment and the logistics network already available at the regional level, enabling the availability of parts from international sources, as well as increasing the local knowledge base through training programs.
3. Leverage existing logistical networks with neighboring countries. For instance, Lubumbashi has associated links with Zambia, while the northeastern regions of the country have associated links with Uganda.

The manner in which collaboration can be established will need to be defined in consideration of country requirements with options including:

- ✓ The public sector could contract regional maintenance to private sector refrigeration contractors and companies already established in country. These companies would interact with international stakeholders to source and manage a supply of parts, as well as provide skilled services.
- ✓ There may be opportunities for private sector engagement with public health at the SLA level as well. Service providers are happy to negotiate terms of agreements in order that they are mutually beneficial to both parties. With proper planning, public sector could engage with private sector service providers to ensure continuing CCE maintenance support, with measurable success through KPIs.

As an example, the collaboration can be established leveraging this maintenance service approach and parts inventory maintenance model identified in Kinshasa from the private sector analysis.



4.3 Maintenance models approach considerations

For each of the maintenance approaches, the key considerations on selecting the model for implementation are detailed below:

Approach	Key considerations
In house	• Varied skill levels. • Availability of training or apprentices for staff • Some small spares may be kept on site. • May be carried out by someone who is not a refrigeration technician (for instance an electrician or general handyman).
Outsource	• The person carrying out repairs is usually a refrigeration technician. • Do not keep spares on site.
Hybrid	• More likely than the other maintenance models to keep spares on site. • Often small repairs are done in-house while bigger jobs are outsourced.
Other	• Maintenance plan is to replace equipment as needed to leverage access to warranty

5. Maintenance models analysis tools and interview findings

Data collated in the sheets shared below was gathered from each of the countries visited, and in the telephonic interviews with service providers. These findings capture the trends and approaches deployed by the private sector.

Overview of key CCE components – DRC Lubumbashi

Component	Component description	Maintenance strategy	Resources & skills	Weaknesses	Strengths
Large storage	Condensers and compressors	Scheduled cleaning and inspections	Highly skilled	Parts are not available	Technicians are readily available
Medium storage	Condensers and compressors	Scheduled cleaning and inspections	Highly skilled	Parts are not available	Technicians are readily available
Small storage	Condensers, compressors, oil, gas, seals	Varied: some companies perform inspection and cleaning daily while others perform less often. Some only perform reactive maintenance	Varied: some refrigeration technicians but also general handymen	Parts are not available	Readily available inexpensive technicians
Fleet: trucks	Transfrig trucks	Hybrid	Skilled at repairs; keep stock of spares	Sometimes need to send to Namibia or South Africa for repairs	A number of skilled technicians

Maintenance service structure

Approach	Service Description	Terms/SLA	Weaknesses	Strength
Local services	Preventative and emergency	A few contracts but largely pay for each job or by the hour	May lack skills	Inexpensive
Regional services	Emergency	Pay for each job	No contracts	N/A
International services	Emergency	Contract	Expensive	Highly skilled

Maintenance service tracking

Component	Approach & reporting	Key performance indicators (KPIs)	Strengths	Weaknesses
Storage	Outsourced	Amount of money spent on maintenance; fuel consumption	Contractor is on a retainer	N/A

Asset management strategy

Component	Approach	KPIs	Strengths	Weaknesses
Storage	Asset registers or lists are usually kept	N/A	N/A	Sometimes not available or not maintained

Innovation approach

Component	Approach	KPIs	Strengths	Weaknesses
Storage	Generators for power cuts	Not available	Necessary because power is intermittent.	Short term solution; no interest in next generation technologies such as solar

Overview of key CCE components – DRC Kinshasa

Component	Component description	Maintenance strategy	Resources & skills	Weaknesses	Strengths
Large storage	Condensers, compressors, oil, gas, seals	Varied: some companies perform inspection and cleaning daily while others perform less often; some only perform reactive maintenance	Varied: some refrigeration technicians but also general handymen; some highly qualified technicians in both electrical and refrigeration componentry	Parts are available	Technicians are available
Medium storage	Condensers and compressors	Scheduled cleaning and inspections	Highly skilled	Parts are available	Technicians are readily available
Small storage	Condensers, compressors, oil, gas, seals	Varied: some companies perform inspection and cleaning daily while others perform less often; some only perform reactive maintenance	Varied: some refrigeration technicians but also general handymen; some highly qualified technicians in both electrical and refrigeration componentry	Parts are available	Readily available inexpensive technicians

