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A PROJECT REPORT
ON

The Role of Information Technology (IT) in improving damage control in the warehouse: A case study of Voltamp energy SAOG.

By
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Guided by

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Table of Contents

Table of Tables

Table of Figures

ABSTRACT

This dissertation has been compiled on the research topic “The Role of Information Technology (IT) in improving damage control in the warehouse: A case study of Voltamp energy SAOG”. Warehousing is very important in now-a-days business life for logistics firms. In this research paper the technologies introduced by IT has been discussed to effectively control damages at workplace or outer boundary. This is a quantitative research based on correlational research design to check the association between role of IT on organizational performance of Voltamp energy company, Oman. The questionnaire has been developed to gather the information from respondents. There has been 100 questionnaires distributed among employees of Voltamp Energy Company. Random sampling technique has been used to collect the information from everyone in the selected sample. The findings of research states that qualitative and quantitative analysis of the data collected demonstrated that WMS has been the best warehousing operations management system due to which the damages at workplace or outer boundary of the organization has been controlled easily as it has different innovative feature to predict the emergencies, inventory control. It is observed and proved that WMS could work better by installing other IT technologies for different operations at workplaces, because other technologies has also advanced features due to which the WMS would operate tremendously to control the damages. One more thing has been analyzed that reduce the influence of human and manual touches of the stock by the staff employees could reduce the damages at workplace. It is newly observed that WMS system is an all-rounder warehousing management system which maintain the communication with other departments also to ensure the safety and security of the stick to avoid any accidents or emergency through RFID technology.

Keywords: IT technologies, organizational performance, Voltamp Energy Company, Oman.

Chapter 1

Introduction

1.1 Background of the study:

According to current fast-paced world with client requests and prompt delivery requirements, a viable integration of all members of the supply chain - suppliers, producers, retailers and stock rooms - is needed within the organization, warehousing is embarking on a transformation as it acts as a buffer to provide value-added administration for companies. As per (Fischer-Preßler et

al., 2020), Warehousing requires well-functioning procedures that do not have such a shortage that it was in stock but also the damage to the product between the quick and fast supply chain handles in which the supply chain costs are also high.

As per (Sharma et al., 2020, p.1-10) “Since the expanded accentuation on shorter lead times, steady changes in the client requests and more extensive item ranges, the significance of and weight on distribution center operations has expanded, such as the capacity to store different articles and to choose and assemble a wide extent of client orders there is a need of hour to adopt such information technology which has been tackle all the procedure in an efficient way by controlling all the possible damages at workplace”. As per (ZHU, 2017) in managing new environments and managing optimal forms of distribution center; Acquiring, acquiring capacity, arranging selections, and delivering; The Internet of Things (IoT) is an important modern invention.

In this research the main focus on the utilization of diverse information technologies to control and reduce the damages occurred at workplace to improve the performance of the warehouses in Oman, especially Voltamp energy SAOG, Oman.

1.2 Statement of the research Problem:

According to (Martínez-Rojas et al., 2016) warehouses are the most important sector for logistics firms to store, retrieve and dispatching their orders from customers. All this process in warehouses controlled by the WMS systems to effectively perform and there would be less chance of mistakes (Khanam et al., 2020). But sometimes the product damages or losses still occurred during the use of this software, which impact the overall performance of the organization. So this research has been conducted to fill this gap and find out how to improve product damages by improving the performance of existing WMS through incorporating advanced systems to improve the damage control in warehouse organizations. This research would become helpful for Voltamp Energy SAOG Co., Oman and other warehouses organizations in Oman.

1.3 Aims and Objectives of the Research:

1.3.1 Aims:

The basic aim of the research is to analyze the use of WMS in improving damage control in warehouses for Voltamp Energy SAOG Co. Oman.

1.3.2 Objectives of the Research:

i. Investigate the use of WMS in improving damage control in Voltamp Energy warehouse in Oman.
ii. Identify the means by which appropriate and effective use of technology can achieve damage control.
iii. Identify suggestions that can improve the efficiency and effectiveness of the use of a WMS system in improving damage control.

1.4 Research Questions:

i. What is the use of WMS in improving damage control in Voltamp Energy warehouse in Oman?
ii. What are the means by which appropriate and effective use of technology can achieve damage control?
iii. What are the suggestions that can improve the efficiency and effectiveness of the use of a WMS system in improving damage control?

1.5 Scope of the Study:

This research has been conducted on the role of information technology on improving the damage control in the warehouse of Voltamp energy, SAOG, Oman. The research would be completed in one organization only and not taking into consideration other warehouse organizations incorporated in Oman. This research paper would only focus the warehousing and logistics department of the company and survey their department employees to scrutinize about the efficiency and effectiveness of WMS system they have installed and used. And examined what are the means by which appropriate and effective use of technology can achieve damage control.

1.6 Significance of the Study:

This research has its own importance in terms of identifying the role of IT in improving the damages control in the field of warehouse and logistics. This research would be beneficial for the warehouse organizations that are most worried about their product loss or damages occurs frequently at the time of loading, unloading storing materials, products, consignments etc. the main objective of this research is to provide the best solutions, strategy, or technology for improving damage control in warehouse system of Voltamp energy SAOG Company, Oman. Because if the damage control are reduced it enhance the productivity, efficiency, customer

satisfaction and reputation of the company among other organizations that also results in good financial performance of the company.

1.7 Limitations of the Study:

This research has some limitations listed below:

i. One of the big constraint is that this research is limited to only one organizations regarding damages control of the warehouses and not taking other organizations into account. So, the results of the research are biased only to one organization.
ii. The lack of resources is also a limitation to conduct this research.
iii. Also the research only limited to one Geographical location (Muscat) of Oman

1.8 Operational definitions of the terms:

Information Technology (IT): As per (Buntak et al.,2019), "IT is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data".

Warehouse: A warehouse is a huge building for storing and retrieving the stock for delivery on order. The stock may be merchandises, fabrics, durable goods etc. (Khan & Javaid, 2021).

Damage Control: According to (Ali & Phan, 2022), it is the procedure of restricting the damages of the product through an incident, accident of lifting them from one place to another.

1.9 Structure of the Research:

Chapter 2: after chapter 1 the next chapter is about the literature review. In literature review all content regarding the related topic in form of journals, articles, books, and websites has been discussed and studied well to dig-out the factors on which the investigation would be happened to the respondents to get the findings of the research.

Chapter 3: it's all about the research methodology and includes research data collection methods, procedures, approach, and type as well as research instrument. It also provide the details of the measurement scale of questionnaires, provide the reliability and validity testing of the research.

Chapter 4: is the chapter of analysis and interpretations of the results. The Analysis would be done through SPSS and the statistical tools (descriptive statistics, regression and correlation) used to check the relationships among the I.V and D.V.

Chapter 5: is the last chapter of research and conclude all the research by summarize the findings and discuss the results. Then there would be recommendations to strengthen the weaker areas of the companies or personnel to enhance the performance of the organization.

1.10 Summary:

A brief introduction in this chapter, all the details about the research problem, the objectives for which this research will be based, as well as the research questions also depend on these objectives, Scope, and importance of research has talked over.

In the next chapter, all relevant literature would be discussed along with the critical analysis of each article to analyze the research gap.

Chapter 2:

Literature Review

Paul and Criado (2020) stated that a simple summary of sources can be a literature review. A literature review, combine summary and synthesis but it has an organized pattern. A summary is a duplicate of important source data, yet merging is re-associating, or redoing, that data. It can provide another version of old things or combine new ones with old understandings. Alternatively, it can follow the ideas of experts in the field, which includes important discussions. In addition, depending on the whole situation, writing literature may search sources and motivate the reader with the most appropriate or important qualifications. Here is, a literature review of the role of IT in improving damage Control in warehouses; A case study of Voltamp Energy SOAG is discussed.

2.1-Warehouse Management System:

Torabizadeh et al. (2020) stated that WMS is a product system that provides visibility to the entire business stock and manages the satisfaction activities of the innovation network from distribution to warehouse. The cost of installing WMS is high, but once installed, there are lifetime benefits that add to the return on investment and increase the profitability of the organization WMS also enable organizations to expand their work and environment and hardware programs by planning and improving the use of assets and material streams. In particular, the WMS frameworks are intended to assist the needs of a global production network, including disintegration, construction, resource development, and management organizations.

The function of WMS is to help customers deal with satisfaction, deliver and receive jobs in a warehouse, or focus on dispersal, for example, to pick up products on racks for shipping or to care for acquired goods. Its function in stock is to track incoming stock information from scanner tag checkers and radio frequency identification labels (RFID) and to update the stock

management module in the ERP framework to ensure it has the latest data. The Reconciliation link aligns the stock information set in the ERP framework with WMS (Lee et al., 2018).

In this regard, the ERP framework handles bookkeeping and a large portion of invoices, requesting management, and stock management. TMS is where the process of transport process is considered. It is a point-and-point database for delivery vehicles but at the same time is a value-based framework and framework for planning, making, and tracking shipping. In some cases, TMS will be merging with WMS to enable better communication of planned inbound and outbound activities that take place at the junction of stock exchanges and carriers, for example, consolidation, sales booking, work booking, onboard, load building, and cross-docking (Žunić et al., 2018).

Typically, orders come naturally from ERP or request TMS-linked board structures. The ERP framework similarly provides the application data TMS needs to schedule and execute deployments. In addition to basic things like client name and address, information from the ERP framework also remembers point-by-point data to ensure that relevant information is delivered. TMS returns the hidden delivery items required by the ERP framework to be maintained and asks for board power, for example, next number, carrier name, and cost. Delivery data can also go to the client relationship (CRM) module to help refresh clients about the situation with their orders (Pane et al., 2018). In my opinion, Warehouse management system plays an important role in improving the performance of the organization. In warehouse management, layout design of factory is designed in such a way that delivery and production time reduce. Due to which cost of product reduce. When products deliver at a time then customer satisfaction level improve and develop the good customer relationship.

2.2-Features of Warehouse Management System:

Warehouse Management System, which gives organizations the power to change the process and the reason for selection to ensure that the Warehouse is designed for stock distribution. WMS opens an open container that expands the extra room and records variations in stock from time to time (Baruffaldiet al., 2018).

Stock tracking enables the use of the next edge and visual cues and photographic information (AIDC) frameworks, which include RFID and standard tag scanners to ensure that products can be successfully found when they need to move (Minashkina & Happonen, 2020).

Discover and exit, which allows for stock extraction and recovery, often with a variety of choices to voice to help inventors find goods.

Selection and compression of products, including location picking, wave selection, and collection collections. Distribution center specialists can similarly use the package structure and alternating power to direct the selection and packaging work professionally (Van Geest et al., 2021).

Shipping, which gives WMS the ability to submit refinancing billing (B / L) before shipping, generate compelling records and dispatch requests, and send pre-delivery notifications to beneficiaries.

Work with supervisors, which assists the management of distribution centers by looking at staff exhibitions using execution kits (KPIs) that show employees working above or below the guidelines (Lototsky et al. ,2019).

Yard and dock management, which helps transporters enter the distribution center to look for appropriate shipping locations. The more mind-boggling use of the yard and booth enables the crossing of vessels and a variety of internal and external integrated activities.

Revealing, assists chiefs by disbanding the delivery of distribution center activities and tracking regions to reach another level (Assis & Sagawa, 2018).

