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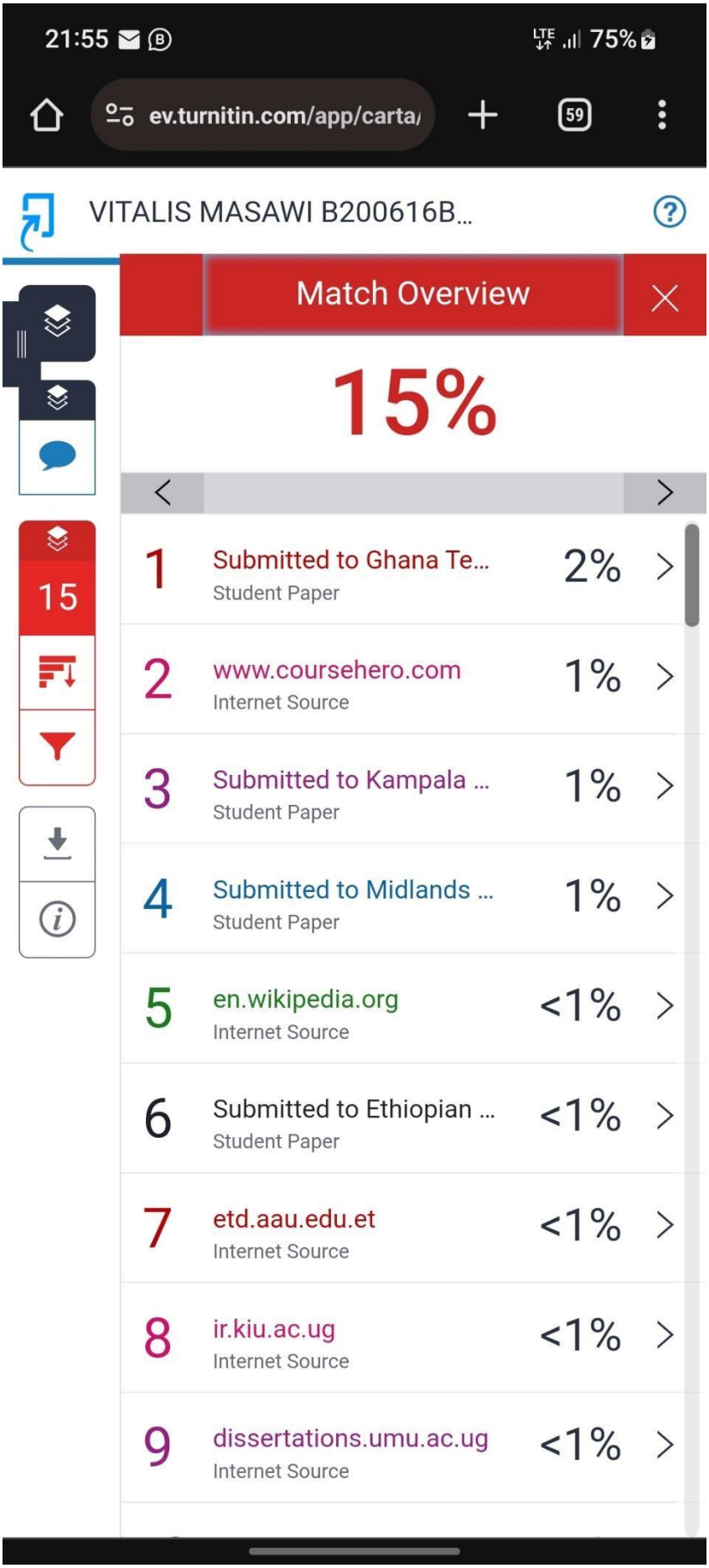
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Dedication.

I would love to thank the Lord highly exalted in the heavens the King of Kings and savior from sin for giving me strength and wisdom in the times of writing this project. To my beloved parents, Muchineripi Masawi and Catherine Zaranyika, also my uncle Felix Zaranyika, my beloved siblings and my beloved friends thank you for instilling in me the value of hard work and dedication. Your constant belief in me fueled my determination to see this project through. This dissertation is a testament to your love and support.

ABSTRACT

Efficient material handling plays a pivotal role in warehouse operations, directly influencing costs and overall productivity. This dissertation explores the nuanced relationship between material handling strategies and warehouse costs, focusing on the case study of BAK Logistics. This research will employ a mixed-method approach. Quantitative data will be collected through an analysis of BAK Logistics' warehouse management system data, focusing on labour hours, inventory levels, and damage reports. Qualitative data will be gathered through interviews with warehouse personnel, to understand their experiences with current material handling practices and identify potential areas for improvement. Use of interviews and questionnaires within BAK Logistics' warehouse facilities, elucidating the current material handling practices, challenges faced, and perceived impact on costs. These qualitative insights are complemented by quantitative data analysis, utilizing financial records and performance metrics to quantify the direct and indirect costs associated with material handling processes.

Through the lens of cost accounting and supply chain management theories, the dissertation evaluates various material handling techniques employed by BAK Logistics, including manual, mechanized, and automated systems. By examining key cost drivers such as labour, equipment maintenance, inventory holding, and space utilization, the study aims to identify critical areas for cost optimization.

Furthermore, the dissertation investigates the influence of technological advancements and industry trends on material handling strategies, exploring the potential for warehouse cost reduction. Insights derived from the case study of BAK Logistics are contextualized within the broader landscape of warehouse management, offering valuable implications for practitioners and researchers alike. This dissertation aims to provide valuable insights into how material handling strategies can be optimized to minimize warehouse costs at BAK Logistics. The research will contribute to the existing body of knowledge on warehouse logistics and supply chain management by providing a case study-based analysis of the impact of material handling on warehouse costs.

Acknowledgements

Completing this dissertation would not have been possible without the support and encouragement of many individuals. I would like to express my sincere gratitude to my dissertation supervisor Mr Bindu for his insightful feedback and guidance through the journey. I would also thank the participants in my study who generously shared their time and insights, their willingness to participate was essential to this research. Finally, I am grateful to my family and friends for their unwavering support and encouragement throughout this entire process.

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Chapter One

1.0 Introduction

The chapter contains the background of the study, statement of the problem, purpose of the study, research objectives, research questions, research hypothesis, and significance of the study, scope of the study, limitations of the study and organization of the study. This study seeks to study the impact of material handling on warehouse costs in BAK logistics.

1.1 Background of the study

The expenses related to running a warehouse, including rent, utilities, labour, insurance, upkeep, and taxes, are referred to as warehousing costs (Alyahya, Wang and Bennett, 2016). Along with the cost of inventory management, order fulfilment, and other associated services, it also includes the cost of the products kept in the warehouse. According to (Biddle, 2006) Material handling is the process of transferring, regulating, and safeguarding materials in order to ensure their storage. It is crucial for managing products and equipment in an efficient and effective manner. Regarding the inefficiency of the material handling system in terms of equipment research and processing in connection to the issues with the material handling system, logistics organizations are suffering.

According to studies on material handling, which were estimated to account for 60% of project costs overall direct costs were used as a measure of material handling costs, which in turn became typical high costs. These costs were considered non-value-added operating activities, with estimates and counts ranging from 30% to 70% of allocated cost in all material manufacturing. As a result, the majority of production companies that fall under the manufacturing function experience practices that range from 25% involving workforce to

55% involving the remainder of the factory spaces with 87% for production time Kumar and Nayak, (2018).

BAK Logistics is the front-runner among the competitors because to its extensive fleet of 150 Toyota forklifts and variety of handling equipment. BAK Logistics faces numerous challenges, including high cargo volume and traffic because of inefficient material handling equipment and the element of clearances; the company owns free space for truck parking that can handle the capacity of truck slots in one go. In Zimbabwe, BAK Logistics offers more than 100,000 square meters of covered industrial warehousing and storage space, owned truck, division forwarding, and cargo clearing. In light of the capacity that BAK Logistics has highlighted, it has been demonstrated that factors that lower handling and supply chain performance result in inefficient and ineffective equipment handling, which lengthens waiting times and forces employees to park their vehicles against their will because BAK Logistics handles an increasing number of cargoes. This causes financial instability because of lost waiting time.

Handling in Zimbabwe still seems to have shortcomings in this area, such as ineptitude poor material flow, poor automated handling systems, inadequate manual handling, and limited proficiency with the material orientation system Performance in the supply chain is hampered by inefficient handling practices, inadequate handling equipment, and a shortage of knowledgeable and experienced personnel. As a result, the researcher decided to fill in the gaps and investigate how material handling affects supply chain performance. An analysis of BAK Logistics' case.

1.2 Statement of the problem.

In the context of BAK Logistics, the issue this research attempts to solve is the dearth of empirical data and a thorough understanding of how material handling affects warehouse costs. Material handling systems are essential for effective warehouse operations, but it is important to look at how they specifically affect different cost elements and pinpoint areas where they might be improved (Cochran, Linck, Mauderer and Reinhart, 2000). The literature that is now being published provides general information on the significance of material handling and how

it affects warehousing expenses. Nevertheless, few comprehensive case studies examine these impacts in a real-world logistics firm like BAK Logistics. The lack of expertise in this area makes it difficult for decision-makers and logistics managers to optimize their material handling systems in a way that will save costs and improve operational effectiveness.

However, there are not many thorough case studies that look at these effects in an actual logistics company like BAK Logistics. Decision-makers and logistics managers find it challenging to optimize their material handling systems in a way that would save expenses and increase operational performance due to a lack of experience in this field.

1.3 Purpose of the study

The purpose of the study is to investigate the effects of material handling systems on warehouse costs within the specific context of BAK Logistics warehouse operations. The study aims to provide a comprehensive understanding of how different material handling systems affects labour costs, storage costs and equipment-related expenses. By focusing on BAK Logistics, a large warehousing and storage company in Zimbabwe, the study seeks to identify best practices, strategies and trade-offs associated with material handling systems that contribute to cost optimization.

The study's purpose can be further elaborated as follows:

- **To enhance knowledge:** The research aims to contribute to the existing body of knowledge in warehouse management by providing a focused analysis of material handling systems' impact on warehousing costs. By studying BAK Logistics practices and strategies, the study will expand the understanding of the relationship between material handling systems and labour costs, storage costs, and equipment-related expenses. This will help researchers in the field.
- **To identify best practices:** by examining the practices employed by BAK Logistics, the study aims to identify best practices and strategies that contribute to cost optimization through effective utilization of material handling systems. These insights will serve as a valuable reference for organizations seeking to improve their own warehouse operations and reduce costs.

- **To provide recommendations:** based on research findings, the study will provide practical recommendations for the organizations aiming to optimize warehouse costs. These recommendations will encompass areas such as labour management, space utilization, inventory management and equipment maintenance, offering strategies to enhance cost efficiency.

1.4 Research objectives

i. To examine the relationship between materials handling and warehouse costs at BAK logistics

ii. To examine the types of Material Handling used by BAK logistics. iii. To examine the other factors affecting the warehouse costs at BAK logistics.

1.5 Research questions

i. What is the relationship between materials handling and warehouse costs at BAK logistics?

ii. What types of materials handling does BAK logistics use?

iii. What other factors affect warehouse costs at BAK logistics?

