Working Paper 2025.2.1.1

- Vol. 2, No. 1

PHÂN TÍCH MÔ HÌNH QUẢN LÝ KHO XANH CỦA IKEA VÀ ĐỀ XUẤT CHO DOANH NGHIỆP VIỆT NAM

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Tóm tắt

Nghiên cứu này điều tra việc thực hiện các biện pháp quản lý kho xanh của IKEA, một công ty dẫn đầu toàn cầu về đồ nội thất gia đình. Sử dụng phương pháp nghiên cứu điển hình, nghiên cứu này phân tích các chiến lược của IKEA nhằm giảm thiểu tác động môi trường trong toàn bộ hoạt động kho bãi của mình. Phân tích tập trung vào các lĩnh vực chính như hiệu quả năng lượng, giảm thiểu chất thải, xử lý vật liệu bền vững và tích hợp các nguồn năng lượng tái tạo. Thông qua việc kiểm tra các hoạt động được ghi chép của IKEA, các báo cáo bền vững và các tiêu chuẩn ngành liên quan, nghiên cứu này xác định hiệu quả của các sáng kiến xanh của họ và khám phá những thách thức và cơ hội liên quan đến việc triển khai kho bãi bền vững trên quy mô lớn. Những phát

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hiện này góp phần vào sự hiểu biết sâu sắc hơn về cách các tập đoàn đa quốc gia có thể đạt được sự bền vững môi trường trong chuỗi cung ứng của họ, đặc biệt thông qua các chiến lược kho bãi sáng tạo.

Từ khóa: quản lý kho xanh, IKEA, đề xuất cho doanh nghiệp Việt Nam

THE ANALYSIS OF GREEN WAREHOUSING MANAGEMENT: A CASE STUDY OF IKEA AND RECOMMENDATIONS FOR VIETNAMESE ENTERPRISES

Abstract

This research investigates the implementation of green warehousing management practices within IKEA, a global leader in home furnishings. Utilizing a case study approach, this study analyzes IKEA's strategies for minimizing environmental impact throughout its warehousing operations. The analysis focuses on key areas such as energy efficiency, waste reduction, sustainable material handling, and the integration of renewable energy sources. Through an examination of IKEA's documented practices, sustainability reports, and relevant industry benchmarks, this research identifies the effectiveness of their green initiatives and explores the challenges and opportunities associated with implementing sustainable warehousing on a large scale. The findings contribute to a deeper understanding of how multinational corporations can achieve environmental sustainability within their supply chains, specifically through innovative warehousing strategies.

Keywords: green warehousing management, IKEA, recommendations for Vietnamese enterprise

1. Introduction

1.1. Background of the study

"Sustainability is the key to our survival on this planet and will also determine success on all levels" (Arison 2009).

In a rapidly changing world, supply chain managers struggle to balance cost reduction with corporate social responsibilities. Sustainability, more commonly known as corporate social responsibility, is fluid and ever changing but it is consistently complicated. Environmental degradation, global warming, and corporate pressures to adopt green initiatives stress organizations to incorporate and implement sustainability practices into their supply chain and seek effective strategies to measure the performance of their sustainability efforts.

In the 21st century, successful business operations demand that all management levels adopt an ecological mindset to ensure sustainability. Now more than ever, sustainability plays a crucial role in both short-term business goals and the long-term growth of companies. Without a sustainable strategy, a company's performance and future viability may be at risk.

Green supply chain management and logistics focus on reducing the environmental impact of various logistics and supply chain operations. Warehousing, as a key component, should be as eco-friendly as possible. Adopting green warehousing strategies enables companies to ethically save the environment, comply with local regulations, and efficiently lower warehousing costs.

IKEA is an international furniture manufacturer and retailer with warehouses, distribution centers, and department stores spread across the globe. Given its extensive global supply chain, integrating green logistics is a key component of its value chain management strategy. IKEA was selected as the subject of this case study for three main reasons. Firstly, as a multinational company with manufacturing and distribution centers worldwide, it operates a highly complex supply chain. Secondly, IKEA has been a pioneer in systematically incorporating sustainability into its business practices. Lastly, the company aligns with the objectives of our study, which aims to examine a global enterprise that effectively develops and implements meaningful sustainability initiatives within its warehouse management.

1.2. Research Objectives

This thesis aims to "Investigate the implementation of green warehousing at IKEA". The objective of this research is to explore and enhance the implementation of green warehousing at IKEA. By analyzing current warehousing practices, this study seeks to identify opportunities for integrating more sustainable and environmentally friendly solutions within IKEA's operations. The research will evaluate key factors such as energy efficiency, waste management, and future direction of green warehousing to develop practical strategies that align with IKEA's broader sustainability goals. Ultimately, this study aims to provide actionable recommendations that contribute to improving the environmental performance of IKEA's warehousing system while maintaining operational efficiency.

1.3. Research Question

Research Question (RQ) is: What strategies can be implemented to enhance green warehousing practices?

The research question is divided into investigative questions (IQs) as follows:

IQ 1. What energy efficiency practices are currently implemented in IKEA's warehouses?

IQ 2. What practices are presently used for effective waste management in IKEA's warehouses?

IQ 3. What recommendations can be proposed to advance green warehousing implementation for Vietnamese enterprises?

1.4. Scope of the Study

This section outlines the research's scope. Figure 1 presents the key subjects addressed in this study, as well as the aspects that are not included.

Figure 1. Green warehousing thesis demarcation

The study aims to explore the sustainability of supply chain management and green logistics, both of which are vast and intricate fields. In the logistics chain, inbound logistics involves the delivery, transportation, and storage of goods within a business, typically in a warehouse. Conversely, outbound logistics focuses on storing and distributing goods to retailers or customers. The internal warehouse serves as a crucial link between inbound and outbound logistics, handling goods storage, packaging, inventory management, and order fulfillment before products reach customers. From an ecological perspective, sustainability can be integrated into all stages of logistics, including inbound operations, warehouse management, and outbound logistics.

This study specifically focuses on sustainability within the central warehouse, also referred to as green warehousing (Figure 1). The research explores three key aspects: energy efficiency, waste management, and the future development of the green warehouse. However, the study does not cover green initiatives related to inbound or outbound logistics.

