This study is about the analysis in Lean management implementation in project management sector. The study aims to explore how Lean principles can improve the productivity of project management. The study has also identified lean tool and technique that applicable and waste in project management. In this study, qualitative method was used for collecting data. The qualitative data collected by in-depth interview with a property developer. The result of this study shows that the lean principles can improve the project productivity. Besides that, this study suggests by implementing applicable lean tools and technique, it could reduce the waste in the project management sector. The key measure of a successful project is using lean concepts to reduce the time, cost and eliminate waste. However, in Malaysia only few of the companies using lean management. The result of this study can be as a recommendation or suggestion for further study about the lean management implementation in project management.

Keywords: lean management, project management, lean project management, lean tools and techniques

INTRODUCTION

Nowadays, the challenge faced by the organizations is strong international competition, fast technological evolution, high quality demand and maturing customer expectation. The primary way for organization adapt for their existence is having effective and efficient management. Nowadays, project management plays a central role in undertaking a different kind of business activities in an effective way. Projects of today and without doubt those of the future are increasingly dynamic, unpredictable and forced to finish early (Levitt, 2011).

However, some project still often over budget, delay or does not meet the customer expectation even through a successful project can enhance a success of a business. In business, delay in project means that tend to delay of product introduction or missing some marketing opportunity. Besides that, may lose a chance to attract potential customer and lose forefront of technology. So, delaying a project has a great effect to an organization. Further, it is also identified that projects often show unsatisfactory performance with respect to productivity and quality (Atkinson, 1999). Apply an effective and efficient management method is the way to survive in the competitive market today. So, in order to improve project performance a new perspective need apply
to project management such as lean management. From this study, it aims to explore how the five principles used to improve a project productivity. Besides that, this study identifies the applicable lean tool and technique and waste in the project management sector.

**PROBLEM STATEMENT**

A project is the initial method to carry out activities in project-driven organization, even in non-project driven organization such as finance, marketing department also. In the past few years, the focus on organizing activities in projects always increasing. Researchers evolving interest in projects are also documented in research on the organization of construction, product development and of companies in a number of other industrial sectors (Midler, 1995). Recently, there has been increasing the amount of project often fail because of over budget, delay and cannot meet the customer satisfaction in term of quality. Recently, some product development project did not meet with the organization goals.

Until now, researchers from Malaysia focus on studies lean as a management philosophy with objective and principal. In a tentative study it has been shown that lean thinking can be applied to knowledge work that is characterized by task uncertainty and ambiguity with positive results (Staats, Brunner, & Upton, 2011). Thus, in order to make better current project management practice and performance it need to improved project management and analysed how lean manufacturing can be suited to project management. This can improve the interest of the company in new project management approach that can help to improve project performance, decrease duration and prevent rivalry relation in the process of executing a project. For now, lean project management practice is new. Moreover, a new perspective need introduce in project management in order to solve the common problem such as delay, cost overrun and cannot meet customer satisfaction. Thus, the relevance of lean implements in project management will explore in this study. So, this study will describe about how the lean implement can improve productivity of project management.

**LITERATURE REVIEW**

**Lean management**

Lean management plays an significant role in enhancing the performance of businesses in the USA since the 1970s. It involves reducing costs, improving quality, reducing lead-times, increasing market share, develop new products and services, human resources, etc. (Emiliani, 2006). Lean management was developed from Toyota Production Systems by Ota Ono, Shigeo Shingo and others. It is a long term approach to run an organization and to work as systematically in order to achieve small change in improving quality and productivity. Lean management referred to as lean production practices. It considers that the use of resources is a waste of anything other than creating value for the end customer and thus a target for elimination (Begam, Swamynathan, & Sekkizhar, 2013).

Besides that, Lean management does not identify activity with value, but it is focused on the principle that it is possible to produce less motion, so that costs and waste are
reduced and people work more satisfying. It seeks to eliminate any waste of money, time, or effort by identifying each step in the workflow and then removing steps that do not create value. Hence, there are five Lean principles that should be used by organizations to improve their operations and it should focus on improvement continuously. Womack and Jones define the five principles of Lean, which are accepted by major importance to the successful implementation and they are determined in the following.

a. Specifying the value
   The first principle is specifying the value from the customer’s point of view and it help to add value to the customer. Manufacturing companies challenge to develop product portfolio based on understanding customer needs, leading to comply with the specified value of Lean principles to develop a portfolio (Melton, 2005).

