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ASSESSMENT OF THE PERFORMANCE OF DRY PORTS
IN ETHIOPIA USING SCOR METHOD

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Assessment of the Performance of Dry Ports in Ethiopia Using SCOR Method

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Cover: Mojo dry port terminal, Ethiopia. 2015. Photo: Elshaday Woldehawariat Gebreyesus

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Elshaday Woldehawariat Gebreyesus

To my Mom Tsehay Seyoum and My Dad Woldehawariat Gebreyesus

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To the almighty God, “ለግድግና፣ ለጥቅም፣ ለግዚአብሔር፣ ይመስገን።”

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ABSTRACT

The Ethiopian government drafted a logistics strategy, and implemented what is called multi modal transportation system (de facto an intermodal system), where as nearly all shipments had to be processed under Ethiopian Shipping & Logistics Services Enterprise, which is a government owned shipping company (ESLSE profile,2014).

Dry ports were introduced as a way of accessing the hinterland and also reduce the pressure on the bottle necked, congested and inefficient sea ports (Zhihong J., 2015). Ethiopia, being a landlocked country relies heavily on dry ports efficiency. Hence, this research aims at assessing the performance of two of the major dry ports in the country (Mojo and Kality) using Supply Chain Operation Reference Model (SCOR) and Queue analysis in relation to the intermodal transportation system.

The results showed that there exists a gap between the employees of ESLSE who believes the provided service by their organization is satisfactory on almost all performance parameters and the customers who have a list of complaints. With regards to Reliability, the main problems were delay on delivery of shipments, wrong dry port location and lack of proper tracking means. These problems were due to lack of trucks, proper system automation and coordination. The obvious absence of understanding the value of time at each level of process for customs and dry port clearance, dwell time at Djibouti and dry ports has a major effect on the Responsiveness of the organization. In addition, the unnecessary and lengthy customs clearance at the checkpoints hinders a delay. Agility performance attribute was assessed in regards to the service at peak season and during accidents at which Mojo dry port has less flexibility than Kality dry port to unforeseen scenarios and increase in demand. Moreover, ESLSE has paid a demurrage cost of about 340,000 USD for Djibouti port in 2014/2015 and has a higher transportation (Sea and land freight) cost than the private sectors.

The results for queue analysis at entrance gate of Mojo and Kality dry port showed that Utilization factor of 1.1 and 0.7 were obtained respectively. On the other hand, the lead time at customs examination warehouse reveals an extreme variance between the larger and smaller values which confirms that a delay is incurred due to not having a proper work schedule.

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LIST OF ABBREVIATION

ATD	Associations of Djiboutian Transistor
CIR	Container Interchange Report
DO	Delivery Order
DPOIS	Container tracking system
EMAA	Ethiopian Maritime Affairs Authority
ERCA	Ethiopian Revenues and Customs Authority
ESL	Ethiopian Shipping Lines
ESLSE	Ethiopian Shipping and Logistics Service Enterprise
ETB	Ethiopian Birr (Ethiopian Currency)
FTA	Federal Transport Authority
GPS	Global Positioning System
GRO	Goods Release Order
GRR	Goods Release Request
SCC	Supply Chain Council
SCOR	Supply Chain Operation Reference
SSR	Special Service Request
TEU	Twenty Equivalent Units
UNCIMTG	United Nations Convention on International Multimodal Transport of Goods
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar

1 INTRODUCTION

1.1 Background

Intermodal transport refers to the transfer of goods using at least two modes of transport and under a single billing system. The goods reach their destination without undergoing unpacking or repacking when the means of transport changes. The development of this system has led to highly increased efficiency in international logistics (Hanaoka S. et al., 2011).

In 2012, the intermodal system has been implemented in Ethiopia hoping to avoid safety risks, increase efficiency and save businesses from paying demurrage costs in foreign currency and having to deal with customs processes at the port by developing inland dry ports. But the system was different because the government operated Ethiopian Shipping and Logistics Services Enterprise (ESLSE) was the only one authorized to deliver shipment from the point of origin until it reaches dry ports. Prior to the implementation of the intermodal system, freight forwarders were responsible for bringing in shipments from Djibouti port to customer.

Transport nodes such as airports, seaports, logistics intermodal terminals, and dry ports need to be developed in order to promote intermodal transport (Hanaoka S. et al., 2011). Dry ports are inland terminals which are especially useful in land-locked countries whose shipments come through a neighboring sea port. These dry ports provide warehousing, customs control and clearance, forwarding, container handling, stuffing & unstuffing, and security services. Ethiopia is a landlocked country; dry ports such as Mojo and Kality play an important role in the efficiency of the intermodal system.

Since its implementation, the intermodal system in Ethiopia has encountered several problems. In the beginning, there was heavy congestion at Djibouti port. The congestion then moved to dry ports. Containers were not picked up in time which severely hampered the effectiveness of the dry ports. These problems lead to the question whether the dry ports in Ethiopia has been performing efficiently and has achieved the intended purpose. There are

many actors involved in the dry port operation and the research aims to examine whether the current performance of dry ports are more expedient and less costly for the customers and reflecting for the country as a whole.

1.2 Problem Statement

The effective operation of dry ports is essential for the success of any intermodal system. Currently an intermodal system solely operated by the government owned ESLSE exists in Ethiopia. This system which started in 2012 relies on several dry ports including Mojo (the main one), Kality (Addis Ababa), Semera, Galan, Dire Dawa, Kombolcha, and Mekele.

Since the start of the system, there have been complaints about cargo congestion at these dry ports, especially at Mojo, 70 km from the capital. While clients cite delayed clearance, lack of foreign currency, inability to track cargo as reasons for the delay, the carrier, ESLSE, on the other hand says that importers are using the dry port as temporary storage because demurrage costs are much cheaper than Djibouti port (where they have to pay in foreign currency). This congestion prevents the dry port from providing efficient service and reflects badly on the intermodal system the government is implementing. Since a significant number of the country's imports are handled by the intermodal system, the inefficiency at dry ports has serious implications for the economy. According to a World Bank report from 2013, it takes 41 days to import a single 20ft container in Ethiopia whereas in neighboring Kenya only half the time is required. For anyone interested in investing and doing business in Ethiopia, such data is bound to be a drawback.

1.3 Objective

The main objective of this research was to assess and analyze the performance of two of the major dry ports in Ethiopia (Mojo and Kality). The performance will be measured in-terms of reliability, responsiveness, agility, cost and queuing condition with timely and reasonably priced service delivery to customers in major operational areas of the two dry ports.

The specific objectives were

- ✓ Identify the strong and weak points of the provided service at these dry ports
- ✓ Assess if the intermodal system in Ethiopia has achieved the positive outcome to the customers' satisfaction
- ✓ To review the drawbacks and advantages of the intermodal system in relation to the dry ports

1.4 Limitations

- ✓ Travelling to Djibouti port to see how the loading and unloading system operates at the initial node was not possible due to financial constraint and lack of contact.
- ✓ It was not possible to visit all the dry ports in Ethiopia other than Modjo and Kaliti dry ports.
- ✓ Fearing repercussions, some research subjects and case studies were not forthcoming in disclosing a complete secondary data and are hesitant on to confidently give comments.
- ✓ Since the data collection period was not all year round the result might not be representative for all seasons.

2 LITERATURE REVIEW

Global logistics have played a pivotal role in fostering the development of world trade and integration of manufacturing worldwide (Kotabe, M., Henson K., 2009). Therefore, a research-based assessment of a country's logistics sector in a global context is important in identifying weaknesses and improving its economy (Debela F.M., 2013).

The ability to transport goods quickly, safely, economically and reliably is seen as vital to success of businesses, and to a nation's prosperity and capacity to compete in globalized economy (Debela F.M., 2013). Hence, as one of the important pillars of a country's economy, the logistics sector needs to be efficient and incorporated.

Ocean freight transport industry has changed its structure as a result of the new trends and preconditions that came with the introduction of the container and the rise of intermodality (Jarzemskis A., Vasiliauskas A., 2007). Since the blooming of containerization in 1960's, the need to enhance the efficiency of transportation of goods across the borders has led to the concept of intermodal transportation system.

The terms intermodal, multimodal, and combined transport systems are often used interchangeably to mean the transporting of goods by two or more modes of transport (ZahurulIslam D., 2005).

According to Marten Kinlström (2003), intermodal transport is a term within logistics which is the integration of shipments across modes with the goal of providing seamless transport under one billing and common liability on the whole movement from origin to destination. Another definition by Panayides (2002) also states that Intermodal transport is the transport of unitized loads by the coordinated use of more than one transport mode so that the comparative advantages of each mode are maximized and the transport chain is guided as one unity.

Similar definitions are also adopted by some authors to describe the multimodal system. Multimodal transport is the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country to a place designated for delivery situated in a different country (Article 1, UNCIMTG). In contrast, Gebresenbet G. (2015) states that when freight is transported overseas by ship, it has to be delivered to the

docks by rail, barge, or truck and these types of movements are multimodal. A vastly accepted definition for these similar but yet different transport systems is, while multimodal transport is characterized by separate movements of different modes of transport, intermodal transport is the integration between this different modes abided by a single contract.

Hence, this study uses the definition adopted by most scientific researchers referring Intermodal transportation system as the transportation of shipments from the point of origin to the point of destination by using at least two modes of transportation under a single billing system.

Figure 1 shows the flow of intermodal transportation of imported goods from sea port to end customers.

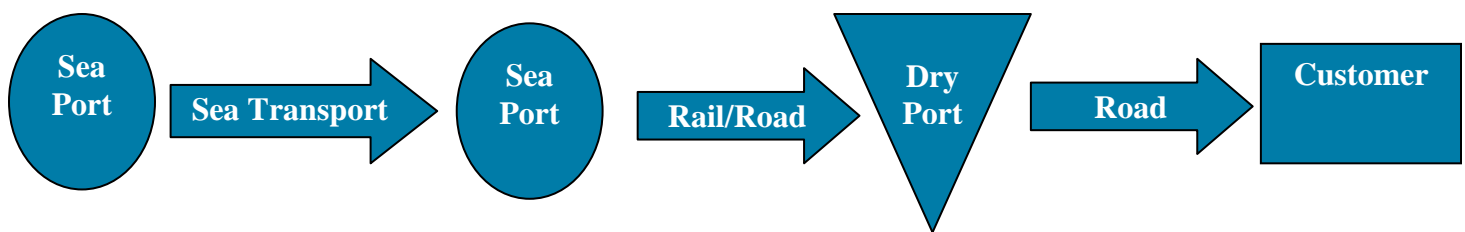


Figure 1: Intermodal Transportation flow

At present, due to globalization the freight transport system has boomed significantly causing an increase in traffic volumes, congestion and pollution. Even though, some of these problems have been addressed by the implementation of intermodality, it is still experiencing some bottlenecks. Therefore, having an expansion and progress in seaport terminals only will not have a significant solution to the maritime part of the transport chain.

The globalization of supply chains implies that it is often attractive for shippers to outsource value adding services such as customs, packaging or sequencing to logistics service providers at strategically placed nodes (Cheung et al.,2003; Notteboom and Winkelmanns, 2001; Paixão and Marlow,2003; Robinson,2002). Although inland freight distribution has been taking place since the industrial revolution, developments in intermodal transportation since the 1970s favored the setting of inland terminals performing functions that are synchronized with global supply chains (Hayuth, 1982).

The concept of dry port has emerged with the aim of alleviating the traffic bottleneck around the sea port in addition to being a connection node to the seaport for land locked countries.

2.1 The Dry port concept

The dry port concept came into widespread use in conjunction with containerization. Developing a dry port can be a solution for the congestion at sea ports and also increasing the port's capacity. As stated, the ever growing container flow has caused congestion, pollution and prolonged dwell time for containers. An option for relieving the sea ports is to outsource the main activities to dry ports.

In addition, the existence of dry port is vital for land locked countries which completely rely on the neighboring coastal country to have an access to the sea. There are 48 land locked countries in the world, of which 16 are found in Africa.

For many developing countries, the situation is even more important as often there is just one main port which accounts for nearly all the country's international trade (Snow T. et al, 2003).

According to UNCTAD (2013), road transport initially dominated inland container transport in the industrialized countries, mainly owing to its flexibility and speed. It was mentioned that the main reason for its success was the availability of high quality road system in the industrialized countries. In contrast, in developing countries, the poor quality of roads can often be a major drawback. Container transportation by road calls for the existence of a good road quality and vehicles.

Currently railway system is dominating the transportation mode to transport cargoes from sea ports to the dry ports. Rail hauling is preferable for having less emission which makes it environmentally friendly, provides less traffic congestion and is economical for longer haulage.

2.2 Dry Port Definition

There is no universal definition provided for Dry port, and different definitions have been adopted by different authors. Roso et al.(2009) defined dry port as an inland intermodal terminal directly connected to one or more seaports, with a high capacity transport option, most likely rail, where customers can collect or drop off their containers as if they are in a seaport (see Figure 2).

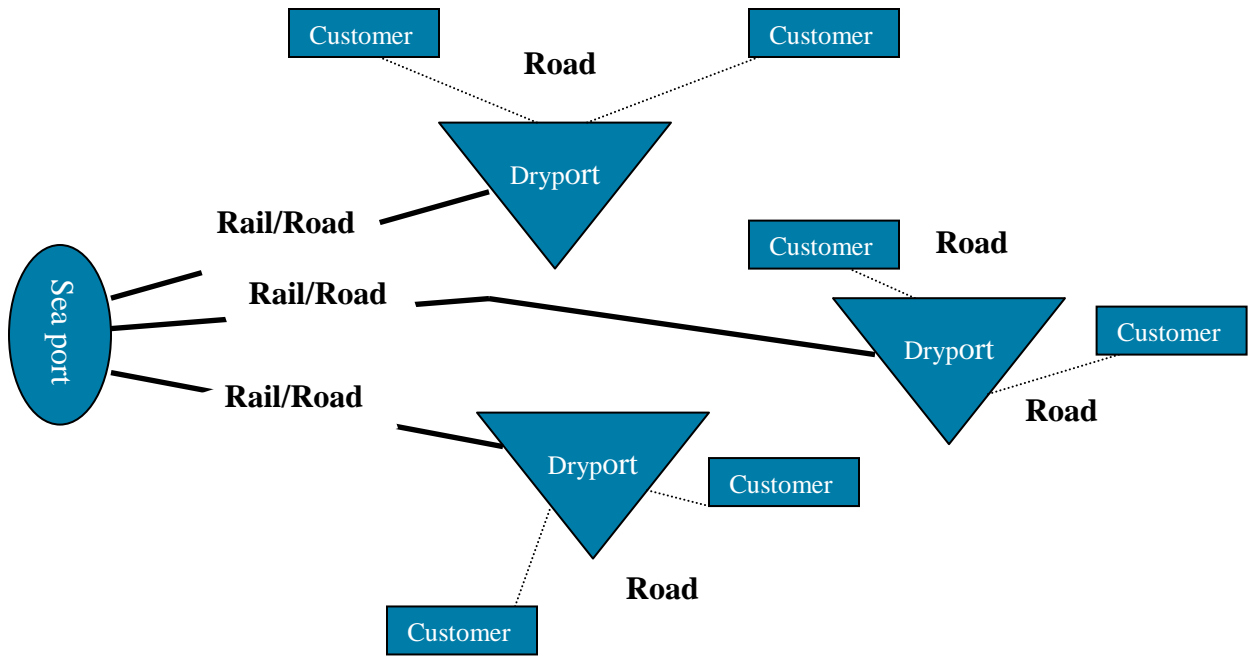


Figure 2: Dry port connection

UNCTAD(1991) has provided a more detail definition stating that a dry port is a common user facility with public authority status, equipped with fixed installations and offering services for handling and temporary storage of any kind of goods (including containers) carried under customs transit by any applicable mode of transport placed under customs control and with customs and other agencies competent to clear goods for home use, warehousing, temporary admissions, re-export, temporary storage for onward transit and outright export.

In addition, dry port was defined as inland terminal within a country that has a gateway port or they could be located in adjacent land-locked countries in the hinterland of one or more sea ports (UNCTAD, 1991).

In 1991 the council of Europe gave a simple definition stating dry port as a landlocked station which is connected to the seaport directly and geographically (Zou, 2009)

In this research dry port is defined as a terminal located in land locked country directly connected to the sea port with traffic modes, which offers services for handling and temporary storage of any kind of goods placed under customs where customers can collect their shipments after getting a clearance.

2.3 Dry port Characteristics

According to UNCTAD (1991), the three fundamental characteristics related to dry port are:

- ✓ An intermodal terminal, either rail or barge that has been built or expanded (High capacity traffic mode)
- ✓ A connection with a port terminal through rail, barge or truck services
- ✓ An array of logistical activities that supports and organizes the freight transited

Dry ports have the capacity to alleviate the bottle neck traffic that occurs at sea ports. The unloaded cargoes from ships will be transported to dry ports without waiting for service, with the realization that customs services would be available within the dry ports. Table 1 emphasizes on the different functions undertaken within the dry port before the release of cargo to the customer.

Table 1: Functions of a dry port (adapted and revised from Tamosaityte D. et al., 2012)

Functions of dry ports	Description
Transportation functions	Cargo handling functions such as consolidation, deconsolidation, loading, unloading, and reloading. Releasing to the customer just before the merchandise leaves the dry port.
Warehouse logistics functions and customs bonded warehouse	Storage or warehouse cargoes, consolidation/deconsolidation of shipments, stripping and stuffing, packing, sorting, assembling, waiting final clearance in custom bonded warehouse.
Container depots	Storing surplus containers, acting as an empty containers supply point and maintenance and repairing containers under contract.
International port functions	Customs inspection and clearance performed at dry port location. Safety/security procedures have to be taken into account.

Information technology functions and communication	Freight management requires information system linking customs with seaports, customers and service providers.
Other functions	Freight forwarding, immigration related services, repairing vehicles, fumigation, documentation, billing and cash collection, customers and drivers facilities.

Depending on the relative uniqueness of each dry port, the functions are linked with the regional economic, geographical and regulatory settings. Dry port should be oriented to the expansion of its functions in order to be able to attract more enterprises and get more benefits from growing economics and increasing transportation volumes, as well as giving benefits for the area where it is located (UNESCAP,2006).

According to UNCTAD (1991), the minimum facilities that a dry port must provide are,

- ✓ Customs control and clearance
- ✓ Temporary storage (warehouse) during customs inspection
- ✓ Container handling equipment for 20 foot(ft.) and 40 foot(ft.) containers
- ✓ Offices of an operator, either the site owner, lessor or contractor
- ✓ Offices of clearing and forwarding agents
- ✓ Complete enclosure, fencing and security system
- ✓ Reliable and efficient communication facilities
- ✓ Container Freight Station (CFS) with stuffing and unstuffing services

In addition UNCTAD outline that a more comprehensive set of facilities could include, offices of shipping line agents, container repair facility, weigh bridges, computerized cargo-tracking services and railway goods office.

Cargo handling equipment is necessary for facilitating activities within the dry port terminal. This equipment is required for the movement of the cargo within the container yard, to the CFS area, to warehouse, loading unloading purposes. The main functional equipment is forklift, reach stalker, terminal tractor and trailer empty container handler and Rubber tied Gantry.

2.4 Key Actors involved in Dry port operation

The operation of dry port has a complex nature having to rely on several key actors for an efficient process. These individual organizations will perform independently for the common benefit and smooth work flow (see Table 2). If one of these key actors fails to fulfill their role competently it will be a handicap for the overall performance of the dry port.

Table 2: The Key actors and their function in the dry port process (Edited from Tamosaityte D. et al., 2012)

Actors	Functions
Shipper/ Importer	Order and pay the transport service
Forwarder	Design, market and coordinates the door to door transport process
Shipping line	Move containers between sea ports
Seaport	Transship between different modes of transportation (usually between ship and rail)
Intermodal operator	Designs, markets and coordinate the total transport service including terminal handling
Rail carrier	Moves cargo-trains.
Dry port	Handles and manages the dry port operations
Road carrier	Transport the containers by road from dry port to the customer
Government	Involved in the development of dry ports

2.5 Freight transport in Ethiopia

Ethiopia has become a landlocked country in 1993 after the independence of Eritrea. The country is located in Eastern part of Africa bordering the country Sudan, South Sudan, Eritrea, Somalia, Kenya and Djibouti.

Before the 1998 dispute between Ethiopia and Eritrea, port Asseb used to handle about 85% of the Ethiopian maritime traffic through the red sea while Djibouti covered only 15% (Nathan Associate Inc., 2014). Ethiopia turned to Djibouti after May 1998, were both countries signed a formal agreement.

Currently port Djibouti handles about 98% of the foreign trade and grants Ethiopian imports and exports to transit with no customs transit fee, guarantee or security within their boundary. The Djibouti port is located at the southern entrance to the Red Sea, at the intersection of major international shipping lines connecting Asia, Africa and Europe. The Port of Djibouti is ideally located to serve the COMESA market, linking 19 countries and 380 million peoples. (Port De Djibouti, 2015)

According to a study made by Nathan Associate Inc. (2014), to accommodate this important business Djibouti port has made an investment in building a new container terminal called Doraleh with a capacity of 1.2 million TEU. The new facility is four times larger than the previous facility and includes a 1,000-metre berth, six quay cranes and has a water depth of 18 meters, which can accommodate the world's largest container vessels (UNCTAD, 2013). It also has state of the art equipment and terminal operating software that gives it the capacity to handle 54 TEUs per crane hour with of more than doubling its capacity to 3million TEU (Nathan Associate Inc., 2014).

The main road connecting Djibouti to Addis Ababa has a distance of 910Km. Having recently been rehabilitated, the first 71 km from the port is in good condition, while the remainder of the road in Djibouti is heavily pot-holed, especially in the many dry riverbeds that cross the road (Nathan Associate Inc., 2014).

2.5.1 Intermodal System in Ethiopia

Ethiopia has outlined plans to become a middle income country by 2025, according to its five year Growth & Transformation Plan, (GTP, 2009). The Maritime Transit Authority believes that increasing efficiency of logistics is one of the ways Ethiopia plans to achieve its ambitious plan.

To maintain the commendable economic growth that has been registered in the country over the last several years, one of the strategic measures taken by the Federal Government of Ethiopia is merging the former three public enterprises that have until recently been operating

separately in a rather similar and interdependent maritime sub-sector; namely, Ethiopian Shipping Lines S.C (ESL), Maritime and Transit Services Enterprise and Dry Port Enterprise (ESLSE profile, 2014). As a result, Ethiopian Shipping and Logistics Services Enterprise (ESLSE) was formed by the amalgamation of these three enterprises in 2011.

According to a local newspaper (Fortune, Oct 02 2011), the amalgamation of the companies comes from a need for coordination among the separate firms under the state's control and for efficient use of their resources. It also states that, although the respective roles of the individual companies will remain the same, they are to be governed by a new board of directors and management.

In 2012, the Intermodal system was declared to be executed solely under ESLSE, the government entity taking the responsibility for the delivery of shipment from the point of origin until it reaches the dry ports. It became a mandatory system where anyone in the country who need to import shipment, first had to approach the ESLSE.

According to ESLSE (2014), the provided definitions for both Multimodal and Unimodal are:

***'Multimodal transport service':** Essentially, this is a door-to-door cargo service with SAD (single administrative document) from the point of origin to the point of destination. In Ethiopian Shipping Lines' (ESL) case, the cargoes are shipped all the way from the port of their origin via Djibouti port and finally to Mojo Dry Port as well as other inland ports. Therefore, ESL as official Multimodal Operator takes all possible care to the cargo under its custody, as of the time the shipment is confirmed and ordered.*

***Unimodal** transport service by contrast involves one mode of transportation, i.e., sea, rail or road, or air freight of cargo. Here services are disintegrated, with many operators and agreements involved. In ESL's case, the unimodal service ends at port of Djibouti, after which the consignee will choose his/her transitor and/or transporter and enter agreement with to receive cargo in the hinterland of the country.*

Containers and ro/ro (roll on roll off, vehicles) with weight less than 3tonnes, are necessarily handled by ESLSE under the intermodal system hence the responsibility of ESLSE is up to

the point of dry port. In addition, ESLSE will also provide door to door service to selected manufacturing enterprises, by which the container is delivered to the customer's bonded warehouse instead of the dry port.

Only companies which are granted waiver, for special circumstances are allowed to use unimodal by which the importers can pick their container from Djibouti port. In addition, break bulk cargoes and steel are transported under the unimodal transport. Break bulk cargoes or sometimes called general cargoes are goods not in containers but transported in bags, boxes, drums or barrels. The cargoes that use unimodal transportation have to get clearances from customs clearing branch offices.

After the monopoly implementation of the intermodal system, there has been heavy congestion (Clogged with piled of containers lying at the port of Djibouti) as the ESLSE did not have the capacity to bring in all the shipments from Djibouti port. It was reported by local newspapers, Fortune, that in July 2012, there were 22,000 containers stranded at Djibouti port, for which the government was responsible for paying demurrage cost. Meanwhile, it had only the capacity to bring 300 containers per day. This caused uproar from costumers and businesses. The job was previously handles by freight forwarders and transporters.

Even though, the government reported that it has stabilized the intermodal system, it still ran into troubles as importers failed to pick up their shipments from dry ports.

According to ESLSE's annual report 2013/2014, the target dwell time at Djibouti port for intermodal transported containers was set for 5 day. But more than 75% of the containers were picked within 8 days while the remaining 25% were picked with average of 10 days. In contrast, cargoes transported through the unimodal system have an average of 45days dwell time at Djibouti port (ESLSE, 2013/2014). Djibouti port grants 8 days of grace period and starts charging demurrage cost per container per day after these days; (9th -15thdays) 5.65 USD, (16th -20th days) 7.05 USD, (21st -25th days) 8.80 USD and 26th till delivery 11USD (Port Djibouti,2012).

In the year 2014/2015, about 200,598 TEU (Twenty Equivalent Unit) containers have been imported to the country and 60% of the land freight was covered by the intermodal system. Table 3 shows the amount of different cargoes that were transported from Djibouti.

Table 3: Amount of goods transported from Djibouti port using intermodal and unimodal transportation for the year 2014/2015 (ESLSE annual report 2014/2015)

Land Freight through	Type of Cargo	Unit	Quantity
Unimodal	Break bulk cargo including oil	tonnes	441,806
	Wheat	tonnes	622,527
	Sugar	tonnes	160,958
	Coal	tonnes	362,152
	Fertilizers	tonnes	917,47
	Malt	tonnes	35,581
Intermodal	Containers	no.	120,404
	Ro/Ro	no.	10,636

Realizing the importance of producing research based solutions to this problem the government has commissioned several studies to be conducted including one done by Nathan Associate Inc. The research analyzed the logistics system in terms of a value/Supply Chain Analysis but the contract was cancelled before the company could present its final analysis (Nathan Associate Inc., 2014).

Another study conducted independently by Tadesse Kenea evaluates the international import-export freight transport system as a whole (Amentae, T.K., 2015). The study assessed customer satisfaction and found that “majority of the customers were not satisfied with many of the service performances. In contrast, the ESLSE employees evaluated their organization positively on many performance indicators.” According to the study repetitive and time consuming custom checks were high on the list of constraints with the intermodal system. Generally, it was concluded that the enterprise is doing well in terms of transport documentation performance indicators but in terms of cost and convenience the performance was unsatisfactory.

The literature available so far assesses the Ethiopian intermodal system in its entirety. However, there is a need for different researches that shine the light on one aspect of the

system and provide detailed analysis. This paper will attempt to fill this gap, by focusing on dry ports which are essential parts of the intermodal system and assess their performance.

2.5.2 Ethiopian dry Ports

The main strategy considered by the government when implementing intermodal transportation system was to focus on the development of dry ports. Currently there are 7 dry ports in the country handling imported cargoes (see Figure 3).



Figure 3: Location of the Dry ports in Ethiopia

The EMAA have studied ideal locations for additional 9 dry ports which were decided to be constructed in the near future.

