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The Effects of Port Resources and Sustainability Practices on Port Operational Performance in Ethiopia: Modjo Dry Port in Focus Ethiopia: Modjo Dry Port in Focus Ethiopia: Modjo Dry

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BAHIR DAR UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN
MANAGEMENT

THE EFFECTS OF PORT RESOURCES AND SUSTAINABILITY
PRACTICES ON PORT OPERATIONAL PERFORMANCE IN
ETHIOPIA: MODJO DRY PORT IN FOCUS

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JUN, 2018

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The Effects of Port Resources and Sustainability Practices on Port
Operational Performance in Ethiopia: Modjo Dry Port in Focus

By

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Economics in Partial Fulfillment of the Requirements for the Degree of
Masters of Art in Logistics and Supply Chain Management

Advisor

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Jun, 2018

Statement of declaration

I, Mr. Debanu Bonaya, Hereby declare that the thesis entitled "The Effects of Port Resources and Sustainability Practices on Port Operational Performance in Ethiopia: Modjo Dry Port in Focus" is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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LIST OF ACRONYMS/ABBREVIATIONS

AGFI:	Adjusted Goodness Of Fit Indices
AMOS:	Analysis Of ModeStructure
AVE:	Average Variance Extracted
C.R.:	Critical Ratio
C:	Cost
CAAP:	Clean Air Action Plan
CCTV	Circuit Television Camera
CFA:	Confirmatory Factor Analysis
CFI:	Comparative Fit Index
CFS:	Rail-Mounted Gantry Crane
CFS:	ContainerFreight Station
CMIN/DF:	Chi-Square Minimum/Degree Of Freedom
D:	Dependability
DO	Delivery Order For Container Release
EFA:	Exploratory Factor Analysis
EFY:	Ethiopian Fiscal Year
ERC:	Terminal Operating System
ESCAP:	Environmental SustainabilityAction Programme
ESLSE:	Ethiopian Shipping And Logistics Service Enterprise
EU:	European Union
F:	Flexibility
GDP:	Growth Domestic Product
GFI:	Goodness Of Fit Indices
GMP:	Green Management Practices
GOE:	Government Of Ethiopia
GRR:	GoodRelease Request
HC:	Human Capital
HUMANCAP:	Human Capital
IC :	Information Capital
ICT:	Container Freight Station
IFI:	Inflated Fit Index
INFCP:	Information Capital
IT:	Information Communication Technologies
KM:	Kilometer
Kw:	Kilowatt
LLDCs:	Land Locked Developing Countries
LPI:	Logistics Performance Index
NFLS:	National Freight Logistics Strategy
OE:	Operating Efficiency
OPEREFF:	Operating Efficiency
PCA:	Principal Component Analysis
PI:	Port Infrastructure
POP:	PortOperational Performance
PORTINF:	Port Infrastructure
PORTPERFO:	Port Performance
PPP:	Public Private Partnership
PSP:	Port Sustainability Practices

Q:	Quality
R.M:	Railway Machine
RBV:	Resource Based View
RMSEA:	Residual Mean Square Error Approximation
RO-RO:	Ride On And Ride Off/Roll On Roll Off
RTG:	Rail Mounted
SEM:	Sequential Equation Modeling
SPD:	Speed
SPSS:	Statistical Package For Social Science Software
SUSTAIN	Port Sustainability Practices
TEU:	Twenty-foot Equivalent Unit
TLI:	Tucker- Lewis Index
TOS:	Terminal Operating System
UNCTAD:	United Nations Conference on Trade and Development
UNDP:	United Nation Development Program
US:	European Union
USD:	United State Dollar
VAF:	Variance Accounted For
WBG:	World Bank Group

ABSTRACT

Unlike countries that have direct access to the sea, landlocked countries are being affected by different constraints to trade at the global scope. The lack of territorial access to the sea, remoteness and isolation from world markets and high transit costs continue to impose serious constraints on the overall socioeconomic development of landlocked developing countries including their trade competitiveness, in order to trade with the rest of the world, it must transship goods through one or more transit countries to reach the sea). So using inland/dry ports are the basic option land locked developing countries (LLDCs) have to trade globally and prosper its economy by increasing the competitiveness of their exports. Hence these inland ports need enough resources to operate. The main objective of this study was to analyze the effect of port resources on port operational performance and to see the mediating role of port sustainability practices at Modjo port and terminal operation from port resource based view (RBV) perspective. To address this issue, this study adopted a two phase research design which incorporates quantitative and qualitative phases. In the first explanatory design At first quantitative phase, to evaluate the effects of port resources on port operational performance and to see the mediating role of sustainability practices, first hand quantitative data were collected using standardized questionnaire from 209 respondents from Modjo port and terminal. At the second face to validate the statistical results interview and document review were taken place. Simple random sampling and purposive sampling were used to select respondents. The quantitative data was analyzed by SEM in AMOS 23 and qualitative part was analyzed using thematic analysis. Finally the result revealed that these port resources have direct positive effects on port operational performance with human capital holding the highest effect. The mediating effect shows that port sustainability practices partially mediates the relationship between port resources and port operational performance. Based on the analysis it is been concluded that Modjo port and terminal needs additional port resources to handle container cargoes efficiently and improve export competitiveness of Ethiopian products. And lastly, based on all variables under investigation brief recommendations were made.

Key words port resources, port sustainability practices, port operational performance
Modjo dry port

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

As the structures of world economy is changing and production of goods and services are taking place at global scope (Midoro, 2005), trade is critical to economic growth and ports are critical to trade (Herrera and Suarez, 2016). Due to this economic globalization, the global trade and transport chain has been forming gradually (Deng, Lu, and Xiao, 2013). With more than 90% of global freight moving by containers via sea, container transport industries have an immense influence and role in the global economy. Ports are a core component in the international supply chain and play an enormous role in regional economies; (Vujicic, Zrnica, and Jerman, 2013).

Unlike countries that have direct access to the sea, landlocked countries are being affected by different constraints to trade at the global scope. The lack of territorial access to the sea, remoteness and isolation from world markets and high transit costs continue to impose serious constraints on the overall economic development of landlocked developing countries including their trade competitiveness (ATPC, 2010). Hence, in order to trade with the rest of the world, it must transship goods through one or more transit countries to reach the sea (UNOHRLLS, UNDP, UNCTAD, (2007)). So using inland ports are the basic option land locked developing countries (LLDCs) have to trade globally and prosper its economy by increasing the competitiveness of their exports.

Roso, (2009), defines a dry port as *an inland intermodal terminal directly connected to a seaport(s) by rail or truck where customers can leave/pick up their units as if directly to a seaport*. Due to absence of sea port in LLDCs the issue of dry port operational capabilities and sustainability practices is gaining special attention and researched.

This study adapts a resource based view theory (RBV) as theoretical base to understand the determinants of dry port operational performance. RBV theorists argue that firms enable themselves to improve their efficiency and effectiveness by using their own tangible and intangible resources (Peteraf, 1993). Accordingly, resources (tangible or intangible) include assets, capabilities, organizational processes, information, knowledge, firm attributes, and etc (Barney, 1991). Container ports of individual countries have different levels of resources such as facilities, infrastructures, and operational efficiency. These resources are indicators of

ports, capabilities (Cho and Kim, 2015). The resource based view suggests that superior organizational performance is dependent on the manner in which shipping service providers leverage their resources (Lai, 2004)

prior studies on operational capabilities revealed that competitive capabilities generated from tangible and intangible assets is a source of competitiveness which positively affects business performance (Arya and Lin, 2007). It is also demonstrated by (Rajasecar and Deo 2015 Nyema, 2014 and Li 2000) that dominance in determinants of port capabilities or competitiveness leads to higher operational performance.

Through literature about port resources shows that, infrastructure (both hard and soft) is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development and increase terminal efficiency (Nyema, 2014) In addition, operational efficiency means speed and reliability of port services, so a very reliable and quick service should be provided by terminal operators for their better performance (Tongzon, 2002). In connection, it was argued that the level of ICT applications in port operations and management is an important element of port service quality and port performance (Thai 2015). Besides, Marlow and Paixao Casaca (2003) and Kaplan and Norton (2004) emphasize that the port needs investment in intangible assets such as human resources as employees who have the right skills, talent and knowledge contribute the most in enhancing the organization's internal processes and performance.

In addition to operational capabilities, considering ports as strategic assets, countries and port operators must take a long term view in port development (Yim, and Siu, 2013). port development or „sustainability practice, in port operations is considered as a strategic/operative practice that means the simultaneous pursuits of economic prosperity, environmental quality, social responsibility and operational viability (Dinwoodie et al., 2012; Cheon and Deakin, 2010).

Yang, (2013) ascertained the positive and significant effects of sustainability practices in the context of container shipping. In the same vein, research efforts have identified various benefits of sustainability practice in diverse industries (Yang, 2013; Adams, 2010; Cheon and Deakin, 2010) including cost saving and efficiency improvement, quality improvement, environmental impact prevention and minimization, health and safety, enhanced employee motivation and satisfaction, new market opportunities, reputation and reliability, and

relationship improvements. As a result, organizations and industries related to port operations have progressively begun to translate sustainability issues from an inside management concern into a core issue directly related to efficiency and competitiveness (Denktas and Karatas, 2012; Lun, 2011; Cheon and Deakin, 2010). But, even though the issues of port sustainability are gaining special attention in recent periods, it almost exclusively focuses on sea side and still a gap exists in the field of inland dry ports.

Therefore, inland dry ports are becoming more important in global supply chains and up to now the scientific attention to these processes is lagging behind for the dry ports, researcher relies on the RBV as the theoretical foundation for the study and focus on various resources (like port infrastructures, operational efficiency, human capital and information capital) and sustainability practices as possible determinants of dry port performance, which help to add to the existing field of port literatures and help to provide useful insights for the government to guide policy and strategies for efficient, competitive and sustainable dry port operations in Ethiopia.

1.1.1. Justification of the Study

As a motivation behind conducting this research, a number of reasons can be justified for it. The main reasons for selecting this field (port industry) can be justified by economic rationality behind dry port and research gap in this area from novelty perspective as follows.

From economic perspective, in today's interdependent globalized world, efficient and cost-effective transportation systems that link global supply chains are the engine fueling economic development and prosperity. For this engine port plays the major role.

As Africa strives to become a bigger stakeholder in global economy, it is imperative that concerted efforts are channeled towards the advancement of a safe, secure, efficient and sustainable maritime transport with simplified and minimized formalities and procedures to enhance the competitiveness of African products in order for Africa to trade itself out of poverty.

Dry Ports play a key role in the Ethiopian economy and development, as nearly 95% of the trade between Ethiopia and the rest of the world is handled at Modjo dry port. Thus, the importance of ensuring efficiency and sustainability in dry ports is an issue to be studied to improve the ability of the Ethiopian trade to be competitive at international level. By serving 95 percent of import and export activity, the Modjo Dry Port facility is set to be a modern

logistics hub in the country which is hoped to become a state-of-the-art facility in the logistics sector in the country. However, as a landlocked developing country, Ethiopia is facing a number of challenges to meet the ever-changing and developing needs of the industry. So, studying these challenges and respective remedies is needed.

Ports also hold a social role, as it strongly contributes to the national economy and to employment opportunity. Therefore, given the stated role of dry ports in the Ethiopian economy, it is critically important to understand the operational sustainability practices and operational condition at Modjo dry port for the future country's economic sustainability.

From a novelty perspective, this paper can be justified because there has been a lack of empirical research on determinants of port performance from RBV and dry port sustainability practices especially in landlocked African countries. Most of the previous studies related to port determinants and port sustainability issues have been dedicated to sea ports in developed countries. In addition, there are few, „if any, papers that connect sustainability issues with port resource capabilities and port operational efficiency. Apart from this as most of the landlocked African countries ports are state-owned; there are no known attempts that studied dry port determinants issue against international Principles RBV theory. Besides, Even though few papers tried to cover sustainability issues in inland ports, they focus only on environmental concern, rather than internal operational sustainability.

As a result this researcher tried to gain a better understanding on what roles port resource and sustainability implementation play in managing dry port capabilities and operation. So, this research fills this gap by studying different determinants of dry ports from RBV approach and less researched sustainability issue in dry port operation, which will be used as a paper of reference for future researchers who want to conduct similar studies.

1.2. Statement of the Problem

In light of the background of the research discussed above, the specific research problem addressed by this study is stated as follows:

Problem: the current inland port operations practices in Ethiopia are inefficient in ensuring superior port performance. There are underinvestment in infrastructural facilities, insufficient information and human capital, poor service quality, high service charge, increased congestion around the facility and lengthy of customs clearing procedures which introduces long delays, significant uncertainties and unnecessary costs to port users.

The above problem can be solved by investigating the issue that poor inland port performance results from different resource constraints from RBV approach and poor sustainability practices. The resource-based (RB) theory holds that firms gain growth because they have sustainability by acquiring and accessing resources and capabilities Karia N., 2016. Reputation, knowledge of technology, efficient process, skilled personnel are intangible resources that can contribute to the strength of a port and its delivery of service quality Karia N., 2016

The understanding of the attributes of ports or terminals operations performance is particularly important because they are vital to the economy of the country and the success and welfare of its industries and citizens (Anguibi, Balla and Allate, 2016). Accordingly Yoon, (2015); stated that various factors such as facilities, location, cost, and service a softer factors including human resource, network, customers, government support policy, and reputation determines port operation performance, as unavailability or insufficiency in these factors leads to poor performance.

Reasons for poor port performance are time lost due to interruptions in operation, poor utilization of provided equipment, weak stacking and handling practices, insufficient training activity and / or its poor organization Florin N., Marian R., Alexandru C. Filip N., (2015)

In addition to this, the lack of sustainability practices also results in poor inland port performance. As evidenced by (Kim 2014) if ports don't practiced sustainability issues the result will be low operational performance. This is supported by a study conducted by (Kim and Chiang, 2014) that, sustainability practices necessitate the simultaneous pursuit of

container traffic growth, low environmental impacts and corporate responsible image making, operational efficiency, efficiency of the use of the port area and sustainable growth.

However the theoretical literature on which the above problem was studied in the past has some limitation. In this connection, most studies in the existing literature mainly focus on the environmental aspects of sustainable sea development and have not clearly explained what sustainable dry port development exactly entails. Furthermore, since these studies also focused on sea ports, it overlooked to see the commonalities between dry port sustainability practices, operational resources and performance. To address these gaps, this research aim to explain the relationship between determinants of dry port, sustainability and performance.

In Ethiopia, Modjo is the major bottleneck in the supply chains via imports of containerized cargo. It introduces long delays, significant uncertainties and unnecessary costs due to the confluence of: Underinvestment in facilities and equipment, Poor operational procedures and control, insufficient yard management systems, cumbersome customs procedures and failure to relocate abandoned and long term boxes UNDP (2017).

From stakeholder,s feedback and researcher personal communication with port employees (which is later evidenced by public disclosure documents of Ethiopia trade logistics projects appraised on 19-Jan-2017) the following significant port resource operational constraints for the poor inland port performance for Modjo are identified;

With regard to infrastructural facilities, there is lack of port infrastructure/facilities which resulted from underinvestment in facilities and equipment, like cargo handling equipment, stuffing and unstuffing facilities, ICT or port management system, storage facilities, rail facilities and improper utilization of the available facilities.

In addition, the problem of operational efficiency includes increased congestion around the facilities due to poor traffic flow patterns and lack of parking spaces for parking trucks, poor operational procedures and control which are responsible for 35-40% of container dwell time and truck turnaround time.

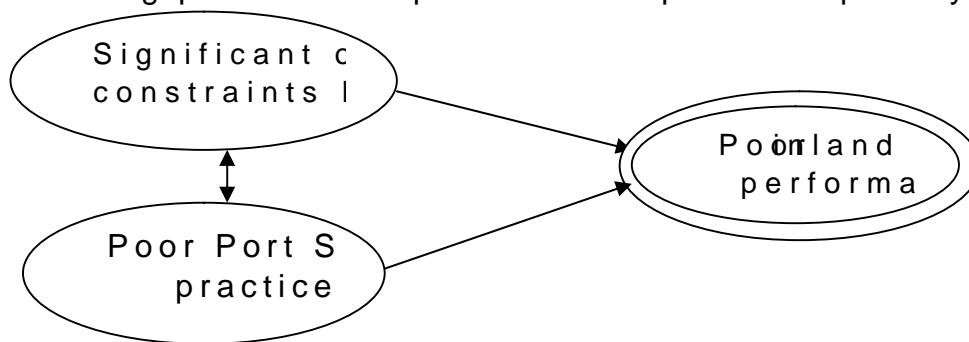
Again, In terms of information capital Modjo dry port is inefficient because of lack of proper systems for the management of the facility leading to delays in locating containers and necessitating increased moves of boxes as the port is operating without a proper TOS (Terminal Operating System) and gate system and Poor port security as evidenced by the absence of CCTV. Furthermore, workforce of the port needs additional training and

Lastly, In terms of cost the transportation cost per container, cargo handling charges, port charges and port service costs are high because of pure monopoly by one port (Modjo dry port).

Generally, there is theoretical problem (gap in literature) and practical problem as studied above, which can easily be depicted by the diagram below. Such problems warrant further study and this is an attempt towards that end.

Therefore, the purpose of this sequential explanatory mixed method research is to analyze the relationship between determinants of dry port, sustainability and port performance to ensure superior port operation performance in Modjo dry port, (Ethiopia).

In an attempt to relate port sustainability with port determinants and performance which may account for the superior inland operational performance of Modjo dry port, the study raises the following quantitative and qualitative research questions respectively



Quantitative Research Questions

For the first, quantitative part of this study the main research question is:

- What is the effect of resource determinants of dry port operation on dry port operational performance Modjo dry port, Ethiopia?

To address this main question, two sub-questions were investigated,

These are

1. What is the effect of the port resources possessed by a port on its operational performance?
2. What is the mediating role of dry port sustainability practices between port resources and port operational performance?

Qualitative Research Questions

For the second, qualitative part of this study the embracing research questions are

1. How do these quantitative factors contribute to dry port operation performance? or
2. How can the statistical results obtained in the quantitative part be explained deeply?
3. How much do sustainability practices help in explaining dry port operation performance?

1.3. The Objectives of the Study

1.3.1. General Objective of the Study:

The aim of this study is to analyze the effects of port resources operational factors on inland port operation performance from RBV approach and to see the role of sustainability practices in developing and sustaining inland port operation performance of Modjo dry port; Ethiopia.

1.3.2. Specific Objectives:

The specific objectives of this study are:

- To determine the effect of the port resources possessed by port on its operational performance
- To analyze the mediating effect of sustainability practices between dry port resources and dry port operation performance

1.4. Research Hypothesis and Model:

In order to answer the specific research objectives stated above the following research hypotheses are developed based resource literature.

Hypothesis 1: port human capital positively and significantly influences operational performance in Modjo dry port operations.

Hypothesis 2: port operating efficiency positively and significantly influences operational performance in Modjo dry port operations.

Hypothesis 3: Port infrastructures positively and significantly influence operational performance in Modjo dry port operations.

Hypothesis 4: port information capital positively and significantly influences operational performance in Modjo dry port operations

Hypothesis 5 port sustainability practices mediate the relationship between port resources port operational performance

Based on this the model developed for this research can take the form of

$$POP = f (\dots + \beta_1 X_1 + \beta_2 X_2 \dots + \beta_n X_n)$$

1.5. Significance of the Study

A number of theoretical and practical contributions are expected to be drawn from this research.

Theoretically, this study is proposed to deepen the understanding of the port resource capabilities, and sustainability practices in dry port operation by viewing attributes of sustainability practices (i.e., environmental technologies, monitoring and upgrading, internal growth, and communication and cooperation) for enhancing operational sustainability in dry port operation, hence it will contribute to port operations literature. Thus, this study uses the resource-based view theory to construct a general framework that allows for the estimation of various types of value that a dry port can generate by relying on its strategic and basic resources.

From the academic point of view, this research examines the relationship between port operational capabilities, sustainability practices and dry port operational performance in maritime sector.

From practical perspective, the finding of this study will have significant implications for dry port operators in Ethiopia, for the enhancement and continuous improvement of dry port operational performance by implementing operational sustainability practices. Consequently, by viewing the structure of dry port operation from four RBV critical determinants like infrastructure, operational efficiency, information capital and human capital, this paper provides useful insights for dry port managers in Ethiopia to establish and review their strategies on their overall operational performance improvement.

Moreover, the most expected important practical implication of this study is that, the research empirical results provide significant contributions to dry port operators to encourage a more proactive attitude for adopting and implementing the sustainability practice and the policy

makers can gain critical insights to encourage sustainability practices among dry port users and to review and establish the relevant strategies in operating dry port such as monitoring systems, environmental regulations and incentives, for responding themselves to the rapidly changing business landscape.

Finally, Managers of Ethiopian maritime or transportation sectors can use the findings as sources of reference to manage maritime sector to improve performance, and academicians can use the finding for application of the dry port management field and further extension of this topic or related topics.

1.6. Delimitation of the Study

The objective of this study is to empirically test the effects of operational factors on inland port operation performance from RBV approach and to see the role of sustainability practices in developing and sustaining inland port performance of Modjo dry port; Ethiopia. To this end, the scope of this study was delimited to the theoretical explanations of the phenomenon of RBV in dry port operation performance, and sustainability issue. Methodologically, this study was delimited to sequential explanatory mixed research design for which both quantitative (Structural Equation Modeling) and qualitative (thematic) techniques were used. Empirically, the study was delimited to both qualitative and quantitative data collected from document review, interview and the distributed questionnaire. And geographically this study was delimited to the Ethiopian major regional hub, Modjo dry port, found in Modjo town 70KM east to Addis Ababa

1.7. Limitation of the Study

The limitations of research study are concerned with the limits which are beyond researcher control, the limits inherent in methodology sources of data, sampling errors, research instrument, generalizability, etc.

As port data are kept secret by port authorities because of threat to port security, there is an expected restriction for this research regarding data sources, especially with regards to performance measures like throughput. In addition to this as the researcher is new to SEM (structural Equation modeling) analysis; the boot strapping part was not tested and this may have some effect in interpreting the direct effect of the result

1.8. Organization of the Study

This research paper contains five chapters. The first chapter deals with the introductory part which includes background of the study, statement of the problem, objective of the study, research hypothesis and model, justification of the study, significance of the study, delimitation of the study and operational definition of key terms. The second chapter contains a review of related literature, under which dry port concepts, sustainability issues in dry port operation, and dry port performance were discussed. The third chapter was about Research design and methodology. In the fourth chapter the results and discussions of the study were included. Finally, chapter five provides the summary, conclusion and recommendations for Ethiopian Modjo dry port.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Introduction

In this chapter review of related literature which consists of four parts are discussed. Part one is all about theoretical review (i.e., Resource based view approach (RBV) concept, dry port concepts, and sustainability practices concept). The second part is about empirical review (i.e., relationships between variables, hypothesis development, and conceptual framework of the study). Part three is about performance measurements in port industry, whereas part four is all about summary of literature review and research gap.

2.2. Theoretical Review

2.2.1. Resource Based View Approach

Research on RBV is about the use of assets, skills, abilities and knowledge within the firm. The resource based perspective of the firm states that the firm's strategy and success is based on its resource profile (Amit and Schoemaker, 1993) cited in Coates and McDermott (2002).

The resource based view (RBV) theory of the firm widely acknowledges that capabilities that are unique and are important for achieving sustained competitive advantage. It has been argued in the manufacturing literature that manufacturing facilities, technology and policies are important to gain performance (Coates and McDermott (2002).

RBV theorists argue that firms enable themselves to improve their efficiency and effectiveness by using their own tangible and intangible resources (Peteraf, 1993). However, even if research on the RBV has scratched the surface of the maritime industry, there is lack of research for the container port industry and particularly for inland dry container

Container ports of individual countries have different levels of resources such as facilities, infrastructures, and operational systems (So and Kim (2014)). These resources may be indicators of ports, capabilities. Container ports using distinct resources may gain several advantages. As with any industry, competitive resources play an important role in the battle to gain and defend container traffic volume in the maritime industry. Container ports may use

various resources such as port infrastructure to acquire market share and gain customers and Kim (2014).

