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# A Review on the Strategies of Lean Planning in Malaysia Construction Industry

**Mohammed Elhaj Alsoufi Mohammed Ahmed***

*Assistant dean of faculty of Engineering, SIMAD university, Somalia*

**Corresponding author:** Mohammed Elhaj Alsoufi Mohammed Ahmed, Assistant dean of faculty of Engineering, SIMAD university, Somalia, **Email:** mohammedelhajalsoufi2021@simad.edu.so

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## Abstract

The impact of the construction wastes results in project delay, low productivity of construction projects, construction cost overrun, and disputes among construction players. The lean construction offers enormous advantages to reduce construction waste. However, lean construction in Malaysia is still new and not fully adopted. This is due to lack of effective strategy in adopting lean construction at construction phase. The aim of this study is to provide planning strategies for the reduction of construction waste. In conclusion, for a wide range of the implementation of lean construction to be successful, a good push by the government alone is inadequate. All the other teams in the construction sector defined must be well aware of their roles in the development of lean construction at the construction sites.

**Keywords:** Barriers of lean construction in malaysia; Barriers and propose strategies

## Introduction

On the basis of construction Malaysia construction industry, local contractors, ranging from the smallest to medium class up sized project are not ready yet to utilize lean construction in this country. This is due to the use of Lean construction (LC) between them is still low, as well as the LC philosophy that has not yet been fully explained to the public [1]. However, Public Work of Department [2] pointed that the Association of Consulting Engineers Malaysia (ACEM) hopes that LC can be properly practiced by the entire project team, where it reduces construction waste in the construction projects and therefore provides more quality and efficiency for projects in Malaysia. Lean construction is dominated by an obsession with eliminating waste from all business processes, while the process that adds value to output will maximize to provide satisfaction to customers [3]. The main steps advocated by lean production to cut down waste to achieve customer value can be categorized as follows [4-6]. First, set up the infrastructure to accommodate variations should they occur (people and equipment) by modularity. Second, the production system should drive design where possible (concurrent engineering). Third, eliminate the variation through production processes in order to ensure time delivery. Fourth, do it right the first time (eliminate rework). Finally, continuous improvement or kaizen (emphasize measurement). Therefore, for Malaysia construction industry, Building Information System (BIM) is very efficient, and advanced technique for Modularity and Industrial Building System and (IBS) is used to drive design where possible. Building Information Modelling (BIM), Supply Chain Management (SCM) and Conference Management (CM) are used to eliminate the variation by insuring ensuring on time material delivery at the construction phase. Also, Total Quality Management (TQM) and Building Information Modelling (BIM) are used to get things at the

first time [7]. Lastly, Key Performance Index (KPI) and Health and Safety management (HS) are utilized for continuous improvement. Therefore, lean construction principle can only be applied fully and effectively in the construction sector in Malaysia by focusing on the improvement of the whole process. This means that all parties must be engaged, involved and strive to overcome the obstacles that could arise from traditional contractual arrangements as it is shown in figure 1 [7].

According to the previous scenario, there are seven types of waste in the construction phase (construction waste) [4,5]. Firstly, the waste of waiting, which means that the time is not being used efficiently and thus creates a delay in value-added processes. Secondly, overproduction of waste and simply means doing too much work, too early or just in case. Thirdly, transportation waste which is a matter of movement of components and materials around a site. Fourthly, unnecessary movements of waste. Fifthly, inappropriate processing by using a hammer for a product that does not meet the customer's requirements. Sixth, inventory waste or stock of materials to be supplied in the event of delay in the delivery of materials and, finally, defect waste. The average waste of materials (inappropriate process and defects) in Malaysia is 28.6 million tons per week in the construction project and, therefore, there is a cost of material waste and the cost of disposal from various construction sites [8]. Currently, all material wastes produced in Kuala Lumpur construction projects are collected by registered construction waste contractor and are transferred to the dumping area in Sungai Kertas, Gombak [9]. Generally, the impact of construction waste will lead to project delays, low productivity of construction projects, an overrun of construction costs and disputes among construction players [1] (Figure 1).

