ROAD MAP OF DEVELOPMENT FOR PULL SYSTEM IN THAILAND SMALL AND MEDIUM AUTOMOTIVE PART MANUFACTURER

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Abstract

Since most of the Thai small and medium enterprises (SMEs) that manufacture automotive parts are facing problems in the production system inefficiency and the employees that do not understand the working system properly, accordingly, the production costs have risen up. This research aims to provide guidelines to develop a pull production system for small and medium enterprises that manufacture automotive parts using the lathe method in the production. Data was collected from the interview conducted with the employees at the factory which manufactures automotive parts by the lathe method and using the pull system efficiently in 5 factories in Thailand. The results from the study were analyzed, compiled, and made it suitable in order to develop the pull production system for the small and medium enterprises that manufacture the automotive parts by the lathe method in Thailand step by step. The results showed that in order to develop the production system to the pull system, the firms should operate according to the following steps: 1.) Set up the agency which is directly responsible for the system 2.) Train the employees 3.) Do 5S activity and visual control 4.) Conduct training across the production lines 5.) Bring Kanban and Kaizen cards into use 6.) Set standard for the production and once the production process of the enterprises is put into the pull system, it must be maintained to keep it as a standard. In addition, it improves the quality of production system of the enterprises.

The advantage of adopting the pull production system is that the firm can quickly adjust the system according to the production procedures. Although the study focused only on the firms that use the lathe method, the researcher found that the study could be applied to the factories using other manufacturing methods.

Keywords: *Pull system, Waste, and Standard work*

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1. INTRODUCTION

Medium and small enterprises are very important to the economy of Thailand since there are as many as 92 per cent of factories throughout the country. Consequently, it is considered to be a priority as well as supporting large industries to be competitive with other countries. In addition, these small and medium enterprises generate revenue to the local as well as the country. Nowadays, SMEs companies need to have potential to adapt in the context of globalization. However, most of the SMEs factories in Thailand still have problems and limitations in terms of the adequacy and effectiveness of inputs. It was also found that other important issues are the inefficient production system and employees do not truly understand the working system. These problems led to the higher cost of production. Therefore, it is necessary to attain the development of production system to make it efficient and effective, reduce losses in the production, high productivity quality standards to be used in the development of manufacturing technologies and increasing productivity potential in order to increase the competitiveness of the organization to the highest level.

Automotive and automotive parts industries in Thailand are considered main industries that can generate a lot to the economy of the country and continue to grow. This is because in the present, Thailand exports vehicles and automotive parts in a large amount to foreign countries. There is a lot of foreign companies that come to invest in Thailand and use the country as a base for producing automobile and automotive parts in order to export their products abroad. Thailand automotive industry also has a few advantages as compared to other countries such as availability in the infrastructure and the ability of the workers that are important factors affecting the automotive industry in Thailand to have high growth rate. The key issue to consider is the strong automotive parts manufacturers that are the main foundations for sustainable competitiveness of the country. These manufacturers must have the ability to manage production costs that are rising continuously and are prepared for future changes in the economy, society, environment, and technology advances in order to prepare for the ASEAN Economic Community (AEC) initiation.

The pull system is a system that will be operated only when the customer needs with inventory control as much as it is sufficient to make the process flows smoothly. When external customers and departments pull the products, it should be an order of parts to replace what is being used. In case of no order made, the inventory is still kept until the process runs. Pull system is a system that does not cause excessive production and has inventory to some extent which is a concept which aims at producing products and services in quantities that fit the needs of the customer (make-to-order). In addition, it is the production system that

is directly related to the needs of the customers, which results in the implementation of low-cost plant.

According to the problem of high cost of production which is due to the lack of an effective system of production and employees do not truly understand the system, the researcher then developed guidelines for the pull production system for the small and medium enterprises in Thailand that manufacture the automotive parts that use lathe method step by step. Consequently, the entrepreneur can understand and put into practice effectively. Therefore, the factories have a low cost of operation and can produce to the standard level to achieve the goals that were set.

2. SCOPE OF STUDY

Study the pull system from the automotive manufacturer which has the assets of over 200 million baht or number of 200 employees and production method of lathe of 5 plants.