On using a tangible resource, some intangible resources may be found to be of importance to port operational capabilities. Specifically, intangible but important resources such as linear shipping connectivity, port infrastructures, operating efficiency, human capital, organizational capital and information capital may enhance operational performance of port industry MIN-HO HA (2017).

Container ports may use various tangible and intangible resources to enhance their performance. This activity may correspond to the role of firms, strategy in marketing territories. Performance usually depends on how a strategy may be utilized to increase container traffic volume, a key indicator for container ports, ability to survive and compete in the dynamic marketplace. In general, the object of a firm's strategy is to achieve performance that can be enhanced through generated competitive advantage (Nasser and Slater, 1990).

Based on the foregoing literature reviews, the determinants of port performance may be classified into internal and external factors and tangible or intangible factors. Among them, the researcher relies on the RBV as a good theoretical base for guiding the selection of the possible determinants of container port operation performance justifying the hypothesized relationships. According to RBV theorists, resources include assets, capabilities, organizational processes, information, knowledge, firm attributes, and are classified in terms of tangible and intangible resources (Barney, 1991).

Tangible resources can be imitated and acquired by competitors, while intangible resources are not easily imitated or acquired. This study discusses infrastructure and information capital (ICT) as a tangible resource for container ports and operating efficiency and human capital as intangible resources.

2.2.2. Dry Port Concepts

Many landlocked developing countries continuously face the challenge of physical isolation, supply chain related barriers from the sea and high costs of trading with the rest of the world (United Nations Economic Commission for Africa, 2011). In order to counter these challenges associated with landlockedness, the dry port concept evolved. It makes sense to start with defining dry port as Fig. 1 provides a diagram which is useful in explaining the concept.

The word dry port has been defined by many scholars and the definitions reflect the broad view of the concept from different perspectives. Important to note is that the definitions emanate from the perspective of the physical facility, function and purpose. The definitions were also born of the fact that the periodical steep rise in container flows resulted in crowded terminals, congestion and prolonged dwell time for containers. As a result to these problems at the main sea ports, the transoceanic vessels started to call at single hub port while feeder vessels, haulages, trucks and trains connected to many smaller inland or dry ports, (Baird A.J, 2002)

Roso, Woxenius and Lumsden (2009) defined dry port as:

An inland intermodal terminal directly connected to a seaport, with high capacity traffic modes, preferably rail, where customers can leave and/or collect their goods in intermodal loading units, as if directly to the seaport. Moreover the authors state that services such as transshipment, consolidation, depot, track and trace, maintenance of containers, and customs clearance should be available at dry ports.

Similarly, Trainaviciute, Lina, july (2009) defined dry port as:

An intermodal terminal situated in the hinterland servicing a region connected with one or several ports by rail and/or road transport and is offering specialized services between the Dry Port and the overseas destinations. Normally the Dry Port is containeroriented and supplies all logistics facilities, which are needed for shipping and forwarding agents in a port.

Academic research on dry ports has grown exponentially in recent years as exemplified by the special issues on dry ports in *Maritime Economics and Logistics* (vol. 14, 2012) and *Research in Transportation Economics* (vol. 33, 2011). The first mention of dry ports in academic literature goes back to 1980 (Munford, 1980). A United Nations text of 1982 provides an early definition of the dry port concept, an inland terminal to which shipping companies issue their own import bills of lading for import cargoes assuming full responsibility of costs and conditions and from which shipping companies issue their own bills of lading for export cargoes. In this paper researcher follow the definition of Roso (2005) and Roso et al. (2009): „a dry port is an inland intermodal terminal directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardized units as if directly to a seaport. This definition takes into account the fact that a

dry port does not only do the traditional role of transshipment as inland terminals but in addition to this role, it provides other services like; consolidation, storage (both full and empty containers), maintenance and repair of containers, and customs clearance.

Dry port functions include distribution, consolidation, storage, customs services, and possibly equipment maintenance (Wang and Wei 2008). In this context, the implementation of the dry port concept has not only support extensively expansion of container terminal capacity, but it has also impacted the relationships between seaports and the distribution network of the hinterland (Notteboom, 2008)

Containerization and global trade are conjoined twins indicating that one cannot live without the other. The ease with which containerization facilitates door to door delivery of cargo has facilitated the growth of global trade. The actual process of container transport is affected by simultaneous use of multimodal carriers combining sea/river going ships/barges and land based services such as trucks and trains (Bichou, 2004; Schoenherr, 2009). In view of consistently rising expectations of shippers/consignees for faster, efficient and low cost services, the logistics services providers had no alternative but innovate new concepts to improve their services while simultaneously endeavoring to lower costs.

Essentially, four functions take place at a dry port: transfer of cargo, mostly unitized, between two modes; the assembly of freight in preparation for its transfer; the storage of freight awaiting pickup; and delivery and the logistical control of flows (Slack, 1999). In this stage it becomes imperative to ponder upon the indicators of performance as well as the factors which influence such indicators.

Dry port operation is a commercial activity as such there can be no better indicator than the measure of real profit. But reliable and accurate figures and profit derived from dry port operations itself are usually business secret and publicly unavailable. Factors that can affect the performance of dry ports can be classified into two categories: tangible and intangible parameters. The tangible parameters of a dry port are size, container handling equipment (infrastructure), number of employees, rail connectivity to port, tariff etc. whereas the intangible parameters are organizational effectiveness, human capital, operating efficiency, service quality and synergetic/strategic relationships with other stake holders. It should also be noted that the influence of the different parameters on the performance indicator will vary from side to side. As such benchmarking dry port performance and

comparing one with another may lead to erroneous inferences. However benchmarking would be acceptable to compare performance of similar dry ports G., (2011).

In order to guarantee the sustainable development of the sector, private investments represent a core element nevertheless, to attract them, more convenient conditions have to be created. In particular, it is necessary to guarantee a level playing field, and competition (many services are still provided in monopoly), as well as to foster transparency and non discriminatory practices. Finally, port authorities are often limited in their ability to determine the level of dues, thus to impact on their resources and determine their operating income.

At the present time, according to stakeholder opinion, issues concerning the port service sector seem to be mainly focused on price, while quality is generally not such a relevant issue. Users are generally least satisfied with pilotage, cargo handling and passenger services. Shipping companies tend to be more severe in their evaluation of services than other stakeholders It is expected that port traffic will increase. Nevertheless, inefficiency would prevent industry players from internalizing the whole value added derived from increased demand.

With regard to intervention, this study considers a set of approaches, ranging from soft measures, such as guidelines through to structured measures, some of which might be regarded as imposing practices with a view to fostering competition. From an economic perspective (e.g. meeting future demand and quality, and development) a moderate approach is regarded as insufficient, as local interests would prevail over the overall need to improve the industry. Similarly, forced competition would be inefficient, due to increased high costs and benefits counterbalanced in case of local specificities that would not be considered. None of the considered policy options have a relevant social impact, as the increase in terms of jobs is an indirect and limited effect. The environmental concern, apart from being assessed on the basis of the presence of measures specifically aiming at reducing pollution, depends on modal shift. In this case, it is related to the economic factor, as the more the maritime sector becomes attractive to transport goods, the more it is expected to be preferred to other means. However, modal shift is in no case very relevant (2013).

2.2.3. The Role of Dry Ports in Economy

Results of the various reports from ports around the world clearly put forth the idea that ports are a vital part of a country's economy. The growth of ports will unerringly boost the country's economy. The growth and development of ports leads to greater activity, increased supply, greater foreign reserves and reduced prices for commodities as a whole. Improvement in the port infrastructure has shown very good reflections in the GDP in the cases discussed. Ports continue to play an important role in the economic status of a country, and their effectiveness can lead to significant economic benefits or failures (Dwarakish, and Muhammad, 2015).

Ports are very important for modern societies. They contribute in a positive way to industry, both for the port city and for society as a whole. This is reflected in the GDP and the added value created by ports (Wang, 2014; Merk and Notteboom, 2013). We can distinguish several economic impacts of ports, for instance, port-related value added growth, port-related employment growth, port-related labor productivity, moderate economic impact with relatively large spillover effects, etc. (Merk and Notteboom, 2013). By playing a key role in facilitating trade and specialization of economic activities, the performance of ports is pivotal to regional economic development (de Langen & Haezendonck, 2012).

The prospects for dry ports remain positive with large continental markets like North America and Europe relying on a network of satellite terminals and load centers as a

fundamental structure to support hinterland freight movements, particularly their massification. This entailed the emergence of extended gates and extended forms of supply chain management in which inland terminals play an active role. As the pressure on port regions increases in terms of freight flows passing through them and associated environmental effects, dry ports will be even more important in maintaining efficient and sustainable commodity chains. It can also be expected that resources will play a great role within containerized trade with inland terminals, again underlining unique regional characteristics. This implies a set of repositioning strategies where inland terminals play a fundamental role either to improve the efficiency of this repositioning by providing better cargo rotation opportunities, or by acting as an agent that can help promote containerized exports (Paul and Notteboom, 2012).

Dry ports play a very important role in the African maritime industry because there are many landlocked countries in Africa and the establishment of dry ports is crucial to inland regions (Arvis et al., 2010). „Forward Ports, is a general term given to African dry ports because most of the dry ports act as cargo delivery stations with high speed and security. These forward ports not only execute the role of intermodal terminal but also balance the traffic between rail and road transportation, providing customs and border management services (Ahamed, 2010).

The function of dry ports as a modal shift or a transition interface terminal contributes to cooperative freight distribution networks and has a significant effect on the environment, social and economic benefits, reducing congestion as well as improving competitiveness in the supply chain (Wisetjindawat et al., 2007). However, Raballand et al. (2008) indicated that many dry ports are not well operated because of insufficient logistics infrastructure and inefficient services to the customers, which have led to poor connectivity to seaports and delays in container clearance.

ESCAP, (2015), recent fact-finding missions to five member countries of the UNESCAP region have identified a number of significant issues and policies which are considered to affect the establishment, development and sustained operation of ports and related intermodal freight terminals throughout the region. Among the issues and policies, with an influence on dry port development, are:

- (I) Function and location issues with dry ports being seen to have a main function of supporting the movement of international trade between inland origins or destinations and seaports, for which purpose they need to be located within, or close to, the sources of trade and accessible by rail to the seaports;
- (II) Ownership issues Private ownership of dry ports is not necessarily a precondition for their sustainability, but they could benefit from an infusion of private sector logistics expertise plus private and public capital injection in the form of a PPP (Public Private Partnership) contract;
- (III) Dry port development incentives Governments can encourage the establishment of dry ports through a range of incentives designed to attract private sector investment, specifically through the provision of low cost land and tax holidays or waivers

Among the issues and policies, with an influence on the sustainability of dry port operations are:

- (I) Reform of customs and other border control procedures which can result in the reduction of delays to trade consignments and accelerate the turnaround of containers in terminals, with a commensurate reduction in their unit operating costs and an improvement of their profitability;
- (II) Measures to minimize total logistics cost Policy interventions are necessary to ensure least cost intermodal solutions to container and cargo haulage between trade sources and seaports. In particular, planning of terminal development and regulation of road vehicle dimensions and weights should be focused on the optimum use of road for local delivery and rail for line-haul transport of containers and cargo. This will be necessary, in order to ensure that terminal and transport operations are both financially and environmentally sustainable.
- (III) Offers of tariff incentives to encourage the adoption of modern cargo handling technology, specifically involving the palletization of cargo, which by speeding up the turnarounds of containers and cargo, will add to the profitability of CFS operations in dry ports and will contribute to the minimization of total logistics cost. ESCAP, (2015)

2.2.4. Ports in East Africa

Mombasa and Dares Salaam Sea ports found in Kenya and Tanzania respectively are the current gateways to East Africa from the Indian Ocean, although a third Sea port in Lamu

(Kenya) is under construction by China Communications construction Company in a deal worth \$478.9 million to directly link the coast, Kenya, Ethiopia and Southern Sudan. Traditionally, dry ports development and expansion was linked to economic growth and increase in volume of trade. The growth in the volume of trade turned such regions or places into the centers of attraction (Grishi, 2010). Continuous rise in trade resulted in a rapid rise in demand for port services of which failure to meet capacity needs created inefficiency and operational bottlenecks. Challenges to expansion in original sea ports included limited land or high cost of land, together with the high cost of relocating people and compensations for the destroyed property to pave way for port expansion. Many nations beginning with the most developed and industrialized established dry ports as a solution.

2.2.5. Dry port in Ethiopia

In Ethiopia, currently there are around six operating dry ports namely; Modjo port and terminal, Kaliti dry port and terminal, Dire Dawa dry port, Mekelle dry port, Kombolcha dry port and Semera dry ports. Again there are two dry ports under construction namely, Adan and Hawassa dry ports.

The containers with imported cargo to Addis Ababa are inspected by customs and other agencies at Modjo Dry port if traveling under the multimodal system (72% of total multimodal imports) and at Kaliti Dry port if traveling under the unimodal system (70% of total unimodal imports).

Modjo is the major bottleneck in the supply chains serving imports of containerized cargo. It introduces long delays, significant uncertainties and unnecessary costs due to the confluence of:

- Underinvestment in facilities and equipment
- Poor operational procedures and control
- Insufficient yard management systems
- Cumbersome customs procedures and
- Failure to relocate abandoned and long term boxes

ESLSE has already tackled some of these issues but it remains to be seen if those activities produce the desired results. The major cause of delays is the presence of two types of users at the Dry Port. Those whose interest is in having their cargo released as soon as possible and

those (traders) who want to store their cargo cheaply at the dry port they search for customers

The average dwell time of 44 days masks the fact that some are cleared in 3 to 5 days, while others are held for over 140 days (and perhaps should be abandoned at that time).

These long held containers take up space at the container yard, increase the number of containers per stack, and increase the number of moves to get to a container. A Modjo capacity model was prepared to estimate the impact of delays on the yard capacity (UNDP (2017))

Governments in developing countries depend heavily on trade to generate hard currency, and finance their investments on infrastructure and production sectors. As a result, they have been increasingly focusing on the competitiveness of their exports and reducing the cost of imports (UNDP (2017)).

2.3. Sustainability Concepts

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. We distinguish between three types of sustainability: economic, environmental, and social. To be sustainable, an organization should fulfill a minimum performance in each of these three dimensions (Vejvar, Lai, Lo, and Furst, 2017).

Port development or sustainable development in port operations means „business strategies and activities, in order to accommodate the current and future needs of the ports (Cheon and Deakin, 2010) And „sustainability practice, in port operations is considered as a strategic/operative practice that means the simultaneous pursuits of economic prosperity, environmental quality, social responsibility and operational viability (Dinwoodie et al., 2012; Cheon and Deakin, 2010).

The sustainability discourse has significantly matured in both transportation research and practice (Carter and Easton, 2011; Vejvar et al., 2016). While there is a variety of definitions for sustainability practices available in the transportation literature (Seuring and Müller, 2008), there is a consensus that sustainable development includes a maximum economic, environmental, and social performance (Carter and Rogers, 2008; Linton et al., 2007). Due to the intrinsic aim of for-profit companies to turn a profit, the economic dimension of

sustainability is usually at the centre of any ports, strategy. In this regard, ports in general tend to focus on operational efficiency (Clark et al., 2004; Cullinane et al., 2005; Tongzon, 2001).

2.4. Empirical Review: Relationship between Variables from RBV

2.4.1. Port Infrastructure and Operational Performance

Nyeme S., 2014 conducted research on factors influencing container terminal efficiency in Kenya Mombasa, and the study shows that, infrastructure both physical (hard infrastructure) and soft (Management of port operations) inversely influence container terminal efficiency. He added that, infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep container connectivity for economies heavily dependent on international trade. According to his study factors like limited yard capacity to store container before collection and congestion problem due to over capacity are factors associated with infrastructure.

Hales, Douglas N. et al (2016) conducted research titled "An Empirical Test of a Balanced Theory of Port Competitiveness". Their study shows that as infrastructure becomes congested, port fees rose, service levels dropped, and port facilities expanded.

As part of a study on dry ports, Gujar G., (2011) conducted study titled *Essays on Dry Ports*. His study shows that as port infrastructure usually container handling equipments are viewed as the main machines for dry ports as well as seaports, and they can greatly influence both the container handling capacities and, in turn, the performance of the dry port.

Ojala R., (2015) conducted the study titled *The World Bank's Logistics Performance Index (LPI) and drivers of logistics performance* and presented on international transport forum in Finland. His study shows that capacity management plays vital role for infrastructure efficiency. As he found most of the transport facilities operate with low utilization rates, yet suffer from capacity constraints in peak periods due to high variability of demand. He recommended that flexible transport systems, better resource allocation, and higher utilization of existing physical infrastructure provide less costly and more efficient improvement opportunities than capacity extension and a superior transport infrastructure supports intermodal transport systems, including access roads to terminals and seaport channels.

The work of Ojala R., (2015) supported the work of Haughwout (2001), which shows that transport infrastructure has a significant impact on the productivity and the cost structure of businesses. For example, better port and hinterland connections may reduce the expenditure required for construction of distribution networks or transport of raw materials

Supporting them, an Empirical study by Saidi (2011) shows that foreign direct investment (FDI) is attracted to areas with efficient transportation systems. For this reason, an effective and efficient logistics system is the cornerstone of a prosperous economy in attracting foreign investment. Based on the above discussion:

H1: Port infrastructures positively and significantly influence operational performance in Modjo dry port operations

2.4.2. Port operating efficiency and operational performance

Efficiency often means speed and reliability of port services. UNCTAD (1992) cited on-time delivery, as a major concern by most shippers, in fast paced industries where products must be moved to the markets on time. Terminal operators as vital nodes in the logistics chain must be in a position to guarantee shippers a very reliable and quick service. Port efficiency reflects also the turnaround time of ships and cargo dwelling (Tongzon, 2002).

Operational efficiency in port operations is the key factor required to be a logistics hub (Tongzon, 2004). As faster turnaround time with the port is critical for port operations, a higher level of efficiency invites more port users to use a port as their port of call (Yeo et al., 2011; Tongzon, 2004). Besides, efficiency of inland transport and hinterland connection has become a critical factor in a port's potential future to evaluate port competitiveness (Rodrigue and Notteboom, 2009).

In the present market circumstances, efficiency can be an important alternative to improving port operational performance and competitiveness. Container port operational efficiency is an essential component of frequent liner shipping links with the rest of the world (Asteris et al., 2012). No container port enjoys dominant freedom over the handling of cargoes; instead, ports must compete for cargoes. In such a competitive environment, efficient management of container ports is crucial. Therefore, the competitiveness of a container port depends on the level of operating efficiency. Yeun et al. (2013) argued that internal interport competition might enhance container terminal efficiency (Yeun et al., 2013). Additionally, Tongzon (2009) noted that port choice is closely associated with its level of efficiency.

Florin N, Martin R, Alexander C, and Flip N (2015) stated that the main consequences of a low port performance will be a speed reduction in operating the vessel and an increased residence time of the vessel at berth. This increase the cost per ton of handled cargo, since operating costs are distributed over a smaller amount of cargo handled per unit time. A higher handling cost will be generated by the other partners involved in port activity: ship owner (for the higher cost of operating the vessel), cargo shippers and receivers (for higher costs associated to dockside handling, transportation or storage). Another consequence of lower operating speed is additional stationing of the ship in port; as a result, increase of voyage costs will be recovered by ship owners through higher freight. Finally, poor port performance will be reflected in higher cost of naval transport and products, and all the consequences will be supported by consumers. In these circumstances, consumers can redirect to other products, in which case producers will be forced to reduce their profits or most frequently, to shift towards more efficient routes (Florin N, et al(2015))

If the operating speed of the ship is so low that the port cannot handle the entire amount of cargo that need to be transferred, port congestion occurs with dramatic consequences on port activity and increases substantially and unreasonably total voyage costs, forcing ship to increase freight rates when operating on that port (Florin N, et al (2015)) This concept is similar for inland ports

Suarez, Morales, Serebrisky and Trijillo (2016) show that ports in the developing world have varying levels of productivity and efficiency, regardless of the region or country in which they are located. Thus, ports in the developing world, and within countries themselves, should not be considered as homogenous units of production. Public policies at a country level, although positive, may not be the best alternative for improving port efficiency. Instead, understanding the market conditions and detailed conditions at a port level could lead to a better performance. Moreover, greater efficiency, which translates into higher productivity, is not directly linked to a single characteristic. We believe that a more thorough examination of the determinants of efficiency especially by introducing variables related to port management and governance is necessary to provide further policy recommendations. That said, the results of this paper provide evidence that some variables have sizable effects on ports technical efficiency: private sector participation in ports, the reduction of corruption in the public sector, and improvements in internal process improvement, ports can achieve greater efficiencies in their operations, which have a win-win relationship in

terms of performance incorporating economic and environmental aspects (Suarez et al 2016; Kim 2014)

Various practices, which improves operational efficiency, include automation system, efficient use of the port area, optimizing the routing of vehicles (modal shift), and provision of facilities for companies to maximize their performance. Moreover, from integration processes such as IT or system, processes and procedures can be simplified (e.g. electronic data interchange, IT integration, joint planning, supply chain integration, and integrated ICT and joint ventures). Benefits related to ports, operational efficiency through internal process improvement include efficient use of resources and energy, saving from optimizing the routing of vehicles and waste reduction (Suarez et al 2016; Kim 2014)

As more stated by Florin N, et al (2015) reasons for poor port performance are time lost due to interruptions in operation, poor utilization of provided equipment, week stacking and handling practices, insufficient training activity and / or its poor organization

Although poor performance and port congestion is due mostly to poor organization of cargo handling activities and inefficient use of available resources, the ports tend to eliminate the congestions by investing in additional berths or new facilities. This will result in a temporary reduction in congestion without thereby eliminate the real cause of poor performance. The costs of such a large investment will be covered by increased port fees and charges, negatively influencing once more transport and products (Florin N, et al (2015).

Based on the above discussion

H2: Port operation efficiency positively and significantly influence operational performance in Modjo dry port operations

2.4.3. Port Human Capital and Operational Performance

According to Fernandez et al. (2000), intangible resources basically consist of soft resources like knowledge or information. Those characteristics can be found in the concept of port service quality and are applicable to port operational performance. Several studies of resource-based approach referred to the human knowledge that increases their professional qualifications or productivity were reviewed, which is called human capital or human resources in the RBV.

This indicator measures the strength of human resources, whether employees have the right level of skills to perform their jobs. According to Becker (1964), human capital resources include the training, experience, judgment, intelligence, relationships and insight of individual managers and workers in a company (Barney, 1991). There is a need for reliable human resources (HRs) that cannot be easily imitated by competitors (Marlow and Paixão Casaca, 2003).

Employees who have the right skills, talent and knowledge contribute the most to enhancing the organization's internal processes and performance (Kaplan and Norton (2004). Marlow and Paixão Casaca (2003) also emphasized that the port needs investment in intangible assets such as human resources in order to respond to the volatile demands caused by market uncertainty. In other words, the skills and capabilities of human capital can be improved through training and education.

In this respect, Ha (2003) mentioned port's labour performance and port workers, foreign language skills as important port operation and service quality aspects. Similarly, port employees, responsiveness, knowledge and skill (Pantouvakis et al, 2008), labour force's quality (Celik et al. 2009), employees, high qualification/skill level (Kolanovi 2011) and professionalism of staff (Lu et al. 2011) were also mentioned respectively. The above mentioned factors are deeply involved in human knowledge or skills, so it can be classified as human resource.

