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Unveiling the Key Drivers of Warehouse Performance: A Case Study from Malaysia's Steel Stockist and Distribution Industry

Tan Kian Boon[1], *Azilah Anis[2]
[1]MISI University (Formerly Malaysian Institute of Supply Chain Innovation), Shah Alam, Selangor, Malaysia
[2]Faculty of Business and Management, University Teknologi MARA, Selangor Branch, Puncak Alam Campus, Selangor, Malaysia
Email: aventkb@gmail.com, *azilahanis@uitm.edu.my
Corresponding Author: Azilah Anis

Abstract: Warehouse management performance is a critical component of operational efficiency, particularly in the steel stockist and distribution industry. This study aims to investigate the relationship between space utilization, inbound activities, outbound activities, human resource management and warehouse management performance. A quantitative research design was adopted, with data collected via a structured questionnaire from 97 employees selected through stratified and convenience sampling methods. The collected data were analyzed using Pearson correlation and multiple regression analysis. The findings reveal that all four independent variables show a positive correlation with warehouse performance; however, only outbound activities were found to have a statistically significant impact. This indicates that the outbound logistics performance which involves picking, packing and shipping, is a strong determinant of the warehouse overall efficiency. Thus, this research asserts that, while space planning, inward flow control, and workforce optimization are the basis to support, it is the performance outcomes that the implementation of the outbound activities generates that fundamentally dictate the success of the performance in the warehouse. These results have practical implications for warehouse and SCM managers and imply that the early life focus of the warehouse's operations should be placed on holistic yet mission-focused development, focusing on driving outbound excellence and then aligning other operational areas to support this. The contribution of this study to academia and industry is to identify operational drivers that could be used to enhance warehouse performance and to remain competitive in high-demand sectors.

Keywords: *Warehouse Management Performance, Space Utilization, Inbound Activities, Outbound Activities, Human Resource Management, Steel Industry*

1. Introduction and Background

Warehouses form the basis of supply chain infrastructure and are a critical factor that ensures that the movement of goods from a supplier to the end customer is a smooth one. Not just storage boxes, contemporary warehouses are living organisms that process change, from receiving and sorting, to storing, and picking and shipping. With the rising prevalence of Warehouse Management System (WMS), and Automated Storage and Retrieval System (AS/RS) warehouses, they have become strategic assets helping to facilitate on-time delivery, increasing inventory accuracy, reducing costs and improving the responsiveness of the entire supply chain (Faveto et al., 2024).

Warehouse performance has been increasingly identified as a critical factor to determine the competitive operation of the organization. As Andiyappillai (2020) observed, warehouses affect service quality as well as the cost of warehouse-related operations, whilst ineffective management can cause performance to deteriorate. Therefore, monitoring warehouse performance by key performance indicators (KPIs) including order fulfilment rate, inventory accuracy, storage efficiency, labour productivity, and cost containment has emerged as one of the best practices in logistics management (Vatumalae et al., 2020). Efficient warehouse operations allow businesses to set appropriate customer expectations, maintain lean inventory systems, and prevent unnecessary capital tie-up.

Nonetheless, the efficient functioning of a warehouse is contingent on its ability to adapt to variations in inbound and outbound activities, optimize space utilization, and manage human resources in alignment with operational demand. In practice, organizations often encounter challenges when there is a mismatch between inventory inflow and outflow, leading to underused or overburdened facilities, increased storage costs, and risks of product obsolescence. These operational inconsistencies, whether driven by poor inventory planning,

uneven distribution flows, or reactive labour deployment, can ultimately reduce customer satisfaction and affect bottom-line performance (Mabotja, 2024).

In the context of a large-scale commercial enterprise such as ABCH Company, these challenges are particularly salient. ABCH Company is facing warehouse inefficiencies involving limited storage space, delayed incoming shipment material, and an inaccurate picking process. The warehouse handles over 3,000 sizes of steel products, yet faces congestion and poor space allocation. Manual documentation and customs delays affect the inbound process, while stock misplacement and picking mistakes delay deliveries. Manpower shortage and limited training are making the situation even worse. These issues are evident as the turnover ratio slipped from 4.2 to 3.5, order cycle time increased from 3 to 5 days, customer satisfaction fell by 15%, and overtime costs increased by 15%. This study examines how these factors collectively impact warehouse performance.

