The growing importance of Warehouse management System to the effective management of operational Logistics Al-Madina Logistics

ABSTRACT

The purpose of this study is to explore the growing importance of Warehouse Management System to the effectiveness of operational logistics at Al Madina Logistics Services Company (SAOC) in Oman. The study has three objectives: first, to develop a background knowledge about the WMSs functions, second, to explore aspects of effectiveness of the WMS used at AMLS, including: efficiency, added value services, service customization and reducing margin for errors, and third, to explore the growing importance of WMS to the effectiveness of operational logistics. The study adopted a mixed-method approach with qualitative and quantitative data. The study employed questionnaire surveys and semi-structured interviews for the data collection. The sample included 31 participants who are personnel dealing with a variety of WMS functions from different department working in the company's site of dry port, distribution center and transport operation in Barka. The findings revealed relatively high effectiveness in the four aspects, and demonstrated areas of the growing importance of WMS to the effectiveness of operational logistics at AMLS.

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LIST OF FLGURS

List of Operational definition of terms

SCM	Supply Chain Management
WMS	Warehouse Management System
OL	Operational logistics
AMLS	Al Madina Logistics Services Company (SAOC)

CHAPTER ONE INTRODUCTON

1.1 Background of the Study

The purpose of this introduction chapter is to present a brief background of the study, state the aim and objectives, and list the research questions. The chapter also discusses the scope and limitations of the research project and discusses its importance. It also provides operational definitions of the terms used throughout the research project's report.

The topic of the study is warehousing management system in practice within a context of firms working in the logistics sector. The implementations and practices of any logistics firm are associated with its use of an effective warehouse management system. Thus, the present research project is an attempt to figure the importance of warehouse management system to operational logistics.

The logistics sector is one of the most important axes of enhancing Oman's economic diversification. It contributes to attracting investment and diversifying sources of income due to its competitive capabilities. Thus, it is expected to make Oman among the most effective countries in the global logistics sector. The sector of logistics in Oman has great prospects. Therefore, establishing firms of integrated logistics networks in Oman offers a wide variety of activities, including import, export, supply, distribution, supply, etc. Warehousing is an essential component of all logistics activities.

Warehouse Management System (WMS) includes the practices and procedures that of managing daily operations in a warehouse. The main functions of warehouse management systems are to provide inventory and storage, improve handling and shipping of orders, and provide advice on identifying inventory.

This research project is basically a case study project, exploring the topic within the context of Al Madina Logistics Services (AMLS), stablished in Oman in 2007. It is considered a distinguished company in the field of logistics. It has introduced itself in the operational logistics market as a leading company in supply chain and port construction solutions.

1.2 Statement of the Research Problem

Invariable deficiencies in warehouse management may occur due different factors. The use of a particular warehouse management system can be sometimes labour-intensive, prone to errors (like: wrong storage locations, wrong reporting of quantities, inefficient use of space, etc.). Effective material flow, information flow, and time flow are the core aspects of developing warehouse management systems (WMS). Thus, effective development of a warehouse management system gains its importance from the essentiality of interlinked warehouse operations to the broader context of operational logistics, whose successful run is the main task of firms like Al Madina Logistics Services (AMLS).

1.3 Aims and objectives of the Study

1.3.1 Aims
The major aim of the project is to explore the growing importance of warehouse management system used at Al Madina Logistics Services (AMLS) to the effectiveness of the broader management of operational logistics.

1.3.2 Research Objectives

The project is targeted to accomplish these objectives:

1. To explore the functions of warehouse management system currently in use at Al Madina Logistics Services (AMLS)
2. To examine aspects of effectiveness and efficiency of the warehouse management system used at Al Madina Logistics Services (AMLS)
3. To explore the areas of importance of the warehouse management system at AMLS to the effective management of operational logistics.

1.4 Research Questions
1. What is the warehouse management system (WMS) currently in use at Al Madina Logistics Services (AMLS)?
2. How effective is the warehouse management system at aspects of material flow, information flow, and time flow?
3. What are key areas of importance of the warehouse management system at AMLS to the effective management of operational logistics?

1.5 Scope of the Study

The Scope of the Study covers factors of effectiveness of WMS in AMLS, which include material flow, time flow and information flow. However, the study takes into consideration limits caused by low access to strategic data. Therefore, the scope of the study is directed to attitudes about the growing effectiveness of the warehouse management system from the perspectives of personnel working warehousing processes at AMLS. The scope is also dependent upon the availability of secondary data at the consent of the company.

1.6 Significance of the Study

The study gains its significance from the significance of the logistic sector in its context at the Sultanate and the increasing interest in inward investment and non-oil exports. ln addition, to my knowledge, the topic has not been investigated at the local context in logistic firms in Oman. There are no published research papers on the WMS contextualized in Oman.

Working on this research project has potential long-term benefits for the researcher through increasing scientific knowledge and gaining experiences and research skills. Facing challenges and overcoming them through the course of the study is also going to improve positive personal attributes, such as self-reliance, dedication, and meeting deadlines.

The impact of the research to the company lies in presenting the most important proposals and ideas to identify the most important problems of warehouse management. Thinking about the challenges from the perspective of the researcher student may add new dimensions to review their practices of warehousing at AMLS.

The impact of research on the educational institution lies in making use of the student's ideas presented in the study. It also supports the process of helping students acquire research skills by actual practice and engagement in the real business world.

1.7 Limitation of the Study

As there are many limitations that the researcher faces during the implementation of the research project. The key restrictions and limitations are:

Time period

The research project has to follow a scheduled timeline, and the scope of the project's data collection and analyses have to be in accordance with the timeline. Meeting the research requirements needs to take into consideration predicted lockdown obstacles during to current Covid-19 situation.

Restricted access to the personnel (sample)

The researcher is an external visitor/ researcher and has limited access to data. Moreover, referring back to the current situation of the pandemic, it has become more difficult for the researcher to go to the company and collect information and data related to the project. The alternative may be online interaction, which may offer less options of sampling.

Confidentiality of the data

A great deal of beneficial secondary data is, due to regulations and research ethics, of confidentiality and not available for external research access. These regulations may restrict the researcher's entry to evaluate personnel's attitudes towards key areas of operational logistics' effectiveness.

Unavailability of references

The topic of operational logistics and effectiveness of WMS is relatively new, specially in the Sultanate and GCC. Therefore, insufficient references, especially published research work, is going to be a serious obstacle.

1.8 Operational definition of terms

The present study includes some concepts that need to be explained to ensure the readers are familiar with them. These terms include: Warehouse Management System, operational logistics, and supply chain management.

1.8.1 Warehouse Management System (WMS)

Kumar (2018) defined warehouse management system (WMS) as a software application designed to support and improve warehouse functions and manage a distribution centre. WMSs are designed to facilitate the daily planning, organization,

and control of the use of available resources, by transporting and storing materials inside and outside the warehouse.

1.8.2 Operational Logistics

Kress (2016) defined operational logistics as a technical term that involves two dimensions. The first dimension is *logistic processes*, which include: movement, maintenance, traffic control, and assessment of reliability. The second dimension is *logistics entities*, which include: inventory, means of transport, warehouses and facilities, and equipment.

1.8.3 Supply Chain Management (SCM)

As defined by Ayers and Odegaard (2018), supply chain management is the integrated planning and conducts of flow from sources and suppliers to the end consumers. Ayers and Odegaard (2018) explained that management of supply chain involves the end-to-end management of inventory and information to go through sourcing, distribution, delivery to consumer depending on the business models.

1.9 Structure of the Research

Chapters	Content of each chapter
Chapter One	Chapter One offers an introduction to the study. It givers an overview of the topic, the research problem, the aims and objectives of the study, and the research questions. It also explains the key concepts and terms used in the study and states the scope, limitations and significance of the study.
Chapter Two	Chapter Two review the previous literature and research work on the topic. It is targeted to explain key dimensions of warehouse management systems and operational logistics and attempts to explore gaps in previous research. It also directs attention to the frameworks to be used later in the course of the study.
Chapter Three	Chapter Three addresses the research methodology. It explains the research approach, tools of data collection and data analysis. It also describes the context and the sample of the study.
Chapter Four	Chapter Four presents the findings and discusses results of data analysis in relation to the broader context of the topic.
Chapter Five	Chapter Fiver provides a summary of the study and offers practical recommendation and prospects of future research.