b. Identify the value stream
   The second principle is to determine the value stream, which means that according to the customer's point of view, rather than according to departmental needs of the organization from raw materials to the final customer process (Melton, 2005).

c. Elimination of waste
   The third principle is to eliminate the waste. Elimination of waste is a process to eliminate waste or add value to the production of a product or service, which can provide customer with one of the best product or service. Waste can be eliminated through the implementation of Lean and various Lean tools, but the focus should not be on the identification and removal of waste (McBride, 2003).

d. Establish pull
   The fourth principle focusing on the demands of customers in order for elimination of excess production. So, no need produce product early to save our inventory and produce product when demanded by the customer.

e. Seek perfection
   The fifth principle involves increasing quality by producing the product with customer need and reasonable price and off of waste (Womack, 1990). By accomplishing steps 1-4 is a start, but the fifth step is the most significant because making lean thinking and process improvement part of corporate culture.

**Lean project management**

Lean is a management system that focuses on improves quality of an organization. Lean management helps to enhance processes and worker efficiency and effectiveness in an organization. Lean management help to reduce waste of time and resources and help to improve the quality of goods or service and add value to goods and service to the end customer.

Lean project management is the delivery of projects focusing on the creation of value to the customer, allows them to reduce technical and market risks (Bosca, 2012). A company work on various projects that include making a product develop a service or process. So, lean project management is using data driven methods to manage project with focus on continuous improve. A lean project management is the process that synchronizes the flow of work and provide the customer needs.

Lean project management focus on the impact of time, resources, cost, quality, safety. Applying lean in project management can help to improve quality, empowered cross-functional work team, increase customer value, create data analysis and eliminate time, resources and cost waste. Lean project management focuses on four important things
such as process improvement, ongoing analysis, visual documentation tools and in depth planning to reduce waste and create value. Reinforce the effectiveness of project management by emphasizing iterative discovery, problem solving, value delivery, and eliminating wasteful tasks, resulting in improved quality, reduced total elapsed project time and reduced project costs (Bun, 2012).

The objective of lean project management is to enhance customer satisfaction by focus on customer value in every project. Next, by a smart standardized work process to reduce time waste. Besides that, by eliminating waste and remove and add value activity to save project cost. Next, an organization need keep improving by concentrating on learning and critical attitude during the project. Last, by continuous feedback and empowered team to get the professionalism and quality improvement.

**The seven wastes of project management**

Waste is any activity in project management that no add value to the customer. The seven wastes such as transportation, inventory, motion, overproduction, waiting, over processing and defects.

a. **Transportation**
   In a transactional environment, transportation, waste occurs when documents or folders are transported around the office in person or internal courier (Pereira, 2009). In project management, the waste occur when the first complete work and then they need to pass the work to another person. Maybe the teams working from different locations.

b. **Inventory**
   Extra inventory leads to higher inventory financing costs, higher storage costs and higher defect rates (Capital, 2004). In project management unnecessary document is a waste of inventory. Some of a project needs a lot of documents and may be some the document that is never used.

c. **Motion**
   Any wasted motion that the workers have to perform during their work is termed as unnecessary movement (Begam, Swamynathan, & Sekkizhar, 2013). In project management unwanted processes are a type of waste. Some processes are no necessary in a project can cause people doing double work.

d. **Overproduction**
   Producing items more than required at given point of time such as producing items without actual orders creating the excess of inventories, which needs excess staffs, storage area as well as transportation (Begam, Swamynathan, & Sekkizhar, 2013). In project management unproductive proposal is a waste that mean people need to redo a proposal for a project to meet customer need. If customer or project owner do not satisfy about the proposal, then need to redo again and it causes the waste of overproducing.

e. **Waiting**
   The waste of waiting occur when the goods are not moving or being processed. In project management lag between the process steps can cause waste time to wait. Some of the project will occur unwanted process so it need identify only required processes at the beginning of the project.

f. **Over processing**
   The waste of over processing is working on a product, more than the actual requirements (Begam, Swamynathan, & Sekkizhar, 2013). In project management unproductive status meeting is a waste of over processing. Unnecessary meeting
will cause waste of equipment or time. So to reduce this type of waste it needs proper plan a meeting.

g. Defects

The defect can be defined as any work that is did not meet the request of the customer. In project management, lack of technical skill set for team member is a waste. Before starting a project team member need have the right skills of the team and suitable coding standard and guideline in place up front.

