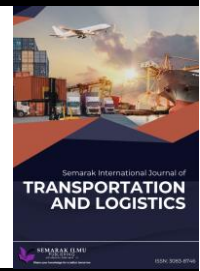




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Preliminary Logistics Performance Framework in Malaysia's Construction Industry

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ABSTRACT

The relationship between logistics management in construction projects and how performance can be improved to help the construction project holistically is studied in this study using qualitative methods. A semi-structured interview session was conducted to ensure that the respondents were representative of relevant areas of responsibility. The data collected was analysed using a thematic analysis approach where at the beginning there were six (6) factors that had been identified that could improve logistics performance in construction projects. However, from these six (6) factors, only three (3) new main themes and three (3) sub-themes are new findings. The results of this finding can help related organizations to ensure that it can affect the performance of construction logistics or affect its achievements in Malaysia. It is hoped that the positive findings of this study can contribute to the acquisition of current research knowledge and will offer suggestions for future research.

1. Introduction

The process of delivering goods and logistics is becoming more complex and advanced than before. It requires a process of planning and moving and maintaining before it is implemented. The importance of this logistics has been identified since World War II where military operations such as the movement of food supplies, medicines, soldiers, artillery and others across borders [1]. Apart from that, logistics is also important in various other sectors such as manufacturing, transportation, health and others.

Good logistics management is when it can reduce costs and time for the entire cost of operations, where it also means an increase in profits for an organization. Efficient logistics management also means "value-added" to the entire operation. Basically, it is possible to break the task of logistics management into two. In short, the task of logistics management is to minimize costs and make the

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system "cost effective". In the context of the construction industry, [2] states that logistics includes the transportation of materials, plants and machines and information to the location, time, efficiency, quantity, and reasonable price [3-5]. A study [6] added that the concept of building logistics goes beyond the movement of building materials to the construction site.

The logistics industry studies, authored by previous studies [7-11] collectively emphasized the importance of logistics efficiency, highlighting various dimensions such as responsiveness, quality, efficiency, flexibility, level of service, perfect order and cycle, logistic cost, organizational performance, and competitive advantage. Additionally, a study [11] specifically delved into measuring green logistic performance, infrastructure, and services trade & environment, signifying a growing focus on environmental sustainability in the logistics sector.

On the other hand, the construction industry studies, conducted by previous researchers [12-17], centered around establishing successful logistics in construction projects, creating cost diagrams, proposing conceptual models for holistic construction logistics systems, measuring effective construction logistics, and developing key performance indicators based on vehicle movements for transportation cost management understanding. Some past studies used modelling to measure the performance [18] while in this study, qualitative approach was explored.

Essentially, the collaborative research efforts in the logistics industry aim to create a framework for efficient logistics. This emphasizes dimensions, connections to organizational performance, and the growing focus on environmental sustainability. Conversely, studies in the construction industry concentrate on enhancing logistics and transportation management in projects. This includes models, indicators, and frameworks, with a notable focus on cost, efficiency, and returns, particularly in less developed nations. Overall, these efforts contribute to a better understanding of logistics and construction, emphasizing the importance of effective, sustainable, and cost-efficient practices in these sectors.

2. Methodology

For this study, a semi-structured interview methodology was used, where four respondents from construction organizations operating in the Klang Valley, Selangor, were selected. Each of these respondents was selected based on their respective criteria to represent a different role in the construction project. It includes assistant project manager and interior architect, project executive and surveyor. This interview session was held for 40 minutes to one hour in a conducive and comfortable location. The interview questionnaire is divided into three parts (A, B, and C). Part A collected demographic information, while Part B delved into logistics activities in construction projects. Part C focuses on the performance evaluation of construction logistics. To maintain confidentiality, pseudonyms or aliases are used for the informant's name. All interview sessions were carefully recorded, transcribed, and then analyzed using thematic analysis. The data is organized according to codes, categories and themes. Scheduled presentations facilitate understanding, leading to the creation of a conceptual model as an achievement of the study. This structured approach ensures a comprehensive investigation of the logistics function in construction organizations, with the results contributing to a deeper understanding of the field and highlighting the importance of efficient and effective practice. Table 1 summarizes the informant profile.