Thai (2015) highlighted that the ability of the port's staff to demonstrate professional attitude and behavior in meeting customers' requirements, respond quickly to their enquiries and requests, and possess good knowledge of their needs constitutes an important component of operational performance. Pantouvakis et al. (2008) also emphasized the importance of port's high quality services to the customers and acceptance of passengers, specific needs and personal requirements. Kolanovi et al. (2011) affirmed about the value of informing and listening to customers and the willingness to negotiate with customers was also highlighted by Lu et al. (2011). These papers extensively addressed human capital as a key factor of port operational performance.

H3: Port human capital positively and significantly influence operational performance in Modjo dry port operations

2.4.4. Port Information Capital and Operational Performance

The RBV also appreciates the importance of innovation techniques and technology and it is classified as technology capital or technology resources by many studies (Teece et al. 1997; Powell et al. 1997; Fernández et al. 2000). In this connection, it was found that the level of ICT applications in port operations and management is an important element of port service quality (Thai 2015). Discussing port operation service quality, Ha (2003) also argued that establishing EDI system and provision of cargo tracking system are efficient way to improve port operational quality

This indicator measures how adequate the IT portfolio of infrastructure and applications supports the internal processes (Zhang, 2010). The infrastructure consists of hardware (i.e. central servers and communication networks) and managerial expertise (i.e. standards, disaster planning and security), whilst the applications comprise transaction processing application (i.e. ERP system) and analytic applications for promoting analysis, interpretation and sharing of information and knowledge.

Kaplan and Norton (2004) tested empirically on the performance effect of IT investments in manufacturing firms. They found, in particular, heavy transactional IT investment is significantly and consistently associated with strong firm performance (sales growth, return on assets and labour productivity).

Weill (1992) discussed the moderating role of IT (information efficiencies and information synergies) in the relationship between organizational characteristics (structure, size, learning, culture and interorganizational relationships) and organizational outcomes (organizational efficiency and organizational innovation).

Dewett and Jones (2001) investigated the relationship both between IT investment and firm performance and between quality of data and firm performance. They found the companies that manage quality of data show a better performance than the companies that do not.

Sheng and Mykytyn Jr (2002) analyzed IT effects on firm performance and found statistically significant relationship between the IT usage index and the firm performance index. The index he used for IT usage is IT in communication, IT in production and operations, IT in decision support and IT in administration and pecuniary affairs

H4: Port information capital positively and significantly influence operational performance in Modjo dry port operations

2.5. Port Sustainability Practices and Operational Performance

Lun (2011) conducted research on Green management practices (GMP) and performance: A case of container terminal operations. Overall, his study provided an insight into an emerging field of the relationships between sustainability and operational practices and firm performance. He found that (1) adoption of GMP seems to have a win-win relationship in terms of economic and environmental and performance, (2) cooperation with supply chain partners and environmentally friendly operations quality management are key elements of GMP, and (3) internal management support is important for firms to adopt GMP.

Vejvar et al. (2017) explores sustainability practice adoption in inland port operations. They postulated that while inland ports have an intrinsic need for economic viability in their operations, they are increasingly regarding the environmental and social impact of their business. Indeed, there is evidence that profitability and operational efficiency are focal issues of inland ports, and all ports in their data sample show an above average commitment to social sustainability. Ports seem to be aware of their roles as employers, regional suppliers and economic drivers, and seek good relations and regular exchanges with stakeholders as part of their core business strategy.

Improved environmental performance is a potential source of competitive advantage leading to more efficient processes, improvements in productivity, low costs of compliance and new market opportunities (Porter and van der Linde, 1995; Porter, 1991)

Kim and Chiang (2014), conducted research on „Sustainability Practices to Achieve Sustainability in International Port Operations Sustainability, and found that, port sustainability is a broad concept involving economic, social and environmental issues in port operational and managerial processes. Their results revealed that, as a strategic practice to improve their internal business processes, sustainability practices necessitate the simultaneous pursuit of container traffic growth, low environmental impacts and corporate responsible image making, operational efficiency, efficiency of the use of the port area and sustainable growth. From thematic analysis by Kim and Chang (2014) and other related literatures, the relevant port sustainability practices were clustered into four dimensions incorporating environmental technologies, continual monitoring and upgrading, internal process improvement, and cooperation and communication

2.5.1. Environmental Technologies

Environmental technologies incorporate equipment, methods and procedures, and mechanisms that improve energy, cost, and resource efficiency (Shrivastava, 1995). In the shipping and ports industry, green port practices can be considered as new process innovation, in that innovation means significant changes that embody a new idea that is not consistent with the current concept of port business and aimed at shaping changes in the external environment. Greve and Taylor (2000) stated these innovative processes as a catalyst for organizational change. Moreover, Porter and van der Linde (1995) argued that process innovation leads to a more effective value chain for organizations implying resource productivity, abiding by environmental law and regulations. These corresponding improvements make companies more competitive and sustainable, reducing the negative effect on the natural environment.

Environmental technologies in port operations embraces the relevant issues: upgrading port facilities and equipment to cut operation costs, sustainable building construction in a port and hinterland, enhancing long-term viability of operation through using renewable and alternative energy sources, and expansion of the coastal region (Kim, 2014)

2.5.2. Operational Efficiency Through Internal Process Improvement

Through internal process improvement, ports can achieve greater efficiencies in their operations, which have a win-win relationship in terms of performance incorporating economic and environmental aspects. Various practices, which improve operational efficiency, include automation system, efficient use of the port area, optimizing the routing of vehicles (modal shift), and provision of facilities for companies to maximize their performance. Moreover, from integration processes such as IT or system, processes and procedures can be simplified (e.g. electronic data interchange, IT integration, joint planning, supply chain integration, and integrated ICT and joint ventures). Benefits related to ports, operational efficiency through internal process improvement include efficient use of resources and energy, cost saving from optimizing the routing of vehicles and waste reduction (Kim, 2014)

2.5.3. Continual Monitoring And Improvement

Sustainability practice in a port means a continual process improvement paradigm engaged in port activities. Ports need to effectively respond to stakeholder concerns and to

communicate the result achieved because ports must constantly innovative solutions to respond to pressures from competitors, customers, regulators (Dinwoodie et al., 2012). Therefore, the role of a port also includes continual monitoring and improvement for existing and new facilities, and measuring and reporting on continuous improvement in port operations. As argued by Dinwoodie et al., (2012), an accessible generic business process framework can mitigate potential risks in port operations, which improve ports, reliability alongside risk reduction, be eco-friendly and create a socially responsible image.

From an operational perspective, potential benefits include service quality improvement and service differentiation. In addition, continual training and education of all sorts of internal stakeholders including employees, tenants, and managers helps to gain the potential benefits of providing a specific port sustainability strategy through improving environmental awareness, knowledge, skills and motivations towards the eco-friendly management (Kim, 2014)

2.5.4. Cooperation and Communication

The increased stakeholder pressures significantly affect the adoption of sustainability practices (Sarkisa et al., 2010). In order to respond to the increased pressures of all sorts of stakeholders including competitors, customers, regulators, port authorities and other stakeholders including industry governments, and commodity groups should actively coordinate and cooperate with each other (Dinwoodie et al., 2012). Active engagement and communication with each other are not only crucial to carry out a sustainable model of seaports through better understanding of mutual benefits, but also promote continual improvement in cooperative practices in a port (Cheon and Deakin, 2010).

Satisfaction of stakeholders, operational transparency, exchange of information and knowledge, active employee participation, and incentives are categorized under distributive (Kim 2014).

Chin, Kuo, and Chi (2016) identified crucial sustainability criteria and examine sustainability assessment dimensions in the context of container port. Results revealed that social issues with respect to employee job security and safety ranked the most important sustainable assessment criterion, followed by considering environmental protection when handling cargo, facilitating to economic activities, port traffic accidents prevention and ensuring cargo handled safely and effectively. Chin, Kuo, and Chi (2016) also identified four sustainability

assessment factors which are identified as environmental material, economic issue, environmental practices and social concerns. Based on the above arguments it can be hypothesized that

H5: Implementing sustainability practices in dry port can positively mediate the relationship between port resources and port operation performance

2.4. Performance measures

Operational performance refers to how well an organization achieves its business goals including financial and non-financial aspects (Lu et al., 2009). In Today's complex and competitive environment, container terminals need to measure, monitor, control, and improve the performance of the container terminals in order to sustain and increase competitiveness Hari, Vijaya, Ashok, and Sudheer (2015).

In the spirit of what gets measured gets managed, Several port performance indicators have been used with the aim of improving port operations and providing useful information for port development planning and strategy. Talley (2006) defines these indicators as choice variables^ i.e., variables that can be controlled by port management for optimizing economic objectives. These indicators may assess port operations from different viewpoints (UNCTAD, 1976). Some examples of the broad taxonomy used to measure performance include efficiency, productivity, utilization, and effectiveness indicators.

Performance measurement of container terminals is considered a criteria decision making problem as the performance of container terminals depends on multiple criteria (Hari et al 2015). Jing Lu et al. (2010) evaluated container terminal service attributes through statistical methods such as Inter-Consistency Reliability, Factor Analysis and cluster analysis. The study identified five most important container terminal service attributes (Custom declaration efficiency, Loading and discharging efficiency Reliability of the agreed vessel sailing time, Berth availability and Port tariff).

Chang et al (2008) performed exploratory factor and confirmatory factor analysis and identified five port choice categories, i.e. port charge; physical/operational ability of port; advancement/convenience of port; marketability; operational condition of shipping line affecting the choice of port by the shipping companies.

Ines Kolanovic (2008) determined port service quality attributes using exploratory factor analysis was used and the convergent and discriminatory validity of the factors have been additionally tested by using the confirmatory factor analysis. Hwang and Chiang (2010) explored causal relationships between types of port, influential factors and port competitiveness. Chiang and Hwang (2010) explored causal relationships between influential factors, types of port cooperation, integration of ports and the overall competitiveness of ports in a region using factor analysis and structure equation modeling.

Fraj-Andres et al. (2009) categorized performance measures into operational performance (e.g. cost efficiency), commercial performance (e.g. corporate reputation), and economic performance (e.g. sales growth).

Green et al. (2008) surveyed 142 managers who operated supply chains in the U.S. and focused on logistics performance (delivery speed, delivery dependability, responsiveness, delivery flexibility, and order filling capacity), marketing performance (return on investment, profits, profit growth, return on sales), and financial performance (market share growth, sales volume growth, and sales growth).

As discussed earlier, this paper aims to evaluate dry port resources and sustainability practice as determinants of port operational performance (OP) which is vital to its existence in a long-term perspective rather than the short-term objectives of port operations. As Modjo port and terminal is becoming the central logistics hub in Ethiopia, and dry port is an integral part of supply chain, the researcher used logistics performance measures to measure port operational performance which include delivery speed, delivery dependability, delivery flexibility, quality of operation and service costs. A Structural Equation Modeling (SEM) methodology was developed to validate the developed hypotheses.

2.4. Summary of Literature Review and Conceptual Frame Work of the Study

The aim of this research is to investigate the effects of port resources on operational performance and to explain the mediating role of sustainability practices between port resources and operational performance in Modjo dry port operation in Ethiopia.

In the through literature the concepts of dry port determinants from RBV approach were discussed as port infrastructure, port operating efficiency, port human capital and port information capital. port sustainability practices is also discussed from four attributes; environmental technology,

process improvement, continuous monitoring and cooperation and communication. As indicated in both theoretical and empirical part of literatures these variables are found to have direct and indirect effect (through sustainability practices) on port operational performance

The overall review of literature shows that research in inland port and dry ports are still lagging behind especially in Africa. These conducted also didn't show the exact relationship between port resources, sustainability practices and operational performance. The concept of port sustainability practices is the new burning concept being applied in almost all ports across the world recently. The available literatures are mostly on sea ports and overlooked inland/dry ports. Some few available on inland port also hardly focus on environmental aspects of port operation and do not show the effect of operational sustainability on performance

As the researcher didn't find publicized literature on issue under investigation at Modjo dry port and Ethiopian ports, different documents were collected from print, capital news, business news and analyzed. These documents and news shows that Modjo dry port is inefficient in ensuring continuous port operation in Ethiopia. The reasons behind inefficiency are underinvestment in infrastructural facilities, insufficient information and human capital, poor service quality, high service charge, increased congestion around the facility and lengthy of custom clearing procedures which introduces long delays, significant uncertainties and unnecessary to port users

As a critical solution for these problems and improve operational performance, the researcher summarized literature concepts as follows. The better the operating efficiency of the dry port equipment and staff, the more customers the terminal can attract and the more customers will place handling orders. More handling orders result in an increase of the storage usage rate which also induces a greater order fulfillment rate. The higher the order fulfillment rate, the higher the available capital on the terminal and the greater the resources budget. A greater resources budget allows the management for more staff training to increase equipment exploitation which again results in an increase of operating efficiency. An increase in the operating efficiency induces extra handling orders which generates more gains and further allow for more staff training and better equipment exploitation. As a result, an increase in the operating efficiency through port resource budget has a reinforcing impact on the port sustainable performance

Therefore, given the scarcity of prior studies, whether the attributes identified from literature are applicable to Ethiopian dry ports is critical for empirical investigation which validates and generalizes the findings in this research. Based on the previous studies conducted on sea ports in another parts of the world the researcher adopted conceptual framework for this study, which is depicted as follows:

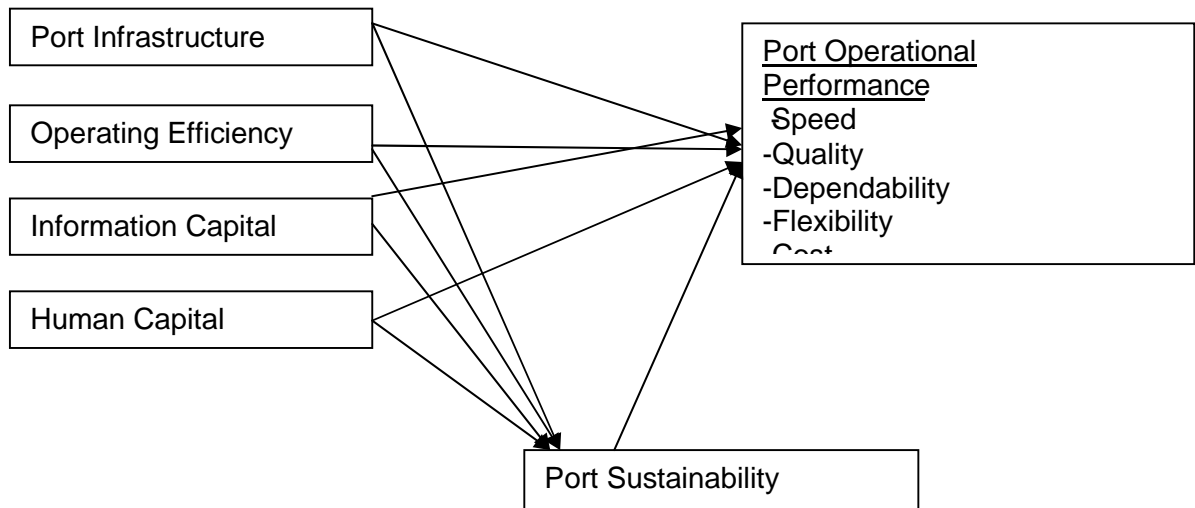


Fig.1 Conceptual Framework of The Study

CHAPTER THREE

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

Following the development of the conceptual research model and hypotheses in chapter two, in this chapter the research design and methodology that were applied for validating the model and testing the proposed hypotheses are further elaborated. Research design, methodology, and methods are the three important conceptual terms, which are often used interchangeably and confusingly. So it seems appropriate at this juncture to explain the difference between research design, research methods, and research methodology by researcher to have a common understanding about what these terms are mean and how they differ from one another to avoid confusion in describing research.

Plan your work and work your plan is the suggestion of Napoleon Hill. For a scientific research one has to prepare a research design. A research design is a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately and economically (Kumar, 2011). As further defined by Kelinger (1986), A research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems.

As explained by (Kothari, 2004) decisions regarding what, where, when, how much, by what means concerning an inquiry or a research project constitute a research design. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data.

A faulty design results in misleading findings and is tantamount to wasting human and financial resources (Kumar, 2011). In scientific circles, the strength of an empirical investigation is primarily evaluated in the light of the research design adopted. Therefore, when selecting a research design it is important to ensure that it is valid, workable and manageable (Kumar, 2011).

Research methods may be understood as all those methods/techniques that are used for conduction of research (Kothari, 2004). Research methods are specific strategies and procedure for implementing the research design, including sampling, data collection, data analysis, and interpretation of findings. Specific research methods are determined by the overall methodological orientation of the researchers (Kothari, 2004).

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them (Kothari, 2004). Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology (Rajasekar, 2013). As defined by Leedy & Ormrod (2001) Research methodology is the general approach the researcher takes in carrying out the research project. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research.

By summary to broaden the concept of research design and methodology, this chapter was organized as follows: first, the researcher discussed about the overall research design in which the chosen sequential explanatory mixed design is elaborated in terms of the research philosophy (paradigm), research approach, and research strategy with rationale and justification behind selection of each design. Second, data collection techniques that were used in the study are highly structured, under which both cross-sectional sample survey through standardized questionnaire for quantitative data source and depth interview via semi-structured interview procedures for qualitative data were discussed with justification. Third, the data analyzation techniques that were used for analyzing both types of quantitative data are discussed. Fourth, the issues of validity and reliability for instrument developed were discussed.

3.2. Research Design

Based on the previous discussion about the difference between three conceptual terms a research design for the current study is stated as follows. Van B., (2015) stated that, the research design also reflects the purpose of the inquiry, which can be characterized as one or more of the following: Exploration, Description, Explanation, Prediction, Evaluation and History. Similarly Zikmund, (2003) stated that based on their function or purpose, business research studies can be classified as exploratory, descriptive, or causal.

An exploratory study is defined as „an initial research conducted to clarify and define the nature of a problem, whereas a descriptive study is a „research that is designed to describe the characteristics of a population or phenomenon. Zikmund, (2003). He added that the third type of study is causal or explanatory research which is undertaken to identify cause and effect relationships between variables

For the purposes of this study, the researcher used a mixed research, which involves the combination of descriptive, explanatory and exploratory. Because as the purpose of this study is to explain the relationship between port resource and port operational performance and to detect the role that sustainability might play in mediating the relationship between independent and dependent variables this research is explanatory/causal in nature. In addition to this exploratory design was used to validate and support these relationships through an in depth exploration using typical experience of the participants through interview. Moreover descriptive research design was also used to describe the respondents demographic characteristics.

The reason behind choosing a mixed method design in this research is that a mixed methods design is useful when either the quantitative or qualitative approach by itself is inadequate to best understand a research problem or the strengths of both quantitative and qualitative research can provide the best understanding (Creswell, 2009). Consequently, the current problem under investigations justifies the use of mixed research methods in this study as either the approach alone can't answer the research questions regarding the effects of port resources on port operation performance and the role of sustainability practices in mediating the relationship between dry port resources and operation performance.

3.3. A Research Paradigm (Philosophy)

Morgan (2007), conceptualizes research paradigms as „Systems of beliefs and practices that influence how researchers select both the questions they study and methods that they use to study them“ or it is a „shared belief systems that determine the kinds of knowledge researchers seek and how they interpret the evidence they collect,. A research paradigm guides how research should be conducted, based on people,s philosophies and their assumptions about the world and the nature of knowledge asserted by, Collis and Hussey (2009). Therefore, research paradigms can be seen as a basic set of assumptions that guide researchers to ground their research.

As a basic set of belief that guides research, Wilson, (2001), focused on four aspects that combine to make up a research paradigm (i.e., Ontology, Epistemology, Axiology and Methodology). First, Ontology or a belief in the nature of reality is your way of thinking, what you believe is real in the world. Second, Epistemology is how you think about that reality. Third, when we talk about research Methodology, we are talking about how you are going to use your way of thinking (your Epistemology) to gain more wisdom about your reality.

Finally, a paradigm includes Axiology, which is a set of morals or a set of ethics Wilson, (2001).

As stated by Saunders et al., 2012, there are three general philosophical paradigms explaining social phenomena in business and management research, and they are labeled positivism, interpretivism (constructivism), and pragmatism.

According to the positivist epistemology, science is seen as the way to get at truth, to understand the world well enough so that it might be predicted and controlled. The world and the universe are deterministic; they operate by laws of cause and effect that are discernable if we apply the unique approach of the scientific method Eric, (2005) positivistic approach is concerned with positive facts and not based on speculation on ultimate causes or origins (Astley, 1985; Bettis, 1990; Deetz, 1996). Positivistic research is based on three principles: 1) finding facts; 2) documenting facts; and 3) the use of scientific methods (Wicks and Freeman, 1998).

Interpretivist researchers believe that the social world can only be understood from the standpoint of the individuals who are part of the ongoing action being investigated (Cohen et al, 2003). According to Willis (2007), interpretivism usually seeks to understand a particular context, and the core belief of the interpretive paradigm is that reality is socially constructed. Denzin and Lincoln (2008) stated that Interpretivist methodology aims at exploring and understanding phenomenon inductively.

Quantitative research typically deals with numerical data and exhibits a view of the casual relationship between variables while qualitative research generally entails numerical data for studying participants, meaning and relationships between them (Saunders et al., 2012; Bryman and Bell, 2011). This shows, quantitative research is generally associated with positivism and a deductive approach while qualitative research is connected with an interpretivist philosophy and inductive approach which focuses on the details of a situation (Saunders et al., 2012). However, Johnson and Onwuegbuzie, (2004) proposed that mixed methods could bridge the gap between the quantitative and qualitative positions.

Pragmatism admits that the mixed or multiple methods including both quantitative and qualitative data is possible and appropriate to provide more comprehensive evidence and strength within one study rather than adopting one method (Saunders et al., 2012), within a newly emerging paradigm of pragmatism (that stresses the importance of shared

interactions), it was made possible to use both methodologies, where mixed, combined or integrated methods could be executed in a sequential or a concurrent manner, thus addressing complex and multifaceted research problems in a ~~dynamic~~ ~~dynamic~~ manner (Howe, 1988). This should potentially allow a more complete understanding of research problems (Creswell and Plano Clark, 2007).

In reflection of the above concepts, this study is considered as pragmatic, in which both quantitative and qualitative data are necessary to achieve the objectives of the research. Consequently, the philosophy of pragmatism has underpinned the researcher's choice of a combined method in this study. The details for the combined method are further discussed in the following section.

3.4. Research Approach

There are generally two main research approaches which correspond to research philosophies: deductive and inductive research (Brayman and Bell, 2011; Creswell, 2009). In support of this Aqil M., (2008) stated that, in research we often refer to the two broad methods of reasoning as the deductive and inductive approaches.

In Aqil M. (2008) lecture note, Deductive reasoning works from the more general to the more specific which starts with theory, followed by hypothesis, ~~observation~~ ~~observation~~ and confirmation or Sometimes this is informally called a "top down" approach, by which Conclusion follows logically from premises (available facts). On other hand he stated that, Inductive reasoning works the other way, moving from specific observations to broader generalizations and theories which start with observation followed by pattern, tentative hypothesis, and then theory. Informally we sometimes call this a "bottom up" approach by which conclusion is likely based on premises Aqil M. Burney(2008).

Supporting the above idea, Wilson, (2010) argued that the deductive approach constitutes developing of an assumption based on the existing theories and forming a research plan to test the assumption. Beiske (2007) suggests that the deductive research ~~studies~~ ~~studies~~ a certain theory and tests to see if that theory applies under intended circumstances or not. Argumentation begins with a theory and leads to a new assumption. This assumption is tested via comparison with the observations and finally it would be accepted or rejected (Sneider & Larner, 2009).

On the other hand, in inductive research, no theory is applied at the beginning of the research and the researcher enjoys complete freedom in terms of determining the course of research. Particularly, there is no assumption at the early stages of research and the researcher is not sure about the kind and the nature of findings as research is not finished (Zalaghi, 2016).

The main advantage of the inductive method is that there is no necessity for any pre-fabricated framework or model. Obviously, while principles are generalized they should be verified through a logical method (deductive approach) (Zalaghi, 2016).