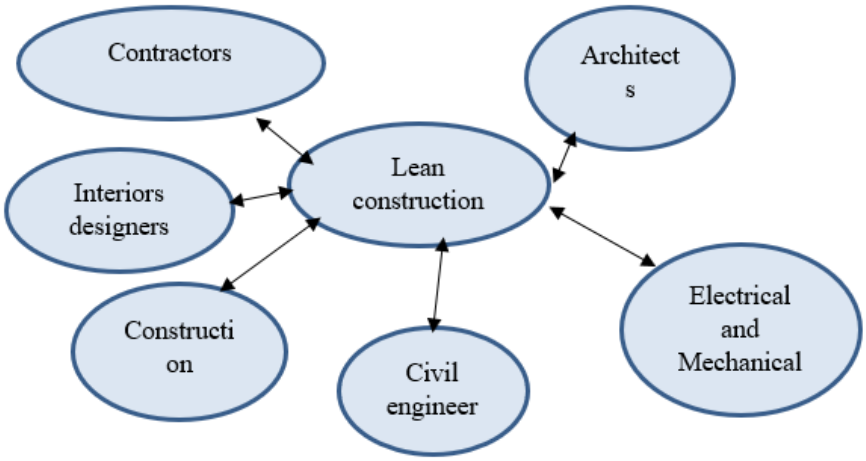


**Figure 1:** Stakeholders integration according to LC through the WLCC of the project [100].

## Barriers to adopting Lean Construction in Other Countries

The barriers in adopting LC in several countries were discussed in several published research works. Notably, Li et al. [10] highlighted the lack of appropriate organizational structure as well as leadership style as the main factors in failing to adopt lean construction techniques in China. Basically, project managers used to follow their superior managers in managing their projects by using the conventional methods in spite of their awareness of the importance of implementing LC to gain the profits into their projects. On the other hand, [11] specified contract issues and organizational culture as the preventive factors in adopting lean construction in the United Kingdom. Thus, inappropriate organizational structures prevent the labours to work in a systematic manner in accordance with the decision making within the organization and most often labor problems are directly reported to the project managers. Fernandez-Solis reasoned that a lack of staff training is a dominant factor in failing to adopt lean construction in the United States. Therefore, organizations are required to change their management system and provide training to their staff to adopt LC to gain the profit.

Notably, both countries are getting a strong support from their government to get the full benefits from lean construction. Government support has a more significant role to speed up the improve the effectiveness of the implementation of LC at the construction phase. This indicates that in both USA and UK construction phase, the government stimulate, and force is a must to adopting modern approaches. Having a full enforcement from the government is crucial. Without the government support, the implementation of LC in their construction industry would be futile. Besides, the private sector also plays a crucial factor in implementing lean construction by encouraging a mutual work to provide a guideline in implementing lean construction. Furthermore, both countries considered that developing leadership strategic of the project manager as a leader who draws on authority that is afforded mostly by informal means is to build an integrated project team and convince top management to adopt lean construction. The PM must identify the range and extent of the sources of influence available to them, so that they can secure an appropriate leadership position to drive the project, and to direct its resources effectively. The aim is always to meet the

concerns and needs of the participant, while simultaneously securing the needs of the project. The PM needs to be highly skilled and very political about doing this and must recognize that a very high degree of flexibility will be required [12].

## A Proposed Strategies on the Implementation of Lean Construction in Malaysia Construction Industry

After identifying the nature of the barriers at selected construction sites in Klang Valley, Malaysia, the proposed strategies and recommendations to overcome these barriers were stated as follows. It has been realized that fragmentation is one of the crucial barriers to the implementation of lean construction. Similarly, the barrier has been mentioned in the literature review. Both Kim & Park [13] and Fox and Sarhan showed that procurement organization structure has to be addressed by an integrated team. Therefore, mutual purposes among firms at selected construction projects in individual or multiple projects should be encouraged to collaborate and exchange knowledge, information, and materials between project teams. Therefore, the project objectives will be achieved. Kim & Park [13] and Fox and Sarhan added that this depends primarily on the influential role of the Project Managers (PM). Furthermore, it was revealed that the development of an effective leadership style for PM at the construction sites is very important to develop an appropriate organizational structure and introduce the pull production system. Müller et al. [12] added that leadership and political skills are fundamental for the level of informal and seniority given to the PM to override cultural and procurement problems. As a result, the project can be successfully delivered. Notably, most of the PM at the building projects in Klang Valley seek to follow the progress of work in the best possible direction to obtain approval of payment in time, without focusing on quality. It must be noted that, infrastructure projects have been implemented to ensure timely delivery of materials with a high level of quality and cost due to the conventional planning method [1]. García demonstrated that project objectives in terms of time, costs and quality performance are significantly influenced by the quality of the PM leadership. Therefore, leadership includes giving meaning and purpose to work, winning and empowering followers, inspiring and infusing organizations with a value and ideology. Also, it motivates people within and outside the project organization to accept a project's goals, and to work enthusiastically towards the achievement of these goals in Klang Valley projects. Thus, PM must use the leadership and political skills to develop an effective power base, perhaps largely dependent on informal authority (or power), to instruct, integrate the project team and direct the resources needed to get the project done on time, with required quality and budget. In addition, PM could use their own leadership style to convince senior managers to introduce the last planner method (pull production), to replace the conventional planning method (push production based on critical path method). Therefore, resources such as materials to be delivered or progress required from upstream activities are determined by the progress of downstream activities due to the contribution of front-line people. This means that activities depend on these resources [14]. On this basis, it contributes determining timely delivery at the required cost and quality at the construction projects [10].

