Chapter 27
A Case Study of Lean Manufacturing Implementation Approach in Malaysian Automotive Components Manufacturer

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1 Introduction

The lean manufacturing (LM) or Toyota production system (TPS) is one of the proven productivity and quality improvement initiatives in the automotive industry. TPS was pioneered by a Japanese automotive company, Toyota motor corporation (TMC), during 1950s. TPS was born through various efforts of TMC to catch up with the automotives industries of western advanced country after the end of World War II. TPS has been initiated, created, and implemented from actual practices in the factories of TMC, and it has a strong feature of emphasizing practical effects, and actual practices over theoretical analysis. Due to its global superiority in cost, quality, flexibility and quick respond, LM was transferred across countries and industries [1]. LM has become a widely acceptable and adoptable best manufacturing practice across countries and industries [2]. The primary goals of LM were to reduce the cost of product and increase productivity by eliminating all kinds of wastes or nonvalue added activities [3]. Hence, LM or TPS is a productivity and quality improvement initiative that hailed as a cost of reduction mechanism [3–8].

In order to success in LM implementation, there are several factors and approaches. Prior study has identified four critical success factors: leadership and management, financial, skills and expertise, and supportive organizational culture of the organization [9]. Other researchers also suggested that applying the full set of

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lean principles and tools also contribute to the successful LM transformation [10, 11]. However, in reality not many companies in the world are successful to implement this system [12, 13]. Furthermore, previous researchers insist that there is no "cookbook" to explain step by step of the LM process and how exactly to apply the tools and techniques [14–16]. Many manufacturing companies have implemented LM in many different ways and names in order to suit with their environment and needs. Therefore, it is important to conduct the research in order to identify the approaches and processes in LM implementation.

In Malaysia, some studies have been done in manufacturing industries regarding LM implementation. Wong et al. [17] focused to examine the adoption of LM in the Malaysian electrical and electronics industries. Nordin et al. [18] focused on exploring the extent of LM implementation in Malaysian automotive manufacturing industries. Both studies found that most of the Malaysian manufacturing industries have implemented LM up to a certain extent and in-transition toward LM. However, the findings based on Malaysian manufacturing industries do not provide on how to implement and what approach to be used to successfully implement LM. Hence, this research is very important to give more detail sequences and steps in implementing LM.

Therefore, the purpose of this study is to investigate on how to implement and what suitable approach to be used in order to successfully implement LM in Malaysian manufacturing industries. The investigation focuses on the LM implementation approach in Malaysian automotive components manufacturer. From this study, it will give one of the several approaches in implementing LM that has been practiced in Malaysian automotive components manufacturer. This study will present and highlight the early stage of the LM implementation approach by the case study company. The next stage of the LM implementation approach will be presented in future publication that will highlight the continuous improvement of LM implementation approach in order to sustain the efforts and success.

2 Research Methodology

The research methodology used in this research is a case study methodology. Through this case study, it enabled several sources of evidences and practices to be highlighted. The case study also provides better understanding of the problems faced by the Malaysian automotive components manufacturer. The case study method allows researchers to retain the holistic and meaningful characteristics of the real-life events. Furthermore, the use of case study as a research method based on three conditions as follows [19]:

1. The type of research question posed: typically to answer questions such as"how" or "why"
2. The extent of control an investigator has over actual behavioral events: when investigator has no possibility to control the events
3. General circumstances of the phenomenon to be studied: contemporary phenomenon in a real-life context

A case study was performed in one of the automotive components manufacturers in Malaysia. This company selected was based on its achievement as a TPS model company awarded by Malaysia Japan automotive industries cooperation (MAJAICO) in year 2007. MAJAICO is a 5-year project from 2006 until 2011 initiated under the Malaysia Japan economic partnership agreement (MJEPA) to develop and improve the Malaysian automotive industry to become more competitive as global automotive players. The main function of MAJAICO is to introduce continuous improvement activities in manufacturing companies mainly through total implementation of lean manufacturing. Under MAJAICO project, TPS has known as lean production system (LPS) where the activities have been conducted by the Japanese experts and local experts from perusahaan otomobil nasional sendirian berhad (PROTON) and perusahaan otomobil kedua sendirian berhad (PERODUA).

Interview was conducted at the case study company with two interviewees at managerial level; manager of safety environment & quality management, and assistant manager of TPS & skill development. Both of them are from total quality management department and very wide experience in conducting LM implementation projects. Interview was conducted through prepared semistructured and open-ended questionnaires. The semistructured interview and open-ended questions were used where interviewees were encouraged to explain why the line operated in a certain way [20].

The semistructured and open-ended questionnaires were utilized to gain insights into the status of LM implementation approach in this case study company. For this case study company, the semistructured and open-ended questionnaires have been divided into three sections as follows:

(a) The company's background information—Year of establishment, start of production, ownership, number of employees, products, customers, and achievements.
(b) The understanding of lean manufacturing.
(c) The implementation of lean manufacturing.