1.7 Statement of Hypothesis

The effectiveness of BAK Logistics' material handling procedures has a big influence on warehousing expenses. In particular, lower total costs—including personnel, equipment, and inventory costs—will be linked to more effective material handling techniques (Rosenblatt, 2001). At BAK Logistics, improved material handling workflows and procedures result in better warehouse and space utilization, which lowers overhead costs and boosts operational efficiency. The hypothesis posits that BAK Logistics may cut expenses related to damaged goods, rework, and order fulfilment problems by effectively utilizing technology and automation in material handling operations (Thirumalai and Sinha, 2005). Additionally, this

automation can increase productivity and eliminate manual errors. The productivity and accuracy of BAK Logistics' material handling operators are positively impacted by their proper training and skill development, which lowers the expenses related to inefficiencies, delays, and errors. When combined with BAK Logistics' material handling procedures, efficient inventory management techniques—such as appropriate storage allocation, precise demand forecasting, and inventory optimization—reduce holding costs, stock outs, and obsolescence of inventory, which in turn lowers overall warehouse costs.

1.7 Significant of the study

This study is anticipated to be important in the following ways for all organizations, society, and the researcher:

The findings of the study will provide practical insights and recommendations of warehouse managers, logistics professionals and decision makers. Understating the effects of material handling systems on labour costs and storage costs will enable the organization to make informed decisions regarding the selection, implementation and optimization of these systems. This knowledge will help improve cost efficiency, enhance warehouse performance and ultimately contribute to the success of warehouse operations (Patel, 2022). The study focuses on BAK logistics one of the biggest warehouse facilities in Zimbabwe. The insights gained from analysing BAK logistics practices and strategies will benefit the organizations operation in the warehousing industry and those in e-commerce.

The research will contribute to the existing body of knowledge in warehouse management. This contribution will be valuable to both researchers and practitioners in the field, allowing for the development of more effective methodologies and strategies in warehouse cost optimization.

1.8 Assumptions

- The assumption of data accuracy and reliability suggests that the data obtained from BAK Logistics warehouse operations is trustworthy and accurately reflects the actual conditions and performance of the warehouses. It assumes that the data has been collected using reliable measurement techniques and quality control processes.

- The assumption of data availability entails that relevant data required for the study is accessible and can be obtained from BAK Logistics warehouse operations. This may include data on labour costs, storage costs, equipment utilization, productivity metrics, and other related variables. It is assumed that BAK Logistics maintains comprehensive records and data systems that can be utilized for the research study.
- The assumption of BAK Logistics cooperation assumes that the company is willing to collaborate and provide the necessary information, insights, and resources for the research study. This may involve obtaining consent, establishing research partnerships, or leveraging existing relationships with BAK Logistics.

1.9 Delimitations of the study

- As the case study organization, BAK Logistics is the particular subject of this investigation. Other logistics organizations with different operational features, organizational structures, or industry settings may not be able to immediately implement the findings and recommendations.
- The impact of material handling systems on warehouse costs is the main topic of this study. Although they are not the focus of this study, additional warehouse management factors such order fulfilment, inventory control, and customer satisfaction may have an impact on costs.
- Labour, equipment, facility, transportation, and inventory holding costs are just a few of the costs that are examined in this study and are impacted by material handling systems. It does not, however, include every potential expense factor that could be involved in warehouse operations.

The study attempts to offer a thorough examination of the effects of material handling technologies on warehouse costs within the particular context of BAK Logistics while acknowledging the probable limitations and bounds of the research by addressing these delimitations.

1.10 Limitations.

- Not all logistics firms will benefit equally from the conclusions and suggestions drawn from the case study of BAK Logistics. The results may not be as broadly applicable as they may be due to BAK Logistics' particular operational characteristics, environment, and challenges. As a result, care should be taken when applying the results to other organizations.
- There can be restrictions on the case study's data accessibility and availability. Certain private information may not be shared by BAK Logistics, which could limit access to some parts of the warehouse operations and affect the analysis's depth. The constraints of the data may have an impact on the study's conclusions and suggestions.
- It is possible that the study did not properly account for the influence of external factors on warehousing costs, such as macroeconomic conditions, market volatility, and regulatory changes. These outside variables might have an effect on the recommendations and research findings.
- The subjectivity and bias of the researcher may affect the data's analysis and interpretation. Triangulating the results and doing a thorough examination of the data will help reduce bias. Personal opinions and interpretations could, nevertheless, still have some impact on the outcomes.

1.11 Definition of terms

1. **Material Handling Systems**: Material handling systems refer to the equipment, processes, and technologies employed within a warehouse or distribution centre to move, store, and manage materials and products (Iornum, B, 2007). These systems can include conveyors, automated guided vehicles (AGVs), robotic systems, sorting systems, picking and packing systems, and other machinery or tools used for material handling activities.
2. **Material handling**: it refers to the movement, storage, control and protection of materials through warehousing or distribution (Mulcahy, D 1994). Material handling involves systematic planning and optimization of activities for supply chain optimization.
3. **Warehouse Costs:** According to (Mulcahy, D 1994) Warehouse costs are the expenses incurred in operating and maintaining a warehouse facility. These costs can include

labour costs (such as wages, benefits, and training), storage costs (such as rent, utilities, and shelving), equipment costs (such as purchase, maintenance, and depreciation), inventory costs (such as carrying costs and shrinkage), and other related expenses (such as security, insurance, and administrative overhead).

4. **Labour Costs**: Labour costs encompass the expenses associated with the workforce engaged in warehouse operations. This includes wages, salaries, overtime pay, benefits (such as healthcare and retirement contributions), training costs, and any other expenses directly related to the human resources involved in material handling, order fulfilment, inventory management, and other warehouse tasks (Mulcahy, D 1994).
5. **Storage Costs:** Storage costs refer to the expenses incurred in storing and managing inventory within a warehouse facility. This includes costs associated with the physical space used for storage (such as rent or mortgage payments), utilities (such as electricity or heating/cooling), equipment for storage (such as racks or shelving), and any other costs related to maintaining an efficient and organized storage environment.
6. **Equipment-Related Expenses:** Equipment-related expenses encompass the costs associated with the acquisition, operation, and maintenance of machinery, tools, and technology used in warehouse operations (Kulwiec R., Ed 1985). This includes the purchase or lease costs of material handling equipment (such as forklifts, conveyors, or robotics), ongoing maintenance and repair expenses, equipment depreciation, and any other costs directly tied to the utilization and upkeep of warehouse equipment.
7. **Operational Practices:** Operational practices refer to the strategies, processes, and procedures implemented within a warehouse to manage and optimize its operations.

1.13 Chapter summary

This chapter focuses on the case study of BAK Logistics to present an overview of the subject of how material handling affects warehouse expenses. The research backdrop and justification are established, the research aims and questions are outlined, and the study's significance is emphasized in this chapter. It also establishes the parameters and boundaries of the study. The significance of effective material handling systems in warehouse operations and their effect on total costs are highlighted in the first section of the chapter. It illustrates how the complexity of the supply chain, consumer expectations, and the desire for competitive advantage have made minimizing warehouse costs more and more crucial.

The study's justification is based on the fact that there is a dearth of actual data and a thorough understanding of how material handling techniques affect warehouse expenses, especially when considering a real logistics company such as BAK Logistics. The chapter makes the case that investigating BAK Logistics, as a case study will yield important information on the real-world effects of material handling technologies on warehouse expenses. After that, the study's goals and questions are laid out, with an emphasis on examining how various material handling affect warehouse expenses, pinpointing particular cost elements that are affected by these systems, and locating inefficiencies and bottlenecks in the material handling systems that BAK Logistics currently uses.

The study's importance is highlighted, with a focus on how the results will advance our understanding of warehouse management and offer actionable advice to logistics firms like BAK Logistics on how to maximize material handling systems and cut expenses associated with warehouse operations. The chapter concludes by outlining the parameters and boundaries of the study. It admits that because of the unique circumstances of BAK Logistics, the conclusions could not be immediately applicable to other logistics firms. It also draws attention to potential drawbacks such time restraints, subjectivity and prejudice, confidentiality of data, and outside influences.

Overall, Chapter 1 gives a thorough overview of the research issue and lays the groundwork for the other chapters, which evaluate the literature, discuss methodology, analyse case study, and offer suggestions for raising material handling system performance and cutting warehouse expenses.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction.

This chapter covers the literature related to the study. It is from studies and observations made by other researchers with a better understanding of the subject and the theoretical models to be used in this study. In addition, the conceptual framework will be drawn to show the variables of the research study to be done by the writer.

2.1 Theoretical framework

A study's theoretical framework aids in guiding the design, analysis, and interpretation of the study as well as providing the conceptual underpinnings. It is made up of a number of ideas, models, or theories that clarify how the variables and phenomena being studied relate to one another. Your theoretical framework should offer a framework for comprehending how material-handling influences different cost components in warehouse operations in the context of the dissertation on the effects of warehouse expenses.

2.1.1 Total Cost of Ownership theory.

A theoretical framework known as Total Cost of Ownership (TCO) Theory offers a thorough understanding of the expenses related to purchasing and maintaining equipment over the course of its lifetime (Bennett, 1996). Making educated selections is made easier by the use of TCO Theory, which provides insights into the long-term cost implications of material handling equipment on warehouse costs.

The Theory acknowledges that a substantial portion of the total cost of ownership is attributed to maintenance and repair expenses (Rugenyi, 2015). It implies that routine inspections,

preventive maintenance plans, and prompt repairs can help limit unplanned malfunctions, cut down on downtime, and save expensive repairs. Warehouse managers can assess the dependability and longevity of material handling equipment and select alternatives that provide the most long-term value by taking maintenance and repair expenses into account. Material handling equipment acquisition expenses are only one part of the overall cost (Ellram, 1995). It recommends taking into account not just the purchase price but also the expenses related to the appraisal, negotiation, procurement, and selection of equipment. Warehouse managers may make well-informed judgments about the purchase of material handling equipment by considering these costs up front.

Different cost components frequently involve trade-offs. For instance, purchasing better equipment may cost more up front but will save money over time on maintenance and repairs. Warehouse managers can assess these trade-offs and decide wisely by considering the whole cost implications instead of just the initial expenditures when employing TCO analysis. One can obtain a thorough grasp of the financial impact throughout the course of the equipment's lifecycle by using TCO Theory to analyse how material-handling equipment affects warehousing costs. According to Maltz and Ellram (1997) Warehouse managers may make cost-effective decisions that support the organization's goals and objectives by using Total Cost of Ownership (TCO) analysis, which takes into account purchase costs, operating costs, maintenance and repair costs, training and personnel costs, disposal costs, and the trade-offs involved.

Accurate and thorough data on numerous cost components over the course of the equipment's lifecycle are necessary for TCO analysis. It might be difficult to find trustworthy data, especially when it comes to long-term expenses like upkeep, repairs, and disposal. Incomplete or inaccurate data might cause errors in TCO calculations and can lead to deceptive findings.

2.1.2 Efficiency Theory

An organization's operational efficiency and resource utilization can be enhanced by applying the principles of efficiency theory. Efficiency Theory sheds light on how the usage of

equipment might affect productivity and cost savings when it comes to the effects of material handling equipment on warehousing expenses (Mizzaro, 2001).