From a knowledge perspective, existing research has explored various technical and process-based improvements in warehouse operations. Studies by Gu et al. (2010) and Richards (2017) Have examined optimization strategies in warehouse design and automation. However, limited empirical attention has been paid to the *integrated evaluation* of how fluctuations in activity levels, spatial dynamics, and workforce responsiveness collectively influence warehouse performance, particularly in emerging or resource-constrained environments (Chong et al., 2019; Narasimhan et al., 2021). Furthermore, while simulation and modeling approaches have advanced, practical diagnostic tools and decision-support frameworks that are tailored to firms managing distributed warehouse networks remain scarce in the literature (Baker P. & Canessa, 2009; Marchet et al., 2021).

Therefore, this study aims to address these gaps by examining the determinants of warehouse management performance at ABCH Company. Specifically, it focuses on four key areas—space utilization, inbound activities, outbound activities, and human resource management—as interrelated dimensions influencing operational efficiency. The overarching goal is to identify actionable insights that can inform more balanced and strategic warehouse operations across the firm's logistics network.

2. Literature Review

Warehouse performance

Warehouse performance has emerged as a pivotal construct within contemporary supply chain management, reflecting a firm's ability to handle inbound and outbound logistics, optimize space utilization, and synchronize activities across supply chain nodes. Warehousing plays an active and indispensable role in facilitating the seamless movement of goods across the supply network (Tubis & Rohman, 2023). In demand-driven supply chains, warehouses must efficiently manage both the storage and sorting of goods to ensure prompt service to external customers. It is this operational flexibility that is crucial to satisfy market demand with as little lead time as possible, while still ensuring high customer satisfaction and service performance (Byberg & Nylander, 2023). On the other hand, in a supply-driven environment, warehouses service their own operations, such as ensuring production is possible through sufficient capacity and enough inventory. No matter which models you use, efficient warehouse operations involve striking a balance between capacity and demand, without creating bottlenecks that could hinder response.

A highly performing warehouse tends to be characterised by some key performance aspects that include effective delivery execution, labour productivity, and the linkage to the overall organisational systems. As Michlowicz (2024) points out, top-performing warehouses reach a 99% delivery accuracy rate and operate with a very motivated team that ultimately affects service edge. Further, the smooth connection between the warehouse and the internal departments, e.g., logistics, procurement, marketing and human resources, works as a strategic direction in enhancing coordination and operational efficiency (Odeyinka & Omoegun, 2023). This convergence results in improved visibility to inventory, reduced cycle time for order fulfilment and enhanced flexibility for reacting to rapidly changing market conditions. In these situations, the warehouse isn't just a place but the "center" where decisions are aligned and orchestrated across the supply chain.

In addition, warehousing activities are integral to the overall supply chain measurements of the products, since they impact inventory flow, delivery accuracy and cost control. The capability of balancing inventory and lead times increases the ability of the organization to serve customers with reliability and efficiency. According to

Jermsittiparsert et al., (2019) operations in warehouses by orders and sorting, and dispatch operations, which should be done in a timely and quick manner, are essential to minimizing problems caused by errors in volumes being dispatched and delivery lead time, conditions to perform in a competitive environment of logistics. Such operations minimize inventory holding costs and at the same time ensure an easier production schedule, in addition to higher customer responsiveness which is crucial in organizations following just-in-time and lean logistics philosophies.

New technologies are also expanding the limits of warehouse performance management. The presence of smart warehousing systems, which include automation and Internet of Things (IoT) offerings, allows to conduct the real-time monitoring, predictive analytics and intelligent resource utilization effectively. These technologies add robustness to a system and enable more rapid operation. As highlighted by Khan et al. (2022), these advancements enable a higher degree of control in warehouse operations and support quicker, more well-informed decision-making. Complementing this, Amosu et al. (2024) contend that technology-based warehouses, in the presence of standardised processes and coherent information systems, could serve as strategic levers in obtaining competitive advantage. Warehouse performance as known today is essentially a complex entity which is influenced by not only the physical operations and technology-based infrastructure, but also by the alignment of an organization, and is therefore considered to be an important domain of research and practice in supply chain.

