

3.0 Research Methodology

3.1 Introduction

Apart from reviewing Lean Principles and explore suitable Lean Construction Systems and Tools in the Malaysian construction industry. The purpose of this study aim to examine the contractor perception towards Operational Performance and Lean Construction Systems and Tools therefore effectiveness may be recognize to achieve sustained competitiveness in relation to nation's potential to improve its competitiveness over time thus long term economic targets can be met.

3.2 Research Questions

The research topic deal with production management of construction service and more specifically investigate into

“Effectiveness of Lean Construction Systems and Tools in improving operational Performance in the Malaysian Construction Industry”

The research questions are important as it guide to locate the source of data and align the information to the proposition. The questions driving this research are:

Question 1: *What is Lean Construction?*

Question 2: *What are Lean Construction Systems and Tools?*

Question 3: *Does Lean Construction Systems and Tools improve operational performance?*

The first question defines and reviews the underlying theories and principles of Lean Construction. The second question explores Lean Construction Systems and Tools that fit into various stage of construction process to minimize waste. The third question study the influence of Lean Construction Systems and Tools has on construction operational performance in Malaysian construction industry considering operational quality, time and cost as performance indicator in the Malaysian construction industry.

3.3 Research Hypotheses

The research hypotheses assess the influence of Lean Construction Systems and Tools has on operational performance.

Hypotheses 1, H1: Lean Construction Systems and Tools improve operational performance.

Null Hypothesis 1, H₀1: Lean Construction Systems and Tools do not improve operational performance.

3.4 Research Design

The analysis conduct in this research seeks to determine whether the application of Lean Construction Systems and Tools truly improve Operational Performance.

For this purpose, literature review, interview and questionnaire is used for this study.

Both electronic and printed document and report are reviewed. The reviewing process is where and when the sticky note were place, write on or even attach to other reading material to the copy that was read to make the document review more comprehensive and easier for reference. All these are useful source for the content of this study. Those document and report published are of current market trend and development.

Exploratory research method is use due to lack of understanding and practice by local contractor towards Lean Construction. Thus it is crucial to explain, discuss and understand from the local contractor, their thought and opinion toward the suitability and perceived effectiveness of Lean Construction Systems and Tools for effective implementation to achieve sustainable competitiveness.

Qualitative study was carried out; research questionnaire is answered through conducting interview with contractor and perceived operational performance considering quality, time and cost in the Malaysian construction industry.

Figure enlisted below shows the overall research design in this thesis.

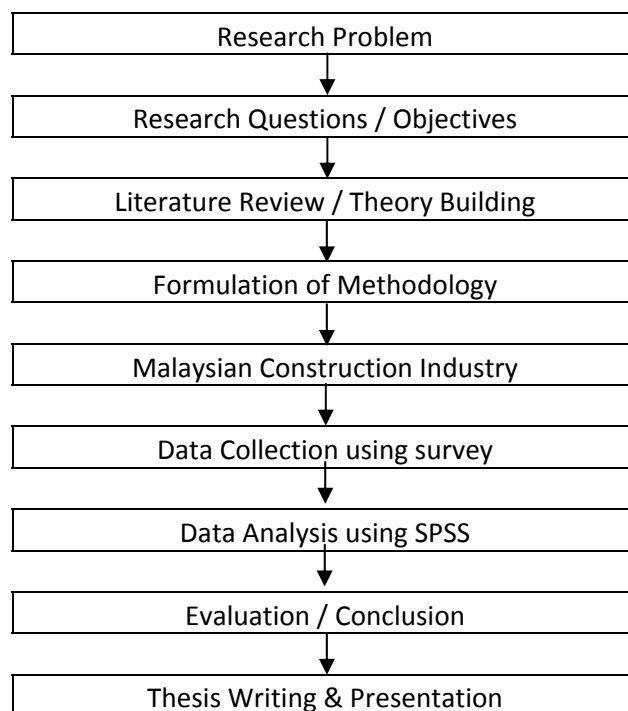


Figure 1: Research Design Flow Chart

3.5 Research Model

The propose research model of Lean Construction Systems and Tools to Operational Performance is shown below:

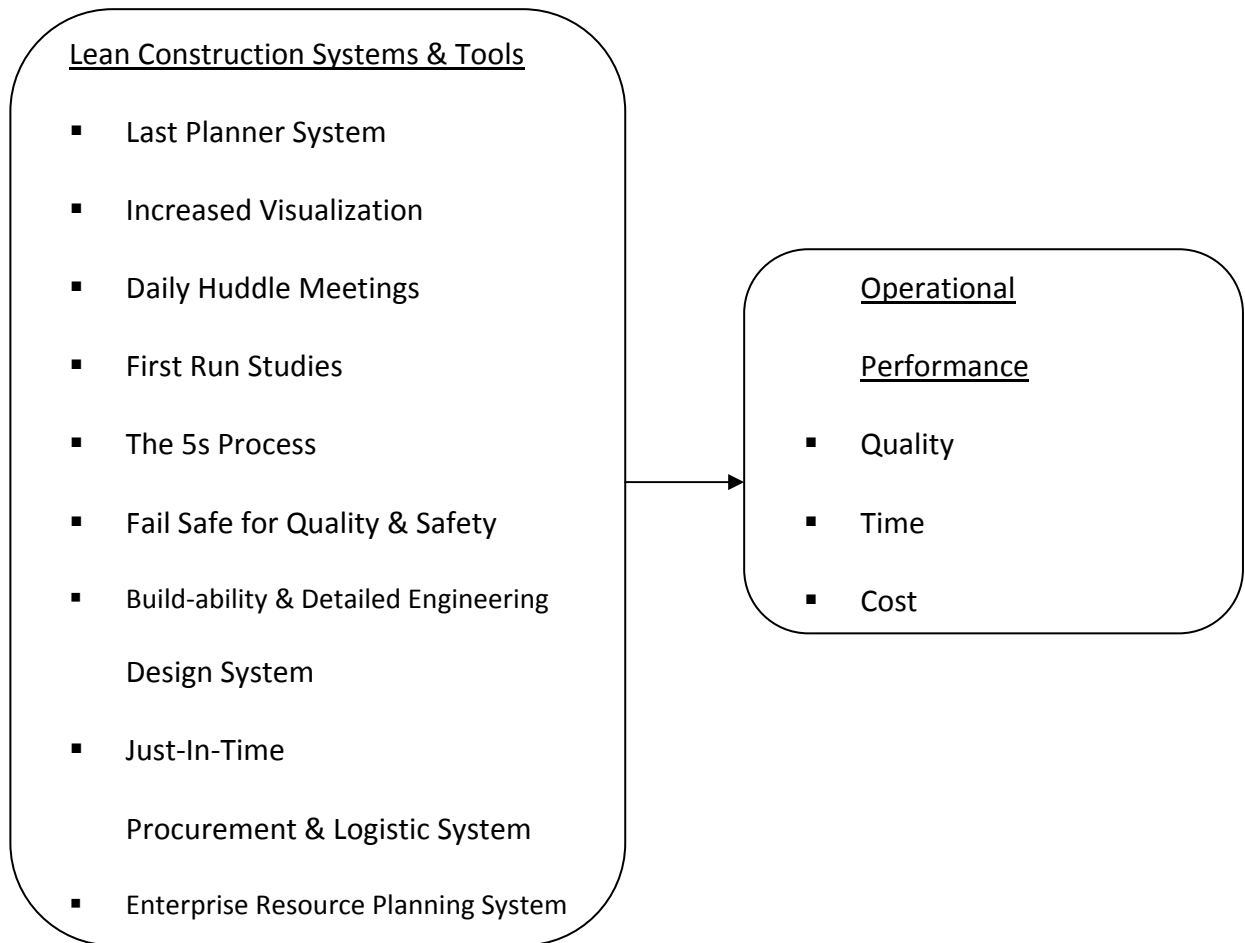


Figure 2: Research Model

3.6 Sampling Design

The population for sampling is the construction organization within Malaysian construction industry. The information of population (1Q 2010) is taken from the Construction Industry Development Board (CIDB), Malaysia where registration of construction company is mandatory prior undertaking construction works in Malaysia.