Table 1
 Summary of Informant Profile

Construction Organization	A	B	C	D
Designation of Interviewee	Assistant project manager cum interior architect	Construction manager/ Quantity surveyor	Project Executive	Project manager
Type of Organization	Main contractor (Interior Design)	Developer	Main Contractor	Main Contractor
Experience in Construction Industry	4 years	20 years	5 years	25 years
Type of Project	Building Project	Building project	Building project	Building project

3. Findings

Based on Table 1, there are four companies that have been interviewed for this study. Among ten (10) companies that have been called, only four (4) of them were willing to participate in this preliminary study. All the interviews were conducted in face-to-face manner. The sessions with Informant A, C and D were conducted at mamak (food premises) while for Informant B; it was conducted at coffee shop as per request.

Based on the interview with the four informants, 6 components or factors or themes are consistent with the past studies that are agreed to be able to boost the logistics performance in the construction projects. From these six (6) factors, three (3) new main themes and three (3) sub themes have emerged and summarised in Figure 1.

Details of the responses are analysed and discussed based on the themes or factors. In order to make the logistics of the construction project more effective, it should be built in the most effective way to meet the needs of the client, and the following considerations should be considered in the process: (adopted from previous research [19,20])

Number of Suppliers: According to an author [21], the number of the suppliers and the most appropriate suppliers for a client can be optimized. Among the strategies commonly used is the reduction of the supply base by many companies in various sectors. Most of these companies believe that reducing the number of suppliers can make them more competitive, flexible and cost-effective. Rationally, a supply chain with a smaller number of suppliers is easier to manage and thus logistical barriers can be reduced.

“For example, for carpentry work normally we would as the carpentry specialist to buy the material that is needed for this project. However, we will give them a list of prices for that wood works, and they must buy the material within that price given in the list. It is easier if they are the one who buy the material for carpentry work as they will know much is the actual material needed.” (Informant A)

Effective Communications: To ensure that logistics in construction is holistically successful, each phase in logistics management needs to achieve quality objectives. A study [18] stated that in order to achieve objectives related to quality, on-time delivery and cost, a close relationship with suppliers is something that must be prioritized. Efficient communication between suppliers, design teams and construction teams need to be systematic to ensure that information flows from one to the other. Therefore, the communication plan or method in the project needs to be mobilized and mobilized and productive at every level of logistics management [19].

Information exchange is crucial in building projects for a cost-effective and adaptable logistics

management system. It allows stakeholders to synchronize efforts, respond to difficulties, and adapt to changing dynamics. Effective information exchange improves coordination, optimizes resource allocation, lowers costs, and increases project efficiency. It fosters a collaborative atmosphere, providing real-time insights to decision-makers. A solid information-sharing structure is the foundation of a logistics management system, promoting agility, cost-effectiveness, and adaptability.

“Since this is conventional project, we cannot buy any material without approval of consultant. Therefore, the approval of consultant is very important in order to purchase materials. This project is a bit delay due to this matter.” (Informant A)

“... a communication between contractor and supplier in term of order planning at the early stage is very important as ordering period would take minimum of 7 days” (Informant D)

Effective Communications: All informants agree that the element “flexibility toward changes” is an important aspect in logistics management in construction project. They believed that by being too rigid in handling changes in construction project can improve logistics management. By being flexible, some construction issues such as delay may be overcome. The responses by informants are reported as follows:

“we need to check whether the type of the air conditioner is suitable for the building. If flexible, it would be easier...if we use the latest type of air conditioner with no diffuser, things would be easier. But since the design of the building is quite “old school”, the design of the interior need to follow the current plan of M&E. therefore, there would be some design adjustment to be done.” (Informant A)

“Let say we need to construct 5 level of basement. On basement level 2 there are boulders of rock. And we also have done value engineering for these matters. Due to this project is being done in the middle of the city we can apply with DBKL to reduce the number of parking since this project is situated in transport hub area.” (Informant B)

“... there are some circumstance where the we have to change the brand of material as equivalent to the BQ since there are some availability problem...” (Informant C)

Relationship with Suppliers: In Malaysia, developing a good relationship with suppliers play an important role in construction project. In this study, most of the main contractors have their own suppliers that they have been working with several projects.