Maintenance service structure

Approach	Service description (preventative & emergency)	Terms/SLA	Weaknesses	Strengths
Local service	Preventative and emergency	A few contracts but largely pay for each job or by the hour	May lack skills	Inexpensive
Regional services	Most regional services take place within Kinshasa, as above	Most regional services take place within Kinshasa, as above	Most regional services take place within Kinshasa, as above	Most regional services take place within Kinshasa, as above
International services	Emergency	Contract	Expensive	Highly skilled

Maintenance service tracking

Component	Approach & reporting	KPIs	Strengths	Weaknesses
Storage	Hybrid	Amount of money spent on maintenance; fuel consumption	Contractor is on a retainer	N/A

Asset management strategy

Component	Approach	Performance KPI	Strength	Weakness
Storage	Asset registers or lists are usually kept	N/A	N/A	Sometimes not available or not maintained

Innovation approach

Component	Approach	Performance KPI	Strength	Weakness
Storage	Generators for power cuts	Not available	Necessary because power is intermittent.	Short term solution; no interest in next generation technologies such as solar

Overview of key CCE components - Kenya

Component	Component description	Maintenance strategy	Resources & skills	Weaknesses	Strengths
Large storage	Condensers and compressors	Regular scheduled inspections and servicing, clearly defined by SOPs and SLAs	Highly skilled	Parts are not always available	Technicians are readily available
Medium storage	Condensers and compressors	Regular scheduled inspections and servicing, clearly defined by SOPs and SLAs	Highly skilled	Parts are not always available	Technicians are readily available
Small storage	Condensers, compressors, oil, gas, seals	Only perform reactive maintenance, running units until they are beyond economical or exchanging for new at expiry point	Low	Must return to retailer in order for warranty repairs	Reliable equipment with warranty repairs
Fleet: trucks	Refrigerated trucks	Outsourced keep general stock of spares which are approved by manufacturer	Skilled at repairs		A number of skilled technicians

Maintenance service structure

Approach	Service description (preventative & emergency)	Terms/SLA	Weaknesses	Strengths
Local service	Preventative and emergency	Mostly contracts but some businesses do pay for each job	Traffic can create challenges getting to clients	Highly skilled
Regional services	Emergency, some preventative dependent on contracts	Contract but emergency work may require additional fees	Some are on a return to retailer basis; travel can be problematic due to weather conditions	N/A
International services	Preventative and emergency			Skilled

Maintenance service tracking

Component	Approach & reporting	KPIs	Strengths	Weaknesses
Storage	Outsourced	Maintenance records	Service provider on call	N/A
Fleet	Outsourced	Audited maintenance records	Local supplier, accredited by manufacturer	Must return to base for repairs/maintenance

Asset management strategy

Component	Approach	KPIs	Strengths	Weaknesses
Storage	Asset lists are typically kept	N/A	Track maintenance schedules	

Innovation approach

Component	Approach	KPIs	Strengths	Weaknesses
Storage	Generators	Not available	Necessary due to amount of power required to run equipment	Not available
Fleet	Some service engineers carry small generators	Not available	Not available	Not available

Overview of key CCE components - Malawi

Component	Component description	Maintenance strategy	Resources & skills	Weaknesses	Strengths
Large storage	Condensers and compressors	Regular scheduled inspections and servicing; annual testing	Skilled	Parts are not always available; it can take up to seven days to source parts internationally	Technicians are readily available
Medium storage	Condensers and compressors	Regular scheduled inspections and servicing; annual testing	Skilled	Parts are not always available; it can take up to seven days to source parts internationally	Technicians are readily available
Fleet: trucks	Refrigerated trucks	Outsourced: regular scheduled service at time and mileage intervals	Moderate: some in-house staff to perform checks	None specifically identified	Local technicians highly trained
Fleet: motorcycles	Motorcycles, small cars	Regular maintenance; training vehicle users on annual maintenance requirements	Skilled: have workshops for all vehicles in their fleet and management to ensure regular, preventative maintenance	None specifically identified	Technicians are mobile