Space Utilization

Space utilization is the use of space within a warehouse in an efficient manner to enable a material to flow through the warehouse with minimized cost. It's a critical system that optimizes storage space while still providing an open, safe and accessible warehouse environment without impeding on customer service levels. According to Sadeghi et al. (2024) space-use efficiency is not only a space issue but also a cost factor as storage costs accumulate on a monthly basis with or without inventory movements. This means that space can be one of the most scarce and costliest commodities in the warehouse. Awashreh et al. (2024) mentioned that affects space utilization is how warehouse is designed and that must be in proportion to operational needs and flow of material, so it will decrease movement cost and increase productivity. A well-optimized footprint means that each square inch of the warehouse is contributing to the throughput of the building.

Warehouses with effective space utilization see smoother inbound and outbound operations; improved inventory visibility; and less congestion in storage and retrieval zones. Rejeb et al. (2019) argue that a proper storage system, i.e., vertical racking and dynamic slotting can increase the facility's adjustability to handle variation in volume. This flexibility is essential as it enables companies that have seasonal demand or cannot expand physically. Moreover, Tien et al. (2021) suggests that good space management supports short-term response to customer orders and external storage rental can be kept at a minimum level. With systematic storage of goods according to turnover, travel times when picking are minimized, leading to an increase in order quality and speed (Georgise et al., 2020). Therefore, the space-optimization does not just achieve higher storage density, but directly impacts the performance in the warehouse, such as lead time or the operating costs.

According to Lawrence & Gabriel (2024), diligent space management saves on unnecessary capital investment to expand premises and results in better use of space. In line with this, Falari et al. (2024) and Mohamud et al. (2023) who have shown that good storage organisation can lead to the reduction in damage, better access to stock and increased accuracy of stock holdings. These benefits together improve the warehouse's capability to act as a flexible and cost-efficient node in the supply chain. So, optimization of space utilization is not just a matter of facility management; it is a strategic enabler for superior warehouse organization.

H1: There is a significant relationship between space utilization and warehouse management performance.

Inbound Activities

Receiving functions incoming activities are those warehouse operations that involve receiving, checking and storing goods. Their fundamental procedures represent the initial phase of all movement, serving as the basis for all ensuing logistics endeavours. Kalaiarasan et al. (2023) effectively carry out inbound logistics turnover of materials fast, correctly, inspected, stored without mixing, protecting the product but there is no operation stagnation. This involves providing arrival notifications, unloading, quailing and check-in of goods as per the

process. If such activities are properly handled, less disturbance and reduced inventory imbalances are created along the chain, as materials move more efficiently through the supply chain.

Integration of technology is also changing the nature of inbound activity. Technology such as WMS, bar coding and Radio-Frequency Identification (RFID) contribute to the enhancement of openness to the reliability and timeliness of receiving and documenting (Minner, 2019). These advances enable data entry to be done in real time, increase visibility and reduce manual errors. As noted by Nurhasan et al. (2023) adequate receiving phase processing will avoid stock discrepancies and delays, and accurate inventory tracking will assist in implementing improved planning and replenishment strategies. In addition, good inbound logistics further develops best practices for storage, so products are directly targeted at their proper location, hence, improving space productivity and quick execution of goods when required.

Properly performed inbound activities have a significant impact on the performance of warehouses, as they support the elimination of unproductive operations, lower the error rate and improve stock accuracy. Well-handled procurement and handling of goods prevents bottlenecks, can expedite order fulfilment, and can minimize overstock. According to Charoenmetta (2023), by maintaining accurate receiving, online inventory visibility is more accurate enabling more efficient picking, replenishment, and order fillings. This reduces cycle time, which means expensive bottleneck-creating disruptions are minimised. Hu & Weisel (2020) also contend that effective inbound logistics improves the warehouse's responsiveness, which thereby makes it more accessible for surrounding businesses, and consequently provides a quicker response to the demand, and improves the level of customer satisfaction. As such, the maximisation of inbound activities drives warehouse performance, impacting operational KPIs such as speed, accuracy and cost.
H2: There is a significant relationship between inbound activities and warehouse management performance.

Outbound Activities
Outbound operations are a key to efficient warehouse management because they impact order fulfilment, customer service and overall supply chain performance. These operations comprise a sequence of tasks such as order picking, checking, packing, palletizing and then shipping products to customers (Shimels, 2019). According to Mostafa & Eldebaiky (2023), outbound logistics also include strategic decisions regarding the transportation mode, consolidation of shipments, and effective location of distribution centers. These are lead-time reductions and higher delivery reliability, and both are absolute musts in today's competitive, fast-paced market. Outbound operations are the last mile of the fulfilment process and the direct correlation between being successful at outbound operations means that the service you provide to your end customer is of the highest quality.