However, many researchers claimed that it is possible to combine deduction and induction within one research project and the combined approach can have advantages which offer a better understanding of a specific research topic (Creswell, 2009; Denscombe, 2008; Johnson et al., 2007).

In order to examine the role of sustainability practice in identifying the relationships between dry port resource determinants and operational performance, whether the attributes of sustainability practice are applicable to Ethiopian dry port is an important issue in this study. Although this study is based on theoretical and existing knowledge it is possible to present an alternative outcome of the research, within the unique structure of Ethiopian dry port operation. Therefore, the current study can be considered as an integrated approach, in that either existing theory is adapted or an alternative theoretical framework can be accepted.

3.5. Research Strategy and Time Horizon

3.5.1. Research Strategy: (Specific Design)

Once a mixed methods approach has been decided on, the next step is to decide on the specific mixed methods research design (strategy) that best addresses the research problem. A research strategy is „a general plan of how the research question(s) will be answered, (Saunders et al., 2003: 9).

While designing a mixed methods study, four criteria for choosing a mixed methods strategy need consideration: timing, weight or priority, mixing, and theorizing (Creswell et al, 2003). Timing refers to whether the quantitative and qualitative data collection and analysis comes in sequence or in chronological stages, one following another, or in parallel or concurrently. Weight or priority refers to which method, either quantitative or qualitative, is given more emphasis in the study. For mixing qualitative and quantitative methods three strategies are

identified by Creswell (2009), namely merging, embedding and connecting the datasets. Finally, theorizing concerns whether a theoretical lens or framework will guide the study.

For the current study the researcher made use of the mixing strategy proposed by Creswell and Plano Clarke (2011:67) to sequentially connect the qualitative data, in order to validate or support the succeeding quantitative data. More specifically, in this research the data were connected so that the qualitative results were used in collaboration with the literature review to support a quantitative data.

Based on the criteria set by Creswell et al 2003, for designing a mixed methods study, a research employing a mixed methods design can be chosen from six possible research design strategies: sequential explanatory strategy, sequential exploratory strategy, sequential transformative strategy, concurrent triangulation strategy, concurrent nested strategy, and concurrent transformative strategy (Creswell, 2009).

There is no one best research strategy that is superior to others. What matters most in selecting a research strategy is whether the chosen strategy fits with the assumptions of the research philosophy and whether it enables the researcher to answer the research questions and meet the objectives of the research (Saunders et al., 2003).

For the current study the explanatory sequential research design was used as a specific research design. The explanatory sequential research design consists of two distinct phases (Creswell et al., 2003, Creswell & Plano Clarke, 2011). In the research design, a researcher collects and analyses the quantitative data as phase one. In the second qualitative phase, the researcher supports the results of the quantitative data (Creswell, 2009).

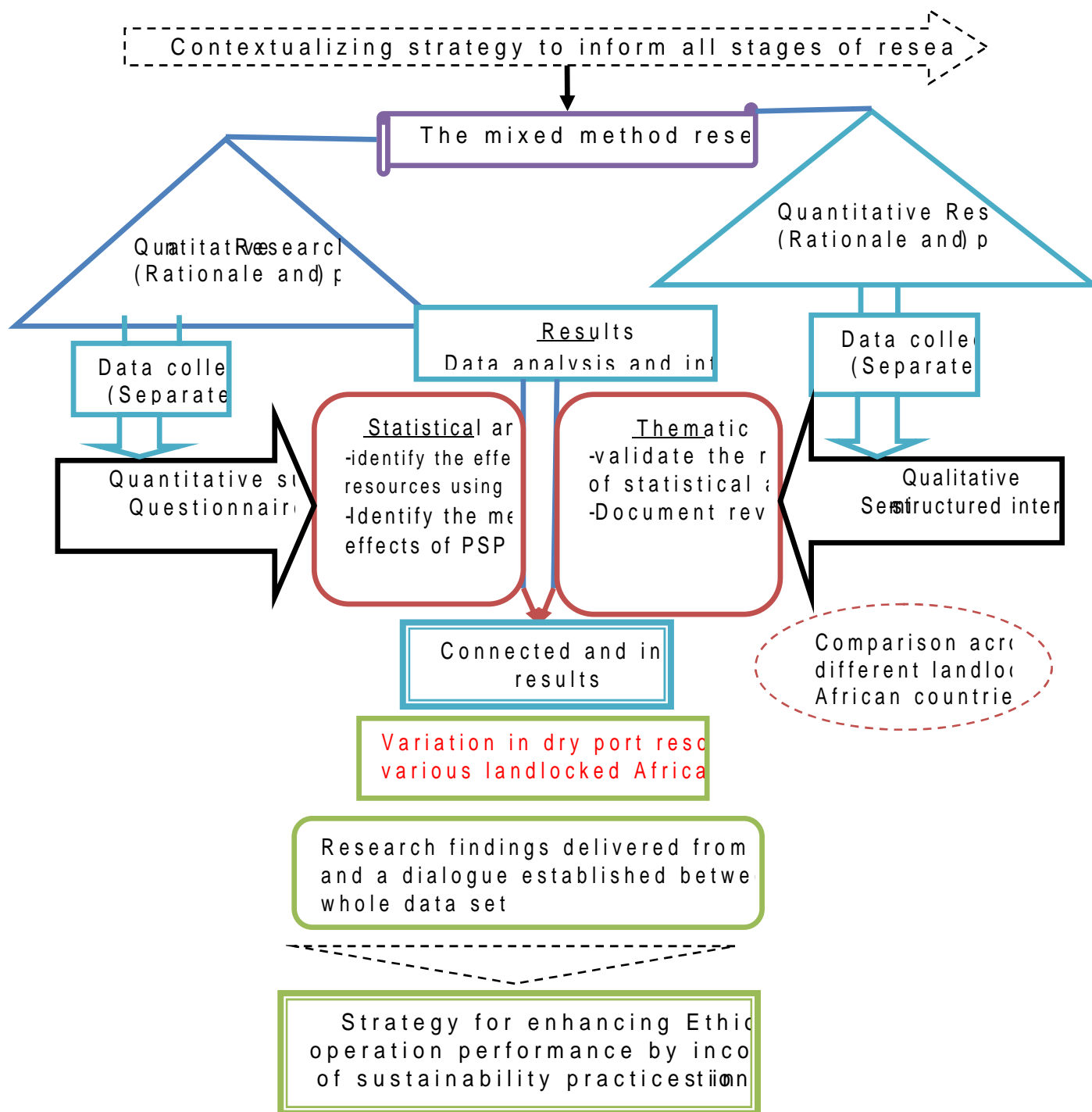


Figure 2: The Mixed Method Research Design Model

3.5.2. Time Horizon: Cross-Sectional

In dealing with the issue of determining the time horizon for doing a study, researchers have two principal options: the cross-sectional (snapshot) and longitudinal (diary). Whereas cross-sectional studies involve observations of a sample, cross-section, of a population or phenomenon that are made at one point in time, longitudinal studies are by contrast designed to permit observations of the same phenomenon over an extended period (Saunders et al., 2003). For this study a cross-sectional (snapshot) will be used, because (Aisen C. and Marie D., 2004) stated, in cross-sectional research study, either the entire population or a subset thereof is selected, and from these individuals, data are collected to help answer research questions of interest about what is going on at only one point in time.

3.6. Target Population, Sample and Sampling Techniques

3.6.1. Study Population

A study population is the aggregation of elements from which the sample is actually selected. Supporting this Zikmund, (2003) defined target population as the complete group of the specific population elements relevant to the research project. For port industry research the issue of stakeholders approach are always rises during target population and sample size determination.

Kim 2014 in his dissertation paper on, port competitiveness and sustainability practices in port operation, discussed about port stakeholders to be considered during the selection of sample from study population. As he argued the achievement of sustainable operations and development is a difficult challenge and a complex problem to be solved, in which ports have a complex organizational and technical structure and a number of stakeholders engaged in port operations (Dinwoodie et al., 2012). Freeman (1984) in Kim define stakeholders as: *any individual or group of individuals that can influence or are influenced by the achievement of the organization's objectives*.

Notteboom and Winkelmanns, (2002) applied a stakeholder approach to the port industry identified different categories of stakeholders in the port sector: internal stakeholders (port authority organization) and three groups of external stakeholders including economic/contractual external stakeholders (e.g. terminal operation companies), policy stakeholders (e.g. government bodies) and market player groups.

Based on consideration of stakeholder approach applied to port industry, for this study internal stakeholders (port authority, and port employees) are considered as study population. Currently there are 984 employees (internal stakeholders) in the port

3.6.2. Sampling and Sample Size

Sampling refers to the selection of a subset of persons or things from a larger population, also known as a sampling frame with the intention of representing the particular population (Gall et al., 2007:166; Neuman, 2011:246). Supporting this Zikmund (2003) added that a sampling frame is the list of population elements from which the sample may be drawn in order to represent the target population. This research port operators (terminal operators), port authority, shipping line, inland shippers and forwarders were selected as sample frame for this study.

As this study is combination of explanatory and exploratory design their sample size determination are also differ. In the first phase of this study, the probability methods chosen because of its universal acceptance and the high generalizability of results based on the availability of the sampling frame. In selecting sample size in different scholars have suggested many sample determination technique to much it with study design. Hair, (2010) suggested that the required sample size can be evaluated by the number of construct or predictors used (Hair, 2010; Faei et al., 2009, 2007). Generally, a standard of the minimum sample size can be estimated with the two considerations of „the estimation technique, and „the ratio of respondents to parameters, (MacCallum, 2003).

The sample size necessary to yield stable results is an empirical question that depends on the complexity of the model as well as other contextual factors (Jackson, 2003). Different authors indicated that the sample size for SEM should be at least 200 cases (Barbara B2010; Geregory R2006) Therefore for this study at least 200 cases is necessary condition.

For this study currently there are 984 employees in the organization; out of which 400 are daily laborers. Therefore the rest 484 permanent employees of Modjo port and terminal are considered as a target population of this study. To determine sample size the following sample size formula were used.

$$= \frac{484}{()^2}$$

$$= \frac{484}{1 + 484(0.005)^2} = 220$$

Therefore 220 permanent employees of Modjo port and terminal were considered as sample size. Since these employees are from four basic departments in the shipping line, terminal operation (forwarding and transit, and warehouse and storage) there is no need of stratification as all of them are equally important and have related information in the port.

In the second part of the interview process, port practitioners as a major player in implementing certain practice in the port sector were selected for interview process. Using purposive sampling technique the researcher selected 1 terminal director, 4 managers of departments, and operations director. Non-probability Purposive technique is chosen because researcher believes that they are expected to have deep knowledge on port operation practice in dry port than any other employees and as a large number is not a central issue for the qualitative method (Malhotra and Birks, 2007) only six of them are considered.

3.7. Methods of Data Collection

Introduction:

The choice of a particular method of collecting data depends upon the purpose of collecting information, the type of information being collected, the resources available to you, your skills in the use of a particular method of data collection and the socio-economic demographic characteristics of your study population (Kumar, 2011). In the following section the types and source of data, data collection instrument, and sampling technique are discussed.

3.7.1. Types and Source of Data

Research uses data as the raw material in order to come to conclusions about some issue. It depends on the issue being investigated what data needs to be collected, William, (2011). The task of data collection begins after a research problem has been defined and research design/plan chalked out (Kothari, 2004). While deciding about the method of data collection to be used for the study, the researcher should keep in mind two types of data viz., primary and secondary. The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. The Secondary data, on the other hand, means data that are already available i.e., they refer to the data which have already been collected and analyzed by someone else Kothari, (2004).

There are several methods of collecting primary data, the important ones are: observation, interview, questionnaires, schedules, and other methods like warranty cards, distributor

audits, pantry audits, consumer panels, using mechanical devices, through projective techniques, depth interviews, and content analysis Kothari, (2004). Secondary data may either be published data or unpublished data. Usually published data are available in: various government publications, technical and trade journals, books, magazines and newspapers, reports, historical documents, and other sources of published information. The sources of unpublished data are diaries, letters, unpublished biographies and autobiographies and also may be available with scholars and research workers, trade associations, labour bureaus and other public/ private individuals and organizations Kothari, (2004).

In order to achieve the objectives of this study, both primary and secondary sources of data were used. For collecting quantitative primary data the standardized survey questionnaires was administered to the internal stakeholders (employees) of Modjo dry port. To collect the qualitative primary data, an in-depth semistructured interview was carried out with dry port director, and terminal port operation manager. Again, work of other authors such as research books, port management books, sustainability reports, journal articles and related literature from the internet were used as secondary sources of data.

3.7.2. Data Collection Instrument

The construction of a research instrument or tool is an extremely important aspect of a research project because anything you say by way of findings or conclusions is based upon the type of information you collect, and the data you collect is entirely dependent upon the questions that you ask of your respondents (Kumar, 2011). The famous saying about computers' „garbage in, garbage out, is also applicable to data collection. The research tool provides the input to a study and therefore the quality and validity of the output, the findings, are solely dependent upon (Kumar, 2011). The semistructured interview, document review and questionnaire survey were the main form of data collection methods in this study. For brief discussion, the following section explores the nature of both data collection instruments.

Survey Questionnaire

The aim of the quantitative part of this study is to gather objective data and empirically test the hypotheses in the theoretically integrated research model of dry port operation resources performance and sustainability, practices delineated in chapter two.

The term survey is used for the techniques of investigation by a direct observation of a phenomenon or a systematic gathering of data from population by applying personal contact and interviews when adequate information about certain problem is not available, records, files and other sources (Pandey, 2015)

The survey is an important tool to gather evidences relating to certain social problems. The term social survey indicates the study of social phenomena through a survey of a small sampled population as well as to broad segments of population. It is concerned with the present and attempts to determine the status of the phenomenon under investigation (Pandey, 2015)

Therefore, in this study to survey the effects of dry port determinants from RBV theory on performance and the results when sustainability strategy is implemented, the questionnaire survey was used as the main form of quantitative data collection.

A questionnaire is a systematic compilation of questions that are submitted to a sampling of population from which information is desired (Pandey, 2015) The Main aspect of a questionnaire is that, quite often it is considered as the heart of a survey operation. Hence it should be very carefully constructed. If it is not properly set up, then the survey is bound to fail. In the case of a questionnaire, as there is no one to explain the meaning of questions to respondents, it is important that the questions are clear and easy to understand. Also, the layout of a questionnaire should be such that it is easy to read and pleasant to the eye and the sequence of questions should be easy to follow. A questionnaire should be developed in an interactive style. This means respondents should feel as if someone is talking to them (Kumar, 2011). This fact requires to study the main aspects of a questionnaire viz., the general form, question sequence and question formulation and wording (Kotler, 2004).

So far as the general form of a questionnaire is concerned, it can either be structured or unstructured questionnaire. Structured questionnaires are those questionnaires in which there are definite, concrete and predetermined questions (Kumar 2011) The form of the question may be either closed (i.e., of the type „yes, or „no,) or open (i.e., inviting free response) When these characteristics are not present in a questionnaire, it can be termed as unstructured or non-structured questionnaire. In this study structured questionnaire was used to gather objective data.

In order to make the questionnaire effective and to ensure quality to the replies received, the question sequence must be clear and smooth, meaning thereby that the relation of

one question to another should be readily apparent to the respondent, with questions that are easiest to answer being put in the beginning (Kumar, 2011).

With respect to question formulation and wording of questionnaire, the researcher should note that each question must be very clear for any sort of misunderstanding or comparable harm to a survey (Kumar, 2011).

For this research the scales, questionnaire and interview guide were designed according to the existing literature and experts' opinions. Most of the items were directly adopted from previous survey instrument (from Kim, 2014) with modification to operationalize the constructs in this study, while few new items were also included in different constructs by reading different port operation and management literatures, to get good response from data collection through survey.

The questionnaire has two parts. The first part is intended to understand the personal information of respondents using nominal scale. The second part consists of the perceptual information of respondents regarding the constructs of the model. The independent (dry port operating resources), mediating (sustainability practices) and dependent construct (dry port operational performance) were all measured using standardized multiple items on a five-point Likert-type scale. Respondents were asked, "To what extent they agree or disagree with the statements about the dry port operating resources, implementation of sustainability practices, and dry port operational performance in Modjo dry port?" Level of agreement or disagreement with items were reported on five-point scales, ranging from 1 = Completely Disagree to 5 = Completely Agree.

The reason behind choosing structured questionnaire for this study is, as it is less expensive and offers greater anonymity, this method of data collection is quite popular, particularly in case of big enquiries (Kothari, 2004).

In-depth Interviews

The aim of the qualitative part of this study is to gather subjective data to explore the relationship between port resources, sustainability attributes and operational performance in detail.

According to Burns (1997), an interview is a verbal interchange, often face to face, though the telephone may be used, in which an interviewer tries to elicit information, beliefs or

opinions from another person. Any person-to-person interaction, either face-to-face or otherwise, between two or more individuals with a specific purpose in mind is called an interview Kumar, (2011).

According to Kumar, (2011), when interviewing a respondent, you, as a researcher, have the freedom to decide the format and content of questions to be asked of your respondents, select the wording of your questions, decide the way you want to ask them and choose the order in which they are to be asked. This process of asking questions can be either very flexible, where you as the interviewer have the freedom to think about and formulate questions as they come to your mind around the issue being investigated, or inflexible, where you have to keep strictly to the questions decided beforehand including their wording, sequence and the manner in which they are asked. Based on the above concept, interview can be structured (interview with rigid structure, rigid contents, and rigid questions & wording) or can be unstructured (Interview with flexible structure, flexible contents, and flexible questions) Kumar, (2011).

While structured interviews are used in descriptive research, unstructured interview, however, happens to be the central technique of collecting information in case of exploratory or formulative research studies Kothari, (2004) in this study unstructured interview was used.

There are several types of unstructured interview that are prevalent in qualitative research, for example in-depth interviewing, focus group interviewing, narratives and oral histories.

The reason why unstructured interview is selected for this study lies in the strength of semi-structured interview. The strength of unstructured interviews is the almost complete freedom they provide in terms of content and structure. So, to get the brief information about resources sustainability practices and operational performance in Modjo dry port operation, unstructured interview is important as it helps researcher to ask questions as they want.

For selecting participants for interview, working experience, job position and involvement level were used as selection criteria. For the validation of information gathered from people on managerial position, port operation (terminal operation) were selected as the participants of the qualitative interview part in this research.

To develop interview guide different logistics, operations management, port management literatures and different sustainability reports were used.

3.8. Methods of Data Analysis

As cited in Pandey, (2015) Kaul defines data analysis, as, "Studying the organized material in order to discover inherent facts. The data are studied from as many angles as possible to explore the new facts". The following section discusses about the data analyzation techniques for both qualitative and quantitative data as this study is explanatory-sequential in design

3.8.1. Quantitative Data Analyzation Technique: SEM (Structural Equation Modeling)

As stated earlier, by analysis we mean the computation of certain indices or measures along with searching for patterns of relationship that exist among the data groups. Analysis, particularly in case of survey or experimental data, involves estimating the values of unknown parameters of the population and testing of hypotheses for drawing inferences. Analysis may, therefore, be categorized as descriptive analysis and inferential analysis (Inferential analysis is often known as statistical analysis) (Kothari, 2004).

Descriptive analysis is largely the study of distributions of one variable. This study provides us with profiles of companies, work groups, persons and other subjects on any of a multiple of characteristics such as size, Composition, efficiency, preferences, etc. This sort of analysis may be in respect of one variable (described as unidimensional analysis) or in respect of two variables (described as bivariate analysis) or in respect of more than two variables (described as multivariate analysis) (William 2011; Kothari, 2004)

We may as well talk of correlation analysis and causal analysis. Correlation analysis studies the joint variation of two or more variables for determining the amount of correlation between two or more variables. Causal analysis is concerned with the study of how one or more variables affect changes in another variable. It is the study of functional relationships existing between two or more variables. This analysis can be termed as regression analysis Kothari, (2004).

Quantitative analysis deals with data in the form of numbers and uses mathematical operations to investigate their properties. The levels of measurement used in the collection of the data i.e. nominal, ordinal, interval and ratio, are an important factor in choosing the type of analysis that is applicable, as is the numbers of cases involved William, (2011). Multivariate analysis looks at the relationships between more than two variables. This tests the effect of a third variable in the relationship between two variables, for example the effect

of gender on the income and level of education of a group of people (Will, 2011). Therefore, in this study descriptive statistics was used to describe the demographic characteristics of respondents, where as inferential statistics using multivariate analysis was used to study the role of sustainability practices mediating dry port resources determinants and dry port operation performance.

In order to attain at better results from data analyzation, ensuring data accuracy is very important. This can be done by conducting preliminary analysis. As stated in Sekaran (2003) Preliminary analysis is carried out to ensure that the data is translated into a form that is suitable for analysis and capable of being interpreted into meaningful results. So, for this study different data screening technique like normality, multicollinearity, outlier and etc were carried out to ensure data input accuracy.

In order to test the proposed hypotheses Structural Equation Modeling (SEM) path analysis was carried out using Amos 23. Structural Equation Modelling (SEM) is a second generation multivariate data analysis method that attracts scholars across different disciplines and progressively more in the social sciences (Chow and Chan, 2008). The term structural equation modeling suggests two main features of the procedure (a) that the causal processes are characterized by a series of structural (i.e. regression) equations, and (b) that these structural relations can be modeled in a picture to enable a clearer conceptualization of the theory under study (Tabachnick and Fidell, 2007).

To validate the research instrument exploratory factor Analysis (EFA) using principal component analysis (PCA) was used. Exploratory factor analysis (EFA) is a widely utilized and broadly applied statistical technique in the social sciences (Acosta B. Costello & Jason W Osborn, 2005). As for principal components analysis, factor analysis is a multivariate method used for data reduction purposes. Again, the basic idea is to represent a set of variables by a smaller number of variables. In this they are called factors. These factors can be thought of as underlying constructs that cannot be measured by a single variable (e.g. happiness) Cornish, (2007). In addition to EFA, CFA (Confirmatory Factor Analysis) was used, in order to verify how well the measured indicators represent the constructs and to make measurement model valid before it is used in structural model

3.8.2. Qualitative Data Analyzation Technique: Thematic Analysis

There are a number of approaches proposed to analyze qualitative data (Siddiqui, 2000). Like for example, case analysis, content analysis, and thematic analysis. The approach to analyze qualitative data can be adopted according to research questions and/or objectives (Bryman and Bell 2011), In this study, to understand the constructs under investigation in depth and to validate the statistical results, thematic analysis was used for analyzing data gathered through semi-structured interview technique. Thematic analysis is a method of identifying, analyzing and reporting themes or patterns within data (Braun and Clarke, 2006).

The choice of thematic analysis for this research lies in its flexibility, suitability to a pragmatic framework, ease of use, acceptability academically, its provision of rich description of data sets, its allowance for social as well as psychological interpretation of data and its ability to highlight similarities and differences across data sets (Braun and Clarke, 2006).

3.9. Measurement Model Validity and Reliability

Whether you are planning a research project or interpreting the findings of someone else's work, determining the impact of the results is dependent upon two concepts: validity and reliability Last (2001). Let see each in detail.

3.9.1. Reliability: Internal Consistency

Basically, any research tool should provide the same information if used by different people (inter-rater reliability), or if it is used at different times, for example, on Friday morning and again on Sunday afternoon (test-retest reliability) Robert et al (2006). The internal consistency of research tools needs to be assessed. Internal consistency is the relationship between all the results obtained from a single test or survey. If we ask people ten questions about job satisfaction, do they answer every question in a similar way, or are there a few questions where the replies seem to be unrelated to the others? (Robert et al, 2006).