**Lean tools and techniques**

a. Lean project delivery system

The holistic philosophy of lean construction is embedded in the lean project delivery system (LPD), whose mission is to develop the best possible way to design and build infrastructures (Bosca, 2012). Lean project delivery system is “a prescriptive model for managing projects, in which project definition is represented as a process of aligning ends, means and constraints (Ballard, 2008). The lean project delivery system helps customers to decide what they want.

![Figure 1](image)

**Figure 1**

Lean project delivery system (LPDS)

Lean project delivery system model have five phases that are definition, design, supply, assembly and usage. Each phase contains three project stages. First is definition phase, which it includes the build customer and stakeholder goals and values, design criteria and design concepts. The aim of this phase is to more understanding the project. The second phase is lean design which is continues the discussion with the stakeholder to develop the product design and process together. In this phase is to concentrate on maximizing customer value and minimizing waste. The third phase is lean supply included includes detailed engineering, fabrication and logistics. The logistics concept is used to decrease the inventory and eliminate lead time. The fourth phase is lean assembly. This phase starts with delivery of information, components and materials such as labour, tools so they can be installed. The final phase is lean usable. This phases end after customer start use the facility.

Every phase involves production control and work structuring. The purpose of work structuring is to get a reliable work flow by separating work into little part. The purpose of production control is focused on workflow and production unit and utilize look ahead to control it. In addition, the learning loop is used to learn and adjust the system at each stage and phases when it necessary.
b. Last planner system
The last planner system (LPS) is a decisive method of lean project management, which is inspired by the lean production philosophy. The elaboration of this system shows the adaptation of lean principles and methods to the project area (Ballard & Tommelein, 2012). This system is used to improve workflow and variability and improve control of the uncertainty in the building work.

![Last Planner System Diagram]

**Figure 2**
Last planner system

The last planner system has four schedules such as master, phase, intermediate and weekly scheduling. First, master scheduling knows as the what tasks that should be done and it consist of project activity planning and set up space and time relations between different activity plans. It is important to determine every responsible to complete each part of the project. It should show time period of project that which should act. Second, when the project is long and complex these phase scheduling is required. Phase scheduling means more detail subdivision of master scheduling to complete each part of the project. Third, intermediate scheduling also called as look ahead. Function of intermediate scheduling is penetrating deeply to the activity planning in an intermediate term. Intermediate scheduling will determine what can be done in the scheduled time. The intermediate scheduling can determine availability and needed resources for the development of activity planning. Last, weekly scheduling is determine what should be done during next week depend on the objective achieve in intermediate scheduling. In order to correct mismatches the analysis of doing the expired planning and identify the cause of non-fulfilment must be done in the weekly meeting.

**RESEARCH METHODOLOGY**

The method that used in this study is the qualitative method. The qualitative method which including primary data and secondary data. A property development company was selected for in-depth interview. This company was selected based on willingness to share information and experience. Data collection method used in this study is first contacting the company, explained the objective of the study and recorded all information. A semi structured interview guide was made by reviewing the literature done in prior study. The interview was conducted in form one to one person. The interview session was done in two hours. All answer of the interview was recorded and
note down on paper. The respondent was an executive director of the company and had been working at his position for six years and had few years working experience in civil engineering. The respondent was questioned with regard based on his actual experience.

**FINDING AND DISCUSSION**

**Company background**

Imperio Development Sdn Bhd is located at Kedah, Malaysia. The company was established in 2010. The main activities of the company are property development, management and construction. The company mission is building a harmony and suitable living spaces through sustainable architectural design to change a person’s life, encourage family bonding and minimize unfavourable environmental impact of buildings.

**Five lean principles in Imperio Development Sdn Bhd**

From the interview, the researcher identifies that the company was not a lean company and did not use five lean principles in their project management. So, the researcher analyses the interview information and would like to suggest the company the five lean principles as below.

a. **Specify Value**

   The company starts a project based on the company think it needed not customer requirement. In the property development project the customer value is clear and can be identified in beginning of the project. The customer value of this company was a comfortable home for family and friend. The added value in the project was to build a harmonious living space in a suitable place and affordable price to change a person's lifestyle and encourage family bonding. The value adding activity measure by product development which doing research before starts a project.