Outbound activities' efficiency is related to physical handling as well as to information systems and technological support. According to Audi & Raage (2020), outbound logistics are required to have accurate pick and pack procedures as well as real-time inventory control in order to satisfy customers. Advanced systems integration lets warehouses keep better order tracking and greatly reduces errors with easier tracking of shipments. In addition, Ruthramathi & Sivakumar (2023) point out that software solutions like route optimization and dispatch management are very important for outbound productivity as well. The real-time apps and analytics will help in scheduling, reduce delivery costs and facilitate proactive decision-making. Using these systems, warehouses can optimize processes, reduce delays and ensure that customers receive their orders correctly and on time.

Effective outbound operations have a real impact on the performance of the warehouse, with order cycle times, service levels and costs all falling by the wayside. Warehouses are more successful when outbound operations are automated and strategically picked, and when quality control is rigorous, leading to faster and more accurate order fulfilment (Helm et al., 2023; Jaghbeer et al., 2020). This also maximizes accuracy, minimizes shipment errors, and ultimately makes the delivery experience more dependable. As Zennaro et al. (2022) note that fast and error-free delivery is a competitive imperative in such high-demand domains as e-commerce. In addition, Sharma & Dave (2024) argue that efficient outbound logistics help improve warehouse reputation and overall costs over time, thereby improving the overall performance of the warehouse.
H3: There is a significant relationship between outbound activities and warehouse management performance.

Human Resource Management

Warehouse operations are increasingly acknowledging Human Resource Management (HRM) as a strategic driver that affects two key drivers of performance namely efficiency and safety as well as workforce stability. In the warehouse environment, HRM covers a wide variety of functions that include but are not limited to recruitment, training, performance management, safety management and employee involvement (Alshurideh et al., 2022). Good recruitment will ensure that the right people are recruited, for example, for the roles of forklift operators, inventory specialists and warehouse coordinators (Batool et al., 2023; Cen, 2023). Nagamani & Nikhitha (2023) highlight the selection through assessments and job-specific evaluations would maximize the job fit and minimize early attrition. After being recruited employees need to be trained systematically and continually in the various operating tasks, safety requirements and the use of new technologies such as WMS (Kramarz, 2023). With the increasing automation, HRM ensures that employees are trained to deal with new tools and robots and in this way also the warehouse's flexibility is maintained (Li, 2022).

It's not just about hiring and onboarding, performance management is also another important dimension to HRM that contributes to warehouse operational excellence. Establishing fair performance targets, like order accuracy, also makes it easy to score performance, so team members can regularly monitor their own performance and get feedback on how to make it better (Almulaiki, 2023; Nasereddin, 2024). Safety management is just as important as the work is very physical. Wang et al. (2023) Report that HR driven safety measures and training programs along with the use of ergonomic database equipment contribute effectively to the minimization of workplace accidents and adherence to health standards. Additionally, employee relations and workplace culture are built upon by HR via tools like maintaining an effective communication channel, complaint redressal policies and employee-friendly policies in the organization (Rakhimova, 2024). These techniques foster a sense of a great place to work, minimize disputes and stimulate collaboration between warehouse teams.

The association of effective HRM and warehouse performance was observed not only in this study, but also in other works in logistics and supply chains. SHRM raises labour productivity as well as lowers employee turnover, an important issue in warehousing where high employee turnover can trigger labour instability (Kanike, 2023). Education schemes designed to fit the functions of warehouses increase the accuracy of inventory control and order execution (Sharma, 2024), while fair and competitive systems of remuneration support motivation and retention (Prakhova & Chaplynska, 2022). That is, technology-integrated warehouses depend on skilled workers who can operate sophisticated systems like ASRS and ERP applications (Kellermayr-Scheucher et al., 2023; Özbek, 2023). Judijanto & Iswanto (2024) mentioned HRM's contribution in mediating this technological alignment is important to keep warehouse capabilities responsive and provide quality service. At the end of the day, HRM forms an indispensable infrastructure to high-performing warehousing.
H4: There is a significant relationship between human resource management and warehouse management performance.