1.10 Summary

In summary, the present study aims at exploring the growing importance of Warehouse Management System used at Al Madina Logistics Services (AMLS) to the effectiveness of managing of its operational logistics. Chapter 1 sets the objectives and the research questions, along with describing the scope of the study and its limitations. It also offers a brief description of the research problem behind the study and defines key operational terms of the study.

Chapter 2 is concerned with reviewing the literature related to the research topic. It is meant to give an overview of recent research work and to develop further understanding of WMS and to introduce frameworks of analysing effectiveness of warehousing system to management of operational logistics.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

This chapter introduces a review of the literature on the topic of importance of warehouse management systems (WMS) to the effective management of operational logistics. The purpose of the chapter is to gain understanding of the growing importance of WMS and to develop knowledge about the existing research and the key concepts relevant to warehousing, warehouse management, operational logistics and supply chain management. In addition, the review of previous literature is meant to offer guidelines and insights into applying the terms and concepts about WMS and its importance for the effectiveness of operational logistics.

The chapter is divided into four main sections. Section 2.2 explores concepts of warehousing and WMS's types, practices and operations and tendencies of recent research work on warehouse management. Section 2.3 addresses concepts of supply chain management and operational logistics and how they relate to warehouse management systems. Section 2.4 narrows down the discussion to explore the growing importance of WMSs to effectiveness of operational logistics. The importance of this last section lies in developing the conceptual understanding and the framework of this current research to specify the meaning of effectiveness of WMS.

The discussion in all these sections shows critical reviews of previous research to narrow the scope of the in a way that helps in establishing further knowledge and understanding of the key concepts of the present study. Section 2.5 provides a summary and explains the gap the present study attempts to address.

2.2 Warehouse Management System (WMS)

The term Warehouse Management System (WMS) is defined as an application of comprehensive control of warehousing and distribution operations (Baruffaldi, Accorsi and Manzini, 2019). As a software application, a WMS is developed to be capable of managing processes of managing inventory, counting cycles and task distributions, managing labour, automating handling materials and spaces, organizing packing, picking, shipping and tracing items, and all other relevant processes in logistics and performance of supply chain management (Pane, Awangga and Azhari, 2018). The

levels of advancement in WMSs have developed to meet the needs of logistics management and supply chain.

2.2.1 Functions of Warehouse Management System (WMS)

The main function of a warehouse management system is to organize, control and generate the work of a warehouse (Hompel and Schmidt, 2014). However, recent research focus on certain functions and address the effectiveness of the using warehouse management systems to manage these areas.

To begin with, studies and research work focus on keeping records of capacity of storage. For example, Nduwayo (2020) published a doctoral dissertation on a programming model of warehouse management system; the study compared the performance of a proposed WMS's programming model and an existing programming model to detect the function of giving advanced and accurate data about warehouse storage capacity. Many other recent studies emphasize the use of intelligent warehouse management systems that allow increase of storage capacity. A study conducted by Egorov et al. (2020) explored the challenges of warehousing in supply chains and operational logistics, and stated that data processing need to use advanced technology of processing data in order to increase storage capacity. Similar to the study of Nduwayo (2020), a recent study conducted by Öztürkoğlu (2020) aimed to develop a mathematical data processing model to maximize capacity of storage usage.

A second function of warehouse management system is developing inventory management. Research on effectiveness of WMS has mostly emphasized this function as the main task of WMS. Jia et al. (2018) stated that improving efficiency of inventory management by using software applications results in decreases in cost as well as reducing intensity of labour. A study conducted by Abdul Rahman et al. (2020) on inventory management as a WMS's function. Abdul Rahman et al. (2020) stated that there is a direct correlation between profitability and conduct of supply chain management; they concluded that the use of advanced WMS for inventory management helps in addressing deviations in traceability, waste of resources and inefficiencies of using stores. Abdul Rahman et al. (2020) found that digitalizing WMS in supply chain operational logistics increases accuracy of data about quantities.

One more essential function of WMSs is establishing reports of estimations and receipts. Setiawan et al. (2020) examined smoothness of distribution through exploring

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the function of establishing receipts. The study evaluated accuracy, efficiency and punctuality of receipts production to address smoothness of distribution in the context of their study in Ceva Logistics. The study found that there is a significant positive relationship between advancement of receipts and reports and smoothness of logistic operations. Another study on this function was recently conducted by Prananingtyas and Zulaekhah (2021) on the effect of financing reports published by WMS on variables of effective management of operational logistics and competitiveness of warehousing costs. The study examined satisfaction of users of WMS's receipts and reports with a sample of 120 suppliers dealing with context company. The study found a significant positive correlation between preciseness and punctuality of these receipts and reports produced by the WMS and competitive and loyalty of suppliers and clients.

2.2.3 Importance of Warehouse Management Systems

A WMS is an essential element of logistics operations and businesses, since they are found to control all areas of supply chain management (Anđelković, and Radosavljević, 2018). The conducts and performances of WMS are as essential as all other management of supply chain framework, including HR management, finance and marketing (Soble, et al., 2018).

Studies about essentiality and importance of WMS focus on two main areas: cost saving and competitiveness. First, a great deal of recent research has addressed the role of WMS in reducing costs and facilitating cost saving. For example, Mostafa, Hamdy, and Elawady (2020) proposed the use of a WMS implementing the Internet of Things (IoT technology) and evaluated the possibility of this WMS to achieve high levels of monitoring and control on cost saving. Latte and Javalagi (2021) conducted a theoretical and statistical analysis on performance of small scale industries and draw a conclusion that capabilities of WMS maximize making profit of available resources and are there is a direct relationship between effective warehouse management and cost saving.

Second, and very frequently addressed area of WMS importance, is competitiveness. A lot of recent research on supply chain management focuses on sustainability and competitive advantage. For example, a comprehensive study was conducted by Muhalia, Ngugi, and Moronge (2021) on the effects of WMS on performance of supply chain in Kenya, addressing competitiveness of supply chains on movement of urgent

demand materials between suppliers and clients. Muhalia, Ngugi, and Moronge (2021) found that WMS is agreed to reduce margin for errors and increase capability of storage and space management. They also found agreement among suppliers that WMSs improve productivity of supply chains and agreed to offer high opportunity of sustainability and obtain competitive advantage. Another recent study on the specific WMS's operations was conducted Wanganoo (2020), which addressed correlation between sustainability and competitive advantage of retail distribution firms and the operation of "reverse logistics" (management of return processes). Wanganoo (2020) found that low client satisfaction, delays and insufficient use of space in WMS are mainly consequences of low integration of technology in retail businesses. Wanganoo (2020) also developed a framework of the relationship between competitiveness and advance use of RFID and Internet of Things (IoT) technology.

2.3 Supply Chain Management and Operational Logistics

Supply chain management refers to the approaches of controlling activities from basic points of manufacturing to last ends of products and services, integrating all functions and activities including shipping, inventory estimations, storage management and meeting delivery deadlines (Pono and Munizu, 2021, p. 126). The relationship between effectiveness of operational logistics and supply chain management is frequently approached in recent research. Sorkun, Hüseyinoğlu and Börühan (2020) explored the effect of flexibility as a capability of operational logistics on customer satisfaction and found indirect relationship between the two ends within the context of their study. However, another study conducted by Kempa, Tanuwijaya, and Tarigan (2020) examined the role of service quality and data processing in WMS's control over operational logistics. Kempa, Tanuwijaya, and Tarigan (2020) found that quality of warehousing operations and WMSs in third part logistics have statistically significant impact on aspects of customer satisfaction, service quality and collaborative integration among operations within supply chains.

2.4 Aspects of WMS Effectiveness

Frazelle (2021) listed the major challenges of today's warehousing management industry, including: the short time for processing orders, lack of skilled warehousing personnel, limited margin for errors, and most importantly, low capabilities of warehouse management systems. Thus, as stated by researchers, warehouse

management should focus on meeting a number of requirements. This section of the review discusses these requirements so that a clear understanding of warehouse management capability is generated.

2.4.1 Efficiency (speed and simplicity)

To begin with, many researchers focused on that warehouse management systems need to execute more processes with minimum number of transactions. That is, a warehouse management system implements technology to simplify and speed up warehousing processes. For example, despite that barcode technology has been widely used in warehousing industry, a recent study conducted by Istiqomah et al. (2020) used a qualitative approach to explore the impact of using barcode on warehouse management efficiency. Istiqomah et al. (2020) found that warehousing personnel find it of high efficiency in comparison to manual handling, and the researchers recommended implementing barcode in the warehouse management system to guarantee efficiency. However, the study seemed to be addressing efficiency of warehouse management at contexts with moderate or even small warehouses. Firms of operational logistics and supply chains are no longer expected to use manual handling.