In order to find out the approach of LM implementation from this company, a number of questions were tailored to enable the extraction of ideas that give a true reflection on the interviewee's practices. The questions attempt to investigate the company's understanding of LM and LM implementation. For example, the key questions in section (b) and (c) of the semistructured and open-ended questionnaires were as follows:

Section b: The understanding of lean manufacturing

- When did your company started to implement LM?
- What is your understanding about LM?
- Who has motivated your company to implement LM?
- How long it takes to complete the first implementation project of LM in your company?
- Do you think it is necessary to hire consultant to assist the implementation of LM? How about your company's practice?

Section c: The implementation of lean manufacturing

- Who is the person responsible to lead the implementation of LM in your company?
- Where has LM been implemented in your company?
- What were the criterions for choosing that specific area?
- How many people involved in the project?
- What kind of waste does LM eliminated in the project?

During the interview session, it was tape recorded with the permission from the interviewees to avoid any missing points of information given by them. Finally, the overall information obtained from the interview session was summarized and verified with the interviewees. Findings from the interview were analyzed and discussed in the findings and discussion section.

3 Background of Company

From the section (a) of the semistructured and open-ended questionnaires, the company's background information was gained and illustrated in Table 27.1. The name of this company is changed to MJ Sdn. Bhd. in terms of confidential issues. The company was established on 3rd April 1980 and starts their production on 1st July 1983. They have two manufacturing plants; thermal systems plant and electronics plant. In thermal systems plant, they have three product divisions: air-conditioning, cooling systems, and wiper & motor division where they produce nine products namely condenser, compressor, hose, piping, heater, ventilator, blower, radiator, and washer. And in electronics plant, they have four product divisions: industrial systems, electronics, body electronics, and engine control division where they produce four products namely programmable controller, engine electronic control unit, air-con amplifier, and CDI amplifier.

Currently, the number of employees of this company is 1,200 persons. This company is an industry specialist in high quality and technologically advanced automotive components with original equipments manufacturer status. This company has manufactured a total of 13 products from these 2 plants. This company is a major automotive components supplier to national car in Malaysia. Their major customers are Toyota, their own group companies, Perodua, Honda, Proton, and others.

4 Findings and Discussions

In 1996, the first lean manufacturing implementation initiative in this company was started. At the beginning, the concept of lean manufacturing is still new and the knowledge in this company is still at a very low level. In 2002, the president of the company from headquarter in Japan came and asked to continue lean

Table 27.1 Company's profile

Company name	MJ SDN.BHD.	
Establishment	3rd April 1980	
Start of prod.	1st July 1983	
Employees	1,200	
Land area	70,100 M	
Build up area	17,410 M (office + thermal systems plant) 14,060 M (electronics plant)	
Manufacturing product	Product division	Products
Thermal systems plant	Air-conditioning	Condenser, compressor, hose, piping, heater, ventilator, blower
	Cooling systems	Radiator
	Wiper & motor	Washer
Electronics plant	Industrial systems	Programmable controller
	Electronics	Engine electronic control unit
	Body electronics	Air-con amplifier
	Engine control	CDI amplifier
Customers	Toyota, MJ Group Companies, Perodua, Honda, Proton, Others	
Achievements	1994 – ISO 9002 certification from SIRIM 2000 – ISO 14001 certification from SIRIM 2003 – ISO/TS 16949 certification from SIRIM 2006 – Company group president award 2006 – Achieved zero emission 2007 – TPS model company by MAJAICO 2007 – Environment award from selangor government 2007 – Achieved quality management excellent Award from MITI 2007 – Proton best overall performance award 2008 – ISO 9001:2000 certification from SIRIM 2008 – OHSAS 18001/MS 1722 certification from SIRIM 2009 – The winner of ministry of international Trade and industry Malaysia (MITI) 2009 – The winner of prime minister hibiscus award	

manufacturing activities in proper way where one team was formed with five full-time members. At the early stage of lean manufacturing implementation in this company, the project-based approach was used. The project is based on a small-scale project where the focus of LM implementation in this company is to solve the problem at the small area. From the interview, the authors have formulated the lean manufacturing implementation approach by this company as shown in Fig. 27.1.

From Fig. 27.1, this company forms a small team with five full-time members to run the lean manufacturing implementation project. A few Japanese experts from headquarter in Japan came to teach and shared their knowledge of lean manufacturing implementation with the team members.