Table 4 illustrates the number of containers and vehicles that were received by the dry ports for the year 2014/2015 using intermodal transportation. It is clear that in cumulative Mojo

and Kality dry port handles more than 90% of the containers. Out of the total amount of containers 95% were destined to different dry port while 5% were delivered to the importers' bonded warehouse. In addition, out of the total vehicles, 78% were delivered to the dry ports. Galan dry port handles 99% of the imported vehicles (ro/ro) destined to the dry ports while Semera dry port covers the remaining 1%. In the year 2014/2015, 8,193 and 82 vehicles were handled by Galan and Semera dry port respectively. Even though Galan dry port has been developed recently it has encountered some construction problems and is currently handling ro/ro only.

Table 4: Received number of containers and ro/ro at the dry port 2014/2015, through intermodal (Adapted & revised from ESLSE annual report 2014/2015)

Dry Ports	Distance from the Capital (Km)	No of Containers	Share (%)
Mojo	70 East	86,097	75.3
Kality	14 East	17,165	15
Mekele	780 North	5,082	4.4
Diredawa	317 East	2,863	2.5
Kombolcha	380 North	2,729	2.4
Semera	587 North-East	433	0.4
Galan	94 East	-	-
	Total	114369	

According to ESLSE, in the year 2014/2015, there is a total accumulation of 9,323 TEU containers allocated in different dry ports. Even though Ethiopian Revenues and Customs Authority (ERCA) has a regulation stating that containers having a dwell time of over 60 days within the dry port will be confiscated, this rule has not been implemented yet. The

average dwell time of containers at different dry ports of the country is 71 days (ESLSE, 2013/2014).

2.5.3 Key actors involved in Ethiopian Dry port operation

Ethiopian dry ports are state owned under the organization of ESLSE. To assess the performance of the dry ports the contribution of the different actors must be taken into consideration. Figure 4 shows the different participants involved in the Ethiopian dry port operation.

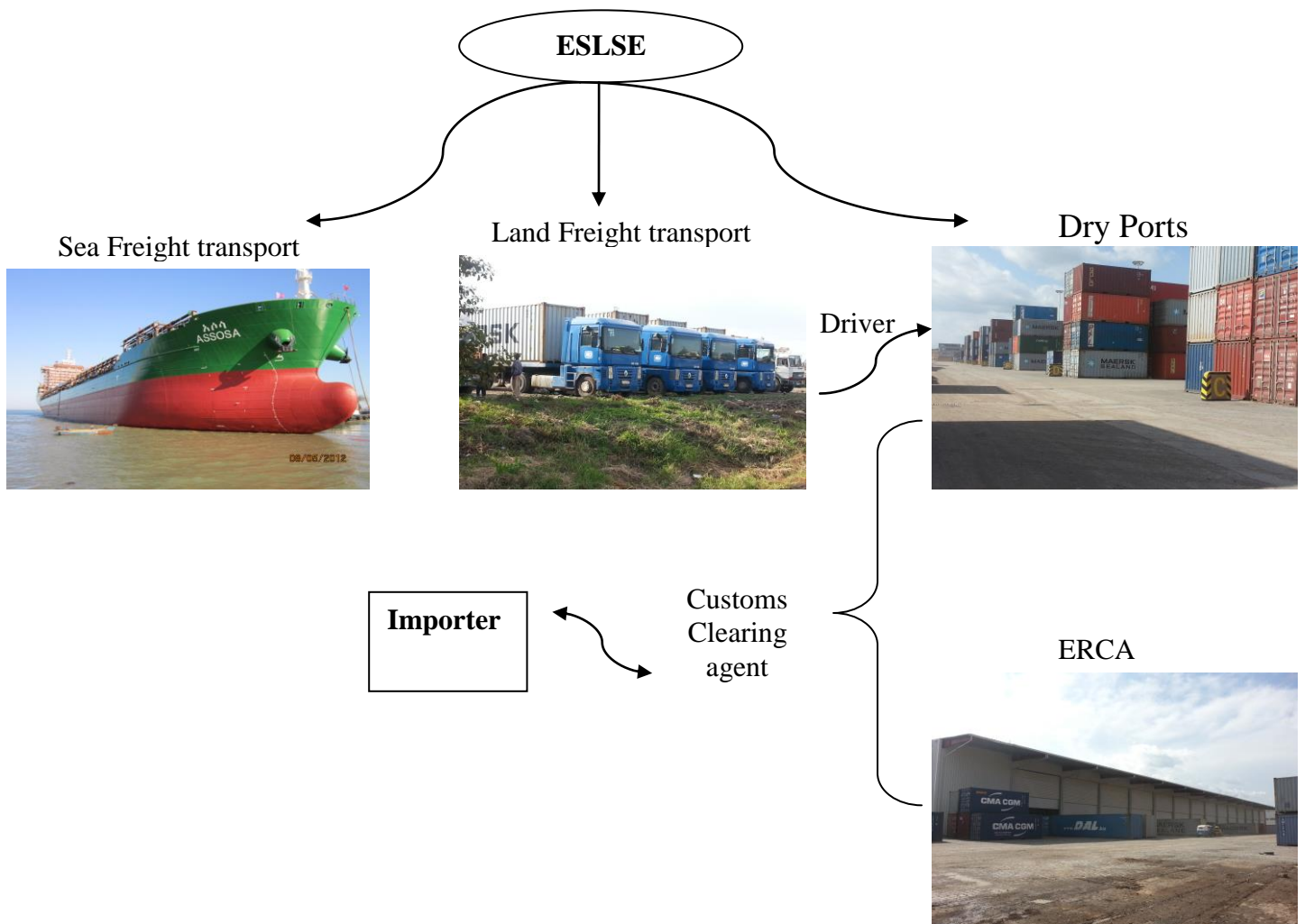


Figure 4: Key actors involved in Ethiopian dry port operation

2.5.3.1 Dry Port Operator (ESLSE)

ESLSE has been a sole operator of the intermodal system in Ethiopia since 2012. It is vested with huge responsibility of reducing cost, transit time and handoff by handling the sea transport and logistics services to the country's importers, exporters, and investors in a more effective and efficient way (ESLSE profile, 2014).

Sea Freight transport

ESL currently owns 13 dry cargo ships and two oil tankers with carrying capacity of 400,000 ton (on average 300 container per ship) and 42,000 metric ton of oil respectively (ESL profile, 2014). Nine of these are brand new and the remaining are within the service age of six to 28 years. According to the ESLSE's annual report, 2015, most recently two of the older vessels have been out of service. This has resulted in reduction of shipments handled by the ESL's vessels allowing slot carriers to cover an additional 10% of the shipments from their previous coverage.

ESL works in collaboration with other shipping lines like Maersk, CMA/CMG, PIL, APL, etc. to handle the shipments flow of the country.

Table 5: Slot carriers of ESL (Adapted & revised from ESL profile report)

Shipping Companies	Fleet Size	Carrying Capacity
	(No. of Ships)	(TEU)
Maersk	577	2,619,000
CMA/CGM	425	149,9
Ever Green	202	818
PIL	175	375
APL	122	642
Messina	14	-

Table 6, describes the share of ESL on transporting the countries imported shipments. It is clear that the slot carriers cover 70% of the shipments.

Table 6: ESL’s Vessel share on imported Cargoes (Adapted & revised from ESLSE annual report 2014/2015)

Types of Cargo	Cargoes Transported by ESL’s vessels (ton)	Cargoes Transported by slot carriers (ton)	Total	ESL's Vessels share (%)
Container	339,147	1,958,710	2,297,857	85
RORO	49,836	41,211	91,047	45
Bulk	305,588	271,087	576,675	47
Steal	304,026	70,483	374,509	19
Total	998,597	2,341,491	3,340,088	70

Land freight transport

The land freight connecting port Djibouti to different dry ports is covered solely by trucks. ESL originally had 60 trucks for handling dry cargoes but after the former Comet Transportation Share Company has transferred under ESLSE; its capacity has increased to 265 vehicles (ESL, 2014).

Currently, the total amount of vehicles has dropped in number due to frequent breakage. Table 7 clearly shows that the vehicles could not meet the targeted mobilization set by the company and achieved only 72% (Kality dry port Annual Report 2014/2015).

Table 7: ESLSE’ trucks performance for the year 2014/2015 (Adapted & revised from Kality dry port Annual Report 2014/2015)

	Total available vehicles (No)	Mobilized Vehicles (No./month)	Total distance covered (Km/month)	Round trip to Djibouti (No./month)
Target	218	188	16610.81	4.3
Actual	215	135	7933.38	2.84
Accomplished (%)	99	72	48	66

According to Kality dry port annual report 2014/2015, on the reporting year, the vehicles have been to the garage 1474 times and 37 vehicles are still under maintenance. The average daily number of vehicles in the garage has reached 66. The report explained that spare parts are not available on time and there is a problem of finding one for the old model vehicles. In addition, there is lack of skilled manpower in the area that could be able to handle these problems.

To solve this problem, ESLSE has recently bought 215 brand new heavy duty trucks equipped with GPS. Currently only 115 vehicles have arrived in the country and the GPS system is on the process of being tested (Kality dry port annual report 2014/2015).

In addition, since ESLSE does not have the capacity to cover the land freight along Djibouti corridor it subcontracts other transport companies. Ethiopian Transport Authority has given permit to 9,885 vehicles belonging to 87 transportation associations, individual owners or transport companies (FTA, 2015). According to the information obtained from Road and transport Authority, the ages and capacities of these trucks is presented in Table 8. Significant amount of trucks are old with 56.6% having an age greater than 10 years. This will directly affect the round trip to Djibouti port per month.

Table 8: Age and carrying capacity of dry cargo across border trucks (Adapted & revised from FTA)

	Vehicles Capacity and ages						
	20-30 (ton)			30-40 (ton)			20-40 (ton)*
	< 10 years	10-20 years	>20 years	< 10 years	10-20 years	>20 years	>20 years
Total no. of trucks	50	747	1661	4244	1677	952	554
Round trip in a month (A.A - Djibouti)	4	3	2	4	3	2	2
Of the total Percentage (%)	0,51	7,56	16,80	42,93	16,97	9,63	5,60
	Total						9885

* 554 vehicles carrying capacity is not available but could range between 20 and 40tonnes

These vehicles are not equipped with GPS either hence, ESLSE has set a time limit of four days from Djibouti port for the drivers to reach the Mojo and Kality dry, or 3 days from Galafi as a means of controlling the drivers. According to the drivers if they exceed this time limit without a valid reason they will be penalized with 1500ETB (72 USD). If the delay is due to an accident, the driver must provide a police report. Table 9 shows land freight rate for different container weight that the importer has to pay. Dangerous cargoes which include toxic substances, corrosive substances, flammable liquids and solids, etc. have a higher cost than normal containers. The inland haulage charge includes service charge, container handling, and container cleaning. In contrast, other freight forwarders have no specific fixed rates but on average except for machineries they charge 1,200-1,500 USD for 20ft. and 2,200-2,400 USD for 40ft. per container. The Djibouti clearance cost is also included in these charges and on average a 20ft container can weigh up to 12.5tons and a 40ft. container between 15-17.5tons.

Table 9: Inland haulage freight rate for containers (ESLSE, 2015)

Loads including tare weight	up to 12.5 tons		12.5 - 15 tons		15 - 17.5 tons		17.5 - 20 tons	
	Djibouti clearance cost (USD)	Inland haulage charge (USD)	Djibouti clearance cost (USD)	Inland haulage charge (USD)	Djibouti clearance cost (USD)	Inland haulage charge (USD)	Djibouti clearance cost (USD)	Inland haulage charge (USD)
20ft.								
Normal Containers	596	1,064	596	1,149	596	1,209	596	1,236.5
Dangerous Cargoes	716	1,064	716	1,149	716	1,209	716	1,236.5
40ft.								
Normal Containers	976	2,128	976	2,299	976	2,415	976	2,475
Dangerous Cargoes	1,239	2,128	1,239	2,299	1,239	2,415	1,239	2,475

2.5.3.2 Importers

A businessperson who wants to engage in import trade in Ethiopia must be registered with the Ministry of Trade, which regulates imports, and obtain a trading license (2Merkato, 2013). Any purchase worth more than 2,000 USD should be processed either through letter of credit (L/C) or Cash-Against-Documents (CAD) processes (Nathan associates Inc., 2014). Since there is a shortage of foreign currency in the country, importers might have to wait for a long period of time (on average 3 months) to obtain this document from the banks. Importers who secured the foreign currency must approach ESLSE if using sea transportation.

If the ESLSE does not call at the port of loading it issues importers a waiver to use other carriers. In addition the Ministry of Industry has recently sent a list of manufacturers to the National Bank of Ethiopia who were exempted from the requirement to use ESLSE (2Merkato, 2013).

Import goods procedures in Ethiopia initiate from destination customs stations. Import operations start by submitting complete basic import documents prepared by declarants and lodged with the website of ERCA (Nathan associates Inc., 2014).

2.5.3.3 Customs clearing agents

The customs clearing agents provide freight forwarding service within the dry ports. They are the bridge for the customer between ERCA and ESLSE. They handle all the formalities and procedures on behalf of the customer. The agents settle the sea freight and land freight payment to ESLSE (head office), pay taxes at ERCA (located in the dry port), present all the required documents by following proper procedures for customs physical examination and settle dry port service charge. The customs clearing agents provide cheap service for the importer.

2.5.3.4 Ethiopian Revenues and Customs Authority (ERCA)

The Ethiopian Revenues and Customs Authority (ERCA) is the body responsible for collecting revenue from customs duties and domestic taxes (ERCA, 2015). The authority came into existence on July 14, 2008, by the merger of the Ministry of Revenue, Ethiopian Customs Authority and the Federal Inland Revenue Authority, which formerly were responsible for raising revenue for the federal government and preventing contraband (Nathan Associates, May 2014).

The Revenue and Customs Authority has 30 branch offices, 22 control stations, 50 checkpoints, and 153 tax centres. Customs control stations are administered by a branch office where formalities are conducted and taxes and duties are collected on imported and exported goods (Nathan Associates, May 2014).

Customs inspection is done at each check points for the inbound trucks transporting from Djibouti port to the different dry ports. The examination is conducted using a scanning machine, manually or both.

A customs inspection almost always incurs additional costs to the importer (ERCA, 2015). These fees include temporary storage fees, penalty fees and transportation costs of the cargo to the examination area with in the dry port. Figure 5 shows the route that a truck follows to transport shipments from Djibouti port to the capital city, Addis Ababa. In total there are 4 customs check point along this route.

The process for customs clearing starts after the importer obtains a bank permit to import the goods. The importer will appoint a clearing agent to handle the process for customs clearance on behalf of him/her. The clearing agent will provide all the complete import documents to the ERCA website through a self-assessment system called ASYCUDA ++ (Automated Systems for Customs Data). In accordance to the registered documents ASYCUDA ++ will categorize the imported goods into one of the four ERCA risk channels; Red, Yellow, Green, Blue. Taxes and duties are paid in accordance to the presented values. The inspection process gets more stringent, from blue to red, as the trust level declines.

After arrival of the cargo and all the documents are processed at Djibouti port, the driver will be provided with transit documents and the ATD seal will also be bared on the container in addition to the existing manufacturer seal provided at the port of loading.

At Galafi exit gate of Djibouti customs territory, the driver will provide the transit document and get checked if the cargo is as it was loaded at the port of entry (Nathan associates, 2014). About 10Km from the Djibouti exit gate, Galafi Revenue and Customs Authority for Ethiopian border entry is located where the driver will submit the Djibouti customs transit document and the seal and cargo will be checked. The customs officer provides the driver with T-1 Transit permit printed from ASYCUDA transport manifest (Nathan associates, 2014). Once the driver is in the Ethiopian territory he will present T-1, Djibouti customs

transit document and waybill at each customs check point while transiting to the destination dry port.

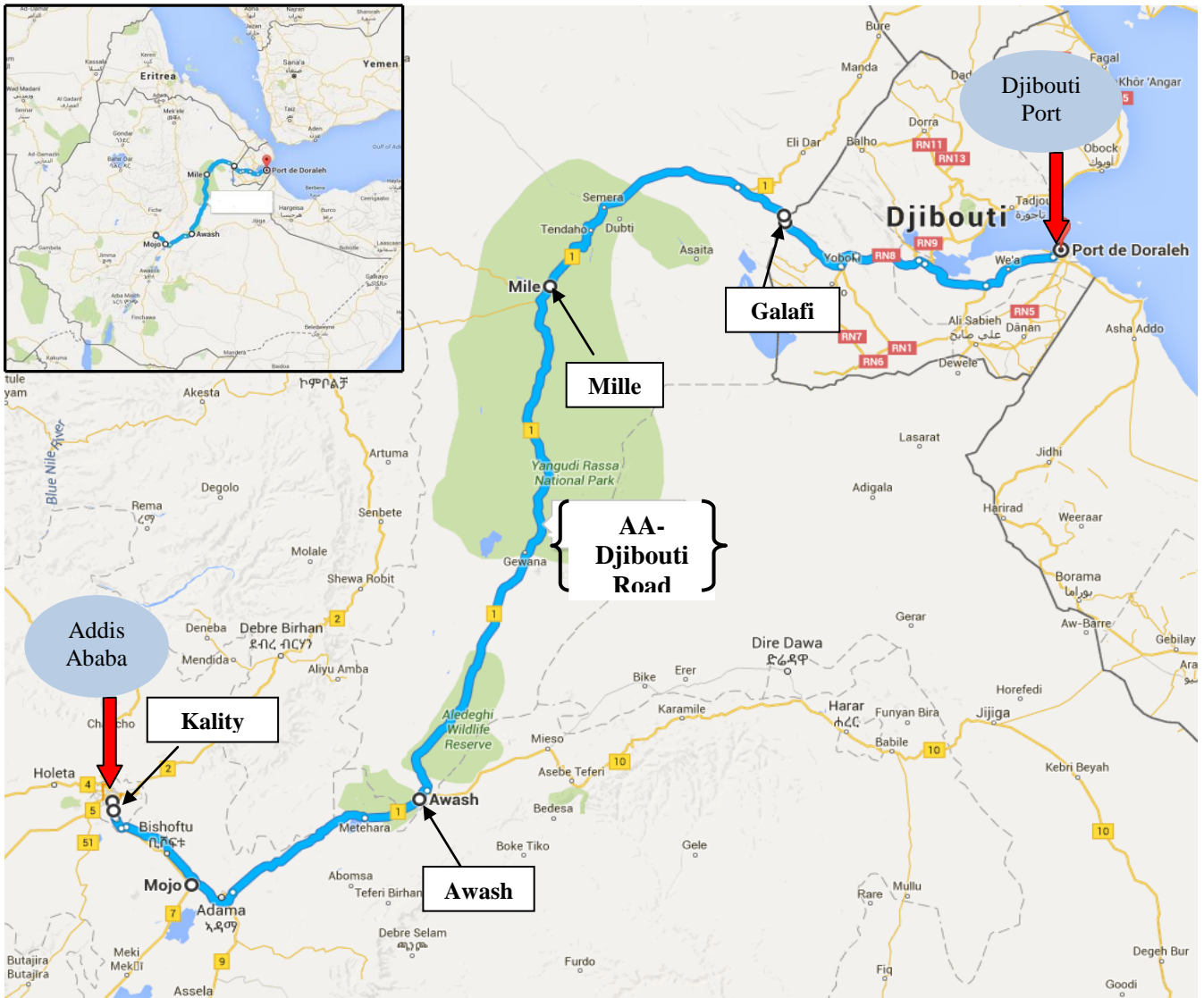


Figure 5: Road way map from Djibouti to Addis Ababa with the check points

A cargo destined to Mojo dry port will pass through two customs check points after Galafi Ethiopian border entry; Mille ERCA cargo scanning station and Awash ERCA check point. Cargoes intended for Kality dry port will incur one additional check point at Kality. The customs officers at each check point will assess the documents provided by the driver and assess the cargo and the seal to verify the condition. The T-1 will be stamped at each checkpoint while the ASYCUDA is updated as the truck is cleared. The revenues and

customs authority at Mille cargo scanning station will only scan cargoes transported through unimodal transportation system.

As the cargo arrives at the dry port, the customs inspectors at the entrance gate will retrieve the Transit document (T-1), Djibouti customs transit document and waybill, check the seal and verify the cargo if it has been tampered with. The document will be transferred to the transient officer to cross check the transport manifest provided by the trucker with the information registered in the ASYCUDA ++ system and if all stamps from each check point are available.

The trucker will unload the cargo at the assigned container yard and the waybill will be stamped and provided to the driver as a proof of delivery. This serves as a receipt for the driver or associations to approach ESLSE office at Addis Ababa and claim the payment for the provided service.

2.6 Performance Parameters

‘If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it’ (Harrington, 1991). The underlying concept of measuring the performance of an organization is for thorough understanding of the current situation and seeking for an improvement. There are different methods and standardized process for collecting the data and assessing the operation. The dry port operation is complex involving different parties which make it difficult to have a specific method for analysis. Choosing the appropriate metrics relies on having a standardized measureable parameter that has an impact on the specific dry port with clear understanding and communication with the involved actors.

2.6.1 Supply Chain Operation Reference model (SCOR)

Success for many companies depends on their ability to balance a stream of product and process changes with meeting customer demands for delivery and flexibility (Gordon Stewart, 1997). The Supply Chain Operation Reference (SCOR) model has been developed to describe the business activities associated with all phases of satisfying a customer's demand.

It provides a unique framework that links business process, metrics, best practices and technology into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities (Supply Chain Council, 2012).

The SCOR model, proposed by the Supply Chain Council (SCC), is a standard for supply chain performance evaluation model, which has been widely embraced by many modern organizations (Yeong- Dong Hwang et al., 2008).

The SCOR model focuses on the function of the organization and according to SCC (2012), SCOR model has 4 major sections:

- ✓ *Performance*: Standard metrics to describe process performance and define strategic goals
- ✓ *Processes*: Standard descriptions of management processes and process relationships
- ✓ *Practices*: Management practices that produce significant better process performance
- ✓ *Human resource*: Standard definitions for skills required to perform supply chain processes.

The performance section consists of two types of elements; Performance Attributes and Metrics. All the metrics belong to the performance attributes. A performance attribute cannot be measures by itself and enables to set a strategic direction by grouping all the metrics under it. As described in Table 10, there are five performance attributes; Reliability, Responsiveness and Agility which are customer-focused and Cost and Asset which are considered internal-focused. The table also illustrates the Level 1 metrics which belongs to each specific parameter. SCOR describes 3 levels of metrics: level 1, level 2 and level 3. While level 1 metrics is calculation by which an organization can measure how successful it is in achieving its desired positioning within the competitive market, level 2 and 3 are diagnostics for the upper level (SCC, 2012). This implies that by looking at the performance of the lower level, the upper level can explain performance gap or improvements.

Table 10: The SCOR Performance Attributes and Level-1 metrics (Adapted & revised from SCC, 2012)

Performance Attribute		Definition	Level-1 Strategic Metric
Customer-Faced	Reliability	The ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability attribute include: On-time, the right quantity, the right quality.	Perfect Order Fulfillment
	Responsiveness	The speed at which tasks are performed. The speed at which a supply chain provides products to the customer. Examples include cycle-time metrics.	Order Fulfillment Cycle Time
	Agility	The ability to respond to external influences, the ability to respond to Market place changes to gain or maintain competitive advantage. SCOR Agility metrics include Flexibility and Adaptability	Upside Supply Chain Flexibility
			Upside Supply Chain Adaptability
Downside Supply Chain Adaptability			
		Overall Value at Risk	
Internal-Faced	Costs	The cost of operating the supply chain processes. This includes labor costs, material costs, management and transportation costs. A typical cost metric is Cost of Goods Sold.	Total Cost Serve
	Assets	The ability to efficiently utilize assets. Asset management strategies in a supply chain include inventory reduction and in-sourcing vs. outsourcing. Metrics include: Inventory days of supply and capacity utilization.	Cash-to-cash cycle time
			Return on supply chain Fixed Asset
		Return on working Capital	

2.6.2 Queuing Theory

A dry port performance can also be analyzed with queue model, like any other service providing organization; customers will wait in queue to get service. A queue is the waiting line of a customer requiring a service facility. Queuing theory uses queuing models to represent different scenarios of queuing systems that are encountered on day to day bases. The theory enables mathematical analysis of several related processes including arriving, waiting and being served (Gebresenbet G., 2015). The model provides the analyst with a powerful tool for designing and evaluating the performance of queuing systems (Bank, Carson, Nelson & Nicol, 2001). The queue model is characterized by the arrival process of the customer, the behavior of customer, the service times and the service disciplines.

Little's Law says that (see Figure 6), under steady state conditions, the average number of items in a queuing system, arrival rate and total queue time are expressed as (Gebresenbet G., 2015):

$$L = \lambda W \quad (1)$$

$$Lq = \lambda Wq \quad (2)$$

$$W = Wq + 1/\mu \quad (3)$$

Where;

L = average number of customer in the queuing system (includes customers in service)

W = average waiting time in the system for an item (includes customers in service)

λ = average number of items arriving per unit time

Lq = average number of items in the queuing system

Wq = average waiting time in the system for an item

μ = average number of items getting served per unit time

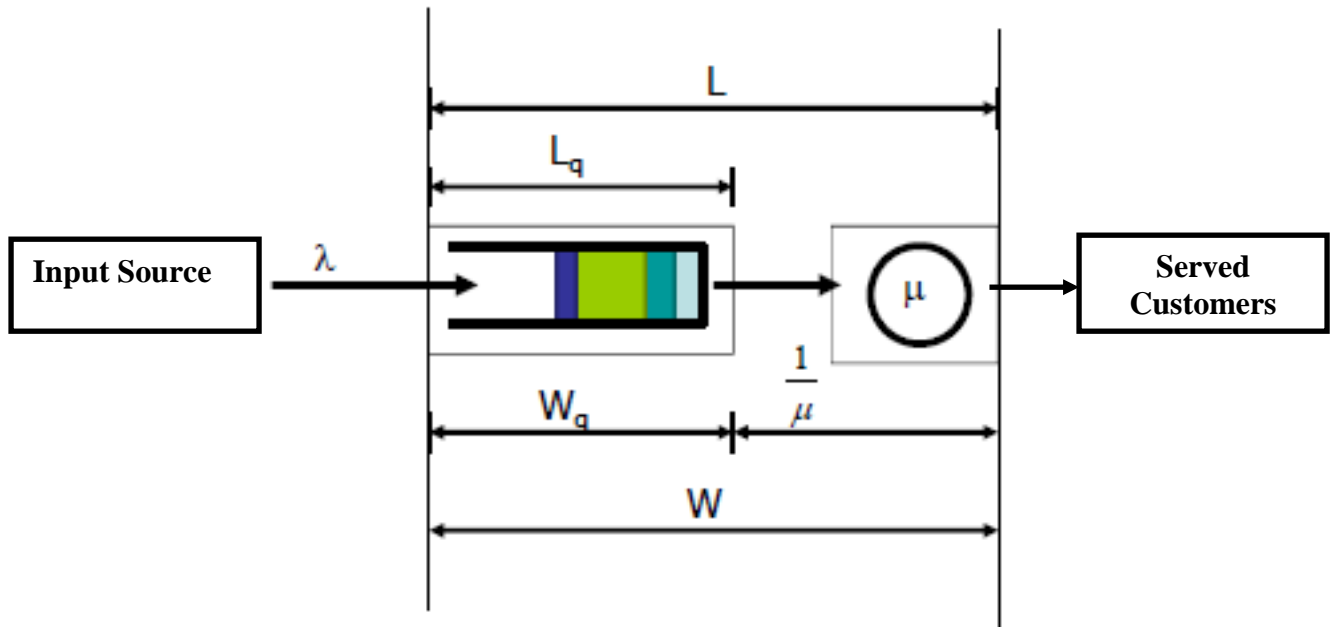


Figure 6: The queue system and Little's law (Adapted & revised from Gebresenbet G., 2015)

Queue Performance Measures:

The performance measures are commonly investigated under stochastic scenario i.e. the inter-arrival times of the customers and the service times are assumed to be random.