Previous research, in fact, has widely investigated efficiency of warehouse management in broader and advanced contexts. For example, a study conducted by Jermsittiparsert, Sutduean and Sriyakul (2019) addressed the role of warehouse attributes, specifically in supply chains, on determining efficiency in operational logisics in Indonesia. Warehouse attributes is used in Jermsittiparsert, Sutduean and Sriyakul (2019) to refer to well-structured warehouse design and technology based performance. The researchers adopted a quantitative approach, using questionnaire surveys to examine the role of these attributes in simplifying and speeding up warehouse operations. The study focused on supply chain companies in Indonesia. Jermsittiparsert, Sutduean and Sriyakul (2019) found two main findings. First, the layout (design) of warehouse management and technology-based performance increase the efficiency of warehouse management system. Second, degree of implementing information technology management is a major factor to make positive differences in efficiency in supply chain warehousing.

2.4.2 Providing more product-service customization

The concept "product-service customaization" is very frequent in warehousing management research. It refers to the process of making a service driven by the consumer, and the capability of deriving a service to meet the needs and to make it adequate for particular consumers (Price and Harrison, 2015, p.45). In operational logistics industry, a warehouse management's capability of service customization includes anumber of variants, most importantly of which is that warehouse management has the capability to control object-oriented processes (Frazelle, 2018, p. 238). For example, the capability of a warehousing management system to customize warehousing is basically meant to meet different warehousing needs with to regard to the products and the needs of the consumer, such as: food and cold chains, pharma and medical warehousing, bonded storage for retail. It also includes the WMS's capability to control value added special services, like: co-packing and labelling products (Mariotti, 2015, p. 44).

Baruffaldi, Accorsi and Manzini (2019) explored a tool of decision support that functions to help managers to decide on customization of warehouse management system. Baruffaldi, Accorsi and Manzini (2019) examined tool uses evaluation of three factors affecting decision of WMS customization: information sharing cost, security of client's data and the extent of certainty to measure returns from customizing warehousing services. The study adopted an experimental approach by using a digital simulation version of the WMS in practice, and implemented it in the scenario of meeting needs of a biomedical production firm. After observation of ten months, Baruffaldi, Accorsi and Manzini (2019) found that the examined tool effectively supports service customization capability of WMS, and recommended implementing minor modifications to the tool.

A very similar study was conducted by Minashkina and Happonen (2020), which aimed at investigating the selection framework of warehouse management system in third-party logistics companies. The study used secondary data gathered from the research context and analyzed them in accordance with frameworks developed in the literature. Minashkina and Happonen (2020) finally developed a framework to be used for purposes of deciding about customization of WMS. Their framework integrates four modules: customer's specific WMS needs, categorization of WMS, technology-driven standards, and their new enhanced framework included 4 modules: customer's

warehouse characteristics for WMS, WMS categories, WMS technical criteria, and WMS business limitations. Among these four modules, Minashkina and Happonen (2020) found that customer's warehouse characteristics is measured to constitute the major consideration, while WMS technical criteria has minimum impact on customization of warehousing services.

2.4.3 Providing Value-Added Services

Value-added services is another concept very frequently mentioned in logistics contexts research as an aspect of WMS effectiveness. By definition, "Value-added services" are developed services which are provided by operational logistics companies and supply chain management beyond their ordinary operations and prcesses (Kerber, 2017, p.119-120).

Alias et al. (2017) conducted a case study research for a new warehouse management system in a company that is internationally operating logistics service providing a wide range of services, including warehousing. The study aimed at exploring current and future needs for a warehouse management system. Alias et al. (2017) adopted a mixed method approach to implement theoretical and experimental data collection tools and analyses. The theoritical part investigated logistics and warehousing requirements of warehouse management systems, whereas the experimental part employed surveys and interviews. Alias et al. (2017) found that evaluating warehouse management systems need to develop tendency to give high priority to a number of features among which is the capability to offer value-added services. The framework of WMS requirements developed on the data emphasized the adaptability of warehouse management systems to offer services beyond expectations of client companies.

Similarly, capability of a WMS to offer value-added services is deemed in another case study by Ghaouta, Bouchti and Okar (2018) as a key performance indicator for competitiveness and effectiveness. The case study aimed to propose and develop a framework of indicators of warehouse management performance to be utilized as an tool to measure and develop the performance of warehousing operations, which include receiving, storage, picking, and shipping. The scae was an operational logistics company in Morocco offering third party logistics services. Ghaouta, Bouchti and Okar (2018) found that WMS performance can only achieve competitiveness and effectiveness by well measured warehousing functions in four dimensions: quality,

productivity, costs and time. Ghaouta, Bouchti and Okar (2018) listed capability to provide value-added services as a key function in the dimension of productivity.

2.4.4 Reducing Errors (Limited Margin for Errors)

Warehouse management involves intensive labour work processes. Thus, various types of errors can be committed in warehousing management. Research has extensively addressed the use of different techniques and strategies to reduce margin for errors. Therefore, a WMS's selection and implementation take into consideration having sufficient knowledge of particular errors (Price and Harrison, 2015, p. 51).

A case study by Škerlič and Muha (2017) aimed to develop a strategy offering ideal solutions for potential errors in the warehouse process. The study mainly addressed inaccurate order picking errors as the most frequent error type in the case company. Škerlič and Muha (2017) highlighted the use of technology-based data sharing as a key factor to reduce errors of inaccuracy.

A vast range of recent research work approached the use of the Internet of Things (IoT) as an effective solution to reduce errors of inaccurate picking. For example, Lee et al. (2018) highlighted a number of error factors, such as: severe complexity and variety of customer orders, the increasing demand of high order customization, and most importantly, high requirement of on-time delivery despite frequent changes. Thus, Lee et al. (2018) developed a proposal of a WMS with advanced data analytical capability. The data collected from their case company revealed that accuracy and efficiency is highly enhanced to cope with high order variability and customization. Similar findings are generally shown by Wanjari (2020), Chen et al. (2020) and Muhalia, Ngugi and Moronge (2021).

2.5 Summary

To sum up, this review of previous literature deems the main concepts that generates further understanding of the topic of the growing importance of Warehouse Management Systems (WMS) to effectiveness of operational logistics, especially in supply chain, like the case of Al Madina Logistics. Based on the discussion hereby, the researcher may conclude with those aspects of approaching effectiveness of a particular WMS in operational logistics include: speed and simplicity (efficiency), capability for service customization, capability to provide value-added services, and accuracy to reduce margins for errors. However, it should be clearly stated here that these aspects

are the initial considerations, and the secondary data available in the case company of the present research may generate and add other considerations.

Chapter 3, Research Methodology, is going to illustrate the research approach, methodology, tools of data collection, and models of data analysis. It is also going to provide detailed description of the research context, the case company, the participants and sampling model.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter offers an overview of the research methodology used in this study. The chapter explains the procedures and steps of data collection and data analysis. Section 3.2 aims to justify the selection of the research approach and research design adopted in the study. Section 3.3 describes the context of the study and the participants. Section 3.4 outlines the development of data collection tools, providing detailed description of: the survey questionnaires and the interview protocols. Section 3.5 shows models of analysis to report how the set of procedures and tools work together to answer the research questions of the study.

Research methodology is the comprehensive and accurate description of the implementation of research design, the target population, the tools and techniques used in order to analyze data and information, in addition to elements of validity, reliability, and ethical considerations of the research (Remez, 2018). Sileyew (2018) stated that research methodology is the path that the researcher needs to clarify which path through which the data is obtained in line with the objectives and achievements of this study.

3.2 Research Approach and Design

Research approach is defined as the broad label that includes: the research idea, the framework of interpretation, the research design and the research methods (Berger, 2017, p. 43). Because the present study is basically developed by to generate and interpret both qualitative and quantitative data, it basically adopts mixed-method approach. It attempts to answer the research questions by using both qualitative data as well as quantitative data.

Since the research approach is the general description of the process, one needs to have a specific description of what to expect to experience in the process of developing the study. Therefore, research design, as defined by Metti (2020), is the strategy of enquiring data that guides the researcher to select methods. For the present study, it adopts an exploratory design, since the researcher has no past data about how the WMS used in AMLS company functions and about its importance to operational logistics management, the exploratory design will serve as a tool for developing idea of the

research topic. In fact, the study may not suggest solutions for any problems affecting the WMS's effectiveness. It only develops a better understanding the effectiveness of the currently used WMS to the company's operational logistics. Metti (2020) states that exploratory research provides initial background, and it requires investigation of sources such as secondary data provided in the context of the study, statistical survey data, and opinions about the company and its services or products.