3 RESEARCH TOOLS AND PROCEDURES

3.1 Tools: Questionnaire about the pull system in automotive manufacturing plant.
3.2 Procedures
3.2.1 Study a few textbooks and research papers related to the pull system.
3.2.2 Study the data from large-scale automotive manufacturers that use the lathe method with the pull system.
3.2.3 Study the documents and textbooks about the interviewing methods.
3.2.4 Conduct the interviews about the production of automotive parts that cover the objectives of the research. The style of the research is characterized by semi-structured questions (semi-structured interview) divided into 3 sections as follows:
Section 1 Demographics of the interviewees
Section 2 The process of pull production system
Section 3 Problems and recommendations
3.2.5 Show the questionnaire to the expert to determine the appropriateness and completeness of the contents (reliability and confidence).
3.2.6 The checked questionnaire by the expert is used for interviewing the employees who perform the work related to the pull system of large-scale automotive parts manufacturers that use lathe method and the use of effective pull system of 7 employees from 5 factories.
3.2.7 The collected data were compiled and analyzed and documented in the developing manner in order to improve the manufacturing process in the automotive parts industry which uses the lathe production method in the production system step by step.
3.2.8 Present the development procedures to the expert to check the accuracy and completeness.
3.2.9 Present the approved pull system development plan by the expert to the interviewers of 5 companies to check the accuracy and the appropriateness.

4. CONCLUSION

The result of the research is the development which was divided into 2 phrases as follows:

- Phase 1 Environmental change
  To improve the environment of the plant to be suitable to the pull system. There are 6 steps that need to follow in order to complete before starting the next step as follows:
  Step 1 Set up a department to be responsible
  Step 2 Train and give knowledge about the pull system
  Step 3 Adjust the environment to suit the pull system
  Step 4 Adjust the workload
  Step 5 Support the pull system efficiency
  Step 6 Create the standard works

- Phase 2 Maintaining the environment

4.1 Phase 1 Environmental Change

Environmental change consists of several steps as shown in Figure 1

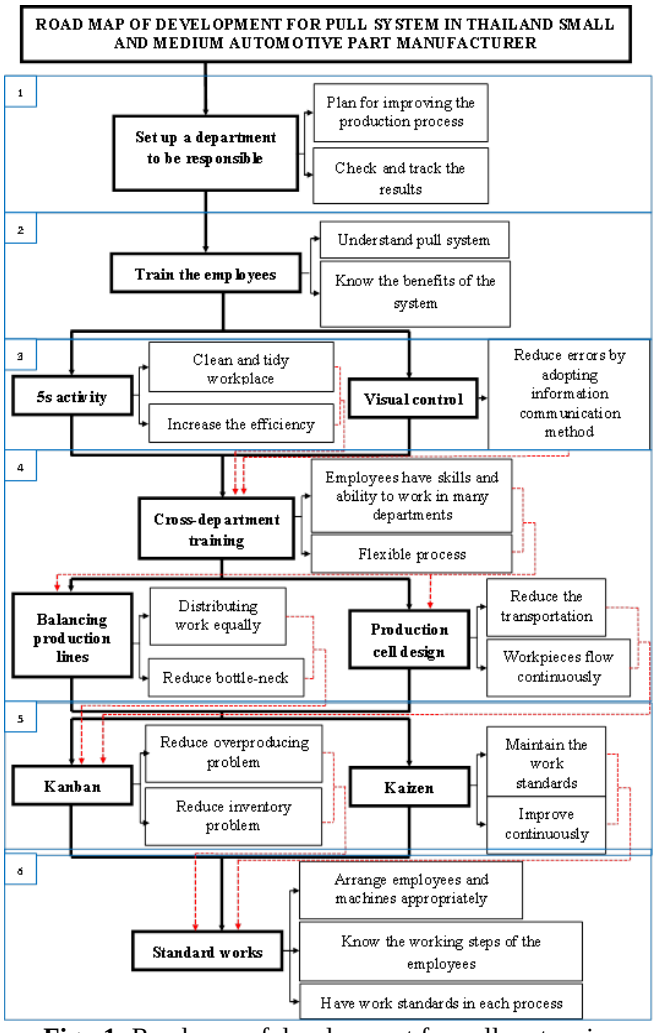

Fig - 1: Road map of development for pull system in Thailand small and medium automotive part manufacturer

4.1.1 Step 1 Set up a Department to be Responsible

Establish a department which is directly responsible for the changes from the production system to the pull system. It is a department which is under the plant manager or the person who has an authority to make the transition smoothly and quickly. Moreover, the members of the department are educated about the implementation of changes to the pull production system.

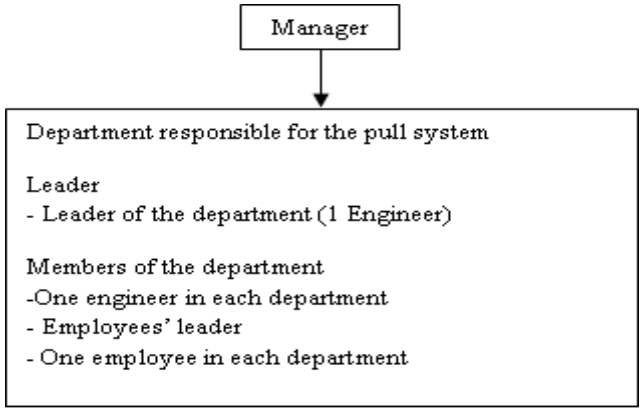

Fig - 2: Set up a department to be responsible

and implementation of the changes from the beginning. Then monitoring and tracking are needed to be done in order to follow the plan until the pull system is put into the process.