2. Theoretical background

2.1. Warehouse and Warehouse Management

2.1.1. Warehouse

Warehouse is a type of real estate designed to store and preserve goods. Therefore, a warehouse is also known as an intermediate point in the supply chain, where goods are concentrated and classified. Enterprises can own and operate one or more warehouses in different locations or choose to rent services from professional suppliers.

Warehouses are used to support purchasing, manufacturing, and distribution. Firms place orders for raw materials, parts, and assemblies, which are typically shipped to a warehouse near or within the buyer's location and then transferred to the buyer's various operations as needed. In a retail setting, the warehouse may be regionally located, with the retailer receiving bulk orders from many suppliers, breaking these down and reassembling outgoing orders for delivery to each retail location, and then moving orders to the retail locations using a private fleet of trucks or for-hire transportation providers. When manufacturers deliver bulk shipments to regional market areas, similar distribution centers are used to break these down and ship LTL order quantities to customers (Wisner et al., 2014).

2.1.2. Warehouse Management

Warehouse management involves monitoring all operations and processes within a warehouse. To ensure a high degree of transparency, warehousing begins with the receipt of the order and ends when the goods leave the warehouse. Zoom in closer and you'll see that effective warehouse management involves optimizing and integrating each of those processes to ensure all aspects of a warehouse operation work together to increase productivity and keep costs low. The following aspects fall under the targeted management of the warehouse:

- The receipt of goods
- The tracking of goods within the warehouse
- The storage of stock
- The management of product shipment

- The training of personnel
- The general monitoring of the movement of goods
- The planning of workload and labor utilization
- The organization of warehouse space

Thus, warehouse management encompasses various processes and principles that enable smooth operations in the warehouse. This also includes the organizational procedures and processes within the warehouse. Professional warehouse management solutions should therefore consider different aspects and processes.

2.2. Green Warehouse Management

2.2.1. What is a Green Warehouse

Green warehouses are facilities that prioritize environmentally sustainable and eco-friendly practices in their design, construction, and operations within logistics and supply chain management. These warehouses aim to minimize their ecological footprint by implementing strategies that reduce energy consumption, decrease waste generation, and promote overall environmental responsibility.

Key features of a green warehouse may include:

- Energy-efficient lighting and heating systems
- Renewable energy sources like wind and solar power
- Sustainable construction materials
- Waste recycling programs
- Integrating technologies that enhance resource efficiency

The goal is to build a facility that not only meets the functional requirements of a warehouse but also aligns with the principles of environmental sustainability, contributing to a healthier planet and responsible business practices.

Green warehouses play an essential role in the broader movement toward sustainability and popularizing eco-friendliness in supply chain management.

2.2.2. Key components of Green Warehouse Management

Green warehouse management involves several critical components:

a. Energy-Efficient Infrastructure

Energy-efficient infrastructure is one of the cornerstones of green warehouse management. One key aspect is lighting, where the use of LED lighting and motion sensors helps significantly reduce energy consumption. Another vital element is the installation of energy-efficient HVAC (Heating, Ventilating, and Air Conditioning) systems, which optimize heating, cooling, and ventilation to minimize energy usage. Additionally, the integration of renewable energy sources, such as solar panels or wind turbines, plays a crucial role in reducing reliance on non-renewable energy and promoting sustainability. Together, these components form the foundation of a green warehouse, enabling businesses to operate more efficiently while reducing their environmental impact.

b. Sustainable Building Design

Sustainable building design is also a fundamental aspect of green warehouse management. This includes adhering to green building standards, which provide frameworks for creating environmentally responsible and resource-efficient structures. Additionally, the use of sustainable and energy-efficient building materials, along with proper insulation, plays a key role in minimizing energy consumption and reducing the environmental footprint of the warehouse. Together, these elements ensure that the facility is designed and constructed with sustainability at its core, aligning with broader green management goals.

c. Waste Management

Waste management includes the implementation of comprehensive recycling programs designed to handle materials such as paper, plastic, and metal, ensuring they are diverted from landfills and reused effectively. Additionally, waste reduction strategies play a vital role, such as minimizing packaging waste and promoting the use of reusable materials. These efforts not only reduce the environmental impact of warehouse operations but also contribute to a more sustainable and efficient supply chain. In short, these waste management practices are essential for achieving the broader goals of green warehouse management.

d. Eco-Friendly Operations

Eco-friendly operations is another component of green warehouse management. One key aspect is the use of automation and technology, where automated systems are employed to optimize energy consumption and minimize waste, enhancing overall efficiency. Another important element is green logistics, which focuses on optimizing transportation routes to reduce fuel consumption and emissions, as well as incorporating fuel-efficient or electric vehicles into the fleet. In conclusion, these practices not only reduce the environmental impact of warehouse operations but also contribute to a more sustainable and cost-effective supply chain, aligning with the broader objectives of green warehouse management.

e. Employee Training and Engagement

Employee training and engagement is one important part of green warehouse management. A crucial element is sustainability training, which educates employees on green practices and their importance, ensuring they understand how their actions contribute to broader environmental goals. Furthermore, incentive programs play a vital role in fostering staff participation by rewarding and recognizing employees who actively engage in sustainability initiatives. These efforts not only build a culture of environmental responsibility but also empower employees to take ownership of green practices, driving the overall success of green warehouse management.

2.3. Benefits and Challenges of applying green warehousing

The advantages of green warehousing extend beyond the obvious environmental benefits, encompassing also economic and social advantages.

2.3.1. Benefits

a. Cost savings

Green warehousing often leads to significant cost savings over time. Implementing energy-efficient technologies, such as LED lighting and renewable energy sources, can reduce energy consumption, resulting in lower utility bills. With more efficient operations and less waste often resulting in reduced operational costs and increased profit margins. Adopting innovative technologies enables automation, helps streamline operations, and allows the maintenance of smaller staff. This contributes to both efficiency and sustainability. Additionally, waste reduction and recycling initiatives can minimize disposal costs.

b. Reduced carbon footprint

Green warehousing contributes to environmental sustainability by reducing the carbon footprint and minimizing negative impacts on ecosystems. Sustainable practices, such as using

eco-friendly materials in construction and adopting energy-efficient technologies, help businesses play a role in conserving natural resources and mitigating climate change. With an environmental crisis breathing down our necks, it's up to all of us to contribute to the planet's well-being, and if you can make money while doing it, that's even better.