“Normally, our admin has a list of the suppliers that we use to work with. We will do comparison of price based on the list of suppliers that we have. For example, we have supplier A, B, and C; even though the price of supplier B is more expensive, we still opt for supplier B since it is easier to negotiate with.” (Informant A)

“We have a lot of concrete suppliers. For superstructure we use Grade 70, and as for superstructure we use Grade 50... Let say we already got the concrete strength result and all of suppliers’ result are close to consultant requirement. So, we ask the contractor which supplier you would prefer and easy to work with. We don’t want the one that we pre-approved cannot work with our contractor” (Informant B)

“to ensure that the quantity of the material that is being order arrived correctly... a relationship between supplier and main con is very important.” (Informant D)

Outsourcing of scope of work: *In some construction team, sometimes it is not often that they have all the in-house expert needed to complete a job. Alternatively, they will rely on outsourced work to fill in the operational holes. Collaborating with the third party is a good strategy to improve the team's capabilities.*

“... Some parts of the interior design work are being done by our own workers such as installation of LED lights However, for carpentry work we outsource it to other contractors” (Informant A)

“Let say this substructure require 1 and a half year to be completed. Normally substructure is a specialized work which normally involve 1) Piling 2) Excavation work 3) diaphragm wall or soldier piles or retaining wall 4) wet works (concrete, formwork, rebars). For this work we put it under one scope of package.” (Informant B)

“... Some of the artisan work in our project, we outsource it to our specialist as we don't have the skill to do so” (Informant C)

Tracking facility: *In construction project, there are various inbound and outbound of resources especially construction material. In other word, material monitoring is very crucial for logistics management. By incorporating technology in tracking would improve monitoring process. Efficient monitoring means quicker delivery, reduced downtime and lower prices.*

“Normally we track our material through supplier. We would keep in touch with them just to follow up with them. However, I believe that tracking through system it much convenience.” (Informant A)

Cost Transparency: *Transparency is vital in improving the pre and post phases of the construction project. The goal of this element is to provide an inventory of aspects of the relationship between clients and executing parties that are most desperately in need of greater transparency.*

“Through BIM, we can effectively coordinate and retain consistency between the project manager and the workers involved in the project by producing reliable, detailed virtual templates and access to the same, resulting in lower revisions or early revisions of the design, saving time and reduced costs rather than delays and wastage in later phases of construction.” (Informant C)

Benchmarking: *Lessons gained from other organizations or project may be used to set goals for progress and to encourage improvements in the firm. The benchmarking process can provide a productive foundation for innovation, but only in a responsive environment; businesses that share best practices and measure their success to others profit the most.*

“... we have our site diaries where we would record everything that happen in our site It acts as our lesson learnt for future project.” (Informant A)

Price Based: *The value of a project is estimated based on the bids of subcontractors and suppliers in competitive tenders. It is to meet the final tender number to be handed over to the customer.*

Since the lowest tender value is the determining factor in winning a project in a typical competitive tender environment, the estimated value should also be based on suitable tender subcontractors who can offer competitive rates that contribute to the prime contractor's ability to win the tender.

“... so normally we would take three prices from three company... company A, B and C would fairly compete its price...the one that offer quality with lowest price would be our main choice.” (Informant C)

Supplier Management: In order to complete a project, the main contractor usually hires subcontractors. The subcontractors need to report to main contractors, not the client. As part of the contractor, it is their responsibility to handle several parts of project responsibilities, payments, and all other construction related activities.