Maintenance service structure

Approach	Service description (preventative & emergency)	Terms/SLA	Weaknesses	Strengths
Local service	Preventative and emergency	Tend to have gentlemen's agreements	Many clients are on a breakdown only basis and not always defined contracts	70-80% of parts obtained locally; highly trained mechanics
Regional services	Emergency: some preventative dependent on contracts	Dependent on client; some contracts in place	No predictive maintenance modelling	Technicians are mobile and reliable

Maintenance service tracking

Component	Approach & reporting	KPIs	Strengths	Weaknesses
Storage	Outsourced	Based on customer rejections/ complaints	Service provider on call	Not much data for predictive modelling
Fleet	Temperature readings	Record of downtime and losses	N/A	N/A

Asset management strategy

Component	Approach	KPIs	Strengths	Weakness
Storage	Asset lists are typically kept	N/A	Reliable supply chain of replacement parts	Limited parts kept in stock

Innovation approach

Component	Approach	KPIs	Strengths	Weaknesses
Storage	Cold rooms on different mains switch from other circuits; backup generators	Not available	Not available	Not available

Provider interview notes:

Table 1: List of DRC- specific Gavi supplied contacts investigated post in-country visit:

#	Company Name	Address	E-mail	Phone	Notes	Status	Result
Democratic Republic of Congo (DRC):							
1	Sodetap (Societe de Developpement de Technologies Appropriees)	11/12 Avenue du Marche Centre Ville, Gombe, Kinshasa	sodetap@yahoo.fr/ louis_vanbever@yahoo.fr/	(225) 41 85 53/ 00338989681 92 (France)/ 00243898968 192 (DRC)	• 255 Number does not exist. • 0033 number is engaged constantly. • 00243 number reaches a French answering machine.	Email sent to sodetap@yahoo.fr bounced back. Awaiting response from louis_vanbever@yahoo.fr/	• No response from Louis's email. • Conversation had with Philippe. • Sodetap specialize in domestic CCE, only.
2	Sce de le Riviere (also Sce De La Riviere & Phaesun)	France office: compagnie Francaise d'Etudes et d'Entreprises, 5bis, rue Duffour Dubergier, 33074, Bordeaux, France	mail@cfee.com	+33 556 000 666 +33 556 000 661	• This company is part of the West Point air conditioning group which has regional offices in Bordeaux, France. • We were able to contact this office but they would not give out information over the phone, including whether they have operations in the DRC. • We were told that we need to send an email to mail@cfee.com with very specific details of our enquiry including which organization we are affiliated with and why we require information. • It was also expressed that if it was not an official enquiry it would not receive a response. • Neither the company, nor its products were encountered in-country. • A trusted local contractor said that he thinks he has heard of this organization but has not had contact.	Sent official letter on Strategnos letter head	• No further communication was forthcoming after email was sent.

Table 1 continued: List of DRC- specific Gavi supplied contacts investigated post in-country visit

#	Company Name	Address	E-mail	Phone	Notes	Status	Result
Democratic Republic of Congo (DRC):							
3	Prodimpex	http://www.prodimpex.com/	rakesh@prodimpex.com; pixkin@prodimpex.com	00 243 818129303 00 243 999947847	• We were able to contact this organization telephonically; however, we were unable to communicate because of a language barrier. • After an initial attempt was made at conversation across a very bad line, the phone was no longer answered. • This organisation was not encountered in-country. • A trusted local contractor says that he knows this store well and that it sells Yamaha motor parts and many brands of generators and electrical appliances. It does not deal in refrigeration. • No solar equipment involvement.	Telephonic interview with an organization representative.	• Established they supply backup power systems only (e.g. generators), spare parts related to generators and vehicles.