2.4-Voltamp Energy warehouse in Oman:

An Oman-based joint-stock company along with its subsidies engage in the manufacturing, sale, and distribution of transformers, low voltage panel and switchgear name of that company is Voltamp Energy SAOG. Low voltage switchgear and transformer segment are the two basic segments of Voltamp Energy SAOG. Maintaince Contract, onsite assessment service, and supervision of erection are also provided by Voltamp Energy SOAG company. The utilization of WMS in Voltamp has been very accurately adopted. Voltamp Transformer Oman LLC was completely owned by SOAG on December 31, 2011. The top management in Voltamp Energy Co. encourages the use of WMS and other IT advanced technologies to control damages for increasing the productivity and net margin of the company. Up to 15 Megavolt ampere, 33 KV class of transformer are manufactured by Voltamp Transformer Oman LLC. All employees in Voltamp Energy SAOG are well-trained to tackle any emergency (Chowdhury & Mackenzie, 2021).

2.5-Use of WMS in improving damage control in Voltamp Energy warehouse in Oman:

The warehouse Management System involves coordinating, executing, and complying with all cycles that take place in the department, so that they can operate without interruption and as efficiently as can be expected. Warehouse problems can affect the speed, expertise, and efficiency of a particular warehouse function or the entire series of cycles associated with it. As a rule, these errors are detected as soon as the interaction is started or even completed. In addition, by then, it is too late to stop the error - it may be too late to reduce the unit of damage done. In any case, with the foregoing information about possible difficulties in warehouse activity, a company can see it early and stop the damage before it starts (Tongliang et al., 2019).

Poor Damage Control:

Damage is a common problem in stock markets, especially those that are stocked with stocks and shifting gears. Although it is difficult to completely avoid damages, organizations can deal with ways to reduce it continuously (Tang & Zeng, 2021).

It introduces protective features such as bed protectors, special rack nets, monitor rails, hostile tapes, lock frames, low-level warning bars, and collecting transport components. Additionally, make sure the Voltamp Energy warehouse in Oman's paths are light enough and wide enough that Voltamp Energy Warehouse can easily move around things. These actions will help Voltamp Energy Warehouse by protecting representatives, hardware, stock, and lots to prevent misconduct in the workplace which ultimately enhance the customer satisfaction with the organziation (Andiyappillai, 2020).

Run a regular survey throughout the Voltamp Energy Warehouse distribution center to search for early signs of damage to Voltamp Energy computer hardware, stock units, or vehicles. For example, look at the storage areas for luggage and overloading bends, breaks, and breaks. In addition, search for different types of damages as well, which may eventually cause some problems, for example, water damage or bed bugs.

Warehouse management is one of the most important cycles in a distribution center, and it is not a place where Voltamp Energy Warehouse Distribution center can tolerate damage. Since most warehouse-related tasks managers are connected in some way, one problem can create costly mistakes for others. Frequently unintentional repetition, having a busy distribution center, poor stock management, unfortunate readiness for occasional applications, improper board application, overspending, and unfortunate damage management can cost Voltamp money and

ruin the stock office. By educating Voltamp Energy about the potential challenges the warehouse management system may face and their responses, Voltamp Energy can minimize the extent of the damage caused by these errors or even keep them from happening at all (Pingale & Kulkarni, 2019).

Using a warehouse management system can help Voltamp maintain a well-functioning warehouse, free from these pitfalls. Voltamp Energy Inventory is a cloud-based warehouse management system that can handle a variety of stocks, compile deals, deliver orders, provide Voltamp with up-to-date stock information, and provide Voltamp with accurate reports instantly.

Accidental Reduncy:

Löffler, Liu & Hofstedt (2020) stated that Volamp Warehouse plays a different role in every function of a company, and those functions are hung together to make work processes. In any case, in a situation where the work process is not working properly, Voltamp can see that the same work is being done unknowingly at least a few times. This redundancy increases work costs and take more time when Voltamp needs to come back and argue for a mistake. This often happens in larger stocks than in smaller ones, as there is more space and more stock to be managed.

Excessive repetition is often seen altogether picking, in which case objects are taken from their capacity in the warehouse to satisfy the request. In modest distribution centers, the application of the application is a one-man operation that usually results in an error. However, in a large distribution center, many people work together to select items in different parts of the warehouse to satisfy their requests. As the same application is transmitted to more people, there is a greater chance of botches, such as selecting a larger number of similar items (McSherry et al. ,2018).

The answer is to put resources into a new setup, such as an improved WES, that will help you make computer cycles that tend to expose duplication in your distribution center. For example, to help reduce the obvious repetition altogether to pick, Voltamp can use a new identifier to scan selected application items and make the draft tell the client about any copies (Lu, 2018).

2.6-Information Technology in Warehouse:

Stević et al. (2018) stated that In the mid-1970s organizations began to realize that PCs were a needed solution to increase efficiency, accuracy, and productivity in the stock market. Another industry division was introduced in the 1980s called Supply Chain Management (SCM). An

important part of SCM is the business framework WMS or Asset Management System. WMS is intended to assist all distribution tests and provide efficient and continuous data across all functions. Interlink Technologies began offering WMS preparations in 1986 and was a trailblazer in the manufacturing network industry.

The WMS includes two non-segregated universities; one country involves innovation, mathematics, imagination, and creative mind while the other country is busy with forklifts, transportation, and a ton of really hard work. The climate of the warehouse is constantly changing. Before WMS, data was static and preview per second. Stable data does not create the best selection. Stable data provides accurate, current data to managers, warehouse staff, and job intelligence - all at the same time - for better guidance.Without further data, WMS removes the mystery of where an object is located. By tapping a few keys, object data is transmitted seamlessly - where it is found, the number, where it was, who contacted it, and where it was in the store network. WMS erased many human errors and remained inactive. The draft instructions tell the specialist what work to be done, where to place the item, and the next main task. There is no longer a need to translate writing and translated numbers. Data is transferred to PCs - workstations, solid handheld gadgets, car terminals, PCs, and any other mobile with the development of standard IDs, and many standard tags (Wahab et al., 2021).

As industry head, Interlink Technologies integrates flexibility and flexibility into the Warehouse-LINK® Warehouse Management System. Adaptability opens up an important stockroom area using flexible openings, integrated spaces, and endless spaces. Adaptability enables application calculation of the application cycle, improved job requirements, and ease of changing business rules. Adaptability allows Warehouse-LINK® to thrive as your business grows. Organizations that focus on customer loyalty, quality, accuracy, and performance depend on Warehouse-LINK®. Whenever FIFO is important, Warehouse-LINK® ensures that the highest quality item is selected and shipped first. Update routes that include expired dates, timed numbers / statistical numbers, and hidden delivery details are followed by Warehouse-LINK® and are accompanied by a set of feedback to get solid review routes (Pasaribu, 2021).

2.7-Means through which WMS Control Damages
Smart Packing Limit:

Cho (2018) stated that Elevators, trucks, and other items used by your daily staff are designed for specific tasks. An experienced WMS stock management team will consider this and save your

pickers from snatching a lot of their trucks, or themselves. It may include co-pressing to deal with your bulk again. That means fewer spills, smaller items that damage computer hardware, and in any case, prevent you from stacking countless boxes until you wrap up the basics.In some cases, the WMS will also support these restrictions on burdensome entry by voting speed. It's faster if you're not overloaded, so the wave and other options can empower you without having to think about it directly.

Planning Approach:

Ud Din Paul Henskens and Wallis (2021) stated that WMS also plays an important role in the downsizing process: redecorating the stock room. Part of WMS's savings is the ability to split tasks and create formatting ideas, and workspaces, and that's just the tip of the iceberg. Whenever you have mastered your work procedures and timetables, you ensure that individuals work in districts with adequate room and rest.

If WMS has a staff module, you too can design VOSA cleansing program. In the same light, WMS tracking sales as it travels in stock due to RFID and BLE sensors will make it easier for you to differentiate if an item has not arrived in the right workplace. Knowing where things are going will keep things moving faster and limit misfortune.

Reducing Manual Touches:

Every time we humans come in contact with something, it is more likely that it will break or be damaged. Multiple WMS can help reduce the number of contacts and the chance of a person missing out in many ways. It then follows and inspects the beds without needing to be violated; transport lines can find items between slow-moving channels, and earn extra profit (Istiqomah et al. ,2020)..

Improved highlights, such as collections of transport, can similarly help to alleviate the anxiety by holding on to items until the rest of the line is repaired. It motivates us to meet slowly, moreover, it is a lot of mixing when you think you have the freedom to put something down and blow things up with disastrous conclusions.

Continual Check-Ins:

In some cases, misfortune means being robbed. We are dealing with WMS capacity tracking gears, components, etc. with sensor assortment. A non-stop view can detect when a sensor or

part is switched on, allowing you to act quickly in the event of a burglary. Identifying a representative with RFID chips allows you a second level of verification by seeing who is closest to what you think is the problem (Yükse & Yilmaz, 2018).

The point where representatives should look for products at each step in the store network reduces the chances of your distribution center professionals, drivers, and partners going from top to bottom. The prize for this type of non-stop registration is accessible to anyone with passing products, especially your builders. A consistent information framework can ensure that your nominees adhere to FIFO guidelines and avoid spoilage by using highly spicy materials, in addition to what is near the entrance or at the end of the storage area.

2.8-RFID Technology in Warehouse Management of Voltamp for Inventory Control on Organization Performance:

Du (2021) stated that a separate stock following development has been created in the business environment, and one of those processes is Radio ID (RFID). RFID is a structured framework that uses remote renaming to identify and track items marked as an endless number novel. Includes compo-nets as follows: tag or chip attached to an object, per-user that produces radio broadcasts and adopts the marker, and product that combines RFID equipment and business plan. The new introduction of RFID to stock control is important. It empowers organizations to support creative visibility, reduce unauthorized prices, eliminate stock errors, reduce volume costs, robberies, and reductions, and allow for regular revisions to the basics of stock information. RFID increases stock accuracy, technology, and speed, reduces shortages, durability, and distribution costs, and improves overall organizational financing by reducing stock depreciation costs. RFID provides continuous data about stocks and their value to any firm, especially those that control a wide range of assets and that need to determine whether stocks exist or have expired.

Information Technology impacts on warehouse management at company launches; led a comprehensive investigation into the RFID-based Digital Warehouse Manage-ment System (DWMS) in the VOSA. The results obtained from their experiments showed that the RFID-DMS integration of stock controls could assist the stockroom in successful career growth. It can also improve the use of the distribution center limit, increase stock accuracy, reduce staff numbers, and have longer packing time, which sets an important factor for class use. The result further reveals that RFID-based-DMSS empowers VOSA Corporation to recognize predictable and improved continuous stock management, planned volume or return function, machine data, and

high accuracy of stock control. In addition, the stock control function in the introduction of consolidation firms in the agricultural nation argued that holding stocks and soliciting costs could help kill the upper class. Similarly, lower costs in stock management give an organization the ability to achieve satisfactory assets, leading to productivity gains (Benes et al. ,2022).

2.9-Suggestions:

Maximize and Optimize all Available Space:

Instead of expanding your warehouse view, consider making better use of vertical space. Adding long power units and appropriate computer systems to select and store assets can help VOSA save a lot in one place, instead of adding development costs. Similarly, consider the types and varieties of rucks used. Placing small items on the bed wastes the space, and makes it easier to lose things. As opposed to using the same racks throughout the VOSA distribution area, VOSA may need different types of recording equipment. Additionally, take a stab at using common containers to help keep racks clean and accurate (Alfathi et al., 2019).

Lean Inventory:

Embracing the empty stock of the VOSA warehouse is the same as important as it may be in consolidation. The basic reason for dependence is what VOSA wants, and that is it. Maybe VOSA downgrades or kills security stocks, and tries to get providers to tend to pass more modest prices.