“... we would ask our carpenter to buy their own materials. The reason being is that they can accurately estimate the material needed for that project and to avoid wastage.” (Informant A)

Consultant Approval: At the same time, in a construction project, there will be consultant who basically advise on the process and negotiations. The process of purchase order (PO) that starts with a purchase request will be handled by the consultant. Whenever a person in charge with material order such as project manager, who would like to get construction supplies on a job site, they can submit a request to their procurement department. Basically, a sales request demands permission to make a purchase order and will be accepted by the consultant, it will produce a purchase order to be submitted to the buying department for further actions.

“Basically, we as Interior Design contractor will not make any early materials purchase. We cannot “lock” the item that we want to use early since all purchase need to be approved by the consultant of the project”. (Informant A)

Hence, it indicated that a good communication between contractor and subcontractor and consultant plays an important role especially in decision making. A fast decision would enhance purchasing process and improve logistics process.

Figure 1 summarises the six main factors which are Number of suppliers, Effective communications, tracking facility, Cost transparency, Strategic Supplier and Benchmarking which are highlighted from the interview. At the same time three new factors have appeared from the discussion. Those are Flexibility toward changes, Relationship with suppliers and outsourcing of scope of work. The results also highlighted Price based and Supplier management to be the sub-factors for number of suppliers and Consultant approval is the sub-factor for efficient communication.

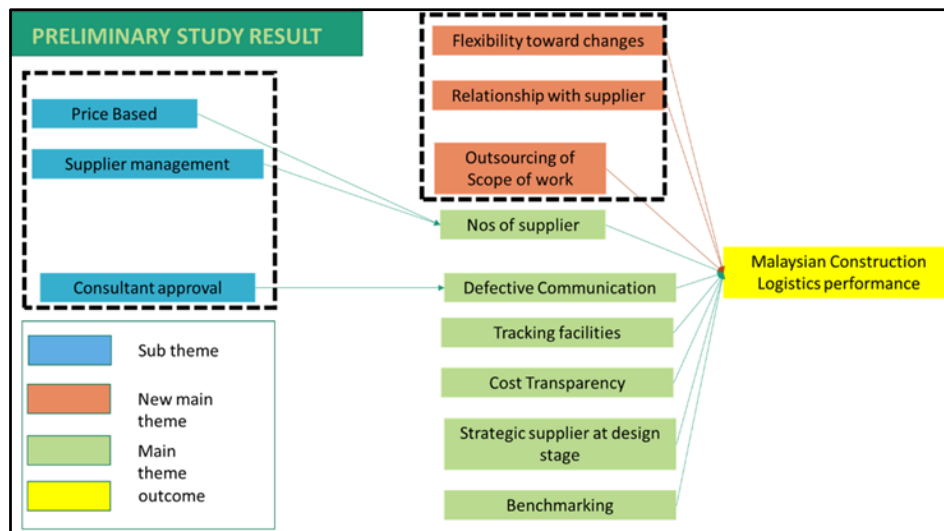


Fig. 1 Malaysia Construction Logistic Performance Model

4. Conclusions

A preliminary study on improving logistics performance in Malaysia's construction industry involved interviews with four selected organizations in Klang Valley, Selangor. The data was analysed using thematic analysis, leading to the identification of six factors that can enhance logistics performance in construction projects. The study found that effective communication, flexibility towards changes, and the relationship with suppliers are crucial for improving logistics activities in construction. The study emphasises the need of rationalising supplier numbers in construction logistics to promote competitiveness, flexibility, and cost efficiency. Effective communication is essential for successful logistics management, including meeting quality, delivery deadlines, and cost objectives. Malaysian construction is based on solid partnerships with established suppliers, outsourcing scope of work to bridge operational gaps, and incorporating technology for efficient material monitoring. Cost transparency is critical for optimising pre- and post-construction stages and Building Information Modelling (BIM) facilitates coordination. Benchmarking and site diaries are effective tools for continual development. Price-based judgements for subcontractor and supplier selection are consistent with competitive tendering contexts. Supplier management is a difficult task undertaken by key contractors that necessitates good communication and decision-making. Consultant approval is critical in the procurement process, which includes communication between project managers. The findings of this study definitely contribute to a broader understanding of the field, offering recommendations for future research and provide significant insights for improving logistics performance in the construction industry.

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