Table 2: List of Kenya- specific Gavi supplied contacts investigated post in-country visit

#	Company Name	Address	E-mail	Phone	Notes	Status	Result
Kenya:							
1	TROPICAL HEALTHCARE	http://tropicalhealthcare.co.ke/	Website email; info@tropicalhealthcare.co.ke	0722555666	Website notes: We are specialized in sourcing and supply of the following categories of medical requirements: 1. Surgical Equipment 2. Laboratory equipment 3. Medical consumables & disposables 4. Lifestyle medical & health products 5. Medical Clothing-Cleaning gloves, boots, aprons, Bed sheets 6. Hospital cleaning, Disinfection and Sterilization products	• Letter sent on website. • Awaiting response. • Letter sent to Abraham Wahome. Awaiting response • Contact by phone was unsuccessful.	• No response from any of the emails sent.
2	Crown Health CARE	www.**crownkenya**.com Crown House, Westlands Road, Nairobi Central, 00100	N/A	+254 20 375 0000	Pharma Distributors & Wholesalers Phoned and sent email.	• Email sent initially. • Called but message was in Swahili. Have not received a reply.	• No response from the email sent initially.
3	Total Hospital Solutions	Corner House, 1st Floor, Kimathi Street, Nairobi	info@totalhospital.com	020-2240890, 2242441/ 0722-522959	Equipment Suppliers Could not contact by phone. Number does not exist.	Email sent and unable to reach by telephone.	• No response from the email sent initially.
4	Sce De La Riviere	unavailable	unavailable	unavailable	N/A	Same as DRC Point 2	• No response from the email sent initially.

Table 2 continued: List of Kenya- specific Gavi supplied contacts investigated post in-country visit

#	Company Name	Address	E-mail	Phone	Notes	Status	Result
Kenya:							
5	Sce De La Riviere & Phaesun	unavailable	unavailable	unavailable	N/A	Same as DRC Point 2	• No response from the email sent initially.
6	Intercross Agencies	http://intercrossagencies.com/ Junction Of Baricho Road & Hombe Road, Nairobi, Kenya	sales@intercrossagencies.com	+254-20-531982	Website notes: Industrial Equipment and Supplies.	• Email sent and phone message in Swahili. • Email bounced back as undeliverable. • Sent mail to in-website mailer – undeliverable.	• No response from the email sent initially. • No response from website-based email contact page.

Table 3: List of Malawi- specific Gavi supplied contacts investigated post in-country visit

#	Company Name	Address	E-mail	Phone	Notes	Status	Result
Malawi:							
1	MM AFRICAN TECHNOLOGY	Off Chipatala Avenue, Near Qech, Blantyre, Malawi	africantech@africa-online.net; felix.ndlovu@mmafricantech.com	Anthony Behan +265 87 2251/ 265-99-2354983 +27 11 646 8111	• Website notes: MM African Technology represents a variety of suppliers providing Gold standard diagnostic and Laboratory equipment and after sales support including Maintenance. Our Customers include, Liverpool School of Tropical Medicine, London School of Hygiene and Medicine, Malawi Blood Transfusion Service. • Possible RSA office in greenside (94 Greenway Road, Greenside, 2193, JHB, SA). • Distribute and service lab equipment and cold chain equipment in Malawi, maintenance for own equipment.	Sent mail to website address. Resent mail to new address, with no response.	• Received email feedback from Felix, who forwarded a request on to the Malawi in-country office. • The Malawi office has not replied.
2	Phaesun	http://www.phaesun.com Brühlweg 9, 87700 Memmingen, Memmingen, Town / Swabia	info@phaesun.com russom.semere@phaesun.com (rural electricfication in Anglophone Africa) sara.dandrau@phaesun.fr (Francophone industrial systems)	+49 8331 990420 or +49 8331 99042 119	• Website notes: Phaesun acts worldwide as an independent wholesale distribution and service company for off grid PV (photo voltaic) and related systems. • We provide a one stop shop service with an extensive high quality product range at competitive prices. Phaesun`s integrated service covers customized packaged systems in the area of rural electrification. • We can engineer and supply state of the art customised off-grid photovoltiac systems according to the specifications of our customers for rural electrification, health care, telecommunications, water pumping, irrigation, education, street lighting and training facilities	German based. Sent mail to website address; Email sent and tried to follow up telephonically. Additional e-mails sent.	• Reply from Phaesun indicating they only do solar electrical services. • Refrigeration is not in their scope of work.