For a single channel and under saturated condition i.e. where there is a single waiting line in a single service facility and where the arrival rate is less than service rate, the performance indicators are:

- ✓ Average queue time, W_q
- ✓ Average queue length, L_q
- ✓ Average time in system, W
- ✓ Average number in system, L
- ✓ Service intensity (utilization factor), or probability that service is busy and customer has to wait :

$$\rho = \frac{\lambda}{\mu} \quad (4)$$

- ✓ Probability of the server being idle:

$$P_0 = 1 - \frac{\lambda}{\mu} \quad (5)$$

Figure 7 shows the typical condition for the relation between the utilization factor and the waiting time of customers in a queue excluding the service time. It can be clearly seen that the queue size increases as the utilization factor approaches 1. The randomness will make it difficult to manage, causing a queue even in under saturated condition. Waiting time more than doubles as utilization moves from 80% to 90% and double again as it moves from 90% to 95% (Thomke S. & Reinertsen D., 2012). This implies that it's not possible to fully utilize network without causing any delays.

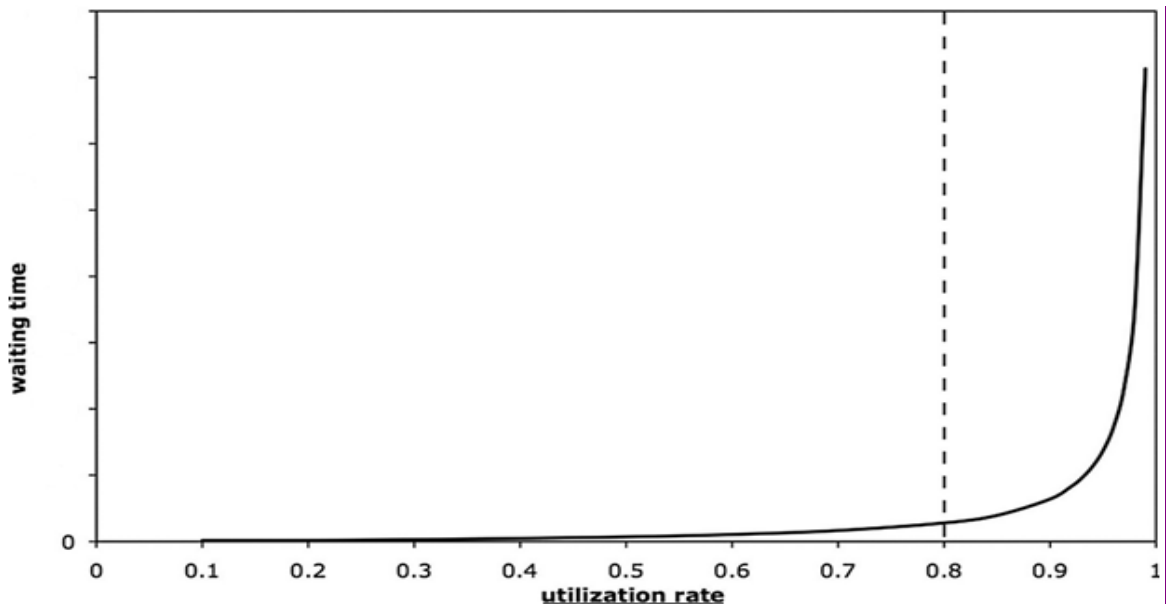


Figure 7: Waiting vs. Utilization (Adapted from Adrian H.Zai et al., 2009)

3 METHODOLOGY

To gather all the necessary data for the analysis and assessment of the performance of the dry ports different methods and approaches were used.



Figure 8: Sequence of the Methodology used

First, literature review was made to assess relevant documents related to the Ethiopian ‘intermodal system’ as a whole and made emphasis on the dry ports for a thorough understanding of the existing conditions and concepts.

Secondly, a case study was selected for in depth analysis about the dry port system in the country. The case study strategy requires development of detailed and intensive knowledge on a single case or related cases to generate answers to the questions of What, Why, and How (Robson, 1993). Hence, Mojo and Kality dry ports were selected which are located on the major transaction corridor of the country. As mentioned in the literature part (ESLSE, 2015), these two dry ports handle in cumulative 90% of the country’s containers and their assessment will have significant impact on the overall dry port performance of the country.

3.1 Data Collection

The data collection focuses on acquiring both secondary and primary data. The secondary data was necessary for desk study and to grasp what has been done in the past and current situation. In contrast, primary data is collected by the researcher based on the knowledge gained through the secondary data.

Secondary data

All the necessary documents were gathered from different public organizations such as; ESLSE, Ethiopian Revenue and customs Authority (ERCA), Ethiopian Maritime Affairs Authority (EMAA), Mojo and Kality dry ports. Moreover, related documents from other international shipping lines, previous researches, local news reports and papers from

consultants were obtained. In addition, relevant international journals, reports and thesis works have been collected to strengthen the analysis.

Primary Data

These are data collected first-hand by the researcher using different data collection methods. To gather the data, both qualitative and quantitative methods were used in the form of a questionnaire and interview. The survey questionnaires were presented to the different actors involved in the dry port system. To have the opinion on the service provider side, the questionnaires were presented to ESLSE employees located at Head office and at the two dry ports. Truck drivers covering the land freight transportation from Djibouti port to the two dry ports were also selected for the questionnaire. From customers' side, both importers and customs clearing agents' were chosen for an opinion about their satisfaction level about the provided service. Sampling size of 5-10% of the total population of each key actor has been considered. The chosen percentages depend on the time constraints, importance of the key actors and reliability of the respondents. Therefore, the distribution of questionnaire was made systematically to be representative to 30 ESLSE employees of head office, 50 truck drivers, 30 importers, 50 customs clearing agents, 30 employees of Mojo dry port and 30 from Kality dry port. The questions contain both close ended questions that were limited to a number of choices and open ended questions; to gather a better explanation about the situation.

The conducted interviews were semi-structured and unstructured. The semi-structured interviews were done by directly approaching the appropriate personnel to get a detailed explanation of the current situation. In contrast, the unstructured interviews were made on the spot by the researcher during field visits to the undertaken research areas to gather detailed information.

In the questionnaires, customers and employees were asked to give opinions about the level of satisfaction of the provided service in addition to their opinion on the actual work being done. The satisfaction level were measured through four levels; satisfied, neutral (mid stand between satisfied and unsatisfied), dissatisfied and don't know. For the measurement of the actual work done, a percentage range of less than 25, 25-50, 50-75 and greater than 75 were taken (see Appendix A).

In addition, actual quantitative data were collected at the entrance gate of both dry ports on the arrival of trucks from Djibouti in order to assess the queue and determine the performance of the provided service.

The inbound trucks encounter physical and document examination at the entrance gates of the destination dry ports which results in queuing of the trucks. The arrivals of the trucks were random and the queue system follows single queue single server in a discipline of First Come First Served (FCFS) manner for both dry ports. Data were collected at peak hours during the day time for consecutive days in addition to off- peak hours' data for a single day to analyze the regular flow of the trucks and the Utilization factor.

The entrance gate at Mojo dry port provides services starting at 6.00am in the morning till 12:00pm at lunch time with an hour break before starting work again at 1:00 Pm. The gate closes 8:00pm in the evening. Hence, the peak hours at which the driver encounters a long delay are during the lunch break and in the morning before service time. To determine the service rate for the accumulated trucks, 12days data were collected at these peak hours. In addition, to have the arrival rate and service rate time intervals for determining the performance parameters, data were collected for a day without the peak hours between 10:40 am – 11:45am and 1:45pm – 2:50pm.

To analyze the lead time, data were collected at one of the closed customs examination warehouse at Mojo dry port for 2 weeks. There exists a time gap between a work order request (claimed by the clearing agent), the request received by the warehouse and the actual start of work.

Similarly, the entrance gate at Kality dry port provides service from 6.00am- 8:00pm. The peak hour was after 3:00pm because the dry port allows an empty container waiting time until 5:00pm for drivers that arrives after this time. For drivers that entered the gate before 3:00pm, the waiting time was only up to 5:00pm on the same day. If there was no available empty container by the end of the day the driver is obliged to return to Djibouti port with no container. Hence, to have a longer waiting time the drivers try to enter to Kality dry port after 3:00pm. Data were collected at this peak hour for 5 working days to determine the service rate. In addition, to have the arrival rate and service rate time intervals for determining the performance parameters, data were collected for a day without the peak hours between 9:35 am – 2:59pm.

3.2 Data Analysis

The performance of activities needs to be measured in order to analyze the existing condition and seek an improvement to meet the required customer's satisfaction.

3.2.1 SCOR model

The level 1 metrics were used to assess the performance of the dry ports. Since obtaining an organized data either from the dry ports or ESLSE was not possible, the questionnaires were designed in such a way that the appropriate performance metrics are incorporated and addressed to acquire the opinions both from employees and customers. The SCOR model (SCC, 2012) and metrics used for this study are presented in Table 11.

Table 11: Chosen Performance attributes and Metrics

Performance Attribute		Level 1 Metrics
Customer-Faced	Reliability	PerfectOrder Fullfilment
	Responsiveness	Order Fullfillment Cycle Time
	Agility	Flexability and Adaptability
Internal-Faced	Costs	Total Cost to Serve

The **Reliability** attribute addresses the ability to perform tasks as required and the metrics chosen to determine the performance of the dry port was the **Perfect Order Fulfillment**. Perfect order fulfillment focuses on the percentage of orders meeting delivery performance at the perfect condition and quantity, at the perfect customer's definition of time, at the right place, with a complete and accurate documentation and no damage.

Responsiveness is customer based attribute that describes the speed at which tasks are performed. **Order Fulfillment Cycle** time was one of the metrics used to describe responsiveness and it is the average actual cycle time consistently achieved to fulfill customer

orders. For each individual order, this cycle time starts from the order receipt and ends with customer acceptance of the order (SCC, 2012).

According to SCC (2012), the **Agility** attribute is describes as the ability to respond to external influences; the ability to and speed of change. The chosen SCOR key performance indicators are **Flexibility** and **Adaptability**. It describes the time interval at which the organization will be stable to unforeseen scenarios whether it is an accident or excess demand.

3.2.2 Queue model

To determine the performance of the provided service at the entrance gate for both dry ports, Poisson arrivals with rate λ , exponentially distributed independent service rate μ and a single queue and server was selected. The Little's law is adopted to determine the queuing system.

Assumptions

- ✓ The flow is assumed to be in a steady state condition i.e after sufficient time has elapsed, the state of the system becomes essentially independent of the initial state and the elapsed time.
- ✓ Infinite numbers of customers in queuing system, the arrivals are independent of the number of customers in the system.
- ✓ FIFO (First In First Out) or FCFS (First Come First Serve)
- ✓ No customer leaves the queue without being served
- ✓ The service times, and inter-arrival times are independent random variables.
- ✓ Arrivals of customers follow a Poisson process (The number of the customers that come to the queue will get service during a certain time period only depends on the length of the time period but no relationship with the start time.

The performance parameters used to analyze the service at the entrance of both dry ports are;

- ✓ Service intensity (utilization factor)
- ✓ Probability of the server being idle:

Finally, based on the obtained results, analysis will be made to make conclusion about the performance of the two dry ports outlining the strength and the areas that needs improvements.

4 CASE STUDY

In order to achieve the study objective, case study was done on Mojo and Kality dry ports. The dry ports function hand in hand with the key actors; importers, ESLSE (intermodal operator), drivers, customs clearing agents and ERCA.

The customs clearing process within the dry port starts with the customs clearing agent providing all the required documents to the Facevet officer. According to the customs officer at Mojo, the complete document includes Declaration (Print out from ASYCUDA), invoice, bill of lading, Certificate of origin, packing list, bank permit, transit document and payment receipt. If the goods are designated Green or Blue the Facevet officer will grant automatic release without inspection. In addition, the Facevet officer will assess the provided documents to check whether the ASYCUDA system has assigned the appropriate risk, if not the risk profile will be revised.

Green channel goods are institutions recognized and trusted by ERCA that is granted automatic release making clearance expedient. Diplomatic missions, embassies, government institutions/enterprises, and industries are included in this list.

Blue channel is reserved for what is known as the Authorized Economic Operator (AEO) program. The term is given for those businesses that the ERCA deems are important for the economy and have been trusted to responsibly pay their taxes and contribute to the development of the country. Authorized Economic Operators have special privilege. Their cargo will have post audit verification.

If the designated of goods is Yellow or Red channel, the Facevet officer will transfer the documents to the Assessor and examiner. Cargoes in the Yellow channel will undergo document examination only. Institutions that import raw materials, chemicals, pharmaceuticals, fertilizers, explosive items are usually categorized as yellow (Kality Customs, 2015).

Red channel goods are subjected to undergo both document examination and a thorough physical inspection. The customs clearing agent must submit work order to the dry port to transport the cargo to the inspection area.

According to the information gathered from the facevet officer at Mojo, the physical examination could be on the full or partial content of the goods. The goods that are considered in red channel are fully unstuffed out of the container to the closed customs examination warehouse were about 20% of the contents are scrutinized to check if the quality and quantity of the actual imports matches with the document. However, if there is any discrepancy the examination officer will examine the full contents.

For the low red category (e.g. fragile cargoes), the physical inspection is less strict. A few sample contents are unstuffed from the container and checked outdoors at the CFS. Most of the importers in the red category are traders that import finished/read-made goods. Businesses that have been caught evading or underpaying taxes are also moved to the red category. The examination officer will present the results of the inspected cargo to the assessor and if there is no discrepancy the cargo will be cleared from customs.

4.1 Mojo Dry Port and Terminal

Mojo Dry port which is located approximately 70 kilometers southeast of Addis Ababa started its commercial operation in 2009 under the former Ethiopian Dry port Enterprise. But after the amalgamation of the three companies, Mojo dry port has been operating under ESLSE since 2012.

The dry port location has an access to the Express road and Djibouti Sebeta Rail way which is under construction. The dry port is only involved with the operation of imported container and Ro/Ro activities that are transported through the intermodal system. Mojo dry port is the corridor for major trade transaction of the country since most of the containers are destined to the capital.

About 75% of the countries imported containers transported through intermodal system are handled by this port (ESLSE, 2015). Currently, 2014/2015, Mojo has financial growth of 555,145,650 ETB (26,435,507 USD) (Mojo dry port and terminal report, 2015). Even though

the dry port is still under construction, with the current master plan of the port, the capacity will grow to 15600 TEU after a year (Mojo dry port and terminal report, 2015).

The number of employees has also increased massively to a cumulative of 241 permanent employees and 141 on contractual bases (Mojo annual report, 2014/2015). In addition, there are 102 daily workers and 240 loading/unloading workers (Mojo dry port and terminal report, 2015).

Today, the dry port offers a wide variety of value added services including receive and dispatch of containers, loading/unloading, stuffing/unstuffing, temporary storage of goods or containers and, billing and cash collecting.

Table 12 shows the container flow received at Mojo dry port for the year 2014 and half of 2015. The port has a monthly average flow of 6,418 TEU containers for the year 2014 and 7,016 TEU containers for the months between January and June 2015.

Table 12: Full in containers flow status at Mojo dry port (Mojo dry port, 2015)

Full in cargo flow status at Mojo dry port (No.)				
Year	Month	20ft.	40ft.	Total (TEU)
2 014	Jan	1,820	828	3,476
	Feb	2,160	1,088	4,336
	March	2,325	1,453	5,231
	Apr	2,741	1,507	5,755
	May	3,051	1,855	6,761
	Jun	3,260	2,097	7,454
	Jul	3,478	2,106	7,690
	Aug	3,601	1,966	7,533
	Sep	2,873	1,477	5,827
	Oct	3,500	2,015	7,530
	Nov	2,806	1,774	6,354
	Dec	3,839	2,613	9,065
Summary		35,454	20,779	77,012
2 015	Jan	2,802	1,672	6,146
	Feb	3,326	2,277	7,880
	March	2,821	1,872	6,565
	Apr	3,270	1,753	6,776
	May	3,003	1,733	6,469
	Jun	3,666	2,298	8,262
Summary		18,888	11,605	42,098

Mojo dry port has an average dwell time of 65days. As it can be seen from Table 13, the longest dwell time is due to the containers belonging to the governmental offices while the second being due to the private companies. Even though Ethiopian Revenues and Customs Authority has a rule to repossess containers which has a dwell time greater than 60days, it hasn't been implemented yet.

Table 13: Dwell time (days) at Mojo dry port (Mojo dry port report, June 2015)

Consignee Type	Less than 60 days Dwell time		Greater than 60 days Dwell time		Total	
	Container (TEU)	Average Dwell time (days)	Container (TEU)	Average Dwell time (days)	Container (TEU)	Average Dwell time (days)
Private	4,992	17	1,691	221	6,683	66
Government Office	290	20	124	317	414	113
Public Enterprise	401	17	38	113	439	24
Grand Total	5,683	18	1,853	217	7,536	65

4.1.1 Layout and Equipment

Mojo dry port has started operating with only a few operating machines, a capacity of handling 200TEU and 26 staff members. According to a report provided by the Dry port dated April 2015, currently the dry port has total area of 64 hectares of land and is also granted an additional 70.40 hectares by the government for expansion.

The terminal has a capacity of handling 12,726 TEU with 3 high stacks and currently has about 8340TEU. At present, the available equipment include 10 reach stackers, 3 empty container handler, 15 forklifts of different capacity, 9 terminal tractors and 2 firefighter trucks (Mojo port & terminal,2015). A fuel depot is also available for terminal machineries. The terminal is reached by road and there is no pedestrian roads provided in the compound.

According to Mojo dry port profile, a weigh bridge is under construction, and there is already a fire station and Clinic for the employees. In addition, the head of the dry port confirms that there is plans to buy 7 Rubber tied Ganty and make it operational by the coming year and also

admits that system lacks Closed-circuit television (CCTV) for security surveillance and Terminal Operating System for location.

Most of the container yard is leveled and paved while the expansion areas are still undergoing construction. As it can be seen from Figure 9, the current location of dangerous cargo container yard is not paved and containers are stacked on the levelled ground.



Figure 9: Mojo dangerous container yard

The Container Freight Station (CFS) area designated for customs inspection at Mojo dry port is unshaded area and can handle up to 70; 20ft. containers and 84; 40ft. containers that are under red risk category and brought for customs inspection (see Figure 10).



Figure 10: Mojo CFS area

The terminal has two large mega warehouses for customs inspection with an area of 5400 sq. meters and a capacity of handling 60TEU each. According to the warehouse head, on average about 30 containers per warehouse are inspected in a daily bases.



Figure 11: Warehouses at Mojo dry port (Exterior and Interior)

Truck waiting area for the inbound trucks from Djibouti is a natural ground located near the entrance gate where drivers parked to finish the paper work needed for unloading the container at the designated location in the container yard.

The fence around the port is still under construction and the current gates are not lockable. There is no camera security available but the terminal is guarded by frequent patrols of security guards around the clock. There are four entrances; the main gate for customers' entrance, for Djibouti inbounds trucks, for entry of local trucks and exit gate.

4.1.2 Operation and Process

Mojo Terminal Operation has six divisions. Terminal Operation and Multi modal clearing are the main divisions that handle core process. Human Resource & General Office, IT & Planning Division, Finance & Accounts Division and Technical division provide back office support.

Any sort of activities in the terminal is handled by the terminal operation division while the multimodal clearing department acts as a transit center. Currently, the IT section is still under developed, partially covering the management and planning systems of the port using Dry Port Operation Information System (DPOIS) and there are services and processes which have

not been automated yet. The financial matters of the dry port including, dry port services and demurrage cost, cost of storage and warehouse service are handled by the finance and accounting division. In addition, the human resource handles the affair and management of the total employees in Mojo.

The gate entrance is open from 6:00am-12:00pm before lunch and 1:00pm-8:00pm after lunch from Monday to Saturday. On Sunday, the gates will be open only 8:00am-12:00pm and 7:00pm-5:00pm. The customs examination warehouse works from Monday to Saturday only during the hours of 8:00am-12:00pm and 7:00pm-5:00pm. But the terminal works 24 hours preparing and moving containers to the required inspection areas.

Figure 12, shows all the required procedures that must be processed before a cargo is released from the dry port.

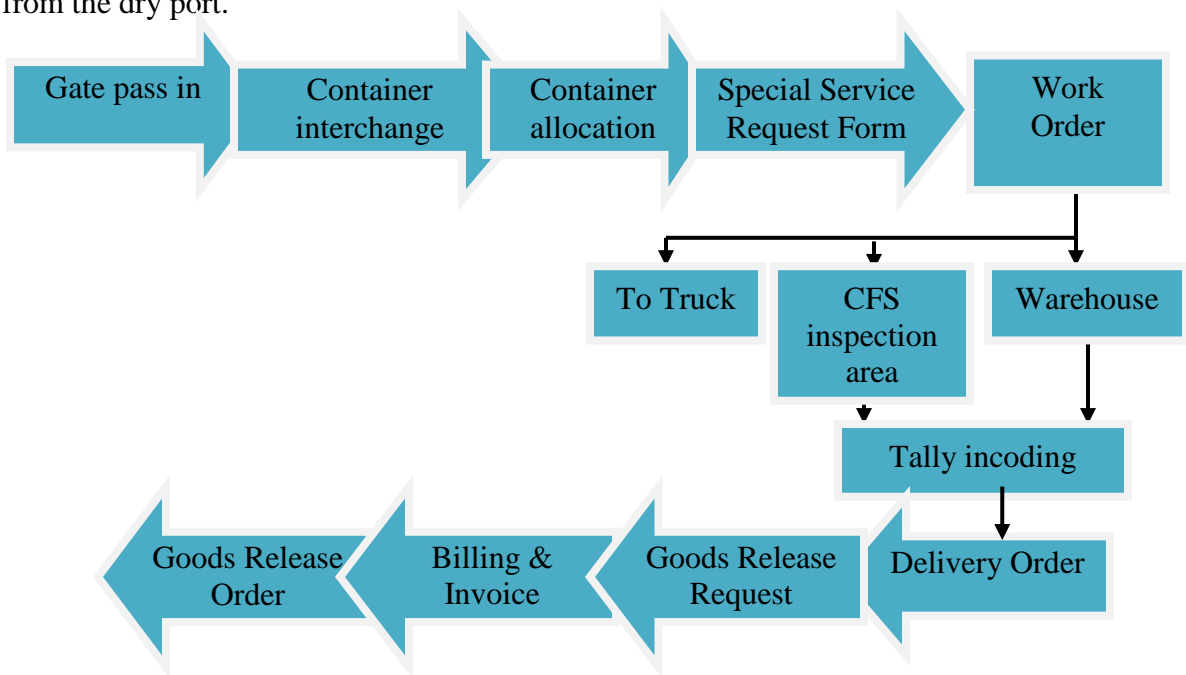


Figure 12: Dry port clearing process for full in container

At Mojo dry port entrance gate, the trucker encounter inspectors both from the dry port and ERCA. The dry port inspector checks the seal with the documents in addition to a thorough assessment of the external condition of the container by examining the left, right, rear, and top sides. If damage has indeed occurred, then the driver has to cover the cost. However, if any damage is discovered after the inspector has given clearance, then the burden is on the

dry port to cover the cost. In addition if any of the two seals are found broken it is considered the security of the cargo is compromised and charges will be made against the driver by a federal customs prosecutor.

Once the documents are verified and the transit manifest is closed by customs, the dry port will provide the driver the Container interchange receipt and gate pass to unload the container. The container will be assigned an operation number which will serve as a reference until it is released from the dry port. The location of the container is assigned manually at the container yard by the terminal supervisor. It is also at this moment that a notification is sent to the importers about the arrival of their container at the dry port.

The customs clearing agent appointed by the importer will fill Special Service Request Form (SSR) and work order which is automated and is done by the dry port employees. Depending on the triggered risk type, the work order can be for the container to be moved to customs closed warehouse, CFS inspection area or for the unstuffing of the cargo into a truck. According to Fecevet officer, out of the total cargoes processed at Mojo dry port, 60% belong to red risk channel, 30%-38% in to yellow and 5%-10% green.

Since the system is not automated to the container yard the printed work order is sent to the closed warehouse or CFS inspection area in a random time interval. Priority is given in accordance to the request time for Work order. Unstuffing of the cargo might be done either with a machine, by labor or both. At the closed warehouse, the unstuffed items are counted one by one and inserted into a tally sheet.

After goods release permit is obtained from customs, Delivery Order (DO) with or without container is prepared by the dry port depending on the importers interest. If the DO is prepared for the release of cargo with container, a container guarantee deposited of 10,000 and 20,000 ETB for 20ft. and 40ft. container respectively is required. The deposit is only valid for 90 days and if the empty container is not returned within this period, additional container demurrage cost will be incurred.

Goods Release Request voucher (GRR) is prepared after the tally for the work done is accepted. The finance department will receive this form automatically through the network system. In accordance with the billing advice the money for the service provided by the dry port is deposited. Finally Goods Released Order (GRO) is prepared.

Even though each of this release forms are automated there is a lot of going back and forth between these offices presenting a lot of printed documents. The cargo will be released to the importer once both the customs assessment and payment of the dry port service is settled.

Table 14 shows the detailed billing advice of the dry ports in Ethiopia highlighting the common incurred charges.

Table 14: Dry port service charge (Adopted from Mojo and Kality dry ports, 2015)

Description	Unit Measure	Unit Price
Port Dues & common charges		
Regular*	Teu	700
Over sized	Teu	900
Dangerous	Teu	1400
Terminal Handling*	Teu	1200
Special Service Requests		
Loading/Unloading*	Teu	348
Unstaffing/Staffing*	Teu	1130
Shift with in Terminal	Teu	420
Move Container within compound*	Teu	492
Shift from Truck to Truck	Teu	432
Loading/Unloading oversized cargo	Teu	480
Seal cutting	Teu	8
Warehouse Charge for Container/days		
Regular	20ft (ETB)	40ft (ETB)
1--8	Free	Free
9--15	43	80
16--20	56	104
21--25	73	135
26--30	95	176
Over 30	124	229
Unloading/Loading cargo from/ to truck		

Using Labour	ton	53
Using Forklift	ton	48
Piece Rate	Kg	0,03
Unloading/Loading Empty (20ft)	Unit	400
Unloading/ Loading Empty (40ft)	Unit	600
Detail count	Kg	0,25
Unpack/ Pack Cargo	Kg	0,25
Gate pass*	Teu	10
Interchange receipt*	No	45

*Common charges

4.2 Kality Dry Port and Terminal

Kality dry port was established at the end of 2014 after the former truck operating company known as Comet Transport Share Company was transformed into a dry port under ESLSE. The dry port is located in the capital city, Addis Ababa, south east gate. Before merging, it used to work hand in hand with ERCA Kality customs station (located in the compound) for unimodal cargoes. Currently, it handles about 15% of intermodal containers and most of the unimodal cargoes (ESLSE, 2015). Kality dry port has a total of 1108 employees working on permanent and contract bases in addition to laborers paid in terms of piece rate (Comet Transport Share company annual report, 2014). According to the organization's annual report, in the year 2014/2015, Kality dry port was able to collect 348,358.81ETB (16,588.5 USD) in gross and a net profit of 121,311.06 ETB (5,776.7 USD).

Table 15 shows the container flow at Kality dry port for 3 and a half consecutive years beginning from 2012 up to half of 2015.

Table 15: Container flow at Kality Dry port

Year	Container in (No.)		
	20ft.	40ft.	Total (TEU)
2012	1,973	1,044	3,017
2013	6,608	4,721	11,329
2014	5,026	4,500	9,526
2015*	2,955	2,387	5,342

*only half year flow is presented

Kality dry port has an average dwell time of 75days (Kality dry port, May 2015). Table 16 shows that the longest dwell time of 380days was recorded by containers belonging to governmental offices. Even though, larger number of containers belongs to the private companies, the governmental offices and public enterprises have less number of containers with longer dwell time.