Underpinning Theory

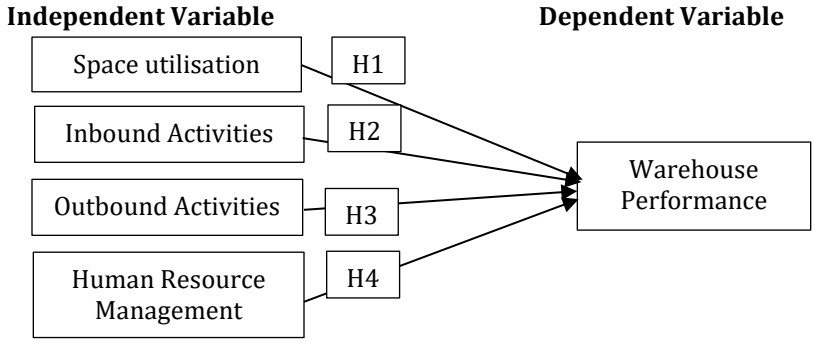
Lean Management Theory provides an operational model for what makes a warehouse high-performance. In the study, the approach of Lean reveals that factors such as inefficient use of space, limited integration of incoming and outgoing activities, and an underused workforce can reduce the level of productivity in a warehouse. By concentrating on the reduction of waste and the simplification of tasks, lean contributes to the improvement of critical aspects such as cycle time, order accuracy, and response time (Baker, P. & Canessa, 2009; Ramaa et al., 2012).

The core four parameters studied in this work are human resources, inbound and outbound activity, and space utilization, which are directly related to Lean principles. For example, an experienced and well-organized employee can minimize hanging around and wasted effort, handling both incoming and outgoing goods in a smooth-flowing fashion keeps the momentum going, and efficient use of space means things can be located more swiftly and errors are minimized. In summary, Lean Management Theory not only provides us with a tool to analyse these operational components but also acts as a valuable practical tool to advance warehouse performance, particularly in the steel industry (Womack & Jones, 1997).

Conceptual Framework

The model presented in Figure 1 is the theoretical model for η, the detected species. It consists of four exogenous variables: space utilization, inbound activity, outbound activity, and human resource management, which are expected to have a strong correlation with the dependent variable in the study of warehouse performance.

Figure 1: The Conceptual Framework of the Study



3. Research Methodology

A research design of a quantitative nature was adopted for the purpose of determining the effects of space utilisation, inbound activities, outbound activities and human resource management on warehouse management performance. A pre-tested structured questionnaire containing closed-ended questions was used to collect primary data with a view to ensuring uniformity and avoiding bias in the responses (Fischer, 2021). The questionnaire was sent out by e-mail and WhatsApp as a Google Forms link to increase participation and allow easier access.

A mixed sampling technique was used; a combination of stratified and convenience sampling (Althubaiti, 2023). Stratified sampling was used to select relevant departments across participating organizations, including top management, human resources, sales and marketing, inventory and administration, logistics, purchasing, and warehouse operations. These departments were chosen due to their direct engagement with the independent variables under investigation. For instance, logistics and warehouse departments were closely associated with space optimization and goods movement, while human resources contributed to workforce efficiency across all operational functions. Within each stratum, convenience sampling was applied to identify respondents who were both available and knowledgeable in the specific operational domains addressed in the study.

The sample size was determined using the Krejcie and Morgan (1970) sample size determination table, with a final valid response count of 97 respondents, which satisfies the required minimum for generalizability. The unit of analysis in this study was the individual employee involved in warehouse and supply chain operations. The questionnaire was organized into three parts: demographic details, independent variables (space utilization, inbound activities, outbound activities, human resource management), and the dependent variable (warehouse performance). All items were rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Before the main data collection, content validity was assessed by expert review, and a pilot test was conducted to examine the instrument's reliability, ensuring that Cronbach's Alpha values exceeded the acceptable threshold of 0.7. Data analysis was performed using IBM SPSS Version 29, employing descriptive statistics, correlation analysis, and multiple regression analysis to test the hypothesized relationships among the study variables (Gamel et al., 2024).

Profile of the respondents:

A total of 97 valid responses were collected for this study, with the sample size determined using Krejcie and Morgan's (1970) sample size table. The demographic breakdown reveals that the majority of respondents were male (64.3%), with most participants aged between 26 and 35 years (34.5%). In terms of educational qualifications, a significant portion (51.2%) no respondents reported holding a PhD or professional

qualification. Regarding tenure, 33.3% had served more than 10 years in their current organization, followed by 31% with 5 to 10 years of service. The majority of respondents were from the warehouse management department (48.8%), which aligns with the core focus of this study, followed by sales and marketing (15.5%), and other departments, including logistics, HR, and administration. In terms of job positions, most respondents were either executives (28.6%) or supervisors (17.9%), ensuring practical familiarity with warehouse operations.