c. Regulatory compliance

Many regions have strict environmental regulations in place, and green warehousing practices ensure compliance with these standards. By proactively integrating sustainable initiatives, companies can avoid fines and legal issues while demonstrating their commitment to responsible business principles. It is much easier to adapt to regulations continuously than redesigning already established warehouse processes.

d. Enhanced brand reputation

Embracing sustainability enhances a company's image, fostering a positive brand reputation. Consumers and partners increasingly value environmentally conscious businesses. By showcasing a commitment to sustainability, companies can differentiate themselves in the market, attract eco-conscious customers, and strengthen partnerships with like-minded suppliers. This positive brand reputation can encourage others to follow in their footsteps, improving sustainability initiatives throughout the logistics chain and even influencing other industries.

e. Employee satisfaction

Green initiatives in the workplace contribute to a positive work environment, enhancing employee morale and satisfaction. Employees often take pride in working for an organization that prioritizes environmental responsibility. This positive atmosphere can increase productivity, improve retention rates, and empower a more engaged workforce.

2.3.2. Challenges

a. Upfront costs

Investing in energy-efficient technologies, renewable energy sources, and sustainable construction materials can entail significant upfront costs. This can be an obstacle for some businesses, especially smaller enterprises with limited budgets.

b. Constraints of Existing Infrastructure

Many industrial warehouses are constrained by older infrastructures that weren't designed with modern, energy- saving technologies in mind. Retrofitting these buildings to accommodate new, greener solutions often entails significant technical and financial challenges, including major modifications to the building's electrical layout, structure, and other foundational elements.

c. Regulatory Hurdles

Diverse and sometimes conflicting regulations across different areas can lead to confusion and compliance issues for warehouse operators. Additionally, the pace at which regulations evolve can lag behind the rapid advancements in green technology, creating gaps that slow down the adoption of decarbonization measures.

d. Conflicting Tenant Requirements

Warehouse tenants may have specific needs that clash with the objectives of decarbonization, particularly if their operations are energy-intensive and difficult to sustain using greener technologies. Finding a middle ground that satisfies both the tenants' operational requirements and sustainability targets requires thoughtful negotiation and creative problem-solving.

e. Supply Chain Limitations

The effort to reduce carbon footprints in warehouse operations is closely tied to the broader supply chain, which can present its own set of limitations. The availability of sustainable materials, renewable energy options, and eco-friendly transportation methods directly impacts a warehouse's ability to lower its environmental impact, making the decarbonization of warehouses a collective supply chain issue.

3. Research Methodology

3.1. Research Objects

Primarily, the object centers on the operational strategies and management practices employed within green warehousing, with a specific focus on how these principles are implemented by a leading multinational corporation, IKEA. This includes examining the company's approaches to energy efficiency, waste reduction, and overall environmental impact minimization within their warehousing operations.

Furthermore, the research object extends to the applicability and adaptability of IKEA's green warehousing model within the context of Vietnamese enterprises. This involves a comparative analysis, evaluating the feasibility and potential benefits of adopting similar sustainable practices

in the Vietnamese market, considering the unique economic, regulatory, and infrastructural landscape. Consequently, the research also focuses on identifying the specific challenges and opportunities that Vietnamese enterprises face in transitioning towards greener warehousing solutions.

Finally, the research object includes the development of actionable recommendations tailored to Vietnamese enterprises, aiming to facilitate their adoption of green warehousing practices. This necessitates a thorough investigation of the existing warehousing infrastructure, regulatory frameworks, and market dynamics in Vietnam, leading to the formulation of practical strategies and guidelines. Ultimately, the research object is to bridge the gap between global best practices, exemplified by IKEA, and the practical implementation of sustainable warehousing in the Vietnamese business environment, fostering a more environmentally responsible and efficient logistics sector.

3.2. Data Collection Methods

The data collection strategy incorporates multiple methods to ensure comprehensive coverage and triangulation. Data has been obtained from both sources of primary and secondary information. Primary data includes information from IKEA’s official website. Meanwhile, secondary data incorporates company documents, sustainability reports, and industry analyses, following Bowen's (2019) document analysis methodology. This multi-faceted approach enhances the validity of findings as emphasized by Creswell (2020).

3.3. Data Analysis Techniques

Analyzing data requires a mixed-methods approach, mainly qualtitative method techniques in this research to provide a comprehensive understanding. For the data gathered through document analysis of their sustainability reports and operational manuals, thematic analysis will be the primary method. This involves carefully reading through documents, identifying recurring themes and patterns related to IKEA's green warehousing practices, challenges, and opportunities. For instance, themes might emerge around energy efficiency initiatives and waste reduction strategies. Content analysis can supplement this by systematically analyzing the frequency and context of specific keywords or phrases related to sustainability within IKEA's communications, providing further insight into their priorities and messaging.

4. Overview of IKEA

IKEA is a Swedish-founded, multinational conglomerate that designs and sells ready-to-assemble furniture and household goods. It was founded in 1943 by Ingvar Kamprad and is the world's largest furniture retailer. The company is owned by the Inter IKEA Group and the Ingka Group, and the brand name is an acronym based on the founder's name and hometown. IKEA is primarily known for its modernist furniture designs, simple interior design approach, and immersive shopping concept, based around decorated room settings within big-box stores, where customers can interact with products onsite. In addition, the firm is known for its attention to cost control and continuous product development, notably, the ready-to-assemble model of furniture sales and other elements that have allowed IKEA to establish lower prices than its competitors. As of September 2024, the company's footprint extends to 473 stores across 63 countries, generating a staggering €45.1 billion in sales during the 2024 fiscal year. This impressive scale is underpinned by a multifaceted corporate arrangement designed to optimize various aspects of the business, including tax efficiency. The core of IKEA's structure revolves around a franchise model. Inter IKEA Systems B.V. holds the reins of branding, design, manufacturing, and supply, essentially functioning as the franchisor. Meanwhile, the Ingka Group, a significant component of the IKEA conglomerate, acts as the primary franchise, managing the company's retail outlets. IKEA's digital presence is equally formidable, with its website showcasing approximately 12,000 products. This expansive online catalog attracted over 4.6 billion visitors in FY2024, highlighting the brand's immense popularity and accessibility.