Internal consistency of items such as individual questions in a questionnaire can be measured using statistical procedures such as Cronbach's coefficient (Cronbach 1951). Reliability is the proportion of variability in a measured score that is due to variability in the true score (rather than some kind of error). A reliability of 0.9 means 90 per cent of the variability in the observed score is true and 10 per cent is due to error. A reliability of 80 to 90 per cent is recommended for most research purposes Robert et al (2006). Therefore in this research

cronbach,s alpha coefficient of more than 0.7 was used to test the internal consistency of each items related to dry port operations, dry port sustainability practices, and dry port operation performance.

3.9.2. Validity

Validity refers to the degree to which a study accurately reflects or assesses a specific concept that the researcher is attempting to measure. While reliability is concerned with the accuracy of the actual measuring instrument or procedure, validity is concerned with the study's success at measuring what the researchers set out to measure (Writing@CSU,2017).

Researchers should be concerned with both external and internal validity. External validity refers to the extent to which the results of a study are generalizable or transferable. Internal validity addresses the reasons for the outcomes of the study, and helps to reduce other, often unanticipated, reasons for these outcomes. Three approaches to assessing internal validity are content validity, criterion-related validity, and construct validity (Eby, 1993, Punch 1998).

Content validity is the weakest level of validity, and is concerned with the relevance and representativeness of items, such as individual questions in a questionnaire, to the intended setting. It is particularly important to measure this if the study is designed to ascertain respondents, knowledge within a specific field, or to measure personal attributes such as attitudes (Eby, 1993). It can be achieved through conducting a pilot study with people who are similar to the intended study participants. Such relevance is supported by literature reviews and documentary evidence, where available.

Criterion-related validity is a stronger form of validity, established when a tool such as a questionnaire can be compared to other similar validated measures of the same or a different phenomenon (Eby, 1993). However, where no other measures exist, this will not be possible.

Construct validity involves demonstrating relationships between the concepts under study and the construct or theory that is relevant to them Roberts(2006).

Construct validity can be broken down into two sub-categories: Convergent validity and discriminate validity. Convergent validity is the actual general agreement among ratings, gathered independently of one another, where measures should be highly related.

Discriminate validity is the lack of a relationship among measures which theoretically should not be related (Writing@CSU,2017). There are several ways of demonstrating construct

validity, one of which is factor analysis. Factor analysis refers to a number of statistical procedures used to determine characteristics that relate to each other (Bryman and Cramer 2004). For that reason, in this study Factor Analysis is conducted by which Convergent validity (through factor loading & T-value) and Discriminant validity (through inter correlation; correlation coefficient) were tested, in order to test construct validity.

CHAPTER FOUR

4. DATA ANALYSIS AND PRESENTATION

4.1. Introduction

In this chapter the result of data analysis through SEM, document review and interview process were presented and interpreted. Before SEM was conducted, descriptive analysis, preliminary assumptions and EFA were done using SPSS version 20 and CFA was done using AMOS 23 to validate measurement model. Then SEM was carried out to see the relationship between variables and to confirm hypotheses. To validate these SEM results document from Modjo dry port and interview were taken place and each of these are displayed and analyzed as follows:

4.2. Demographic Characteristics of Respondents

4.2.1. Response rate

To meet the objective of the study, 220 valid questionnaire were distributed to Modjo port and terminal. Among the 220 questionnaire survey forms distributed, 11 were not returned and/or declined to participate. Eight of the returned questionnaires were deemed invalid after outlier was tested and the final number of valid questionnaires was 209. 209 questionnaires available for analysis.

Number of Replies	209
Not Returned and/or Declined to Participate	11
Total Number of Forms Distributed	220
Response Rate (%)	95% (overall response rate)
	91.36% (effective response rate)

Table 4.1: response rate

The overall response rate of 95% (209 responses/220 questionnaires) and a 91.36% effective rate of responses (201 valid responses/220 questionnaires) which is valid number to run SEM analysis.

After the response rate was determined the demographic characteristics of respondents were analyzed as follows:

Table 4.2 descriptive statistics of respondents					
Number of Employees in the Port		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	over 350	201	100.0	100.0	100.0
Organizational Category in the Port		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	port authority	41	20.4	20.4	20.4
	terminal operator	104	51.7	51.7	72.1
	shipping line	43	21.4	21.4	93.5
	inland shipper	1	.5	.5	94.0
	forwarder/cargo owner	3	1.5	1.5	95.5
	national/local government	6	3.0	3.0	98.5
	local community/researcher	3	1.5	1.5	100.0
	Total	201	100.0	100.0	
Years Passed After The Establishment of The Port		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< than 5 years	20	10.0	10.0	10.0
	6-10	175	87.1	87.1	97.0
	16-20	3	1.5	1.5	98.5
	>20 years	3	1.5	1.5	100.0
	Total	201	100.0	100.0	
Employees Work Experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< than 5 years	135	67.2	67.2	67.2
	6-10	65	32.3	32.3	99.5
	11-15	1	.5	.5	100.0
	Total	201	100.0	100.0	
Workers Job Position		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	operational staff	177	88.1	88.1	88.1
	director/vice director	17	8.5	8.5	96.5
	manager/assistant manager	4	2.0	2.0	98.5
	management board	3	1.5	1.5	100.0
	Total	201	100.0	100.0	

The above table 4.1 shows the demographic information of respondents in the port. Respondents were asked to confirm the number of human resource in the port. As the result of 201 (100%) of respondents responded, there are more than 350 employees in the Port, which was later confirmed by review of document from the port. this shows that the number of employees in Modjo dry port and terminal are large enough to handle cargoes even during high demand period, which one of the basic requirement in industry.

Respondents were also asked to categorize their organization in the port. 104 (51.7%) of respondents are categorized as terminal operators, whereas 43 (21.4%) and 41 (20.4%) are categorized as shipping line and port authority. This result confirms that most of the

respondents are from terminal operators, could provide port resources related information. As this number was supported by respondents from shipping line and port authority, who deemed to have deep information about all port and shipping related decision, we can say the information they provided can represent Modjo dry port and terminal.

In addition to this, to verify how many years have passed since the establishment of the port. Most of them (175, 87.1%) responded that, it is been from 10 years since the establishment of Modjo port and terminal. The result of document review shows it has been 9 years after the establishment of Modjo dry port and terminal. As this result will helps us to know whether the port is performing as expected from data analysis later. In other word, 9 years of operation means we expected average performance from data analysis, as organization which is established before long period of time are supposed to have higher performance.

Furthermore as the result of 135 (67.2%) of respondents confirmed, most of employees in the organization has less than 5 years of experience. This could be true as document review shows an increment in port investment (including human resources) from the year 2015. This implies that employees need additional modern port operation training.

Lastly respondents were asked to their position in the port. The dominating respondents (177, 88.1%) of respondents confirmed as they are working the position of port operation. This could be true as the large pools of respondents in port industry are participated in port operation. In other word 65% and more of job in port industry are port operation or cargo handling process related like (documentation, stuffing, stacking, clearance, container receiving, container releasing and etc).

Therefore, from the above table we can understand that, to efficiently handle containers, the port has enough human resource in terms of quantity, but employees need additional training. In addition to this, as most of the respondents are from port operation departments, we can say they could give enough information on port resources and operational performance.

4.3. Statistical assessment of measurement model

4.3.1. Preliminary Analysis (test of assumption)

4.3.2. Normality

Normality is the fundamental assumption and the critical issue for analysis, in that, for instance, non-normality of a dataset can result in an inflated chi-square statistic (value) and underestimate the values of fit index (e.g. TLI: Tucker-Lewis index, CFI: comparative fit index and standard errors of parameter estimates) (Hair et al., 2010). Normality of data in multivariate analysis is connected with the distribution of each individual metric variable and all linear combinations of the variables (Tabachnick and Fidell, 2001). Skewness and kurtosis to the distribution patterns are widely suggested to measure non-normality in multivariate analysis for a large sample size (Hair et al., 2010 and Kline, 2005).

As suggested by prior studies, the normality of a dataset was examined by considering skewness and kurtosis of the distribution patterns. In the normality test, skewness presents the *f*symmetry of the distribution, while kurtosis measures the *f*peakedness of a distribution (Hair et al., 2010). Multivariate normality can be assessed by Mardia's test based on multivariate extensions of skewness and kurtosis measures (Mardia and Kanazawa, 1983; Mardia, 1974). In this study both skewness and kurtosis were tested for normality.

According to Hair et al. (2000), the value of skewness and kurtosis which indicates normal distribution is zero. Therefore, the values of skewness outside the range from ± 1 are considered as a skewed distribution (Hair et al., 2010).

In this study, skewness of all 37 items was tested and 34 items was within the range ± 1 and ± 1 whereas the rest 3 items were also close to 0. The C.R. values (critical ratio) for all 37 items were also less than ± 2.58 (0.01 significant level), which assumes a normal distribution (Hair et al., 2010). Based on these statistical results in the normality test, the dataset used in this study is considered as a normal distribution.

Table 4.2: Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
HC1	2.000	5.000	-.811	-4.693	.038	.109
HC2	2.000	5.000	-.367	-2.122	-.496	-1.435
HC3	2.000	5.000	-.067	-.390	-.445	-1.287
HC4	2.000	5.000	.356	2.061	-.618	-1.789
F4	2.000	5.000	-.684	-3.958	.244	.706
F3	2.000	5.000	-.445	-2.577	-.019	-.056
F2	2.000	5.000	-.644	-3.726	.178	.516
F1	2.000	5.000	-.649	-3.754	.213	.615
D4	1.000	5.000	-.209	-1.208	-.328	-.950
D3	2.000	5.000	.326	1.887	-.101	-.291
D2	2.000	5.000	.090	.521	-.453	-1.311
D1	1.000	5.000	-.217	-1.259	-.011	-.031
Spd4	2.000	5.000	-.284	-1.643	-.256	-.740
Spd3	2.000	5.000	-.373	-2.157	-.377	-1.092
Spd2	2.000	5.000	-.357	-2.066	-.444	-1.286
Spd1	2.000	5.000	-.481	-2.783	-.302	-.873
C3	2.000	4.000	-.342	-1.978	-.674	-1.951
C2	1.000	4.000	-.486	-2.815	-.087	-.253
C1	2.000	4.000	-.179	-1.034	-.555	-1.606
Q3	2.000	5.000	-.408	-2.359	-.013	-.036
Q2	2.000	5.000	-.385	-2.229	.056	.162
Q1	2.000	5.000	-.513	-2.967	.269	.778
IC1	1.000	4.000	-.029	-.170	-.297	-.858
IC2	2.000	4.000	.276	1.595	-.876	-2.535
IC3	1.000	4.000	.169	.979	-.670	-1.939
SP1	2.000	5.000	-.433	-2.507	-.335	-.969
SP2	2.000	5.000	-.111	-.642	-.422	-1.222
SP3	2.000	5.000	-.109	-.633	-.603	-1.745
SP4	2.000	5.000	.106	.612	-.387	-1.121
OE1	2.000	4.000	-1.237	-7.157	.532	1.539
OE2	2.000	5.000	-1.010	-5.845	.472	1.366
OE3	2.000	4.000	-1.382	-7.999	.952	2.755
OE4	2.000	5.000	-.940	-5.440	.526	1.522
PI1	2.000	5.000	-.138	-.801	-.276	-.800
PI2	2.000	5.000	-.150	-.868	-.300	-.867
PI3	2.000	5.000	-.128	-.742	-.460	-1.330
PI4	2.000	5.000	.013	.075	-.326	-.944
Multivariate					23.785	3.138

4.3.3. Multicollinearity

One way of identifying multicollinearity is to scan a correlation matrix of all of the predictor variables and see if any correlate very highly (by very high we mean correlations of above .80 or .90). This is a good „balpark, method but misses more subtle forms of multicollinearity. Luckily, SPSS produces various collinearity diagnostics, one of which is the variance inflation factor (VIF). The VIF indicates whether a predictor has a nonlinear relationship with the other predictor(s). Although there are no hard and fast rules about what value of the VIF should cause concern, Myers (1990) suggests that a value of 10 is a good value at which to worry. What's more, if the average VIF is greater than 1, then multicollinearity may be biasing the regression model (Bowerman & O'Connell, 1990). Related to the VIF is the tolerance statistic, which is its reciprocal (1/VIF). As such, values below 0.1 indicate a serious problem although Menard (1995) suggests that values below 0.2 are worthy of concern. For this study the collinearity statistics shows that there is no multicollinearity problem.

Collinearity Statistics			
No	Constructs	Tolerance	VIF
1	port infrastructure	.766	1.306
2	operating efficiency	.701	1.426
3	information capital	.870	1.149
4	human capital	.735	1.361
5	sustainability practices	.655	1.526

Table 4.3: multicollinearity

4.4. Results for the Measurement Model

Instrument that measures port resources and port sustainability practices were adopted (Ho Ha M., 2017 and Kim 2014) and Instruments that measure port operational performance were adopted from Batinta L., (2009). Appendix A presents the multiple items representing each of the constructs. Under the following section all statistical analyses to determine the validity and reliability of each construct in this study are discussed.

4.4.1. Item Purification (Convergent and Divergent Validity)

This section presents the results of EFA to determine how clearly and to what extent an observed variable is linked to its underlying factors. In this study, an exogenous variable, (port resources) and endogenous variable (port operational performance), were conceptualized as a higher order model consisting of four dimensions and five dimensions respectively. Therefore, prior to conducting a CFA of a measurement model, EFA was initially conducted to clearly identify these dimensions and eliminate potentially troublesome items in SPSS Version 20.

In addition, for the constructs that has first order structure „dry port sustainability practice, reliability and inter total correlation for the measurement items were measured to purify the ineligible items. In order to extract the minimal number of factors underlying variation amongst observed variables, principal components analysis with varimax rotation was adopted because it assumes independence between factors and maximizes the sum of the variances of the squared loadings (Nunnally, 1978).

The criterion for selecting measurement items were Eigen,s value (>1.0) and factor loading (>0.50) (Hair et al., 2010). Seventeen items for port resource (PR) were assessed with four dimensions (Port infrastructures (PR/PI), Port Efficiency (PR/PE), Information Capital (PR/IC) and Human Capital (PR/HO). An initial analysis shows that PR/PI5 and PR/OE5 had a cross loading of less than 0.5. After removing these two items, the remaining items were factor analyzed. EFA empirically grouped the scale of items of port resources into the four dimensions as predicted. Based on the analysis, all coefficients of each item were calculated and for simplicity purpose, small coefficients below 0.5 were suppressed and only absolute value loadings above .50 are shaded and displayed. The result of analysis shows that, all items are loaded on their respective factors with most loadings above .70 and communalities above 0.5 as shown in Table 4.4. The cumulative variance explained by the four factors is

64.987. This implies that the extracted four port resource (PR) factors explain 64.987% of the inherent variation in their items (Zhu and Saadwarkis, 2004).

Kaiser-Meyer-Olkin's measure of sampling adequacy was 81.5% (value < .000), which indicates the extent to which the observed variables are linked to their underlying facts.

The port operational performance (POP) construct was initially represented by 5 dimensions and 23 items. An initial factor analysis indicated that Quality (Q4 and Q5), Speed (Spd5), Dependability (D5), and Flexibility (F5) had a cross-loading of below 0.5 with their constructs than other respective constructs. After these 5 items were removed the factor analysis of remaining items shows that all items loaded on their respective factors, with all loadings greater than 0.8 as exhibited in table 4.4. Most of the communalities of these items are also greater than 0.5, which increases their reliability. The cumulative variance explained by the five factors is 80.7089 and Kaiser-Meyer-Olkin's measure of sampling adequacy was 81.2% (with P value < .000) which indicates the extent to which the observed variables are linked to their underlying facts.

For port sustainability practices construct, which have a single structure, Cronbach's Alpha indicates reliability of measurements greater than 0.7, and its item total correlation greater than 0.5.

Therefore, the constructs incorporating their purified items (15 items for port resources, 4 items for port sustainability, and 18 items for port operational performance) were used for the further analysis.

Rotated Component Matrixa					
	Component				Communalities
	F1-OE	F2-PI	F3-HC	F4-IC	
OE3	.816	.185	.264	.007	.770
OE2	.790	.145	.220	.013	.694
OE4	.789	.156	.027	.018	.647
OE1	.776	.150	.126	.017	.641
PI2	.145	.818	.128	.127	.722
PI3	.165	.798	.095	.162	.700
PI1	.188	.770	.007	.072	.634
PI4	.116	.682	.175	.018	.509
HC3	.130	.078	.806	.109	.684
HC1	.140	.111	.756	.004	.603
HC2	.139	.152	.713	.011	.551
HC4	.110	.037	.622	.149	.422
IC3	.006	-.006	.026	.836	.700
IC1	.068	.236	.108	.825	.752
IC2	-.026	.118	.130	.824	.710
Eigenvalues	4.574	2.137	1.707	1.322	
% of Variance	30.491	14.247	11.383	8.816	
Cumulative %	30.491	44.738	56.121	64.937	
Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 6 iterations.					

Table 4.4a: rotated component matrix for port resource (convergent validity)

Rotated Component Matrixa						
	Component					Communalities
	F1-Spd	F2-F	F3-D	F4-Q	F5-C	
Spd2	.943	.143	.029	.051	.016	.914
Spd3	.926	.105	.031	.033	.031	.872
Spd1	.906	.170	.009	.041	.001	.852
Spd4	.865	.059	.031	.130	.062	.774
F2	.120	.902	.027	.061	.028	.834
F3	.171	.889	.043	.009	.013	.822
F1	.057	.877	.098	.034	-.017	.783
F4	.114	.848	-.002	.107	-.022	.745
D2	.008	.000	.889	.068	.100	.805
D3	.039	.011	.884	-.013	.031	.783
D1	.035	.106	.867	.032	.078	.772
D4	.011	.041	.803	-.017	.078	.653
Q1	.057	.040	.008	.943	.044	.895
Q3	.031	.041	.005	.926	.037	.861
Q2	.144	.116	.050	.906	-.005	.858
C1	.033	-.007	.075	.046	.877	.778
C2	.012	.039	.067	-.019	.871	.765
C3	.047	-.032	.117	.046	.863	.764
Eigenvalues	4.526	3.113	2.487	2.390	2.010	
% of Variance	25.146	17.295	13.818	13.280	11.169	
Cumulative %	25.146	42.442	56.260	69.540	80.709	
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 5 iterations.						

Table 4.4b: rotated component matrix for port operational performance (convergent validity)

4.4.2. Results of Confirmatory Factor Analysis

This section summarizes the results of the CFA for the measurement model. In order to verify how well the measured indicators represent the constructs, the 37 measurement items under 10 constructs were tested in CFA using AMOS 23. The value of the initial measurement model, as a fundamental measure of absolute fit which indicates the differences between the observed and estimated covariance matrices, was $\chi^2=605.990$ and $CMIN/DF=1.036$ with p value of 0.051 (which is significant at 0.05 test). The construct validity and the item reliability were assessed by fit index, Standardize residuals, factor loading (%), critical ratio (t -value) and squared multiple correlations (R^2).

The value of squared multiple correlation (R^2) that measure the strength of the linear relationships for all items are greater than 0.4 which shows sufficient level of statistical significance in a fundamental measure of absolute fit achievement in measurement model (with χ^2 value of 605.990 Degrees of freedom= 585, and $p=0.051$). To provide statistical support for a measurement model fit, a series of recommended indices like, Goodness Fit (GFI), Adjusted Goodness of Fit (AGFI), Comparative Fit (CFI), Normed Fit (NFI), Tucker-Lewis (TLI), Incremental Fit (IFI), Root Mean Square Error of Approximation (RMSEA) indices and PCLOSE were tested. The result shows that the measurement model is strongly fit with (GFI=.865, AGFI=.838, CFI=.99, NFI=.870, TLI=.994, IFI=.987, and RMSEA= 0.013 with PCLOSE of 1.000).

As shown in CFA table below, the standardized regression weights (standardized factor loading) for the 32 items were above 0.7 and the left 5 were greater than 0.4. Their critical ratio (t -value) was between 4.844 and 24.428 (** $p < 0.001$).

From these statistical results it can be understood that all 37 purified measurement items indicated an acceptable fit to the data for the measurement model. Table 4.1 presents the summary of CFA for the measurement model and Figure 4.1 depicts the results of standardized estimates in CFA for the measurement model.

			Estimate	S.E.	C.R.	P	Std
Spd4	<---	Speed	.772	.044	17.546	***	.815
Spd3	<---	Speed	.920	.038	24.428	***	.914
Spd2	<---	Speed	1.000				.955
Spd1	<---	Speed	.893	.039	22.811	***	.895
Q3	<---	Quality	.956	.051	18.730	***	.874
Q2	<---	Quality	.992	.053	18.762	***	.874
Q1	<---	Quality	1.000				.938
F4	<---	Flexibility	.848	.059	14.254	***	.806
F3	<---	Flexibility	1.000				.870
F2	<---	Flexibility	.941	.056	16.924	***	.893
F1	<---	Flexibility	.919	.061	15.048	***	.833
C3	<---	Cost	.923	.081	11.418	***	.803
C2	<---	Cost	1.000				.798
C1	<---	Cost	.902	.078	11.599	***	.818
D4	<---	Dependability	.808	.069	11.779	***	.721
D3	<---	Dependability	.959	.065	14.734	***	.835
D2	<---	Dependability	1.000				.877
D1	<---	Dependability	.959	.065	14.706	***	.834
PI4	<---	Port Infrastructure	.789	.096	8.207	***	.602
PI3	<---	Port Infrastructure	.945	.089	10.583	***	.769
PI1	<---	Port Infrastructure	.901	.093	9.721	***	.705
OE4	<---	Operating Efficiency	1.032	.115	9.002	***	.695
OE3	<---	Operating Efficiency	1.245	.115	10.833	***	.869
OE2	<---	Operating Efficiency	1.140	.117	9.777	***	.760
OE1	<---	Operating Efficiency	1.000				.704
IC3	<---	Information Capital	1.000				.646
IC2	<---	Information Capital	1.113	.136	8.199	***	.712
IC1	<---	Information Capital	1.327	.155	8.559	***	.883
HC1	<---	Human Capital	1.000				.607
HC2	<---	Human Capital	1.094	.137	8.002	***	.639
HC3	<---	Human Capital	1.288	.140	9.172	***	.753
HC4	<---	Human Capital	1.000				.595
PI2	<---	Port Infrastructure	1.000				.801
SP4	<---	Sustainability	1.000				.543
SP3	<---	Sustainability	1.125	.171	6.569	***	.645
SP2	<---	Sustainability	1.250	.184	6.790	***	.683
SP1	<---	Sustainability	.761	.157	4.844	***	.418

Table 4.5: result of confirmatory factor analysis (CFA)

Figure 4.4: CFA

4.4.3. Reliability of the measurement model

Reliability of the measurement model can be estimated by \hat{R} (item reliability), Cronbach's Alpha and construct reliability/Average variance extracted (scale reliability). For this study, at first in terms of item reliability, all the 37 purified measurement items were greater than 0.4 in squared multiple correlations (\hat{R}) which shows satisfaction in item reliability. In addition to this the result of EFA shows that the four and five extracted factors for both port resources and port operational performance respectively, had a greater than 0.7 Cronbach alpha values, which ensures the construct's internal consistency and validity (Taylor et al., 2003). However, as discussed in different literatures and articles there are some limitations existing in Cronbach's ... approach. Therefore, to additionally verify scale reliability, the composite reliability including construct reliability and variance extracted was evaluated. Construct reliability values of 0.70 or above are considered as a good reliability for the

construct (Hair et al., 2010) and the ~~acceptable~~ value for variance extracted have to be greater than 0.50 (Hult et al., 2007).

In this study construct reliability, composite reliability and average variance extracted were all evaluated to examine the reliability of the constructs. As shown in table 4, the construct and composite reliabilities for all constructs are greater than the values of average variance extracted (AVE) for all variables are greater than the threshold of 0.5. Therefore, considering these results, the item and scale reliability for the measurement model in this study were verified.