Adopting Enable Technology:

A WMS or ERP framework with a solid WMS module can enhance productivity by recommending the best courses and selection or setting methods. In addition, the framework provides robotic selection records that can be sent to portable users and devices to help eliminate slip-ups and reduce idle and paper. VOSA warehouse will be clean and green. Using a fixed tag or radio frequency ID (RFID) instructors can improve exchange accuracy, and reduce errors in selection.

Organize Workstations:

Filtering workplaces improve efficiency as employees do not have to look for tools or gear. Use the "5S" method from lean well packaged in a way that VOSA can produce to secure VOSA workspaces. Includes Filter; Gather all of you; Shine; Edit; and Strengthening - all measures

aimed at keeping pollution under control, minimizing errors, and promoting well-being and integration.

Optimize Labour Efficiency:

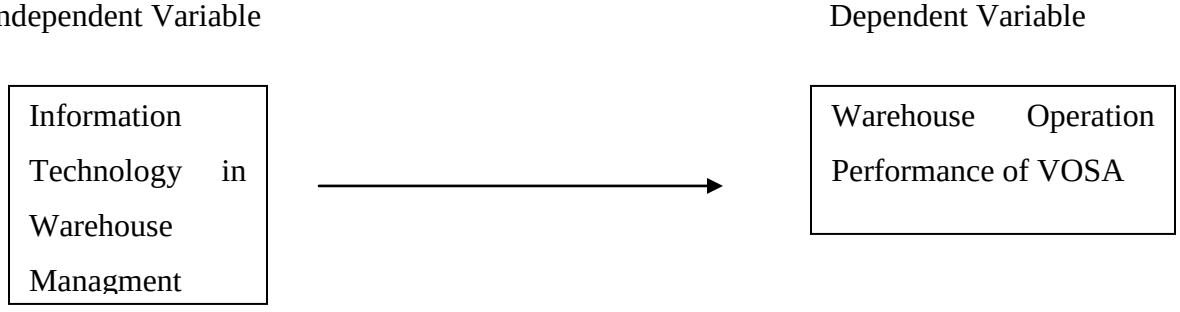
In the unlikely event that VOSA WMS can produce clever, physical choices. Investigate VOSA examples of material use, and keep high-volume items together near the front of the distribution center to minimize movement time. Additionally, keep items that are regularly sold together next to each other. VOSA will fix tasks VOSA thinks VOSA is trying to keep VOSA preferences in the most open spaces so VOSA can pick up the selection delay.

Continuing to develop the skills of the warehouse is about the presence of the mind and the right gear to accumulate a valuable value in complex calculations. Follow these basic developments and watch production first (Pereira et al. ,2019).

2.10-Critical Analysis:

After reading number of literature on the use of information technology in warehouse management , it is analyzed that due to information technology , warehouse management become effective that ultimatively effect on the performance and profitability of company. Voltamp SAOG is a joint stock company that uses information technology in their warehousing to control the damages. Different means are used to control these damages. Along the advantages of information technology in warehouse management there is also some disadvantages that are information security issue. Information security is a major issue that Voltamp SAOG face due to use of information technology in warehouse management system. Information technology wholly depend on internet. Whenever any issue occur in internet then company faces alot of issue mostly work stop that negatively effect on performance of company.

2.11-Theoritical Framework:



2.12 Summary:

WMS has been the best warehousing operations management system due to which the damages at workplace or outer boundary of the organization has been controlled easily as it has different innovative feature to predict the emergencies, inventory control. It is observed and proved that WMS could work better by installing other IT technologies for different operations at workplaces, because other technologies has also advanced features due to which the WMS would operate tremendously to control the damages. One more thing has been analyzed that reduce the influence of human and manual touches of the stick by the staff employees could reduce the damages at workplace.

The following chapter is about the methods of research data and states how all the research has been conducted/ compiled to make it authentic and accurate.

Chapter 3:
Research Methodology

3.1-Introduction:

Techniques that are used to collect the data for this research are discussed in detail in this chapter of the research methodology. Research design. Incoherent and logical way, different components of study are integrated through a strategy, and that strategy is called the research design. Qualitative research and quantitative research are the two types of research. This research is quantitative because in this research we deal with numbers and figures. In a qualitative type of research, use the existing literature and study them in detail, and at last answer all the research questions from that literature.

3.2-Research Design:

Coherently and logically, different components of study are integrated through a strategy and that strategy is called the research design. There are different types of research designs like descriptive research design, diagnostic research design, experimental research design, correlation research design, and experimental research design (Dannels, 2018). From all these research designs, a correlation research design is used in this research. In correlation research design, the relationship between two variables is measured. It measures how the change in one variable

affects the second variable. This relationship may be positive, negative, or have no relationship. As in this study, the effect of information technology on warehouse management of Volamp Energy Saog is measured. That's why a correlation research design is used in this study. To collect data questionnaire research tool is used.

3.3-The population of Study:

This research is conducted in Voltamp Energy Saog, at Muscat. So, all the employees of Voltamp Energy Saog are the population of this research study.

3.4-Sampling Technique and Sample Size:

It is very difficult to take the whole population in research. So, a sample is selected that shows the attributes of the population and that sample represents the whole population. There are different sampling techniques like random sampling technique, stratified sampling technique, cluster sampling, systematic sampling, and convenience sampling. In this research, a random sampling technique is used. Random Sampling is almost like putting everyone's name on a hat and drawing a few words. Every part of society has the same chance of happening. Although this is a popular test method, it is often difficult to do. It is expected to find the total amount for each component in the community (Senaweera et al., 2021).

The sample size is the name of the sample used to indicate the number of people who are remembered for a review to communicate with the public. Sample size refers to the total number of respondents remembered for review, and the number is often divided into sub-socioeconomic groups such as age, status, and location with the goal of the perfect model achieves for the entire community. Determining the sample size is one of the key factors in measurable research. Considering that the sample size is too small, it will not produce official results or deal adequately with the realities of most imaginative people. Then again, even though large sample sizes produce modest security and are an additional agent, larger sample sizes may increase the cost and time taken to conduct research (Vasileiou et al., 2018). Andrew Fischer's formula is used to calculate the sample size.

3.5-Research Instrument and Validity and Reliability Testing:

The research technique picked for this research is inductive grouping where the expert will utilize inductive testing of hypothesis and interpretivism. The expert will additionally utilize facilitated social occasions, abstract reviews of both fundamental and assistant information frames, and thorough understanding.

Different research tools are used to collect data like an interview, questionnaire, case study, survey, checklist, and observations. A questionnaire research tool is used to collect data. In this research, a questionnaire is selected because the questionnaire is cost-saving, easily accessible to people, scalability, and flexible for respondents to fill the questionnaire. By using a google form, a questionnaire is developed and distributed among 100 employees of Voltamp Energy Saog Muscat. The questionnaire has 2 sections and the Likert scale is used in this questionnaire.

The reliability and validity of the research suggest how accurate the research was. It would not be fair to say that it reflects the type of money we have won in the study. The nature of the research consistency is important as it demonstrates the consistency of the research strategy. In the meantime, we have become part of research papers that produce useful and efficient tools to identify the impact of Information technology on warehouse management of Voltmp Energy Saog, Muscat.

3.6-Data Collection Techniques:

A questionnaire research tool is used to collect data for this research. A random sampling technique is used in this research. In a questionnaire, the close ended question is asked to employees so that get reliable and accurate information.

The potential reactions to open-Ended questions are interminable, significance there's no restriction to your information assortment prospects. Various respondents might move toward the inquiries from immeasurably various points, and conversational reactions in the expressions of individual clients permits you to completely grasp them more. Open-Ended questions permit respondents to carefully describe the situation as they want to. Open-Ended Questionnaire offer more subtlety, since they are composed similarly as the respondents talk, so they can account for themselves all the more smoothly. Since they aren't attached to an appraised scale or numerous decision, open-ended questions lead to less equivocal responses

3.7-Data Analysis Technique:

To analyze the data collected through a questionnaire, SPSS is used. SPSS is used to analyze the data because of its advantages. It does not take much effort for a researcher to use SPSS. Indeed, even the expected time to separate data with the help of SPSS is not exactly some measurable resources. It is useful for both types of information, quantitative and subjective. Clients get the opportunity to choose the right type of chart that suits their information usage needs. The chance of an error occurring is small with the use of SPSS. In this research, regression analysis and

correlation analysis is discussed which clearly stated the relationship between this two variable. Different graphs and bar charts are used to show the result of SPSS. Through these graphs and bar charts, the reader easily understands the result of this research. Colum Bar Graph sum up an enormous dataset in the visual structure; effectively think about a few informational indexes; preferable explain patterns overdo tables; gauge key qualities initially. Line charts show patterns and connections between information better than different charts; think about patterns in various gatherings of a variable; show mistake values in the information. Pie Chart gives an incredible visual idea of an entire; clear examination of various parts, feature data by a visual detachment of a fragment, simple to name, loads of room (Denis, 2018).

3.8-Ethical Consideration

Confidentiality:

Confidentiality is described as managing someone's insurance. expecting the gatherings or the respondents will answer the reviews, the suitable reactions will be kept in mystery and will not be controlled for something else. The private convictions will be given respect and they will not be judged (Savvides, Khandelwal & Eugster, 2020). Additionally, consent incorporates taking approval structure a person before taking any action in which that individual is involved. The gatherings will be taken by making game plans for the social affair. Respondents who will be drawn closer to fill the overviews will not be compelled. They will be ensured that their perspectives may be used with the ultimate objective of the assessment. Likewise, their mystery will be ensured. Data recorded by the respondents will not be used for various purposes aside from research. It is critical as it will help with staying aware of the security of respondents.

No Plagiarism:

Copyright encroachment suggests copying someone else's material. Accepting the data of someone else is recreated without changing it into own words it is named as appropriate. For composing the review the data that was removed was summed up to remain from duplicating (Sharma & Verma, 2020). The investigation was not duplicated from any resources, for it was taken suitably implied compose the material that. It is one of the principal bits of the investigation, as it gives credit to the people who in advance have inspected the relevant. It is a kind of regarding others, which is something to be grateful for.

Data Manipulation:

Data Manipulation is changing or changing the outflows of another subject matter expert. It might be in a way like taking their name yet giving mistaken clarifications which are not given by them. Credit was given to the authors whose research was written in a composing overview. It was ensured that there is no control of data or wrong portrayal.

Summary:

The part depicts the examination approach. The specialist applied the examination reasoning of practicality in which, both education and logical techniques were utilized. The scientist's primary spotlight is on income age as it gives data about volume investigation. Information assortment, examination, and translation are utilized for meetings and exploration. Questionnaire were coordinated from Voltamp Energy Company were chosen for the meeting. Of the 100 respondents, a survey was circulated. The survey was incorporated in light of the information utilized in the writing audit and 5 focuses utilized in the Likert Scale process. In the following section, information interpretation and investigation are performed. Information gathered from research.

Chapter 4

Data Analysis

4.1 Introduction:

The adopted structured questionnaire is distributed and data is collected from 100 respondents (employees of Voltamp Energy SAOG, Oman) in a survey. On the basis of data collected through a survey, data analysis is done with the help of simple analysis in form of qualitative and quantitative analysis. In qualitative analysis all the questions analyze through tables and graphs and through quantitative analysis the data has been analyzed through descriptive statistics, regression and correlation to scrutinize the association between introduction of IT technologies and due to which the up to what extent damages would control in Voltamp Energy SAOG. Also the reliability of questionnaires has been analyzed through Cronbach Alpha’s Test.

4.2 Data Analysis:

Data analysis is done with the help of simple analysis in form of qualitative and quantitative analysis. In qualitative analysis all the questions analyze through tables and graphs and through quantitative analysis the data has been analyzed through regression and correlation.

