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THE IMPACT OF MATERIAL MANAGEMENT ON CONSTRUCTION PROJECTS PERFORMANCE

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ABSTRACT

The Malaysian construction sector is crucial for the nation's economy, but inadequate materials management has led to project underperformance. This research paper investigates the impact of material management on construction project performance and identifies strategies for efficient management. The study uses qualitative analysis, interviews, observations, and literature reviews to analyse case studies of two construction projects, LUMINA Taman Harmonis (A) and LILIUM Puncak Iskandar (B). The findings highlight the importance of proper material management practices, including planning, confirmation, negotiation, and supplier engagement. Effective material management significantly impacts project performance, reducing costs, minimizing waste, and enhancing efficiency. Recommendations for the Malaysian construction industry include fostering collaboration among stakeholders, integrating data analytics, and embracing technology-driven solutions. The study also suggests future research directions towards sustainable material selection and eco-friendly construction practices to strengthen the sector's competitiveness and align with national development objectives.

Keywords: *material management, construction project stage*

INTRODUCTION

The Malaysian economy heavily depends on the building sector. Thousands of contractors, employees, developers, client organizations which is public and private, management consultants, architects, engineers, and surveyors, manufacturers, material suppliers, and plant hirers are just a few of the industry's numerous constituents (Kamal et al., 2012).

The inadequate materials management that takes place on construction sites is one of the major contributing causes to subpar project performances. In fact, managing materials is a crucial aspect of building projects (Jusoh & Kasim, 2017). One of the major factors contributing to productivity loss at a jobsite is the lack of materials when needed. Work hours might rise by 50% because of ineffective material management. Therefore, each building project must have a thorough plan in place for managing its supplies (Perdomo-Rivera, 2004).

There are a few problems that occurred in this research. The first one is delay of the project. If materials are bought too soon, money may be held up and interest charges on the excess inventory of materials may be incurred. If a particular task requires a specific piece of material, delays and costs may result. (Ashwini, 2013). Other than that, construction expenses may rise because of poor material management. Reduced procurement costs increase potential to lower project costs overall because materials are significant.

LITERATURE REVIEW

The aim is to guarantee that the right kind and number of supplies and equipment are efficiently acquired, bought for a fair price, and made accessible when required. Implementing a thorough material management programme results in more predictable project outcomes, lower costs, increased productivity and quality, and a safer workplace. Due to this, it is crucial that materials management is fully integrated into capital projects from the beginning. The goal of the study described in this paper was to identify materials management strategies that represent both established and developing business practices in the capital projects sector (Caldas, 2015).

There are issues with controlling the flow of materials in any organization. A project's ability to be completed successfully depends on the effective management of its materials. For any business, the management of materials is a crucial and essential topic that must be handled effectively to complete a project successfully (Mehr & Omran, 2013).

Material Management

According to Vikram (2017), there are three general procedures for material management which is large firm, medium firm and small firm. The planning, organization, and control of the flow of materials from their acquisition through their ultimate usage in building projects is referred to as material management in the construction sector. This covers tasks including material storage, transportation, inventory management, and purchase. For construction projects to be completed on schedule, within budget, and to the appropriate quality standards, efficient material management is essential.