This exploratory research design is meant to determine how to obtain relevant data of the study to answer the research questions. The research design process includes many interrelated decisions and shapes the data collection and data analysis strategies (Sileyew, 2018).

3.3 Context and Population of the Study

The context of the study is Al Madina Logistics Services company, which has a geographical presence in six sites in Oman: (1) freight HQ and air freight operations in Muscat, (2) dry port, distribution center and transport operation in Barka, (3) sea freight, clearance, oil and gas 4 PL operations in Sohar, (4) transport, oil and gas 4PL operations in Fahud, (5) dry port operations in Mazunah, and finally (6) sea freights, clearance and project logistics in Duqm (Al Madina Logistics Services | 3PL logistics Services | Open yard Services Muscat Sohar Oman - Almadina logistics, 2021). However, due to efficiency and access considerations, the scope of the present study only addresses the investigated topic in the context of distribution center and transport operations in Barka. The employee portal's page shows that the WMS is accessible for warehousing personnel within or outside office, and the WMS is run by employing AWARE application developed by Exactus, a software application used as a supply chain management software. According to the developer company, AWARE software application is best used for companies which "store third party goods and do the distributions on behalf of their customers" (Capterra, 2021).

Study population refers to the group of individuals who participate in a specific topic, which includes all individuals who share a specific variety of similar characteristics, and the mechanisms of selecting them is in line with the research approach (Carvalho and Rivara, 2018). The researcher in this study targets employees of the AMLS (Al Madina Logistics Services Company. The study focuses on operations personnel from three departments which have direct use of the WMS, namely Distribution Center,

RMS- Record Management System and Exhibition Center, which are located in distribution center and transport operations in Barka.

3.4 Sampling Technique and Sample Size

The sampling method adopted in this study is meant to indicate selecting a sub-group of the community best represents the target population. The study employs a non-probability sampling technique to respond to the questionnaire survey. Non-probability sampling is defined as a technique of sampling that does not give similar opportunity to each and every population element or member to be selected for the sample (Farhani, Herawaty and Tresna, 2017, p. 277). The researcher basically has limited access and can only reach the samples at the consent of the management and in accordance with the availability. Thus, the sample size and the possibility is shaped by circumstances of the researcher's access, and therefore it is basically developed by convenience or opportunity non-probability sampling. According to Elfil and Negida (2017), convenience non-probability sampling is the most widely used and the most applicable sampling technique in business management research, and it is the technique in which sample elements are enrolled according to their accessibility and availability. The researcher aims to get access for maximum possible number of questionnaire survey respondents (as many as 30-35 respondents from the three departments mentioned in section 3.3, while for the semi-structure interviews, the sample of interviewed participants is not predetermined, and left upon the amount of data gained in the interviews.

3.5 Data Collection Tools, Validity and reliability testing

As briefly indicated earlier in Section 3.4, tools of data collection include: a questionnaire survey that addresses the aspects of WMS's effectiveness derived from the review of literature, including: efficiency, providing more product-service customization, providing value-added services, and reducing margins for errors. The questionnaire survey includes Likert-scale items for each item (rating scale ranging between SA [strongly Agree] to SD [Strongly Disagree] as illustrated in appendix 2).

Validity and reliability are important values that must be taken into account when developing and testing any performance, for example a questionnaire. This is because they are used in the study. "Attention to these considerations helps to ensure measurement and data collected for scientific research. It increases credibility and

reliability, increases transparency and reduces the chances of incorporating researcher bias into qualitative research. For all secondary data, a detailed evaluation of reliability and validity includes the evaluation of methods using all data." (Saunders, 2018). Thus, validity and reliability are to be measured before administration of the questionnaire surveys.

A number of important criteria that the researcher should be guided by when conducting his study and applying the questionnaire, including: That the research tool (questionnaire) has an appropriate and acceptable degree of the conditions of validity, reliability and objectivity; That is, the questionnaire is the research tool, so the honest test is the one that measures what was actually prepared in order to measure it, that is, it is codified and measures the function that was prepared to measure it, and it does not measure anything different.

On the other hand, the interview protocols are meant to address the growing importance of the WMS to the effectiveness of operational logistics. They include open-ended questions to generate elements for aspects of the growing importance of WMS to operational logistics from the perspective of personnel working on WMS in the three departments.

This is administered by interviewing heads and deputies of departments in the three departments. To guarantee high validity and reliability of the interview protocols, the protocols are also examined and judged before administration.

3.6 Data Collection Techniques

Data collection is defined as the procedure of collecting, measuring and analyzing research using standard approved techniques. the researcher can evaluate a hypothesis on the basis of the data collected. In most cases, data is the primary and most important step of the research, regardless of the field of research. The data collection differs from the different fields of study, depending on the required information. Where the most important goal of data collection is to ensure the collection of data rich in information and reliability of statistical analysis and that is where decisions based on data can be made for research. Where the fields of study differ, depending on the required information.

3.7 Data Analysis Technique

The process of analyzing the information and data obtained from the primary data collection tools: the questionnaires and the interviews, involves transferring, describing and evaluating all kinds of information, as well as the data that is collected through a variety of sources in order to discover and find all the basic information in order to support different types of the most important decisions and find solutions suitable for the basic research problem. The process of data analysis comes after the process of collecting, organizing and facilitating the obtaining of various data. The researcher is going to process the data of the questionnaire on statistical analysis software (SPSS) to evaluate and obtain statistical measures, like significance of differences.

3.8 Legal, Ethical and Social Considerations

Ethical, legal and social considerations are of high essentiality in the process of data collection. It should well clarified here that the conduct of present research project addressed ethicality of data collection by following procedures specified in Al Madina Logistics Services Company. The researcher sought approval from HR department to conduct the study and distribute questionnaires and conduct interviews. The purpose of the research project was clarified in the questionnaire. Confidentiality of participants' personal data was also informed and guaranteed (See Appendix 1: questionnaire and interview protocols). Access and use of data obtained from the field are gained upon approval from the management and acceptance of the participants (Appendices 3, 4 and 5).

3.9 Summary

In conclusion, the chapter has discussed the research approach and design, the research context, sampling and sample size and the data collection tools and data analysis. It has also presented the aspects to be considered while developing the data collection tools, such as: validity, reliability, and research ethics.

Chapter Four is going to present the data obtained from the primary and secondary sources and present the findings.

CHAPTER FOUR
RESULTS OF DATA ANALYSIS

4.1. Introduction

The aim of this chapter is to present the key results and discussions. The data is debriefed from the participants' responses to the questionnaire and the interview questions. Then, the findings from the questionnaire are engaged in the process towards research questions, "What are aspects of effectiveness of the warehouse management system (WMS) used at Al Madina Logistics Services (AMLS) from the perspective of AMLS personnel?". Then, the analysis of the data gained from the interview is going to develop answer to the research question, "What is the growing importance of WMS to the effectiveness of operational logistics at AMLS?". Thus, the chapter is divided into two main sections: Section 4.2, which presents analysis of the questionnaire survey data, and Section 4.3, which introduces the main themes and remarks emerging in the participants responses to the interview questions.

4.2. Questionnaire Data Analysis

The questionnaire survey is divided into two main sections. The first section collects demographic data of the respondents. The second section addresses measuring the participants' evaluation of the four aspects of effectiveness derived from the literature and previous research work.

4.2.1 Demographic Data of the Participants

The pie-chart below (Figure 1 demonstrates the participants' gender groups. The questionnaire survey obtained completed responses by 31 participants.
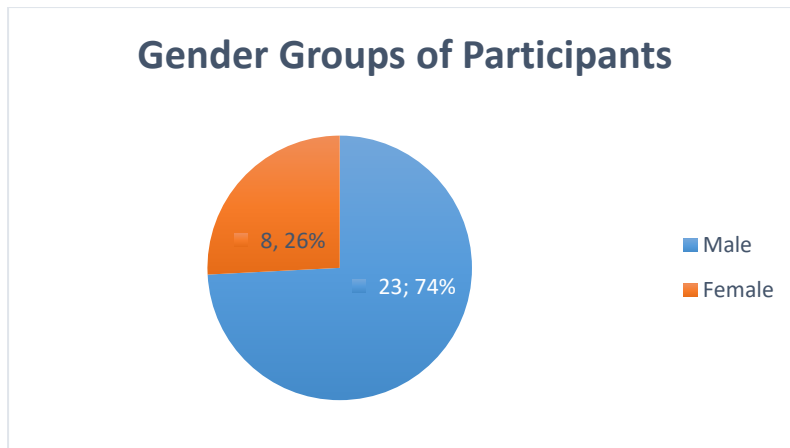
Figure 1: Numbers and gender groups of participants

As illustrated in Figure 1, the questionnaire survey was responded by far more male participants (constituting 74%) than female participants (only 26%).