4.2.1 Qualitative Analysis:

In qualitative analysis all the questions analyze through tables and graphs. After all graphical representation of collected responses the interpretations would be given to understand the opinions and perspective of the respondents.

4.2.1.1 Part A: Analysis of Demographics of Participants

Q1. Age:

		Frequency	Percent
Age	21-25	73	73.0
	26-30	15	15.0
	31-35	8	8.0
	36-40	4	4.0
	Total	100	100.0

Table 1: Age of Participants

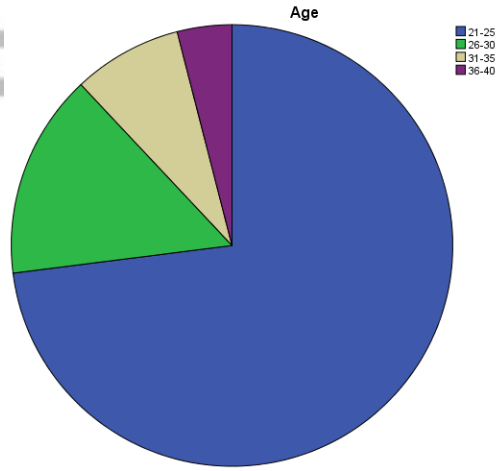


Figure 1: Age

In the age-group category 73% respondents were under age of 21-25 years, 15% respondents were from 26-30 years, 8% participants lying under 31-35 years of age while only 4% participants from 36-40 years. This shows that the data has been dependent on the younger/fresher employees more than experienced employees, the experienced employees were only 27% as a whole and 73% employees were smaller than 25 years of age.

Q2. Gender:

		Frequency	Percent
Gender	Male	85	85.0
	Female	15	15.0
	Total	100	100.0

Table 2: Gender

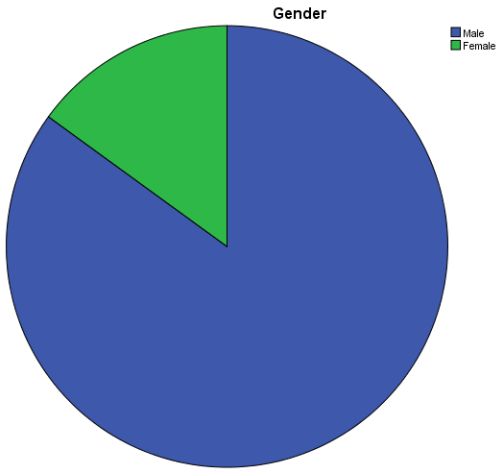


Figure 2: Gender

Mostly respondents were male in Voltamp Energy SAOG Company as their ratio to female employees has 85:15. It demonstrates that the Voltamp energy company employed more male employees than female employees.

Q3. Experience:

		Frequency	Percent
Working Experience	0-2 years	74	74.0
	3-5 years	20	20.0
	6-8 years	3	3.0
	9-12 years	3	3.0
	Total	100	100.0

Table 3: Working Experience

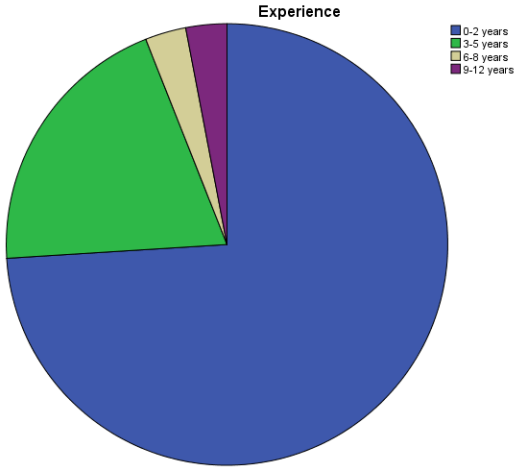


Figure 3: Working Experience

As mostly employees visited by the survey to collect response in Voltamp Energy were under age 25 so according to it their working experience mostly (74%) falls under 0-2 years of working experience, 20% comes from 3-5 years of working experience in the company while only 3% comes from 6-8 years and 3% from 9-12 years of working experience in Voltamp energy.

Q4. Designation:

		Frequency	Percent
Designation	Staff Employees	17	17.0
	Warehouse Manager	29	29.0
	IT Officer	2	2.0
	Damages Control Officer	52	52.0
	Total	100	100.0

Table 4: Designation in Voltamp Energy

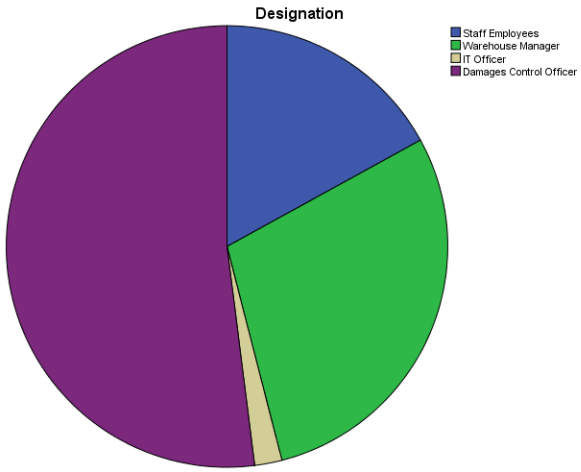


Figure 4: Designation in Voltamp energy

On the basis of designation in Voltamp Energy Company, mostly respondent's visited through a questionnaire survey were damages control officer as the table and pie-charts shows that it was 52%, while on the other hand 29% employees were warehouse manager, 17% were staff employees in warehouse department and only 2% employees visited were IT Officers.

4.2.1.2 Part B: Role of IT in improving the damage control in Voltamp Energy

4.2.1.2.1 Section I: WMS can control the damages through different features:

Q5. Damages mostly found

	Frequency	Percent
Inbound Section	36	36.0
Outbound Section	6	6.0
Put Away	19	19.0
Logistics Documentation Lost	39	39.0
Total	100	100.0

Table 5: Damages mostly found

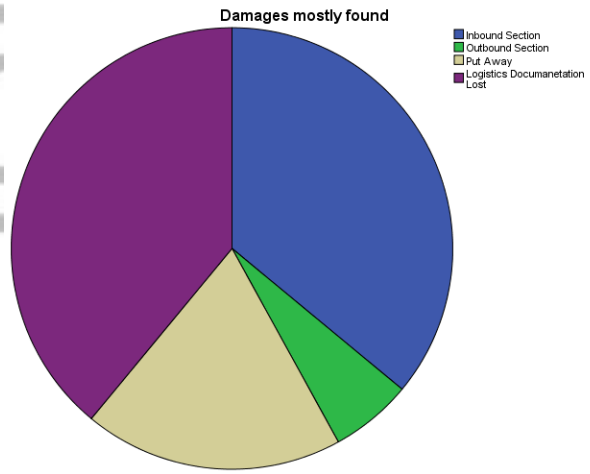


Figure 5: Damages mostly found

As per the experience of the respondents in Voltamp Energy Company they replied in equal ratio as damages for inbound section damages (36%) and for logistics documentation lost (39%). As for any company damages related to inbound or documentation lost matter a lot (Tongliang et al., 2019). Whereas on the other side they respondents that outbound damages are very rare during delivery or loading unloading of the products

Q6. WMS system could influence the following areas

	Frequency	Percent

Productivity	8	8.0
Damages Control	42	42.0
Documentation Control	28	28.0
Reduce Labor Cost	14	14.0
All of the Above	8	8.0
Total	100	100.0

Table 6: WMS system could influence the following areas

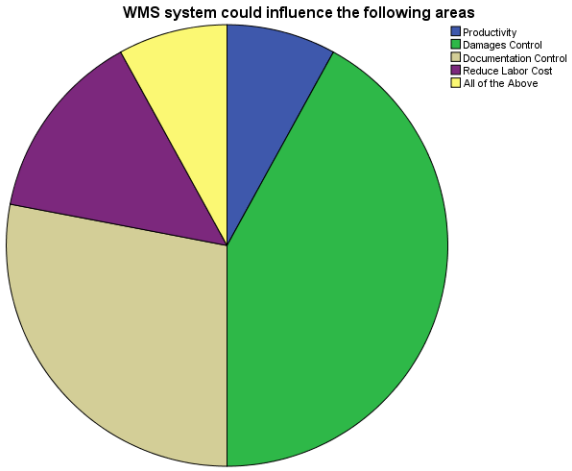


Figure 6: WMS system could influence the following areas

It is observed that mostly (42%) employees said that WMS system have extreme influence on damages control in the warehouse, supported by (Torabizadeh et al. (2020) and (28%) employees said that it saves the documentation to lost, (McSherry et al., 2018) states the same findings in his research while only 8% employees responds that it affects the productivity 14 % participants said that it reduces the labor cost and increase the net profit of the company.

Q7. Other IT technologies utilized in Voltamp to control damages

	Frequency	Percent
RFID Technology	9	9.0
ERP Planning	8	8.0
IoT 4.0	25	25.0
All of them	58	58.0
Total	100	100.0

Table 7: Other IT technologies utilized in Voltamp

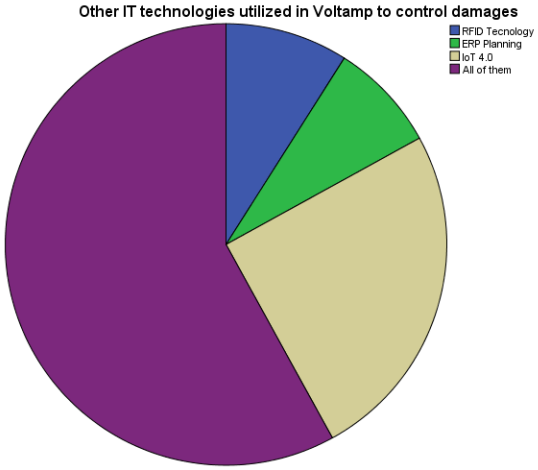


Figure 7: Other IT technologies utilized in Voltamp

According to the responses from participants of the research it is determined that Voltamp energy SAOG company used all other technologies RFID, IoT 4.0, ERP planning along with WMS system to control the damages and operate their warehousing operations. As 58% responses said that they used all of them technologies (Lee et al., 2018) debated all the RFID, IoT 4.0, ERP planning along with WMS system revolutionized the operations of warehousing.

Q8. Total time staff spend by using IT in performing their duty in Voltamp

	Frequency	Percent
≤4	28	28.0
5-10 hours	32	32.0
≥10 hours	40	40.0
Total	100	100.0

Table 8: Time spend by staff using IT technologies

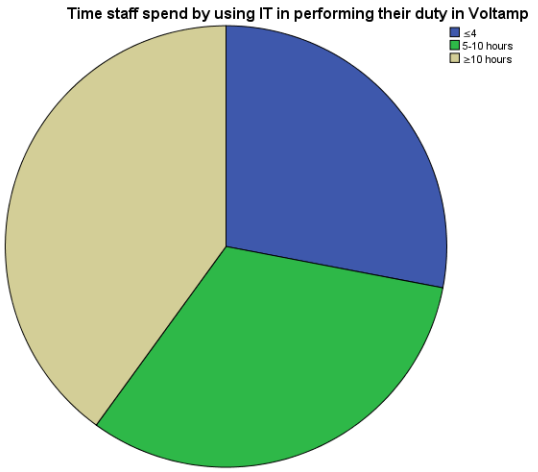


Figure 8: Time spend by staff using IT technologies

The employees of Voltamp Energy Company said that the staff mostly spend time with IT technologies for 5-10 and ≥10 hours in a day almost 72% as a whole, whole only 28% employees said that they had spent time with these technologies ≤ 4 hours in a day.