5. Analysis of Green Warehousing Practices in IKEA

5.1. Current Practices of Green Warehousing Implementation

IKEA has established itself as a leader in sustainable warehousing operations through comprehensive environmental initiatives across its global supply chain network. We will analyze the practices in IKEA based on key components of Green Warehousing Management. The company's commitment to green warehousing is evident in its strategic approach to energy efficiency and waste management.

5.1.1. Energy Efficiency

IQ 1. What energy efficiency practices are currently implemented in IKEA's warehouses?

IKEA stores use water-based (which circulates the buildings) heating systems to conserve energy. Warehouses are divided into zones for specific activities, maintaining temperature levels for customer comfort. Energy-efficiency ventilation systems maintain fresh air and save electricity consumption by nearly 25%. This green initiative ensures a pleasant shopping experience for customers.

IKEA has installed LED lights in all stores, maintaining appropriate lighting levels based on natural light levels. Automatic sensor controllers enable lights to be turned on only when needed, increasing energy efficiency in warehouses. Mechanical handling equipment is powered by electricity, reducing carbon footprint.

IKEA's sustainability leader emphasizes the importance of a systematic measurement approach for effective implementation of green warehouse practices. The company collects energy consumption data from local stores and reports it to global managers, setting realistic targets and continuously improving green energy practices.

A more explanation of IKEA's energy efficiency practices is provided in the following table:

Table 1. IKEA's energy efficiency implementation

IKEA's energy efficiency practices	**Explaining and supporting results**
Heating systems by water with appropriate temperatures.	Saving energy and electricity
The warehouse is segregated with different zones and different temperatures.	Reducing energy consumption in zones requiring a lower temperature
Energy-efficient ventilation systems	Facilitate air changes and save energy of heating systems
Installing fully LED light systems in every store	Saving energy and longer product life cycle
Equipping automatic sensor controllers for lighting systems	Lights on only when needs
Mechanical handling equipment is powered fully by electricity	Reduce carbon footprint and improve internal air quality

A holistic approach to measure and audit energy efficiency	Measurement for coming year targets and continuous improvement
Self-production of green energy	Reducing costs of energy, using renewable energy sources, reducing CO2 emissions, less dependent on energy prices

IKEA has also recently expanded its use of drone technology for inventory management in 50 of its largest warehouses worldwide, marking a significant step towards more sustainable and efficient operations. IKEA's innovative drone-based inventory management system is designed to improve efficiency, cut costs, and minimize the environmental impact of its warehouse operations. This move aligns with the company's long-term commitment to environmental stewardship and its goals of reducing its carbon footprint.

In summary, IKEA possesses a holistic approach to enhance the level of efficiency in energy consumption. The implementation tackles nearly every aspect of energy efficiency with the most up-to-date technologies and innovations. Energy efficiency at IKEA's warehouses contributes significantly to the company's success in green operations.

5.1.2. Waste Management

IQ 2. What practices are presently used for effective waste management in IKEA's warehouses?

IKEA is reducing waste from daily business activities by using more recyclable packaging and properly separating materials and waste. This follows the waste guidelines of IKEA internal documents of how different fractions should be sorted and the waste hierarchy. It emphasizes the importance of seeing waste as a resource. The company prioritizes reuse, recycling, and energy recovery, with disposal waste being the last choice when no other alternatives are available.

The recovery unit processes atypical waste, repacking damaged products or reusing components as spare materials. The program identifies and addresses product damage to avoid future warehouse losses.

IKEA's warehouse waste management process effectively addresses the vast waste types generated due to its massive product range. However, third-party waste management companies offer limited choices for waste types like paper, plastic, metal, and wooden, and mixed waste like glass, which is not recycled.

IKEA's waste management plan also includes increasing recycling pack sizes and cardboard pallets, reducing damaged products, partnering with third-party partners, and exploring innovative waste management initiatives like biomass energy generation.

More explanations of IKEA's waste management practices are provided in the following table:

Table 2. IKEA's waste management process

IKEA's waste management practices	**Explaining and supporting results**
Waste separation	Easier recycling process
Reducing daily activity waste. Recycling, reusing waste as much as possible. Disposing waste is the last choice	Minimizing the amount of waste
Repackage damaged products. Reuse every usable component	Increasing recycling ability of waste management process
Identify and deal with the root of product damage	Avoid future losses, damage and reduce the amount of waste

To sum up, IKEA has effectively managed waste in a sustainable manner. There is only an existing limitation resulting from third-party, which can be an aspect of recommendation to resolve this shortcoming for the case company.

5.1.3. Green Warehousing under Internal Communication

Figure 2. IKEA's organizational structure

Source: IKEA

Here is an overview of IKEA's organizational structure. There is always a difference in understanding business strategies from top management levels to middle-management personnel and employees. With the commissioning company IKEA, the question is how effectively green warehousing strategies are communicated throughout the workforce.

At the top management level, IKEA's Sustainability Leader and Logistics Manager aim to implement green warehouse strategies by planning sustainable strategies, informing employees, and monitoring warehousing executives. They communicate the importance of working in a sustainable company and continuously monitor and adjust changes.

At the middle management level, IKEA emphasizes training and follow-ups for warehouse sustainability, motivating employees to comply with green practices like waste management, recycling, and energy efficiency during work shifts.

A warehouse employee at IKEA, a logistics company, expressed an understanding of the company's sustainability practices. The company provides information through posters, leaflets, TV videos, motivation, and regular work shifts. The employee actively adheres to sustainable practices, demonstrating their commitment to environmental sustainability.

In short, IKEA effectively communicates its sustainability strategy, ensuring personnel understand roles and responsibilities. Effective communication and collaboration among company members are crucial for successful implementation.

5.2. Environmental and Economic Performance

IKEA's green warehousing initiatives demonstrate a strong commitment to sustainability, yielding positive environmental and economic results. Their focus on energy efficiency is evident in the implementation of LED lighting with sensor controls. This is further complemented by water-based heating systems and efficient ventilation, although specific percentage improvements are not available. The transition to electric-powered mechanical handling equipment also contributes to a smaller carbon footprint. Beyond energy, IKEA's store achieved a remarkable near 100% waste diversion rate, significantly surpassing the global average. This success stems from a multi-pronged approach encompassing waste reduction at the source through recyclable packaging and material separation, and resource recovery through repackaging, component reuse, and addressing product damage.