Efficiency theory places a strong emphasis on the value of process simplification in removing waste, minimizing bottlenecks, and raising total productivity. This refers to finding places where equipment can optimize operations, such as lowering manual handling, boosting inventory management, or improving order-picking procedures, in relation to material handling equipment and warehousing costs. According to Burgin (2003) Warehouses can save expenses and increase efficiency by using equipment to streamline processes. Efficiency Theory acknowledges that technology and automation have the potential to increase labour productivity. Automated guided vehicles (AGVs), robotic systems, and conveyors are examples of material handling equipment that can decrease the amount of manual work required and boost warehouse productivity. Warehouses can increase labour efficiency, lower labour expenses, and possibly save money by automating some jobs and procedures.

Efficiency Theory places a strong emphasis on the use of benchmarking and performance indicators to evaluate current levels of efficiency and pinpoint areas in need of development. Warehouses can set up key performance indicators (KPIs) to assess how well they are using their equipment in relation to costs associated with material handling equipment and storage. Metrics like order fulfilment rates, inventory correctness, and equipment utilization rates can reveal information about how cost-effective an item is and point out areas for improvement. The main goals of efficiency theory are resource and productivity optimization Floridi (2002), Nevertheless, focusing only on efficiency optimization may leave out other crucial elements like innovation, quality, worker well-being, and customer happiness. Prioritizing efficiency over these other considerations may have unforeseen repercussions and detrimental long-term effects.

Understanding how equipment utilization affects operational efficiency and cost reductions can be improved by applying Efficiency Theory to the effects of material handling equipment on warehouse costs (Fleissner and Hofkirchner, 1996). You may establish ways to maximize the use of material handling equipment and achieve cost-effective warehouse operations by taking into account process simplification, resource usage, throughput and cycle times, automation and labour efficiency, continuous improvement, and performance metrics.

2.1.3 Systems Theory

According to Bertalanffy and Ludwig (1972), the transdisciplinary study of cohesive sets of connected, interdependent components that can be artificial or natural is known as systems theory. All systems have causal boundaries, are subject to contextual influences, are characterized by their structure, function, and role, and are communicated by their interactions with other systems. A theoretical framework called systems theory can offer important insights into how material-handling equipment affects warehouse expenses. This approach stresses the relationships and interdependencies between the many components of the warehouse, viewing it as a complex system made up of interconnected parts.

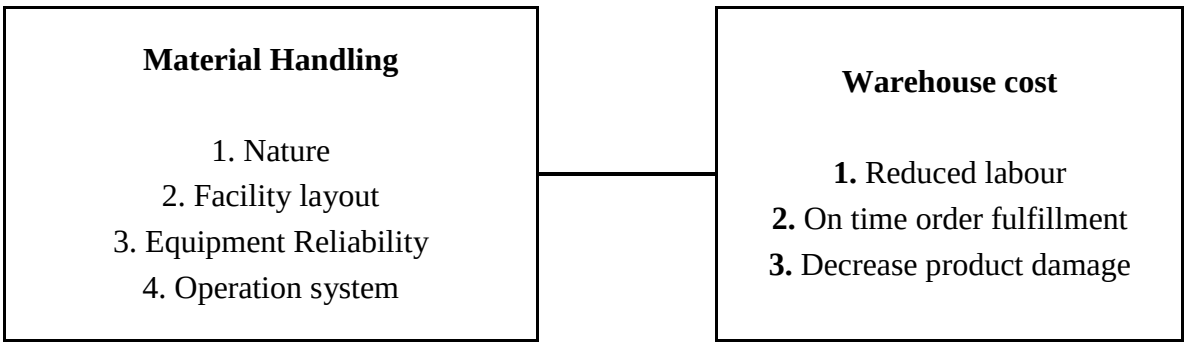
Systems Theory emphasizes how various parts of a system are interrelated. It acknowledges that other elements, such as warehouse layout, processes, staff, and technology, have an impact on the performance and cost implications of material handling equipment. Comprehending these interdependencies aids in determining the impact of modifications to material handling apparatus on the overall expenses of warehouses. According to systems theory, a system has emergent qualities that make it impossible to completely understand by examining its constituent parts separately (Bertalanffy and Ludwig, 1973). This indicates that the overall cost implications of equipment may exceed the direct expenses related to its acquisition and operation in the context of material handling equipment and warehousing expenditures. Emergent characteristics can result in hidden cost savings or inefficiencies that are brought about by the interactions of workers, processes, equipment, and other variables.

By applying Systems Theory to the effects of material handling equipment on warehouse costs, you can gain a deeper understanding of the complex relationships and dynamics at play (Mullin, 2005). Considering the interconnectedness, feedback loops, emergent properties, optimization, trade-offs, and system boundaries can help you analyse the cost implications of material handling equipment from a holistic perspective. However, Systems theory acknowledges that systems are inherently complex and that it might be difficult to completely comprehend and model all of the interactions and interconnections (Woodward and Joan, 1965). It might take a lot of time, data, and computing power to analyse complicated systems, like a warehouse with lots of moving parts and variables.

2.2 Conceptual framework.

According to Berlin and Isaiah (1953) a conceptual framework is a flexible analytical tool that can be used in a variety of situations. It can be used in a variety of job categories when a broad image is required. It is employed to arrange concepts and draw conceptual distinctions. Robust conceptual frameworks effectively convey a true idea in a form that is simple to recall and implement. In the conceptual framework of this study, a relationship is proposed between material handling equipment and warehouse costs. The study's independent variable is material handling equipment, while its dependent variable is warehouse costs. According to the framework, the study assumes that material-handling equipment has a large and favourable impact on BAK Logistics' warehousing costs.

Figure 1: Independent variable vs dependant variable.



2.3 The effect of material handling equipment on warehouse costs.

The process of transporting, regulating, safeguarding, and storing things—such as products, objects, etc.—for production, distribution, or even consumption is referred to as materials handling (Mulcahy, D 1994). Because all the items need to be handled carefully to ensure their safety, arrive at their destination without incident, and retain their quality and

condition, this procedure is extremely important. Stated differently, effective handling of materials is critical. It is essential to handle materials well since it will benefit you.

Handling of materials removes accidents. Accidents can be avoided if appropriate material handling practices are followed, as this entails cautious and appropriate handling Antonio and Zamboni (1999). This increases an organization's profitability since it ensures that its workforce produces at peak efficiency and saves the business money on employee compensation because fewer accidents occur.

Handling materials removes needless labour. You will not need to use redundant staff if there is efficient material handling, which will save you time and money. According to Ashayeri and Gelders (1985) applying appropriate materials handling practices also saves money since you don't have to hire extra staff to make sure that the products are handled properly and you don't have to compromise the quality and condition of the products. The organization's productivity is directly impacted by cost reduction. When you use labourers to act as material handlers, you are referring to the manual handling of goods and materials for distribution, storage, etc. They will be the ones to distribute, store, and other things to the appropriate locations. Effective material handlers who are well trained and proficient in their assigned tasks are essential for ensuring proper material handling. This will guarantee that they handle materials safely for the protection of other employees and the goods.

Managing materials is no laughing matter. This is particularly valid in the case of larger items that you are storing or relocating. This procedure has already resulted in numerous workers compensation litigation against most corporations and has the potential to cause numerous warehouse accidents. For this reason, make sure you are using a competent materials handling method by hiring knowledgeable employees and investing in effective storage systems if you want to shield yourself from these lawsuits and avoid disasters inside the warehouse. Pazour, Héctor and Carlo (2015). Therefore, material handling cannot be compromised for a real profit-oriented firm.

2.4 Types of material Handling Systems

Mechanical equipment known as material handling equipment is used to move, store, regulate, and safeguard materials, goods, and products during the production, distribution, consumption, and disposal processes. Four main categories can be used to group the various handling equipment types: transport equipment, positioning equipment, unit load formation equipment, and storage equipment.

I. Transport Equipment

While positioning equipment is used to work with material at a particular location, transport equipment is used to move stuff from one place to another (such as between offices, a loading dock, and a storage space, etc.) Ogbadu, (2009). The three main subcategories of transport equipment are industrial trucks, cranes, and conveyors.
Material can also be moved by hand without the need for any equipment.

When there is not enough (or sporadic) flow volume to warrant the usage of a conveyor and loads need to be transported over various (horizontal and vertical) trajectories within a constrained region, cranes are utilized. Because the loads handled by cranes can vary more in terms of weight and shape than those handled by conveyors, cranes offer greater movement flexibility. Because they can only work in certain areas, cranes offer less mobility than industrial trucks, but certain models can operate from a portable base. The majority of cranes move horizontally with trolleys and tracks and vertically with hoists; manipulators can be employed if exact load placement is needed. The jib, bridge, gantry, and stacker cranes are the most popular types of cranes.

While commercial vehicles are authorized to drive on public highways, industrial trucks are not permitted to do so. When a conveyor cannot be justified due to insufficient or intermittent flow volume, industrial trucks are utilized to transport products across various pathways Carter (2006). Because they don't have boundaries on the area they may cover and can move vertically if the truck is equipped with lifting capabilities, they offer greater mobility flexibility than cranes and conveyors. The presence of forks for handling pallets,

powered or manual lifting and travel capabilities, the ability for the operator to ride on the truck or be required to walk alongside the truck are some characteristics that distinguish different types of industrial trucks.

II. Positioning Equipment

While commercial vehicles are authorized to drive on public highways, industrial trucks are not permitted to do so. When a conveyor cannot be justified due to insufficient or intermittent flow volume, industrial trucks are utilized to transport products across various pathways. Because they don't have boundaries on the area they may cover and can move vertically if the truck is equipped with lifting capabilities, they offer greater mobility flexibility than cranes and conveyors. The presence of forks for handling pallets, powered or manual lifting and travel capabilities, the ability for the operator to ride on the truck or be required to walk alongside the truck are some characteristics that distinguish different types of industrial trucks Leenders (1992).

III. Unit load formation equipment

Unit load formation equipment is used to confine materials during storage and transportation so they keep their integrity when handled as a single load Ramakrishna, (2005). Materials that can self-restrain (such as a single part or interlocking pieces) can be moulded into a unit load without the need for any special tools. Pallets, skids, slip sheets, tote pans, bins/baskets, cartons, bags, and crates are a few types of unit load formation gear. A pallet is a surface composed of wood, paper, plastic, rubber, or metal that has enough space underneath its upper surface (also known as the face) to allow for the insertion of forks for later lifting operations. A slip-sheet is a thick piece of plastic, corrugated fibre, or paper with grab-able tabs that can be laid over a load.

IV. Storage Equipment

Materials are held or buffered for a while using storage devices. Each sort of storage equipment's design, when combined with its use in warehouse design, is a trade-off between optimizing space utilization (or cube) and lowering handling costs by providing easy access to stuff Gelders, (1985). Storage racks can be used to increase cube utilization by allowing multiple stacks of different items to occupy the same floor space at different levels. If materials are stacked directly on the floor, no storage equipment is needed, but typically, each different item in storage will have a stack only half-full. When the quantity of units per item that needs to be stored reduces, using racks instead of floor storage becomes more advantageous. In a similar vein, cube utilization is influenced by the depth at which an item's units are kept in relation to the quantity of units per item that needs to be stored.