Q9. Departments use RFID system in Voltamp

	Frequency	Percent
1-3 Departments	11	11.0
4-6 Departments	40	40.0
All Departments	16	16.0
None	33	33.0
Total	100	100.0

Table 9: Departments use RFID system in Voltamp

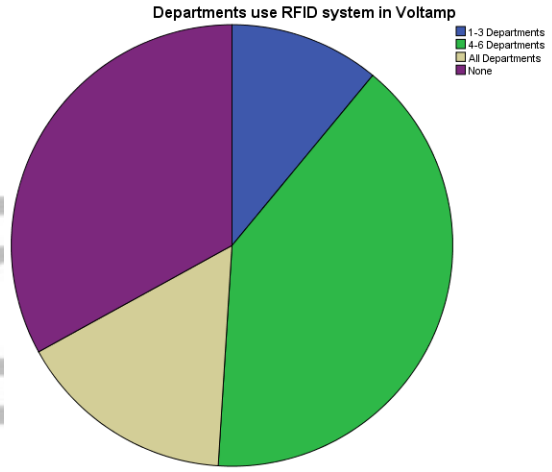


Figure 9: Departments use RFID system in Voltamp

There is a discrepancy in the responses here at one side the (40%) respondents said that they use in 4-6 departments RFID technology but similarly on the other side 33% participants said that they didn't use. Therefore, it is only because of the employees who do not have access to these departments and perhaps they do not even know what they use in their departments.

Q10. Utilization of WMS in Voltamp Energy is very accurate

	Frequency	Percent
Strongly Disagree	11	11.0
Disagree	18	18.0
Neutral	5	5.0
Agree	29	29.0
Strongly Agree	37	37.0
Total	100	100.0

Table 10: Utilization of WMS in Voltamp Energy

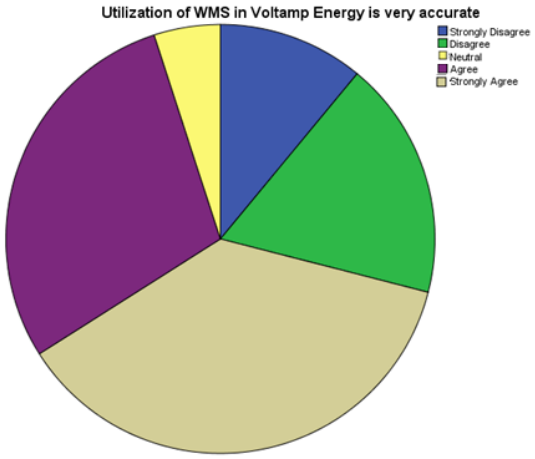


Figure 10: Utilization of WMS in Voltamp Energy

37% employees were strongly agree about the utilization of WMS in Voltamp, confirmed by (Chowdhury & Mackenzie, 2021) while 34% employees agree about the accurate utilization of WMS in Voltamp. So, it is evident that WMS has been given accurate results to Voltamp Energy Company and by its utilization they have enough control on their inbound or outbound or documentation lost damages under control.

Q11. Voltamp top management encourages the use of WMS to control damages

	Frequency	Percent
Strongly Disagree	8	8.0
Disagree	8	8.0
Neutral	2	2.0
Agree	52	52.0
Strongly Agree	30	30.0
Total	100	100.0

Table 11: Voltamp Energy top management encourages to use WMS for damage control

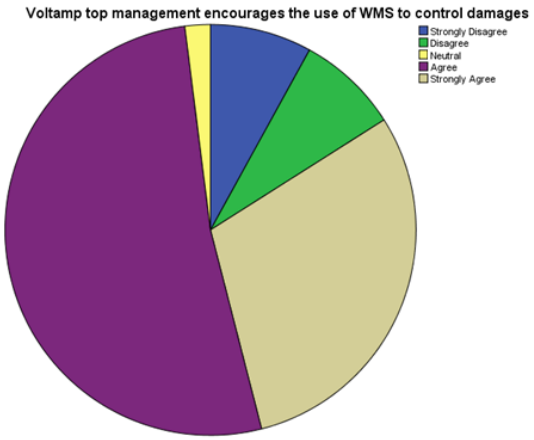


Figure 11: Voltamp Energy top management encourages to use WMS for damage control

The top management in Voltamp Energy Co. encourages the use of WMS and other IT advanced technologies to control damages for increasing the productivity and net margin of the company. As 82% responses said that they are agree and strongly agree as a whole with this statement, proved the finding of (Chowdhury & Mackenzie, 2021) while only 16 % entirely disagree and strongly disagree to this statement that top management encourages to use WMS.

Q12. Smart packing limit enhances the chance of control damages at warehouse

	Frequency	Percent
Strongly Disagree	11	11.0
Disagree	11	11.0
Neutral	10	10.0
Agree	36	36.0
Strongly Agree	32	32.0
Total	100	100

Table 12: Smart Packing Enhances damages Control

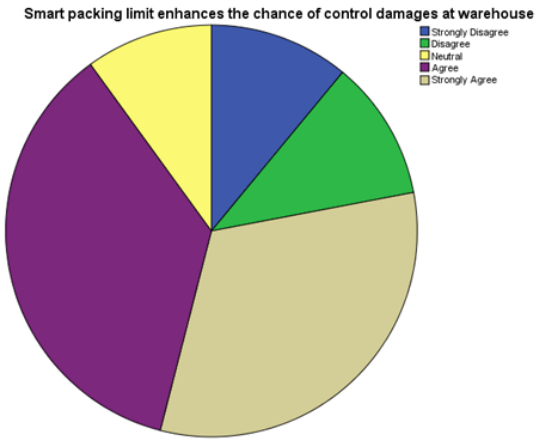


Figure 12: Smart Packing Enhances damages Control

It is also evident from the responses collected by the respondents that smart packing limit enhances the chance of control damages at warehouse because approximately 68% employees agrees that if the packing of the product smartly or with advanced techniques it would decrease the chance of damages at warehouses, also supported by Cho (2018).

Q13. Due to WMS the efficiency and productivity of organization improved

	Frequency	Percent
Strongly Disagree	6	6.0
Disagree	8	8.0
Neutral	20	20.0
Agree	49	49.0
Strongly Agree	17	17.0
Total	100	100

Table 13: Due to WMS efficiency and productivity improved

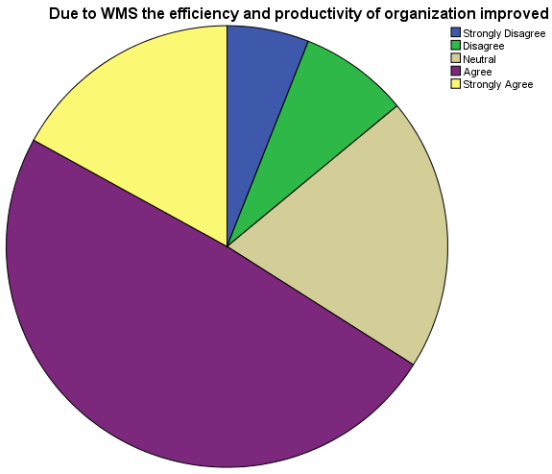


Figure 13: Due to WMS efficiency and productivity improved

As per the above table and pie-chart the employees of the company who are the respondents of the research said that they strongly believe that after the introduction of WMS in warehouse definitely increase the efficiency and productivity of the organizations, (Wahab et al., 2021) confirmed the finding in his research.

Q14. Data storage in WMS cannot be granted to secure, that means can be stolen anytime

	Frequency	Percent
Strongly Disagree	55	55.0
Disagree	16	16.0
Neutral	24	24.0
Agree	3	3.0
Strongly Agree	2	2.0
Total	100	100.0

Table 14: Data storage in WMS cannot be granted to secure

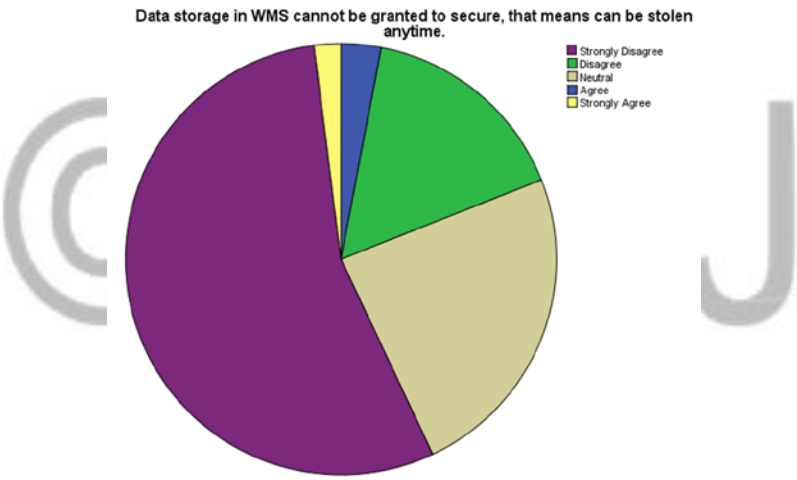


Figure 14: Data storage in WMS cannot be granted to secure

As per the data collected no one has been agreed that the documentation has been lost still after the installation of WMS, but they believe that WMS is the best way to safely secure the data of the organization and logistics documentation, (Buntak et al., 2019).

Q15. By reducing manual touches of humans in warehouses can minimize the chance of stock damages

	Frequency	Percent
Strongly Disagree	3	3.0
Disagree	11	11.0
Neutral	14	14.0
Agree	43	43.0
Strongly Agree	29	29.0
Total	100	100.0

Table 15: Reduced the influence human touches control stock damages

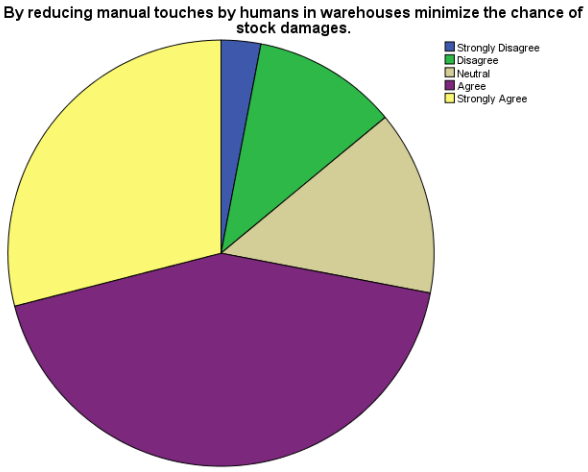


Figure 15: Reduced the influence human touches control stock damages

According to the responses it is observed that when the human touches and influence minimized and machines or IT technological machinery installed the stock damages would be reduced and organization's productivity increases, (Istiqomah et al. ,2020) confirmed the finding.

Q16. Devices could be easily handled and reduces damages

	Frequency	Percent
Strongly Disagree	3	3.0
Disagree	11	11.0
Neutral	6	6.0
Agree	34	34.0
Strongly Agree	46	46.0
Total	100	100.0

Table 16: Devices could be easily handled and reduces damages

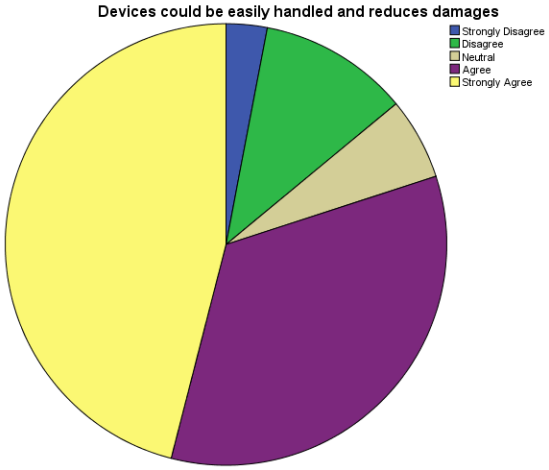


Figure 16: Devices could be easily handled and reduces damages

Mostly respondents (46%) strongly agreed and (34%) agreed that electronic devices could easily be handled by installation of different IT software's into the computer systems and it would minimize the damages that could be happened when the devices not be handled accurately, (Istiqomah et al. ,2020) also confirmed this. Whereas, only 3% respondents were strongly disagreed and 6% disagreed.