b. **Identify the Value Stream**

   Before starting a project, the company doing research and land sourcing to identify the customer value. After specifying the value from a customer viewpoint, the company would plan to buy a land. The company will do a market survey to collect population data and brainstorming with an architect and the management team to decide what kind of property project need to be developed. After this, the company needs to get the authority, compliance from the local government. After getting the permission, the company will start to do advertising and promotion. Next the company starts to outsource the construction team to start the project. After the property does the company will deliver the product to the customer. After delivery, there has a period to check the defect. If there is any defect, the company will solve it immediately.

c. **Elimination of waste**

   The company used Information for Competitive Advantage (IFCA) software to manage their project development from initial stage until the last stage. So, this software helps the company reduce 80% of workers and reduce cost.

d. **Establish Pull**

   The company pulls the work before the project. The company was doing advertising and promotion before start to build the property. The company will sell the property to customer before construction. This can reduce the risk of overproduction and inventory waste and cost.
e. Seek Perfection
The company did not have improvement team. However, improvement and adjustment were made based on the feedback from customer. The quality of the project was control of the company. After the project started, the project manager will monitor progress of the project to measure the quality of work. On site supervisor and worker control the quality of work on the construction site. Besides that, the company using IFCA software to manage the project development. IFCA software is used to monitor project cost and budget and ensure the project complete within budget and schedule. It also used to record each of sale, monitor billing and follow up on loan and documentation. So, with this software the workflow of the project can manage and control effectiveness and efficiency.

Lean tools and technique
From the interview, the researcher identify the company did not implement any lean tool and techniques. Therefore, below are some of lean tools and technique suggested to the company.

<table>
<thead>
<tr>
<th>Lean tool</th>
<th>Description</th>
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| Lean project delivery system| • A process to align people, business process and system to help customers decide what they want, reduce waste and maximize effectiveness of the project.  
• This system was shown that what should be done and who responsible for the task for beginning of the project.  
• The beneficial use lean project delivery system are less rework, easier to create a high quality building, reduce design documentation time and system for managing relationship with the committee. |
| Last planner system         | • A method to control project, decrease variability and improve control uncertainty of the project.  
• The benefit use this system are can deliver projects faster and safe, reduce cost, build collaboration with project team and reduce stress of project management worker. |
| 5S                          | • A system that can improve workplace efficiency and reduce waste.  
• The five steps in 5S are soft, straighten, shine, standardize and sustain.  
• The benefit to use this system are helping the company improve performance in project productivity and quality, fewer defect will occur in the project and can create a more efficient workplace. |

The waste in project management
From the interview, the researcher identifies that there were four types of waste existed in Imperio Development Sdn Bhd based on seven types of waste. From the interview the first waste was inventory. Inventory waste occurs when unnecessary document in the project management. A project needs a lot of documents, but maybe some of the documents are never used or unnecessary. For example unproductive proposal is a
waste of inventory. The proposal do not meet to goal of the project so that it becomes an unnecessary document. Second waste was a motion which is an unnecessary movement occurring in the office. From the interview unwanted processes occur in the office. Some of process causes the people need do double work in a project. An unproductive status meeting occurs in the office and it causes waste of time and unnecessary motion. Next waste was waiting which happens when people queued up. From the interview waiting time waste occurs when the company need wait the authority compliance from government. It was causing the project management lag between process step. Before getting the authority compliance from local government, the company cannot carry on the next step. Last waste was a defect which will cause rework and late delivery. For the interview, the defect occurs when a quality defect occurs at a construction site. It need rework and cause wasting time and late delivery to customer. Besides that, some error finds in the paperwork and it need to redo. This kind of defect will waste material and the cost of the company.

CONCLUSION

Since the traditional project is facing several problems that was having an impact on the project efficiency so that in this study a new approaches have been studied and analysed which is lean project management. Lean project management is best approaches to minimize waste and maximize value in a project. In this study, an interview conducted from the Company Imperio Sdn Bhd has been able highlight that how five lean principles to improve project productivity. From the interview, the respondent agreed that implement lean can decrease human work, cost, and error and increase speed of work and project efficiency. The finding also highlights that there are four waste of project management. These wastes are inventory, motion, waiting and defect. The lean tool and technique that is applied in project management are lean project delivery, last planner system and 5S. From this study, it concludes that possible implement lean and applying lean tool in project management.

This study has been able to successfully achieve the objective by analyse the five lean principles, applicable lean tool and technique that suitable to the company and identify the waste in the project. However, the study limited to one company and study duration for three months, so it was influencing the result generalization. Therefore, future researcher is advised to make a comparative study to identify the differences in project work in implementing lean in project management.

REFERENCES