2.5 Challenges of reducing warehouse costs in BAK logistics.

- **Capital Investment**

It's common to need to make a sizable capital investment in order to implement costcutting strategies. It may be necessary to invest a significant amount of money in order to upgrade material handling equipment, deploy automation technologies, or improve warehouse infrastructure. Obtaining the money required for these initiatives could be difficult for BAK Logistics, particularly if there are conflicting priorities or financial limitations Thomas (2009).

- **Transition and Change Management**

Workers who are used to current procedures may be resistant to changes being made to material handling workflows and processes Curtis Barry (2008). A lack of staff buy-in and resistance to change might make it more difficult to successfully execute cost-saving

measures. To overcome opposition and guarantee smooth transitions, BAK Logistics may need to make investments in change management techniques including employee involvement, training, and communication.

- **Technological Integration**

It can be difficult and complex to adopt new technologies and integrate them into current systems. BAK Logistics can have trouble deciding on and putting into practice the best technological solutions for their unique operational needs Lifang and Wenxia (2004). During the implementation phase, integration issues including data compatibility, system interoperability, and technical expertise could come up.

- **External Factors**

A number of external factors can have a big impact on warehouse costs, including supplier dynamics, regulatory changes, and market volatility. It can be difficult for BAK Logistics to control these outside influences and modify their cost-cutting plans as necessary. Changes in client demands or unpredictable market situations may necessitate modifying material handling procedures and cost-cutting measures.

- **Monitoring and measuring performance**

It might be difficult to gauge the success and influence of cost-cutting measures. Establishing suitable performance measures, data gathering techniques and performance tracking systems may prove challenging for BAK Logistics in order to precisely evaluate

the results of their cost-cutting initiatives. It could be difficult to assess the effectiveness and long-term viability of improvements that have been put into place without trustworthy measuring methods Shouyang and Qinghong (2008).

2.6 Empirical Review (Research Gap)

Ombul and Iravo (2016) conducted a study on the impact of material handling on the productivity of cement manufacturing companies in Machakos County, Kenya. The purpose of this study was to determine how materials handling methods affect improved performance and cost savings. There were 60 respondents in all because the survey included twelve respondents from each department. This study employed the judgmental sampling technique. In this study, primary and secondary data were also employed. A semi-structured questionnaire that was self-administered was used to gather the primary data. The pre-existing literature on cement firms provided secondary data that would be utilized for cross-validation and consistency checks on the questionnaire responses.

The study's conclusions may be drawn from the data, which show that automating material handling systems enhances the productivity of Machakos County cement production companies. Because this study has shown that automating material handling improves organizational performance and cost savings, cement manufacturing companies in Machakos should endeavour to further enhance their material handling systems and equipment in order to improve cost savings and customer satisfaction.

Guilherme, Giovana, Maria, and Gabriel (2018) investigate enhancements in the management of internal materials handling, using a large automotive company as a case study. A case study in the company's manufacturing unit was preceded by a review of the literature, and 26 employees who were directly involved in the process filled out the questionnaires. After analysing the responses, it was able to conclude that internal customers were aware of how the new materials handling equipment lowered costs, all of which contributed to an increase in customer satisfaction.

In Migori County, Kenya, Mwebia and Mutua (2016) conducted an examination of the impact of storage and material handling on the profitability of Mastermind Tobacco Company. The personnel of Mastermind Tobacco Company will benefit from this research study's fresh insights on efficient material handling and storage practices. System theory and inventory control theory were covered in the literature study. There were twenty-one responders in the sample. Both primary and secondary procedures were employed in the collection of the data. The collected data was analysed using basic statistical techniques including frequencies and percentages. The community being served was not invited to participate in the survey, which mainly focused on employees who have a direct connection to the company's outlets.

The research gaps above covered the overall costs of the organization and this study will focus mainly on the warehouse costs only on BAK logistics, organizational costs include warehouse costs, production costs and also distribution costs among other organizational costs but this study covering warehouse costs specifically means it will to a greater extent deal with the warehouse costs among the three main costs highlighted above.

2.7 Chapter summary

A thorough analysis of the research on the impact of material handling on warehousing expenses is given in Chapter 2. It lays forth the theoretical and conceptual foundation for the investigation and highlights the important variables and connections that the writer will go deeper into the research. The efficiency theory and the TCO theory are two of the theories that are highlighted in the theoretical framework and will be applied in this investigation. The independent variable (material handling) and dependent variable (warehouse costs) are identified using the conceptual framework. The section on the results and methods of other researchers' study that leads to the conclusions is called the empirical review.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction.

The goal of the research methodology is to give specifics about the study's location as well as the activities, procedures, and processes that were used during the investigation. Along with examining and explaining the study methodology that was employed, it also included how the data was gathered, analysed, and collected by the researcher. The targeted demographic or group, the sample selected from the targeted population, the sampling procedures, the instruments used to collect the data, and the research strategies that were employed to acquire the data were all covered in this chapter. Further discussion was given to data analysis and presentation issues. Furthermore, ethics in the research study were emphasized in this chapter, and a summary will be provided at the end of the chapter

3.1 Research design.

According to Gubrium and Holstein (2000), a research design is the general framework for how the study will be done and carried out; consequently, it establishes the foundation and tactics to be used in addressing the research questions. A traditional research design is a blueprint or detailed plan of how a research study is to be completed; operating variables for measurement, selecting a sample, collecting data and analysing the results of interest to the study, and testing the hypotheses Thyer (1993). According to Heritage (1984) a traditional research design is a blueprint or detailed plan of how a research study is to be completed; operating variables for measurement, selecting a sample, collecting data and analysing the results of interest to the study, and testing the hypotheses

3.1.1 Quantitative design.

According to Coghlan and Brydon-Miller (2014) the methodical process of gathering and evaluating numerical data in order to comprehend and characterize a phenomenon is known as quantitative research. To draw conclusions and develop generalizations, it entails using systematic data collecting techniques like surveys, experiments, or statistical analysis of available data. The study will use correlational research; according to Maxwell, J (2013) the use of correlational research on quantitative design involves measuring and identifying relationships between the two variables, material handling and warehouse costs.

3.1.2 Qualitative design.

Corrine and Glesne (2011) define qualitative design as a methodological strategy for comprehending and interpreting societal occurrences, subjective experiences, and meanings is called qualitative research. Qualitative research entails gathering and evaluating nonnumerical data, such as observations, interviews, and textual analysis, in contrast to quantitative research, which concentrates on numerical data. It seeks to offer in-depth understanding, investigate intricate occurrences, and reveal the underlying causes of attitudes, actions, and motives. This study uses the case study approach, which is meant to investigate a single individual to gain an in-depth understanding of an outcome, the chosen firm for the case study is BAK logistics.

3.2 Target Population, Sampling Technique, and Sample Size Determination.

3.2.1 Target Population

According to Ackerman and Schmid (2019) the target population is the group of individuals that the intervention intends to conduct research in and draw conclusions from. From the 4 main offices of BAK logistics in Zimbabwe with a total of 450 employees.

3.2.2 Sampling Technique.

In this study a purposive sampling, a non-probability sampling was employed in selecting respondents from the population. This technique enabled the study to give an opportunity to only eligible participants by selecting from each unit within the population of the study Babbie, E (2016). In this case, the researcher ensured that participants from different categories like stores department, Operations department and finance department's staff have equal chance to participate.

3.2.3 Sample size determination.

In research, sample size refers to the number of participants or observations included in a study. It represents the subset of individuals or elements from a larger population that researchers select to gather data and draw conclusions about the population as a whole Miladinia, Zarea, Gheibizadeh and Jahangiri (2024). It suggests a minimum of 30 subjects per population to be considered to avoid calculation problems. According to Bullen (2021) a good sample size is usually 10% of the population, i.e. 10% of 450 is 45 that is the maximum. Bullen (2021) agrees that rule of thumb is a valid and reliable method to determine the sample size of a research investigation, therefore sample size of the investigation was determined using the rule of thumb (*determination of sample size quick and simple without using complex calculations*). The sample size for this investigation is 40 respondents of which 20 were from the Stores department, 10 were from the Finance department and 10 were from the Operations department of BAK logistics.

3.3 Research Instruments

Research instruments are the techniques that researchers employ to obtain data from a population sample. In this study, questionnaires and interviews were used to obtain data from respondents. The questionnaire comprised of both open-ended and closed-ended questions. The researcher interviewed the managers based on the research objective of the study, and gave out questionnaires to both middle level employees *(supervisors)* and low-level employees *(clerks and other officers)*

3.3.1 Questionnaires

This research used self-administered questionnaires distributed among the staff within their respective departments. This method was chosen for several reasons. Firstly, questionnaires are efficient for collecting data from large group of people simultaneously. This is because respondents can complete them at their own convenience, minimizing disruption to their workday. Secondly, they are well suited for quantitative analysis. Since the study focuses on gathering opinions and perceptions, the researches likely designed the questionnaire with closed-ended questions. This format allows for easy data entry and statistical analysis using software like SPSS.

Finally, using questionnaires can encourage honest responses, particularly for sensitive topics, because respondents complete the survey independently, there's less pressure to give socially desirable answered compared to a face-to-face interview setting.

3.3.2 Interviews.

The researcher used in-depth interviews with top managers at BAK Logistics too get more details about the information they collected from surveys. This helped them to better understand the managers perspectives and priorities on the research topic. Interviews were a good way to gather rich data ad get the managers insights on the key issues (Babbie, E 2016).

3.4 Data collection Procedures.

In this section of the study, two types of data are used in the research that is the primary data and secondary data.

3.4.1 Primary Data.

First-hand information gathered specifically for research purposes is referred to as primary data Maxwell, J (2013). It offers fresh perspectives that are directly related to the concerns or goals of the researcher and is unique and unedited. In order to gather primary data, the researcher evaluated the real situation at BAK Logistics through a pilot study. Primary data was then immediately gathered from primary sources. There was less bias involved in this. In order to schedule interviews and deliver surveys, the researcher got in touch with BAK logistics employees. To gather primary data for this study, the researcher used carefully crafted questionnaires and one-on-one interviews. Primary data collection methods include observations, interviews, questionnaires, focus groups and case studies. This research used case study, interviews and questionnaires to collect primary data needed in this study.

3.4.2 Secondary Data

According to Fowler, F (2013) Secondary data refers to data gathered from published reports and documents from BAK Logistics as well as material found in published textbooks, periodicals, and company magazines. Information or data gathered for purposes other than the current research challenge is referred to as secondary data. The writer included this data and information source because it is pertinent to the current inquiry and could help identify important research study components.

The author also reviewed relevant articles and included significant information on the topic in the literature review section using secondary data. Data and information are used more effectively and economically, and the researcher was able to improve the calibre of the study results by using secondary data.

3.5 Reliability of the Instruments

To ensure the questionnaire produced consistent results, the researcher conducted a pilot test with 10 participants. This involved giving the questionnaire to a small group beforehand to see if it yielded reliable data. Cronbach's alpha coefficient was used to assess the questionnaire's reliability.