Table 1: Respondents' Profile

	Item	Frequency Rate	Percent
Gender	Male	54	64.30%
	Female	30	35.70%
Age	18 to 25	8	9.50%
	26 to 35	29	34.50%
	36 to 45	22	26.20%
	46 to 55	18	21.40%
	55 above	7	8.30%
Education Background	Below Diploma	43	51.20%
	Diploma	13	15.50%
	Bachelor's Degree	22	22.00%
	Master's Degree	5	6.00%
	Doctor of Philosophy	Nil	Nil
	Professional Qualification	Nil	Nil
Length of Service in current company	Less than 2 years	12	14.30%
	2 to 3 years	10	11.90%
	3 to 5 years	8	9.50%
	5 to 10 years	26	31.00%
	More than 10 years	28	33.30%
Position	CEO / Managing Director / Director	7	8.30%
	General Manager / Deputy General Manager	7	8.30%
	Senior Manager / Manager / Assistant Manager	11	13.10%
	Senior Executive / Executive / Junior Executive	24	28.60%
	Supervisor / Assistant Supervisor	15	17.90%
	Others	20	23.80%
Department	Top Management	7	8.30%
	Human Resource Management	6	7.10%
	Sales and Marketing	13	15.50%
	Inventory and Administration	6	7.10%
	Logistic	6	7.10%
	Purchasing	5	6.00%
	Warehouse Management	41	48.80%

4. Results and Discussion

Descriptive Statistics: The descriptive analysis in this study presents an overview of the central tendency and dispersion for both the dependent and independent variables. Table 2 shows the mean and standard deviation scores, categorized into high, average, and low based on thresholds set by Hadiyanto et al. (2013). All variables scored within the high category, indicating a strong positive perception by respondents.

Table 2: Descriptive Statistics

Variable	N	Mean	Std. Deviation	Category
Dependent Variable:				
Ware-house Management Performance	97	3.9619	.43958	High
Independent Variables:				
Space Utilization	97	3.9333	.49899	High
Inbound Activities	97	3.9905	.41293	High
Outbound Activities	97	3.8405	.47367	High
Human Resource Management	97	3.8905	.47023	High
Valid N (listwise)	97			

Inbound activities recorded the highest mean score (M = 3.9905), suggesting strong agreement regarding the efficiency of inbound processes such as receiving, inspection, and stocking of goods. This was followed by space utilization (M = 3.9333), indicating that warehouse layout and storage strategies are viewed positively. Outbound activities (M = 3.8405) and human resource management (M = 3.8905) also reflected favorable perceptions. The dependent variable, warehouse management performance, recorded a mean of 3.9619, reinforcing the overall strong operational performance observed by respondents.

Correlation Analysis: The Pearson correlation analysis was conducted to examine the strength and direction of relationships between independent variables and warehouse management performance (Table 3). All variables showed **statistically significant** positive correlations at $p < 0.01$.

Table 3: Pearson Correlation Between Variables

		Warehouse Management Performance	Space Utilization	Inbound Activities	Outbound Activities	Human Resource Management
Warehouse Management Performance	Pearson Correlation	1	.494**	.383**	.531**	.383**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	84	84	84	84	84

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

Outbound activities demonstrated the strongest correlation with warehouse performance (r = 0.531), reinforcing their critical role in accurate and timely deliveries. Space utilization followed closely (r = 0.494), highlighting the importance of efficient layout and storage systems. Inbound activities and human resource management shared equal strength (r = 0.383), signifying their supportive but less dominant impact.

Multiple Regression Analysis: A multiple regression analysis was employed to determine the influence of each independent variable on warehouse management performance. The model yielded an R value of 0.550 and $R^2 = 0.302$, indicating that 30.2% of the variance in warehouse performance is explained by the four predictors.