4.1.2 Train and Give Knowledge about the Pull System

Educate the employees about the details of the pull system including the benefits will arise from the use of pull system by the established department.

Objective: To provide employees with the understanding in activities that will be used and the benefits of the pull system. This will enable the employees to work more efficiently and have a positive attitude towards the pull system.

4.1.3 Adjust the Environment to Suit the Pull System

Bring in the 5s activity and also visual inspection:
1. 5s [5] activity is an activity which is about eliminating unwanted items and put things in order. It also includes cleaning of the equipments and working areas with clean and sanitary condition in order to maintain everything in good condition. It is also needed to create the awareness in the practice continuously.

Objective: To make good atmosphere and environment at the workplace in both objects and the place to be safe and tidy. As a result, the employees can work easily with confidence and there will be safety in the workplace affecting the employees' morale and leads to increase in productivity of the plant.

2. Visual control [10] is the use of information provided in the workplace such as the signals and colors that relate to the job description, working environment and type of materials used.

Objective: To acknowledge and make the employees understand the information in a short time. Consequently, the process can run smoothly and safely and thus, the products are produced within the given time to generate more profits as well as encouraging the employees (Employee moral).

4.1.4 Adjust the Workload

This step makes the production runs smoothly by adopting cross-functional training, manufacturing cell design and balancing the production lines.
1. Cross-functional training [4] is training the employees who are not specialist to be able to work in various jobs.
Objective: To keep the production flows smoothly to make it flexible to work as the employees are skilled in many aspects of performance. When the product of other departments is on demand, the employees can move to work in those departments effectively immediately.
2. Cell design manufacture [2] is about adjusting machines in order.
Objective: To shorten the flow path of the workpiece by putting the machines of the same product together.
3. Balancing the production lines [8] is to distribute workloads to the employees equally.
Objective: To make the running time of each unit equal or nearly equal.

4.1.5 Support the Pull System Efficiency

Bring Kanban card and Kaizen activity into the process
1. Kanban card [1] is a tool used instead of the order or picking up the workpiece from the previous process. The card specifies the order of transporting the workpiece which includes details such as the name of the workpiece, amount, sources, and time.
Objective: To provide a convenient and quick distributing process with accuracy and can produce parts to replace the pulled parts.
2. Kaizen [9] activity is an activity which aims at improving the process continuously by eliminating 3 wastes known as Muda, Mura, and Muri. Muda is a waste due to several activities. Mura is a waste due to irregularity which occurs in all aspects. Muri is a waste due to the reluctance of the things that exceed the needs.

Objective: To reduce wastes that occur in the production process and increase the efficiency of the work.

4.1.6 Create Standard Works [7]

This step is about setting the standard for each and every employee. This is the step which helps clarify the work process by describing the activities and procedures. The details about the time of production, amount of workpieces

in process, the demand for workpieces, operating place, and inventory.

Objective: To make the employees perform the work according to the standards and move in the same direction. It is also about increasing efficiency in work and good coordination which can be ensured that the operation is controlled regularly. Moreover, it is used as a guideline to review and evaluate the system. Lastly, it can be used to provide training to employees and those who are involved.

4.2 Phase 2: Maintaining the Environment [6]

When the production process is put into the pull system, the environment needs to be maintained. The department which has been established by activity 1 must continue to monitor and track performance. If there is any mistake, the researcher will find the cause and solution as soon as possible. The model used in this research is the Deming Cycle which has 4 operating steps: P (Plan), D (Do), C (Check), and A (Action)

Objective: To avoid the variability that can occur from various causes in the production. There is a checking periodically to contribute to the solution so the problems are quickly solved and prevent from causing problems again. This step also aims at maintaining the standards and to enhancethe quality of the production processes.

5. RECOMMENDATION

5.1 Senior executives should arrange meetings to train and provide knowledge to the employees to make them understand the overall image and the benefits of the pull system because the factories that change the production system to pull system usually have staff resisting problem. The cause is the thought of doing everything in the traditional way would be the most efficient, however, the pull system is a new system which puts more loads on the employees.

5.2 Pull production system is a system that reduces wastes in the production process. Number of parts to be produced depends on the customer's demand and delivery according to the schedule. This process helps reduce the inventory cost hence it has an advantage in the matter of cost and increases the competitiveness. Therefore, the executives need to continue to maintain pull production system and also should give precedence to the employees. There must be responsible given together with the authority, freedom to offer ideas to improve the organization, train and teach, and encourage all employees as well

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BIOGRAPHIES

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