The success of IKEA's green warehousing strategy is underpinned by a systematic approach to measurement and reporting. Data collection and analysis enable the company to track progress, set realistic targets, and continuously improve their practices. Crucially, effective internal communication across all levels, from top management to warehouse employees, ensures that everyone understands their role and responsibilities. Training, motivation, and readily available information are key components of this communication strategy. This holistic approach, combining technological advancements with organizational commitment, has enabled IKEA to achieve significant environmental and economic benefits.

6. Evaluation of IKEA’s Green Warehousing Implementation

6.1. Key Benefits and Challenges

6.1.1. Benefits

One of the most prominent benefits lies in enhanced energy efficiency. IKEA's adoption of LED lighting with sensor controls, water-based heating systems, and energy-efficient ventilation demonstrably reduces energy consumption. By segmenting warehouses into temperature-

controlled zones and utilizing electric-powered mechanical handling equipment, the company further minimizes its carbon footprint. These practices not only translate to significant cost savings but also contribute to a more sustainable operational model. The systematic measurement and reporting of energy consumption data allows IKEA to track progress, set realistic targets, and continuously improve its energy efficiency practices, fostering a culture of continuous improvement.

IKEA's focus on supply chain optimization through green warehousing practices also yields significant advantages. The company reduces transportation distances and fuel consumption by strategically locating warehouses closer to distribution centers and implementing efficient transportation management systems. Utilizing optimized packing and palletizing techniques minimizes material usage and maximizes truck capacity, further contributing to fuel efficiency and cost reduction. These initiatives not only improve logistical efficiency but also strengthen the resilience of the supply chain against disruptions.

Furthermore, effective waste management is a cornerstone of green warehousing, yielding substantial environmental and economic gains. IKEA's comprehensive approach, prioritizing waste reduction, reuse, and recycling, has resulted in a nearly 100% waste diversion rate, far exceeding global averages. The company minimizes waste generation and maximizes resource recovery by using recyclable packaging, separating waste materials, and repacking damaged products. This not only reduces the environmental impact of warehousing operations but also mitigates financial losses associated with damaged goods, as demonstrated by the 4.2% reduction in pre-sale damaged products. Moreover, exploring innovative waste management solutions like biomass energy generation further enhances IKEA's sustainability profile.

Beyond technological advancements and operational efficiencies, effective internal communication plays a pivotal role in the success of green warehousing initiatives. By ensuring that all levels of the organization, from top management to warehouse employees, understand their roles and responsibilities, IKEA fosters a culture of sustainability. Training, motivation, and readily accessible information are crucial components of this communication strategy. This holistic approach ensures that everyone is aligned with the company's sustainability goals, leading to greater employee engagement and a more cohesive and effective implementation of green warehousing practices.

6.1.2. Challenges

6.1.2.1. Energy Efficiency Challenges

One of the biggest challenges in deploying energy-saving solutions is the high initial investment cost. Although energy-efficient systems and renewable energy integration can deliver

long-term economic benefits through reduced operational costs, the upfront investment required to install these systems is often substantial (Osarobo & Chika, 2016; Yaseen, 2021). This is particularly challenging for small and medium-sized enterprises (SMEs), as they typically have limited financial resources and face difficulties accessing large capital.

Another challenge in implementing energy-saving solutions is the complexity of integrating advanced technologies into existing operational systems. In many industries, legacy systems and infrastructure may require upgrades or replacements to ensure compatibility with new energy-efficient solutions. This process not only demands significant time and effort but may also necessitate the restructuring of current processes to optimize energy usage.

Additionally, businesses may encounter resistance from employees who are unfamiliar with new technologies or hesitant to abandon traditional working methods (Kaistinen, 2017; Weyer et al., 2015). To address this issue, companies can invest in training and educational programs aimed at raising awareness and facilitating the adoption of energy-saving practices across the organization. Such initiatives not only help employees understand the benefits of new solutions but also encourage their active participation in the transition process. Moreover, the rapid pace of technological advancement requires businesses to continuously invest in upgrading their digital systems to maintain competitiveness. This creates ongoing financial pressure, particularly for large enterprises like IKEA, which operates on a global scale with complex infrastructure.

6.1.2.2. Waste Management Challenges

A significant challenge IKEA faces in optimizing waste management is the limitations associated with third-party involvement. IKEA relies heavily on external partners, such as waste collection, transportation, and processing companies, to carry out its waste management processes. However, this reliance can lead to several issues, including inconsistent service quality, lack of transparency in waste handling, high costs, and dependence on the technology and infrastructure of third parties.

Another challenge that IKEA faces in waste management is the incomplete implementation of waste sorting. Although IKEA employees and customers have a good understanding of how to sort waste, a significant amount of recyclable waste is still not being sorted correctly. Cardboard is the most common type of waste that remains unsorted. This issue may stem from the lack of dedicated waste bins for cardboard in some key areas, such as loading docks.

Currently, IKEA has deployed some general waste bins at its locations, but the absence of dedicated cardboard bins in high-traffic areas like loading docks is reducing the efficiency of the recycling process. A proposal has been made to install fixed cardboard bins in these areas, along

with implementing mobile solutions to ensure that cardboard can be collected conveniently and effectively.

7. Recommendations for Vietnamese Enterprises in Green Warehousing Implementation

7.1. Status of implementing green warehousing in Viet Nam

In general, the current warehouse system in Vietnam is of lower quality than that in other Asian countries. Many warehouses do not have concrete floors, but are built with bricks on sand, and the warehouse floors are uneven, which can easily damage goods. Regarding energy for the warehouse system, warehouses mainly use electricity to serve the needs of lighting and control the warehouse temperature when necessary. Warehouses with environmentally friendly features such as using solar energy, natural light, suitable area, thick walls and floors, and on-site recycling are requirements in the construction and operation of warehouses of Vietnamese enterprises.

According to the Ministry of Industry and Trade (2022), the current statement of applying WMS in Vietnam is reported in the following charts. Statistics are collected from 115 logistics companies combined with those from related ministries and organizations.

7.1.1. The utilization of sustainable energy sources

According to the survey, up to 68.6% of enterprises responded that they have not used renewable energy in warehouse operations at the enterprise or have not rented warehouses using renewable energy. Regarding the reason, 65.3% of enterprises stated that they do not have enough resources to design an operating system and 29.2% of enterprises said that the cost of setting up a warehouse system using renewable energy is high, making it impossible for enterprises to invest. Of the 31.4% of enterprises that have used renewable energy in warehouse operations, 81.8% of enterprises use solar energy; 18.2% use hydropower; 12.1% use wind energy.