Table 16: Dwell time (days) at Kality dry port (Kality dry port report, May 2015)

Consignee Type	Less than 60 days Dwell time		Greater than 60 days Dwell time		Total	
	Container (TEU)	Average Dwell time (days)	Container (TEU)	Average Dwell time (days)	Container (TEU)	Average Dwell time (days)
Private	1008	20	286	263	1294	59
Government Office	5	4	81	412	86	380
Public Enterprise	23	39	8	536	31	205
Grand Total	1036		375		1411	

Table 17 presents the annual percentage distribution of the 3 ERCA risk channels. It can be seen that majority (52.18%) of the cargoes belong to the yellow channel.

Table 17: Risk channel distribution at kality dry port (Kality customs, 2014/2015)

Risk channel	According to ASYCUDA	Manually Aggested	Share (%)
Red	15,607	14,896	42.28
Yellow	17,441	18,385	52.18
Green	2,064	1,831	5.2
Blue	12	120	0.34

4.2.1 Layout and Equipment

Kality dry port and terminal has a total area of 350 hectar (ESLSE profile, 2015). The dry port as formerly being a truck operating company for the past 20years has well-established stores, washing area, maintenance shops, about 11 bays of car wash and battery water filter shops for the trucks (ESLSE profile, 2015). In addition there are two fuel depots for the terminal equipment and for the trucks owned by ESLSE.

The terminal has a capacity of handling 2500 TEU with 4 high stacks. The container yard for 40ft is leveled and paved therefore; it can stalk up to 4 rows. In contrast, the 20ft container yard is a crooked ground which makes high stalking difficult. According to the terminal supervisor, on August 2015 there were 845TEU intermodal and 206TEU unimodal containers in the yard.



Figure 13: Kality dry port container yard

The terminal supervisor confirms that the available equipments include 3 reach stackers, 10 forklifts of different capacity, 4 terminal tractors and 3 normal trucks. In addition, one reach stalker and 3 forklifts are being maintained. There is a Weighing bridge at the entrance gate and provides service for unimodal transported cargoes as per the request of importer or driver.

For intermodal system the CFS inspection area has a capacity of 110, 20ft containers and 120, 40ft containers. For the unimodal containers, the area can handle 400TEU. Similar to Mojo dry port, the customs inspection area has no shading except for the provision of tarpaulin during the rainy season.

Kality dry port has in total 6 customs inspection warehouses, 3 for each intermodal and unimodal transported containers. In cumulative these warehouses have a capacity of handling 122TEU intermodal containers and 92TEU unimodal containers.



Figure 14: Kality customs examination warehouse

There is no camera security available but the terminal is guarded by frequent patrols of security guards. There are two gates for entrance and exit of trucks.

4.2.2 Operation and Process

Kality Terminal Operation has five divisions: Multimodal, Unimodal, Finance, Truck manifest and, documentation and gate control division. There is no IT department since everything is done manually.

The procedure required to get the clearance both from ERCA and dry port are similar to Mojo dry port except Kality dry port handles cargoes transported through the unimodal as well.

For unimodal cargoes all documentation and duties are settled at the port. Once it arrive at the dry port, according to the triggered risk channel it will be directed to the customs closed warehouse, CFS or trucking area. The trucking area is for cargoes which will be inspected while on the truck. The driver is responsible for delivering the cargo to the importer.

The regular working hours of the dry port are 8:00am-5:00pm with one hour lunch break between 12:00-1:00 pm. The gate entrance is open 6:00am-8:00pm while the gate control (for container interchange receipt and gate pass) is open from Monday to Sunday (8:00am – 8:00pm) for intermodal containers. For unimodal, on a Sunday the gate control works only from 8:00am-1:00pm. The terminal works from 8:00am in the morning until 7:00 pm in the evening.

5 RESULTS

5.1 Entrance gate queueing data

The service and arrival time of the inbound trucks at the entrance gate of the dry ports has been collected and the result is presented under this section.

Mojo dry port entrance gate

Data were collected at off-peak hours between the time intervals of 10:40am-11:45 am before lunch and 1:45pm – 2:50pm. The results are summarized in Table 18. Detail data is enclosed in Appendix B.

Additional data were collected for 12 days to determine the peak hour service rate at Mojo dry port. The accumulated number of trucks at the port will reach its peak before opening time in the morning at 6:00am and after lunch break 1:00pm. The average service rate during the morning peak hour was found to be 39.65veh/hr and for the afternoon peak hour, the service rate was 46.89veh/hr. The detailed collected service time is enclosed in Appendix B.

Kality dry port entrance gate

Data were collected at off-peak hours between the time intervals of 9:35am – 2:59pm. During this time period the queue system was idle 9 times. The summarized result is presented in Table 18 and the detailed collected data is enclosed in Appendix B.

The number of trucks at the entrance gate of Kality dry port reaches its peak after 3:00pm. As explained in the methodology part, the drivers prefer to arrive at this time in order to have an additional waiting time for receiving an empty container. The average service rate for the data collected during peak hours excluding weekend is found to be 31.48veh/hr. The detailed collected data for the assessment of the service rate is enclosed in Appendix B.

Table 18 shows the calculated values of λ, μ and ρ . λ and μ were calculated by taking the value of the total arrival and service time respectively. For Kality dry port since it had a number of ideal periods (9times), μ was calculated by omitting the idle periods and taking the average.

Table 18: Queue system at entrance gate of Mojo and Kality dry port

Dry port	Time Period	L (veh)	W (hr)	λ (veh/hr)	μ (veh/hr)	ρ	P_0 (%)	W_q (hr)	L_q (veh)
Mojo	10:40-11:45	32	1	32	30	1.1	-	0.97	30.9
	13:42-14:50	18	1	18.6	16.9	1.1	-	0.94	17.5
Kality	9:35-15:18	38	5.3	7.1	10.6	0.7	33	5.2	37.3

Whereas; W -Average time in system, L- Average no. of trucks in system, W_q - Average queue time, L_q - Average no. trucks in queue, λ - arrival rate, μ - service rate and, ρ - utilization factor

5.2 Lead time of customs examination Warehouse at Mojo dry port

At Mojo dry port, data was collected at the closed customs examination warehouse for 15 days starting August 1st, 2015 to determine the delay time between the work order and start of work. As explained in the Methodology part, the data collection include the time gap between the request for work order by the custom clearing agent, the order being received by the warehouse and, the beginning of the actual work (see Table 19). The weekend data was omitted for the analysis, since the warehouses do not work on Sunday. This will incur a time delay and also an additional cost for the customer as storage cost. The detailed data collection is attached in Appendix C.

Table 19: Lead time at Warehouses

Lead time between	Maximum (hr)	Average (hr)	Minimum (hr)	Standard Deviation (hr)
Work order - Received by warehouse	23,7	7,32	0,03	8,46
Received by warehouse - Start of unloading	28,13	6,21	0,17	7,11

5.3 Observation

This section will outline the observed activities and problems that were witnessed during the field survey by the researcher.

- ✓ Associations of Djiboutian Transistor (ATD) uses tug tight seal type which is functional for a single use and mainly applicable for varying seal length. According to the drivers, this seal can be easily cut by anyone during the transportation from Djibouti port to the destination dry port and hence as a solution to hide it, most drivers wrap this seal with plastic bags, as seen in Figure 15.



Figure 15: ATD seal on the imported containers

- ✓ Both dry ports lack organized information which shows poor data recording. There is no proper data transferring from a former employee.
- ✓ Employees have no thorough understanding and information on the overall work flow.
- ✓ ERCA has high employee turnover. The main reason is that the work is susceptible to fraud and corruption. This is especially true when considering the entry level positions only pay a salary of 5,000ETB but the young recruits are assigned to deal with millionaire business men. The frequent change of rules and regulations which are continually issued and amended to address this problems create confusion, inefficiency and leading to the high turnover. The drawback will be the loss of experienced people which results in poor performance in terms of delay and customer dissatisfaction.

Observation at Mojo Dry Port

- ✓ During the rainy season, the waiting area for the inbound trucks arriving from Djibouti port will get muddy. As seen in Figure 16, this area is inconvenient and difficult for the drivers to park. Hence, trucks are observed lined up outside the gate in order to avoid getting stuck in the mud.



Figure 16: Mojo Dry port's waiting area for inbound trucks from Djibouti

- ✓ The container yard at the danger zone has no light hence; it is currently providing service up to 6:00pm. Also a place locally known as Minjar terminal has no light.
- ✓ The CFS (Container Freight Station) customs inspection area is an open space with no shades. During the rainy season the inspection of the goods will be difficult hence, incurring a time delay. There is tarpaulin available to prevent the underneath of unstuffed cargo from getting wet but not feasible during heavy rain.
- ✓ According to ERCA, the goods that belong to the same importers are unstuffed and stored together in the warehouse. These goods might not be recommended to be stocked together for safety purposes; Figure 17 shows that easily flammable and inflammable goods being stored in the same place.



Figure 17: Stored cargo at Mojo customs examination warehouse

- ✓ The fuel depot is located close to the Dangerous cargo container yard (see Figure 18)



Figure 18: Fuel depot location at Mojo dry port

- ✓ Container stalk record follow up is poor and sometimes locating a container becomes difficult to dispatch to customer.
- ✓ Damaged goods are not attended immediately. They are left at the dangerous container yard for extended period of time.



Figure 19: Damaged goods at the container yard

- ✓ During data collection there has been an accident on a pedestrian, who got hit by a truck, due to lack of separate walk way.

Observation at Kality Dry Port

- ✓ Proper container inspection is not done at the entrance gate and the truck driver submits the documents at the office and will enter the dry port.
- ✓ There is an argument at the gate control office between the truck driver and employees regarding the service order for empty containers since the allowed waiting time are not standardized and fixed.
- ✓ Lack of available equipment is highly affecting the work flow. The dry port is sometimes forced to use trucks to un-stuff cargoes to the warehouse (see Figure 5-6). The terminal supervisor confirms that an additional 2 forklifts and 1 reach stalker is required.



Figure 20: Un-stuffing of cargo using truck at Kality customs examination warehouse

- ✓ There were no enough standardized lights for the terminal and during power cuts there are no backup generators.
- ✓ The CFS customs inspection area is an open space with no shades. Tarpaulin is available during the rainy season to protect the underneath unstuffed cargo.

5.4 Survey questions

In total, responses for questionnaire were collected from 193 respondents of ESLSE employees located at head office, dry port employees, drivers, importers and, customs clearing agents. The lists of questions are attached at Appendix A.

5.4.1 Employees of ESLSE

Employees at the head office were asked to evaluate the service provided by ESLSE to examine the company's performance. A total of 30 responses were gathered which comprises of 37% female and 63% male. To get a well-rounded overview, the questionnaires were distributed to different departments; trade route coordinators, documentation officers, container follow up officers, co-operate communication officer, clearance and customer service for both unimodal and intermodal. .

This section presents the ESLSE employees' response to the performance metrics presented on the bases of perfect order fulfillment, Order fulfillment cycle time, flexibility and adaptability and, cost.

Perfect order fulfillment evaluated by employees of ESLSE

The results of the questionnaires related to perfect order fulfillment are summarized below to determine the Reliability attribute of the organizations.

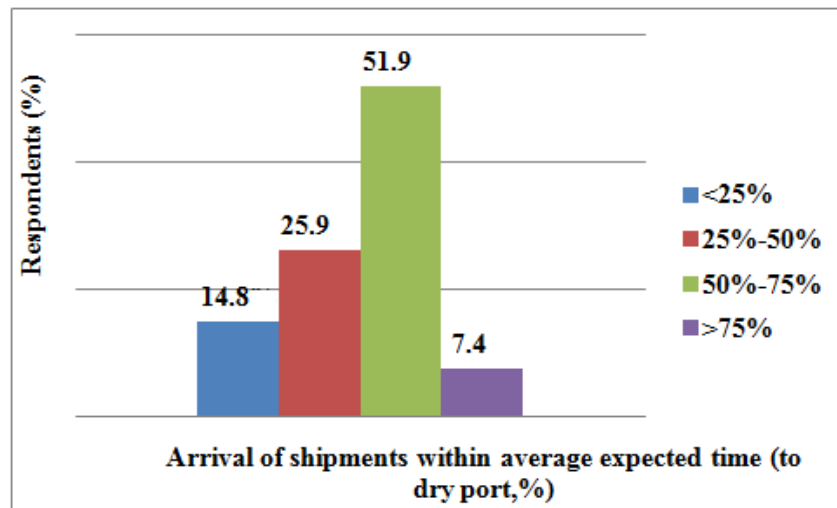


Figure 21: ESLSE employees' opinion on shipments arrival within expected, earlier and late than average expected time at dry ports

As it can be observed from Figure 21, the majority of ESLSE employees (51.9%) responded that 50-70% of shipments are delivered to the dry ports within the average time. 25.9% of respondents agreed that with in average arrival is only 25-50% of shipments while 14.8% of

the respondents confirmed it occurs only to less than 25% of the shipments. Only 7.4% respondents stated that more than 75% of the shipments arrive within the average expected time.

Majority of the employees agreed that the main reason for the delay of shipments by ESLSE is due to the shortage of available trucks, problems related to mismatch of container seal with the documentation and lack of experience. They stated that to aggravate the situation, some cargoes are overweight and there are fewer trucks available to handle the required capacity. Other reasons that were pointed out were, mistakes made by the supplier during shipping in relation with consignee information error and documentation problems. Information gap and lack of co-ordination between the ESLSE offices were also mentioned as one of the reasons for the delay.

Table 20: ESLSE employees’ response on number of deliveries to the wrong dry port location

Delivered at wrong dry port (%)	ESLSE employees’ response (%)
<25	35.7
25-50	28.6
50-75	32.1
>75	3.6

From Table 20 it is clear that significant amount (64.3%) of respondents agreed that the occurrence delivered of shipments to a wrong destination is less than 50%. 32.1% of the respondents confirm that 50-75% of the time the shipments are delivered at the wrong dry port location with 3.6% agreeing it occurs more than 75% which still is significant.

According to the ESLSE employees, mistakes made on delivering shipments at the wrong dry port destination were common at the beginning of the implementation of the intermodal system. The employees stated that currently this scenario occurs rarely and if it does the main reasons are cargoes being overweight, typing error, mistakes made by ATD agent at Djibouti port, lack of trained manpower, errors made on shipping instruction, lack of communication between companies and agents and, freight forwarders error on declaration at Djibouti.

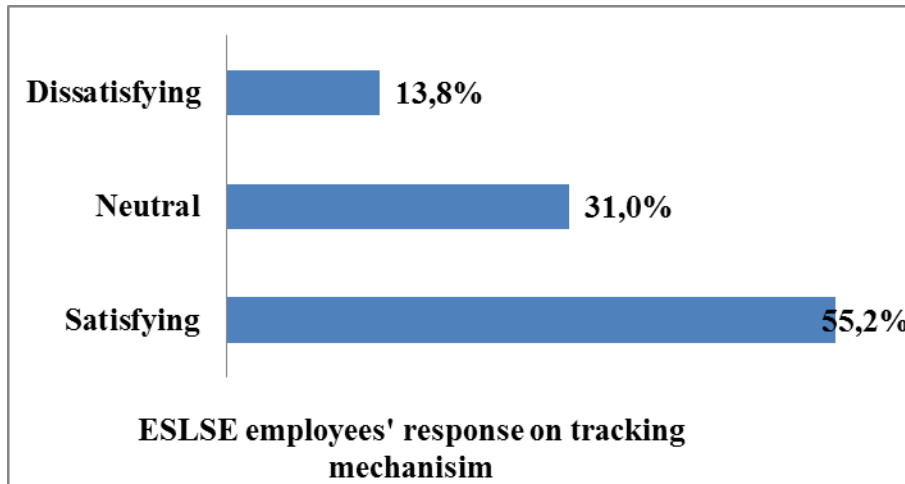


Figure 22: ESLSE employees’ level of satisfaction on the provided tracking mechanism

Once the shipment has reached the dry port; e-mail, phone call, text message and website are available. From Figure 22, higher portion (55.2%) of respondents agreed that the mechanism that ESLSE provides its customers to find the whereabouts of their shipments is Satisfying. 13.8% of the respondents agreed on the system to be dissatisfying with 31% of respondents remaining neutral.

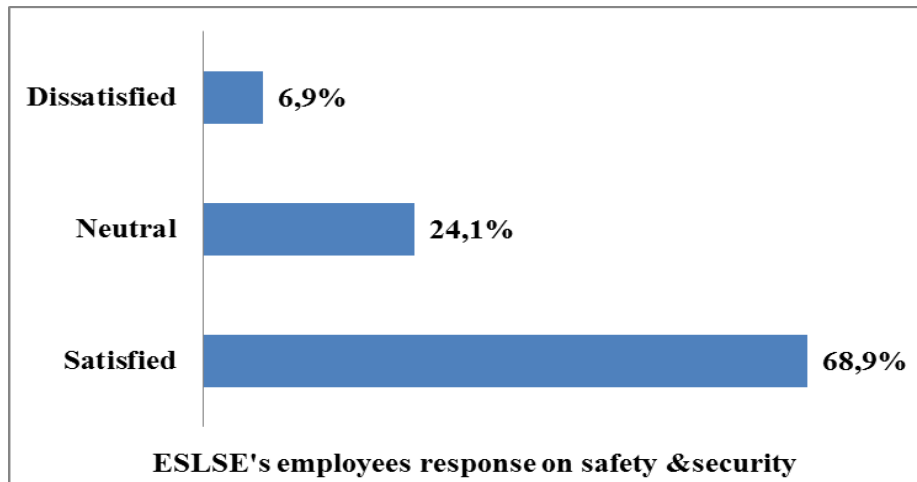


Figure 23: ESLSE employees’ level of satisfaction on the service provided on safety and security of shipments

Figure 23 confirms that significant amount of respondents agreed that ESLSE provides satisfying safety and security on the shipments of the customers, 68.9% were satisfied with

the provided services. Few (6.9%) responded that the system is dissatisfying and 24.1% remained neutral.

Table 21: ESLSE employees’ satisfaction level on existing networking system and the cost being clear

Level of Satisfaction	ESLSE employees’ response on network system (%)	ESLSE employees’ response on the cost being clear for customers (%)
Satisfied	51.7	48.3
Neutral	31	44.8
Dissatisfied	17.2	6.9

Table 21 presents the ESLSE employees’ opinion on the existing network system (IT) and purpose of cost being clear and understandable by customers. Accordingly, 51.7% of the employees agreed that it is satisfying. 31% opted to be neutral while 17.2% found it to be dissatisfying.

Almost equal numbers of respondents were satisfied (48.3%) or neutral (44.8) about the cost being clear and understandable by the importers. The remaining few (6.9%) respondents were neutral.

According to ESLSE head office employees; the company is making an effort to improve the existing problems on the delivery of goods. Most mentioned that the purchasing of the new 215 trucks will solve the problems related to delay. Some said the company is giving training in different areas and has established procedures by making some assessments, while a few stated that nothing significant is being done.

A significant amount of employees pointed out that a fully equipped web based system that enables to connect the logistics system from end to end needs to be implemented. In addition, the need for improvements on salary and coordination were mentioned.

Order fulfillment cycle time evaluated by employees of ESLSE

The responses of the ESLSE employees' at the head office to the provided questions with regards to order fulfillment cycle time is summarized in this section to determine the Responsiveness of the organizations.

Table 22: ESLSE employees' level of satisfaction on the simplification of procedures and formalities of the Intermodal System

Level of Satisfaction	ESLSE employees' response on procedures & formality (%)
Satisfied	68.9
Neutral	20.7
Dissatisfied	13.8

Table 22 shows the ESLSE employees opinion on the service provided by the company on the simplification of procedures and formalities in the intermodal system. 68.9 % of respondents stated that the provided service is satisfying, 13.8% finding it to be dissatisfying while 20.7% opted to be neutral.

Concerning the time it takes to proceed with the shipment after an order is placed, the respondents stated that it is not consistent and has no specific time interval. They mentioned that the start of the shipment depends on the distance of the trade route, availability of ship on port and efficiency of port of loading and it could range from a week to a month.

The ESLSE employees unanimously agreed that the dwell time at Djibouti has improved significantly. They mentioned that the 30days dwell time at Djibouti has decreased to less than 10days after the intermodal system has been implemented. They also pointed out that since Djibouti port auctions shipments with a dwell time of over 6 month; the intermodal system was able to prevent this.

Flexibility and Adaptability evaluated by employees of ESLSE

Flexibility and adaptability were measured in terms of the service provided on damaged goods, during peak season and occurrence of accidents to determine the attribute Agility.

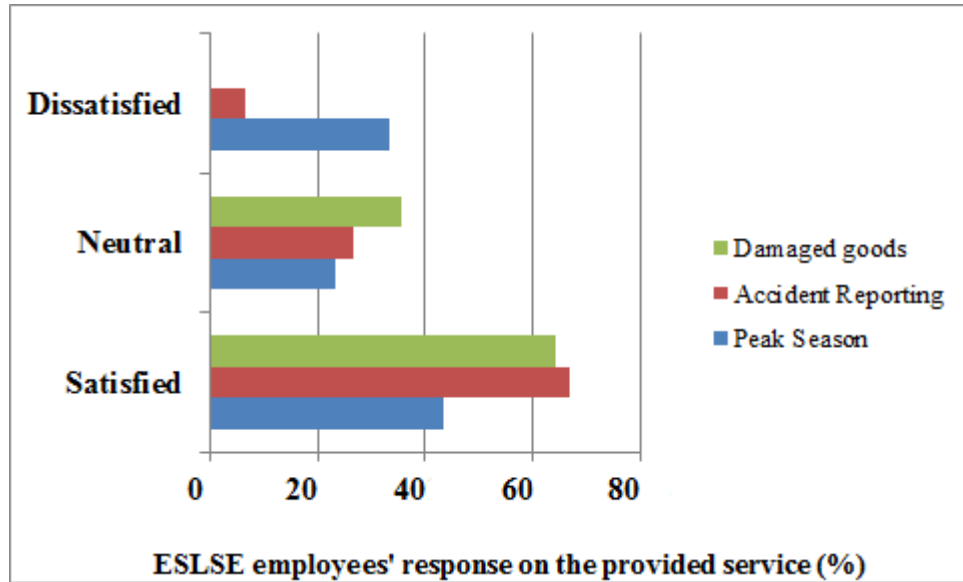


Figure 24: ESLSE employees’ response on the service provided at peak season, damaged goods and accident reporting

From Figure 24 it is clear that out of the total respondents the highest number (43.3%) agreed that the service provided at peak season is satisfying with 23.3% of the employees finding the service to be dissatisfying. The remaining 23.3% were neutral.

Peak seasons are periods during which the container flow is high. Most respondents believed that the effort made by ESLSE to handle the flow during peak season is not enough. A significant amount of employees confirm that ESLSE does not increase operational budget or number of employees during these periods, but the existing employees will work over time to cover the work load. Some also said that ESLSE hire manpower on contractual bases.

Concerning the service provided on reporting of accidents by ESLSE to the costumers, 66.7% agreed the service to be satisfying, 6.7% were dissatisfied and 26.7% were neutral on this matter.

In regards with the level of satisfaction that the employees have on the provided service by their company concerning damaged goods is found to be satisfying by 64% respondents. The remaining 36% opted to be neutral. The opinions were based on the speed of work by the insurance company and providing solution to settle the situation immediately.

Generally the ESLSE employees believed that the service provided by the organization in regards with flexibility and adaptably was satisfactory which is contradictory to the actual existing scenario.

Cost evaluated by employees of ESLSE

Cost is assessed by considering reduction of money on goods due to the implementation of the intermodal transportation system, fairness of the intermodal cost and comparison of cost between Intermodal and unimodal.

In addition, average sea freight transport cost from China ports (source of most imported containers in the country) to Djibouti port was collected to do cost comparison between ESLSE and other carriers. According to Table 23, the rate of ESLSE is 10%-29% for 20ft. and 44%-64% for 40ft. more than other carriers.

Table 23: Average cost comparison for sea freight transportation between ESLSE and other carriers

Ports	ELSE		Other carriers	
	Average sea freight cost (USD)		Average sea freight cost (USD)	
	20 ft.	40 ft.	20 ft.	40 ft.
China				
Xin gang/Tianjin	1350	2380	1050	1490
Shanghai	1250	2190	1000	1475
Yantai	1380	2430	1200	1575
Ningbo	1355	2135	1000	1475
Qingdao	1327	2505	1200	1530

A significant number of respondents agreed that using intermodal will save time and money compared with unimodal. According to most respondents the demurrage cost at Djibouti has reduced and any delay at the dry port is due to the customers (Importers). A few number of employees disagreed, stating that the intermodal system provides no reduction of time or cost. Also lesser amount responded that the unimodal provides a reduction in money and time instead of the intermodal.

Table 24: ESLSE employees' evaluation on fairness of transportation cost and reduction of money on goods due to Intermodal system

ESLSE employees' Response		
Level of Satisfaction	Reduction of money on goods due to Intermodal (%)	Fairness of Intermodal Cost (%)
Satisfying	68.9	53.3
Neutral	17.2	40
Dissatisfying	13.8	6.7

According to Table 24 significant number of employees, 68.9% and 53.3%, agreed that the reduction of money on goods and fairness of intermodal cost respectively is satisfying. The remaining 13.8% were dissatisfied with 17.2% neutral about reduction of money on goods due to intermodal transportation system. Regarding the fairness of the intermodal cost, 6.7% of the respondents were dissatisfied while 40% remained to be neutral.

Table 25: ESLSE employees' opinion on cheaper transportation cost (Intermodal Vs Unimodal)

Cheaper Transportation cost	Respondents (%)
Intermodal	41.7
Unimodal	54.2
Equal	4.2

From Table 25, higher amount of respondents (54.2%) agreed that Unimodal transportation system has a lower transportation cost compared to the intermodal system. Only 4.2% of the employees agreed that both systems have equal transportation cost.

In addition, majority of the respondents mentioned that the intermodal system has an advantage in avoiding long and tiring formalities and procedural paper works and provides safe way of goods.

5.4.2 Employees of the Dry Ports

A total of 32 and 26 employees have replied to questionnaires from Mojo and Kality dry ports respectively. This also includes employees of ERCA allocated within the dry ports. Between the two dry ports there have been 21% females with the remaining 79% males. The responses are presented as follows.

Perfect order fulfillment evaluated by employees of Mojo and Kality Dry ports

The responses of the employees of Mojo and Kality dry ports has been summarized and presented by comparing the operations and the differences between the two Dry ports to determine the performance in regards with Reliability through the metrics Perfect order fulfillment.

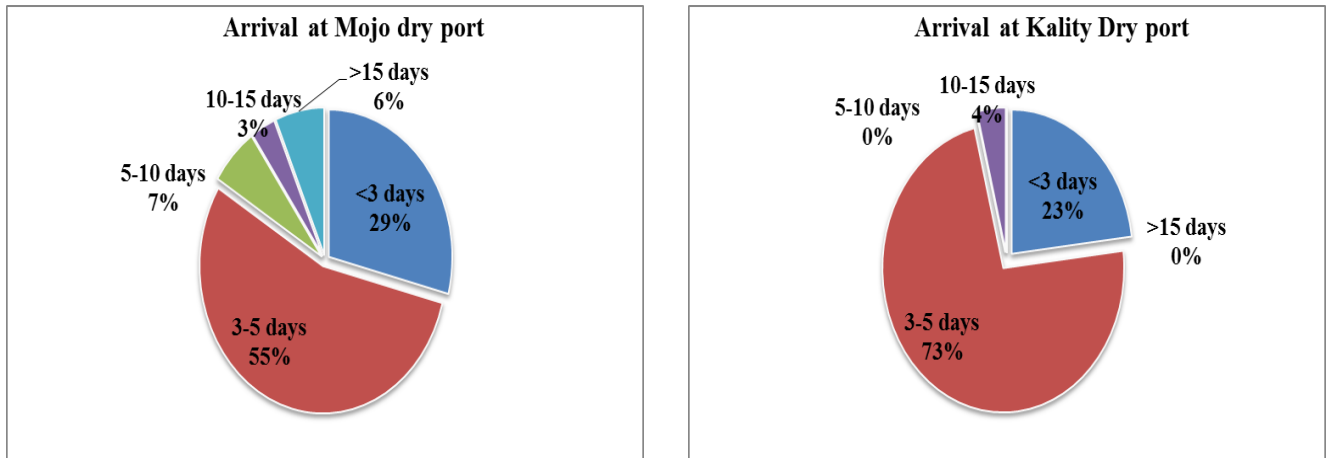


Figure 25: Average arrival days from Djibouti port to Mojo and Kality Dry ports

A glance at the above two pie charts in Figure 25 reveals that 55% (Mojo) and 73% (Kality) of the respondents agreed that on average the shipments from Djibouti port to both the dry ports will arrive between 3-5 days. Arrivals above 10 days are rare by which only 9% of Mojo and 4% of Kality dry port employees seem to agree.