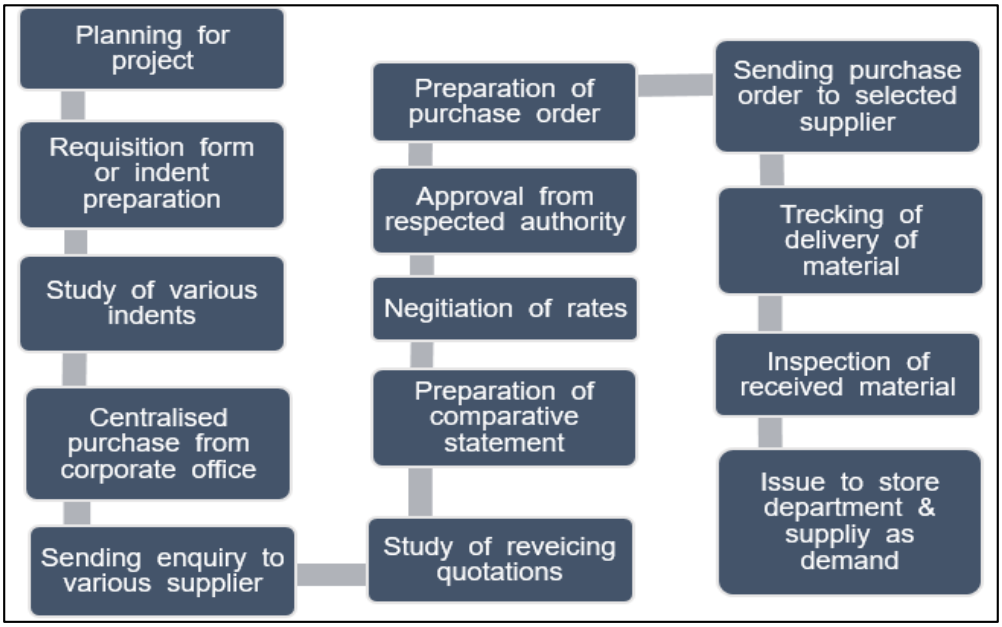

Figure 1: Flow Chart of General Procedure for Large Firm

Advantages of Material Management

Since materials make up a sizable amount of the project's overall cost, material management is a crucial component of project management. The success of any construction project depends on having the right resources; thus, it also plays a significant role in that regard. This has implications for the success of the project (Jusoh & Kasim, 2017).

Waste may be reduced by adopting a mind-set of Zero Wastage, making wise judgements during the design phase, managing the building site, and properly standardising and codifying construction supplies. Construction waste management

strategies include minimising waste output, maximising reuse, and recycling, and reducing the admission of mixed construction debris at landfills may all be utilised to effectively minimise material waste (Gulghane & Khandve, 2015). Profit increases directly when cost is decreased. Increased sales result in higher direct labour and material expenses, which prevents a direct growth in profit. By ensuring that the necessary materials are used and that the company's resources are utilised effectively, materials management may help cut expenses (Chapman et al., 2012).

In conclusion, investigating how material management affects project performance can help those involved in the industry increase the effectiveness of material management to reduce the effects on project performance (Jusoh & Kasim, 2017).

Challenges of Material Management

The main challenges in purchasing and supplying materials are the inability to match materials to orders, forgetting to order materials, ordering too many or too few, arriving early or late, lacking adequate management and training, and failing to communicate with contractors and supply chain companies. In terms of logistics, the primary issues include incorrect material arrival times or even incorrect quality, a lack of information on material arrival times or site stock, missing materials, a lack of storage space, and labour waste associated with material searches on site. It has discovered a discrepancy between the ordering and purchasing of supplies and their delivery and use on the production site (Donyavi & Flanagan, 2009).

Unavailability of materials is not the only phase that can cause problems. In any business, the use of resources is essential since their lack might restrict output. Materials in excess might cause management major issues as well. The cost of material storage can increase production expenses and a project's final cost (Mehr & Omran, 2013).

Most of the time, construction projects are plagued by subpar performance, including delays, cost overruns, low productivity, construction wastes, and degraded quality. The inadequate materials management that takes place on construction sites is one of the major contributing causes to subpar project performances. In fact, managing materials is a crucial aspect of building projects. There were 47 components found, and they were divided into 8 categories. They are: (1) site condition; (2) planning and handling on site; (3) management; (4) materials; (5) supplier and manufacturer default; (6) transportation; (7) contractual; and (8) governmental interferences (Jusoh & Kasim, 2017).

METHODOLOGY

The researcher utilized qualitative evidence to analyse and conclude the study, using primary and secondary data methods. Interviews and references were used to gather precise information from informants, such as project managers and site supervisors. Direct observation at ongoing construction sites was also employed to strengthen the data. Secondary data was collected from journals, existing articles, magazines, and academic books, providing valuable insights into the study's goals and objectives. The data collected from the project manager and site supervisor was analyzed using descriptive coefficients to summarize the project flow description. The researcher used the collected information to answer objectives and make appropriate assumptions. This approach compares different variables or sets of data to understand the link between variables and estimate the influence of certain elements on the study issue. This strategy helps researchers understand similarities, differences, or unique qualities across instances and draw conclusions based on comparisons.

CASE STUDY

There are two case study which is LUMINA Taman Harmonis (A) and LILIUM Puncak Iskandar (B)

The table below provides a summary of the data collected.

Table 1: Data Collected during Interview Session

Question number	Question	LUMINA Taman Harmonis (A)	LILIUM Puncak Iskandar (B)
1	How is the flow of the material in this construction site?	The site supervisor confirms received material before dropping it, checking the quantity and identifying the exact location near the material's use location.	The site supervisor ensures proper materials arrival by checking for accuracy, quality, and quantity before signing receipts and will be placed in empty spaces.
2	Is there a project planning for this particular project before it started? (Yes/No)	Yes (budget material)	Yes
3	During the project planning, is there any specific plan for material management flow before the construction stage started?	Yes	No
4	Is there a requisition form or indent preparation before the material purchase process? (Yes/No)	Yes	No
5	Is it a single requisition form or it is more than one requisition form for this project?	Single requisition form	Delegate materials to another supplier if one supplier cannot supply.