The survey data also shows that warehouse management is not scientific, and has not applied modern techniques, especially not many information technology applications are used in warehouse coordination and management. This is the reason why it is still difficult for businesses to control the amount of energy consumed at the warehouse (Ministry of Industry and Trade, 2022)

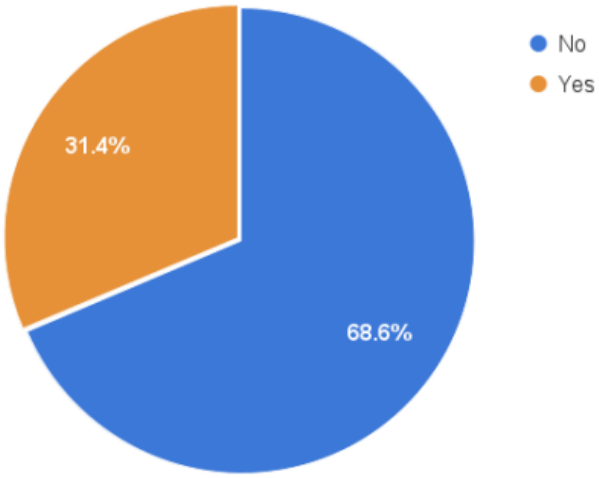

Figure 3. Percentage of businesses using renewable energy in warehouse operations

Source: Ministry of Industry and Trade (2022)

7.1.2. The utilization of technology

Distribution warehouses, or CY/CFS warehouses, have not connected to the information network with customers to serve the work of checking, storing and tracking each shipment from the warehouse to any location, and have not applied warehouse management techniques (specialized software, barcodes,..).

Figure 4 demonstrates the proportion of using and non-using WMS logistics companies in Vietnam. As shown in the chart, in order to effectively manage warehouse operations, 63.8% of enterprises participating in the survey used warehouse management software and rated the effectiveness of using warehouse management software at a fairly high score of 4.31 on a scale of 5.

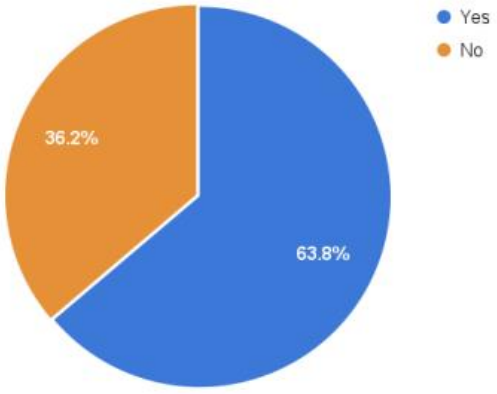

Figure 4. Percentage of enterprises using WMS

Source: Ministry of Industry and Trade (2022)

In addition, the pie chart below illustrates Businesses' evaluation of Warehouse Management System (WMS) implementation, based on data from the Ministry of Industry and Trade (2022). Most enterprises (58.9%) consider WMS to be efficient, represented in yellow. This indicates that while the system meets expectations, there is room for improvement. Meanwhile, 32.9% of enterprises rate WMS as highly efficient (blue), highlighting a significant portion that finds it very effective.

A smaller percentage of businesses classify WMS as normal (5.5%), shown in orange, suggesting that it neither excels nor underperforms. Additionally, less efficient (gray) and inefficient (dark blue) categories occupy a negligible portion of the chart, indicating that very few enterprises have a negative experience with WMS.

Overall, the data suggests that WMS is generally well-received, with over 90% of businesses viewing it as at least efficient. However, some room for optimization remains.

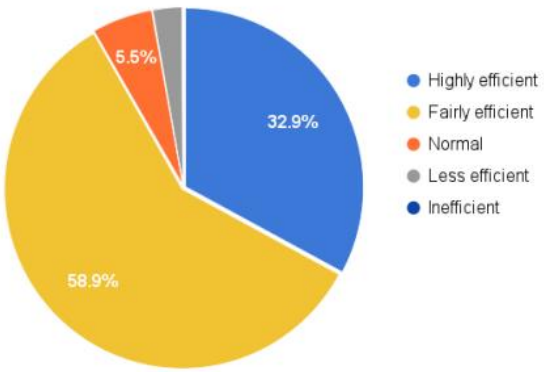

Figure 5. Businesses' evaluation of WMS implementation

Source: Ministry of Industry and Trade (2022)

Overall, the number of businesses developing green warehouses in Vietnam remains limited. Few companies prioritize the development of green warehouses, largely because the concept is still relatively new in the country. Consequently, key evaluation criteria—such as the use of environmentally friendly equipment and vehicles, the implementation of waste treatment procedures, and contracting professional waste management services—are neither widely

recognized nor given significant attention. As a result, specific data on businesses adopting these criteria is still being collected and is not yet publicly available in any reports.

7.2. Difficulties in developing green warehouse in Vietnam

Many businesses have not adopted green warehousing yet due to multiple obstacles, including Warehouses infrastructure, Technological development, Collaboration with stakeholders, Restricted financial ability, Shortage of skilled human resource, and Businesses' lack of environmental consciousness. Therefore, the research team examines these challenges by identifying the factors that hinder the growth of green warehouses for businesses in Vietnam.

7.2.1. Warehouses infrastructure

Vietnam's logistics infrastructure has received investment but still faces many limitations. The limited quality of infrastructure affects the implementation plans and effectiveness of businesses' green logistics solutions. Surveyed enterprises also rated this as the most influential factor in the greening of their logistics operations, with an average score of 4.15 on a 5-point scale (Figure 5).

7.2.2. Technological development

The application of information technology in the business operations of Vietnamese enterprises still lags significantly behind international standards. Given the current state of infrastructure and financial capacity, Vietnam is not yet able to immediately implement the most modern and advanced management tools and technological elements, despite having access to them. This explains why surveyed enterprises rated the factor of "Scientific and Technological Development" as the second most influential external factor affecting the development of green logistics, with a score of 4.07 out of 5.