It has been discovered that organizations need to change their management system firmly to implement lean construction standards and guidelines. It was realized by Kim & Park [13] and Fox and Sarhan that, the government should recognize the benefits of lean construction and seek to encourage private sectors to implement LC in their projects. Fox and Sarhan added that, private sectors should play their part by working with the government to develop and encourage a new model of collaborative guidelines through various working group discussions. Therefore, the win-win relationship should be encouraged between companies in Malaysia because of the emphasis on co-operation rather than confrontation. On this basis, major terms in the signed agreement in terms of goals and objectives could be reached between various parties such as BEM, BAM and REHDA. To promote the implementation of LC, the government through (CIDB) and the private sectors must provide incentive by forming several working groups with specific tasks such as organizing seminars to raise awareness to the construction players and developing LC guidelines [1]. In particular, a government incentive issue in Klang Valley has been provided in terms of free training for several lean construction techniques such as BIM and IBS.

As evident in the literature review, the competitive contract, and the lack of adverse relationship between the project teams, were considered among the barriers preventing the use of lean construction. Kim & Park [13] suggested that, the influence of a new model of competition in contracts provide more practical level of cost savings generated, the supplier or contractor counts no charges for the wasted time and effort in failed bid offers and economies of scale that come from working with the same people over a period of time. Trust between the parties can be improved, and conflicting disputes can be reduced or eliminated. In particular, in-house projects (clients and contractors are the same and there is no need for tendering) were widely used in the Malaysian construction industry to eliminate construction wastes as well as to improve conflicting relationships. It has been revealed that the lack of knowledge on lean construction is considered one of the barriers preventing the full implementation of LC in the building projects. The industry delivery team could be formed by the government to assist all key players in Malaysia construction firms to develop their own standards and guidelines based on the customer's value. Delivery teams typically include those professionals involved in the programming, planning, design and construction of the project. The progress of these guidelines could be reported to the CIDB. Then, processes and procedures on LC implementation could be formed for the Malaysia construction industry. In particular, the previous scenario could be carried out in full collaboration with the private sector to provide the true value of LC based on customer satisfaction.

It was also observed in the literature review and through the interview that the lack of competent staff and the lack of staff training to adopt lean construction in the building projects, are the most influential barriers to the implementation of lean construction. Kim & Park [13] defined that developing a core of skills and training requirements, were very crucial to effectively adopt lean construction

after developing a series of guidelines and processes to help professionals understand the new regulatory process. Fox and Sarhan demonstrated that, the establishment of the Centre for Construction (CC) in the construction sites is very crucial to to ensure the exchange of knowledge and information on the implementation of LC between staff. Fox and Sarhan noted that, the special department for LC in companies is very important to be introduced to monitor and making adjustments for the implementation of LC implementation processes. At the same time, it is necessary to conduct seminars, workshops and conferences on the use of LC guidelines for industry, and to promote implementation processes, by providing training to the construction players to ensure continuous improvement. In addition, it has been revealed in the literatures and through conducting the interview that, the high cost of adopting lean construction is one of the main barriers to the implementation of LC in construction projects. Project teams in terms of developers, contractors and the clients should be encouraged to invest and pay additional money to reduce construction waste at all possible points. It could be stated that, the role of project managers and the government are very crucial to convince and encourage clients and senior management to invest in LC. As a result, lean construction implementation strategies could be associated with the level of management, such as developing a new model of network competition to adopt lean construction, building a sense of trust and collaboration among the project team members, providing incentives by the government and developing an appropriate organizational structure (pull production) at the construction sites. Then, other strategies could be developed to provide relevancy to the technical level such as the implementation of processes that provide true value to the customer, constantly monitor and make adjustments in the implementation processes to adopt lean construction at the building projects as well as continuous improvement and optimization in the building projects. Additional strategies for financial aspects included efforts to encourage clients and contractors to invest in adopting LC techniques in the building projects and, finally, the adverse relationship due to the conventional procurement method would increase the disputes and claims to adopt LC [14- 101].

## Conclusion

The construction industry is less affected by lean construction techniques, due to overwhelming evidence of construction waste during the construction phase. There are many barriers that hinder the full implementation of LC in the construction projects in Malaysia. Therefore, strategies must be proposed to ensure the full and complete implementation of LC at the construction sites in Klang, Valley, Malaysia. The development of the model of lean construction implementation strategies at selected construction sites can be summarized as follows. The first strategy is to develop a new model of competition between the various companies. The second strategy builds a sense of trust and collaboration among the project team members. The third strategy is to establish an appropriate organizational structure (pull production system). The fourth strategy is concerned about the implementation of processes that bring real value. The fifth strategy is constant monitoring and making the adjustments for customer value. The sixth strategy is to ensure continuous improvement and optimization at the building construction sites. The seventh strategy is to encourage clients and contractors to invest in lean construction at the building construction sites. The eighth strategy is to provide incentive by the government such as taxes and finally, legal and contractual issues on LC. Thus, it could be argued that there is still a huge opportunity to assess the level of the implementation of lean construction to reduce construction waste. The subject on the strategies of the implementing lean thinking at construction phase in Malaysia is currently important for reducing construction waste and improving the project management of the construction industry.

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## Conflict of Interest

No conflict of interest.

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