Annexure1: Review of 2 specific Gavi recommended local suppliers-post in-country visits

Company: Agence de Medecine Preventiv (AMP)

Contact: Jean-Claude Mangobo Molanga (Paris Office: +331 538 689 20; Cote d'Ivoire Office: +225 599 9 3931; Email: jcmangobomolanga@aamp.org).

Context:
Jean-Claude Mangobo Molanga is a Technical Expert in Health Logistics and Supply Chain Management for AMP. He was contacted on his Paris number but is currently in Cote d'Ivoire. When called at the Cote d'Ivoire office, Jean-Claude explained that AMP is an independent organisation that collaborates with both private and public sectors. In the DRC, specifically, AMP interacts at the Health Ministry level, whereas a subsidiary of AMP, called Logivac, interacts at the private sector level.

Supply Chain and Extent of Reach:
AMP provides CCE maintenance, solar power and generator maintenance, repair and training in the DRC, as well as eight Francophone countries namely Benin, Burkina Faso, Cote d'Ivoire, Mali, Mauritania, Niger, Senegal, and Togo. In DRC, AMP have 10 people who conduct training locally. Technicians leverage off parts available in-country and so spare parts are not sourced out of country, unless they cannot be found locally. Do not currently support Malawi but may be able to if required.

Servicing:
Jean-Claude said they have good experience in Africa and can usually provide the service required.

Company: B Medical Systems

Contact: Gilles Ries and John Schildermans (+352 920 731 323; +352 621 292 245; bservice@bmedicalassistance.com)

Context:
Gilles Ries from B Medical Systems was contacted to establish B Medical Systems involvement in the maintenance, repair and installation of cold Chain equipment in the DRC, Malawi and Kenya. Gilles Ries put us into contact with John Schildermans, a technical officer, for B Medical Systems in Luxemburg. Johnny Schildermans explained that B Medical Systems has three (3) core services which include:

1) Biomedical Refrigeration, such as medical refrigerators, bloodbank-specific refrigerators, plasma freezers, deep freezers, shock freezers, bespoke refrigerator systems (where there are 13 types of the aforementioned fridge and freezer technology) and transport box systems (6 types).
2) Blood Safety Refrigeration, such as refrigerators and freezers (4 types), transport cooler boxes (5 types), laboratory fridges (6 types).

3) Blood Chain Refrigeration, such as Solar Direct Drive (3 types of WHO PQS approved refrigerators), Transport Boxes (5 types), and a water pack freezer system (1 type).

B Medical Systems is able to supply the above products as well as service the products post implementation through the use of their local service agents.

Supply Chain:
John Schildermans confirmed that B Medical Services have local agents in North America (1 agent), South America (2 agents), Europe (1 agent), South Africa/Africa (1 agent) and Asia (2 agents).

John Schildermans explained that they have provided products to some Western Africa countries, such as DRC and Burkina Faso, but not Malwai or Kenya as yet.

Equipment Maintenance Approach
Agents would send technicians from a local agency or from the closest agency to repair, maintain or install CCE equipment. Onsite training may also be performed. Spare parts would not be left onsite, but rather the servicing agent would bring in the equipment, as well as the appropriate tools, in order to effect a repair or perform maintenance. Technicians may also be able to repair refrigerated vehicles in some cases. Technicians, parts and equipment into Africa may be supplied from Luxembourg or via South Africa.

Innovation:
B Medical Services have a variety of products that maintain the cold chain for transport and storage. They have a PQS approved solar direct drive refrigerator (5 types) which requires 2 solar panel connections.