Statistical Measure for constructs			
construct	...	Composite Reliability	AVE
1. Port Infrastructure	.725	0.851924	0.590988
2. Operating Efficiency	.722	0.871294	0.628663
3. Information Capital	.750	0.860632	0.686166
4. Human Capital	.720	0.816705	0.529106
1. sustainability	.711	0.790987	0.492025
1. Speed	.743	0.950895	0.828947
2. Quality	.755	0.885066	0.855854
3. Dependability	.753	0.922205	0.742069
4. Flexibility	.745	0.925162	0.77304
5. Cost	.754	0.872079	0.757513

Table 4.6: reliability of measurement model

4.4.4. Discriminant validity

After examining unidimensionality, convergent validity and reliability, for this study discriminant validity was evaluated by looking at ~~inter~~ correlation between the constructs. As shown in table 4.7, the highest correlation coefficient (0.716) was between operational performance and port sustainability practices, and the lowest correlation coefficients (.081) were between operating efficiency and information capital. All the constructs used were significant at the 0.01 level (2-tailed) and the correlation coefficients did not exceed the cut-off point of 0.85 suggested by Kline (2005). This result shown in table below indicates that discriminant validity between the constructs used is supported.

Correlations								
	Mean	Sdv.	POP	PI	OE	IC	HC	PSP
POP	3.46	.34	1					
Port Infrastructure	3.59	.47	.544**	1				
Operating Efficiency	3.66	.45	.605**	.398**	1			
Information Capital	2.81	.56	.352**	.263**	.081	1		
Human Capital	3.51	.43	.627**	.290**	.378**	.208**	1	
Port Sustainability Practices	3.49	.41	.716**	.348**	.441**	.286**	.465**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4.7: correlation coefficient

4.5. Validation of second order constructs

Both port resource and port operational performance were both conceptualized as a higher order model consisting of four dimensions and five dimensions respectively. Structural equation modeling (using AMOS 23) was used to determine whether a higher factor model is appropriate for port resource and port operational performance.

Figure 42 and 43 below describes the results of a higher order factor analysis in AMOS 23 for both formative/second order variables. A higher order structure can be acceptable when it has a good model fit and predictive validity (Hair et al., 2010).

For port resource, the fit statistics for the second order model were (CMIN/DF=1.313, GFI=.929, AGFI=.0.902, NFI=.0.900, IFI= .974, TLI=.968, CFI= .974 and the RMSR =.040 with PCLOSE of .806), representing a good model fit. The % coefficients were all significant at P <.01.

For port operational performance, the fit indexes for the second order model were (CMIN/DF= 0.860, GFI=.943, AGFI=.925, NFI=.0.957, IFI= 1.000, TLI=1.000, CFI=1.000 and the RMSR =.000 with PCLOSE of 1.000), indicating a strong model fit. The % coefficients were all significant at P <.01. Therefore, as suggested by Bhuian et al. (2005), within the regression testing, port resource and operational performance can be created as a summated index based on the higher order analysis of the measures

Figure 4.5

Figure 4.6

4.6. Results for the Structural Model and Hypotheses Testing

Mediator analysis procedure AMOS -SEM

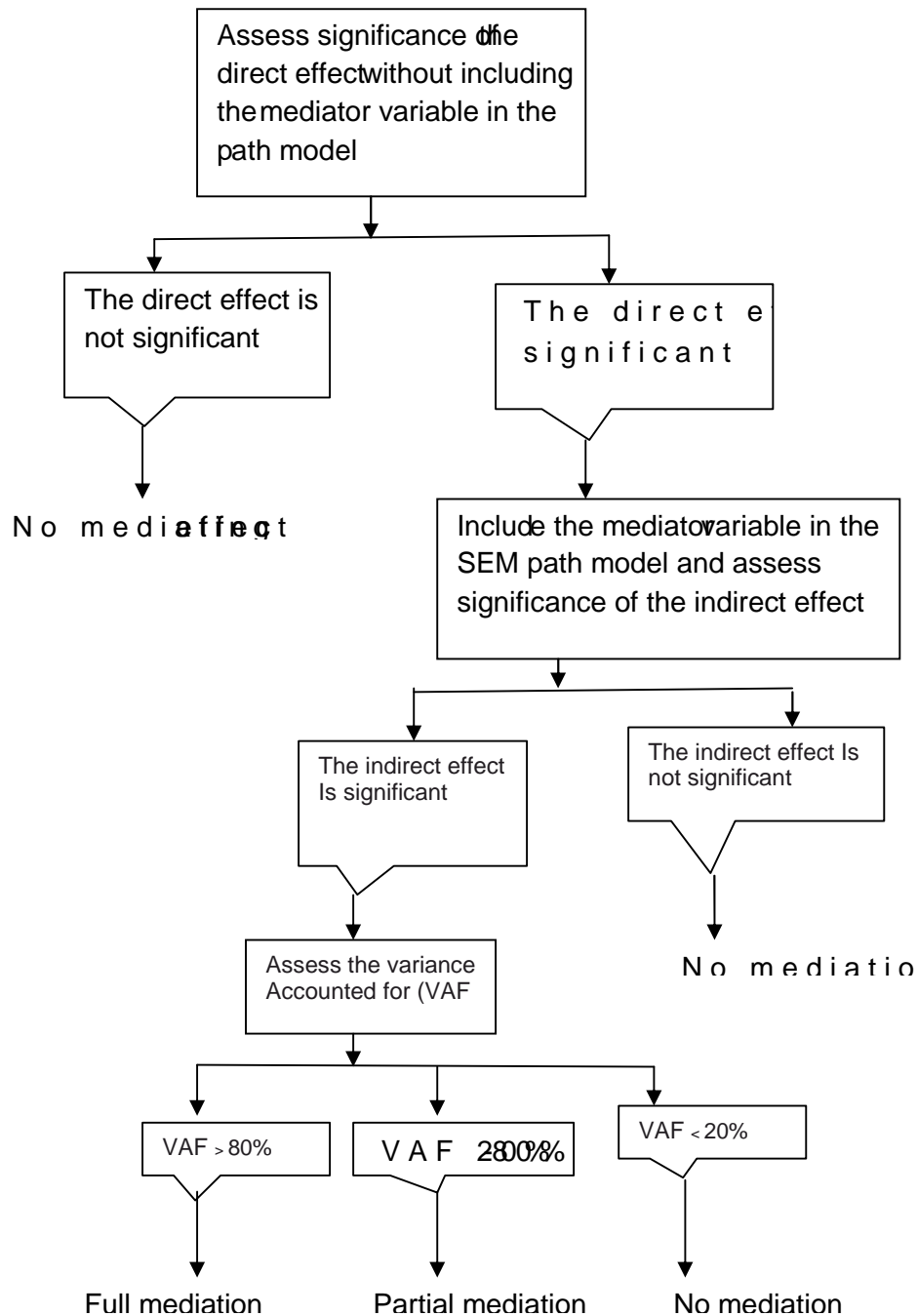


Figure: 4.4 mediator analysis procedures

As discussed in (Joseph F., Tomas M., Christian M., Marko S., 2014) before we see the mediation effect we have to see first the direct effect between exogenous and endogenous variables. To begin with, the direct effect (from each port resource variables/independent variables) should be significant if the mediator is not included in the model. Even though this is not a necessary condition (Zhao, Lynch, & Chen, 2010), this kind of situation makes the mediator analysis much easier to understand and interpret. If this relationship is significant, the mediator may absorb some of this effect or the entire effect. Hence, we continue the mediator analysis if there is a significant direct relationship between the exogenous and endogenous latent variables and include the mediator construct in the PLS path model. When including the mediator, the indirect effect must be significant. If the indirect effect is significant, the mediator absorbs some of the direct effect. For example, in a PLS path model without the mediator variable, a positive direct effect would become smaller after the inclusion of the mediator variable. The question is how much the mediator variable absorbs. The variance accounted for (VAF) determines the size of the indirect effect in relation to the total effect (i.e., direct effect+ indirect effect): $VAF = \text{indirect effect} / \text{total effect}$. Thereby, we can determine the extent to which the variance of the dependent variable is directly explained by the independent variable and how much of the target construct's variance is explained by the indirect relationship via the mediator variable.

For this study all independent variables (port infrastructure, operating efficiency, Human capital, and information capital) has positive significant effect on port operational performance. Human resource have highest positive effect with path coefficient of 0.66, followed by operating efficiency ($t=0.56$), port infrastructure ($t=0.37$) and information capital ($t=0.29$) respectively at $p < .01$ with good model fit indices as shown on the diagram. This shows even though human capital, operating efficiency, and port infrastructure are strong indicators of operational performance, information capital the strong indicator when compared with other constructs. Therefore as there are positive significant direct effects between exogenous and endogenous variable, the mediator may absorb some of this effect or the entire effect. The direct effect and indirect effects are depicted in the diagram 4.1 and 4.2 below.

Diagram 4.1

After positive and significant effects were found between dependent and independent variables, port sustainability practices were included in the analysis of the path diagram resulting from the structural modeling analysis using AMOS 26.0 including the mediator, the indirect effects are also significant. This means that the mediator absorbs some of the direct effect. Therefore, to see how much the mediator variable absorbs, or extent to which the variance of the dependent variable is directly explained by the independent variable and how much of the target construct's variance is explained by the indirect relationship via the mediator variable, the variance accounted for (VAF) were calculated using the ratio of indirect effect to total effect. The results show that port sustainability practices partially mediates the relationship between all independent variables and dependent variable, and all the measurements have significant loadings to their corresponding second order construct. Overall, the structural model has a satisfactory fit with CMIN/DF=1.047, GFI=.860, AGFI=.0.839, NFI=.0.863, IFI= .993, TLI=.992, CFI= .993 and the RMSR =.015 with PCLOSE of 1.00 which is very good.

Diagram 4.2

4.7. Discussion of the Results from Structural Model

As seen from direct effect diagram calculation Results Path Coefficients, we find the path coefficients as shown in the modeling diagram. Looking at the relative importance of the exogenous driver constructs for the port operational performance (PORTPERF) finds that the human resource possessed by the port (HUMANCA) is the most impotent, followed by their operating efficiency (OPEREFF). Moving in the model we also find that, port infrastructure (PORTINF) and information Capital (INCP) are important to port operational performance, even though they are not important as the human capital and operating efficiency.

Here we can see that among the four driver construct, human capital has the substantial DIRECT effect on port operational performance² ($\beta=0.359$), followed by operating efficiency ($R^2 = .291$), port infrastructure ($\beta= .271$) and information capital ($\beta=.079$).

Therefore it is advisable for dry ports to focus on its human resource activities as it positively influence the operational performance of dry ports ($\beta=.359$) in order to provide fastest post service with quality and minimum costs that port customers can depend on. By taking the

construct, indicator weights into consideration, we can specify element of human capital to be addressed. Looking at the measurement weight, (HC3) has the highest weight (0.75), which indicates that Ports continuous training and educational opportunities for workforce is the most important manifest variable to be considered to improve dry port performance.

Previously different similar studies have been conducted. According to Becker (1964), human capital resources include the training, experience, judgment, intelligence, relationships and insight of individual managers and workers in a company (Barney, 1991). Employees who have the right skills, talent and knowledge contribute the most to enhancing the organization's internal processes and performance (Kaplan and Norton (2004). Marlow and Paixão Casaca (2003) also emphasized that the port needs investment in intangible assets such as human resources in order to respond to the volatile demands caused by market uncertainty. In the other words, the skills and capabilities of human capital can be improved through training and education. These concepts have to be adopted in Ethiopian dry ports. As Modjo dry port and terminal is serving 95 % of import and export of Ethiopian products, major emphasis should be given to port's human capital, in order to save the country from international trade logistics cost by improving operational performance at the terminal. Hence hypothesis 1 is accepted

Once again the result of structural equation modeling shows that port infrastructure predict port operational performance by $R^2(0.291)$ directly. This shows that one standard deviation increase in port infrastructures (like road, ICT, rail, container handling equipment, storage capacity etc) will result in 0.291, standard deviation in port operation performance. This result is supported by previous studies. Nyeme S., (2014) stated that infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep container connectivity for economies heavily dependent on international trade. A study by Hales, Douglas N. et al (2016) shows that as port infrastructure becomes congested, port fees rose, service levels dropped, and port facilities expanded. As part of a study on dry ports, Gujar G., (2011) conducted study titled 'essay on dry ports'. His study shows that as port infrastructure usually container handling equipments are viewed as the main machines for dry ports as well as seaports, and they can greatly influence both the container handling capacities and, in the performance of the dry port. As Ethiopia is one of the poorest developing countries in Africa, a trade connection with other parts of the world including Africa is paramount important for the country's development. This requires an investment in port development

and related infrastructures like road and rails that connects it with other transit countries like Kenya, Sudan, Eritrea, Djibouti, and Somaliland. Not only this, a huge investment is needed on inland waterway (using inland rivers that connect other neighboring countries). Therefore the statistically positive relationship found between port infrastructure and operational performance the second hypothesis is supported.

The result from SEM analysis also shows that, dry port operating efficiency is the third direct effect of ($R^2 = 0.271$). This represents the amount of variance in the endogenous construct (PORTPERFO) explained by (OPEREFF) exogenous construct. This means as one standard deviation increase in operating efficiency results in 0.271 increases in operation performance. From resource based perspective port operating efficiency in port are considered as total throughput, terminal productivity, custom procedures, cargo handling speed, service reliability, number of commercial ship visits vessel size and cargo exchange, nature and role of the port, port functions and infrastructure, cargo size, terminal efficiency and etc previous studies shows that, operational efficiency in port operations is the key factor required to be a logistics hub (Tongzon, 2004). As faster turnaround time within the port is critical for mega dry port (that built in landlocked countries) operations, a higher level of efficiency invites more port users to use a port as their port of call (Yeo et al, 2011; Tongzon, 2004). Besides, efficiency of inland transport and hinterland connection has become a critical factor in a port's potential future to evaluate port operation and competitiveness (Rodrigue and Notteboom, 2009). Yeun et al. (2013) argued that intra and inter-port competition might enhance container terminal efficiency (Yeun et al., 2013). Additionally, Tongzon (2009) noted that port choice is closely associated with its level of efficiency.

In Ethiopia this concept can be true, even though there is multiple ports customers choose shipping services provided by foreigners shippers than Ethiopian shipping and logistics service enterprise due to their level of efficiency (ESLSE NEWS LETTER). For instance when ESLSE discussed with steel importers, customers raised major problems observed on the part of enterprise port. The import of steel they bring from abroad within tiresome due processing of foreign exchange, often face a problem of timely availability of vessels. This delays of Ethiopian ship freight in the port of origin had been forcing them to choose foreign vessels, in order to prevent their foreign exchange period expire unduly. Suarez, Morales, Serebrisky and Trijillo (2006) that ports in the developing world have varying levels of productivity and efficiency, regardless of the region or country in which they are located. Thus, ports in the developing world, and within countries themselves, should not be considered as homogeneous units of production. As significant positive relationship is found between port operating efficiency and operational

performance, giving special attention to operating efficiency next to human capital is very important in Modjo dry port. Hence the fourth hypothesis is supported.

Lastly the result shows that information capital has the lowest direct effect of (0.079) when compared to other variables. This shows that, when information capital goes up by one standard deviation, port operation performance increase by 0.079 standard deviation. On the other hand, this result shows that currently information capital at Modjo port and terminal needs special attention to boost operational performance. According to (UNCTAD, 1992) the port administrative efficiency in third generation ports compared to the second generation ports has been enhanced due to advanced information and communication technology (ICT) (Minho, 2017). Other study shows that, A higher worker commitment and loyalty leads to a better workplace performance (Brown et al., 2011). Various studies on the performance effects of IT investment found a statistically significant relationship between information and technology (IT) usage and firm performance (Weill, 1992, Keramati, 2007). Pett and Jones (2001) investigated the relationship both between IT investment and firm performance and between quality of data and firm performance. They found the companies that manage quality of data show a better performance than the companies that do not. Sheng and Myr (2002) analyzed IT effects on firm performance and found statistically significant relationship between the IT usage index and the firm performance index. The index he used for IT usage is IT in communication, IT in production and operations, IT in decision support and IT in administration and pecuniary affairs. Therefore in Modjo dry port and other Ethiopian dry ports, the port's databases, information systems, networks and technology infrastructure, should be reconsidered for the ports to provide efficient port and terminals services at lowest cost. Hence the third hypothesis is also supported.

Generally, Kaplan and Norton (2000) stressed that desired strategic outcomes could be achieved by appropriate deployment and effective utilization of intangible assets in the information era. They also commented that investment in only one of those assets but not all would lead the organization to fail. In other words, both tangible and intangible items should be linked to the firm's strategy together. Therefore, Modjo dry port should consider all tangible and intangible resources like human resources, infrastructures including ICT and operating efficiency effectively to improve dry port operational performance.

Hypothesis	Relationship	Total Effect	Direct Effect	Indirect Effect	VAF	Decision
H1	PI Š POP	.371**	.291**	.080*		Supported
H2	OEŠ POP	.553*	.247**	.306*		Supported
H3	HC Š POP	.656*	.359*	.297**		Supported
H4	ICŠPOP	.297**	.079*	.218*		Supported
H5a	PIŠPSP	.093*	.093*		0.215	partially mediated
H5b	OEŠPSP	.354*	.354*		0.554	partially mediated
H5c	HCŠPSP	.343*	.343*		0.453	partially mediated
H5d	ICŠPSP	.252*	.252*		0.734	partially mediated
	SPŠPOP	.864*	.864*			

GFI=.860, AGFI=.0.839, NFI=.0.863, IFI= .993, TLI=.992, CFI=.993 and the RMSR =.015
Note: all of the effects are **Significant at $\alpha < .001$ (two-tailed test).

Table 4.7: direct, indirect and total effects

4.8. Mediating Role of Port Sustainability Practices

In addition to direct effect between exogenous and endogenous variable the indirect effects were also tested by including port sustainability practices as mediating variable in to the model. After sustainability is added in to the model R^2 value of the path coefficient through total effect are increased. This shows that the inclusion of port sustainability practices mediates the relationship between port resources and operational performance.

The result shows that the operating efficiency of the port has the highest indirect effect on port operational performance with R^2 value of (0.306); followed by human capital (0.297), port infrastructure (0.218) and information capital (0.080). More interesting is the examination of total effects (indirect + direct effect). Specifically, we can evaluate how strongly each of the four formative driver constructs (HUMANCA, OPEREFF, PORTINF, and INFCP) ultimately influences the key target variable PORTPERFOR via the mediating construct SUSTAI.

Here we can see that among the four driver constructs, human capital has the strongest total effect on operation performance ($R^2 = 0.656$), followed by operating efficiency ($R^2 = 0.553$), port infrastructure ($R^2 = 0.371$) and information capital ($R^2 = 0.297$).

The result of VAF (indirect effect/total effect) shows that a sustainability practice partially mediates the relationship between port resources, human capital (0.453), information capital (0.734), infrastructure (0.25) and operating efficiency (0.556).

In literature, port resources mostly, have been linked directly to port operational performance and sustainability practices are related also directly related to port operational performance. The findings of this research find the mediating role of sustainability practices between resources and operational performance.

Therefore the result of path VAF shows that, Hypothesis 5a are also supported which indicate that higher levels of port sustainability practices may lead to improved port operational performance.

This means if dry ports review their sustainability practices from time to time, introduce new innovation process and practices (like eco-friendly technology, and alternative energy sources), it allows continuous port operational performance.

On the other hand if the ports continuously monitors and improve services and facilities (e.g., replacement of older equipment, continuous employees training and educations, and service quality improvement) it leads to better port operational performance which is sustainable.

The study also shows that the emphasis by ports to improve operational efficiency through internal system growth (like simplifications of custom procedures, IT integration etc) allows continuous port operational performance improvement. In addition to this the Modjo dry port works and communicates with port stakeholders and communities by sharing instant information and actively participate employees in decision making it leads to higher operational performance in long run.

This means that, it is possible enhanced sustainability practices and increased port resources could have improved the levels of port operational performance. Improvements in port resources may enable a port to implement a higher level of sustainability practices due to the need for a port to sustain in the future and keep meeting the country's and stakeholder's trade needs.

On the other hand, enhanced operational performance provides a port increased capital; by reducing costs to buy or implement various port resources. Likewise, enhanced operational performance could have increased the sustainability practices of a port. For example, a port

with highest level of quality service at fastest dependable delivery time and lowest cost can sustain in future business as port customers are sensitive to these factors.

Previous studies shows that sustainability practices allow performing outstanding activities in port operations, ports can have the opportunities to achieve a sustainable competitive advantage from improving sustainability (Lun, 2011; Adams et al., 2010), which explains the role of sustainability practice as mediator between the relationship between port resource and performance.

The results imply that the level of sustainability practice significantly influence improvement of port performance including financial and non-financial aspects, as confirmed by prior studies (McGuire et al., 1988; Orlitzky et al., 2003; Zhu et al., 2004). Therefore, it is identified that sustainability practice in port operations play an important role in the improvement of operational performance as identified by the firm's resource and level of implementation.

From the above discussion it can be concluded that, port sustainability practices mediates the relationship between port resources (tangible and intangible) and port operational performance. Hence H5a and d, are partially supported.

4.9. Document Review

After the empirical results obtained using questionnaire were analyzed, different document (like dry port operation manual, ESLSE NEWS LETTER, maritime journal, port brochure, citizen charter, 9 months port performance paper and etc) are reviewed and analyzed from port resources and sustainability perspective as follows:

4.9.1. Introduction:

Following the overall economic development of our country in the last years, it can be understood that the movement of import and export product movements has been increased by quantity and types of products.

Strategic Missions Considered When the Port Was Established

1. To minimize the demurrage costs paid in foreign currency exchange to Djibouti port and to provide container freight station services in the country (different document facts shows that Ethiopian government has been paying \$700 million USD demurrage costs per year)

2. To minimize import and export products dwell time at Djibouti ports and to fasten import and export trades. (on average the dwell time import and export products at Djibouti was 45 days and currently it is reduced to less than 5 day)

In continuously developing the economic, social, political and overall development of the country implementing the policy and procedures that can serve import and export trades of goods effectively, efficiently and in a cost effective manner is the most important thing to be considered. Following this in order to provide quality service expected of the sector, three enterprises that has been working in isolation, but providing related and similar services namely (Ethiopian maritime trade enterprise, Ethiopian shipping and freight forwarding service enterprise, Ethiopian dry port service enterprise and COMET transport enterprise) had been amalgamated under Ethiopian shipping and logistics service enterprises following the decision of council of ministers based on proclamation number 55/2004 from 3/11/2004 on.

Due to the merging of these enterprises, it was found necessary to change the service providing procedures under which these enterprises have been working in isolation. Even though there was a dry port operations manual before the amalgamation of these four enterprises, the port didn't abstain from operating the port.

As these enterprises have been working separately, it is obvious that focusing on the previous operation manual would lead to inequity service provision. So in order to close the gap, basing the port operation load starting from gate (when import or export truckers enter port and terminal) until they are served, and transfer of goods took place, new operation manual has been developed and been implemented. But after 6 years of operation, by considering different challenges that have been encountered during the implementation of the manual and by including different procedures that didn't included, this year (2010) new dry port operations manual was prepared and distributed to all dry ports in Ethiopia, in order to provide enough, speed and consistent port services and to contribute to the growth and transformation plan that our country have started, via bringing change expected in the sector.

Current status Currently the port has 62 hectare working area and have 82 hectare for future expansion. The port is located 70 Km from Addis Ababa to the south and 15 Km from Adama in low land area with altitude of 1780M. Modjo dry port has access to express road and Djibouti to Sebeta rail way. In terms of throughput share, the shares the largest share of

78.8% followed by Kaliti dry port which shares 11.90%. The rest throughput shares are shared by Dire Dawa (4.19%), Mekele (4.19%), Kombolcha (1.99%) and Semera (0.61%) respectively.