Table 4: Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.550*	.302	.267	3.7638

* Predictors: (Constant), Human Resource Management, Space Utilization, Inbound Activities, Outbound Activities

Model		Unstandardized B	Coefficients Std. Error.	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.972	.416		4.475	<.001
	Space Utilization	.205	.142	.233	1.445	.153
	Inbound Activities	-.008	.157	-.007	-.051	.960
	Outbound	.371	.151	.400	2.453	.016

Activities					
Human Resource Management	-.054	.140	-.058	-.386	.700

* Dependent Variable: Warehouse Management Performance, Independent Variables: Human Resource Management, Space Utilization, Inbound Activities, Outbound Activities

The regression analysis reveals that among the four independent variables, only outbound activities show a positive and statistically significant effect on warehouse management performance (B = 0.371, p = 0.016), indicating that improvements in outbound processes contribute meaningfully to operational efficiency. While space utilization has a positive coefficient (B = 0.205), its effect is not statistically significant (p = 0.153), suggesting that its influence on performance is present but not strong enough to be conclusive. Inbound activities exhibit a negative and non-significant relationship (B = -0.008, p = 0.960), indicating no measurable effect on warehouse performance. Similarly, human resource management also shows a negative and insignificant impact (B = -0.054, p = 0.700), suggesting that its influence may be indirect or mediated through other variables.

In summary, the correlation analysis indicates that all four independent variables, space utilization, inbound activities, outbound activities, and human resource management, were found to have significant positive correlations with warehouse management performance. However, based on the regression analysis, only Hypothesis 3 (H3), which posits a significant relationship between outbound activities and warehouse performance, was supported. The remaining hypotheses (H1, H2, and H4) were not supported, as their effects were not statistically significant in the regression model, despite showing positive correlations (refer to the following table). This highlights the pivotal role of outbound activities as the most influential factor in enhancing warehouse management performance.

Hypothesis	**Pearson Analysis**	**P-Value**
H1: There is a significant positive relationship between space utilization and warehouse management performance	Yes (r = 0.494, p < .001)	No (p = 0.153)
H2: There is a significant positive relationship between inbound activities and warehouse management performance	Yes (r = 0.383, p < .001)	No (p = 0.960)
H3: There is a significant positive relationship between outbound activities and warehouse management performance	Yes (r = 0.531, p < .001)	Yes (p = 0.016)
H4: There is a significant positive relationship between human resource management and warehouse management performance	Yes (r = 0.383, p < .001)	No (p = 0.700)

Discussion: The correlation analysis demonstrates that all four independent variables, space utilization, inbound activities, outbound activities, and human resource management, have significant positive relationships with warehouse management performance. Among them, outbound activities showed the strongest correlation (r = 0.531, p < .001), indicating that efficient order picking, packing, and shipping substantially enhance overall warehouse efficiency. This supports the idea that streamlined outbound logistics not only reduces lead times and shipping errors but also directly improves customer satisfaction and operational success (Rasing, 2024; Vaka, 2024). Space utilization also exhibited a moderate positive correlation (r = 0.494, p < .001), affirming that maximizing available space through better layout, vertical shelving, and space tracking systems contributes meaningfully to warehouse performance (Manaviriyaphap, 2024). These findings reinforce that physical optimization and outbound process effectiveness are key drivers of warehouse excellence.

The results also indicate that inbound actions (r = 0.383, p <. 001) and HR management (r = 0.383, p <. 001) are significantly associated with warehouse management effectiveness. Timely receiving, correct inspection, and efficient storage in inbound operations all support that by reducing latencies and ensuring that downstream flow is smooth (Ellithy et al., 2024; Nurhasan et al., 2023). Concurrently, evidence that HRM practices such as tailored training, staff motivation and clear performance management form a skilled and committed workforce, can maintain the high level of operations required (Batista et al., 2024; Sun & Jung, 2024). These findings suggest that although physical and operational capabilities are crucial, the human element is a key component in maintaining the performance of the warehouse. Overall, the strong correlation

between the factors indicates that factors are related and need to be managed in a consolidated way with respect to warehouse performance wherein infrastructure, process, and the people are aligned.

The multiple analysis can clarify how each independent factor space utilization, inbound activities, outbound activities and human resource management contributes to the performance of warehouse management when simultaneously analysed. Of which, the outbound activities had a statistically significant and positive effect (B =0.371, p = 0.016) and were the most significant factor in determining warehouse efficiency. This highlights that successful outbound operations, including picking accuracy, packing timeliness, and dispatch efficiency, have implications on customer satisfaction and resulting overall supply chain responsiveness. These results are consistent with those of Helm et al. (2023) and Zennaro et al. (2022), who highlighted the role of outbound logistics in operational performance. Statistical significance of outbound activities also validates its practical relevance for order fulfilment and delay reduction as well as highlights that the area requires ongoing investment and improvement.

