



2nd Global Conference on Business and Social Science-2015, GCBSS-2015, 17-18 September
2015, Bali, Indonesia

Reducing High Setup Time in Assembly Line: A Case Study of Automotive Manufacturing Company in Malaysia

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Abstract

Lean Manufacturing System has been identified as an approach for improving performance of the processes and products. High setup time can be classified as waste for the company. This study will focus on how an automotive manufacturing company in Malaysia is able to improve their operations time by reducing setup time and at the same time improve their productivity level. The objectives of this research are to identify the factors that influence high setup time and to highlight the action that can be minimized to reduce the setup time. Observations and interviews were conducted to understand the whole assembly process.

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Peer-review under responsibility of the Organizing Committee of the 2nd GCBSS-2015

Keywords: operations; automotive company; productivity; lean manufacturing; setup times

1. Introduction

Lean manufacturing is a quality management practice and philosophy that is popular among manufacturing employers. Other than in the manufacturing area, the system has been applied in other areas including automotives, electronics and consumer products and services. In the past, the price of the product depends on the cost of manufacturing and profit margins, now most product prices are fixed while gains only depend on the reduction manufacturing costs. Due to these reasons, the plant has to run with high recovery cost as a consequence of high

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operation cost, hence resulting to a lower profitability.

In order to reduce the manufacturing cost, company can try to reduce operation assembly time by eliminating some non value added processes which incur additional cost to operation such as tool fixing, shortage of parts and others. High setup time can be classified as a waste for the company. It is important for a company to take action to reduce setup time in order to increase productivity. Setup reduction is an important tool in lean manufacturing to meet the demands of customers. Quick changeover is one in Lean Manufacturing techniques that try to reduce or even eliminate setup time. By reducing setup time, the proportion of productive time will increase. This study focuses on how assembly time for one activity in operation affects the whole production process.

Setup time reduction is one of the lean manufacturing activities with one main objective that is to eliminate waste. Setup time reduction is also known as single minute exchange of dies (SMED) and also known as quick changeover. SMED was originally developed to improve machine tool setups, but the principles were applied to all types of processes (McIntosh, R.I., Culley, S.J., Mileham, A.R. and Owen, G.W., 2010). By identifying factors influencing high setup time and the action that can be taken to minimize setup time, organization can reduce the manufacturing cost and at the same time increase the productivity level.

The ability of company to apply lean concept by reducing waste, minimizing cost and increasing productivity allow a company to maintain competitiveness in the industry. Once a company is able to identify which particular activities that incur longer time and non value added activities, completion time is reduced thus millions are saved.

The objectives of this study are to identify the factors influence high setup time and to highlight the action that can be minimized to reduce the setup time. By achieving all the objectives above, the results can help a company to understand the importance of reducing setup time. This can benefit a company in terms of cost and time consuming in production activity.

2. Literature review

2.1 Lean manufacturing

Lean in manufacturing focuses on improving the throughput of a facility, reducing the lead time, inventory, defects, rework and process wastes and ultimately improving financial savings and customer satisfaction (Melton T, 2005). Application of lean is not limited to the automotive sector only, but, it has also found acceptance in a wide range of manufacturing industries operating under a unionized or a non-unionized environment in the US (Shah and Ward, 2003). Many organizations are enthusiastic to adopt lean manufacturing in order to improve their performance in this competitive globalized market where uncertainty is prevalent (Wong, Wong & Ali, 2009). The adoption of lean has enabled companies to focus on timely delivery of quality product to the customer with low waste (Peter Ball, 2015). Anna, (2014) claimed the idea of lean can be summarized in a simple and short definition – “doing more with less.” Even though the definition is an obvious oversimplification, it conveys the crucial aim of the overall idea of lean – more effective utilization of available resources.

2.2 Waste

Waste is anything that does not contribute to transforming a part to the customer needs. Waste, often called muda, in Japanese, comprises seven types of common waste: over production, unnecessary motion, excess inventory, excess transportation, rejections/rework, waiting, and over processing (Cachon and Terwiesch, 2009). According to Ron Pereira (2009), waste, or muda in Japanese, is any activity that adds no real value to the product or service being created or delivered. According to Yamagar, A.C. & Ravanan (2010), cost reduction is a better option than increasing revenue because capacity of plant is fixed and has to increase price, but due to the presence of competitors in the market it may not be possible. The decision making to eliminate some process or stages is not an easy decision as mentioned by Manimay Ghosh, (2012), apparently, elimination of these wastes looks simple and straightforward, yet their identification is often difficult in most organizations.

2.3 Setup time

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