Q17. Usage of WMS in warehouses granted the higher service level to customers.

	Frequency	Percent
Strongly Disagree	10	10.0
Disagree	5	5.0
Neutral	34	34.0
Agree	33	33.0
Strongly Agree	18	18.0
Total	100	100.0

Table 17: WMS granted higher customer satisfaction

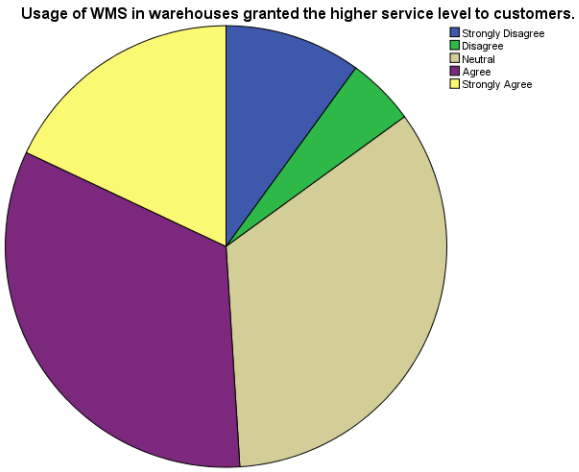


Figure 17: WMS granted higher customer satisfaction

By installation of WMS the damages would be control and customer loyalty and satisfaction with the organization increases, it is also proved by the literature review and now by the current research as 51% employees said usage of WMS granted the higher service level to customers and make the customer more loyal to the organization, supported by (Andiyappillai, 2020).

Q18. All employees in Voltamp is well trained to tackle the risk management related to tracking or security of order.

	Frequency	Percent
Strongly Disagree	11	11.0
Disagree	12	12.0
Neutral	9	9.0
Agree	34	34.0
Strongly Agree	34	34.0
Total	100	100.0

Table 18: All employees are well-trained to tackle any emergency

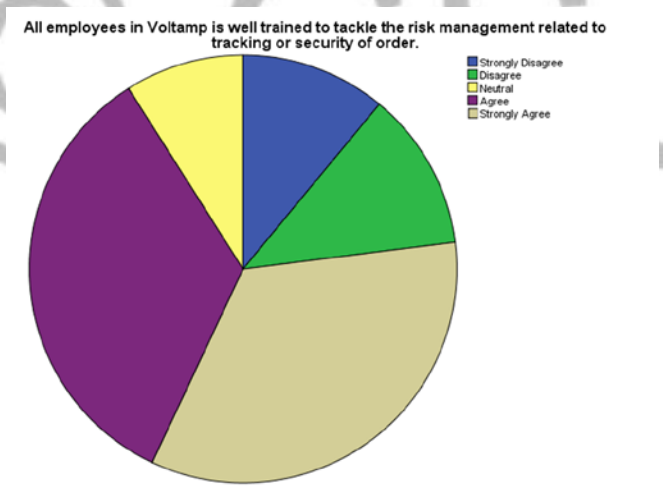


Figure 18: All employees are well-trained to tackle any emergency

As per the table 18 and figure 18 it is depicted that 34% respondents agreed and 34% strongly agreed that Voltamp Energy has well trained and expereiced employees to handle any emergency workplace, confirmed this finding by (Chowdhury & Mackenzie, 2021)

Q19. It helps to improve the communication between departments and inventory accuracy

	Frequency	Percent
Strongly Disagree	7	7.0
Disagree	9	9.0
Neutral	15	15.0
Agree	47	47.0
Strongly Agree	22	22.0
Total	100	100.0

Table 19: WMS also maintain the communication between different departments

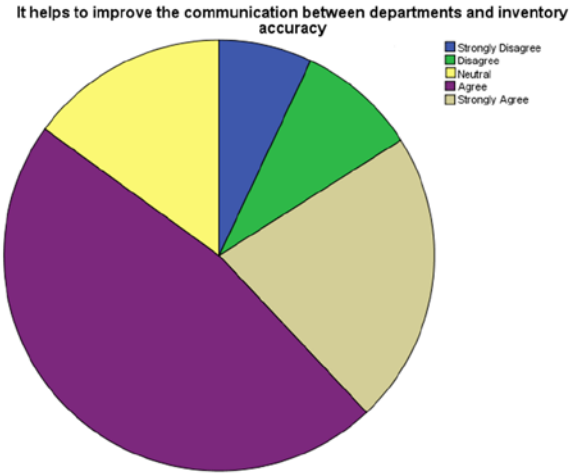


Figure 19: WMS also maintain the communication between different departments

22% employees strongly agree with the statement and 47% employees had agreed with the statement which shows that WMS system is an all-rounder warehousing management system which maintain the communication with other departments also to ensure the safety and security of the stick to avoid any accidents or emergency. This is the new finding in the current research.

4.2.1.2.2 Section II: Productivity of organization by reducing damages control

Q20. Application of information technologies like WMS, ICT, RFID control the damages and enhanced the performance of organization

	Frequency	Percent
Strongly Disagree	5	5.0
Disagree	19	19.0
Neutral	13	13.0
Agree	31	31.0
Strongly Agree	32	32.0
Total	100	100.0

Table 20: IT technologies control the damages and enhanced the performance

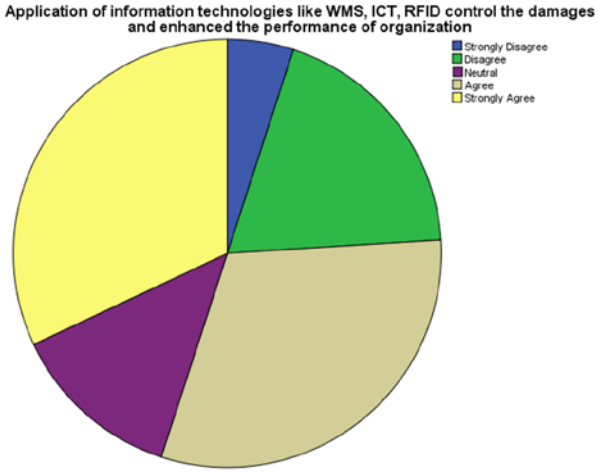


Figure 20: IT technologies control the damages and enhanced the performance

It is also evident from the responses of the respondents that the role of IT technologies ion warehouses improve the performance of organizations because most of the respondents agreed with the statement, supported by (Lee et al., 2018).

Q21. Customer satisfaction increase if their order reached to them without any damages and they need not to acquire any insurance policy for the safety of their ordered stock.

	Frequency	Percent
Strongly Disagree	10	10.0
Disagree	14	14.0
Neutral	22	22.0
Agree	34	34.0
Strongly Agree	20	20.0
Total	100	100.0

Table 21: Customer Satisfaction increases

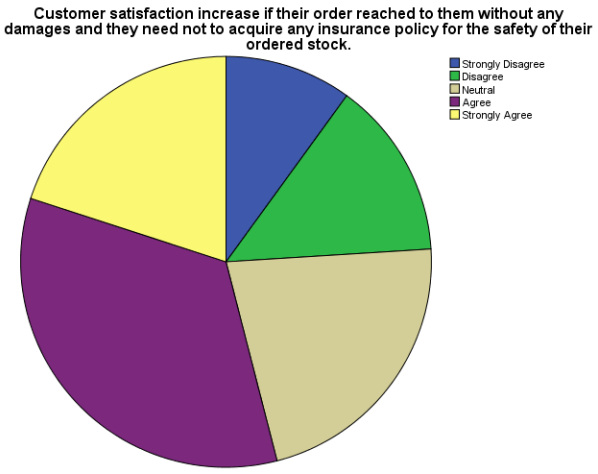


Figure 21: Customer Satisfaction increases

According to the responses 22% employees had neutral about this statement and approximately 54% employees agreed that customers have been satisfied more with the organization when their ordered stock had reached to them safely and they don't even need to buy insurance policy for their safety. It shows this saves the customers money which become them more loyal with the organization.

Q22. The WMS has high return on investment and increase the profitability of organization.

	Frequency	Percent
Strongly Disagree	13	13.0
Disagree	10	10.0
Neutral	20	20.0
Agree	30	30.0
Strongly Agree	27	27.0
Total	100	100.0

Table 22: WMS has high return on investment

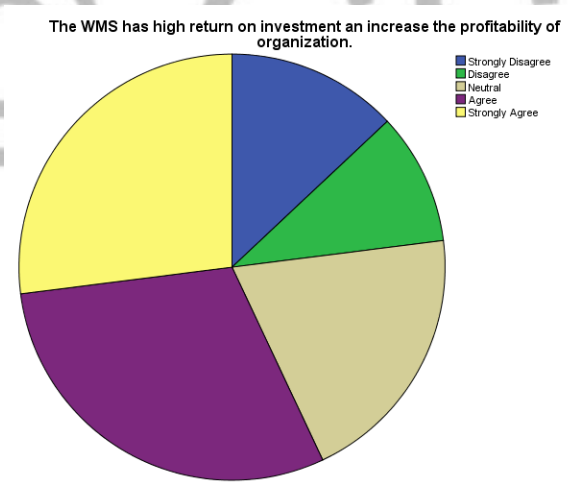


Figure 22: WMS has high return on investment

Mostly (30%) employees agreed and 27% strongly agreed about the statement and Torabizadeh et al. (2020) also confirmed that WMS gets a higher return on investment in the organization by installing the WMS system. This means that the cost of installing WMS is high, but once installed, there are lifetime benefits that add to the return on investment and increase the profitability of the organization.

4.2.2 Quantitative Analysis:

Quantitative analysis give us the most appropriate figure of relationship between two variables; such as dependent and independent variable. For quantitative analysis mostly used regression, and correlation. Also the reliability analysis of the whole questionnaire designed for research under this category of analysis and estimated through Cronbach's Alpha.

4.2.1.1Reliability Analysis:

Reliability Statistics	
Cronbach's Alpha	N of Items
.783	18

Table 23: Cronbach's Alpha Reliability test

According to the result of Cronbach's Alpha test it is evident that the research is reliable and valid because it has the value 0.718 greater than 0.60 and the value is acceptable for reliability testing. As well as it give the most authentic results for which the research has been taken.