Concerning their experience of working at AMLS, the participants' responses show that they are divided as in Table 1 and demonstrated in Figure 2 underneath.

Table 1: Distribution of participants in experience at AMLS

Work Experience at AMLS	Responses
Over 10 years	5
7 – 10 years	13
5 – 7 years	8
2 – 5 years	4
Less than 2 years	1
Total	31

Figure 2: Distribution of participants in experience at AMLS

As illustrated in Figure 1, the largest group of responses belong to participants within the 5 to 10 years of work experience at the context of conducting the questionnaire sur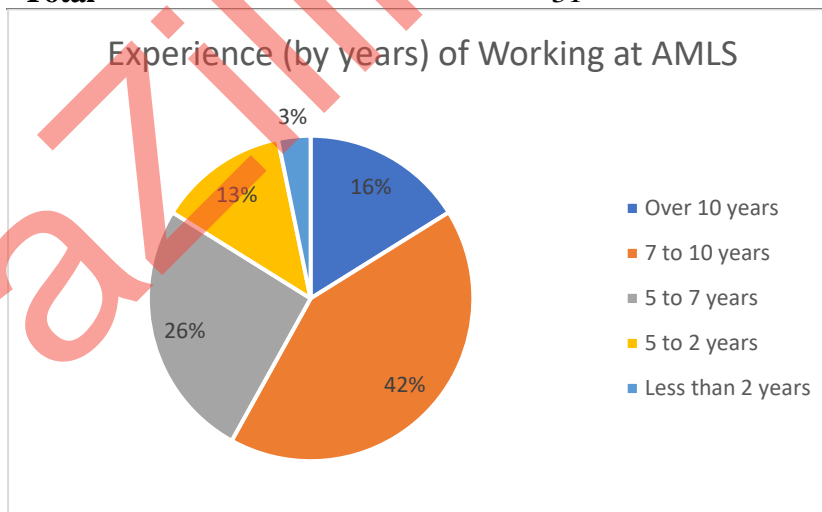vey. This includes the 7 to 10 and the 5 to 7, which constitute 26% and 42% respectively. There is only 3% (1 participant) within the minimum work experience group (Less than two years).

Addressing the participants' educational qualifications gained the data presented in Table 2.

Table 2: Educational qualification of participants

Educational Qualification	Responses
Diploma	16
Bachelor	11
Master	2
PhD	2
Total	31
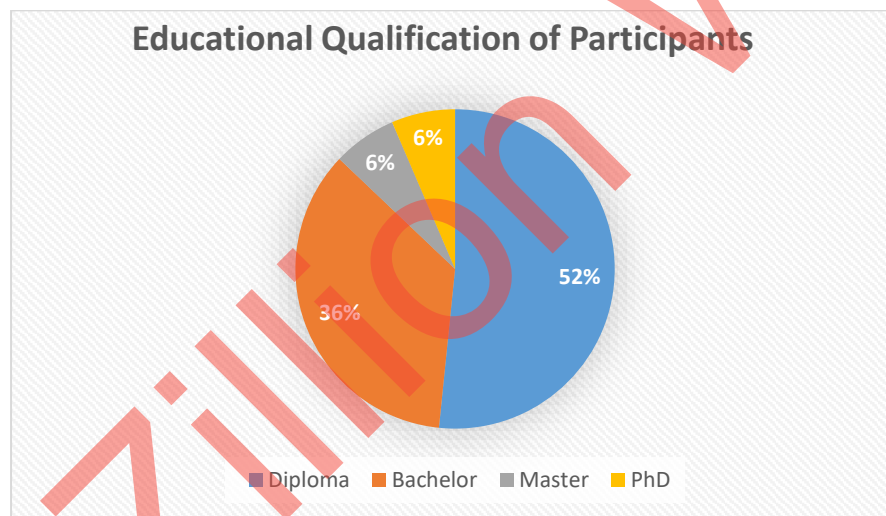
Figure 3: Educational qualification of participants

As illustrated in Figure 3, the vast majority of participants are holders of Diploma degrees, apparently with majors of business management and IT, constituting 52% of the participants, followed by holders of Bachelor's degrees with 36% representation of the total sample. On the contrary, holders of higher qualification constitute the lowest representation in the sample, both represented 6% of the participants group.

Finally, the data obtained from the demographic information section shows that participants' experiences of using the warehouse management system (WMS) at AMLS involve functions and works distributed as demonstrated in Figure 4.

Figure 4: Participants use of WMS services (functions) at AMLS

Figure 4 reveals that a vast majority of respondents, 18 participants constituting 58% of the sample use distribution center services of WMS to achieve their daily duties at AMLS. Interestingly, 13% of them use all the services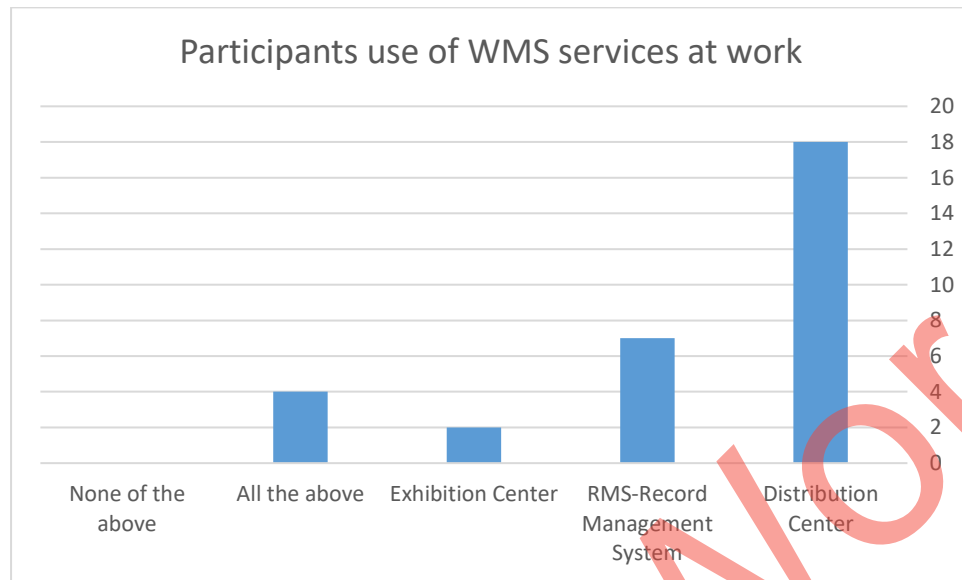, including distribution center, RMS-Record Management System and Exhibition Center services. In general, the sample is basically oriented towards the attitudes of the respondents with reference to their daily use of these WMS's services. Their attitudes of the four aspects of effectiveness of the WMS applied in AMLS are analyzed in the Section 4.2.2.

4.3.2. Analysis of Aspects of WMS Effectiveness

This part of the analysis addresses the participants' evaluation of the four effectiveness domains (aspects) which the researcher inferred from the previous research work. These aspects include: first, efficiency of use and ease of access, second, providing product-service customization, third, providing value added services, and forth, reducing margin for errors. The questionnaire items address these aspects of effectiveness by exploring the participants' attitudes towards motion statements in Likert scale. This section analyzes the responses to develop overall conclusion about AMLS's WMS.

4.3.2.1. Efficiency of WMS (saving time and effort, and ease of access and use)

This key aspect is addressed in items 1, 2, 3 and 4 of the questionnaire. The participants responses to the Likert items are demonstrated in Table 3.

Table 3: Results of WMS Effectiveness as Evaluated by the Sample

Item	SA	A	N	D	SD
1. **I find the company's WMS easy to use.**	6	14	8	3	0
2. **Using WMS software saves the time of my work**	12	13	5	1	0
3. **Learning how to use the WMS was demanding and took a lot of time.**	2	4	7	11	7
4. **Access to the WMS outside office is as efficient as access from inside office.**	6	9	11	5	0

As demonstrated in Table 3, Items from 1-4 explore attitude remarks about the participants' attitudes towards efficiency of the WMS employed at AMLS. Items 1, 2 and 4 are direct items, and, thus, in the Likert scale, responses towards SA (strongly agree) and A (agree), while Item 3 is a reverse (or negatively phrased item). Thus, responses to this item with SA and A mean decrease in evaluation of the aspect of efficiency as an effectiveness consideration.