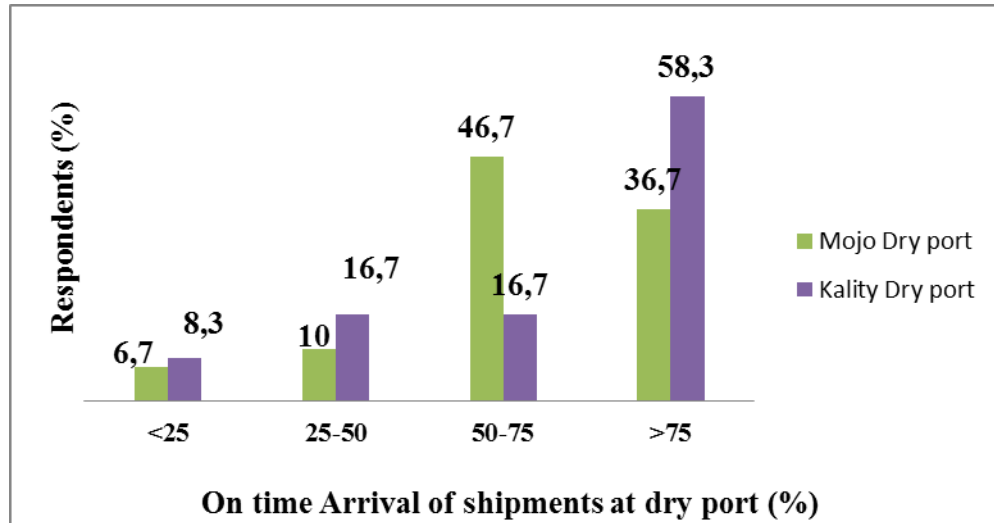


Figure 26: Dry port Employees' response on time arrival of shipments to the dry ports

As described in the literature section the drivers are given 4 days to reach both dry ports from Djibouti port. Figure 26 show the dry port employee's response on the arrival of shipments within this time interval thus, the majority of employees of Mojo dry port (46.7%) agreed that the delivery of shipments is 50-75% on time. For Kality, 58.3% of the respondents agreed that the delivery is on time more than 75%. The second highest respondents from Mojo (36.7%) stated that the shipments is on time more than 75% of the time while 10% believed it is only 25-50%. In contrast 33.4% of Kality Dry port employees agreed that the delivery of shipments is on time between 25-75%.

Table 26: Dry port employees' response on number of deliveries to the wrong dry port location

Wrong dry port location (%)	Dry Ports employees' response	
	Mojo (%)	Kality (%)
<25	86.2	88.5
25-50	6.9	3.8
50-75	3.4	0
>75	3.4	0

Table 26 indicates that arrival of shipments at the wrong dry port destination is a rare case with 86.2% and 88.5% of Mojo and Kality dry port employees respectively agreeing that the

occurrence is less than 25%. The respondents that believed the occurrence to be 25-50% are 6.9% and 3.8% from both Mojo and Kality dry port respectively.

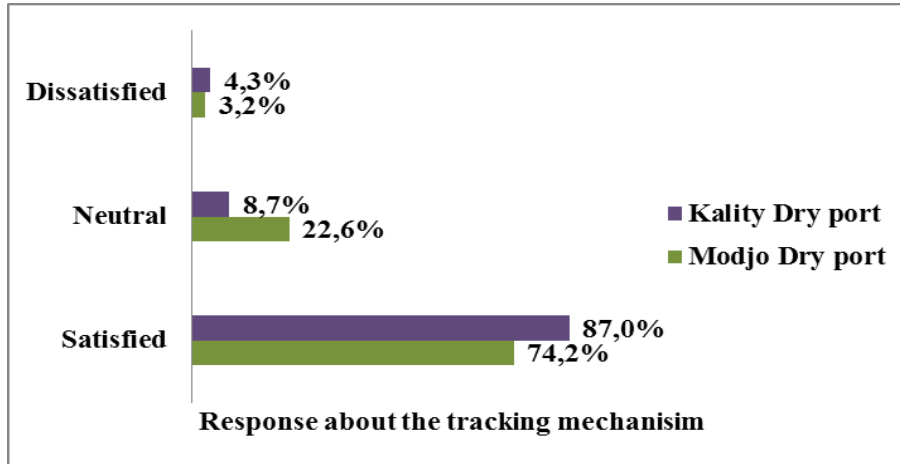


Figure 27: Dry port employees’ level of satisfaction on the provided tracking mechanism for shipments

The bar graph in Figure 27 is about the overall tracking mechanism provided by ESLSE for the importers until the shipment arrives at dry ports. Higher amount of employees both from Mojo (74.2%) and Kality (87%) dry port are satisfied with the service provide concerning tracking of shipments. Only 4.3% of the respondents from Kality dry port and 3.2% from Mojo were dissatisfied. Similar to the opinions of ESLSE employees at the head office (Figure 21), the tracking mechanism is found to be satisfying by dry port employees as well. Majority of the dry port employees agreed that the main reason for the delay of shipments is due to the shortage of available trucks, breakage of the trucks along the route and customs lengthy inspection at the check points. Other mentioned reasons were, coordination problem, information gap between Djibouti port and dry ports, lack of skilled manpower and incomplete documentation.

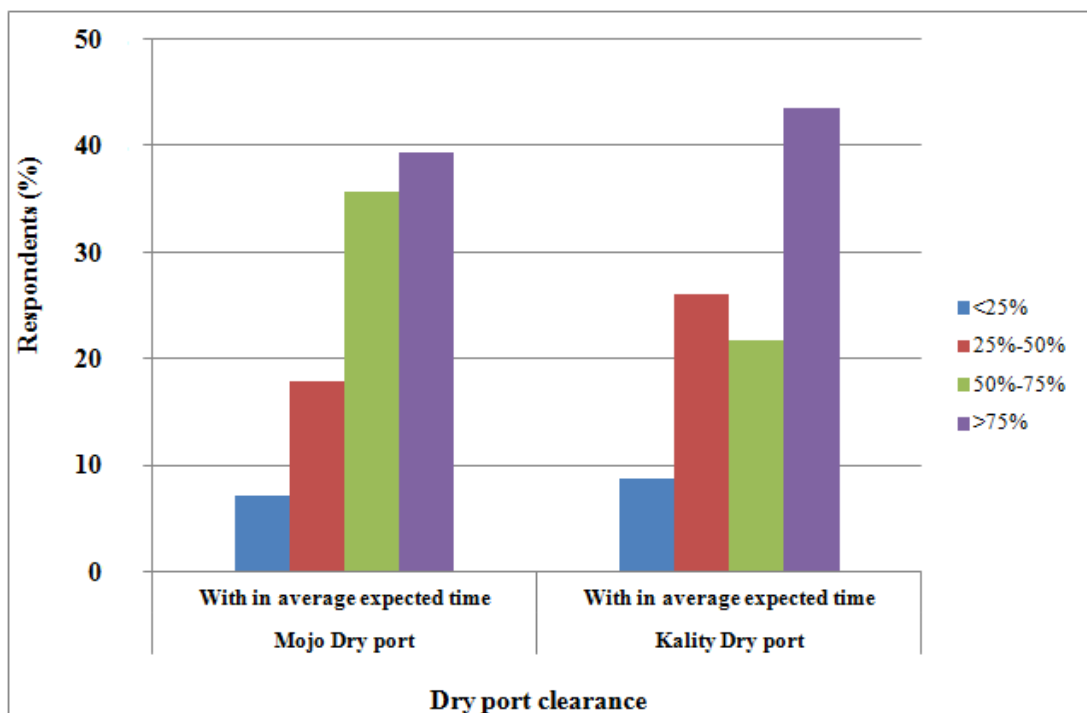


Figure 28: Dry port employees' opinion on the timely performance of dry port clearance

Figure 28 shows 39.3% (Mojo dry port) and 43.5% (Kality dry port) of the respondents agreed that more than 75% of the clearances are processed within the average time. 35.7% of the respondents from Mojo dry port stated that 50-75% of the time the clearance is done within the expected period while 26.1% of respondents from Kality dry port believed it to be only 25-50% of the time.

Table 27: Dry port employees' response on available machinery, existing network system and efficiency of work done at warehouse and CFS area

Level of Satisfaction	Mojo Dry Port employees' response (%)			Kality Dry Port employees' response (%)		
	Available machinery	Existing Network system	Efficiency at warehouse & CFS	Available machinery	Existing Network system	Efficiency at warehouse & CFS
Satisfied	71.9	30.9	74.2	41.7	28	62.5
Neutral	21.9	34.4	16.1	25	32	33.3
Dissatisfied	6.3	34.4	9.7	33.3	40	4.2

From Table 27, the availability of machineries at Mojo was found to be satisfying by 71.9% and dissatisfying by 6.3% of the respondents. In contrast, only 41.7% of Kality dry port employees were satisfied while 33.3% were dissatisfied.

In addition, 74.2% of Mojo dry port employees believed that the efficiency of the work done at the closed warehouse and CFS area is satisfying, 9.7% found it to be dissatisfied while 16.1% opted to be neutral. As for Kality dry port, the majority of respondents (62.5%) were satisfied 33.3% were dissatisfied and 4.2% opted to be neutral.

Concerning the available network system (IT), 30.9% of Mojo dry port employees agreed the system is satisfying while equal number of respondents (34.4%) were dissatisfied and neutral. Smaller number of employees (28%) from Kality dry port were satisfied with 40% dissatisfied and 32% opted to be neutral about the existing network system even though almost every process is done manually.

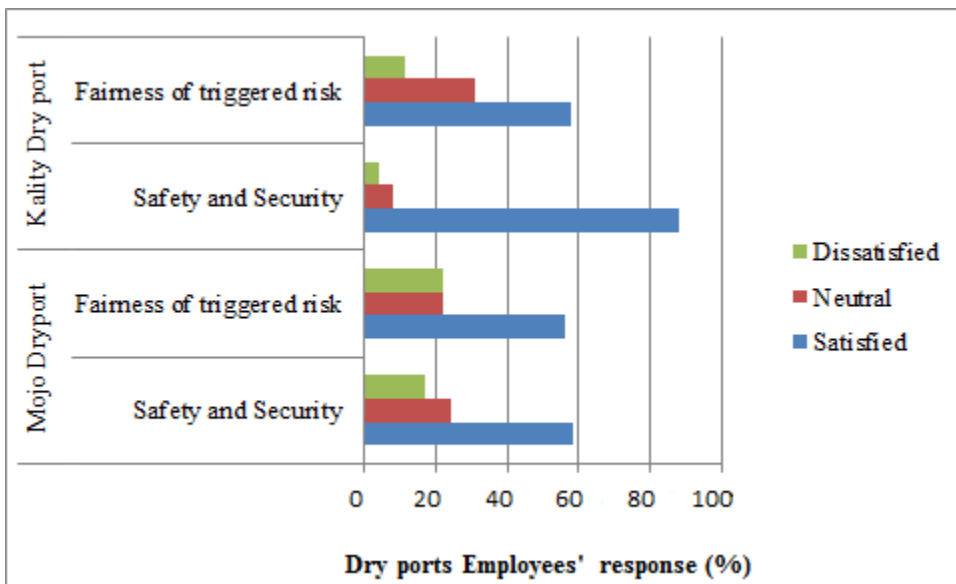


Figure 29: Dry ports employees’ level of satisfaction on the provided service on safety and security of shipments and fairness of triggered risk channel

From Figure 29, it is clear that majority (88%) of employees from Kality dry port were satisfied while 4% were dissatisfied, with 8% to have a neutral stands on performance of the company in terms of shipments’ security and safety. Relatively higher portion (58.6%) of Mojo dry port employees responded the service to be satisfying, 17.2% dissatisfying with the remaining employees’ neutral (24.1%).

Regarding the fairness of the triggered risk channel by ERCA, majority of the dry port employees (57.7% Kality and 58.6% Mojo) agreed that the provided service is satisfying. Only 11.5% and 17.2% of the respondents from Kality and Mojo dry port respectively were dissatisfied.

Order fulfillment cycle time evaluated by employees of Mojo and Kality Dry ports

The responses of the employees’ of both Mojo and Kality dry port to the questions regarding order fulfillment cycle time is summarized in this section to determine the Responsiveness of the organizations.

Table 28: Dry port employees’ level of satisfaction on Customs clearance and Dry port clearance

Level of Satisfaction	Mojo Dry Port employees' response (%)		Kality Dry Port employees' response (%)	
	Customs clearance	Dry port clearance	Customs clearance	Dry port clearance
Satisfied	70.9	77.5	58.3	65.2
Neutral	22.6	16.1	37.5	17.4
Dissatisfied	6.5	6.5	4.2	17.4

Looking at Table 28, 70.9% and 58.3% of Mojo and Kality dry port employees respectively responded that the provided service on customs clearance is satisfying. In contrast, 6.5% (Mojo dry port) and 4.2% (Kality dry port) respondents agreed that the service is dissatisfying.

Regarding the dry port clearance, relatively higher percentage (77.5%) of Mojo dry port and 65.2% of Kality dry port employees were satisfied. 17.4% of Kality dry port employees were dissatisfied and lesser amount (6.5%) of Mojo dry port employees were dissatisfied.

According to the majority of Kality dry port respondents, the average time interval (lead time) to finalize dry port clearance process ranges between 1-2weeks. The Mojo dry port employees believed that on average the dry port clearance might take about 2-3weeks.

Flexibility and Adaptability evaluated by employees of Mojo and Kality Dry ports

Employees of both dry ports were asked to evaluate the flexibility and adaptability of their organization in terms of the provided service during peak season, services on damaged goods and, efficiency of customs' inspectors on different imported good. The results are summarized in this section.

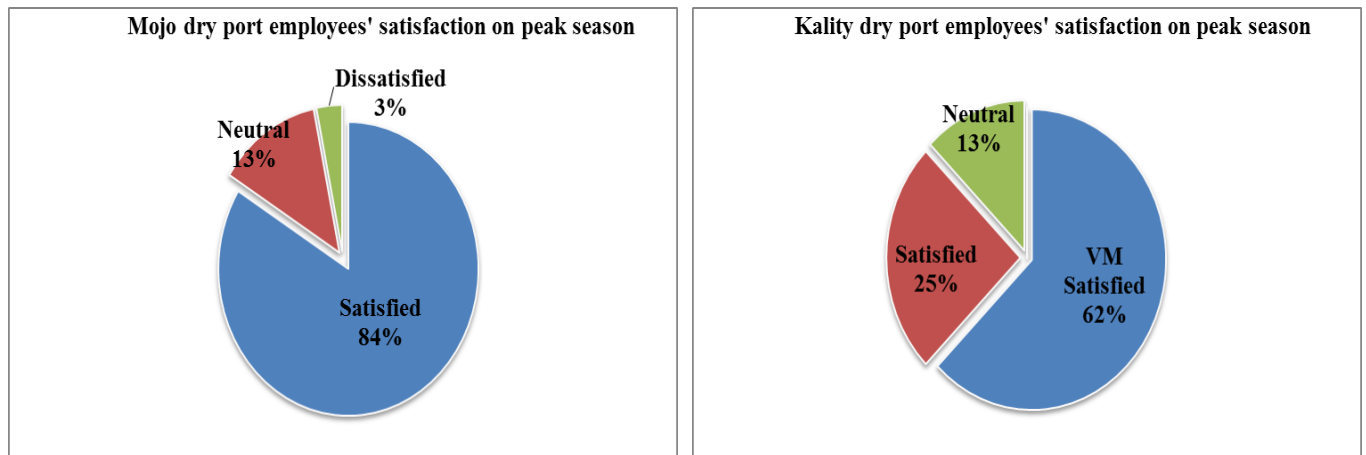


Figure 30: Dry port employees' level of satisfaction on service provided at peak season (Mojo & Kality dry ports)

Figure 30 compare the opinions of both dry port employees on the service provided during peak season by their company. The highest number (84%) of respondents from Mojo dry port believed that the service is satisfying with only 3% to be dissatisfied. 62% of Kality dry port employees were satisfied and 25% dissatisfied about peak season services.

Majority of employees at kality dry port confirms that there is no increase in operational budget or in the number of employees during peak season. They confirmed that to cover the work load, the existing employees will work over time. A few number of employees also mentioned that daily laborers at the warehouses will be hired on a contractual bases.

Most Mojo dry port employees stated that there is no flexibility in increasing the budget or employees during peak season. They confirmed that, mostly the work load is distributed among the existing employees.

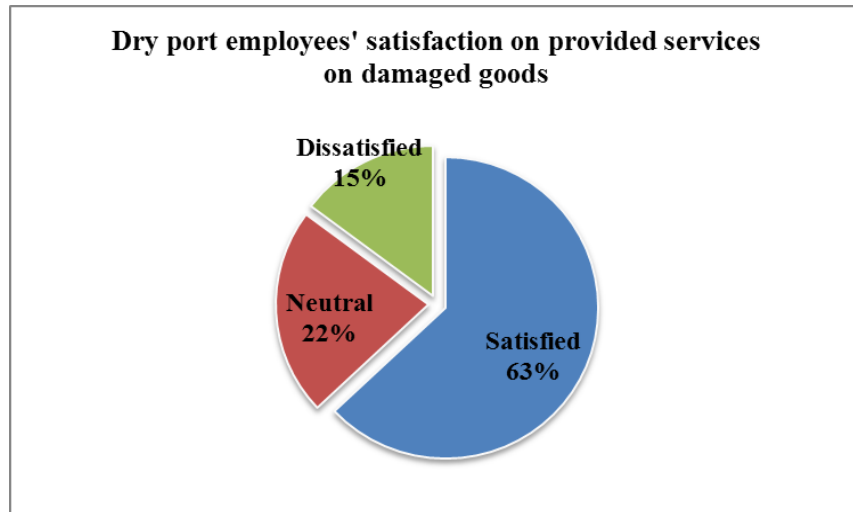


Figure 31: Dry port employees' level of satisfaction on provided service on damaged goods

Figure 31 indicates in cumulative 63% of the dry port employees were satisfied on the service provided on damaged goods (the speed and efficiency at which the situation is handled and solved) while 22% remained neutral and 15% were dissatisfied.

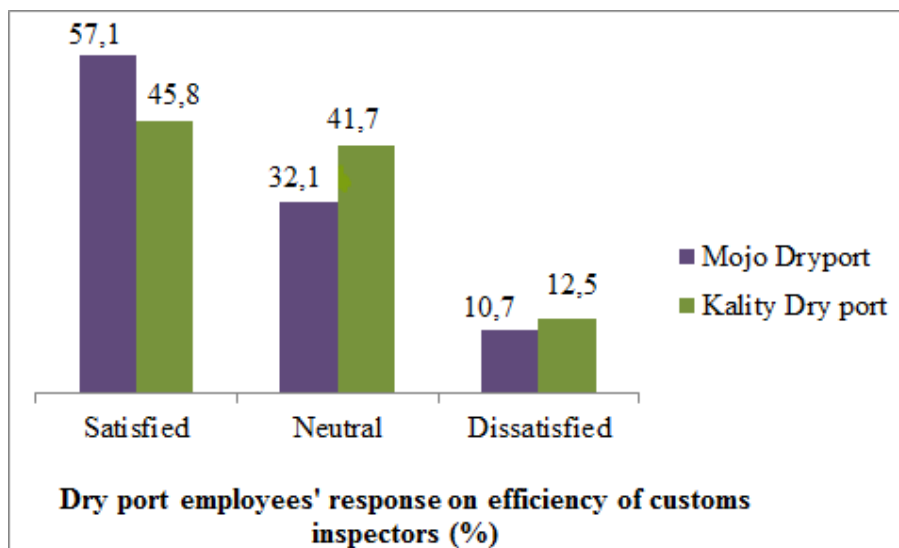


Figure 32: Dry port employees' level of satisfaction on efficiency of customs inspectors

As far as the efficiency and experiences of customs inspectors/ assessors about the different imported goods are concerned, Figure 32 indicates that 57.1% of the respondents from Mojo

dry port were satisfied with only 10.7% to be dissatisfied. In addition, 45.8% of the Employees from Kality dry port were satisfied and 12.5% were dissatisfied.

Cost evaluated by employees of Mojo and Kality Dry ports

Cost is assessed in regards with cost of dry port service, comparison of cost between intermodal and unimodal, fairness of the intermodal transportation cost and reduction of money on goods due to the intermodal system.

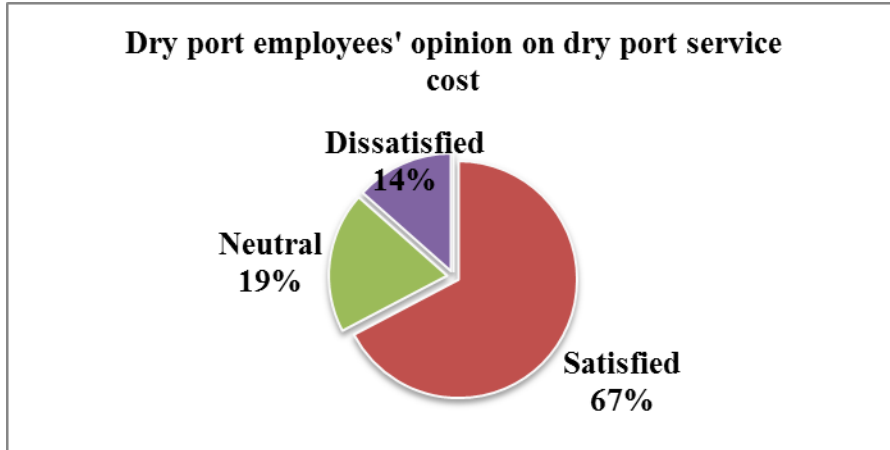


Figure 33: Dry port employees’ opinion on the fairness of dry port service cost

Figure 33 shows the overall opinions of the employees of both dry ports on the fairness of dry port service cost. Significant numbers (67%) of the employees were satisfied. A few respondents (14%) find it to be dissatisfying and 19% were neutral.

Table 29: Dry port employees’ response on the cheaper transportation cost, (Intermodal vs Uni-modal)

Cheaper Transportation cost	Dry port employees’ response (%)
Intermodal	73
Uni-modal	23
Neutral	4

From Table 29, it is clear that more than triple number of respondents (73%) agreed that intermodal transportation cost is cheaper than unimodal. 23% believed unimodal is cheaper while the remaining 4% opted to be neutral.

The trend up to now shows that the employees of ESLSE at head office and dry ports believed that almost all the services provided by the organization is satisfying (which was biased). Comparing Table 29 with the head office employees' response (refer Table 25); there is a big difference by which higher no of head office respondents agreed that unimodal is cheaper than intermodal. The employees at head office having different departments including the unimodal section, have a better perspective on comparing these two.

Table 30: Dry ports employees' evaluation on fairness of transportation cost and reduction of money on goods due to Intermodal system

Level of Satisfaction	Dry Port employees' response (%)	
	Fairness of transportation cost	Reduction of money on goods due to intermodal
Satisfied	76,9	76,8
Neutral	21,2	15,1
Dissatisfied	1,9	7,5

Table 30 shows that almost equal number of respondents agreed that the fairness of intermodal transportation cost (76.9%) and reduction of money on goods due to the intermodal (76.8%) is satisfying. On the fairness of the transportation cost 15.1% found it to be dissatisfying and 7.5% were neutral. As for reduction of money on goods 7.5% believed it was dissatisfying and 15.1% opted to be neutral.

5.4.3 Transporters/ Drivers

Truck drivers were randomly chosen from a pool of drivers arriving from Djibouti and waiting for gate entrance document or waiting for empty container. A total of 22 and 21 respondents have replied to questionnaires from Mojo and Kality dry ports respectively. All the respondents were male.

Perfect order fulfillment evaluated by Drivers

The results to the questionnaire distributed to the drivers in regards with perfect order fulfillment are summarized and presented as follows.

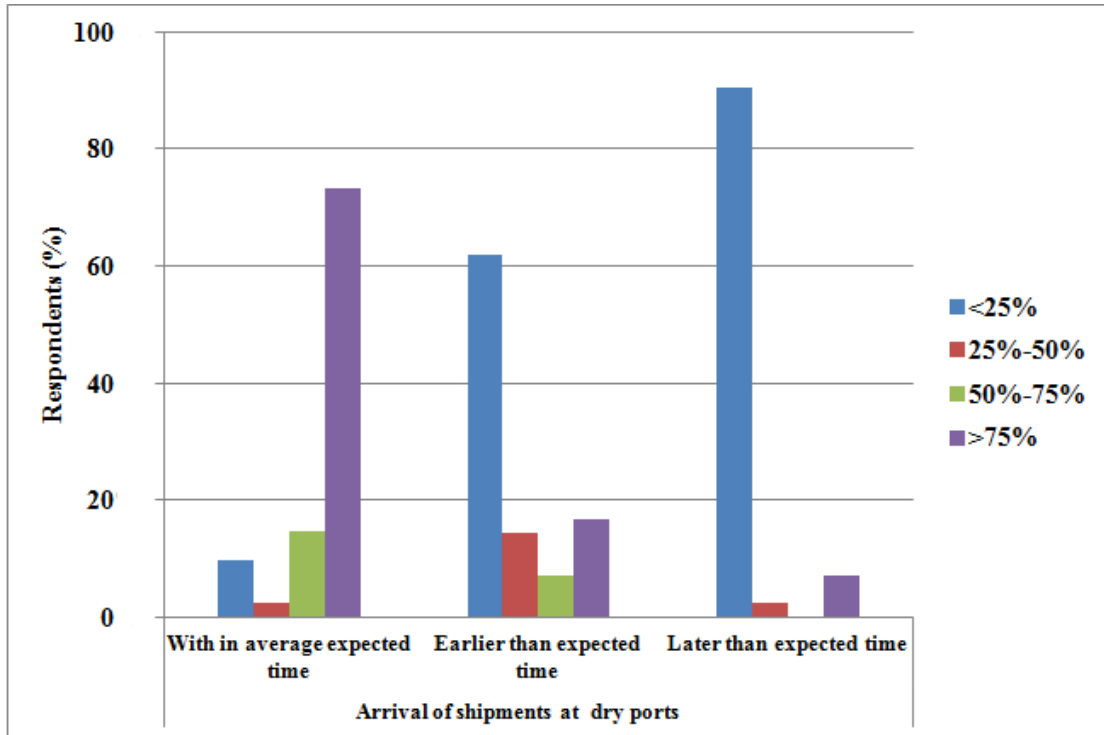


Figure 34: Drivers opinion on the delivery of shipments at the dry ports

The above bar graph in Figure 34 shows a cumulative of 73.2% of the drivers from both dry ports agreed that more than 75% of the shipments are delivered at the dry port with in the average expected time, 61.9% stated that 25-50% of shipments arrive earlier and 90.5% specified less than 25% of the shipments are delivered later than the expected time.

According to the drivers, the main reason for the delay of shipments is due to the time wasted at the check points, especially at Galafi and Mille. They mentioned that most of their time is wasted while waiting in line to get service at check points. To aggravate the situation the network system at the check points is frequently down. Other stated reasons for delay are, vehicle breakage and accidents mainly caused by poor road conditions at Djibouti. All the questioned drivers have also confirmed that their trucks are not equipped with GPS.