4.2.1.2 Descriptive Statistics for Role of IT:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
10. Utilization of WMS in Voltamp Energy is very accurate	100	1	5	2.99	1.06
11. Voltamp top management encourages the use of WMS to control damages	100	1	5	3.32	0.95
12. Smart packing limit enhances the chance of control damages at warehouse	100	1	5	3.23	1.13
13. Due to WMS the efficiency and productivity of organization improved	100	1	5	3.63	1.05
14. Data storage in WMS cannot be granted to secure, that means can be stolen anytime.	100	1	5	3.37	0.88
15. By reducing manual touches by humans in warehouses minimize the chance of stock damages.	100	1	5	3.84	1.06
16. Devices could be easily handled and reduces damages	100	1	5	4.09	1.11
17. Usage of WMS in warehouses granted the higher service level to customers.	100	1	5	3.44	1.15
18. All employees in Voltamp is well trained to tackle the risk management related to tracking or security of order.	100	1	5	3.18	1.11
19. It helps to improve the communication between departments and inventory accuracy	100	1	5	3.54	1.08
Descriptive statistics as a whole	100	1	4.4	3.37	0.69

Table 24: Descriptive Statistics for IT

According to the descriptive statistics of the responses it is obvious that the installation of IT technologies have immense effect on the organization performance. As the higher mean among

all the statements is for the statements that devices could easily be handled by introducing these technologies to the organization (Mean=4.09, S.D= 1.11) supported by (McSherry et al., 2018). Similarly, the respondents said after installation of IT technologies or WMS the influence of human has been decreased and all commands handled by the computers so the manual touches by human decreased which automatically increase the damage control for stock (Mean=3.84, S.D= 1.06), (Istiqomah et al. ,2020) confirmed. similarly all other statements are in favor of installation of WMS to control damages except one which shows the lower mean and S.D value and shows that the utilization of WMS is not so accurate in Voltamp Energy Company, this finding contradicted by (Chowdhury & Mackenzie, 2021) this results also due to some employees who were not aware of the operations of the WMS and have no access to operate it.

4.2.1.3Descriptive Statistics for Productivity of Organization:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
20. Application of information technologies like WMS, ICT, RFID control the damages and enhanced the performance of organization	100	1	5	3.48	1.26
21. Customer satisfaction increase if their order reached to them without any damages and they need not to acquire any insurance policy for the safety of their ordered stock.	100	1	5	3.4	1.24
22. The WMS has high return on investment an increase the profitability of organization.	100	1	5	3.48	1.34
Descriptive statistics as a whole	100	2	4.67	3.45	0.65

Table 25: Descriptive Statistics for Profitability of Organization

The descriptive statistics for Profitability of Organization shows that Q20 and Q22 has same mean=3.48 but difference in S.D. It demonstrates that the role of IT technologies in warehouses improve the performance of organizations because most of the respondents agreed with the statement (Mean=3.48, S.D=1.26). Customers have been satisfied more with the organization when their ordered stock had reached to them safely and they don't even need to buy insurance policy for their safety (Mean=3.4, S.D= 1.24). It shows this saves the customers money which become them more loyal with the organization, both statements supported by (Andiyappillai, 2020). Similarly, WMS gets a higher return on investment in the organization by installing the WMS system. This means that the cost of installing WMS is high, but once installed, there are lifetime benefits that add to the return on investment and increase the profitability of the organization (Mean=3.48, S.D=1.34) also Torabizadeh et al. (2020) confirmed this.

4.2.1.4 Regression Analysis:

Regression Analysis	
R	0.72
R Square	0.518
Adjusted R Square	0.513
Std. Error of the Estimate	0.25988

Table 26: Regression Analysis

According to the regression analysis it is estimated that r^2=0.518, and the organizations productivity has been 51.8% dependent on the role of IT technologies in warehousing or any other organizations, debated by the (Lemos & Scur, 2019) in his research. The regression line below show the trend and equation of regression line that also tells that the slope of the regression is positive and increase in one variable will automatically enhance the other variable performance.

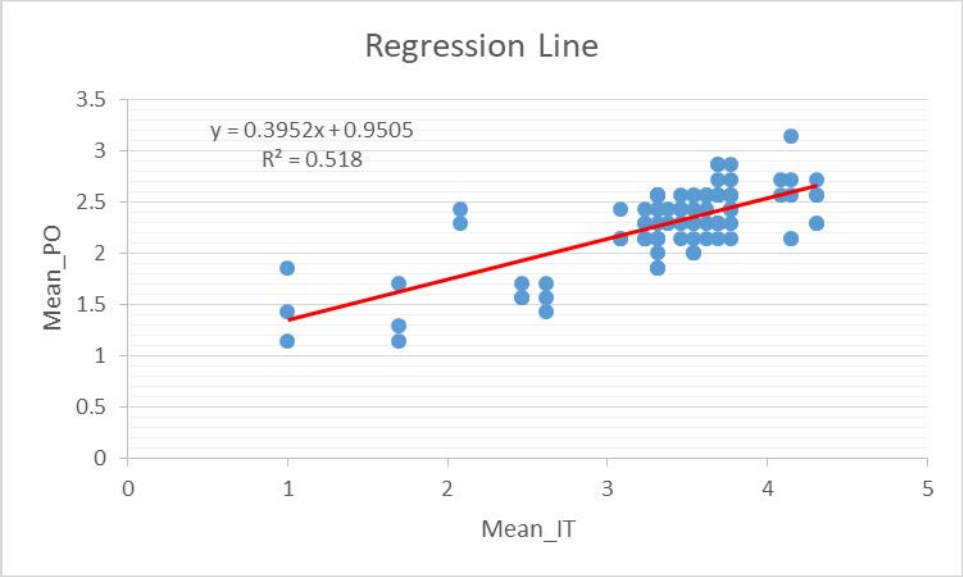


Figure 23: Regression Line

4.2.1.5 Correlation Analysis:

The correlation analysis has been estimated to check the association between dependent and independent variable and determine whether the association is negative, positive or no correlation. Following the correlation analysis table determine the relationship among both variables Role of IT on productivity of Organization.

Correlations

		Mean_IT	Mean_PO
Mean_IT	Pearson Correlation	1	0.72
	Sig. (2-tailed)		0
	N	100	100
Mean_PO	Pearson Correlation	0.72	1
	Sig. (2-tailed)	0	
	N	100	100

Table 27: Correlation Analysis

According to the correlation analysis it is observed that there is a strong positive correlation between both of the variable and it has the strong relationship among one another, confirmed by (Wicki, 2020). It shows that 72% both the variables are correlated with each other.

Summary:

The qualitative and quantitative analysis of the data collected demonstrated that WMS has been the best warehousing operations management system due to which the damages at workplace or outer boundary of the organization has been controlled easily as it has different innovative feature to predict the emergencies, inventory control. It is observed and proved that WMS could work better by installing other IT technologies for different operations at workplaces, because other technologies has also advanced features due to which the WMS would operate tremendously to control the damages. One more thing has been analyzed that reduce the influence of human and manual touches of the stick by the staff employees could reduce the damages at workplace. WMS system is an all-rounder warehousing management system which maintain the communication with other departments also to ensure the safety and security of the stick to avoid any accidents or emergency. This is the new finding of current research.

The following chapter has been the conclusion of the whole research in which all the research objectives would align with the findings and discuss whether it have been accomplished or not.

Chapter 5

Summary of findings, recommendations and conclusions

5.1 Introduction:

This chapter would present the important findings of the whole research based on the analysis of the data presented in previous chapter. The analyzed findings would be discussed in the light of literature review.

5.2 Summary of Findings:

According to qualitative analysis 73% respondents were under age of 21-25 years, 85% respondents are male employed in Voltamp Energy SAOG, their working experience mostly (74%) falls under 0-2 years, and 52% employees are damage control officers. Also the respondents said that there are mostly inbound damages and documentation lost are the damages in warehouses.

As for any company damages related to inbound or documentation lost matter a lot (Tongliang et al., 2019). It is observed that WMS system have extreme influence on damages control in the warehouse, supported by (Torabizadeh et al. (2020) and it saves the documentation to lost. Voltamp Energy used all the RFID, IoT 4.0 and ERP along with WMS to revolutionized the warehousing operations, (Lee et al., 2018). 82% employees responds that top management in Voltamp Energy Co. encourages the use of WMS and other IT advanced technologies to control damages (Chowdhury & Mackenzie, 2021). The packing of the product smartly or with advanced techniques it would decrease the chance of damages at warehouses, also supported by Cho (2018). Also it is analyzed that after the introduction of WMS in warehouse definitely increase the efficiency and productivity of the organizations, (Wahab et al., 2021). Mostly believe that WMS is the best way to safely secure the data of the organization and logistics documentation, (Buntak et al., 2019). It is observed that when the human touches and influence minimized the stock damages would be reduced and organization's productivity increases, devices can be handled easily by WMS (Istiqomah et al., 2020).

WMS granted the higher service level to customers and make the customer more loyal to the organization, supported by (Andiyappillai, 2020). Along previous findings there is a new finding from current research that WMS system is an all-rounder warehousing management system which maintain the communication with other departments also to ensure the safety and security of the stock to avoid any accidents or emergency. Also, the current research contributes that

customer satisfaction increase if their order reached to them without any damages and they need not to acquire any insurance policy for the safety of their ordered stock.

While quantitative analysis demonstrates the findings through devices could easily be handled by introducing these technologies to the organization (Mean=4.09, S.D= 1.11) supported by (McSherry et al., 2018). Through WMS the influence of human has been decreased and all commands handled by the computers so the manual touches by human decreased which automatically increase the damage control for stock (Mean=3.84, S.D= 1.06), (Istiqomah et al. ,2020) confirmed. The utilization of WMS is not so accurate in Voltamp Energy Company, this finding contradicted by (Chowdhury & Mackenzie, 2021).

Customers have been satisfied more with the organization when their ordered stock had reached to them safely and they don't even need to buy insurance policy for their safety Mean=3.4, S.D= 1.24 (Andiyappillai, 2020). Similarly, WMS gets a higher return on investment in the organization by installing the WMS system Mean=3.48, S.D=1.34 also Torabizadeh et al. (2020) confirmed this. Regression analysis states that r^2=0.518, and the organizations productivity has been 51.8% dependent on the role of IT technologies in warehousing or any other organizations, debated by the (Lemos & Scur, 2019) in his research. Correlation analysis states that there is a strong positive correlation between both of the variable and it has the strong relationship among one another, confirmed by (Wicki, 2020).

5.3 Conclusions:

The qualitative and quantitative analysis of the data collected demonstrated that WMS has been the best warehousing operations management system due to which the damages at workplace or outer boundary of the organization has been controlled easily as it has different innovative feature to predict the emergencies, inventory control. It is observed and proved that WMS could work better by installing other IT technologies for different operations at workplaces, because other technologies has also advanced features due to which the WMS would operate tremendously to control the damages. One more thing has been analyzed that reduce the influence of human and manual touches of the stock by the staff employees could reduce the damages at workplace. It is newly observed that WMS system is an all-rounder warehousing management system which maintain the communication with other departments also to ensure the safety and security of the stick to avoid any accidents or emergency through RFID technology.

5.4 Recommendations:

The Voltamp Energy would be also effectively working by the following recommendations:

- ❖ Voltamp Energy Company should adopt advanced technologies along WMS to more efficiently control the damages. ERP, RFID and IoT are the best technologies designed for warehousing companies.
- ❖ Top management must ensures about installation of WMS accurately as it could work better with other technologies and could be handles by sitting at home. As when COVID 19 pandemic prevailed all the businesses stopped and everyone has to work from home. So, in warehousing these technologies would perform better and could be handled by sitting anywhere by just using their tablets or smartphones.
- ❖ The products must be packed smartly as smartly packing also reduce damage control. The Voltamp Energy Company must be very conscious about their documentation lost and design such a security system in WMS to avoid any loss of documentation.
- ❖ There should be less influence of humans in warehousing operations and replace them with electronic devices which reduced the manual touches and decrease the chance of damage control.

5.5 Limitations:

This research has some limitations listed below:

i. One of the big constraint is that this research is limited to only one organizations regarding damages control of the warehouses and not taking other organizations into account. So, the results of the research are biased only to one organization.

ii. In addition, in this organization, only employees of the Warehousing Department visited through surveys and did not cover other employees to get their opinion on damage control and use of WMS.

iii. The lack of resources is also a limitation to conduct this research.

iv. Also the research only limited to one Geographical location (Muscat) of Oman

5.6 Future Research:

The prospective researcher has the opportunity to work with other organizations in Oman on these variables in order to examine the effects of these variables and their factors on other warehouse organizations. This is a topic that has a wide scope that can be taken to other countries or places in Oman. Other factors or technologies have been introduced over time, so these variables can be used by future researchers for research. This research will be useful for

students of supply chain management and the SCM sector to be guided by this research to bring about innovative changes in this field.