7.2.3. Collaboration with stakeholders

The limited cooperation of service providers and customers is also a challenge for businesses in implementing green logistics solutions, with the average impact score of this factor reaching 4.05 out of 5 (Figure 6). This may stem from differences in objectives and disparities in resources between businesses and their partners or customers.

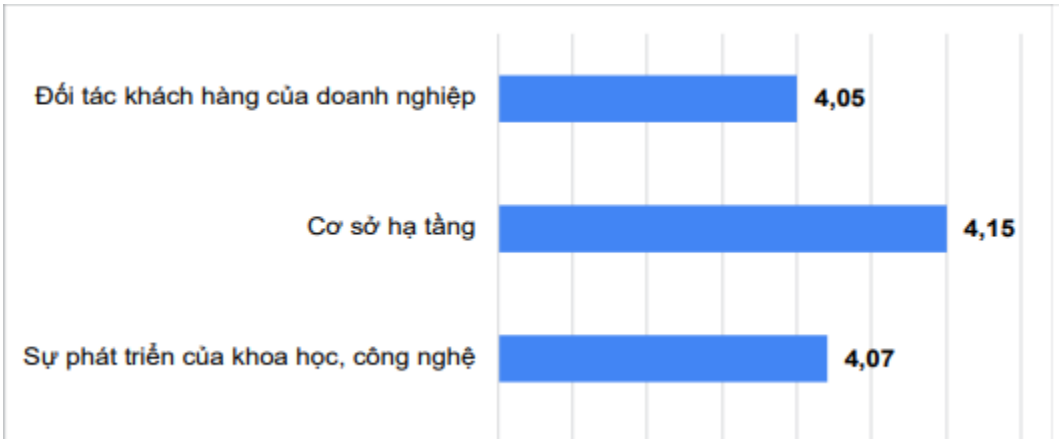

Figure 6. The level of influence of external factors on green warehouse development of enterprises

Source: Survey by the Editorial Board Report (2022)

7.2.4. Restricted financial ability

The biggest challenge for Vietnamese enterprises in implementing green logistics in general, and green warehousing in particular, is financial constraints (Ministry of Industry and Trade, 2022). According to a report by the General Statistics Office, over 98.1% of businesses in Vietnam are SMEs, and 99% of them struggle with capital shortages. Among these, 90% have less than 10 billion VND in capital, while 5% possess between 10 and 20 billion VND, making the adoption of green warehousing solutions quite difficult (Vu Trong Nghia, 2021). Additionally, the high costs associated with implementing technologies for comprehensive warehouse greening pose a major challenge for most small and medium-sized logistics companies in Vietnam. Moreover, as expenses rise, business profitability declines. For SMEs, the initial investment required for warehouse management applications to synchronize data across shipping, inventory management, and financial accounting remains a significant hurdle (Ministry of Industry and Trade, 2022).

7.2.5. Shortage of skilled human resources

a. External human resources

Currently, logistics students from many training institutions, despite specializing in logistics and supply chain services, lack practical knowledge of warehouse management software and barcode systems essential for green warehouse operations. Additionally, most universities focus heavily on theoretical training, with minimal hands-on experience in real-world logistics environments. As a result, many logistics students remain inexperienced in warehouse operations, utilizing modern technology and equipment for e-commerce, and properly classifying and

packaging goods to meet industry standards. The primary reason for this gap is that the skills and professional knowledge taught in schools do not align with the recruitment needs of businesses, and training facilities have yet to keep pace with the rapid advancements in science and technology. (Nguyen Minh Quang & Van Cong Vu, 2020).

b. Internal human resources

Regarding the management team, many managers are reluctant to embrace change and improvement, particularly in implementing sustainability initiatives. This hesitation often stems from limited knowledge of modern green warehouse models or uncertainty about their potential business impact, creating obstacles to advancing green warehousing.

As for warehouse staff, most are trained in vocational schools, with primary responsibilities including loading and unloading, inventory calculations, truck driving, and operating warehouse equipment. Despite receiving training, their skills remain inadequate, lacking industrial proficiency and discipline compared to the manual labor force in some developing countries.

7.2.6. Businesses' lack of environmental consciousness

Businesses still need to enhance their awareness of environmental protection. Existing environmental initiatives are often reactive and short-term, rather than part of a long-term sustainability strategy. Many companies have yet to fully recognize the vital role the environment plays in sustaining their operations and ensuring employee well-being. As a result, they have not proactively fostered environmental responsibility within their organizations.

Moreover, business leaders remain uncertain about the return on investment in sustainability, leading them to prioritize budget allocation toward profit-driven activities rather than environmental initiatives. Fully complying with environmental protection regulations could impose a significant financial burden on Vietnamese enterprises. Consequently, many businesses attempt to bypass these obligations to reduce costs.

7.3. Recommendations for Vietnamese enterprises

IQ 3. What recommendations can be proposed to advance green warehousing implementation for Vietnamese enterprises?

7.3.1. For warehouses infrastructure

- **Enhance Infrastructure for Sustainable Warehouses**

To enhance infrastructure for sustainable warehouses, businesses should focus on upgrading warehouse structures by using durable materials like concrete for flooring to prevent damage to goods and increase longevity. Improving insulation and ventilation is also crucial, as constructing warehouses with thick walls and proper insulation helps regulate temperatures naturally, reducing reliance on artificial cooling systems. Additionally, optimizing warehouse layout by incorporating natural lighting solutions, skylights, and efficient ventilation systems can significantly minimize electricity consumption, contributing to a more energy-efficient and environmentally friendly warehouse operation.

- **Increase Adoption of Renewable Energy**

To increase the adoption of renewable energy, businesses should focus on investing in solar energy, as 81.8% of companies using renewable energy prefer solar power. Expanding solar panel installations on warehouse rooftops can significantly reduce electricity dependence. Additionally, exploring alternative energy sources like hydropower and wind energy where feasible can help diversify renewable energy adoption. Leveraging government incentives such as financial support, tax incentives, or subsidies can further assist in offsetting the high initial investment required for renewable energy projects.

7.3.2. For technological development

- **Implement Energy-Efficient Technologies**

Improving energy efficiency requires the integration of modern technologies into daily operations. Begin by switching out conventional lighting for energy-saving LED lights paired with motion sensors, which reduce energy usage by activating lights only when necessary. Incorporate smart heating and cooling systems that use automated controls to maintain ideal temperatures while cutting down on energy waste. Additionally, replace fossil fuel-driven equipment, like forklifts and machinery, with electric or hybrid alternatives to lower emissions and support a greener, more sustainable environment. Together, these measures foster a more energy-efficient and environmentally friendly operation.

