Lean Construction Tools Strategies in Construction Projects: Research Methodology

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ABSTRACT

This paper delivers research methodology adopted in an ongoing research, which is intended to study the execution of Lean Construction (LC) in the Malaysian construction industry. In conducting this research, mixed method approach is utilised to accomplish the objectives of this study. Questionnaire surveys are carried out to investigate the availability of LC tools and its execution in the construction industry. Semi-structured interviews and case studies are conducted to get in-depth information on the LC tools and its implications towards reducing construction waste. Finally, a focus group is performed to validate the LC framework. The expected outcome of this research is a proposed framework for LC tools strategies recommended for Malaysian context that can be used by the contractors. The proposed framework will improve the contractors’ practices and work done in realising a construction project and perspective on LC mechanism, which will enhance the value and productivity of the construction products.

INTRODUCTION

The current demand for building and infrastructure projects in the construction industry resulted in a tremendous amount of construction waste [1]. In Malaysia, a 28.34% of construction waste is being generated from the industrial and construction to satisfy the demands [2], [3]. Concurrently, this issue affected the depletion of global resources and environment entirely [4]. Hence, the construction industry must inevitably diversify its conventional methods of functioning towards a sustainable environment and improving people’s quality of life.

Lean Construction (LC) is therefore proposed overcoming the issue addressed. Fundamentally, LC is a concurrent and continuous improvement in the construction processes to fulfil client’s needs [5], [6]. This mechanism, which is ultimately aimed to minimise construction waste [7], is capable of reducing the overall cost and cycle time [8]. Besides, LC is also competent in increasingly the productivity and securing a better health and safety environment [9].

This paper is delivered a research methodology to be adopted in an ongoing research, which is intended to study the execution of LC in the Malaysian construction industry. Subsequently of this ongoing research, a proposed framework for LC tools strategies for Malaysian context will be recommended that can be used by the contractors. The proposed framework will improve the contractors’ practices and work done in realising a construction project and perspective on LC mechanism, which will enhance the value and productivity of the construction products.

2.0 Methodology

This paper attempted to deliver the access significant information concerning the LC tools strategies in the construction industry. It discusses the research methodology to achieve the ongoing research objectives. Research methodology engaged comprises numerous approaches such as surveys, case studies and interviews of selected construction projects and respondents.

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3.0 A Review Of Research Methodology In Lc Studies:

From the review of past researchers in LC indicates that most studies have adopted qualitative approach [10]–[32], which is based on an identified group and or case study to acquire a deeper understanding of LC practices. Meanwhile, few researchers took the quantitative approach [33]–[36], which is based on population and sampling to allow for an easier answer and analysis. Furthermore, past researchers also have reviewed the trends of LC from previously published literature [37]–[51] and least have adopted the mixed methods approach [52]–[54]. Besides, Table 1 represents the research methods adopted by the researchers, and a case study is a widely used method of collecting data comparing to the other research methods (refer Table 1).

![Table 1: Research Methods Based on Previous Studies.](image)

<table>
<thead>
<tr>
<th>Research Methods</th>
<th>Authors</th>
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<tbody>
<tr>
<td>Experiment</td>
<td>Al-Aomar (2012); Koranda et al. (2012); Matias and Cachadinha (2010); Pedersen (2010); Sarhan and Fox (2012)</td>
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<tr>
<td>Survey</td>
<td>Adamu and Abdul Hamid (2012); Azevedo et al. (2010); Enkshammahar et al. (2010); Gannon et al. (2012); Hamdi and Leite (2012); Ikuma et al. (2010); Kalsas (2010); Kim and Bae (2010); Lajevardi et al. (2011); Lee et al. (2012); Lindhard and Vandahl (2013); Nahmens and Ikuma (2011); Nahmens and Mullens (2011); Peng and Pheng (2011); Song and Liang (2011); Valente et al. (2012); Yu et al. (2013)</td>
</tr>
<tr>
<td>Case study</td>
<td>Demur et al. (2012); Herrala et al. (2012); Koranda et al. (2012); Olsen and Ralston (2013); Pedersen (2010); Skinnerian (2012)</td>
</tr>
<tr>
<td>Action research</td>
<td>Eriksson (2010); Jang et al. (2011)</td>
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<tr>
<td>Interview</td>
<td>Demur et al. (2012); Herrala et al. (2012); Koranda et al. (2012); Olsen and Ralston (2013); Pedersen (2010); Skinnerian (2012)</td>
</tr>
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Discussion:

According to Reiter, Stewart and Bruce [55], the research questions, the current body of knowledge in the area studied and the access data to the researcher is the key essential in determining any research method. The authors believe that no matter what method had been chosen, it should be suitable to achieve the aim and the objectives of the research study.

The research strategy for this ongoing research is to overcome the issue of construction waste. By reducing or eliminating the construction waste, it will enhance the value and productivity of the construction products.

In the design of this ongoing research, the authors believe that both quantitative and qualitative methods will make significant contributions to the development of new knowledge of LC. Qualitative method is employed in a measurement of a rating scale to analyse the trends of LC development amongst the construction companies in Malaysia. Furthermore, a qualitative method is used to investigate the availability of LC tools, its implementation and its impact in reducing construction waste as these can be of a subjective nature. Quantitative method is efficient, but a qualitative method may be required where information cannot be obtained efficiently by quantitative methods, and are thus complementary. Hence for this research a combined quantitative and qualitative approach is justifiable.

Firstly, an extensive literature review is carried out in the background of the research to appreciate clearly the topic selected (refer Figure 1). The data are gathered from the published or unpublished works, conference proceedings and journals by using keywords LC, implementation, framework or guidelines and tools. The expected findings are the issues, trends and gaps in the LC application in the construction industry.

Three phases have been designed to ease the research flow. As a preliminary, the surveys conducted mainly to determine the contractors who executed the LC in their projects. Based on a stratified random sampling design [56], targeted respondents are registered G7 contractors under the Construction Industry Development Board Malaysia. The expected findings are the availability of LC tools and its implementation in the construction industry.

Case studies are carried out to get in-depth information of implemented tools and the implications of LC tools execution. Interview sessions and documents review are also being made to support the case studies. Targeted respondents are selected contractors who participated in the surveys. The expected findings are the in-depth information on tools and the implications of LC tools that will formulate the LC framework.

Finally, a focus group is carried out to validate the LC framework. Targeted respondent for expert panels is academicians and contractors. The expected outcome of this research is the framework for LC tools strategies that suitable for Malaysian context that can be used by the contractors.

Conclusion:

This paper has presented the appropriate methodology carried out for the realisation of the objectives of this ongoing research. Research strategies and sampling techniques have been submitted, and the adoption of every strategy and technique was adequately justified. Hence, this study adopted a pragmatic approach combining both quantitative and qualitative methods. This ongoing research is designed to find ways to improve project performance through the establishment of an LC tools framework for the Malaysian construction industry.
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**REFERENCES**