According to Construction Industry Development Board, Malaysia, construction companies are graded accordingly to their tender capacity, in total, there are 7 grades altogether:

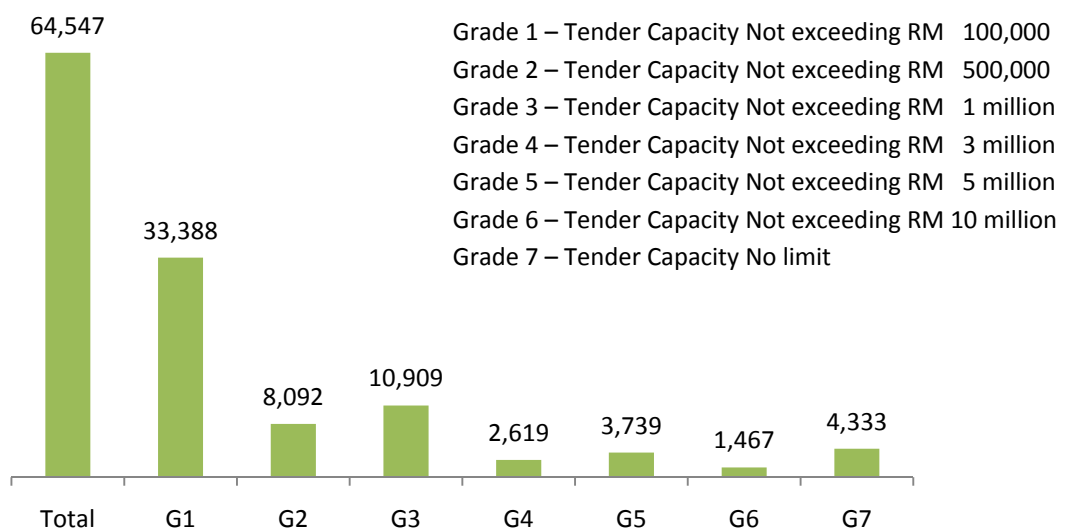


Figure 3: Contractor Registration by Grade 1Q 2010

The population can be further elaborate and sort accordingly to each state:

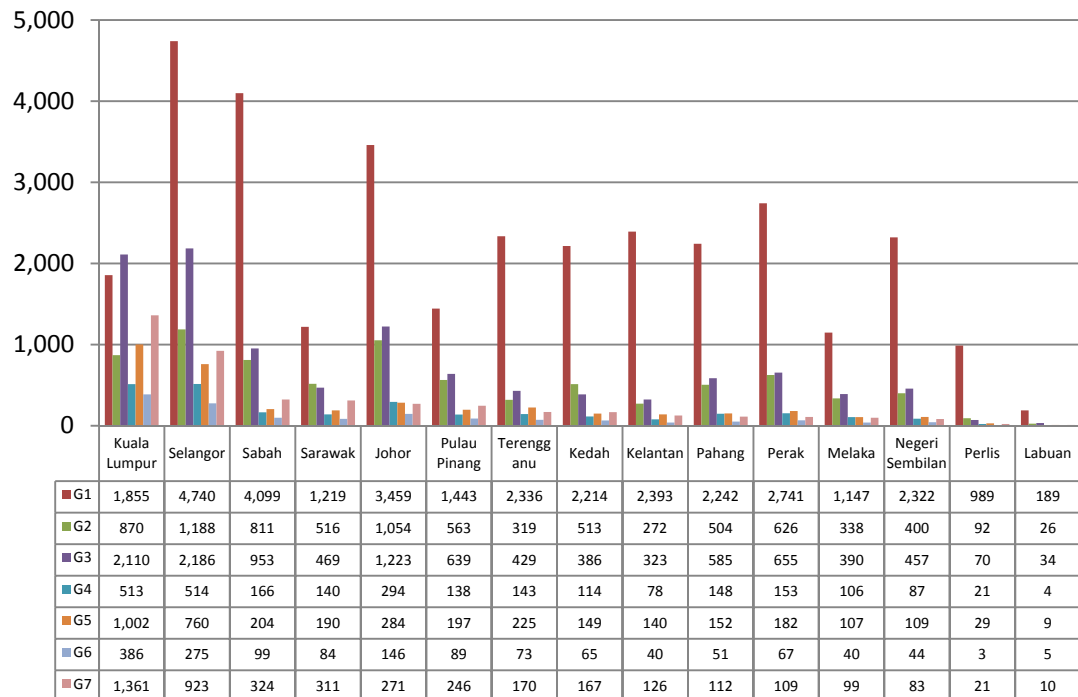


Figure 4: Contractor Registration by Grade & State 1Q 2010

According to statistic of the 64,547 construction companies in the industry:

- about 52% of the companies have tender capacity NOT exceeding RM 100,000
- about 81% of the companies have tender capacity NOT exceeding RM 1 million
- about 19% of the companies have tender capacity of exceeding RM 1 million
- about 9% of the companies have tender capacity of exceeding RM 5 million

These 9% of the construction companies of which about half locate within Kuala Lumpur and Selangor region dominate majority of the market that may be justify by the total tender capacity of more than equivalent of the rest of the states.

Non-probability Convenience Sampling is use to obtain the required information. Some 20 managers across a total of 18,683 construction companies within Kuala Lumpur and Selangor region base upon researcher working network are approach to acquire the representative data. The above managers refers to management personnel who manage a construction firm or site operation who are able to provide reliable information from management perspective for review.

Participation of this exercise is solely voluntarily with explicit confidentiality. The interview is kept anonymous to encourage participation and express of view and opinion that may be sensitive to a company operation and affect individuals career opportunity.

3.7 Data Collection Procedure

Primary and secondary data sources are used in this study. Primary data is obtained through face-to-face interview and secondary data refers to academic literature review, journal and business magazine.

In the development of these data collection procedure, it is essential to establish an effective association between question and information require. For this research the data collection instrument adopted is qualitative through the use of survey questionnaire (7.0 Appendix) answered during interview session, at the same time respondent is allow time and scope to express view and opinion.

The reason to choose interview for this research are because

- Technical and complex question and issue can be discuss and clarify as interviewer can probe area suggest by the respondent's answer, picking up information that has either not occur to the interviewer or of which the interviewer has no prior knowledge.
- Positive rapport between interviewer and interviewee provide simple, efficient and practical way of getting data about things that can't be easily observe.
- High validity as people is able to talk about something in detail and depth. The meaning behind an action may be reveal as the interviewee is able to speak for themselves with little direction from interviewer.

Survey questionnaire is break down into few section:

- Part 1, questions are designed to look into respondents' awareness and level of understanding on Lean Construction, Systems and Tools. Hence the perceive ability to effectively implement Lean Construction to improve operational performance in term of Quality, Time and Cost; thus results are better justifiable in Part 3.
- Part 2, collect the respondents' perceive level of improvement of each system and tool has on construction operational performance thus Lean Construction, Systems and Tools is feasible in Malaysia Construction Industry.
- Part 3, collect the respondent's profile and particulars such as age, education, job tenure, position and company size.

Questions are arrange accordingly and simple English language is used for ease of understanding to avoid ambiguity wherever possible. No pilot test was conducted; however questionnaire was reviewed for clarity and content validity by author's peers, friends and there-in-after by a experience manager who attained MBA. Thus the questionnaire is considered reliable in satisfying the research objectives of this study.

3.8 Data Analysis Technique

Data gathered are usually without any obvious underlying message. Structuring the data to bring meaning is messy, ambiguous, time-consuming, creative and fascinating.

Data gathered are bound to have some limitation that should be understood while interpreting the result. The interview were not anonymous and as such interviewees may be hesitant to express negative view or opinion.

Data gathered via survey questionnaire collected from the respondent are tabulated in spreadsheet, Microsoft Excel. Microsoft Excel is used for analyzing these qualitative data, in particular Descriptive Statistics Analysis is used for the purpose of this research. Descriptive Statistics are needed to describe and summarize the characteristic of the sample, such as the average response or average correlation between functions. Microsoft Excel is also selected for its sophisticated mapping feature which allows high customization of data analysis and graphical presentation.