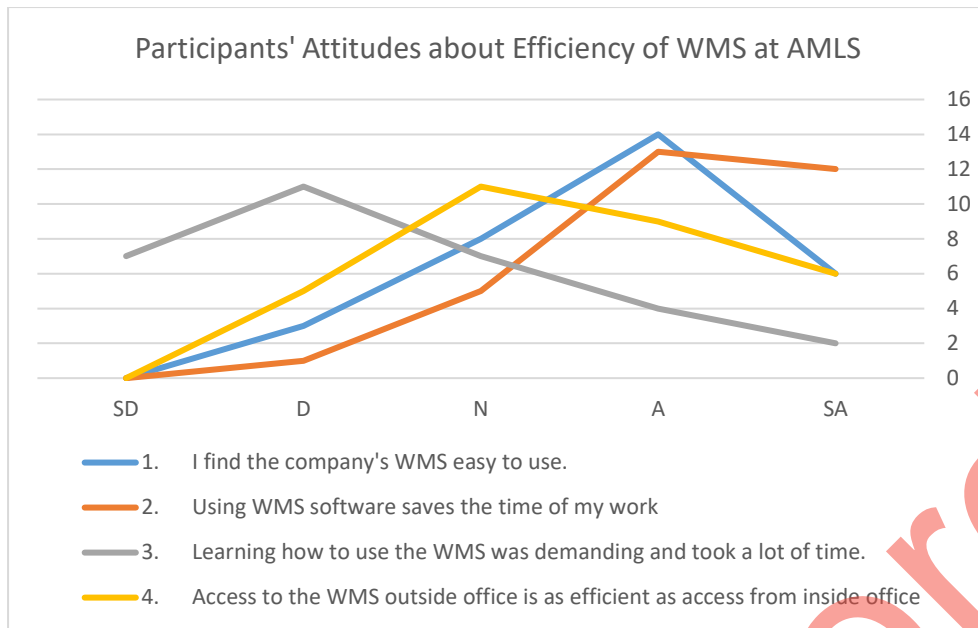The results are illustrated in the line graph in Figure 5.

Figure 5: Results of Evaluating Participants' Attitudes towards Efficiency of WMS at AMLS

The direction of the lines for items 1, 2 and 4 shows tendency towards positive attitudes about efficiency. Item 2 (addressing the WMS's role of saving time of work) has the highest positive tendencies in responses. However, for item 4, there are higher neutral responses than the SA and A. Item 4 is specifically focusing on efficiency of WMS application for distance (out-of-office) functioning. This neutral tendency reveals uncertainty of the WMS's efficiency of use for employees to work from home or from outdoor field sites. On the other hand, the reverse tendency towards D and SD in the line of Item 3 indicates positive attitude towards ease of learning (training) on using the WMS. The responses indicate that the majority of participants have not faced difficulty and do not find getting used to the WMS a demanding and time-consuming process. This reflects a dominating attitude that using the WMS is easy to learn and personnel have obtained experience of using it.

4.3.2.2. Providing Product-Service Customization

The second aspect of WMS's effectiveness is addressed by evaluating the participants' attitudes towards the WMS's role in providing product-service customization. This aspect is examined by Items 5-8 in the questionnaire survey. The results are summarized in Table 4.

Table 4: Results of Responses to Items Addressing WMS's Providing Product-Service Customization at AMLS

Item	SA	A	N	D	SD
5. WMS at AMLS company is flexible to meet client's needs.	19	11	1	0	0
6. WMS allows handling special orders and requirements of clients.	17	9	5	0	0
7. WMS at AMLS is generally flexible and can accept changes easily.	3	4	14	8	2
8. It is sometimes difficult to modify setting of WMS to meet special requests.	3	7	16	3	2

The questionnaire items from 5 to 7 are phrased to explore the participants overall attitude to the role of WMS in making operational logistics more flexible and sensitive to clients' needs and requirements. As the figures in the table reveal, there is relatively high agreement proportions, especially for items 5 and 6. However, there is more neutral sense with 7 and 8. This can be possibly justified by the concept of "accepting changes" as, similar to Item 5, this items also addresses flexibility as a core concept of Service-Product Customization. The line graph in Figure 5 below illustrates the detailed tendency of respondents for each item and for the overall concept of Service-Product Customization.
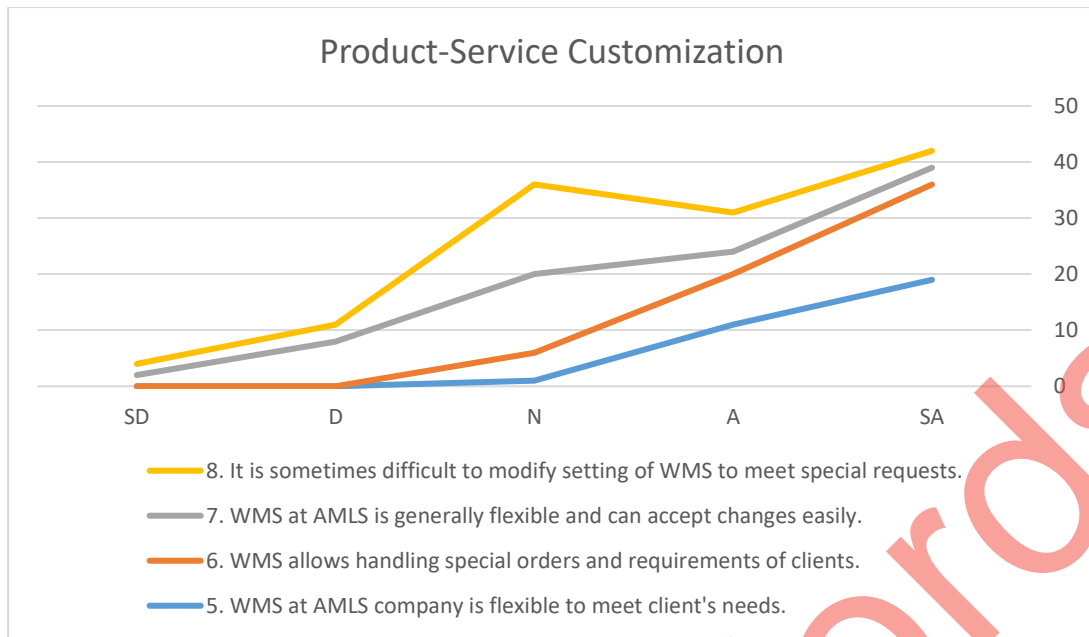
Figure 5: Results of Items Evaluating Participants' Attitudes towards Product-Service Customization of WMS at AMLS

Figure 5 reveals a key finding that for item 8, a majority (over 62%) decided to show a neutral attitude response. With reference to the fact that Item 8 is a reversed (negatively phrased) item, the Agree and Strongly agree are relatively higher than Disagree and Strongly Disagree. The result indicates a confusion about difficulty of modifying setting of the WMS in accordance with clients' need.

4.3.2.3. Providing Added-Value Service

Responses to Items 9 to 11 are meant to explore attitudes towards the role of WMS applied at AMLS in providing added-value services. A summary of responses is provided in Table 5.

Table 5: Responses to Items Addressing AMLS's WMS Providing Added-Value Service

Item	SA	A	N	D	SD
9. WMS at AMLS involves willingness for additional services (packing, retail labeling, etc.)	10	13	4	3	1

10. Clients are encouraged to benefit from additional services other than basic warehousing services.	8	14	6	3	0
11. It is difficult to add extra services of barcoding and labeling in the WMS of AMLS.	1	4	8	13	5

Items 9 and 10 seek remarks about attitudes and thoughts about the WMS at AMLS and whether it is competent to offer and to attract clients to benefit from added-value services. Item 10, on the other hand has negative remark and focuses on the difficulty of the process due to the additional tasks related to providing added-value services. The figures in Table 5 show positive thoughts about the WMS's willingness for extra services. As revealed in distribution of responses for items 9 and 9, there is evident determination reflected in the 74% Strongly Agree and Agree responses for item 9, as well as 70.1% of responses for the Agree and Strongly Agree with Item 10.