3.6 Data Analysis, Interpretation and Presentation.

The research presented its findings in two ways: tables and graphs for the numerical data (quantitative), and narratives for the descriptive data (qualitative) collected through interviews and questionnaires. The qualitative analysis involved a "quick impressionist summary", where the researcher identified frequently occurring responses from the interviews. For the quantitative data, software like the SPSS and Excel were used to analyse the information statistically. This statistical analysis likely focused on ensuring the data's validity (accuracy) and reliability.

3.7 Chapter summary.

Lastly, the methodological research examined the data collecting and techniques, as well as the sources from which the researcher obtained the information and data required. The researcher supported his choice by concentrating solely on descriptive research designs and restricting his comments to the qualitative and quantitative research designs. In addition, the researcher went beyond just collecting data, they examined the methods used to select participants: sampling techniques, demographic samples, and study approach. The most common sample approaches were judgmental sampling and simple random sampling. The researcher concluded the chapter by describing the research methodologies, strategies, and data analysis that were used to obtain the information

CHAPTER FOUR

RESEARCH FINDINGS.

4.0 Introduction.

This chapter dives into the heart of the research: analyzing, interpreting and presenting the data collect from BAK Logistics. To get here, the researcher had to first establish specific goals (objectives) and develop targeted questions that guided the investigation. This chapter will now unpack the findings and their meaning in relation to those initial objectives and questions.

4.1 Response rate.

The study targeted 50 respondents (*40 questionnaires and 10 interviews*) and managed to obtain responses from 44 of them thus representing 85% response rate as shown in table 1. This response rate has been achieved because the researcher gave the respondents enough time to fill the questionnaires. According to Babbie, E (2016) to ensure the reliability and validity of the findings the response rate should be between 60%-70%. Therefore, this study considered the response rate adequate for analysis and generalization since it exceeded the minimum recommended.

Table 4.1. Response Rate

Category	*Questionnaires*	*Interviews*
Sample size	*40*	*10*
Issued/ conducted	*40*	*10*
Responded	*36*	*8*

Non-response/Non returned	*4*	*2*
Percentage	***90 %***	***80%***
Overall response rate	***85.00%***	

Source: Primary data 2024

4.2 Findings from the interviews conducted.

4.2.1 Findings from interviews regarding the effects of material handling on warehouse costs for BAK logistics.

Interviews were given to those with more working experience in the firm, those from the 6-10 years working years at BAK Logistics and those from the sample of more than 10 years working the firm.

4.2.1.1 Effectiveness and Cost considerations.

The most important issues from the interviews were the benefit of material handling on the warehouse costs for BAK logistics. How its implementation can help the firm move forward to be the leading Distribution organization in the country. All interviews carried out gave a positive response on the implementation of material handling to reduce costs such as inventory costs that are a result of damages from poor handling and also delays that can make the clients loose trust in the firm. By introducing material handling customer satisfaction is achievable from the interviews and it is advisable to invest in it as to meet the company's objectives of the long run Oliver, R (2014). The main problem that came out from the finance department was that the cost of acquiring those material handling systems is very expensive for the firm and the firm need to pay for training of personals who will use the systems such as Automated systems.

4.2.1.2 Risk management.

The interviews highlighted the consideration of risk management on the effectiveness of material handling on warehouse costs. The identification of risks such as Damages during handling, poorly trained staff and inaccurate inventory management came from the interviews. These may come as a result of not implementing material handling or even implementing it. Prioritization of the firm to avoid these risks were to focus on addressing inefficient material handling systems and staff training and also implementing regular equipment maintenance and safety measures so as to reduce the impact of the risks related with material handling Hubbard, D (2009).

4.2.1.3 Enhanced Productivity.

The other main issue that came out from the interviews was enhanced productivity. As one of the core objectives of the firm, the interviews gave thumbs up for the introduction of material handling concluding that it boosts productivity to a greater extent as it allows warehouses to handle more orders and shipments efficiently, the respondents agreed with it as they seek to expand the operations of the firm. This was a point for the operations department and the rest of the departments agreed with this issue.

4.2.2 Finding regarding the current material handling systems at BAK Logistics.

4.2.2.1 Stores department.

- **Damage to Products:** the department suggested that the use of the current material handling systems is to some extent the cause of the damage to products. This may be a result to financial losses also if not delt with on time. In order to reduce the damages of products they agreed to the introduction of new and efficient systems that can reduce these damages and minimize losses.
- **Maintenance and Repair:** they agreed with the operations department that the older systems require more frequent maintenance and repairs and it leading to increased downtime leading to customer dissatisfaction, increased hiring of personals and causes financial losses to the company, they suggested that the firm should introduce these new systems so as to reduce the costs of hiring outside labour Oliver, R (2014).
- **Safety risks:** the interview conducted in the stores department also found out that the older systems pose safety risks to the employees leading to injuries and accidents. Some older systems are not comfortable and are also the reason why some personnels do not come to work every day because of the discomfort.

4.2.2.2 Finance department.

- **Increased labour costs:** the findings form the finance department suggested that the use of the outdated material handling systems is inefficient and leads to higher labour costs and increased risks of injury, hence the firm has been hiring more labour.
- **Higher energy Consumption and Sustainability:** the finance department and the Operations department agreed that the use of the outdates systems leads to higher energy consumption and costs, the issue of green environment was part of the findings from the interview conducted in the two environments, they suggested that the use of modern equipment that puts the environment as priority has to be considered. According to Bove and Johnson (2001) higher energy consumption leads to more costs that is customer dissatisfaction.
- The interviews from the finance department agreed with the TCO theory that Warehouse managers can assess the dependability and longevity of material handling equipment and select alternatives that provide the most long-term value by taking

maintenance and repair expenses into account. From the interviews it was agreed that in order to reduce costs associated with employing these advanced systems they need routine inspections, preventive maintenance plans, and prompt repairs can help limit unplanned malfunctions, cut down on downtime, and save expensive repairs. With the agreement that the firm has to bring in newly advanced systems it was also agreed to take this theory into action.

4.2.2.3 Operations department.

- **Competitive Disadvantage:** the operations department interview agreed that the use of the current material handling systems may lead to the organization to face struggles to compete with more modern and efficient operations. In order to target green champions, they suggest that the firm should upgrade to modern material handling systems Oliver, R (2014).
- **Compliance Issues:** in order to avoid fines from the authorities like **EMA** (*Environmental management Agency*) the operations department also suggested that the use of modern systems is also advisable. They should meet regulatory standards, that protect the environment.

To a greater extent the researcher found out that upgrading to modern material handling systems can help address these issues and improve overall efficiency, productivity and also safety.

4.3 Demographic characteristics.

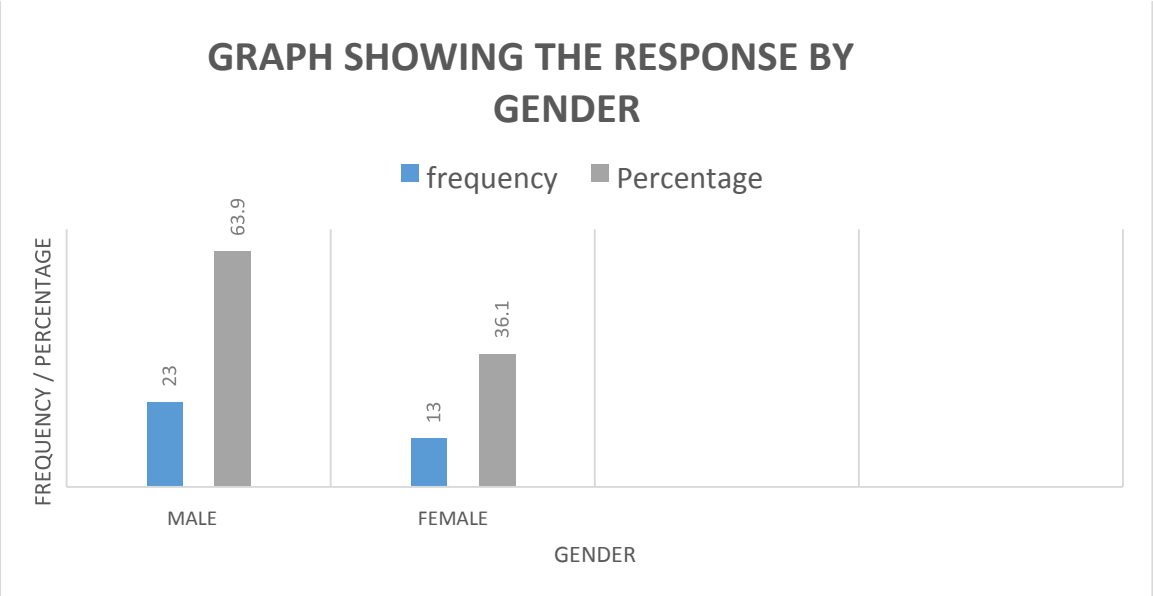
4.3.1 Respondents by gender.

Table 4.2: Respondents by gender

Gender of respondents	Frequency	Percentage value %
Female	13	36.1
Male	23	63.9
Total	36	100

Source: Primary data 2024

Figure 2: Graph showing the response by gender.



Source: Primary data 2024

Discussion of results.

From the bar graph above, the illustration of the number of despondences by gender is depicted. Response indicated that the majority of respondents were male who accounted for 23 (63.9%) and female respondents accounted for 13 (36.1%). This implies there is a marginal majority of males over the females among the staff of BAK Logistics this is because it is a heavy-duty industry that demands a lot of manpower, but the introduction of self-driven material handling systems may lead to more females being employed.

4.3.2 Age of Respondents

Respondents were asked to choose their age brackets and the findings are presented in the table below:

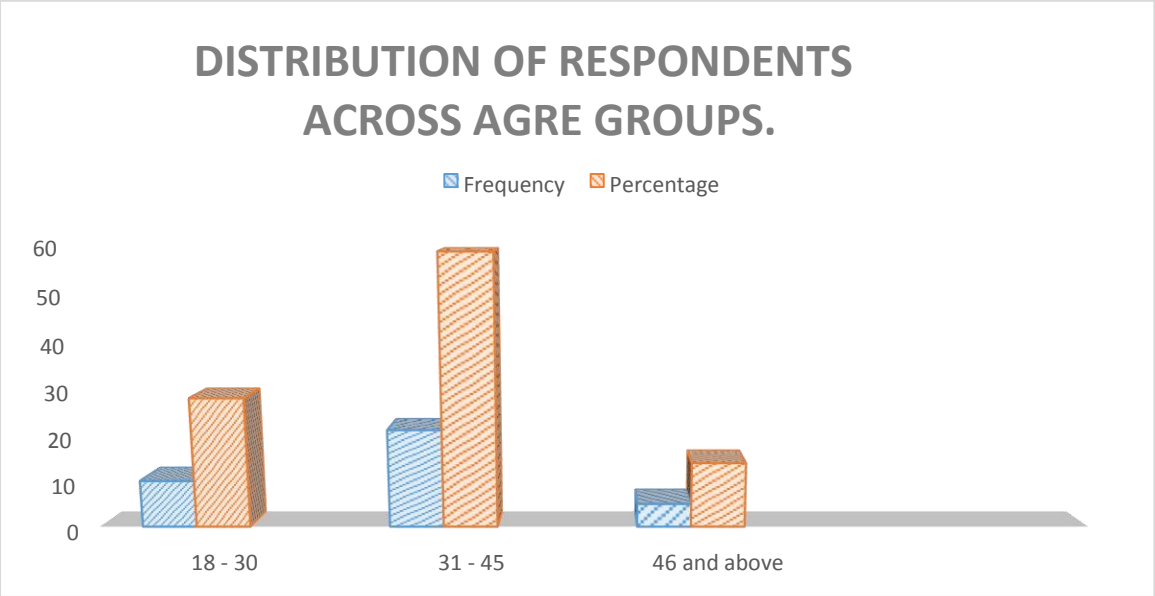
Table 4.3: Distribution of respondents across age groups.