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Appendix A: Project Diaries

كلية الشرق الأوسط
Middle East College

Document Name & Type	Project 2 (BABA) Dairy Template	Author/Department	HoD, Management Studies Department
Approval Date	23/12/2020	Effective Date	23/12/2020
Review Date	03/01/2022	Next Review Date	02/01/2023

Project 2 (BABA) Dairy

Module Name	Project 2	
Module Code	☐PROJ 30001-HR ☐PROJ 30001-AF ☐PROJ 30001-GA ☐PROJ 30001-MK	
Programme Name	BA (Hons) Business Administration (CU)	
Name of Student and ID: Ahmed		Week:
Name of Supervisor:		
Project Title: **The Role of Information Technology (IT) in improving damage control in the warehouse: A case study of Voltamp energy SAOG.**		

Date/ Day:	Time:	Venue:

Tasks as per project plan	Actual tasks taken up / completed
Proposal	Thesis proposal
Comments / observations / remarks by the Student Proposal of the project determines the procedure of conducting thesis that how this research would be accomplished So, all the further collecting information for conducting this thesis project would comply with the similar methods mentioned in Proposal.	
Remarks / Comments by the Supervisor	
Signature of Student: Date:	Signature of Supervisor: Date:

كلية الشرق الأوسط
Middle East College

Document Name & Type	Project 2 (BABA) Dairy Template	Author/Department	HoD, Management Studies Department
Approval Date	23/12/2020	Effective Date	23/12/2020
Review Date	03/01/2022	Next Review Date	02/01/2023

Project 2 (BABA) Dairy

Module Name	Project 2	
Module Code	☐PROJ 30001-HR ☐PROJ 30001-AF ☐PROJ 30001-GA ☐PROJ 30001-MK	
Programme Name	BA (Hons) Business Administration (CU)	
Name of Student and ID: Tariq		Week:
Name of Supervisor:		
Project Title: **The Role of Information Technology (IT) in improving damage control in the warehouse: A case study of Voltamp energy SAOG.**		

Date/ Day:	Time:	Venue:

Tasks as per project plan	Actual tasks taken up / completed
Chapter 1	Introduction
Comments / observations / remarks by the Student Chapter 1 of this research paper has been discuss the detailed introduction of the topic, also state the problem that why this research has been conducted and what are the objectives: 1. Investigate the use of WMS in improving damage control in Voltamp Energy warehouse in Oman. 2. Identify the means by which appropriate and effective use of technology can achieve damage control. 3. Identify suggestions that can improve the efficiency and effectiveness of the use of a WMS system in improving damage control 4. What would be the scope and significance of the study, what are the limitations of this research and how the structure of research has been divided into 5 chapters?	
Remarks / Comments by the Supervisor	
Signature of Student: Date:	Signature of Supervisor: Date:

Document Name & Type	Project 2 (BABA) Dairy Template	Author/Department	HoD, Management Studies Department
Approval Date	23/12/2020	Effective Date	23/12/2020
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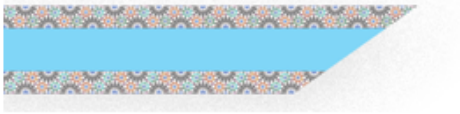
Project 2 (BABA) Dairy

Module Name	Project 2	
Module Code	☐PROJ 30001-HR ☐PROJ 30001-AF ☐PROJ 30001-GA ☐PROJ 30001-MK	
Programme Name	BA (Hons) Business Administration (CU)	
Name of Student and ID: Tariq		Week:
Name of Supervisor:		
Project Title: **The Role of Information Technology (IT) in improving damage control in the warehouse: A case study of Voltamp energy SAOG.**		

Date/ Day:	Time:	Venue:

Tasks as per project plan	Actual tasks taken up / completed
Chapter 2	Literature Review
Comments / observations / remarks by the Student It is analyzed that due to information technology, warehouse management become effective that ultimately effect on the performance and profitability of company. Voltamp SAOG is a joint stock company that uses information technology in their warehousing to control the damages. Different means are used to control these damages. Along the advantages of information technology in warehouse management there is also some disadvantages that are information security issue. Information security is a major issue that Voltamp SAOG face due to use of information technology in warehouse management system. Information technology wholly depend on internet.	
Remarks / Comments by the Supervisor	
Signature of Student: Date:	Signature of Supervisor: Date:



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Programme Name	BA (Hons) Business Administration (CU)	
Name of Student and ID: Tariq		Week:
Name of Supervisor:		
Project Title: The Role of Information Technology (IT) in improving damage control in the warehouse: A case study of Voltamp energy SAOG.		

Date/ Day:	Time:	Venue:

Tasks as per project plan	Actual tasks taken up / completed
Chapter 3	Research Methodology
Comments / observations / remarks by the Student The part depicts the examination approach. The specialist applied the examination reasoning of practicality in which, both education and logical techniques were utilized.	
Remarks / Comments by the Supervisor	

Signature of Student: Date:	Signature of Supervisor: Date:

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Name of Student and ID: Tariq		Week:
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Date/ Day:	Time:	Venue:

Tasks as per project plan	Actual tasks taken up / completed
Chapter 4	Data Analysis
Comments / observations / remarks by the Student The qualitative and quantitative analysis of the data collected demonstrated that WMS has been the best warehousing operations management system due to which the damages at workplace or outer boundary of the organization has been controlled easily as it has different innovative feature to predict the emergencies, inventory control.	
Remarks / Comments by the Supervisor	
Signature of Student: Date:	Signature of Supervisor: Date:

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Date/ Day:	Time:	Venue:

Tasks as per project plan	Actual tasks taken up / completed
Chapter 5	Summary of Findings, conclusions and Recommendations
Comments / observations / remarks by the Student It is observed and proved that WMS could work better by installing other IT technologies for different operations at workplaces, because other technologies has also advanced features due to which the WMS would operate tremendously to control the damages. One more thing has been analyzed that reduce the influence of human and manual touches of the stock by the staff employees could reduce the damages at workplace.	
Remarks / Comments by the Supervisor	
Signature of Student: Date:	Signature of Supervisor: Date:

Appendix B: Questionnaire

Document Name & Type	Coursework Questionnaire Template	Author/Department	Head, Centre for Academic Practices
Approval Date	29/09/2019	Effective Date	29/09/2019
Review Date	21/10/2021	Next Review Date	20/10/2022

QUESTIONNAIRE FOR PROJECT REPORT/DISSERTATION/CASE STUDY /COURSEWORK/ASSIGNMENT

SURVEY QUESTIONNAIRE
On

Role of IT in improving the damage control of warehouse in Voltamp Energy SAOG Company

Dear Madam/Sir,

Respected Participants, I am conducting this research survey on the role of IT in improving the damage control of warehouse in Voltamp Energy SAOG Company. The questionnaire is developed to collect the responses, and you are requested to participate in this research by filling the questionnaire and answer all the queries asked to you.

Do you agree to fill the questionnaire? Yes, No: _____

Part A: Demographics of the Respondent

1. **Age-group of participant:**
21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ Above 45

2. **Gender:**
Male ☐ Female ☐

3. **Years of working in Voltamp Energy SAOG:**
0-2 years ☐ 3 years-5 years ☐ 6 years- 8 years ☐ 9-12 years ☐

4. **Designation of Participant (in warehouse department):**
Staff employees ☐ Warehouse Manager ☐ IT Officer ☐ Damages Control Officer ☐

Part B: Role of IT in improving the damage control in Voltamp Energy

Section I: WMS can control the damages through different features:

5. Where damages are mostly found?
   1. Inbound section ☐
   2. Outbound section ☐
   3. Put away….. ☐
   4. Logistics documentation lost ☐

6. Do you believe that a WMS system could influence the following areas:
   1. Productivity ☐
   2. Damage control ☐
   3. Documentation control ☐

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Middle East College

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4. Reduce Labor Cost ☐
5. All of the above ☐

7. What other IT technologies utilized in Voltamp to control damages?
RFID Technology ☐ ERP Planning ☐ IoT 4.0 Technology ☐ All of them ☐
8. How much time staff spend by using IT in performing their duty in Voltamp?
≤ 4 hours ☐ 5 hours-10 hours ☐ ≥ 10 hours ☐
9. How many departments use RFID system in Voltamp?
1-3 departments ☐ 4-6 departments ☐ All departments ☐ None ☐

By using Likert scale of 5 points and coded as 1-5 to answer your extent of response with the following statements; whereas 1=Strongly Disagree, 2= Disagree, 3= No Sure, 4=Agree, 5=Strongly Agree

Statements	1	2	3	4	5
10. Utilization of WMS in Voltamp Energy is very accurate					
11. Voltamp top management encourages the use of WMS to control damages					
12. Smart packing limit enhances the chance of control damages at warehouse					
13. Due to WMS the efficiency and productivity of organization improved					
14. Data storage in WMS cannot be granted to secure, that means can be stolen anytime.					
15. By reducing manual touches by humans in warehouses minimize the chance of stock damages.					
16. Devices could be easily handled and reduces damages					
17. Usage of WMS in warehouses granted the higher service level to customers.					
18. All employees in Voltamp is well trained to tackle the risk management related to tracking or security of order.					
19. It helps to improve the communication between departments and inventory accuracy					

Section II: Productivity of organization by reducing damages control

By using Likert scale of 5 points and coded as 1-5 to answer your extent of response with the following statements; whereas 1=Strongly Disagree, 2= Disagree, 3= No Sure, 4=Agree, 5=Strongly Agree

Statements	1	2	3	4	5
20. Application of information technologies like WMS, ICT, RFID control the damages and enhanced the performance of organization					
21. Customer satisfaction increase if their order reached to them without any damages and they need not to acquire any insurance policy for the safety of their ordered stock					

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22. The WMS has high return on investment an increase the profitability of organization.						

Thank You for your Participation

Confidentiality and Ethics Declaration from the Student(s):

The information that you express through this questionnaire will be handled by me/us with extreme confidentiality and will be used for arriving at some conclusions for my assignment/case study/thesis/dissertation/report of (Name of Module and Module Code) to be submitted at MEC. Your participation in this survey is optional and highly appreciated and will be of great value to reach objectives of my mentioned work. Please fill out carefully the entire questionnaire for which I thank you in advance. Your response to these questions is based on agreement that you have been clearly explained about the purpose and scope of the survey.

كل المعلومات التي ستعبر عنها في هذا الاستبيان سيتم التعامل معها من قبلي ومن قبل فريق العمل بسرية تامة، وسيتم استخدام نتائجها في هذا البحث/دراسة الحالة/مشروع التخرج/ الرسالة/ التقرير للمادة الدراسية (اسم البرنامج الدراسي ورمز المادة واسمها) لتقديمه لكلية الشرق الأوسط. مشاركة في هذا الاستبيان هي اختيارية، وهي محل تقديرنا وستساهم في تحقيق اهداف هذا العمل الاكاديمي. يرجى ملأ كامل الاستبيان شاكرا لكم ذلك مقدما. ردكم على هذه الأسئلة بناء على موافقتكم وأن الغرض منها قد تم توضيحه لكم.

- Student Name & ID*: TARIQ
- Signature*: _____

*(ngis ot evah puorg eht fo srebmem lla ,krow puorg a fo esac nI)

Approved by: _____ (Module Leader / Module Instructor)