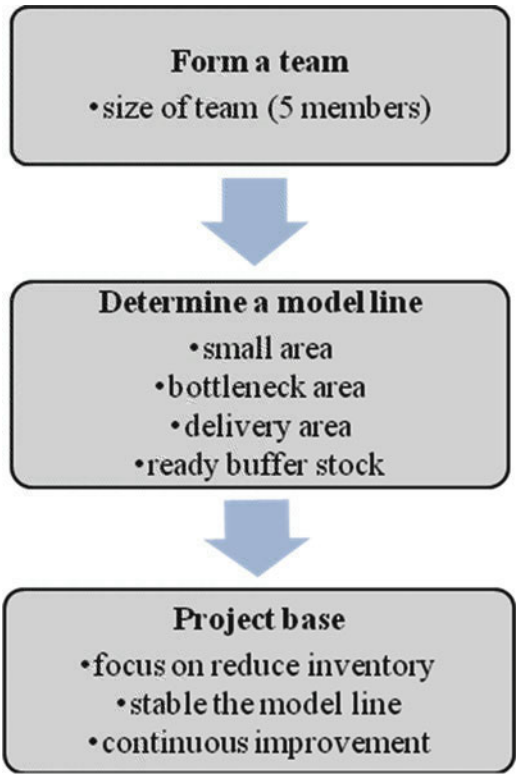

Fig. 27.1 Lean manufacturing implementation approach

The next stage, a small team determines one model line in order to run the lean manufacturing implementation project. There are a few criterions to determine the selection of a model line. The selection of the model line was based on the following characteristics: small area, bottleneck area, and delivery area. Before running the lean manufacturing implementation, the buffer stock was ready and prepared at the model line for any shortages of the product during lean manufacturing implementation.

Finally, at the project-based approach by this company, the focus of lean manufacturing implementation is reducing the level of inventory. For this company, inventory is the mother of other wastes. There are several wastes that have been identified by the prior research. The seven main types of wastes identified by the father of TPS are as follows [21]:

- Waste of over production
- Waste of waiting inventory
- Waste of unnecessary transportation
- Waste of waiting times
- Waste of unnecessary processing
- Waste of unnecessary motion
- Waste of defected products

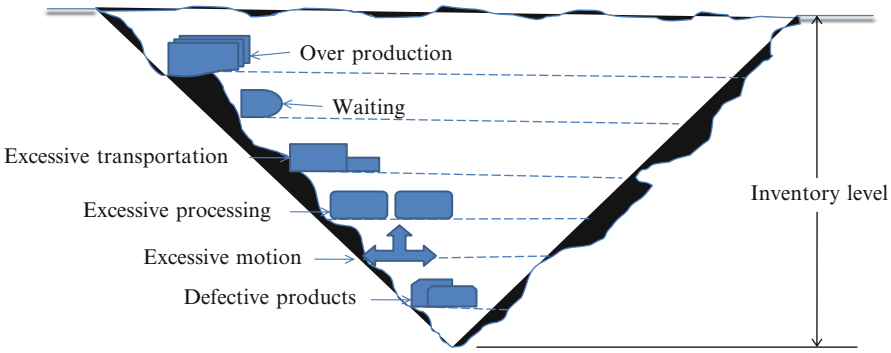

Fig. 27.2 The level of inventory

In lean manufacturing implementation approach by this company, the level of inventory is visualized similar to the level of water in a river. When they reduced the level of inventory, this means that they will be able to lower down the level of water in the river. Consequently, this action will highlight other wastes hiding at the lower level. The other wastes at the lower level are namely over production, waiting times, excessive transportation, excessive processing, excessive motion, and defective products. This scenario of reducing inventory level can be best illustrated by the authors as shown in Fig. 27.2.

In the project-based approach by this company, they did the continuous improvement effort at the selected model line. This continuous improvement effort is continued until a saturated level of major improvement is made, and they reached the stable condition of the model line. In certain cases stabilizing the model line, the interviewee highlighted they did the major improvements for up to ten times. The duration to complete the LM implementation project by this case study company is within 3–6 months. The same approach of implementing LM as shown in Fig. 27.1 will be used continuously in the next LM implementation project to another area [22].

This direction and approach in LM implementation is similar with a traditional Toyota approach where they begin with a model line. In Toyota, they helped their external suppliers to implement TPS through their operation management consulting group lead by Taiichi Ohno [23]. However, findings from the interview session regarding the assistant from the consultant show different approach. In this case study company, they did not hire any external consultant. They solely depend on the internal consultant from their own group companies and their skill workers that have been trained in Japan. They also used their own facilities and their companies' facilities in order to implement lean manufacturing tools and techniques. For this case study company, they did the basic LM implementation largely common sense and suit with their environment and needs.

The analysis done by [24] found that the major difficulties companies encounter in attempting to apply lean are a lack of direction, a lack of planning, and a lack of adequate project sequencing. Consequently, this case study company has clear

direction from the top management, proper planning done by the full-time team members, and has a long-term project in LM implementation. This long-term project will be discussed further in the next stage of LM implementation approach. It can be said that this company has their own strength and capabilities in order to implement lean manufacturing and further develop their LM implementation approach.

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