- **Leverage Warehouse Management Systems (WMS) & Smart Technologies**

Businesses should embrace smart technology and sophisticated Warehouse Management Systems (WMS) to maximize warehouse operations. Given that 63.8% of businesses currently utilize WMS software to improve operations and resource allocation, expanding its adoption is essential. Additionally, by facilitating real-time tracking, cutting waste, and increasing operational efficiency, combining IoT sensors and AI-driven analytics can greatly enhance inventory management. Additionally, implementing barcode and RFID technologies helps improve logistics

procedures and warehouse coordination, guaranteeing more accurate and seamless operations. When taken as a whole, these technologies make warehouses more effective and orderly.

7.3.3. For collaboration with stakeholders

- **Develop Policies and Collaborate with Stakeholders.**

With a view to advancing sustainable warehousing, working with important parties and creating thorough policies are essential. To obtain funds, resources, and technological know-how, promote public-private partnerships by collaborating closely with governmental institutions and sustainability groups. Put in place green logistics regulations that spell out long-term plans and offer rewards for implementing environmentally friendly storage techniques. Additionally, work with clients and suppliers to advance green supply chain projects, like implementing ecologically friendly distribution strategies and employing eco-friendly packaging materials. These initiatives create a shared dedication to sustainability and propel significant advancements in environmentally friendly operations.

7.3.4. For restricted financial ability

- **Utilizing the current incentives offered by the State**

Businesses should capitalize on the available support, incentives, and encouragement from the Government and relevant organizations. This includes accessing financial assistance programs such as Credit Guarantee Funds for small and medium enterprises to secure loans at preferential interest rates, as well as the Small and Medium Enterprise Development Fund. Utilizing these resources can help ease financial pressures in the short term.

- **Taking advantage of foreign development assistance**

Businesses should maximize foreign development assistance, implement special incentive mechanisms and policies, and leverage all available external resources from both domestic and international organizations to invest in green warehouse development. To attract foreign direct investment (FDI) in the construction and expansion of green warehouses in Vietnam, enterprises should also relax restrictions on the proportion of investment capital allocated to warehouses, ensuring that FDI is not constrained.

- **Developing a warehouse system in phases**

Investing in a standardized and fully integrated warehouse system can place significant financial strain on businesses. Additionally, companies must overhaul various existing systems and processes, which can be challenging in the short term.

To address this, particularly for small and medium-sized enterprises, a phased approach to system upgrades is recommended for sustainable long-term development. Businesses can distribute their investment across different business cycles or gradually improve specific stages to ease capital pressure. This approach also enables companies to stay updated on emerging trends in green logistics and warehouse sustainability, allowing them to adopt the most effective and up-to-date methods. By doing so, enterprises can avoid the cycle of implementing improvements only to find them outdated, reducing the need for frequent, costly upgrades.

7.3.5. For shortage of skilled human resources

- **Training in external human resources**

Fostering Collaboration Between Businesses and Educational Institutions. Enhancing partnerships between businesses and educational institutions is essential to bridge the gap between theory and practice in logistics training. Companies should collaborate with universities and colleges to develop training programs that integrate real-world applications. Specifically, industry experts should be invited to teach at academic institutions, providing students with practical insights.

Additionally, businesses should offer internship opportunities starting from the second or third year of study and organize field visits to warehouses, ports, and depots to give students hands-on experience. Hosting scientific seminars, particularly on green warehousing—can facilitate knowledge exchange between industry experts, logistics managers, companies with high logistics demands, and academic institutions. These interactions help universities understand industry recruitment needs, allowing them to tailor training programs accordingly. Simultaneously, warehouse businesses can support schools in arranging internship programs, ensuring students gain relevant experience before entering the workforce.

- **Improving the qualifications and skills of internal human resources**

For managers, businesses should provide opportunities for middle and senior managers to undertake business trips to countries with advanced and efficient logistics industries. These trips would allow them to visit large-scale warehouse systems, gain hands-on experience, and enhance their knowledge of technology application and green warehouse development. By doing so, managers can research, design, and implement a green warehouse model tailored to their company's operations in Vietnam.

For warehouse staff, Businesses should implement medium- and short-term training programs focused on warehousing specialization. Collaboration with foreign experts or organizations can provide valuable training on green warehousing practices. Additionally, companies can adopt on-the-job training to ensure employees develop skills tailored to the specific needs of warehouse management. Professional courses will enable staff to apply their knowledge immediately while also fostering a disciplined and collaborative work culture.

7.3.6. For businesses' lack of environmental consciousness

Large businesses must lead the way and take the initiative in green warehouses. Large businesses can then share their knowledge and green warehouse management practices with small and medium-sized businesses.

Engage in active consultation with specialists. Businesses can seek out green warehousing consultants to develop long-term plans and a roadmap to adapt the system to the unique characteristics of the organization, including warehouse size, quantity, and type, import and export commodities, human resources, equipment, and facilities, etc. Businesses can then invest in various green warehouse project solutions with a better understanding of the potential and opportunity costs.

8. Conclusion

This case study of IKEA's warehousing operations demonstrates a strong commitment to green warehousing management, highlighting the potential for large corporations to significantly reduce their environmental footprint. IKEA's comprehensive approach, encompassing energy efficiency measures, waste reduction strategies, and the integration of renewable energy, serves as a model for sustainable logistics practices. The analysis reveals that proactive investment in green technologies and a holistic approach to sustainability can yield substantial environmental and operational benefits

For Vietnamese enterprises, the lessons learned from IKEA's experience offer a valuable roadmap. While the specific strategies may need to be adapted to the local context, the core principles of reducing environmental impact while enhancing operational efficiency remain universally applicable. By embracing the recommendations, Vietnamese enterprises can not only reduce their environmental footprint but also enhance their competitiveness in an increasingly sustainability-conscious market. Future research could further explore the specific challenges and opportunities for implementing green warehousing practices in the Vietnamese context, considering factors such as regulatory frameworks, infrastructure limitations, and cultural nuances. This will help to provide more tailored and actionable insights for Vietnamese businesses seeking to adopt sustainable warehousing solutions

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