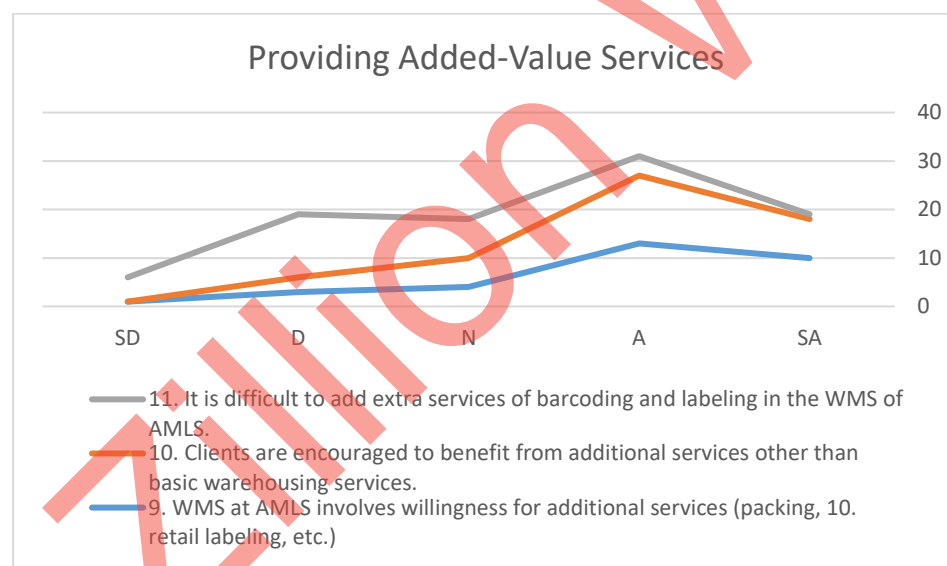**Figure 6:** Results of Items Evaluating Participants' Attitudes towards WMS Providing Added-Value Services at AMLS

As demonstrated in the line graph in Figure 6, there is evident comparability between the response distribution in items 9 and 10. On the other hand, distribution of responses to Item 10 indicated lower agreement tendency, and responses are distributed fairly equally in the Likert scale.

Thus, one may conclude with a general remark of positive attitude about the WMS's overall willingness to offer and provide added-value services, but it is thought to be relatively demanding as the participants' attitude reflected.

4.3.2.4. Reducing Margin for Errors

The last aspect of the WMS's effectiveness is its role in reducing margin for errors. This aspect (competency) is addressed by exploring the participants' attitudes and thoughts in Items 12-16, stated along with distribution of responses in Table 6.

Table 6: Results of Responses to Items Addressing WMS's Reducing Margin for Errors

Item	SA	A	N	D	SD
12. Errors related to traceability and connectivity still exist with the use of the WMS software.	3	5	13	6	4
13. Inaccurate inventory and outfitting still happen with the use of the WMS software.	4	2	6	11	8
14. The WMS software has contributed to reducing delays in the gathering processes.	17	11	3	0	0
15. The storage system has benefitted from the WMS software to reduce errors related to lack of space.	8	15	8	0	0
16. In general, the WMS software is almost error-free.	1	4	19	4	3

Table 5 shows the participants' thoughts as degree of agreement with items 12-16. The items address the role and capability of WMS at AMLS in reducing margin for errors on traceability, connectivity, delays, space management, inventory, and outfitting management. Items 12 and 13 have negatively phrased statements, stating that certain errors "still exist" and "still happen". The responses to these reversed items show different tendencies. That is, a higher disagreement attitude are reflected in responses to item 13 in comparison to Item 12. A total of 19 Disagree and Strongly Disagree responses (constituting 61.2% of the total responses) is compared to total of 10 responses (32.2%) of Disagree and Strongly Disagree to Item 12.

Interestingly, the highest Agree and Strongly Agree figures are in responses to Item 14, stating that the WMS at AMLS has contributed to reducing delays in the gathering processes, with 17 SA responses and 11 A responses (together constituting 90.3% of the total).
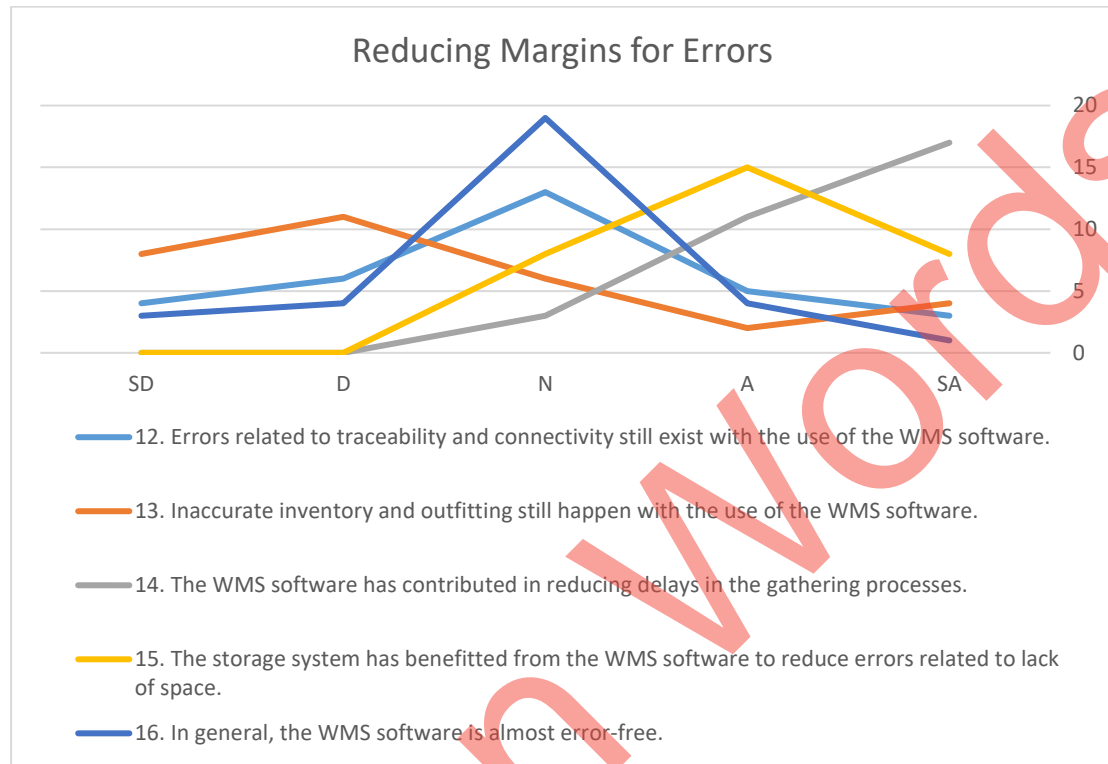
Figure 7: Summary of Participants' Attitudes towards WMS's Reducing Margin for Errors

Figure 7 visualizes the tendency lines in participants' thoughts and attitudes to the role of WMS in reducing errors. Similar to item 14, there is minimum disagreement with item 15 exploring attitudes about reducing errors related to lack of space in storage system due to effectiveness of WMS. However, it does not evolve agreement as high as to item 14, and the A and SA responses are pulled down by the higher Neutral responses. The highest Neutral tendency is indicated in responses to Item 16, which is probably interpreted as uncertainty due to complications in the work field. Item 16 is relatively addressing general conclusion; understanding the term "error-free" may have caused caution and reluctance in responses.

4.3.2.5. Summary of Results about Effectiveness Aspects

The questionnaire survey approached the four aspects of WMS's effectiveness at AMLS operational logistics. Overall, results indicated positive thoughts and attitudes about its efficiency and ease of use. However, attitudes about online (out of office) access, but this might be interpreted with consideration of external factors. With regard to product-service customization, there is relatively high attitude about flexibility and competency to deal with specified requests of clients. Yet, there is some uncertainty about processes of adjustments and detailed processes engaged in the customization operations. Similarly, providing added-value services is also thought to be conceived positively, but the demands and challenges of the process are reflected to be considerable. Finally, the aspect of reducing margin for errors is indicated to be at positive in general. However, specific areas of margin for errors seemed to thought of as less likely to be completely eradicated. Section 4.3 presents the data analysis obtained from the interviews.