Comparing this result with the results of Figure 21 & 26, the drivers seem to claim that they will deliver the shipments on time since they have a penalty if otherwise. But the employees

of the dry port and at head office agreed that there is an overall delay which is caused by lack of trucks to pick shipments from the port and due to breakage and accident.

Table 31: Frequency of trucks traveling back to Djibouti without carrying empty containers and the level of satisfaction on the provided service

Mojo Dry port	Occurrence of traveling to Djibouti with no empty container (%)	<25	25-50	50-75	>75
	Drivers' Response (%)	42.9	14.3	28.6	14.3
	Drivers' level of satisfaction on the service	Satisfied	Neutral	Dissatisfied	
	Drivers' Response (%)	11.1	44.4	44.4	
Kality Dry port	Occurrence of traveling to Djibouti with no empty container (%)	<25	25-50	50-75	>75
	Drivers' Response (%)	33.3	44.4	5.6	16.7
	Drivers' level of satisfaction on the service	Satisfied	Neutral	Dissatisfied	
	Drivers' Response (%)	7.1	57.1	35.7	

Table 31 shows that higher portion of drivers (42.9%) confirm that the occurrence of travelling back to Djibouti from Mojo dry port without an empty container is less than 25% but with regards to this a significant (44.4%) amount of drivers are dissatisfied on the provided service at Mojo dry port.

As for Kality dry port, more than half of the drivers (57.1%) opted to be neutral with 35.7% of respondents dissatisfied. 44.4% of the drivers believes that 25-50% of the time they will travel back to Djibouti without an empty container.

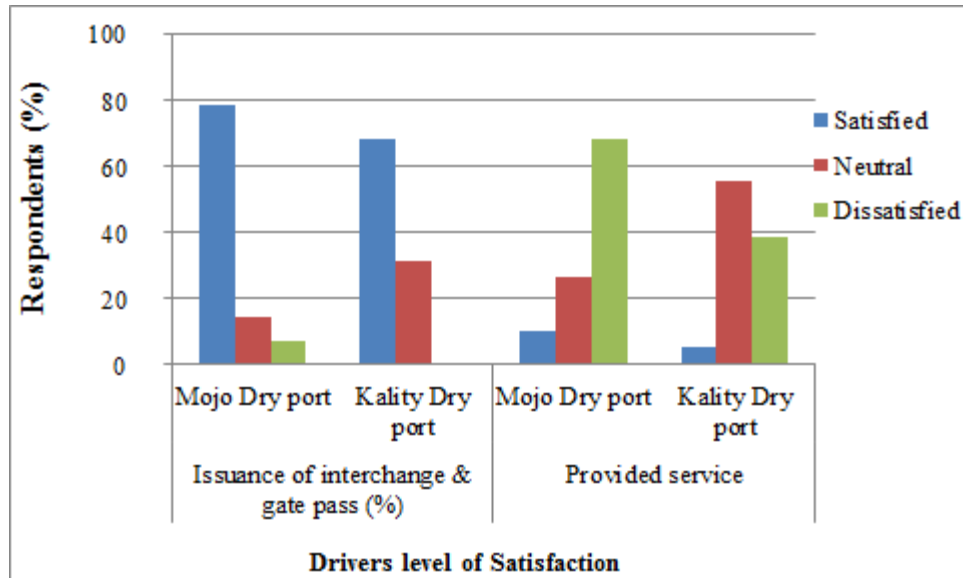


Figure 35: Drivers' level of satisfaction on existing dry port service and issuance of documents for gate pass and container interchange receipt

Figure 35 shows that drivers agreed that Mojo dry port is performing well in terms of the service provided on the issuance of gate pass and interchange documentation with 78.6% satisfied, only 7.1% dissatisfied and 14.3% to be neutral. With regards to Kality dry port, 68.4% of drivers were satisfied and 31.6% were neutral.

In addition, the drivers' level of satisfaction on the overall provided service by the individual dry ports is presented in the above graph. Significant number (68.4%) of drivers was dissatisfied on the provided service at Mojo dry port. In comparison, 55.6% of the drivers were neutral on the provided service at Kality dry port with 38.9% agreeing to be dissatisfied. Almost all drivers have a complaint about the empty container service at kality dry port. They stated that Mojo dry port has a well-organized system, with 48hours waiting time for a driver to get an empty container after arrival from Djibouti port. In contrast, at Kality dry port, the drivers confirm that the queuing system to receive empty containers is disorganized and no fixed time is allocated which creates misunderstanding between the drivers and the employees. The drivers also mentioned that priorities are given to the ESLSE' trucks for empty container service.

Order fulfillment cycle time evaluated by Drivers

Order fulfillment cycle time was assessed in terms of level of satisfaction on Djibouti waiting time, provided service at checkpoints and, average waiting time at dry ports. The results are summarized below.

Table 32: Drivers' level of satisfaction concerning waiting time at Djibouti

Level of Satisfaction	Drivers' response on Djibouti waiting time (%)
Satisfied	27,3
Neutral	12,1
Dissatisfied	60,6

Concerning the waiting time at Djibouti port to finish the process and load a container, Table 32 indicates that in total 27.3% of the drivers were satisfied. The majority was dissatisfied (60.6%) with 12.1% opted to be neutral. This unnecessary waiting time at Djibouti port will add to the cumulative delay time that the shipment incur to reach the dry ports.

According to the drivers, to pass the check points at Galafi and mille, it takes 6-10hours each. The drivers were much more satisfied at Awash check point, which takes from 10minutes up to 3hours. The drivers stated that Kality check point has the least waiting time of 10minutes on average.

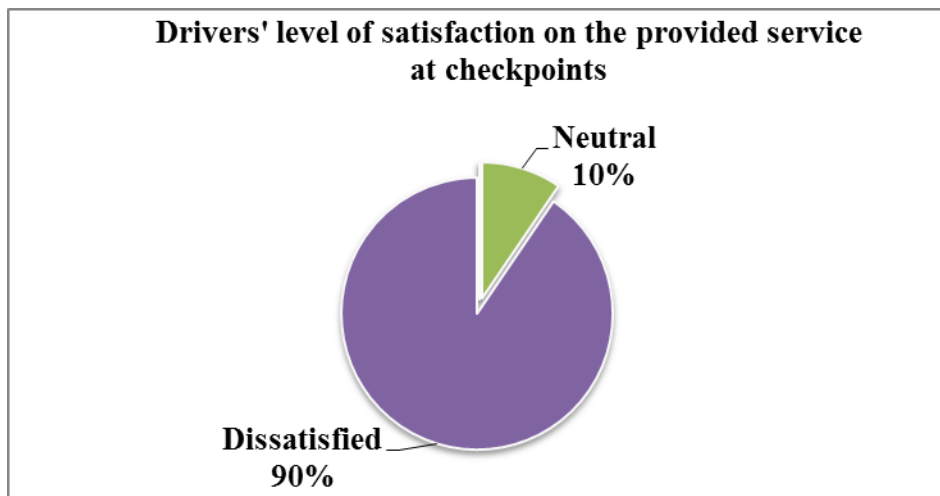


Figure 36: Drivers' level of satisfaction on provided service at check points

It is easily visible from Figure 36 that almost all respondents agreed that the level of service provided at check points between Djibouti and dry ports is dissatisfying. Only 10% of the drivers were neutral.

As far as the waiting time at the entrance gate of Mojo dry port is concerned, the drivers indicated that to get a service, the waiting time could range from a few minutes up to a maximum of 2hours. In contrast, according to the drivers it only takes a few minutes to get a service at entrance gate of Kality dry port.

Flexibility and Adaptability evaluated by Driver

Flexibility and adaptability was assessed in terms of how fast the drivers report during accidents or breakage. The drivers agreed that since ESLSE obliges them to report within 24hr, they will either go to the nearest police station; inform the owner or the associations of the truck or, insurance company as soon as possible. They also mentioned that it takes longer time to get maintenance service or the insurance to come in case of accidents and damaged goods.

Cost evaluated by Drivers

The drivers were asked to give their opinions and level of satisfaction on the payment of transportation cost by ESLSE for delivering the shipments from Djibouti to the dry ports and vice versa. Accordingly, Figure 37 shows, 53% were dissatisfied , 29% neutral and a cumulative of 18% were satisfied.

This cost does not reflect the actual transportation cost but the cost of the land frieght paid by ESLSE to the drivers.

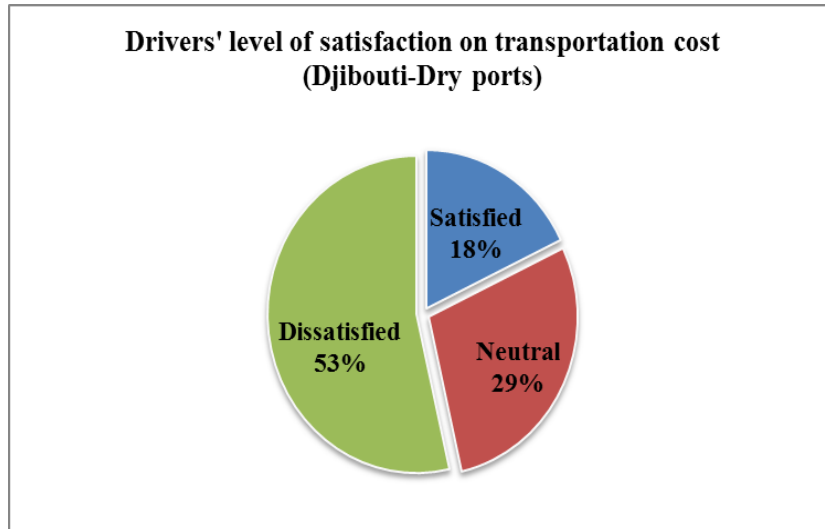


Figure 37: Drivers' level of satisfaction on the transportation cost from Djibouti- Dry ports and vice versa

5.4.4 Importers

This section presents the opinions of the importers and their level of satisfaction on the provided service by ESLSE. In total 22 responses were collected which consists of 82% male and 18% female importers.

Perfect order fulfillment evaluated by Importers

The results of the questionnaire related to perfect order fulfillment is summarized as follows.

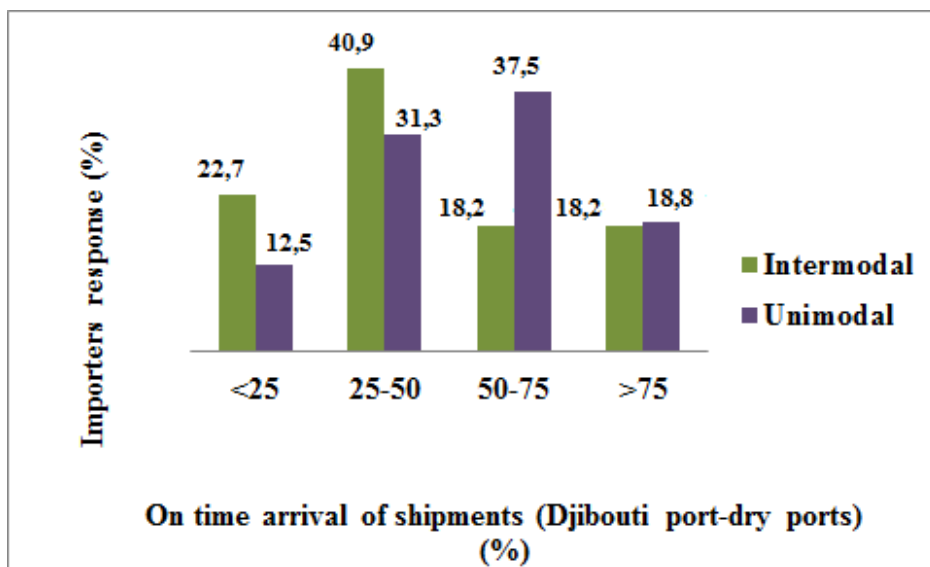


Figure 38: Importers' opinion on timely delivery rate of shipments (Djibouti port-Dry ports)

According to Figure 38, the survey result shows that, on time arrival from Djibouti to the dry ports using intermodal transportation system has a less chance of being punctual than the unimodal system. 40.9% of the importers agreed that the intermodal system delivers shipments 25-50% of the time while 37.5% believed that the unimodal system delivers shipments 50%-70% on time.

Table 33: Importers’ response on the number of deliveries to the wrong dry port location

Delivered at wrong dry port (%)	Importers’ response(%)
<25	72.7
25-50	18.2
50-75	9.1
>75	0

The delivery of shipments at the wrong dry port destination is a rare case. As it can be seen from the Table 33, higher portion of the importers (72.7%) believed that it occurs less than 25% of the time, 18.2% responded that it will occur 25%-50% of the time.

The importers confirmed that the main reason for the delay of their shipments is lack of available transportation trucks, coordination and, system and automation problem. Prioritizing other items such as fertilizers and grains were also mentioned as reasons for delay. The importers stated that mistakes to wrong dry port destination are rare case but the above percentage is still significant. The mentioned reasons were if the cargo is overweight, lack of experienced and responsible personnel.

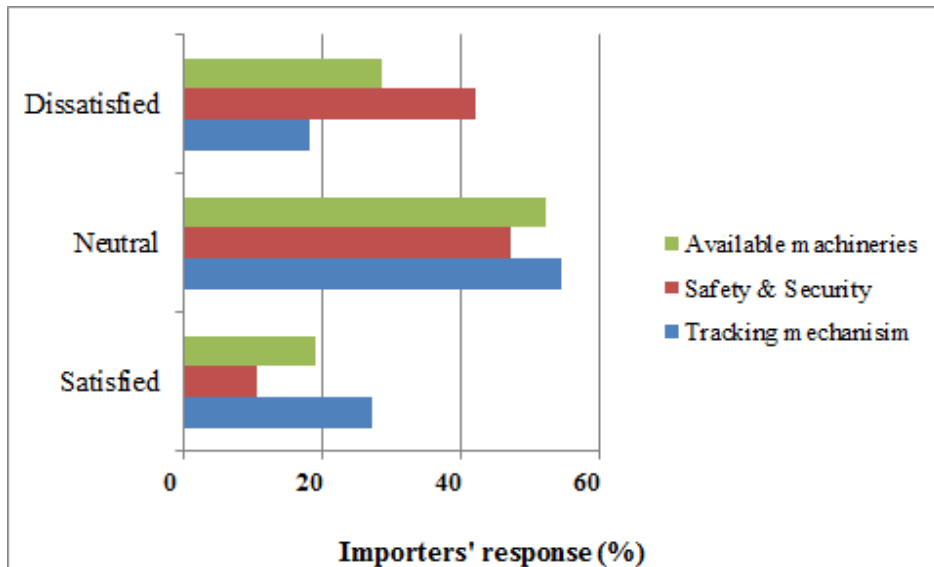


Figure 39: Importers’ level of satisfaction on tracking mechanism, security and safety and, available dry port machineries

Figure 39 illustrates the importers’ satisfaction level on the information provided by ESLSE about the status and location of shipments at a reasonable time, safety and security of the shipments and, available machineries at the dry ports. Importers confirmed that concerning the status of their cargo ESLSE will contact them through e-mail, phone call, text message or it will be available on their website. But there has been a complaint on the timely availability of information about the location of containers. A significant amount (54.5%) of importers has a neutral stand on the provided service with 18.2% dissatisfied and 27.3% satisfied.

When comparing this result with the opinions of the employees (refer Figure 22 &27), significant amount of importers are dissatisfied.

Concerning level of satisfaction on provided service on safety and security of shipments, larger number (47.4%) of importers opted to be neutral while 42.1% were dissatisfied with 10.5% responding to be satisfied.

The availability of machineries at the dry ports were found to be satisfying by 19% and dissatisfying by 28.6% of the importers, while the majority (52.4%) remained neutral.

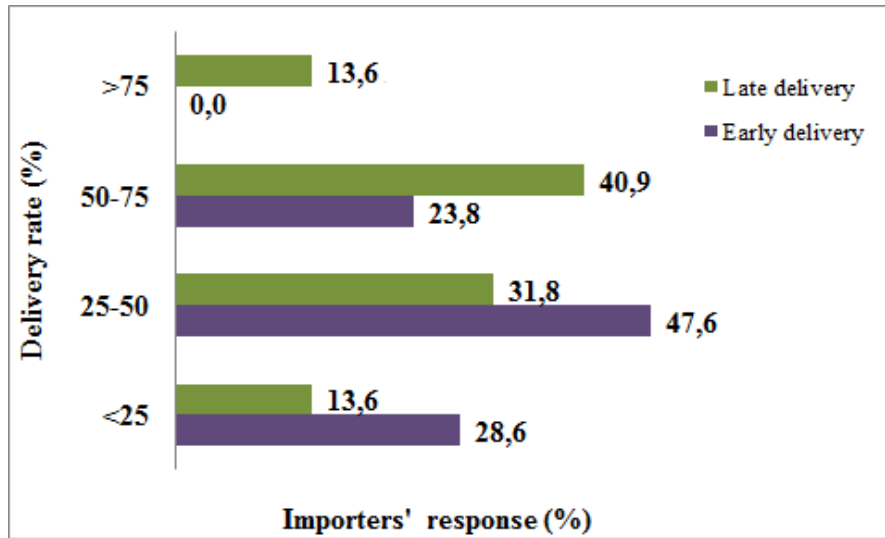


Figure 40: Importers’ evaluation on arrival of shipments earlier and later than expected time

Figure 40 indicates that the arrival of shipments at the dry port through intermodal system. More than 50% of the importers stated that, more than 50% of the time, the shipment is delivered later than the expected time. According to 76.2% of the respondents, early deliveries occur less than 50% of the time.

Order fulfillment cycle time evaluated by Importers

The responses of the importers to the questions regarding order fulfillment cycle time is summarized in this section.

Table 34: Importers level of satisfaction on dwell time at Djibouti, customs clearance and dry port clearance

Level of Satisfaction	Importers' response (%)		
	Dwell time at Djibouti	Customs clearance at dry ports	Dry port clearance
Satisfied	40.9	38.1	23.8
Neutral	31.8	28.6	47.6
Dissatisfied	27.3	33.3	28.6

According to Table 34, 40.9% of the importers were satisfied, 27.3% dissatisfied with 31.8% remaining to be neutral on the dwell time at Djibouti port. In regards with customs clearance at the dry ports, 38.1% responded to be satisfied while 33.3% were dissatisfied.

Majority of the importers opted to be neutral concerning the dry port clearing service while almost equal proportion of importers (23.8% and 28.6%) were satisfied and dissatisfied respectively.

Flexibility and Adaptability evaluated by Importers

Importers were asked to evaluate the flexibility and adaptability of the organizations in terms of the provided service during peak season and on damaged goods.



Figure 41: Importers' level of satisfaction at peak season and provided service on damaged goods

Figure 41 shows the importers opinion on the service provided by ESLSE in regards with the speed and efficiency to handle when damages on the shipment occur. A cumulative of 50% of the respondents were satisfied while 40.9% remained neutral and 9% were dissatisfied.

Majority of the importers were neutral on the service provided during peak season with 27.3% dissatisfied and a few percentage (18.2%) satisfied.

Cost evaluated by Importers

The importers were asked to give their opinions and level of satisfaction in regards with cost of dry port service, comparison of cost between intermodal and unimodal, fairness of the intermodal transportation cost and reduction of money on goods due to the intermodal system.

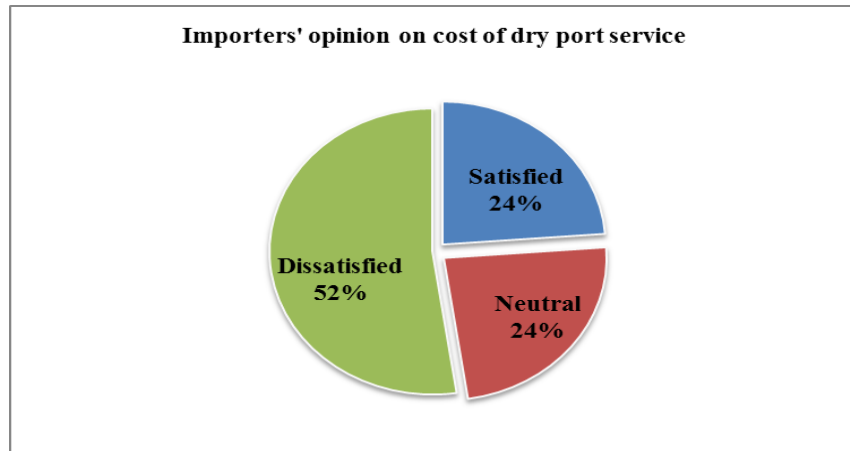


Figure 42: Importers’ level of satisfaction on cost of dry port service

The pie chart in Figure 42 indicates more than half (52%) of the importers were dissatisfied with the service cost of the dry ports while equal amount (24%) of importers were neutral and satisfied

Table 35: Importers’ level of satisfaction on fairness of transportation cost and reduction of money on goods due to Intermodal system

Level of Satisfaction	Importers' response (%)	
	Reduction of money on goods due to intermodal	Fairness of transportation Cost
Satisfied	30	40.9
Neutral	35	31.8
Dissatisfied	35	27.3

Table 35 shows that equal number (35%) of importers was dissatisfied and remained to be neutral on the reduction of money on goods due to the intermodal system, while 30% of the importers were satisfied. This question was asked in order to assess if the cost of goods has been reduced due to the newly introduced intermodal system since the main objective was to reduce demurrage cost and transit time from the unimodal transportation.

On the fairness of the transportation cost, 27.3% found it to be dissatisfying, 31.8% were neutral and significant numbers of importers (40.9%) were satisfied.

Table 36: Importers’ response on the cheaper transportation cost, (Intermodal vs Uni-modal)

Cheaper Transportation cost	Importers’ response (%)
Intermodal	65
Uni-modal	35

From Table 36 it is clear that significant amount of importers (65%) agreed that intermodal transportation cost is cheaper than unimodal.

5.4.5 Customs clearing agents

A cumulative of 42 responses from customs clearing agents was gathered from both dry ports which comprises of 37% female and 63% male. The evaluation was made based on perfect order fulfillment, Order fulfillment cycle time, flexibility and adaptability and, cost.

Perfect order fulfillment evaluated by Customs clearing agents

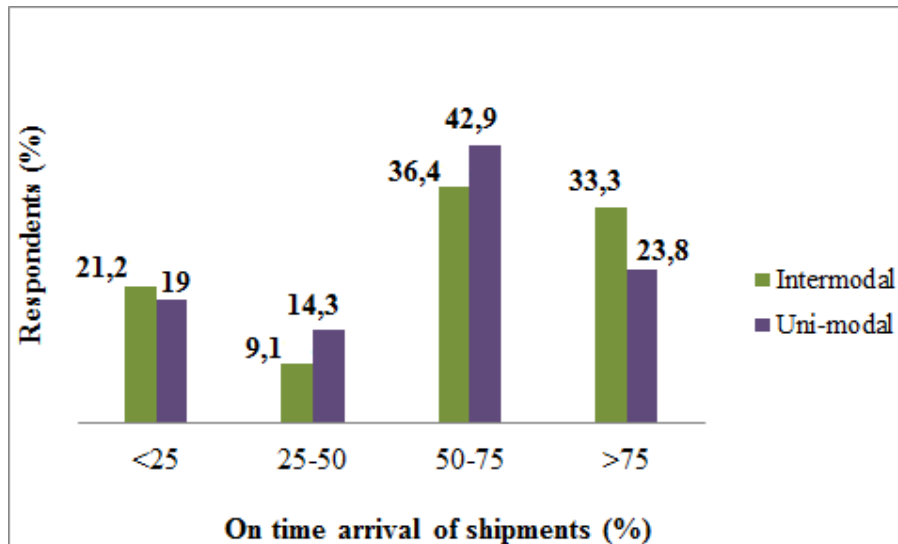


Figure 43: Customs clearing agents’ response on timely delivery rate of shipments at dry port (intermodal vs unimodal)

According to Figure 43, the survey result shows that, almost equal number of clearing agents, 66.7% and 69.7% agreed that in cumulative more than 50% of the time the shipments will be

delivered within the expected time which are transported through intermodal and unimodal respectively.

Table 37: Customs clearing agents’ response on the amount of deliveries to the wrong dry port location

Delivered at wrong dry port (%)	Clearing agents' response (%)
<25	78
25-50	12.2
50-75	7.3
>75	2.4

Table 37 indicates that, in sum, 90.2 % of the customs clearing agents stated that the occurrence of delivering shipments at the wrong dry ports location is less than 50%.

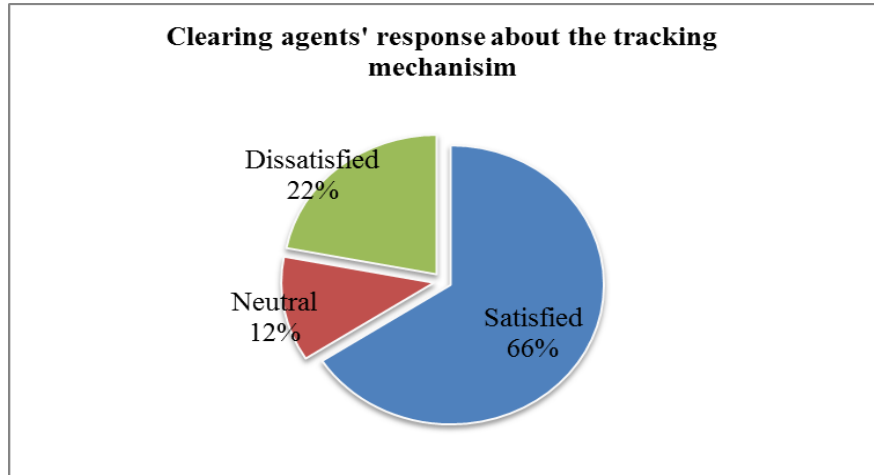


Figure 44: Customs clearing agents’ response on the existing tracking mechanism

According to Figure 44, larger number of clearing agents (66%) confirms that the available tracking mechanism provided by ESLSE is satisfying. The dissatisfied respondents were 22% while 12% opted to be neutral. But most customs clearing agents mentioned that the notifications (through text message or phone calls) about the arrival of the cargo at the dry port has a delay and is not sent immediately.

The majority of customs clearing agents confirmed that the main reason for delay of shipments is lack of available transportation trucks, accidents, lack of coordination and, system and automation problem. Frequent breakage of vehicles has also been mentioned

which was also the reason for blocking the road for other vehicles. Some clearing agents stated that mistakes to wrong dry port destination are rare case and it occurs if the cargo is overweight and is directed to other dry port location which is found to be convenient by ESLSE.

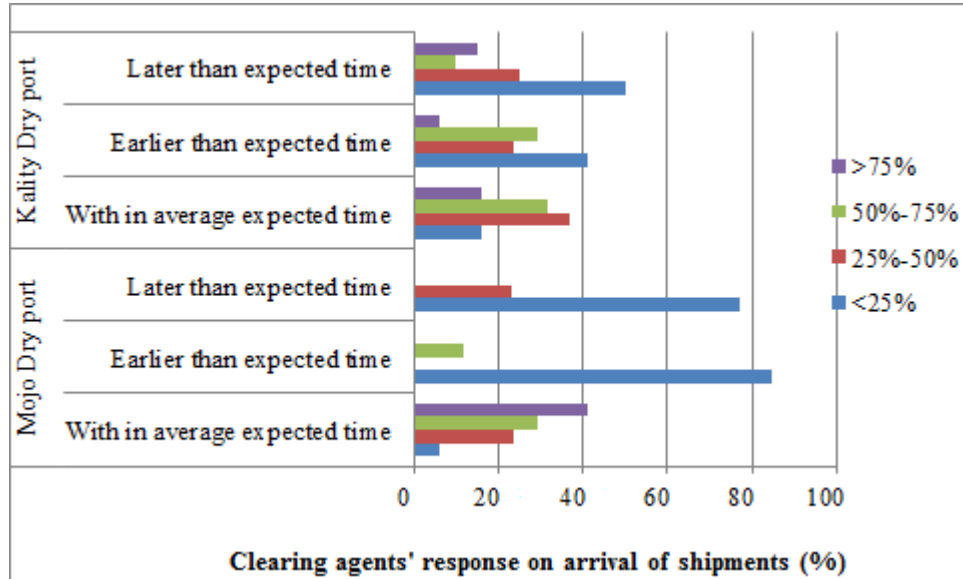


Figure 45: Customs clearing agent’ opinion on delivery of shipments within average, earlier and later than average expected time

Figure 45 shows the opinions of clearing agents with regards to the arrival of shipments at the dry port within average, earlier or later than the expected time. Significant number (41.2%) of respondents agreed that shipments destined to Mojo dry port arrive within the average expected time more than 75% of the time. Similarly, for Kality dry port, 36.6% of the respondents agreed that shipments arrive within the average expected time 25-50% of the time.