In terms of human resources currently there are 477 (372 male and 105 female) permanent employees in the port, 107 (52 male and 55 female) contract employees, and 400 (397 male and 3 female) daily laborers. Today as of 19/4/2018 the port have 984 employees.

In terms of infrastructural development in 2009 the port was on 15 hectare (on read ASH), in 2010 expanded to 2.5 hr, 2015 expanded to 20 hr, in 2016 expanded to 30 hr (developed concrete Terminal), and 2017 expanded to 62 hr and 82 hr under expansion.

In terms of handling capacity Modjo port terminal handling capacity in 2009 was 945 TEU, followed by increment to 1575 TEU in 2010-12, 726 TEU in 2015, and 14, 908 in 2016 container at a time. As today container on hand are 6767 or 7150 TEU.

In terms of port equipment and facility there 10 reach stackers, (2 are not working), 3 empty container handler, 9 terminal tractor, 9 terminal chassis, 15 forklifts of different capacity, (2.5 and 10 ton) two power backups of diesel generator sets 640Kw and 240Kw, and 2 fire fighter truck. In the port there is one pipe line, 2 RTG rail way usages, and 13 reach stacker machine.

As the performance measurement of annual plan shows this year (2018) the average productivity of R. M is 22BOX/hr, availability of machineries is 89%, the port is operating for 24hr, 7 days a week and customers are being served as per the standard charter.

Containers that are received for last 7 years shows that, in 2009 (12, 337 TEU received), in 2010 (10,789 TEU received), in 2013 (39,461 TEU), in 2014 (54,044 TEU), 2015 (86,160 TEU), 2016 (124,949 TEU), and 2017 (133,070 TEU).

Container throughput for the last four years shows that, in 2014 (207,645 TEU), in 2015 (341,712 TEU which is 64% relative to 2014), 2016 (484,173 TEU, which is 41% relative to 2015), 2017 (534,355 TEU, 11% relative to 2016).

Facts of ESLSE; Modjo Dry port starting from port of loading to port of destination well time of containers at Djibouti is 6 days, from Djibouti port up to Modjo dry port, using inland transport it takes 16 hr. or maximum of 3 days, using rail mode of transportation it takes 8 up

to 9 hrs. During the shipments there are different special packages provided by port for domestic and foreign manufacturers. The following priorities are given at port:

- Priority given at time of unloading moving containers to terminal from warehouse, CFS, un-stuff to track and dangerous area.
- Priority given for manufacturers at time of loading and unloading
- Priority given at time of terminal operation office, door to door service and facilitated separated window for manufactures, provide empty container transport for exporter without payment.
- ESLSE discounted for the foreign manufacturers who export its product: for sea transport 5%, for inland transport 25%, container release (DO) given without cash deposit.

Investment in port resources at Modjo dry ports by ESLSE: in 2017, a loan of 150 million USD was received from World Bank for dry port expansion purposes like; for IT infrastructure (20 million), for 2.8 KM rail way infrastructure (35 million dollar), for improving human resource capability and the rest for buying additional port handling equipments and especially for port expansion on 82 hr for export purpose which is at designing phase (out of which 2hr is for export cargo stuffing and stuffing warehouse expansion).

Above all these results are summarized in table 4.9

No	Variables Considered	Years	Change
1	Infrastructural development	2009	1.5 hec (on read ASH)
		2010	Expanded to 2.5 hec
		2015	20 hec
		2016	30 hec (developed concrete terminal)
		2017	62 hectare
2	Terminal handling capacity	2009	945 TEU
		2010	1575 TEU
		2015	12, 726 TEU
		2016	14, 908
		2017	6767 box or 7150 TEU
3	Containers received in past 7 years	2009	12,337 TEU
		2010	10, 789 TEU
		2013	39, 461 TEU
		2014	54,044 TEU
		2015	86,160 TEU
		2016	124,949 TEU

		2017	133,070 TEU
4	Container Throughput for Last Four Years	2014	207,645 TEU
		2015	341,712 TEU (64% relative to 2014)
		2016	484,173 TEU (41% relative to 2015)
		2017	2017- 534,355 TEU (11% relative to 2016)
5	Existing Port Equipment and Facility	Type	Quantity
		reach stackers	10 (2 are not working) And 13 new ready to be received
		Empty handler	3
		Terminal tractor	9
		Terminal chassis	9
		Forklift of different capacity	15 (2.5 and 10 ton)
		Power backups of diesel generator	2 (sets 640Kw and 40Kw)
		Fire fighter	2
		R.T.G rail way usage	2
6	Performance (2018)	Measures	Performance
		Average productivity of R.M	22.5 box/hr
		Machine availability	89%
		Port operating time	24/7
		Customer service	As per standard charter
		Dwell time of container at Djibouti	6 days
		From Djibouti to Modjo dry port under inland means of transport	16 hrs or max 3 days
		From Djibouti to Modjo dry port using rail	8 up to 9 hrs

Source: researcher survey 2018 (document review)

4.9.2. From Port Sustainability Perspective

In this document review, in addition to port resource perspective, the researcher tried to review the issue of dry port sustainability in the last years in terms port contribution in creating job opportunities for local peoples, in terms of continuous monitoring and improving port service and facilities, in terms of internal system growth, and in terms of port's close connection with port stakeholders.

In terms of continuous monitoring and improving services and facilities the replacement of older port equipments, employees training and service quality improvements Modjo dry port is showing dramatic change in past 9 years, which is analyzed as follows:

- In terms of infrastructural facilities : for the last five years the port facilities in terms of land expansion has increased from 1.5 hectare of arid ash to 62 hectares with additional 82 hectares under expansion.
- In terms of storage warehouse supply capacity the port storage capacity has increased from 3000 hectare to 21,600 hectare width, with the capacity to inspect 240 containers at ones. The warehouse expansion process is still under construction and when the project is completed, the port will have 6 warehouses (on 5400 hectares for each).
- The level of service provision at the port the port has made better progress in bringing different sectors that have to be in port to provide services for importers (like customs, health, ministry of trade, transportation authority, banks(3 banks) and transportation and transit community. The port is providing port operation services at 24 hrs, 7 days a week (24/7) by three shifts. All services in the port are being provided in the port as per the standards set for them. The container throughput per day has exceeded 2000 containers on average. On day, the numbers of containers stacked at the port are 6838 box, or 9874 TEU.
- New port procedures started in the port in 2010
 1. Connectivity of newly constructed rail way to port has taken place
 2. RMG (Rail Mounted Granty Cranes) for loading and unloading of rail-has started service at the port for the first time
 3. The port is making enough progress on customers products to be received within one day from Djibouti to Modjo using rail without any damage
 4. From 22/3/2010 to 22/6/2010 (within three months) newly started rail transport has transported 3906 TEU per 37 trips and up to 10/08/2010 rail has transported ---TEU per 75 trips.

Advantages of newly started railway transport from Djibouti to Modjo dry port

1. By reducing the amount of container dwell time at Djibouti, it is fastening the movement of country,s import/export
2. It supports the logistics procedures of using one single documents to transport products by combining containers ordered under one loading document
3. It is highly contributing to deliver customers products without any damage up to port
4. It has reduced the lead times of inland transport that took 3 days from Djibouti to Modjo to less than 1 day.

5. It has reduced the warehouse demurrage fees and Djibouti ports that have been paid by foreign currency exchange.

Ports contribution in creating jobs and other opportunities for society. From the establishment of ports till now, the port has created job opportunities for 475 permanent employees, for 400 day laborers, for 29 container workers, for 56 cable, in total the port has created job opportunities for 959 employees. In 2017 the port has donated 35 million birr for infrastructural developments of Modjo town. In addition to this residents are gaining different trade and business opportunities.

4.9.3. Challenges Facing Modjo dry Port and import and export trade in Ethiopia

Trade plays a key role in achieving the objectives of growth and transformation of the country and in driving sustained poverty reduction in Ethiopia. Abundant low cost labor provides Ethiopia with a comparative advantage in less skilled, labor intensive sectors such as light manufacturing. Previous analysis suggests that factory floor costs in Ethiopia in products such as garments, footwear and other leather products and processed food are lower than those in China and India. These competitive advantages are complemented by the tariff preferences that Ethiopia enjoys in key markets such as the US and EU. However, studies shows that the potential to export such products is constrained by a number of key supply side factors. This lack of competitiveness is reflected in the fact that despite the advantages of low labor costs the unit value of Ethiopia's exports of light manufacturing products at a point of export are considerably higher than those of China and competitor countries elsewhere in the world.

- As a newly stated Ethiopian trade logistics project report shows, one of the key factors that have been identified as undermining international competitiveness is poor trade logistics. A number of recent reports have drawn attention to the trade logistics sector in Ethiopia as being a critical constraint to current trade flows and a bottleneck to further economic growth and development. The latest of LPI (logistics performance index) by World Bank shows, logistics sectors performance in Ethiopia appears to be considerably behind those of competitor countries in Asia as well as certain other landlocked countries in Africa, such as Uganda. In terms of actual costs it has been calculated that for a twenty foot container of garment exports to Germany,

Ethiopia's logistics costs are 247% higher than those of Vietnam and 72% higher than those of Bangladesh.

- Other factors that have been identified as undermining competitiveness include lack of industrial land, limited access to finance and the availability, cost, and quality of inputs

Different documents and reports Modjo dry port and ESLSE shows that, the main bottleneck on the logistics supply chain for containerized imports is currently the dry port at Modjo. The key issues are at the main nodes of the logistics supply chain for the Ethiopia Djibouti corridor at the Port of Djibouti, the border crossing at Galafi, the dry ports, such as at Modjo, and distribution/consolidation centers for agricultural products. There are challenges at each of these main nodes which lead to delays, uncertainties and increased logistics costs. These challenges include:

- For inbound container traffic, the constraints are most apparent at Modjo and are manifest through long delays, significant uncertainties and unnecessary costs.
- Modjo regularly reaches its terminal capacity very quickly and stays crowded thereafter.
- For Multimodal traffic- which currently accounts for more than 85% of containerized imports, 86% of the total transport time is spent at Modjo.

There are also significant operational constraints at the Modjo dry port including:

- a) Insufficient cargo handling equipment
- b) Lack of facilities for stuffing of export containers and unstuffing of import containers,
- c) Lack of proper systems for the management of the facility, leading to delays in locating containers and necessitating increased moves of boxes; the port is operating without a proper TOS(Terminal Operating System) and gate system
- d) Increased congestion around the facility due to poor traffic flow patterns and lack of parking spaces for trucks;
- e) Poor port security as evidenced by the absence of CCTV; and
- f) Lack of facilities and readiness to handle inbound and outbound railway traffic when commercial operations start in early 2017.
- g) Underinvestment in facilities and equipment,
- h) poor operational procedures and control, and

- i) Lack of yard management system is responsible for the excess time for truck turnarounds and for 35%-40% of the container dwell time.
- j) For bulk imports the key weakness is the lack of storage and handling facilities in Ethiopia.

4.9.4. Measures Taken To Overcome the Problems

The government of Ethiopia is taking several steps to improve the transport and trade infrastructure in Ethiopia, through Ethiopian maritime authority, transport authority, ERC (Ethiopia Railway Corporation), Ethiopian shipping and logistics service enterprise and etc. to overcome trade logistics problem in Ethiopia, the government is focusing on Modjo dry port and terminal and striving to make it logistics hub across Ethiopian trade routes. Measures taken so far and underway by the government are summarized as follows:

- Through ERC Ethiopia recently completed its first rail way that connects the country with Djibouti and from construction rail spur into the Modjo facility. Regarding railway infrastructures ERC currently owns a fleet of 32 locomotive and around 1,100 wagons out of which 990 are designated for different kind of cargoes and 110 to transport fuel.
- The GoE borrowed 150 million USD and undertaking expansion project for Modjo dry port as will become the major logistics hub in the country.
- The GoE is also heavily investing in road network of Ethiopia-Djibouti corridor via Galafi, Dire Dawa and Dewele.
- As different industrial park are under constructions, important investment that will link industrial parks to the main transport corridors (mainly Modjo terminal) within Ethiopia and onward connectivity to port of Djibouti (expressway development project of Batu-Arsi Nagelle sections of Modjo-Bawassa Development corridor is one example).
- To manage these objectives the GoE through Ethiopian Maritime Affairs has finalized a National Freight Logistics Strategy (NFLS) for Ethiopia which is expected to provide an assessment of Ethiopia's logistics sector, identifies the main logistics impediments and provides key recommendations to transform the sector. The NFLS outlines key strategies along with corresponding interventions and implementation in five areas: (1) improving logistics service offerings, (2) improving trade finance, production and the distribution network, (3) improving and developing trade logistics

facilities and infrastructure, (4) Implement an efficient transit trade facilitation, and (5) Set up effective logistics governance

Therefore if the above investments undertaken as proposed, the logistics sector of the country is expected to flourish.

4.9.5. Performance Result of the Modjo Dry Port and ESLSE In 2018

The Ethiopian shipping and logistics service enterprise, 2018 quarter performance said encouraging. As ESLSE has been given a shared duty and tasks to bring about efficient and cost effective logistics services in line with the Nations Growth and Transformation Plan; it has prepared its 2010 EFY (Ethiopian fiscal year) plan and has been striving to accomplish its quarterly plan expected tasks as per its annual plan projected for the new budget year.

Accordingly the report expounding the results of the accomplishment of the enterprise quarterly plan, has disclosed that the company has secured an encouraging achievements in all its four sectors; including in its Babogaya Maritime and Logistics Academy.

Hence, it, s underscored that in the first quarter of the enterprise annual plan; having planned to earn 456.5 million birr net profit, it has been able to get 339.9 million birr which is 74% of the plan. This has remarkably shown an increase of 96.3 million birr profit which is 39% increment, compared with the achievement of its last 2009 EFY plan accomplishments.

Looking the accomplishment of the shipping sector, planning to provide transit service on 110 foreign international ports within an average of 21 days it has been able to provide services with 22.6 days and this has accounted to be 96% against the planned 98.7%. on the same sector it has been able to provide ship carriage services for 985,869 tons of cargos of import and export goods and 70,141 tons of cross trading cargos.

Looking the containerized cargos however there has been a plan to increase the provision of multimodal transport services for containerized cargos and the sector provision of shipping services for these cargoes has reached only 96%. On the other hand its achievements have been less, with regard to provision of services for moving ~~RO~~ cargos that are more than three tons.

Regarding the accomplishments of enterprises various capital projects accomplishing 0.06% of the Modjo 3rd phase dry port expansion construction; it has been able to complete the hitherto third phase construction performance to 76.26% and its financial accomplishment to

44.44%. With regard to the construction of closed warehouses (No. 3 and 4) up on an area of 5,400 square meter; planning to accomplish 19.03% of the fiscal project activities, it has accomplished 10.03% of the planned activities.

By large the report has disclosed that the construction of the closed warehouses has reached 86.14%.

The freight forwarding and logistics services accomplishment in the report has shown that it has been able to move 54,947 TEU and 1942 RO vehicles in number to inland dry ports and to bonded warehouses.

Moreover, it has been able to move 515,438 tons import and 74,498 tons export of all cargoes through multi-modal transport services.

The report further disclosed that it has been able to provide services for 54,054 TEU full containers or for about 205,890 TEU containers throughputs, 169 RO vehicles in the closed mega warehouses that are developing dry ports.

In general, the enterprise, planning to get revenue of 5.003 billion birr from services it has been providing, with an expense of 4.558 billion birr for operational and administrative costs, it has been able to earn a profit of 339.9 million during the first quarter of the 2010 EFY annual plan period ESLSE NEWS LETTER (Jan. 208)

Similar report shows that, In terms of port and terminal sector, the annual plan accomplishment of ports are successful. During the half year the report points a container throughput of 388, 092 TEU has been in and out the inland port and 101, 40 TEU full containers and 3,760 RO cargoes have been handled in the port. Moreover 48,011 TEU containers have been stuffed and about 78,332 tons of cargoes in closed warehouses services. Totally the throughput of the incoming and outgoing containers have been 388,092 TEU and these were 105% of the plan compared with the accomplishment of the last same budget year. An increase of 13,022 TEU (15%) of import containers, 7860 TEU (9%) full export containers and 6,713 TEU (8%) outgoing containers are observed. In general an increase of 35,400 (10%) container throughputs is observed during the annual plan period. Similarly planning to handle 10,302 import RO cargoes a total of 3,760 (36%) are given cargo handling service during the annual plan period. With regard to RO cargoes a decrease of 1,152 (23.5%) is observed when compared with bi annual plan of 2017. The reason for the decrease of these vehicles are 3 tons and arrive at inland port

driven. The increase of container ~~RO~~ vehicles coming into inland port has also been a major reason for the decrease of ~~RO~~ vehicles during the ~~ba~~ annual plan.

4.10. Interview Result

In order to validate the results of statistical analysis measured by SEM, the researcher interviewed Modjo port and terminal director (Mr. Dereje Mideksa). Based on all variables under investigation, the researcher asked port director 1 question per variable. His answers were analyzed as follows:

1. Please could you tell me the overall status of Modjo port and terminal infrastructure status and its effects on port operational performance?

Answer: yes. From infrastructure perspective our port has average infrastructural capacity. In order to handle cargo we do have above average container handling equipments (but not enough) and the quality of these equipments are at medium. The current storage capacity is also not enough to handle both import and export cargoes as 95 % of import and export cargoes are handled at our port. In terms of rail way, we recently started rail transportation which has transported more than 7918 containers per 75 trips and for loading and unloading of train 2 RMG (Rail Mounted Gantry crane) started job for the first time at our port. As the port is congested around gate, the new automated gate is under construction and when it is completed CCTV cameras will be installed which makes the container inspection and security simple and reduce gate congestion. In terms of ~~the~~ port is operating without TOS which will make container location easy to find when installed. As general the current infrastructural capacity of our port is not enough to handle incoming and outgoing containers, but since we use the scarce resources effectively it has positive effect on our operation performance.

To overcome these problems, recently, the World Bank's Executive Board have approved a new \$150 million project to increase the efficiency of trade logistics in the country that will focus on improving the Modjo Dry Port, a key transportation hub that handles 95 % of country's trade.

The project will expected to support investments in physical infrastructure, human capacity development and ICT systems, as well as regulatory improvements which will increase exports, generate jobs, and raise incomes of producers and traders.

In terms of information capital, ESLSE has signed an agreement with an American giant software technology and data base oracle to implement an internationally sized oracle fusion cloud computing software project. The objective of the software technology is to make effective and efficient communication b/n the internal and external customers of the port and to share updated information with port stakeholders.

This result validates the statistical result of port infrastructure and ICT capital, which can be confirmed that port infrastructure and information capital has positive effect on port operation.

2. Could you please tell me about the current human capital of your port in terms of workers knowledge to perform job and training provided by port to upgrade their skills?

Answer from port director: in terms of human capital we have enough human resource who can handle containers even when the port is congested. With regard to skills, most of our workers have enough skill in operating the port. Previously, within Ethiopian port sector the area of port skills have been largely ignored as the country is landlocked and most of the workers have management and accounting skill than logistics and supply chain management. But as port is one part of supply chain recently we are providing enough shipping and logistics related training for employees. In addition to this our workers started to join master,s degree in logistics and supply chain management. This means from supply chain management perspective most newly employed workers lack common port skills like; logistics management skills, commerce skills, data management and interface solution skills, route scheduling and planning skills, supply chain management skills and new technology skills applicable to supply chain distribution. But after the gate training mostly at Babogaya logistics academy they are handling the port in a most efficient way.

From this we can understand that human resource is the major resource possessed by Modjo dry port which is positively affecting operation performance at the port. But form interview result we can understand that employees lack logistics skills when the employed in the port. This maybe due to absence of national logistics centered institution and due to the fact that the academic content thought in logistics courses at tertiary institution is not aligned with the domestic logistics trade. Therefore national logistics centered institutions currently needed in Ethiopia than ever to save the country from international logistics cost by producing

human capital skilled in logistics and international trade. This interview result also supports the statistical result.

3. Can you tell me please how the port is operating in ensuring efficiency?

Answer: in our port we have citizen charter and we are delivering every service in the port as per the standards set for them. For example for containers that are released from the port it takes 7 minutes to receive and prepare good release request (GRR), all service operation in the port has this kinds of standards. Even if we didn't start one window concept in our port we providing customer service under one building centre (that means all processes are finished in one room). The port operates 24 hour, 7 days a week. And these services are provided. When compared with last 7 years the port productivity has increased in last two years (2016/17) than before and we are doing all we can to improve efficiency as this port is the only port serving the country at most.

Form this we can understand that port efficiency positively affects port operational performance.

4. Please can you tell me something about port costs or corridor cost from Modjo to Djibouti and the time it takes to deliver container from Djibouti to Modjo?

Answer by port director the corridor cost of Modjo to Djibouti is still very high. We shift only the area of container temporary storage from Djibouti to Modjo. Previously the containers imported from abroad lie or temporary stored at Djibouti port until shipment owners collect their containers. At that time it takes up to 42 days of container dwell time at Djibouti. Therefore, during that period, we have been paying high dollar amount of demurrage costs for Djibouti port. But recently until multimodal transportation system start the container dwell time at Djibouti is reduced from 42 to 7 days, hence the warehouse demurrage fee paid in dollar is reduced. But the problem is the container dwell time at Djibouti is now shifted to Modjo dry port and on average it takes up to 2 hours for shipment owners to collect their containers. That means, the only change is we shift the area from Djibouti to Modjo and changed currency paid in dollar to Ethiopian birr. Interns of port service charge we are collecting reasonable, fair and competitive services charge from customers.

He added that, to deliver containers from Djibouti to Modjo it takes 42 hrs or maximum of 3 days under inland transportation, and it takes 48 hrs under rail transportation.

From this one can understand that, there is a dramatic change in container delivery time and dwell time. In terms of cost the only change is from dollar to birr and from Djibouti to Modjo. This shows that, the problem is not from terminal but from customers in collecting their containers.

5. Does the port is flexible enough in handling special services and types of cargo, in such a way that customers can depend on Modjo dry port?

Answer: In terms of flexibility we respond to customers need as per their request. In the port we have special request form. In case any complains arise from customers, we have customers complain handling way. Customers can inform their complains, through oral by presenting to the port, through verbal (in written form), through suggestion box installed in the port, through fax, through our web site (www.ethiopiashippinglines.com) and through email (esl@ethionet.et) and etc. we also update if there are new information to reach customers through our website and bill boards. So based on customer complain we respond to their complain step by step.

In terms of cargo type, we have a capacity to handle different types of cargo like, break bulk (e.g., barley), general cargo (e.g., steel), RORO (vehicle cargo), dangerous cargo, reefer cargo, and etc. out of this 45% shipments are break bulk cargo, and 35% are general cargo, which are handled under 7880% of multimodal system. So our focus is on containerized cargo. As it is our responsibility to keep these containers safe and secure customers are satisfied with this regard.

Thanks for your answer; but please can you tell me something about your overall port supply chain management and your overall interaction with port stakeholders?

Answer: the concept of modern supply chain management is not being applied in our port. We are still on traditional way of handling the overall logistics. Every process from port of origin to destination are managed as a chain of supply, but we are not master overall management, as the supply chain is new for the country and human resource on supply chain are scarce.

We regard to the overall port stakeholders we have good relationships. From time to time we discuss we discuss with port communities including stakeholders from (local public, laborers, importers and exporters, all sectors under ESLSE and etc)

From this we can understand that, Modjo port and terminal is flexible enough to serve customers. And as the issue of supply chain is not fully being applied, what holding them back.

6. Please tell me what contribution this port is contributing to society and the economy of the country.

Answer from interviewee; in terms of socio-economic factor this port is highly contributing to the development of the country, GDP as a big logistics centre in the country on which import and export trade of the country depends. From social perspective we are contributing to different infrastructural developments in the country and particularly to Modjo town. The port has project called RAP (replacement action plan) to keep social responsibility. For instance in 2009 E.C we provide 16 million birr for displaced peoples from around the port area due to port expansion, and also we provide 35 million birr for infrastructural development of Modjo town. In terms of employment opportunities the port hired more than 950 employees out of more than 400 are daily laborers from Modjo and rural surrounding area.