4.3. Analysis of Interview Data

This section presents the themes derived from participants responses to the interview questions. The data obtained from the interview is targeted to generate an answer to the main research question: "What is the growing importance of WMS in the effectiveness of operational logistics at AMLS?". The interview protocols included five questions approaching thoughts about the role of WMS in warehousing problem solving, implementing, and adopting appropriate strategies. The interview protocols also explored challenges of applying and introducing functions of the WMS. The interview finally collects ideas about areas to be developed in the WMS at AMLS for further contribution to the effectiveness of operational logistics.

Thus, the present section is sub-sectioned in accordance with the themes derived from the responses of the interviewed participants. The next subsections present the main themes derived from the interview data.

4.3.1. The Role of WMS at AMLS in Operational Logistics Problem Solving

The participant's responses agree that WMS is the most essential factor of following up and tracking inventory from end to end, especially upon delivery and distribution. A participant revealed that WMS is the "key tool of tracing inventory across the

operational logistics". The responses agree in those features and capabilities related to capacity and tracking provide solutions for problems related to spacing, labeling and coding, etc. Problems related to tracing "storage locations" do not exist, thanks to the WMS's control center. Participants also referred to solving problems related to human resource managements and personnel shifting and phasing situations. They stated that problems related to reduced performance due to situations of movement are also addressed in the WMS.

The growing importance of WMS basically lies in its functions of improving and organizing work inside warehousing centers. It also lies in efficient run of functions to reduce margins for errors. It also contributes to establishing and generating key indicators of performance. In addition, WMS helps in developing strategies of effective labor and space management and helps in reducing waste of resources and unnecessary consumption of time and materials.

4.3.2. WMS's Contribution to the Adoption and Implementation of Strategies

The responses emphasized that WMS at AMLS is a major source of short-term strategies. They referred to WMS's role in increasing volume of production as a key aspect that involves developing strategies and plans of distribution, delivery and other operational logistics. According to the participants, AMLS's implementation of temporal plans is basically generated upon the WMS.

The requirements of developing WMS, on the other hand, are also indicated to contribute the strategic planning, especially with training and professional development considerations. A participant explained that having sufficient experiences in dealing with malfunctions of the WMS and management of inventory and space require adoption of professional development strategies.

4.3.3. Challenges against Effectiveness of Operational Logistics concerning WMS

The responses referred to a set of challenges that may cause setbacks against effectiveness of operational logistics and that can be addressed by developing the WMS's functions. The participants referred to two main challenges as follows:

1. Disruption and suspensions of some WMS's functions, which may result in periods of low productivity in particular operation, especially in warehousing departments.

2. Delivery errors and inaccuracy of orders in attempts to meet customized services to adapt to the needs of retail distributors and clients of other levels and categories. Such adjustments and customizations require specialized personnel and sometimes demand use of external experiences.

4.4 Summary

Chapter four has presented the data analysis and demonstrated key findings of the data collection and data analysis. The analysis of the questionnaire survey data revealed key conclusions about the effectiveness of the WMS at AMLS from the perspective of personnel sample. The effectiveness aspects included: efficiency and ease of use, providing service-product customization, providing added-value services and reducing margin for errors. The analysis of interview data presented key conclusions about the growing importance of WMS for the effectiveness of operational logistics, key challenges and the role of WMS's effectiveness in determining and shaping implementation of strategies adopted at AMLS.

The next chapter, Chapter 5 is going to discuss the findings in a broader context with reference to previous research, and it will present recommendations and possible future research directions.

CHAPTER FIVE SUMMARY OF FINDINDS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter states a conclusion of the research project. It offers a summary of findings in a broader context. It also suggest and offers recommendation to AMLS with reference to the findings related to the importance of developing certain areas of WMS for effective run of operational logistics. The chapter also discusses limitations of the research project and suggests areas for future research.

5.2 Summary of Findings

The study addressed areas of effectiveness of the warehouse management system (WMS) at Al Madina Logistic Services company (SAOC). These areas are: (1) efficiency and ease of use, (2) flexibility and competence service-product customization, (3) ability to increase added-value services, and finally (4) reducing margin for errors. The study approached these areas from the perspective of employees at AMLS, and found that these areas of effectiveness, based on responses and attitudes of personnel, are generally well-managed and maintained with consideration. Emphasis on areas of effectiveness showed that there might be areas which are less addressed than others. For the efficiency aspect, the external use of WMS (out of office) is an area that is reflected in the personnel's attitudes to be addressed with caution and less confidence than internal use. The scope of the study does not go beyond to discover the factors. For product-service customization, the study found the WMS is viewed to offer flexibility and to support customization, with some reference to the complication of setting adjustment made to meet each and every client's needs. Similarly, providing added-value services is viewed by personnel to be highly considered and addressed competently by the WMS. The WMS was also indicated to have utmost contribution to reduce margin for errors, with cautious distribution of attitudes about having an error-free operational logistics.

The study finally addressed the growing importance of WMS to the effectiveness of operational logistics. The findings revealed that WMS is viewed to be the key strength of AMLS and the core contributor to accurate and smooth run of operational logistics in supply chain management. It is also found to be agreed upon that WMS is the major

layout to organize logistic operations, including traceability and developing strategies and plans of distribution, delivery and other operational logistics. The functions of WMS included improving and organizing work inside warehousing centers, reduce margins for errors, establishing and generating key indicators of performance, and developing strategies of effective labor and space management. It is also viewed to have a key importance in reducing waste of resources and unnecessary consumption of time and materials.

5.4 Recommendation

Recommendations offer suggestions and solutions to address issues and concerns reflected in the research findings. The study would basically and generally recommend the implementation of latest advances of WMS software, especially with the eruption of advanced technology backed by Industry .4 and new generations of WMSs. Yet, the present research study, based on its findings about particular aspects of WMS effectiveness, would offer the recommendation below:

- The gap between personnel's understanding of concepts related to margin for errors may need to be bridged in training and professional development programmes. Since, as indicated in the findings, the WMS is the main contributor of accuracy, punctuality of orders and meeting deadlines, the margin for errors, such as errors traceability and space management, are on the surface caused by human deviations. Therefore, the study would suggest paying further attention to developing understanding and bridging gaps related to WMS personnel's conducts.

- One key finding is that the WMS at AMLS constitutes a dynamic contributor to shaping strategies and determining the implementation of the overall run of the company's conduct, it seems to be of core importance for the upper management to gain maximum understanding of WMS's scopes and features. This has not been addressed within the scope of the present study, but it might be a factor of cautious attitudes about certain technical settings related to added value and customization of services.

- The study recommends that, especially with current COVID-19 pandemic situation, that the efficiency of access to the functions of the WMS may need to be empowered and well-addressed. The possibility for distance work is recommended to be examined and maintained to be as easy and efficient as work from the company workplace locations.

5.4 Limitations

The topic of this research project is demanding and needed a lot of hard work to gain answers to the research question. The basic limitation of the study is that the data collection process is limited to the site of dry port, distribution center and transport operation in Barka, and therefore its findings cannot be generalized to the other five sites. Similarly, the responding sample represents the population of their context and participants may reflect experiences based on personal work functions, some of which have more managerial work on the WMS than operational logistics. Yet, the data is reflective of their attitudes and thoughts about the effectiveness of WMS.

The researcher also encountered some obstacles regarding the difficulty of obtaining approval to access the company and to distribute the questionnaire and conduct the interviews. However, one should confess that the personnel who participated cooperated and supported the project.

5.5 Areas for Future Research

This research recommends conducting similar research projects within the other five work sites of AMLS to gain further understanding of the WMS's attitudes of personnel. Similar research could be conducted in freight HQ and air freight operations in Muscat, sea freight, clearance, oil and gas 4 PL operations in Sohar, transport, oil and gas 4PL operations in Fahud, dry port operations in Mazunah, and sea freights, clearance and project logistics in Duqm. Moreover, the company may support and fund a comprehensive comparative research project to explore its employees' difficulties of access and using the functions in different departments.

The study further suggests research project about its personnel's acceptance and attitudes about different types of errors and deviations when using the features and functions of the Warehouse Management System.

5.3 Conclusion

Warehouse Management System (WMS) includes the practices and procedures that of managing daily operations in a warehouse. The main functions of warehouse management systems are to provide inventory and storage, improve handling and shipping of orders, and provide advice on identifying inventory. This case study project has explored the topic within the context of Al Madina Logistics Services (AMLS).

Finally, the researcher hopes that this research project has a positive impact to the company by presenting the most important proposals and ideas to identify the most important problems of warehouse management. Thinking about the challenges from the perspective of the researcher student has hopefully added new dimensions to review practices of warehousing at AMLS.

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