Comparing this result with the dry port employees opinion (refer Figure 26), for Kality dry port most clearing agents stated that there exists a delay most of the time while the employees claim that most shipments arrive within the average time interval. In contrast, while the majority of clearing agents stated that the delivery of shipments is on time more than 75% of the time the dry port employees agreed that it is 50-75% of the time.

Table 38: Customs clearing agents' level of satisfaction on available machinery at both dry ports

Level of Satisfaction	Clearing agents' response on available machinery (%)	
	Mojo Dry Port	Kality Dry port
Satisfied	70	60
Neutral	20	20
Dissatisfied	10	20

From Table 38, the availability of machineries at Mojo dry port was found to be satisfying by 70% of customs clearing agents. Only 10% of the respondents were dissatisfied with 20% remaining to be neutral. Similarly, majority (60%) of clearing agents were satisfied on the availability of machinery at Kality dry port, while equal (20%) number of respondents was dissatisfied and neutral.

Order fulfillment cycle time evaluated by Customs clearing agents

The responses of the customs clearing agents concerning order fulfillment cycle time for both Mojo and Kality dry port was assessed in terms of the provided service cycle time at CFS, customs examination closed warehouse, customs inspection process and overall clearing procedure for dry ports and customs.

Table 39: Clearing agent's level of satisfaction on CFS area, closed warehouse and customs inspection for both dry ports

Level of Satisfaction	Clearing agents' response, Mojo Dry port (%)			Clearing agents' response, Kality Dry port (%)		
	CFS area	Closed warehouse	Customs inspection	CFS area	Closed warehouse	Customs inspection
Satisfied	21.6	50	35.7	72.2	70	45
Neutral	30.8	11,1	57.1	27.8	15	45
Dissatisfied	15.4	11,1	7.1	0	15	10

According to Table 39, customs clearing agents' evaluation of both dry ports in terms of the service provided at CFS area, closed warehouse and customs during the inspection is presented. Concerning Mojo dry port, 30.8% of the customs clearing agents were neutral about the service provided at CFS with 21.6% satisfied and 15.4% dissatisfied. In addition 50% of the respondents were satisfied about the service at the closed warehouse while equal number (11.1%) of respondents was neutral and dissatisfied. The majority (57.1%) of the respondents agreed to have a neutral stand on the provided customs inspection service while 35.7% were satisfied.

On the other hand, significant (72.2%) amount of the respondents were satisfied with the service provided by Kality dry port at CFS with only 27.8% being neutral. 70% of the agents were satisfied about the service at the closed warehouse while equal number (15%) of respondents was neutral and dissatisfied. For the customs service provided at Kality dry port, equal number (45%) of clearing agents were satisfied and neutral with only 10% to be dissatisfied.

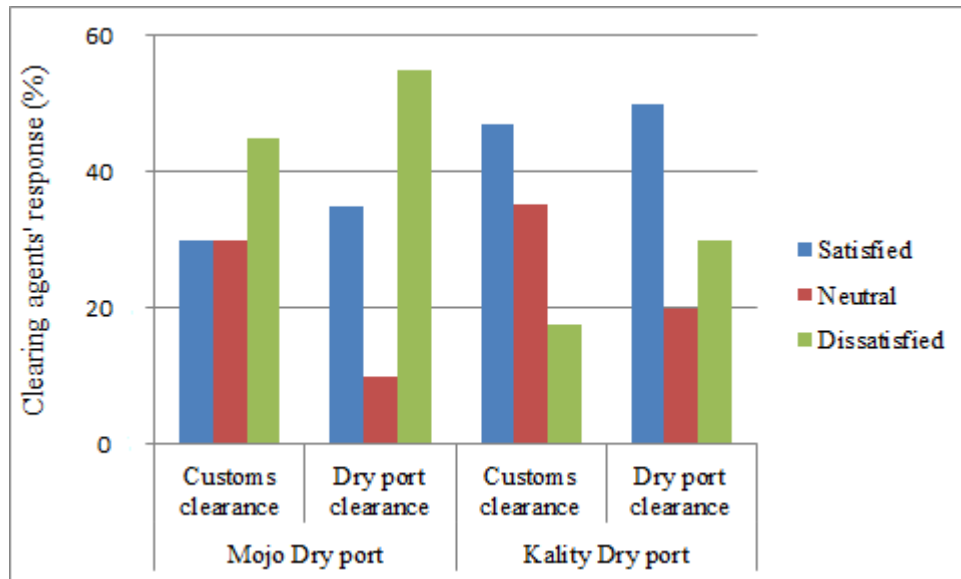


Figure 46: Customs clearing agents' level of satisfaction on procedural paper works of dry port and customs clearance

Customs clearing agents' evaluation on the overall procedural clearance from both customs and dry port as presented in Figure 46 indicates that the majority of the respondents believed that the service is satisfying at Kality dry port. 47.1% and 50% of the agents were satisfied with both customs and dry port clearing procedures respectively. The dissatisfied amount of

respondents was 20% on dry port clearance and 17.6% on customs clearance of Kality dry port.

In another hand, 55% and 45% of the customs clearing agents were dissatisfied on dry port and customs clearing procedural paper works at Mojo dry port respectively. The satisfied respondents were 35% on dry port clearance and 30% on customs clearance procedures.

Flexibility and Adaptability evaluated by Customs clearing agents

Flexibility and adaptability was assessed in terms of the level of satisfaction on the provided service during peak season. The responses of customs clearing agents are summarized below.

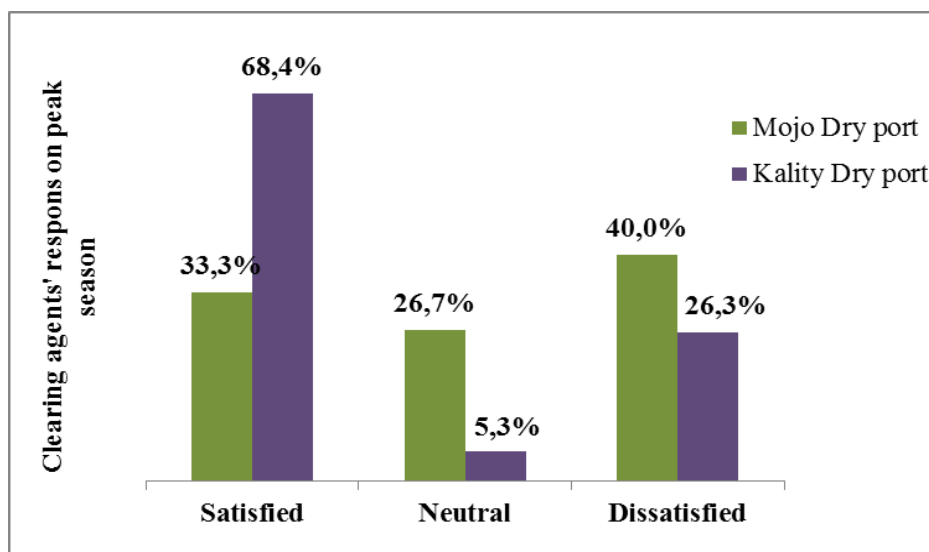


Figure 47: Customs clearing agents' response on the provided service on peak season by both dry ports

Looking at Figure 47, 68.4% of the clearing agents were satisfied on the provided service during peak season at Kality dry ports while 26.3% were dissatisfied. In contrast, for Mojo dry port, relatively greater number (40%) of respondents was dissatisfied with the provided service, while 33.3% were satisfied and 26.7% opted to be neutral.

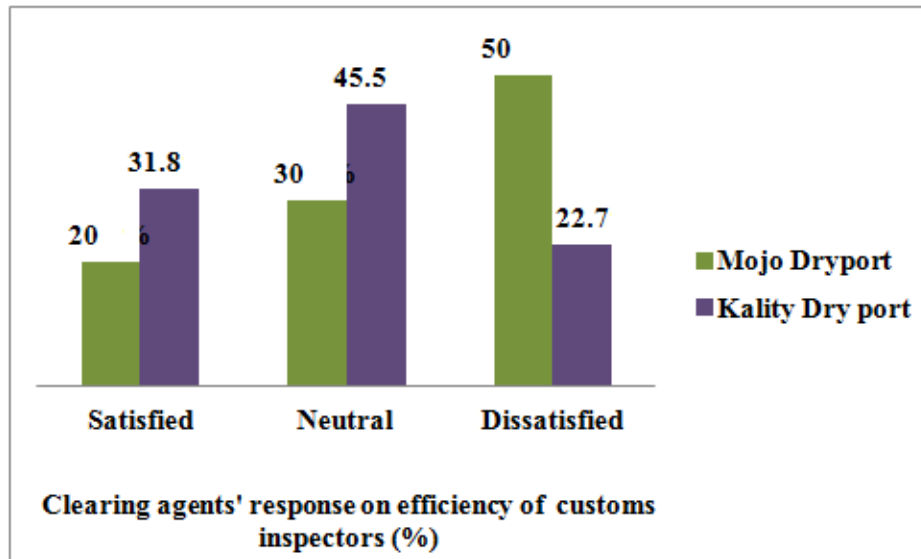


Figure 48: Customs clearing agents' level of satisfaction on efficiency of customs inspectors

Concerning the efficiency and experiences of customs inspectors/ assessors about the different imported goods are concerned, Figure 48 indicates that 50% of the respondents from Mojo dry port were satisfied with only 20% to be dissatisfied. In addition, 45.5% of the employees from Kality dry port were neutral and 31.8% were satisfied.

In contrast, comparing this result to the dry port employees response (refer Figure 32), the majority of employees were satisfied with the provided service at both dry ports.

Cost evaluated by customs clearing agent

Cost is assessed in regards with cost of dry port service, fairness of the intermodal transportation cost and reduction of money on goods due to the intermodal system.

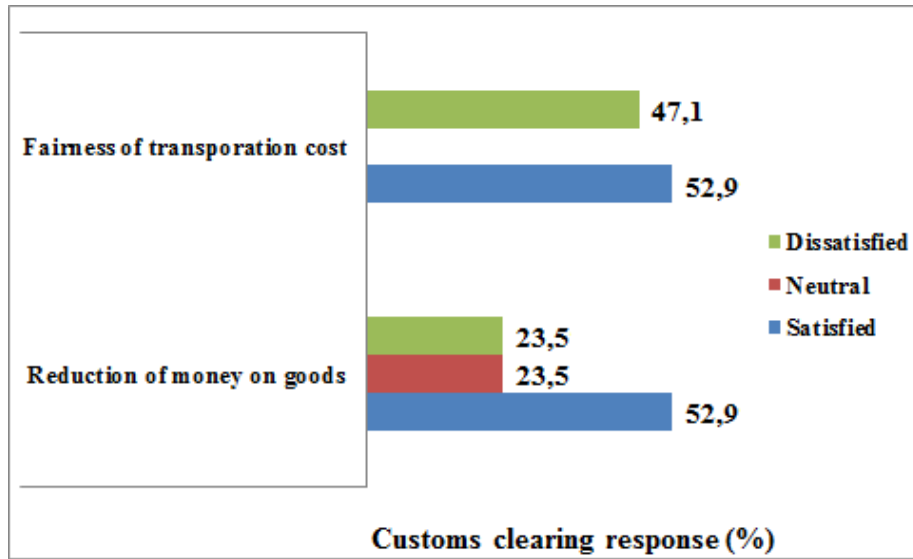


Figure 49: Customs clearing agents’ level of satisfaction on fairness of transportation cost and reduction of money on goods

According to Figure 49, equal number of clearing agents (52.9%) was satisfied on fairness of the transportation cost as well as reduction of money on goods due to intermodal system. 47.1% of the respondents were dissatisfied on the fairness of transportation cost while 23.5% were dissatisfied on reduction of money on goods.

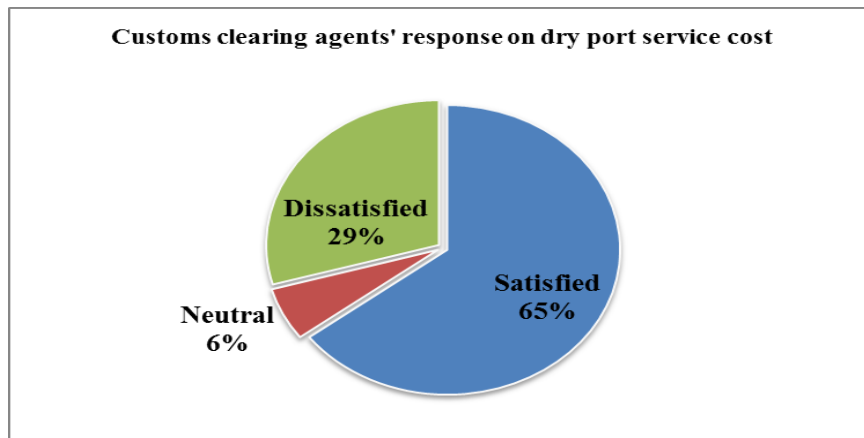


Figure 50: Customs clearing agents’ level of satisfaction on fairness of dry port service cost

Figure 50 indicates that the majority of clearing agents were satisfied on the service cost of dry ports. In summary, 65% of the agents responded to be satisfied, 29% dissatisfied while 6% opted to be neutral.

6 ANALYSIS AND DISCUSSION

As presented in the previous chapters, questionnaires were distributed, interviews were conducted to the different actors involved in the dry port operation, available performance data of the various sectors were previewed and queuing data for arrival trucks were collected to assess the service rates for both dry ports. Moreover, the lead time at the customs examination warehouses for Mojo dry port were determined. Accordingly the analysis and discussion part is presented below.

6.1 Entrance gate queueing

At the entrance gate of Mojo dry port for the inbound trucks during regular hours shows that (refer Table 18) the queue system was over saturated with the arrival rate being greater than the service rate. This causes trucks to spend substantial time in a queue. The average utilization factor was greater than 1 which implies that the performance of the service is below the required capacity causing backlogging of trucks. This result indicates the need for additional servers.

Moreover, as observed at site (refer chapter 5), the backlogging will be aggravated during rainy days as the waiting area gets muddy for trucks to park.

On the other hand, during peak hours (after lunch break); it is realized that the service rate was higher (46.89 veh/hr) than during regular time intervals (30 veh/hr & 16.9 veh/hr) implying that the servers implying that the servers can offer higher service rate during peak hours.

In regards with Kality dry port, it can be clearly seen (refer Table 18) that at regular hours, the average Utilization factor was close to one (0.7) implying that the queue was approaching the saturated condition. Even though the capacity was still greater than the demand, the trucks having a random flow rate will have a queue before reaching utilization factor of 1.

In addition, Figure 51 shows the plot for Utilization factor (only for values less than 1) versus queue waiting time which was tabulated for every individual queue system between the idle periods. The result confirms that the graph doesn't agree with the expected trend due to a high fluctuation on the lag time of the server. Even at a lower Utilization factor, the waiting

time was significant. This fluctuation was caused by the inefficiency of the servers in doing their job properly.

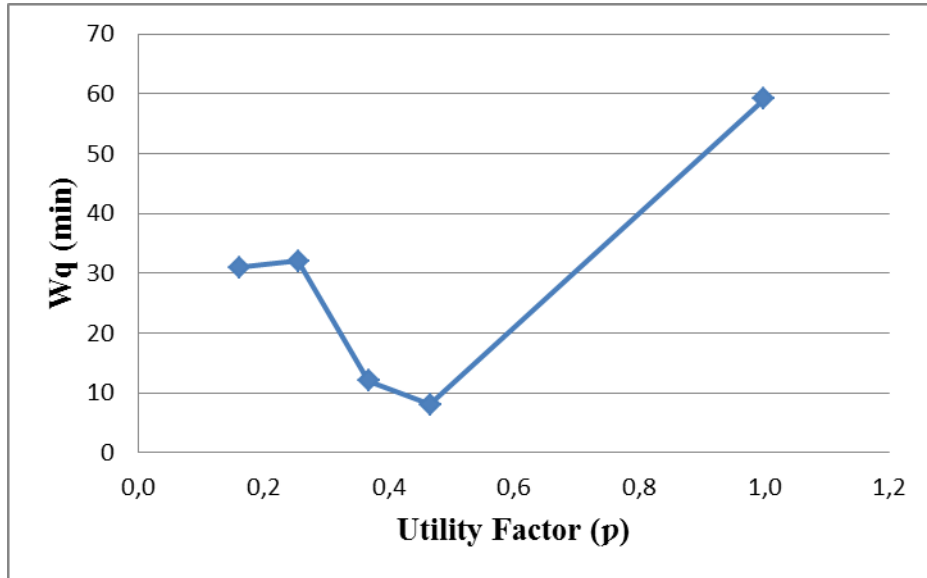


Figure 51: Waiting of trucks in a queue Vs. Utilization for Kality dry port

On the other hand, during peak hour (3:00pm) at Kality dry port the service rate was higher (31.48 veh/hr) than during regular time intervals (10.6 veh/hr) implying that the servers can offer higher service rate during peak hours.

6.2 *Lead time of Customs examination Warehouses at Mojo dry port*

For cargoes inspections at the customs examination warehouse, work order must be requested by customs clearing agent at a specific time. There was a time delay before the work order was submitted to the warehouse which depends on the good will of the employee on how frequently to deliver the accumulated orders. Once the orders were received by the warehouse, depending on the queue and available machineries the container will be moved from the container yard to the warehouse and unstuffing of the cargo will start. According to the result (refer Table 19), it was clear that for both cases the standard deviation is greater than the mean value, implying that there is a huge gap between the maximum and minimum lead time. This great deal of variance with extremes of the larger and smaller values is due to not having a fixed time schedule. Especially the lead time between the work order and being

received by warehouse could have been avoided easily if a proper time schedule is set for delivering the documents to the warehouse.

6.3 Survey Findings

The survey findings are summarized in Table 40 where the performance attributes are Reliability, Responsiveness, Agility and Cost which were expressed through their metrics; Perfect order fulfillment, Order fulfillment cycle time, Flexibility and Adaptability and, Total cost respectively.

Table 40: Summary of the responses to the survey questionnaire

Performance metrics	Provided Service	Respondents							
		ESLSE Employees			Driver		Importer	Customs clearing agents	
		Head Office	Mojo Dry port	Kality Dry port	Mojo Dry port	Kality Dry port		Mojo Dry port	Kality Dry port
Perfect Order Fulfillment	Arrival of shipments on time	Satissfied	Satissfied	Satissfied	Satissfied	Satissfied	Dissatisfied	Satissfied	Dissatisfied
	Occurance of Wrong location	Satissfied	Satissfied	Satissfied	-	-	Satissfied	Satissfied	
	Tracking mechanisim	Satissfied	Satissfied	Satissfied	Dissatisfied		Neutral	Satissfied	
	Safety & Security	Satissfied	Satissfied	Satissfied	Dissatisfied		Neutral	-	-
	Network System/ IT	Satissfied	Diss/Neu	Dissatisfied	Dissatisfied		-	Dissatisfied	Dissatisfied
	Available machinery	-	Satissfied	Satissfied	-	-	Neutral	Satissfied	Satissfied
	Efficiency at Warehouse & CFS	-	Satissfied	Satissfied	-	-			
	Fairness of triggered risk	-	Satissfied	Satissfied	-	-			
	Issuance of gate pass & interchange	-	-	-	Satissfied	Satissfied			
	Over all dry port provide service	-	Satissfied	Satissfied	Dissatisfied	Neutral			
Empty container service	-	-	-	Diss/Neu	Neutral				
Order Fulfillment Cycle time									
Order Fulfillment Cycle time	ESLSE's Procedure & formalities	Satissfied							
	Dry port clearance procedure	-	Satissfied	Satissfied			Neutral	Dissatisfied	Satissfied
	Customs Clearance procedure	-	Satissfied	Satissfied			Average*	Dissatisfied	Satissfied
	Djibouti waiting time for drivers				Dissatisfied				
	Checkpoint	-			Dissatisfied				
	Dwell time at Djibouti	-					Satissfied		
	CFS area	-						Neutral	Satissfied
	Customs inspection warehouse	-						Satissfied	Satissfied
	Customs inspection	-						Neutral	Sat/Neu

Flexibility and Adaptability	Peak season	Satissfied	Satissfied	Satissfied	-	-	Neutral	Dissatisfied	Satisfied
	During accidents	Satissfied	-	-	Dissatisfied				
	Damaged goods	Satissfied	Satissfied		Dissatisfied		Satissfied		
	Efficiency of customs inspectors	-	Satissfied	Satissfied	-	-		Dissatisfied	Neutral
Cost	Fairness of intermodal cost	Satissfied	Satissfied		-	-	Satissfied	Average*	
	Reduction of money on goods	Satissfied	Satissfied		-	-	Average*	Satissfied	
	Intermodal cheaper than unimodal	Dissatisfied	Satissfied		-	-	Satissfied		
	Fairness of dry port cost	-	Satissfied		-	-	Dissatisfied	Satissfied	
	Payment to the Drivers/associations	-			Dissatisfied				

*Average is considered if the difference between satisfaction and dissatisfaction is within the margin of error $\pm 5\%$

6.3.1 Perfect order fulfillment

Perfect order fulfillment focuses on the percentage of orders meeting delivery performance at the perfect condition and quantity, at the perfect customer's definition of time, at the right place, with a complete and accurate documentation and no damage (SCC, 2012). Hence, this paper utilized this metrics to assess the delivery of shipment on time, at the right dry port location, in perfect condition and with the proper information to describe **Reliability**.

With regards to shipment arrival time, contradictory statements had been received from stack holders,

The majority of ESLSE employees claim that the service provided are on time while most importers are dissatisfied with the delay encountered for their consignments. On the other hand, 73.2% of drivers stated that on average they arrive within the given 4-day deadline more than 75% of the time unless there is an accident or breakage. In addition, significant numbers of customs clearing agents are satisfied on timely delivery of shipments. Looking at the gap observed during field investigation and listening to multiple complaints of customers, it is hard to accept the assertion of the ESLSE employees that delivery arrival is satisfactory.

Greater portion of the ESLSE employees at the head office and both dry ports agreed that the main reason for the delay of shipments at the dry port is due to the shortage of available trucks, breakage of the existing trucks and customs lengthy inspection. This is in agreement with the literature review. Official reports show that the existing trucks for the transportation of the imported containers from Djibouti port are very old which hinders the timely delivery of shipments. 56.6% of non- governmental trucks have an age greater than 10 years (FTA, 2013) and also out of the fleet of 215 owned by ESLSE, it was noted that there was a call to the garage 1474 times within the last year (Kality dry port annual report, 2014/2015). The newly purchased 215 heavy duty trucks is believed to alleviate some of the problems but still the time wasted at the check points and network problem (computer system problem) will still have an impact on timely delivery of goods. Even though significant numbers of customs clearing agents are satisfied with timely delivery of shipments, they confirmed that in addition to the constant breakage of the trucks, delays occur due to coordination and automation problem. Putting this into the frame work of the metrics assessment, the lack of

on time delivery severely affects the perfect order fulfillment time. Vast improvement is needed.

Concerning at-the-right-place requirement for Perfect Order Fulfilment, 36% of ESLSE head office employees confirmed that the delivery of shipments at the wrong dry port destination occurs more than 50% of the time. While, the majority of both dry port employees responded that it is a rare case (with the probability of occurrence less than 25%). Even the latter percentage is still significant because it goes against the concept of delivery of shipments at the right place. The main reasons mentioned were, container overweight, lack of available transportation trucks, coordination, and system and automation problems.

Concerning availability of information about the status of trucks between Djibouti port and the destined dry ports, research result reveals that there was no means of tracking. Nevertheless, most ESLSE employees and customs clearing agents claimed that the available tracking mechanism is satisfying while most importers have a neutral stand.

On the other hand, the same clearing agents also pointed out that phone calls and text messages are not sent in a punctual manner and there is no timely update of the website to get information on arrival of shipments at the dry port. The drivers have confirmed that the trucks were not equipped with a tracking device and almost all were dissatisfied with Djibouti waiting time, the available network system at the check points and the safety of ATD seals. In contrast, most drivers were satisfied with the service provided by both dry ports with regards to obtaining documentation for gate pass and container interchange receipt.

The majority of the importers have neutral stand on safety and security but based on the observation of this research, the customs examination warehouse stored flammable and inflammable goods together; and the existing fuel depot is located nearby the dangerous cargo container yard at Mojo dry port, which has a high risk for safety.

Prioritization should be given to safety as well as to providing pedestrian walkways within the dry ports in order to avoid accidents. Higher portion of the questioned respondents were satisfied regarding the available machinery, which contradicts from what has been observed and gathered. Especially at Kality dry port, there is lack of available machineries which causes a time delay in the working process.

In conclusion, it is fair to say that the dry port has to do more to meet the Reliability of its service to the customers' satisfaction by way of mobilizing new trucks equipped with GPS, improved coordination and modernizing document information system.

6.3.2 Order fulfillment cycle time

Order Fulfillment Cycle Time is the metrics used to describe **Responsiveness** and it is the average actual cycle time consistently achieved to fulfill customer orders (SCC, 2012). This paper made the analysis with regards to Order Fulfillment Cycle time by assessing the average actual cycle time consistently achieved for each individual process in the intermodal system (especially at dry ports) to fulfill customer needs.

The preview and observations made using this indicator reveal that there exists an obvious problem in terms of understanding time value at each level of the process.

Concerning the time it takes for clearing procedure from dry ports, results show that 77.5% of employees from Mojo dry port, 65.2% from Kality dry port and 50% customs clearing agents at Kality claimed to be satisfied. In contrast, 45% of customs clearing agents at Mojo dry port were dissatisfied while the importers had a neutral stand. According to the analysis this study conducted on the lead time of the warehouses at Mojo dry port, there is a huge gap in time delay between receipt of work order and processing that order. These results clearly show an inefficient system that causes unnecessary delay and affects the overall quality of service of the dry ports.

Similarly, concerning customs clearing procedures, most employees of Mojo dry port and Kality dry port were satisfied. In addition, customs clearing agents at Kality were satisfied while the ones at Mojo were dissatisfied. On the contrary, this research has observed that ERCA having a high turnover of experienced employees affects the smooth and efficient functioning of customs clearing activities. Also, the frequent change of rules and regulations creates confusion that affects the operation.

The drivers were dissatisfied on the average waiting time at Djibouti port to load a container and on the unnecessary delay at check points. Especially at Galafi and Mille check points, the drivers complained that 6-10 hours is wasted at each station. Needless to say, this has a large impact on the overall cycle time of the delivery of shipments. Punctuality is the hallmark of

quality service delivery and customer satisfaction. A serious synchronization effort is needed by the ERCA and ESLSE.

When considering the waiting time at the entrance gate of both dry ports, the drivers were satisfied, especially at Kality dry port, stating that it only takes a few minutes. On the other hand, the drivers at mentioned that it takes from a few minutes to 2 hours to get an entrance clearance at Mojo dry port. This is confirmed by the queue analysis. Therefore, an additional server is required for Mojo dry port entrance service.

Even though the majority of dry port employees claim to be satisfied with the current dwell time at Djibouti dry port, ESLSE was not able to achieve the planned target of 5 days. According to ESLSE's annual report (ESLSE, 2013/2014) it could only achieve 8 days for 75% of the containers and an average of 10 days for the remaining 25% of the shipments. This shows that, there still is a gap in achieving a well-functioning intermodal system with respect to Responsiveness.