6	Is there a proper study of various indents before proceed to the next stage? (Yes/No)	No	No
7	After get the quotation from the supplier, is there any study and confirmation of all material before completing the purchase? (Yes/No)	Yes	No
8	All the received quotations will be categorizing and select using any criteria?	Will be handled by HQ	-
9	Is there a negotiation of rates with the supplier? (Yes/No)	Yes	No
10	How does it go? Is the supplier being negotiable and cooperative or not?	Yes	No
11	How long is it take to get the approval from respected authority?	No approval due to private project	No approval due to private project
12	Who will be prepared the purchase order?	Site supervisor	Site supervisor
13	All the material from start to finish will be ordered in bulk or will be separated according to stage of construction process?	Separated	Separated
14	Issues that always occurred during this process?	Damaged item	Not enough materials
15	Is there anyone who will track the delivery of material? (Yes/No)	Yes	Yes
16	How long does it take to receive the ordered	4-5 days	2-3 days

	material from the supplier?		
17	Usually, after the material received, is there an inspection of the material? (Yes/No)	Yes	Yes
18	The material condition inspection will be carried out on the same day or a day after?	Same day	Same day right when the material arrived
19	Who is the person that will carried out the material condition inspection?	Site supervisor	Site supervisor
20	Is there any storage space for the material? (Yes/No)	Yes	Yes
21	Who will be in charge to arrange all the material in storage space?	Sub-contractor's supervisor	General workers
22	How is all the material will be stored?	Depends on the material	In bulks according to its type
23	Where is all the material will be stored?	Depends on the material	In a container or stored in an open space.
24	How the material will be managed? (keeping track of the inventory checklist)	No	No
25	How the supply is distributed throughout the construction phase?	According to construction phases	Based on construction needs throughout the process.

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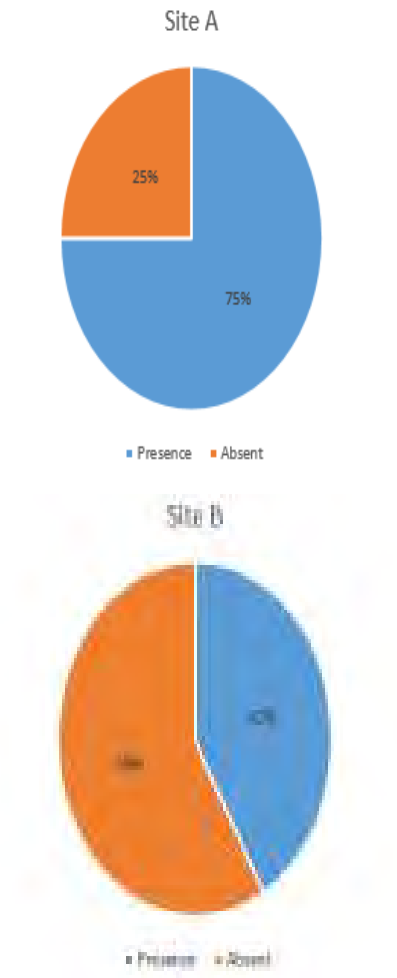

Figure 2: The Pie Chart Presents the Presence/Absent for Site A and Site B

For site A, the fraction of the data that a slice represents increases with size. In this instance, the blue sector which is the presence of each planning for material management is greater than the orange sector, showing that the category "presence" makes up most of the data (75%), while the category "absent" makes up the minority (25%).

The proportion of site B and the material management planning's presence is shown in the blue area. The proportions of each category in relation to the entire dataset are graphically represented by the pie chart. Each sector's size is matched to the percentage it contributes to the data. This indicates that "absent" is the dominating category, accounting for 58% of the data, while "presence" is the lesser category, accounting for 42% of the data. The orange sector is larger than the blue sector in this instance.

Due to its detailed plan, confirmation of supplies, discussion with suppliers, and engagement of subcontractors, site A performs material management better than site B. Material management at site a is structured and well-organized, resulting in efficiency and reduced waste. Site B, on the other hand, is missing these crucial processes, which causes inefficiencies, increased expenses, and delays in the building process. Effective material handling and resource utilization can be hampered by a lack of a clear plan, a lack of material confirmation, and a failure to negotiate pricing. Overall, site A's material management procedures are more effective for ensuring efficient construction activities, but site B's method could be missing crucial processes that could have a big influence on project performance.

CONCLUSION

The significance of material management in Malaysian construction projects is examined in this study article, which also emphasizes how vital it is to improving project effectiveness, cost-effectiveness, and overall success. Planning, acquiring, and controlling materials effectively guarantees resource availability, reduces building delays, and prevents cost overruns. Better resource allocation, waste reduction, and increased production result from systematic material management. The building sector in Malaysia confronts difficulties such shifting material costs, hiccups in the supply chain, and legal restrictions. Effective material management strategies need collaboration among stakeholders, data analytics, and technology-driven solutions. Future studies should look on eco-friendly building techniques and sustainable material selections to boost competitiveness and further Malaysia's development objectives.

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