Age bracket (years)	Frequency	Percentage
18 – 30	10	27.8
31-45	21	58.3
46 and above	5	13.9
Total	**36**	**100**

Source: Primary data 2024

The following graph takes a closer look at the findings in the table above.

Figure 3: Distribution of respondents across age groups.



Source: Primary Data 2024

Discussion of Results

As illustrated in Table 3 and Figure 2, the study participants were spread across different age groups. The largest portion, at 58.3% (21 individuals), fell within the 31–45-year-old range. Those aged 18-30 comprised 27.8% (10 people), while the 46 and above age group was smallest at 13.9% (5 participants).

The data suggests that BAK logistics workforce leans towards the 31- 45 age group, which makes up the majority of employees (58.3%). This age group is often considered to be in their professional prime, potentially bringing a wealth of experience and dedication to their roles.

According to Groves and Fowler (2009) This indicates that the majority of the respondents were in the productive age group and not minors, and therefore had the ability to respond appropriately to the questionnaire. This implies that valid and reliable information was got.

4.3.3 Highest Academic Qualification.

The following table explores the educational background of the survey participants.

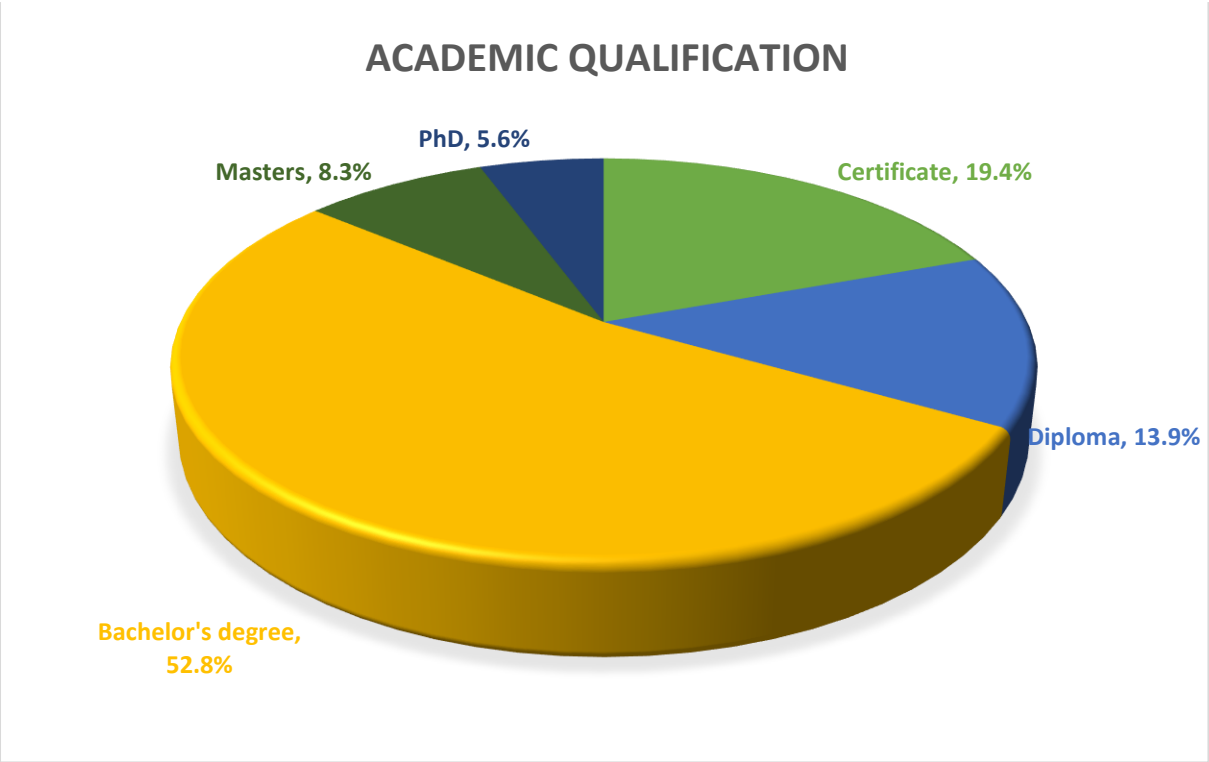
Table 4.4: Showing the highest level of education of the respondents

Level of Education	**Frequency**	**Percentage**
Certificate	7	19.4
Diploma	5	13.9
Bachelor's Degree	19	52.8
Masters	3	8.3
PhD	2	5.6
Total	**36**	**100**

Source: primary data 2024

This information is further presented in the figure below:

Figure 4: Education Level of the Respondents



Source: Primary Data 2024

Discussion of Results.

As shown in Table 4 and Figure 3, the educational background of BAK Logistics' employees is quite diverse. The majority (52.8% or 19 participants) hold a Bachelor's degree, suggesting a preference for hiring candidates with a strong academic foundation. Certificate holders (19.4% or 7 people) and Diploma holders (13.9% or 5 people) make up a significant portion as well. The presence of Master's degree holders (8.3% or 3 people) and PhD holders (5.6% or 2 people) indicates BAK Logistics also values advanced degrees for senior management positions. This educational variety ensures a workforce with a range of knowledge and expertise. This likely contributed to a high comprehension rate of the survey questions, leading to quality data and insightful interview responses, ultimately enriching the research Fink, A (2019)

4.3.4 Working Experience with BAK Logistics.

Respondents were asked how long they had been working with BAK Logistics and the findings are presented in the table below:

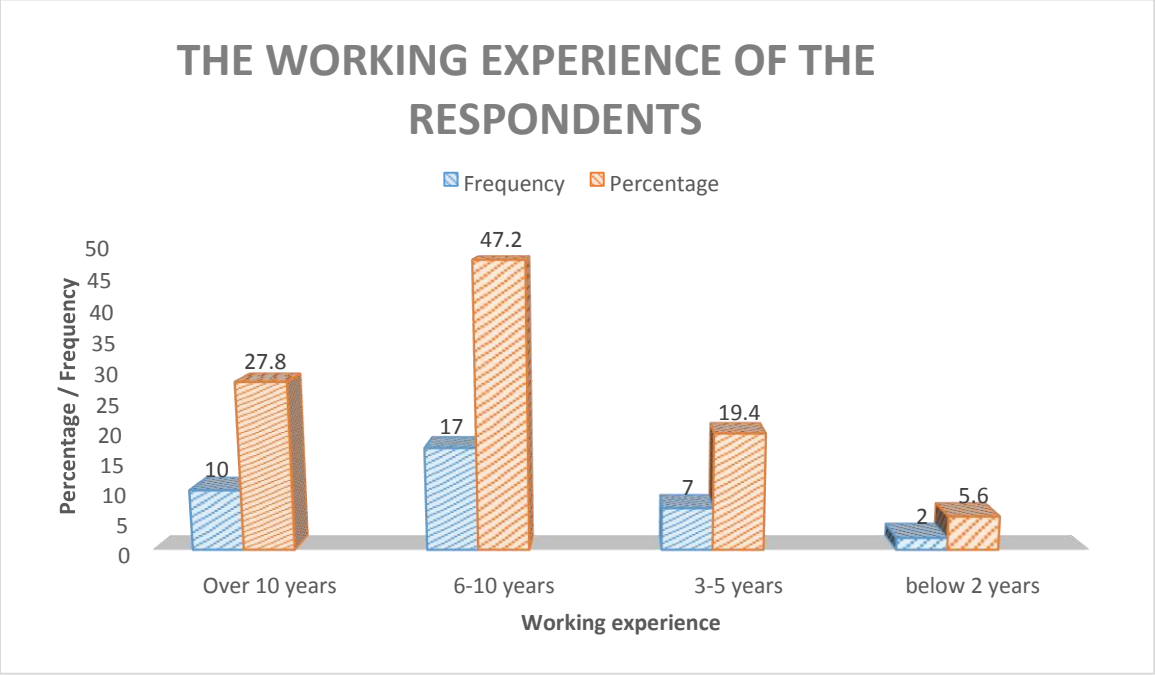
Table 4.5: Period of Employment of Respondents.

Period of employment	Frequency	Percentage
Over 10 yrs.	10	27.8%
6 – 10 yrs.	17	47.2%
3 – 5 yrs.	7	19.4%
Less than 2 yrs.	2	5.6%
Total	**36**	**100**

Source: Primary Data 2024

These findings are further presented in the graph below:

Figure 5: Working Experience of the Respondents



Discussion of results

Examining Table 5 and Figure 5, we see that a substantial portion of the employees (47.2% or 17 participants) have been with BAK Logistics for 6 to 10 years, with another 10 (27.8%)

exceeding 10 years. This indicates a relatively experienced workforce. Fewer respondents fell into the 3–5-years (19.4% or 7 people) and less than 2 years (5.6% or 2 people) categories. This experience suggests the staff likely possesses deep institutional knowledge about BAK Logistics, particularly regarding materials handling and warehouse cost reduction strategies (the research topic) Fink, A (2019). The low turnover rate further strengthens this notion of a knowledgeable workforce.

4.4 Relationship between Material handling and warehouse costs of the Organization. `

To investigate the connection between material handling and warehouse costs, the research included specific questions posed to the respondents. The results of these questions are presented in the following table.

Table 4.6: Relationship between Materials Handling and warehouse costs of the Organization.

Relationship between materials handling and warehouse costs of the organization.	**Response**											
	Strongly agree		**Agree**		**Neutral**		**Disagree**		**Strongly disagree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Material Handling reduces inventory costs (*less damages*)	30	83.3	6	16.7	-	-	-	-	-	-	36	100
Material Handling reduces idle machine capacity	28	77.8	6	16.7	-	-	2	5.5	-	-	36	100
Material Handling reduces idle time for labour	25	69.5	7	19.4	-	-	4	11.1	-	-	36	100
Material Handling eliminates factory hazards	19	52.8	8	22.2	3	8.3	6	16.7	-	-	36	100
Material Handling maintains quality of materials	27	75	9	25	-	-	-	-	-	-	36	100
Material Handling enables optimum usage of space	12	32.8	20	56	2	5.6	2	5.6	-	-	36	100
Material Handling reduces opportunity costs (missed sales due to delays)	20	55.6	14	38.8	2	5.6	-	-	-	-	36	100

Material Handling facilitates better customer care	30	83.3	4	11.1	-	-	2	5.6	-	-	36	100
Material Handling reduces shipping costs.	24	66.7	8	22.2	-	-	4	11.1	-	-	36	100

Source: Primary data 2024

Discussion of results

Reduction in Inventory Costs (Less Damages) high Agreement (83.3% Strongly Agree, 16.7% Agree): Effective material handling systems reduce the likelihood of product damage during storage and transport. Automated systems, proper packaging, and careful handling procedures minimize physical damage, spoilage, and loss. Lower inventory costs mean fewer write-offs and insurance claims for damaged goods, directly reducing overall inventory expenses.