Annual reports obtained from the dry ports indicate that, average dwell time is 65 days at Mojo and 75 days at Kality. The longest dwell time recorded was 317 days and 380 days for Mojo and Kality dry ports respectively (For detail break down refer Table 13 & Table 16). The main reasons behind this are financial constraints and the fact that clients (including the government and public and private enterprises) use the dry port as a temporary storage.

In general, the system at Mojo dry port is partially automated while Kality dry port has no network system and it is done manually. The provided service at Mojo dry port by the closed warehouse, CFS and customs inspectors during the inspection of the containers were found to have a neutral response from the clearing agents. For Kality dry port, the agents were satisfied on the service at CFS and closed warehouse while equal number of respondents were satisfied and neutral with the service of customs inspectors. But in regards to the CFS area of both dry ports, since it is not a shaded area it is difficult for inspection during rainy periods.

In summary, a lot has to be done with regards to Responsiveness. The unreliable network system at each of the check points and within the dry ports is highly affecting the overall work flow by incurring a time delay. There also needs to be a systematic and regular work procedure, and the realization that inconsistency with regards to time at each of the service provision points, affects the timeliness of the overall cycle.

6.3.3 Flexibility and Adaptability

Flexibility and adaptability describes the time interval at which the organization will be stable to unforeseen scenarios whether it is an accident or excess demand (SCC, 2012). This metrics was assessed in terms of the level of satisfaction on the provided service with regards to peak season, on damage goods, when accidents occur, and experience and knowledge of customs inspectors on different goods to describe the **Agility** performance attribute.

The analysis with regards to this metrics shows that a lot has to be done to have the required effective service for unforeseen scenarios or seasonal rise of shipments flow. Mojo dry port which is handling a larger container flow (75%) has low room for flexibility than Kality dry port which handles less (15%). During the peak season, the container distribution should be adjusted between the two dry ports to handle the extra container and to have smooth work flow.

Results from the questionnaire reveal, 54.5% of the importers have a neutral stand on the service provided during peak season by the dry ports. 68.4% of customs clearing agents were dissatisfied on the service provided at Mojo dry port while they were satisfied at Kality dry port. On the other hand, most of the ESLSE employees were satisfied with the provided service by their organization during peak seasons. Analysis of these results shows that a systematic approach by re-organizing the employees and hiring extra hand on contractual bases is needed to avoid any additional delay.

In regards with damaged goods and accidents handling, ESLSE employees claimed to be satisfied with the provided service by their organization. Even most (50% satisfied and 40.9% neutral) importers seem to agree with the employees, stating that the occurrence of damage on goods was a rare scenario and that service provision in this regard was satisfactory.

On the contrary, the majority of the drivers were dissatisfied with the lack of immediate response during accidents by the insurance or maintenance division which results in delay and road blockage. More so, the research has witnessed that even after the insurance has been settled, damaged goods were observed and left at the dangerous container yard for extended period of time at Mojo dry port.

Looking at the experience of the customs inspectors on the know-how of the variety of inspected goods, the clearing agents have a neutral opinion of the inspectors of Kality dry port while they were dissatisfied with Mojo dry port inspectors. Even though Kality customs

authority has relatively more experienced employees than Mojo, the fairness and speed of goods assessment is still severely affected because of the high employee turnover and the resulting recruitment of young workers without institutional knowledge. Frequent training and better payment is required to alleviate this problem.

6.3.4 Cost of service and transportation

This section assesses Cost of service in terms of fairness of the intermodal transportation cost, reduction of money on goods due to the intermodal, fairness of the dry port cost, comparison between intermodal and unimodal and charges levied by ESLSE as opposed to using private sectors.

Table 9 and Table 23 give sea and land freight costs of ESLSE and private companies. Comparing the two reveals that sea freight cost of ESLSE is 10%-29% for 20ft. and 44%-64% for 40ft. more than other carriers. Furthermore, the land freight rate of ESLSE also has on average 23% for 20ft. and 47% for 40ft. increase from other freight forwarders.

Moreover, even though the complaints and the cargo accumulation at Djibouti port has been reduced significantly, ESLSE has still been paying demurrage the past year (2014/2015) due to its inability to pick up the shipments during the grace period for various reasons that tie back to capacity, reliability and responsiveness. On average, ESLSE pay demurrage charge of 5.65 USD per day up to an average of 2 days for 30,090 number of containers per year amounting to about 7,140,256 ETB (340,000 USD) during 2014/15. This is significant because the whole reason why ESLSE started a near-monopoly intermodal system was to cut down demurrage costs paid at Djibouti port and save foreign currency for the country. Looking at this number, it is fair to ask whether the ESLSE has reduced foreign currency cost as much as possible. ESLSE must immediately increase its truck capacity and coordination, in order to effectively meet its foundational goal.

Looking at the questionnaire results, the majority of the ESLSE employees at head office were satisfied with the fairness of intermodal cost but believed unimodal is cheaper than intermodal. As for both dry port employees, most agreed that the service provided by ESLSE with regards to fairness of dry port and transportation cost was satisfying.

In contrast, the drivers were not satisfied with the transportation payment from ESLSE stating that the payment does not reflect the hardship that they incur. Even though the importers were

satisfied with the fairness of the intermodal transportation cost, the majority was dissatisfied on cost reduction of goods due to the intermodal and believed that unimodal is cheaper. Cumulatively, the customs clearing agents agreed that the cost of the intermodal transportation and the dry port service is fair.

Generally, the development of dry ports in Ethiopia is at the infant stage and a lot has to be done. According to the study by EMAA, the government has a plan to develop 9 more dry ports in the near future. Since most of the existing dry ports are not fully utilized and developed, the main focus should be on improving the performances of the existing dry ports instead of increasing the number.

7 CONCLUSIONS AND RECOMMENDATIONS

The problems of the Ethiopian Multimodal Transport system (de facto intermodal system) begin with the conceptual understanding of how an intermodal system should operate. In an intermodal system, a single bill should govern the payment of shipments through different modes of transportation. However, the Ethiopian Intermodal Transportation System is not controlled under a single bill even though it has one sole operator; ESLSE. The payment for sea freight, land freight and dry port service is settled separately. This results in additional paper work, clearance delay, unnecessary cost of storage, and wastage of human resources. **Therefore, the ESLSE should consider changing its operation to a simplified single-billing system as an improvement option.**

Despite its shortcomings mentioned above, the intermodal system which ESLSE introduced has brought about positive changes. The intermodal system is beneficial in terms of avoiding demurrage payment in foreign currency at Djibouti port. Moreover, importers can access their containers within the safety of their own country. This gives them a sense of security. ESLSE gets a discount from the slot carriers for the sea freight. Although this is an advantage gained through monopoly of the intermodal system, it none-the-less saves money for the government which in turn can be channeled to other development projects. **The ESLSE should strengthen its positive achievements and continually work to solve the many problems encountered in its intermodal system.**

Primarily, the system must bridge the gap between the divergent views of ESLSE employees who think service delivery is satisfactory on almost all points and the customers who have a long list of complaints. When looking at the answers given, it is important to remember that most of the importers were reluctant to participate in the questionnaire fearing a negative response by the government. Any institution that does not give adequate regard for customers' and stakeholders' opinions is bound to be inefficient and ultimately fail. Disgruntled customers have no other competitor to go to when they fail to find proper service or fair treatment. **ESLSE should systematically evaluate customer's feedbacks and improve the satisfaction of its customers.**

This research has assessed two of the most functional dry ports (Mojo and Kality) with the main objective of identifying the performances using SCOR attributes and queue analysis.

With regards to **Reliability**, this research has identified lack of on time delivery, occurrence of delivery of shipments to the wrong dry port location (rarely), unavailability of proper tracking means and safety issues as main problems. **Therefore, ESLSE needs to highly increase its truck capacity, improve coordination and document information system. Moreover, during network system problem, there must be alternative solutions to manually handle the situation in order to avoid any delays.**

Concerning the **Responsiveness** parameter, the main problems were with regards to the delay in cycle time of dry port and custom clearance procedures, dwell time at Djibouti and dry ports, and, the time wasted at each check points. **A well synchronized system is needed between ERCA and ESLSE to solve the problems at these check points. In addition, regular and systematic work procedure is required within the dry ports for consistent operation considering the value of time.**

The main problems associated with **Agility** are not having the flexibility during peak seasons to accommodate the extra container flow especially at Mojo dry port. More so, concerning damaged goods and accidents handling, there is a gap in providing a quick response to offer the required service. **ESLSE needs to re-organize and increase its human resources during peak seasons and attention needs to be given during accidents.**

ESLSE was not able to fully meet its target in regards to **Cost** since it still pays demurrage cost (340,000 USD for the year 2014/2015). In addition, comparing the ESLSE transportation cost of sea freight and land freight with other private companies, there exist a significant cost increase by ESLSE. **Therefore, ESLSE should improve its working system to provide cost efficient service to its customers.**

According to the **Queue analysis** done at the entrance gates of both dry ports, Mojo dry port having Utilization factor of 1.1 indicates the need for an additional server while Kality dry port shows more of inefficiency problems with the servers in doing their job properly.

The lead time at closed customs examination warehouses at Mojo dry port between claim for work order- received by the warehouse and actual start of work confirms that, the extreme variance between the larger and smaller values was caused due to not having a proper schedule. **Hence, an appropriate schedule should be prepared and implemented.**

Further Research

Following the Literature review and the case studies, some areas can be recommended for further study. The performance of the dry ports for different seasons (peak and regular) can be analyzed for complete assessment. Even if the remaining dry ports contribute only 10% of the imported intermodal containers, the assessment of their performances would make a comprehensive understanding of the dry ports in the country. In addition, the location of the existing dry ports can be analyzed. Furthermore, detail analysis on each individual key actor can help to control and make adjustments for coordinated works. Djibouti port being the initial mode for the intermodal system, and the individual check points can also be investigated to understand the delay sources and the work flow.

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APPENDIX A- Questionnaires for Key Actors

ESLSE (Head Office Employees)

Organization: -

Job title: -

Gender: - Female Male

Reliability (Perfect Order Fulfillment)

1. How many of the orders placed within a month come within the **average** expected time (at dry port)?
a. <25% b. 25%-50% c. 50% -75% d. >75%
2. How many of the orders placed within a month come **earlier** than the average expected time (at dry port)?
a. <25% b. 25%-50% c. 50% -75% d. >75%
3. How many of the orders placed within a month come **after** the average expected time has passed (at dry port)?
a. <25% b. 25%-50% c. 50% -75% d. >75%
4. How many of the orders arrive at the wrong dry port destination?
a. <25% b. 25%-50% c. 50% -75% d. >75%
5. What is your opinion concerning the existing tracking mechanism (providing information to costumers about the whereabouts of their cargo)?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
6. What are some of the reasons for
a. The delay of order.....
b. Mistake in dry port destination point.....
7. What is ESLSE doing to improve its order delivery?
.....
8. What is your level of satisfaction on the service provided on the safety and security of the shipments?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
9. What is your opinion concerning the existing networking system?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
10. What is your opinion about the cost of services being clear and understandable by customers
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Responsiveness (Order Fulfillment cycle time)

11. How many days does it take to begin shipment after an order is placed?
.....
12. Your opinion on the simplification of procedures and formalities in intermodal system.
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
13. The difference at Djibouti dwell time before the intermodal system and after?
.....

Agility (Flexibility and adaptability)

14. What is your opinion on the level of service ESLSE provides during peak seasons?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
15. Does ESLSE increase operational budget and number of employees to handle intermodal order traffic during peak season? How soon do you make changes when peak season comes?
16. What is your opinion on the service provided when accidents occur (informing the customer)?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
17. What is your level of satisfaction on the service provided on damaged goods (the speed and efficiency at which the situation is handled)?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Cost

18. Is there any reduction of money and time when using intermodal system than using the unimodal system?
.....
19. What is your level of satisfaction concerning the reduction of money on goods due to the intermodal system?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
20. Your opinion on fairness of transportation cost, (intermodal)?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
21. Which transportation system is cheaper
a. Unimodal b. intermodal

Dry Ports

Organization: -

Job title: -

Gender: - Female Male

Reliability (Perfect Order Fulfillment)

1. How many days does it take for a shipment to travel from Djibouti port to the Dry port (Mojo/Kality)?
a. <3 b. 3-5 c. 5-10 d. >15
2. How many of the orders arrive on time at the dry port from Djibouti port?
a. <25% b. 25%-50% c. 50% -75% d. >75%
3. How many orders arrive at the wrong dry port destination?
a. <25% b. 25%-50% c. 50% -75% d. >75%
4. What is your opinion concerning the existing tracking mechanism (providing information to costumers about the location of their shipments)?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
5. What are some of the reasons for;
a. The delay of order.....
b. Mistake in dry port destination point.....
c. Lack of full order delivery?
6. How many of the clearance requests at the dry port are processed within the **average** expected time?
a. <25% b. 25%-50% c. 50% -75% d. >75%
7. How many of the clearance requests at the dry port are processed **earlier** than the average expected time?
a. <25% b. 25%-50% c. 50% -75% d. >75%
8. How many of the clearance requests at the dry port are processed **later** than the expected time?
a. <25% b. 25%-50% c. 50% -75% d. >75%
9. What is your level of satisfaction on the available machineries in the dry port
a. Very much Satisfied b. Satisfied c. Neutral d. Dissatisfied
10. What is your opinion concerning the existing networking system in the dry port?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
11. What is your opinion on the level of efficiency of the work performed at the warehouse and Container Freight Station (CFS) area?
a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

12. What is your level of satisfaction on the service provided on safety and security of the shipments in the dry port?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
13. Fairness of the risk triggered (green, yellow and red) on the imported goods
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Responsiveness (Order Fulfillment cycle time)

14. What is the average time gap (Lead time) for the clearance process in the dry port? (For the detail process to finish; documentation, customs inspection and settling dry port fees)

15. What is your opinion on customs clearing service procedure
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
16. What is your level of satisfaction on the overall procedural clearance paper works of the dry port
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Agility (Flexibility and adaptability)

17. What is your opinion concerning the level of service provided during peak season?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
18. Is there an increase in operational budget and number of employees to handle order traffic during peak season?

19. What is your level of satisfaction on the service provided on damaged goods (the speed and efficiency at which the situation is handled)?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
20. Efficiency and Experience (know how) of inspectors/ assessors about the different imported goods.
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Cost

21. What is your level of satisfaction on the fairness of cost of dry port services (loading/unloading, warehouse charge)?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
22. Which transportation system is cheaper
- a. Unimodal b. intermodal

23. Your opinion on fairness of transportation cost, (intermodal)?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
24. What is your level of satisfaction concerning the reduction of money on goods due to the intermodal system?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Truck Drivers

Organization: -

Job title: -

Gender: - Female Male

Reliability (Perfect Order Fulfillment)

1. How many of the shipments do you deliver within the **average** expected time (on monthly bases)?

a. <25% b. 25%-50% c. 50% -75% d. >75%
2. How many of the shipments do you deliver **earlier** than the expected time (on monthly bases)?

a. <25% b. 25%-50% c. 50% -75% d. >75%
3. How many of the shipments do you deliver **later** than the expected time?

a. <25% b. 25%-50% c. 50% -75% d. >75%
4. What are some of the reasons for delay of an order, or bring incomplete shipments?
.....
5. What percent of the time do you travel back to Djibouti without receiving an empty container?

a. <25% b. 25%-50% c. 50-75% d. >75%

Your level of Satisfaction on the provided service

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
6. What would you like to see improved when processing shipments?.....
 Your level of Satisfaction on the existing condition
 a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
7. What is your level of satisfaction on the issuance of your documents to obtain the gate pass and interchange?

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Responsiveness (Order Fulfillment cycle time)

8. What is your level of satisfaction on waiting time at Djibouti (Between arrival and departure)?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
9. How long does it take to get service at each check points?
- a. Galafi
- b. Mille
- c. Awash
- d. Kality (only for cargoes destined to kality dry port).....
- Your level of Satisfaction on the provided service
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
10. What is the average waiting time at dry port gate?.....

Agility (Flexibility and adaptability)

11. How fast do you report accidents to shipments or vehicle breakage?.....

Cost

12. What is your level of satisfaction concerning the transportation cost from Djibouti-Dry ports and vice versa?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Importers

Organization: -

Job title: -

Gender: - Female Male

Reliability (Perfect Order Fulfillment)

1. How many of the orders you placed arrive on time from Djibouti port to dry port
- a) Multimodal a, <25% b. 25%-50% c. 50-75% d. >75%
- b) Uni-modal a, <25% b. 25%-50% c. 50-75% d. >75%
2. How many orders arrive at the wrong dry port destination?
- a. <25% b. 25%-50% c. 50% -75% d. >75%
3. What is your level of satisfaction concerning the information provided about particular status and location of a shipment in a reasonable time?
- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
4. What are some of the reasons for;
- a) The delay of order.....
- b) Mistake in dry port destination point.....

- c) Lack of full order delivery?
5. How many of the orders placed within a month come **earlier** than the average expected time (at dry port)?
 - a. <25%
 - b. 25%-50%
 - c. 50% -75%
 - d. >75%
 6. How many of the orders placed within a month come **after** the average expected time has passed (at dry port)?
 - a. <25%
 - b. 25%-50%
 - c. 50% -75%
 - d. >75%
 7. What is your level of satisfaction on the service provided on safety and security of the shipments?
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know
 8. What is your level of satisfaction on the available machineries in the dry port
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know

Responsiveness (Order Fulfillment cycle time)

9. What is your level of satisfaction on dwell time at Djibouti port (Compared to the unimodal system)
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know
10. What is your opinion on customs clearing service procedure
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know
11. What is your level of satisfaction on the overall procedural clearance paper works of the dry port
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know

Agility (Flexibility and adaptability)

12. What is your level of satisfaction on the level of service provided by dry ports during peak seasons?
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know
13. What is your level of satisfaction on the service provided on damaged goods (the speed and efficiency at which the situation is handled)?
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know

Cost

14. What is your level of satisfaction concerning the reduction of money on goods due to the intermodal system?
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know
15. Your opinion on fairness of transportation cost, (intermodal)?
 - a. Satisfied
 - b. Neutral
 - c. Dissatisfied
 - d. Don't Know

16. Which transportation system is cheaper

- a. Unimodal b. intermodal

17. What is your level of satisfaction on the fairness of cost of dry port services (loading/unloading, warehouse charge)?

- a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Customs Clearing Agent

Organization: -

Job title: -

Gender: - Female Male

Reliability (Perfect Order Fulfillment)

1. How many of the orders arrive on time from Djibouti port to dry port
 - a. Multimodal a, <25% b. 25%-50% c. 50-75% d. >75%
 - b. Uni-modal a, <25% b. 25%-50% c. 50-75% d. >75%
2. How many orders arrive at the wrong dry port destination?
 - a. <25% b. 25%-50% c. 50% -75% d. >75%
3. What is your level of satisfaction concerning the information provided about particular status and location of a shipment in a reasonable time?
 - a. Satisfied b. Neutral c. Dissatisfied d. Don't Know
4. What are some of the reasons for;
 - a. The delay of order.....
 - b. Mistake in dry port destination point.....
 - c. Lack of full order delivery?
5. How many of the orders placed within a month come with in average expected time (at dry port)?
 - a. <25% b. 25%-50% c. 50% -75% d. >75%
6. How many of the orders placed within a month come **earlier** than the average expected time (at dry port)?
 - a. <25% b. 25%-50% c. 50% -75% d. >75%
7. How many of the orders placed within a month come **after** the average expected time has passed (at dry port)?
 - a. <25% b. 25%-50% c. 50% -75% d. >75%
8. What is your level of satisfaction on the available machineries in the dry port
 - a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Responsiveness (Order Fulfillment cycle time)

9. What is the total no of days (lead time) spent in the dry port? (The time spent to finish all the necessary procedures and get a release).....

Your level of satisfaction on the service provided at;

i. **CFS**

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

ii. **Warehouse**

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

iii. **Customs**

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

10. What is your opinion on customs clearing service procedure

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

11. What is your level of satisfaction on the overall procedural clearance paper works of the dry port

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Agility (Flexibility and adaptability)

12. What is your level of satisfaction on the level of service provided by dry ports during peak seasons?

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

13. Efficiency and Experience (know how) of inspectors/ assessors about the different imported goods.

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

Cost

14. What is your level of satisfaction concerning the reduction of money on goods due to the intermodal system?

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

15. Your level of satisfaction on fairness of transportation cost, (intermodal)?

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

16. What is your level of satisfaction on the fairness of cost of dry port services (loading/unloading, warehouse charge)?

a. Satisfied b. Neutral c. Dissatisfied d. Don't Know

APPENDIX B- Dry port entrance gate queuing data

Mojo Dry Port

Table A.B-1: Mojo dry port queuing data (10:40- 14:50)

Truck	Arrival time	Start of Service time	End of Service
1	10.4	10.41	10.46
2	10.4	10.42	10.49
3	10.4	10.49	10.52
4	10.4	10.54	10.56
5	10.4	10.54	10.56
6	10.46	10.55	10.56
7	10.46	11.06	11.09
8	10.49	10.5	10.52
9	10.49	10.51	10.52
10	10.51	10.54	10.55
11	10.52	10.56	10.58
12	10.58	10.59	11
13	11	11.01	11.02
14	11.03	11.06	11.09
15	11.04	11.09	11.11
16	11.04	11.06	11.09
17	11.1	11.11	11.14
18	11.1	11.16	11.17
19	11.1	11.19	11.2
20	11.1	11.21	11.22
21	11.12	11.18	11.19
22	11.13	11.24	11.25
23	11.15	11.25	11.26
24	11.22	11.26	11.27
25	11.23	11.26	11.28
26	11.27	11.28	11.3
27	11.27	11.3	11.32
28	11.29	11.35	11.36
29	11.29	11.35	11.36
30	11.37	11.38	11.39
31	11.38	11.4	11.41
32	11.41	11.43	11.45
Lunch break			
33	13.45	13.46	13.47
34	13.49	14.02	14.03

35	13.49	14.03	14.04
36	14.06	14.1	14.13
37	14.06	14.12	14.13
38	14.06	14.15	14.16
39	14.06	14.16	14.17
40	14.08	14.19	14.2
41	14.08	14.28	14.29
42	14.08	14.2	14.21
43	14.2	14.22	14.23
44	14.24	14.24	14.25
45	14.26	14.34	14.36
46	14.27	14.36	14.37
47	14.27	14.39	14.4
48	14.28	14.38	14.39
49	14.39	14.4	14.43
50	14.44	14.49	14.5

Table A.B-2: Mojo dry port Peak hour queuing data

Date		Morning Service time				Afternoon Service time			
		Start time	End time	No. of trucks	Total service Time (hr)	Start time	End time	No. of trucks	Total Service Time (hr)
Thursday	2015-08-08	-	-	-	-	13.1	13.45	31	0.58
Friday	2015-08-07	-	-	-	-	13.35	14.5	27	0.5
Saturday	2015-08-08	6.2	7.3	38	1.17	13	13.4	30	0.67
Sunday	2015-08-09	8	9	68	1	13.1	14	50	0.83
Monday	2015-08-10	6.3	7.2	44	0.83	13.15	13.35	11	0.33
Tuesday	2015-08-11	6.3	7.3	38	1	13.1	13.4	20	0.5
Wednesday	2015-08-12	6.3	7.3	40	1	13	13.3	16	0.5
Thursday	2015-08-13	6.4	7.2	20	0.67	13.1	13.55	45	0.75
Friday	2015-08-14	6.35	7.4	32	1.08	13.3	14	29	0.5
Saturday	2015-08-15	6.3	7.2	36	1.83	13.1	14	50	1.17
Sunday	2015-08-16	8	9	40	1	13.05	14	35	1.08
Monday	2015-08-17	6.4	8	61	1.33	13.05	13.4	30	0.58

Kality Dry Port

Table A.B-3: Kality dry port queuing data (9:35-14:59)

Truck	Arrival time	Start of Service time	End of Service	Queue System
1	9.35	9.35	9.38	1
2	9.38	9.4	9.42	
3	9.41	9.41	9.55	
4	9.41	9.42	9.56	
5	9.44	9.44	9.58	
6	9.47	9.48	9.59	
7	9.47	9.48	10	
8	10	10.01	10.04	
9	10.01	10.01	10.07	
10	10.01	10.01	10.09	
11	10.01	10.02	10.1	
12	10.04	10.05	10.11	
13	10.04	10.09	10.14	
14	10.11	10.11	10.16	
15	10.15	10.15	10.17	
Idle Period				
16	10.3	10.3	10.37	2
Idle Period				
17	10.49	10.3	10.54	3
18	10.54	10.54	11.02	
Idle Period				
19	11.19	11.19	11.24	4
20	11.19	11.2	11.25	
21	11.24	11.24	11.3	
22	11.44	11.44	11.49	
23	11.44	11.45	11.5	
24	11.45	11.45	11.51	
Idle Period				
25	12.22	12.22	12.28	5
Idle Period				
26	13.05	13.05	13.16	6
Idle Period				
27	13.24	13.24	13.32	7
28	13.26	13.27	13.36	

29	13.29	13.29	13.35	
30	13.32	13.33	13.42	
31	13.41	13.41	13.43	
32	13.41	13.42	13.44	
Idle Period				
33	14	14	14.07	8
Idle Period				
34	14.1	14.1	14.15	9
35	14.26	14.26	14.29	
Idle Period				
36	14.48	14.48	14.5	10
37	14.49	14.5	14.53	
38	14.55	14.55	14.59	

Table A.B-4: Kality dry port Peak hour queuing data

Date		Start time	End time	No. of trucks	Total service time (hr)
Monday	2015-08-24	13,27	14,03	27	0,60
Tuesday	2015-08-25	15,08	16,04	26	0,93
Wednesday	2015-08-26	14,41	15,42	26	0,98
Thursday	2015-08-27	15	16,05	39	1,08
Friday	2015-08-28	15	15,3	11	0,50

APPENDIX C- Lead time of customs clearing warehouse (Mojo dry port)

Work ordered Date	Lead time between Work order to Warehouse (hr)	Remark	Lead time between received by warehouse to start of work (hr)
2015-08-01	47,22	Week end	6,72
	45,7		8,8
	45,69		8,8
2015-08-03	1,75		3,72
	16,07		2,58
	15,95		5,16
2015-08-04	21,33		1,5
	18,5		2
	23,7		1,67
	23,65		1,75
2015-08-05	18,19		28,13
	18,19		3,13
	18,12		3,13
	18,12		1,63
	18,09		2,13
	18		0,25
	18,72		3,2
2015-08-06	1,07		2,53
	1,05		2,53
	1,04		3,11
	1,74		15,73
	0,44		16,06
	2,23		16,42
	1,92		16,42
	1,7		23,83
	1,68		23,75
	21,79		0,58
	21,59		0,58
2015-08-07	5,17		0,75
	3,22		0,75
	0,5		0,75
	1,67		1,92
	1,67		0,83
	0,79		0,83
	0,25		1,92
18,13		4,17	
2015-08-08	1,35		1,42

	1,17		4,25
	0,75		4,3
	0,37		4,25
	0,37		4,42
	0,33		4,5
	0,30		4,53
	0,27		4,5
	46,77	Week end	0,32
	46,63		0,35
	46,35		0,40
2015-08-10	0,37		0,48
	0,10		0,57
	0,03		0,65
	18,34		0,33
	3,33		15,83
	1,08		16,25
2015-08-11	0,88		16,62
	0,06		17,12
	0,51		17,12
2015-08-12	17,84		0,58
	17,55		0,83
	17,55		0,83
	16,74		0,92
	16,42		1,00
	16,25		1,50
	16		1,58
2015-08-13	1,33		15,21
	1,28		15,3
	1,27		15,4
	1,25		15,46
	1,15		15,58
	0,22		15,66
	21,13		0,17
2015-08-14	1,83		0,42
	1,38		3,75
	1,77		6,75
	0,83		5,34
	0,58		5,42
2015-08-15	3,39		2,33
	3,22	Week end	41,83
	2,44		47,33