Annexure2. DRC-01 In-Country Overview in Relation to Opportunities for Private Sector Engagement with Public Health for Cold Chain Equipment Maintenance-Lubumbashi

(This is supplemented with an attached detailed document Annexure DRC-01-01)

#	Company Name	Industry
1	Climat de l'air conditione	Refrigeration Industry
2	Grand Karavia Hotel	Hospitality Industry
3	Belleue Hotel	Hospitality Industry
4	Salut Casino	Entertainment Industry
5	Route de Golf	Entertainment Industry
6	Jumbo Mart	Retail Industry
7	Panaco Eletrical Genereale	Retail Industry
8	Megastore	Retail Industry
9	Manoa	Retail Industry
10	BIAC Bank	Banking Industry
11	Lattelicious Lounge	Food Services Industry
12	Le Buche	Food Services Industry
13	University of Lubumbashi	Education Industry
14	Bien Etre Pharmacy	Private Medical and Pharmaceutical Industry
15	Zottos Pharmacy	Private Medical and Pharmaceutical Industry
16	International Medical Laboratory	Private Medical and Pharmaceutical Industry

Annexure3. DRC-02 In-Country Overview in Relation to Opportunities for Private Sector Engagement with Public Health for Cold Chain Equipment Maintenance-Kinshasa

(This is supplemented with an attached detailed document Annexure DRC-02-01)

#	Company Name	Industry
1	Samsung	Refrigeration Industry
2	Sonadez Electrical and Refrigeration Services	Refrigeration Industry
3	Hitec Techno Cool	Refrigeration Industry
4	Eolia Froid and Climatisation	Refrigeration Industry
5	Electro Cool	Refrigeration Industry
6	Memling Hotel	Hospitality Industry
7	Shoprite	Retail Industry
8	City Market	Retail Industry
9	Hassans and Freres	Retail Industry
10	ORCA	Retail Industry
11	CFAO Motor Centre	Retail Industry
12	BCDC Bank	Banking Industry
13	Standard Bank	Banking Industry
14	Bralima Brewery	Food Services Industry
15	Victorie Bakerie	Food Services Industry
16	University de Kinshasa	Education Industry
17	Pharmacie 30 Juin	Private Medical and Pharmaceutical Industry
18	Pharmacie Ngaliema	Private Medical and Pharmaceutical Industry
19	UFUK Laboratorie Medical	Private Medical and Pharmaceutical Industry

Annexure4. Kenya-01 In-Country Overview in Relation to Opportunities for Private Sector Engagement with Public Health for Cold Chain Equipment Maintenance-Nairobi

(This is supplemented with an attached detailed document Annexure Kenya-01-01)

#	Company Name	Industry
1	Imperial Health Sciences	Pharmaceutical Warehouse and Distribution
2	Khune and Nagel	Pharmaceutical Warehouse and Distribution
3	Francis Refrigeration	Refrigeration Industry
4	Celtic Refrigeration	Refrigeration Industry
5	Mountain Dew	Refrigeration Industry
6	SAI RAJ	Fleet Maintenance
7	Alpha Fine Foods	Retail Industry
8	Nakumatt	Retail Industry
9	Elephant Gorge Camp	Hospitality

Annexure4. Malawi-01 In-Country Overview in Relation to Opportunities for Private Sector Engagement with Public Health for Cold Chain Equipment Maintenance-Lilongwe

(This is supplemented with an attached detailed document Annexure Malawi-01-01)

#	Company Name	Industry
1	Imperial Health Sciences	Pharmaceutical Warehouse and Distribution
2	Central Medical Stores Trust	Pharmaceutical Warehouse and Distribution
3	R.E Works	Refrigeration Industry
4	Kapani	Processing and Distribution
5	Malawi Dairy Industry	Processing and Distribution
6	Riders for Health	Transport
7	Cargo Management Logistics	Transport
8	Shoprite	Retail
9	Carlsberg	Retail
10	Dairy Board	Processing and Distribution

Attachments

1. Annexure DRC-01-01
2. Annexure DRC-02-01
3. Annexure Kenya -01-01
4. Annexure Malawi-01-01


GAVI CCE Checklist Collated Data Lubumt


GAVI CCE Checklist Collated Data Kinshas


GAVI CCE Checklist Collated Data Kenya-


Gavi CCE Checklist Collated Data Malawi-