Decrease in Idle Machine Capacity - Strongly Agreed (77.8%), Agreed (16.7%), Disagreed (5.5%): When supplies are delivered to production lines on schedule, waiting times and machine idle times are decreased thanks to proper material handling. According to Diwekar, U (2011) Increased production output and efficiency from better machine usage maximize the return on investment from new machinery purchases and lower operating expenses from inactive machinery.

Strong Agreement on Reducing Labor's Idle Time (19.4% Agree, 11.1% Strongly Agree): Effective material handling systems make material transportation more efficient and guarantee that workers always have the supplies they need to do their tasks. Lower labour expenses per unit of output and higher workforce productivity are directly correlated with decreased idle time for workers, which improves overall operational efficiency.

Diverse Views Regarding the Removal of Factory Hazards (52.8% Strongly Agree, 22.2% Agree, 16.7% Disagree and 8.3%): Many people think that good material handling lowers risks and hazards in the factory (for example, by automation and better ergonomics), but some people don't agree. This could be because there are some persistent dangers that material handling can't completely eliminate. Improved safety measures and tools can decrease accident rates, which can save expenses for workers' compensation, insurance premiums, and fines for noncompliance (Ang, 2015). Different perspectives, however, indicate that hazard elimination could yet be improved.

Sustaining a high level of agreement in material quality (75% strongly agree, 25% agree): By avoiding physical damage, deterioration, and contamination, proper handling maintains the integrity of the material. By ensuring that the finished product fulfils requirements and minimizes returns, rework, and customer complaints, maintaining high-quality materials ultimately saves money and preserves brand reputation.

Moderate Agreement on the Best Use of Space (32.8% Strongly Agree, 56% Agree, 5.6% Unsure, 5.6% Disagree) Efficient planning, stacking, and storage solutions can optimize warehouse space with the help of effective material handling. Improving inventory management, lowering storage costs, and postponing the need for warehouse growth are all possible with optimal space utilization (Ang, 2025). The contradictory answers suggest that some participants still see difficulties or inefficiencies in the use of space.

Diminished Opportunity Costs (Sales Lost Because of Delays) 38.8% Agree, 55.6% Strongly Agree, constitute the majority: Product delivery to clients is guaranteed when materials are handled promptly and effectively, as this minimizes manufacturing and shipping delays. Lower opportunity costs have a direct influence on revenue and customer loyalty since they result in fewer lost sales and higher customer satisfaction.

Improvement of Customer Service Facilitation Strong Agreement (11.1% Agree, 83.3% Strongly Agree and 5.6% disagree): Effective handling systems guarantee the prompt, correct, and secure delivery of goods, enhancing the general clientele's experience. Improved customer service builds goodwill and may even increase recurring business by raising customer satisfaction and retention rates Cascio, W (2015).

Lower Shipping Prices High Level of Agreement (66.7% Agree, 22.2% Strongly Agree and 11.1% disagree): Minimizing shipping errors, optimizing load planning, and minimizing packaging materials and space all contribute to reduced shipping costs through effective material handling. Lower shipping costs improve profitability by lowering freight costs, lowering the demand for expedited shipping, and streamlining logistics.

The majority of survey respondents strongly believe that material handling has a favourable impact on a number of cost-related aspects of warehouse operations. Efficient material handling systems are considered essential for lowering inventory and transportation expenses, making the best use of available space and manpower, and raising customer satisfaction and product

quality Noe, R (2016). The removal of factory dangers is the one area where there is noticeable disagreement, indicating that this may be a need for additional study and development.

The aforementioned analysis highlights the significance of allocating resources towards resilient material handling systems and ongoing enhancement in order to optimize financial gains and operational efficacy in storage and the overall logistics of a business.

4.5 Types of materials handling systems.

Table 4.7. Showing material handling systems

Material Handling System	**Response**											
	Strongly agree		**Agree**		**Neutral**		**Disagree**		**Strongly disagree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Manual material handling	30	83.3	6	16.7	-	-	-	-	-	-	36	100
Storage and retrieval systems (*automated storage and retrieval systems AS/RS*)	-	-	-	-	20	55.6	11	30.5	5	13.9	36	100
Automated material handling *(conveyors & cranes*)	36	100	-	-	-	-	-	-	-	-	36	100
Unitizing systems (*pallets, unit loads and containers*)	34	94.4	2	5.6	-	-	-	-	-	-	36	100
Identification and tracking systems (*barcodes and RFID*)	26	72.2	10	27.8	-	-	-	-	-	-	36	100

Source: primary data 2024

Discussion of results.

Regarding Manual Material Handling Just a small percentage of respondents disagree, with the majority (75%) strongly agreeing that manual material handling is effective. Because they may

be easily adjusted to different activities and circumstances, manual handling methods are still considered valuable in some contexts.

Storage and Retrieval Systems (AS/RS): The results appear to be contradictory; a sizeable minority either disagrees or is unsure, while a small majority (55.6%) disagrees with the efficacy of AS/RS systems. suggests that opinions on the effectiveness and acceptability of automated storage and retrieval systems are not entirely clear or consistent, maybe as a result of things like cost, complexity, or compatibility with other systems.

Automated Material Handling (Conveyors & Cranes): The data indicates overwhelming support (100%) for automated material handling systems, particularly conveyors and cranes. Conveyors and cranes are examples of automated systems that are highly appreciated in a variety of industries due to their efficiency, speed, and capacity to optimize material movement.

Unitizing Systems (Pallets, Unit Loads, and Containers): A vast majority (94.4%) agree with the effectiveness of unitizing systems, showing strong support for their utility in material handling processes. Unitizing systems are widely recognized as essential components of modern material handling practices, offering benefits such as standardization, ease of handling, and protection of goods during transport and storage.

Barcodes and RFID identification and tracking systems: Although still highly regarded, these systems receive somewhat less resounding approval than some other categories, with 72.2% of respondents agreeing with their efficacy. There may be some space for improvement or clarification on the implementation or benefits of identification and tracking systems, despite the fact that they are essential to inventory management, supply chain visibility, and traceability.

To sum up, the survey findings indicate a general agreement on the effectiveness of several material handling technologies, including automated, manual, and unitizing techniques. But contained in this agreement is a sophisticated knowledge of the benefits and drawbacks of particular automated systems, such AS/RS, as well as the difficulties in putting identifying and tracking technology like RFID and barcodes into practice. According to Kithinji (2015) Diverse automated systems have diverse levels of support, indicating that while automation is usually appreciated for its capacity to increase productivity and streamline procedures, not all

automated solutions are seen in the same way. Kithinji (2015) suggests that it is probable that several factors including affordability, dependability, expandability, and harmony with current infrastructure impact how stakeholders see these systems. Similar to this, elements like accuracy, simplicity of integration, and data security issues may have an impact on how effective identification and tracking technologies are.

These results highlight the necessity of continuing research and development initiatives targeted at resolving the highlighted problem areas and enhancing material handling systems' overall performance. Leenders (1992) suggests that the optimization of material handling processes can be achieved through the combination of ongoing technological innovation, improved user education and training initiatives, and other factors. To meet the changing needs of the contemporary supply chain ecosystem, firms can optimize their material handling processes by recognizing and addressing the unique opportunities and problems within each system category.

4.6 Factors affecting warehouse costs at BAK Logistics.

Table 4.8: showing Factors affecting warehouse costs at BAK Logistics

Factors affecting warehouse costs at BAK Logistics	**Strongly Disagree**		**Agree**		**Neutral**		**Disagree**		**Strongly Disagree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Labour costs (*Hiring etc.*)	32	88.9	4	11.1	-	-	-	-	-	-	36	100
Utility costs *(e.g. water and electricity*)	33	91.7	3	8.3			-	-	-	-	36	100
Facility costs (*e.g. property taxes and insurance*)	20	55.6	14	38.9	-	-	2	5.6	-	-	36	100
Regulatory compliance (*e.g. licenses and permits*)	20	55.6	10	27.7	4	11.1	2	5.6	-	-	36	100
Inventory management	18	50	14	38.9	-	-	4	11.1	-	-	36	100
Space utilization	30	83.3	5	13.9	1	2.8	-	-	-	-	36	100

Maintenance and repair costs of equipment.	33	91.7	3	8.3	-	-	-	-	-	-	36	100

Source: Primary data 2024

Discussion of results.

Labor Charges (Recruiting, etc.) Strong Agreement (11.1% Agree, 88.9% Strongly Agree): Everyone agrees that labor expenses have a big impact on warehouse costs. This covers salary, benefits, and the costs related to recruiting and onboarding staff. Effective labor management and productivity are essential for cost control in warehouse operations since high labor expenditures can have a significant impact on overall costs Lyson (1996).

Costs of utilities (such as electricity and water) Good Agreement (91.7% Agree, 8.3% Strongly Agree): There is almost universal agreement that utility costs have a significant impact. The operation of warehouse facilities depends on utilities, such as lighting, heating, cooling, and equipment operation. Gong and De Koster (2011) suggest that Effective management and optimization of utility usage can result in significant cost savings, underscoring the significance of energy-efficient practices and technologies in cutting operational costs.

Facility expenses (such as insurance and property taxes) Mixed Agreement (38.9% Agree, 5.6% Disagree, and 55.6% Strongly Agree): Most people agree that facility expenditures, such as insurance and property taxes, are an important cost component. There is, however, some dispute, suggesting different opinions about their significance. These expenses are usually set and can add up, so careful budgetary management and planning are required. Differences in how these expenses are distributed or handled inside the company may be the cause of disagreement.

Compliance with regulations (such as licenses and permits) Variable Agreement (27.7% Agree, 11.1% Neutral, 5.6% Disagree, and 55.6% Strongly Agree): Most people view compliance with regulations—which includes obtaining the required licenses and permits— as a significant cost component, while opinions vary greatly. Although maintaining regulatory compliance might be expensive, it is necessary to prevent penalties and legal problems. Different experiences with regulatory burdens across different activities may be the cause of the inconsistent replies.

Moderate Agreement on Inventory Management (50 percent strongly agree, 38.9% agree, and 11.1% disagree): Most people believe that inventory management is a big cost issue, however there is a noticeable difference in opinion. According to Zipkin (2000) Costs associated with excess inventory, obsolescence, and storage can be decreased with effective inventory management. The disagreement raises the possibility that BAK Logistics' present inventory management procedures are difficult or ineffective.

Strong Agreement on Space Utilization (Agree 13.9%, Strongly Agree 83.3%, Neutral 2.8%): It's common knowledge that optimizing space is essential to keeping warehouse expenses under control. Making the most use of available space can optimize storage capacity and minimize the demand for new facilities. Delaying the need for expansion and increasing operational effectiveness can result in significant cost savings through space optimization. The nearly universal consensus emphasizes how crucial space management plans are.

Strong Agreement on Maintenance and Repair Costs of Equipment (91.7% Strongly Agree, 8.3% Agree): Nearly all respondents viewed maintenance and repair costs as a significant factor. Proper maintenance and timely repairs can prolong equipment life, improve reliability, and lower unforeseen expenses, all of which contribute to overall cost efficiency. Maintaining equipment in good working order is crucial for seamless operations and avoiding expensive downtime.