On the other hand, the use of space, inbounds and HR were not found to make statistically significant contributions to `Warehouse' in the regression model, despite positively correlating in initial analyses. This may indicate that although these variables are perceived as operationally relevant on their own, they may have nuanced individual or interactional effects, or they may be more context-specific in their effects. For example, the space is already efficiently used in the surveyed companies, which makes only a little difference in the performance. Furthermore, HR practices, no matter how essential, might not automatically convert into performance results, unless coupled with operational measures that could easily be quantified. It appears that outbound operations are the supreme point of value delivery of the warehouse process and the operations greatly influence the overall performance outcomes. These findings highlight the strategic significance of the outbound logistics for the warehouse efficiency and indicate the requirement for additional studies focusing on interaction effects, contextual variabilities, and long-term performance contributions of the internal warehouse operations.

5. Managerial Implications and Recommendations

The results of this paper offer significant managerial implications for ABCH Company and the steel stockist and distribution industry. Outgoing activities – order picking, packing, and shipping, in particular – have become the main operational factor in warehouse management performance. This highlights the critical importance of managers to focus investment also on the outbound process which clearly impacts customer satisfaction and service reliability. Managers need to think of warehouse functions together rather than in isolation and implement interdependent operational strategies where the proper utilisation of space, inbound operations and human resources round out and support efficient outbound operations. For example, the optimal arrangement of heavy products near the dispatch areas and reliance on real-time tracking to expedite outbound operations can reduce handling inefficiencies.

The study further contributes to the literature by advocating a conceptual framework that sheds light on the complementarities in support tasks, space utilization and HRM, which support activities themselves are individually not significant but reinforce the outbound tasks and add value if implemented strategically in combination with outbound tasks. Building managers are encouraged to improve the arrangement planning of the warehouse, to deploy modern storage techniques and systems and to increase workforce training efforts. An efficient warehouse, well manned and powered by an integrated operational strategy enhances smooth workflow, minimizes downtimes, improves warehouse productivity. These observations drive for a comprehensive and coordinated operation that would enforce the performance amplification through improvement levels in all dimensions of logistics.

Recommendations

According to empirical results, strategic attention should be paid by ABCH Company to improving the outbound activity, which provides more direct and greater effects on the warehouse's performance. High levels of accuracy in order picking, short lead times and timely delivery need to be safeguarded with enabling technologies such as barcode systems, RFID tracking, and warehouse mechanization. These investments will not only improve customer satisfaction but also drive increased freight volumes. Inbound actions and space

use also must be constantly refined to maintain outbound efficiency, for instance, through simplified receiving operations and the reconfiguration of storage zones for improved accessibility. The business also needs to weave through the DNA continuous workforce development initiatives to deploy in terms of digital transformation, safety compliance and operational agility.

Conclusion

This research aimed to examine the operating factors of warehouse management performance in a business entity in the steel stockist and distribution industrial sector of Malaysia, ABCH Company. The analysis investigated the function of four of the most significant variables in the control of space utilization, inbound and outbound activities, and human resources regarding their influence on the general efficiency system of the warehouse. Positioned in a quantitative method used and with the help of the correlation and regression analysis, the results validated that outbound activities have been the most significant determinant of warehouse performance.

It was found that although space utilization, inbound activities, and HRM showed a significantly positive relationship, in the regression model, the results were not significant. This suggests that their influence, interesting though it must be, is likely to be more indirect and dependent on coordination with other parts of the organisation. That is what ABCH Company could learn from and emphasize the need to optimise other operational facets excluding silos. Outbound Logistics are optimally efficient if a supply chain is backed by an effectively planned space utilization and easy and convenient inbound operations.

Finally, the importance of human resource management ends is not directly performance-related; however, it is crucial in developing a workforce that is skilled, safe and motivated and therefore can enable sustainable operational excellence long-term. The across-the-board improvement plan–which will focus on outbound logistics but leverage capacity, inbound, and HR muscle–will leave ABCH Company well positioned to operate a competitive warehouse, pay competitive wages, and withstand changes in the steel distribution industry.

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