From this one can understand that the port is highly contributing to the country's economy as the country fully depends on it in terms of import export.

7. Please can you tell me, if there are some environmental problems being imposed by the port?

Answer: in terms of environmental factor, there is no wastage that we release to the surrounding environment, but due to some old aged trucks the gas that they emit may affect the environment by polluting air quality and their noise may affect social living around the port.

8. Inters of port management, please can you tell me the port is managed? Is it being managed only by government or there are some private sector participations?

Answer by port direct: in terms of port management the port is fully managed by government (especially all shipping and logistics services are provided by government). The only service provided by privates are forwarding and transiting service, which accounts for 6-7%.

This shows that the port is fully managed by government as operating port than landlord ports.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of the Major Findings

In this thesis the effects of port resources (port infrastructure, operating efficiency, information capital, and human capital) on port operational performance were analyzed. Furthermore, in order to see how port translates its resources in to higher operational performance through implementing sustainability practice or the mediating role of port sustainability practices in explaining the relationship between the two was tested by using SEM in Amos 23. Hence the results are summarized as follows:

- Prior works on port sustainability practices considered the importance of environmental perspectives on sustainable and responsible business to assist ports to proactively incorporate sustainable practice in to operation. In contrast, basing RBV theory and sustainability concept, this study has highlighted the criticality of operational sustainability in managing port operational performance in order to encourage proactive adoption and/or implementation of operational sustainability practice in container dry port operations.
- To conduct the study 209 respondents took part in the study; where 201 cases were used after outliers were deleted from databases.
- To test the proposed theoretical model, a number of items were adopted and developed for each constructs under investigations using comprehensive literature review. After the model was developed from theory data were collected using 209 respondents from Modjo dry port and terminals through questionnaire, and in order to validate the statistical results found, document review and interview took place and analyzed through thematic analysis.
- Following the two step approach the measurement model were tested before analyzing the structural model. Convergent validity was assessed using EFA. The result of EFA shows that all items are loaded on their respective constructs as proposed. Furthermore, CFA was performed on all scales in AMOS 23. The result of fit indices in CFA shows high degree of reliability and convergent validity. Reliability of the measurement model was tested using (item reliability) cronbach alpha, composite reliability, and AVE, whereas discriminant validity were tested using inter

correlation between constructs. Thus, all constructs qualify for use in testing and evaluating proposed hypothesis in SEM model.

- The structural model was analyzed based on described measurement models in analyzation part. All goodness of fit criteria (GFI, AGFI, CFI, NFI, TLI, IFI, CMIN/DF and RMSEA) indicates that the research model fits the sample data well. For each path, direct and indirect (computed path), the path coefficient were calculated and its statistical significance assessed.
- The model result shows that port resources have both direct and indirect effect on port operational performance. From direct effect, result shows that, human resources has strong significant effect on port operational performance ($t=0.359$), followed by port infrastructure ($t=0.291$), operating efficiency ($t=0.247$), and information capital ($t=0.079$) respectively.
- After sustainability practice was included into the model the computed path coefficient and total effect shows that by human capital ($\beta=0.656$) followed by operating efficiency ($\beta=0.553$) has highest total effect on operational performance. The total effect of port infrastructure ($\beta=0.371$) and information capital ($\beta=0.297$) has substantial effect on port operational performance.
- The result of VAF shows that port sustainability practices partially mediates the relationship between port resources and operational performance.
- The result of document analysis shows that, even though the port has shown dramatic change, particularly during the year (2016 and 2017), the resource like infrastructure, human resources, and information capital are not enough in sustaining port operational performance. In explaining the relationship between port resources and operational performance, operations sustainability practices at the port is also not to the extent needed.
- Supporting this, the interview result also shows that the current port infrastructures are not enough in order to handle container efficiently. The result also shows that human resource at the port need additional skills with regard to logistics and port supply chain management. The result further shows that the information infrastructures at the port need further investment to support sustainable port operation.
- To solve these problems, via ESLSE the port has borrowed 150 million USD from World Bank group (WBG) to improve infrastructure, information capital, human

capital and overall operating efficiency. But these measures taken by the port are not enough in ensuring operational efficiency at the port. Therefore considering these results the researcher has concluded the major finding and recommended additional measures to be taken as follows.

5.2. Conclusion

This section outlines the conclusions for each hypothesis compared with the findings detailed in Chapter 4.

- From the statistical SEM analysis performed, the study establishes that port resources (port infrastructure, operating efficiency, human capital, and information capital) strongly influence dry port operational performance which is statistically significant.
- It was further observed that port resources have significant positive effect on sustainability practices and sustainability practices have strong positive effect on port operational performance ($R^2 = 0.86$, at P value < 0.001).
- Port sustainability practice was discovered to partially explain the relationship between port resources and operational performance
- The study shows that human resource² (R² = 0.59) is the most important factor to be considered in improving both sustainability practices and operational performance. Kaplan and Norton (2004) have stated that employees who have the right skills, talents, and knowledge contribute the most to enhancing organization's internal process and performance. In addition to this, different previous studies show that in order to respond to volatile demands caused by market uncertainty, ports should invest in intangible resources like human resource (Marlow and Paixao, 2003; Kaplan and Norton 2004) Therefore hypothesis 1 was supported
- It was also found that port infrastructure² (R² = 0.291) has the second most significant positive effect on dry port operational performance. This result is supported by previous studies. Nyeme S., (2014) stated that port infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing seaport connectivity for economies heavily dependent on international trade. In addition to this the study by Gujar G., (2011) shows that, as port infrastructure usually container handling equipments are viewed as the main machines for dry ports as well as seaports, and they can greatly influence both the container handling capacities and, in turn, the performance of the dry port. Hence hypothesis 2 was supported
- It was further analyzed found by analysis that port operating efficiency (operating procedure) has also substantial effect on port operational performance² (R² = 0.21). From resource based perspective port operating efficiency in ports is considered as

total throughput, terminal productivity, custom procedures, cargo handling speed, service reliability, number of commercial ship visits, vessel size and cargo exchange, nature and role of the port, port functions and infrastructure, cargo terminal efficiency and etc. previous studies shows that, operational efficiency in port operations is the key factor required to be a logistics hub (Tongzon, 2004). As faster turnaround time within the port is critical for mega dry port (that built in landlocked countries) operations, a higher level of efficiency invites more port users to use a port as their port of call (Yeo et al, 2011; Tongzon, 2004). Besides, efficiency of inland transport and hinterland connection has become a critical factor to port's potential future to evaluate port operation and competitiveness (Rodrigue and Notteboom, 2009). Hence the third hypothesis was supported.

- As the SEM result shows, information capital has the low direct effect on port operational performance² (R² 0.079). This result is against literature. It was found by different studies that information technology has the strongest significant positive direct effect on port operational performance (UNCTAD, 1992; Brewal, 2011; Keramati, 2007 and etc). The result of this study shows that port information capital has substantial effect on operational performance when it passes through sustainability practices. This can be true as sustainability practices ask IT to be integrated across supply chain and between ports to improve performance. Hence the fourth hypothesis also confirmed.
- The result of sustainability practices has strong significant direct positive effect on port operational performance² (R² 0.86). The result also shows that port resources have strong effect on port operational performance when they are installed and practiced in a sustainable way. In other word results imply that the level of sustainability practice significantly influence improvement of port performance including financial and nonfinancial aspects, as confirmed by prior studies (McGuire et al., 1988; Orlitzky et al., 2003; Zhu et al., 2004). Hence the fifth hypothesis also accepted.
- The result of interview and document review also supports and validates the above results.
- After the above conclusions were made from results, the following recommendations were made by researcher, which were recommended after different international dry port and sea port operation and sustainability practices were reviewed.

5.3. Recommendations

5.3.1. Recommendation for Modjo dry port and other Ethiopian dry ports

Based on the results of data analyzed from questionnaire, document review, and interview the following recommendations are made for Modjo port and terminal and Ethiopian dry ports as Modjo is the model port in Ethiopia.

- To stay competitive and encourage economic growth Modjo dry port and terminal must address a host of new challenges, including increasing trade volumes and transport industry complexity. To promote job creation, economic growth, sustainable development, and improve the living standard of Ethiopians, Modjo dry port terminal plays crucial role. To meet this mission the terminal need new ways to achieve efficiencies of its operations and the flow of cargoes by having open dialogue with port communities and stakeholders.
- The efficiency and productivity of Ethiopian dry ports and their infrastructures is crucial to our country,s ability to successfully compete in global market places. As over 95% of Ethiopian import and exports flows through Modjo dry port and terminal that links our producers with their sources, their customers and with global markets this port need special attention.
- Our ports ability to facilitate this trade flow is essential deliver goods to customers on time and at lowest possible cost, which is crucial to exporter,s ability to compete at global market place and take advantages of expanded sales opportunities, there should be an enough resources at the port to improve performance.

From the results of research finding, it was found that operational inefficiencies have kept Ethiopian ports and supply chain from keeping pace with the growth of Ethiopian trade and quick changing economic growth. The result shows that these inefficiencies has been resulting fromlack of information capital to communicate with port communities, weak port infrastructure, slow in operating process, lack of human resources with modern logistics and supply chain knowledge and weakness in implementing sustainability practices. Therefore the researcher made the following recommendations to Modjo dry port and ELSSE based on these operational constraints found by analysis one by one.

Recommendation to the port in improving information capital

- The result shows that, Modjo port and terminal is working without proper systems for management of facility, TOS (Terminal Operating System, which leads to delays in locating containers), and gate system. To overcome these problems Modjo port and terminal must install these technologies in the port order to improve cargo movement, ease of locating container, minimizing gate congestions and internal operational efficiency.
- As buying and implementing these all technologies at once may be cost; the port should work closely with international technology inc. to install customized information technologies based on a standard set of trade (import export cargo) data elements. Installations of these technologies not only help in port operation, but also help port to know pre and post arrival information cargos.
- Therefore In addition to working with these international companies, the port should organize an international conference or international trade fair on supply chain digital transformation and innovating port community IT system; which will open competition between international technology inc. to install these technologies at cheapest prices.

Recommendations to improve infrastructural development

- As the result of research analysis shows, the current infrastructural developments are not enough in handling import and export containers. The effect of lack infrastructures at the port shows, slow cargo movement, insufficient terminal space for stacking containers and parking trucks, reduced equipment and terminal productivity, limits on port and terminal handling capacity especially during seasonal cargo surge, thus reducing the velocity of container cargo movement in the port.
- To overcome this problem the port should apply public private partnerships (PPP or P3s) and investment. As the state government alone can't afford for investing in port and trade related infrastructures attracting private partners is the best way to overcome the problem.
- Different literature shows that, PPP model can provide ports with a way to accelerate terminal facility projects, while sharing financial and investment risk with state governments. In addition to this incorporating manufacturing industry and market trends in to transportation agency planning can improve infrastructure capacity. It is

better if user fees be employed to generate additional infrastructural development funds, with all port users contributing.

- Therefore using the above recommendation Modjo port and terminal through Ethiopian maritime affairs and ESLSE can improve port infrastructures.

Recommendations to improve efficiency in operating procedures

- One of the basic challenge holding Modjo port and terminal back is weakness in supply chain cooperation management across the chain. To overcome this problem Modjo port and terminal should form port supply chain working group to achieve operational benefits.
- Many international dry and seaports have established comprehensive supply chain working groups with broad mandates and regular meetings by including representatives from all port communities and stakeholders. These steps promote full, open discussion among ports and their supply chains and support actions to identify and implement process improvements in movement (in terms of visibility, predictability and reliability), system performance, and operational and infrastructural efficiency.
- In other word this working group,s help port to check port resources sufficiency and availability (like human resource, equipment, and terminal space) before the arrival of cargos. In order to improve performance of this working group, implementing port communities, information portal is important which shows the full information about pre, during and post arrival of cargo at the terminal.
- In addition to this, facilitating container chassis availability which will increase container movement, reduced trucks turn times and increase overall efficiency.
- Moreover, better planning and scheduling (by implementing integrated scheduling programs and appointment systems) will help truckers to arrive port terminal for container/chassis drop off and pick up, for booking, for empty container return and provide terminal with status notifications.
- Once again to improve operational efficiency the use of „on demand, or „free flow, programs through which truckers can pull containers off a stack on a first-come basis for delivery, rather than waiting for designated customers. Therefore implementing these recommendations by ESLSE Modjo port and terminal will improve the overall port operating efficiency.

Recommendations to improve human capital performance

- It was found by the analysis that the current workforce at Modjo port and terminal needs an additional logistics and supply management skills. Therefore, through ESLSE Modjo dry port and terminal should work closely with local universities to resolve logistics workforce shortages.
- In addition to this the port should work with different international logistics academy and institutions which have logistics and maritime education programme, to send workers for upskilling and reskilling using scholarship or internship programs.

Recommendations with regard to sustainability practices

- The concept of port sustainability practice has been defined in literature parts as it is the way to reach at highest operational performance and keep growing today without affecting the opportunities of future generations. The component of port operational sustainability practices has been derived from environmental technologies, communication and coordination with stakeholders, internal system growth and continuous monitoring and improvement of service and facilities. These concepts are being practiced at Modjo port and terminal, but not to extent need in improving performance. Therefore to overcome this problem the following recommendations are made:
- An ongoing concern in operational management relates to sustainable and responsible business. To respond to a changing business environment demands compliance with environmental regulation and the fulfillment of stakeholders, expectations, firms and industries must constantly review their sustainability practice to preserve the marine environment, and as an opportunity to create a sustainable competitive advantage
- By taking resource available in to consideration, Modjo dry port should improve coordination and communications among terminal, shippers and carriers in order to improve terminal cargo handling efficiency and at the same time improving coordination and communication within port, between port and shippers to find ways to reduce congestion around gates and terminals is important for operational performance improvements. This means in other words port authorities should work in conjunction with terminal operators and municipal planning organizations, and incorporate the view point of stakeholders to find ways to improve cargo flows and to

more fully utilize existing assets for systems and infrastructure efficiency and resilience.

- Using available resources, the port should improve funding process to attract more national and international private sector investments in port and related infrastructures for improving sustained operational performance.
- The port should develop the internal system through simplifying customs procedures, integrating and expanding the use of technology, information, and data to improve port operation and cargo movement fluidity.
- In addition to this to improve performance the port should replace equipments, train employees, and improve service efficiency by effectively utilizing the resource available.
- Identifying policies that need to be included in national freight policy to improve port and trade corridor performance.
- Even though the port is not exposing the environment badly, to prevent future problems and keep operating, Modjo terminal should meet environmental goals and requirement by implementing technologies that address adverse environmental effect that may result from port operation and cargo movement.
- To this end port,s should implement international practices like CAAP (clean air action plan), a sweeping plan significantly aimed at reducing the health risks posed by air pollution from port related trucks, train and container handling equipments. For instance the port can test diesel electric hybrid gantry cranes for container stacking operations, replace older model trucks, and chassis in the port and etc.

By applying the above recommendations Modjo port terminal can improve port operation performance which is sustainable.

5.3.2. Recommendationfor Academics

- Drawing on RBV theory based on empirical investigation, this study discovered that sustainability practice is a significant factor for improving terminal sustainability which enhances the relationship between port resources and operational performance. However, the findings of this study are a mere beginning, and attached too much importance to the relationship between port resource and performance.

- As pointed out in this study, very few studies have investigated the links between sustainability practices and operational sustainability considering port resources and operational performance, because prior works on sustainability practice focused on environmental perspectives such as low environmental impacts in sea ports rather than inland dry ports.
- In order to provide empirical evidence, this study analyzed the mediating role of sustainability practices in the relationships between port resources and operational performance, this is only the beginning for future research. This shows that, a more attention and a variety of academia approaches are required to explore and analyze the role of sustainability practice improving sustainable operational performance.
- In addition, this study recommends case studies on the benefit of sustainability practice in a variety of organizations and industries, other than port industry, which provide empirical evidence and/or examples. Therefore as Ethiopia is landlocked country, studying the relationship between resources, sustainability and performance is a mere important to be explored and investigated to improve sustainable dry port operational performance.
- These academic chiding on sustainability practice will provide the opportunities to suggest guidance for future improvement strategies in port operations, allowing for the benchmarking of successful cases.

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APPENDIX-A

BAHIR DAR UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Title: Leveraging Inland Port Operation in Ethiopia: Modjo Dry Ports in Focus

Questionnaire to be filled by port authorities, terminal operators, shipping line, inland shipper, cargo owner, and etc of Modjo and Kaliti Dry ports

Dear Sir/Madam,

This survey is being undertaken as part of Master,s Thesis at College of Business and Economics, Bahir Dar University, Ethiopia, to build knowledge and gain insights into the effects of different port operational resource constraints on port operation performance and to see the effect of port sustainability practices in dry container port operations in Ethiopia. I would like to ask you to spend a few moment of your time to share your expert knowledge with me on a brief questionnaire. All contributions are confidential and for academic research purpose only and no individual would be identified in any published results.

Completion of this questionnaire will take just a few minutes of your time. I would value your input very much.

Yours sincerely,

Mr. Debano Bonaya

Address: College of Business and Economics; Department of Logistics and Supply Chain Management; Bahir Dar University, Ethiopia. Contact number: +251902098858 or +251983146318; Email: debanobonaya@gmail.com or helpofgod11@gmail.com

Part 1: Demographic Information

This part of the questionnaire is intended to collect general demographic information about you and your port. Please select one oval that best describes you and your port.

1. Port name where you are engaged or working? Mark only one oval
 - Modjo dry port
 - Kaliti dry port

2. How many people are engaged in your organization? Mark only one oval
- 50-100 300-350
- 101-200 Over 350
- 201-300
3. Which category does your organization fall in? mark only one oval
- Port authority Forwarder/cargo owner
- Terminal operator National/local government
- Shipping line Local community/ researcher
- Inland shipper Other:_____
4. How many years have passed since the establishment of your organization? Mark only one oval
- Less than 5 years 16-20 years
- 6-10 years Over 20 years
- 11-15 years
5. How many years have you engaged in port industry? mark only one oval
- Less than 5 years 16-20 years
- 6-10 years Over 20 years
- 11-15 years
6. What is your job position in your organization? Mark all oval that apply
- Operational staff
- Operational supervisor
- Director/vice director
- Manager/assistant manager
- Management board member
- President/vice president
- Other:_____

Part 2: Questions Related To Determinants of Port Operational resources

These questions are related to port operational conditions in terms of its resource. With regard to this please judge the most appropriate linguistic term and encircle it to indicate each of the question blows at your port.

A Items Related to Port Infrastructures		Very Poor	poor	Medium	Good	Very Good
1	Capacity of port infrastructure (road, ICT, rail etc.)	1	2	3	4	5
2	Availability of container handling equipment	1	2	3	4	5
3	Quality of container handling equipment	1	2	3	4	5
4	Availability of storage capacity	1	2	3	4	5
5	Connectivity to road and rail network	1	2	3	4	5
B Items Related to Operational Efficiency		Very Poor	poor	Medium	Good	Very Good
6	Terminal productivity	1	2	3	4	5
7	Reliability of port service	1	2	3	4	5
8	Simplification of customs procedures	1	2	3	4	5
9	Cargo handling speed	1	2	3	4	5
10	Supply chain cooperation	1	2	3	4	5
C Items related to Information Capital		Very poor	Poor	medium	Good	Very Good
11	Our IT infrastructure system in terms of functionality, compatibility and accessibility in operation is:	1	2	3	4	5
12	Our databases, in particular, application for promoting analysis, interpretation and sharing of information and knowledge is:	1	2	3	4	5
13	Our networks for internal and (or) external communication is:	1	2	3	4	5
D Items Related to Human Capital		Very low	low	Medium	high	Very high
14	Workers knowledge and skill to perform their job is	1	2	3	4	5
15	Workers capacity to develop new strategy and services is	1	2	3	4	5
16	Ports continuous training and educational opportunities for workforce is	1	2	3	4	5
17	Workers commitment and loyalty is	1	2	3	4	5

Part three: Questions Related To Dry Port Sustainability Practices

These questions are related to dry port sustainability practices. Please tick (✓) one box to show how well your organization performs. 1=(Strongly Disagree, 2 = Disagree, 3 = No Reference, 4=Agree, 5 = Strongly Agree

No	Items	SD	D	A	A	SA
23	Our dry port reviews sustainability practices and introduces new innovations processes and new practices (e.g. friendly technology, alternative energy sources)	1	2	3	4	5
24	Our local dry port continuously monitors and improves services and facilities (e.g. replacement of older equipment, employees training and education, service quality improvement)	1	2	3	4	5
25	Our local dry port continuously tries to improve operational efficiency through internal system growth (e.g. simplification of procedures, IT integration).	1	2	3	4	5
26	Our local dry port works together and communicates with stakeholders to meet their expectation (e.g. information exchange, active employee participation, incentives)	1	2	3	4	5

Part Four: Questions Related port Operational performance

The following questions are related to port operation performance of your port. Please tick (✓) one box to show how far you agree/disagree with each statement. 1=(Strongly Disagree (SD), 2 = Disagree (D), 3 = No Reference (N), 4=Agree (A), 5 = strongly Agree (SA)

No	Items	SD	D	N	A	SA
Speed						
1	Shipments/cargo are cleared as scheduled	1	2	3	4	5
2	Documentary procedure at the port is efficient	1	2	3	4	5
3	All key documents are available electronically	1	2	3	4	5
4	There is clear and automated duty payment process	1	2	3	4	5
5	There is agile and precise clearance custom procedures	1	2	3	4	5
Quality						
6	Quality of trade and transport related infrastructure (e.g., ports, railroads, roads, information technology) is sufficient	1	2	3	4	5
7	Incidence of cargo damage at the port is low	1	2	3	4	5
8	All workers including port authority are competent and responsive	1	2	3	4	
9	Competency and quality of logistics services (e.g. transport	1	2	3	4	5

	operators, custom operators..) is better					
10	Overall there is better cargo handling process	1	2	3	4	5
Flexibility						
11	Our port has capacity to respond to special requests	1	2	3	4	5
12	Our port has capacity to operate with multiple supply chain partners	1	2	3	4	5
13	Our port continuously adopts an innovative technology and Process	1	2	3	4	5
14	Our port has capacity to handle different types of cargo	1	2	3	4	5
15	Our port has capacity to provide on time updates of information	1	2	3	4	5
Dependability						
16	There is reliable and visible transport schedule	1	2	3	4	5
17	Port is safe and secure	1	2	3	4	5
18	there is adequacy of integrated communication infrastructure	1	2	3	4	5
19	Availability of direct service to the cargo,s destination is high	1	2	3	4	5
20	Port authorities responsiveness to special request is high	1	2	3	4	5
Cost						
12	Total port service charge is reasonable and transparent	1	2	3	4	5
22	Overall port service is delivered within expected costs by customers	1	2	3	4	5
23	All charges related to cargo handling, port facility, and ancillary services are competitive	1	2	3	4	5

Appendix-B

Interview guide:

1. Please could you telme the overall status of Modjo port and terminal infrastructure status and its effects on port operational performance?
2. Could you please tell me about the current human capital of your port in terms of workers knowledge to perform job and training provided by port to upgrade their skills?
3. Can you tell me please how the port is operating in ensuring efficiency?
4. Please can you tell me something about port costs or corridor cost from Modjo to Djibouti and the time it takes to deliver container from Djibouti to Modjo?
5. Does the port is flexible enough in handling special services and types of cargo, in such a way that customers can depend on Modjo dry port? Thanks for your answer; but please can you tell me something about your overall port supply chain management and your overall interaction with port stakeholders?
6. Please tell me what contribution this port is contributing to society and the economy of the country.
7. Please can you tell me, if there are some environmental problems being imposed by the port?
8. Intersof port management, please can you tell me the port is being managed? Is it being managed only by government or there are some private sector participations?