To sum up, the survey results demonstrate a distinct understanding of the main factors influencing costs in BAK Logistics' warehouse operations. Everyone agrees that labor, utility, space usage, and maintenance and repair expenses are high and call for targeted cost- and efficiency-controlling solutions. Even though facility costs and regulatory compliance are significant, there is some variation in how they are perceived, which points to potential areas for uniform management techniques Kumar (2014). Better procedures and systems have the ability to reduce costs and improve operations, which makes inventory management a promising area for improvement. This thorough understanding emphasizes how crucial it is to keep funding and improving material handling systems in order to reduce expenses and raise overall operational efficiency in warehouses Ombul and Iravo (2016).

4.7 Reliability testing

The investigation had 25 variables in the research questionnaires. The use of Cronbach's alpha, a statistical tool used to help in assessing if the data is reliable. The results of the Cronbach alpha were obtained from the SPSS and they are below in the table.

Figure 5 Cronbach's Alpha variable testing

Reliability Statistics

Cronbach's Alpha	N of Items
.976	25

Source: SPSS 2024

Cronbach's Alpha is a metric that quantifies the internal consistency or reliability of a set of scale or test items. Its values range from 0 to 1, where higher values signify greater reliability Cronbach, L (1951). High Reliability: A Cronbach's Alpha of 0.976 is exceptionally high. Generally speaking, a value exceeding 0.70 is deemed acceptable, above 0.80 is deemed good, and above 0.90 is deemed excellent DeVellis, R (2017). There were 36 respondents and the reliability testing was done using the SPSS software. Consequently, a value of 0.976 indicates that the scale's items are very consistent and measure the same underlying construct. The study was done on a scale with a substantial number of items 25 that can contribute to a higher Cronbach's Alpha if they are well-correlated.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDARTIONS

5.0 Introduction.

An overview of the main research findings, conclusions, and suggestions is provided in this chapter. It will provide information on how well the research has met its goals. Everything that is offered here is derived from the discoveries that were made in the earlier chapters. This study's primary goal was to examine the connection between BAK Logistics' warehouse expenses and material handling (a case study of BAK Logistics).

5.1 Summary of Major findings

The findings of this study highlight the critical role of efficient material handling systems in reducing warehouse costs and enhancing operational efficiency at BAK Logistics. Below are the discussions of the major findings. At BAK Logistics, many of the material handling systems in use are antiquated, which results in inefficiencies and increased expenses because they require frequent repairs and maintenance. The research findings indicate that many of the current material handling systems in use at BAK Logistics are outdated, leading to increased costs and inefficiencies. For instance, 91.7% of respondents strongly agree that maintenance and repair costs of equipment significantly impact warehouse costs. Upgrading to modern, reliable systems can reduce these costs and minimize downtime.

Effective risk management is vital in mitigating the potential costs associated with material handling. Key findings include 83.3% of respondents strongly agree that material handling reduces inventory costs due to less damage. Implementing better risk management practices, such as regular equipment maintenance and comprehensive staff training, can further reduce these costs (Hubbard 2009).

Proper management of labour and utilities is crucial for controlling warehouse costs. The findings emphasize: 88.9% of respondents strongly agree that labour costs significantly affect warehouse costs. Investing in automated material handling systems can reduce labour costs by decreasing the need for manual handling Noe, R (2016). Similarly, 91.7% of respondents strongly agree that utility costs impact warehouse operations. Adopting energyefficient systems can help manage these costs effectively.

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respondents strongly agree that utility costs impact warehouse operations. Adopting energyefficient systems can help manage these costs effectively.

A result of 0.976 from the reliability test using Cronbach's Alpha indicated extraordinarily excellent internal consistency. This high reliability guarantees that the data gathered is reliable and strong, supporting the veracity of the conclusions Tavakol and Dennick (2011).
This was from the responses from both interviews and questionnaires which show an overall response rate of 85%, indicating a high level of engagement and data reliability.

5.2 Conclusions

Other logistics companies in Zimbabwe can use the findings as a model to assess and enhance their own operations. Enhancing industry-wide efficiency can be achieved by using comparable procedures for risk management, resource optimization, and system improvements Chipfunde, H (2018). By implementing the study's suggestions, BAK Logistics, a well-known and reputable company, can raise the bar for operational excellence in Zimbabwe's logistics industry.

Businesses in Zimbabwe across a range of industries will gain from improved logistics services in terms of cost-effectiveness and dependability, which will raise their overall competitiveness. The focus of the study on evidence-based suggestions and data-driven decision-making may incentivize other logistics firms to make comparable investments in analytical endeavours aimed at pinpointing optimization prospects Kachingwe, K and Mbohwa, C (2017). Improved reliability and cost-effectiveness of logistics services will benefit businesses across various industries in Zimbabwe, enhancing their overall competitiveness. The study's emphasis on data-driven decision-making and evidence-based recommendations can encourage other logistics companies to invest in similar analytical efforts to identify optimization opportunities.

The results can spur beneficial changes across the sector by acting as a model for operational enhancements. This could result in more cost-effective and higher-quality logistical operations across the nation. Improved logistics effectiveness can enable more dependable and seamless trade flows with foreign partners as well as within Zimbabwe. This may facilitate Zimbabwe's better integration into regional and international supply chains. Adopting best practices and contemporary technology in logistics can encourage innovation in the sector and increase the

competitiveness of Zimbabwean logistics firms abroad Mhlanga, O and Mbohwa, C (2019). The insights from this study on BAK Logistics have the potential to significantly impact Zimbabwe's logistics landscape and support the country's broader economic objectives. By serving as a model for operational improvements, the findings can catalyse positive changes throughout the industry, ultimately strengthening Zimbabwe's position as a reliable logistics hub within the region. Through these improvements, BAK Logistics and other companies can contribute to the economic growth and development of Zimbabwe, making the logistics sector a pivotal component of the nation's prosperity.

5.3 Recommendations.

Based on the findings of the study conducted on BAK Logistics, several actionable recommendations can be made to improve operational efficiency and reduce warehouse costs. These recommendations are crucial for enhancing the overall performance of logistics companies in Zimbabwe and can also serve as a guideline for other players in the industry

To enhance automation, tracking, and inventory management, spend money on contemporary material handling equipment and warehouse management systems (WMS). Conveyor systems and automated guided vehicles (AGVs) are two examples of how to improve throughput and decrease errors in human handling. Utilize artificial intelligence (AI) and Internet of Things (IoT) sensors to track equipment health, forecast maintenance requirements, and improve warehouse routing. This may result in lower breakdown rates and better asset use (Waters, 2003).

To detect possible operational risks like equipment failure, supply chain disruptions, and safety hazards, conduct frequent risk assessments. To address these risks, develop and implement mitigation plans. To reduce mishaps and interruptions to operations, offer staff thorough training programs on risk management techniques, including as safety procedures, emergency response, and equipment handling Grant, D and Trautrims, A (2018). Rethinking warehouse layouts to make the most use of available space. To improve storage density, use vertical storage options like high-bay racking systems. Optimize storage sites and inventory levels with data analytics. In order to cut down on excess inventory and free up valuable space, implement a just-in-time (JIT) inventory system.

To predict labour demands based on demand trends, use workforce management software. In addition to lowering overtime expenses and increasing labour productivity, this guarantees ideal staffing levels Rushton, A, Croucher, P and Baker, P (2014). Encourage staff morale and productivity by implementing reward schemes. Acknowledge and compensate top performers to create a motivated and productive staff. Boost ties with suppliers to guarantee dependable and prompt delivery of goods. Work together on projects that can cut expenses and improve supply chain operations. Participate in events and industry groups to exchange best practices and learn about the newest developments in logistics trends and technologies.

Implementing these recommendations can significantly enhance the operational efficiency and cost-effectiveness of BAK Logistics and other logistics providers in Zimbabwe. By adopting modern technologies, optimizing resources, and fostering a culture of continuous improvement, the logistics industry in Zimbabwe can overcome current challenges and contribute to the nation's economic growth and development.

5.4 Suggestions for further research

This study looked at how material handling affected an organization's warehouse costs; nevertheless, further research has to be done in areas that are closely connected to material handling and minimizing warehouse costs: Education and research on the effectiveness of material handling and Materials handling in an organization's customer service delivery.

APPENDIX I: Research questionnaires

Dear respondent,

I am a student at Bindura University pursuing a Bachelor’s Degree in Purchasing and Supply Management. I am conducting research on the impact of materials handling practices on warehouse costs within organizations.

This questionnaire is completely anonymous and your participation is entirely voluntary. All information you provide will be kept strictly confidential and used solely for academic purposes.

Your insights will be invaluable in helping me understand the relationship between materials handling and warehouse costs. By completing this questionnaire, you will be making a significant contribution to the accuracy and value of my research.

Thank you in advance for your cooperation. I truly appreciate your time and support.

Demographics of the survey participants

Put an 'X' in the box were appropriate

1. Gender

i) Male ☐

ii) Female ☐

2. Age group

i) **18 – 25 years** ☐

ii) **26 – 35 years** ☐

iii) **36 – 45 years** ☐

iv) **46 years and above** ☐

3. What is your level of education?

i) PHD **iii)** ☐ **ii) Masters** ☐ **Bachelor's degree** ☐

iv)Diploma ☐ **v) Certificate** ☐

4. From which department do you work?

i) Operations department ☐ ii) Finance department ☐

iii)Stores department ☐

5. Duration of employment with the organization.

i) 2 years and below ☐ ii) Between 3 – 5 years ☐

iii) Between 6 and 10 years ☐ iv) Over1o years ☐

Relationship between Materials Handling and warehouse costs of the Organization

Instruction: Please tick the appropriate options

Relationship between materials handling and warehouse costs of an organization	**Strongly Agree**	**Agree**	**N**	**Disagree**	**Strongly Disagree**
Does Material Handling reduce inventory costs (*less damages*)					
It reduces idle machine capacity					

It reduces idle time for labour					
It eliminates factory hazards					
It maintains quality of materials					
It enables optimum usage of space					
Material Handling reduces opportunity costs (*missed sales due to delays)*					
It facilitates better customer care					
It reduces shipping costs.					

Types of material handling systems currently used.

Instruction: Please tick the appropriate options

Material Handling System	**Strongly Agree**	**Agree**	**N**	**Disagree**	**Strongly Disagree**
Manual material handling					
Storage and retrieval systems (*automated storage and retrieval systems AS/RS*)					
Automated material handling *(conveyors, cranes and AGVs*)					
Unitizing systems (*pallets, unit loads and containers*)					
Identification and tracking systems (*barcodes and RFID*)					

Factors affecting the warehouse costs of BAK Logistics.

Instruction: Please tick the appropriate options

Factors affecting the warehouse costs	**Strongly Disagree**	**Agree**	**N**	**Disagree**	**Strongly Disagree**
Labour costs (*Hiring etc.*)					
Utility costs *(e.g. water and electricity*)					
Facility costs (*e.g. property taxes and insurance*)					
Regulatory compliance (*e.g. licenses and permits*)					
Inventory management					
Space utilization					
Maintenance and repair costs of equipment.					

Thank you for your participation …

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