Lean Manufacturing Techniques of Automotive Company

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Summary. The project was divided into four (4) distinct phases. These continue the iterative process of planning, implementation, revision and correction, according to the Deming Cycle (PDCA). The project culminated in the development and implementation of the Manual for the implementation of the PSA Excellence System in the supply chain of the company. Fulfilling formats and standards set by the Department of Communications, it explains the concepts primarily through diagrams and figures made after long periods of analysis. increase the reliability of the supply chain is high.

Keywords: Automotive industry, Logistics, Supply Chain, Lean Manufacturing.

Introduction

From a strategic standpoint, lean manufacturing is to identify the value chain, the sequence of business activities that contribute to the generation of value to the product and / or service, and thus gain competitive advantage in the long-sought market [1]. This value can only be achieved when customer needs at the right cost and at a precise time are met, justifying the importance of creating value in the assembly processes and activities responsible for transforming raw materials and deliver products and / or services to end customers [2] ,[3] , [4], [5] ,[6] , [7], [8].

The company study sample is an automobile manufacturer with global presence. This under constant quest for continuous improvement, focuses its efforts on optimizing each area of the Directorate for Planning and Logistics Operations and capitalize on their knowledge, thus creating the "Excellence System PSR" designed to be implemented in all areas of the company : both vertical (Research and Development, Production, Sales, etc.) and cross-sectional areas (Supply Chain, Quality, Human Resources, Finance, etc.).

The term "System of Excellence" encompassing all the policies that frame the operation of the company based on their strategic priorities. According to [3] and [4] is the set of management policies, behaviors and tools to meet the objectives of the vision of the company.

Composed of a series of working methods and management supported the principles of lean manufacturing and continuous improvement culture, the PSR offers [5]:

- Operation and simplest methods of work
- Best individual and collective efficiency
- Better customer satisfaction
- Better partnership with suppliers
- Competitive advantage for the company
- Culture of continuous improvement

This article aims to show the incorporation of lean manufacturing techniques to supply chain an automotive company based on excellence PSR system.

Methodology

The project was divided into four (4) distinct phases. These continue the iterative process of planning, implementation, revision and correction, according to the Deming Cycle (PDCA) [4], [9], [10], [11], [12].

- Phase 1. Diagnosis: Diagnose the current state of implementation of the system PSR Excellence in the supply chain of the company.
- Phase 2. Characterization: To characterize the supply chain of the company.
- Phase 3. Integration: Determine Lean Manufacturing principles established in the PSR Excellence System applicable to the supply chain.
- Phase 4. Development: Develop manual for the implementation of Excellence System PSR in the supply chain of the company.

Results and analysis

The results obtained are shown in each of the steps outlined in the methodology.

Phase 1. Diagnosis of the current situation

Table 1 presents a summary version of the diagnosis made Supply Chain Company by structuring the generated observations and corresponding corrective actions.

Table 1. Summary of the analysis of the current situation Supply Chain Company

Observation	Plan of action
Lack of documents within the company clearly stating the concept of Supply Chain PSR	Generate a concept for Supply Chain PSR and include it in the manual.
Existence of various documents stating different objectives PSR Supply Chain	Consolidate the objectives of PSR Supply Chain and include it in the manual.
Existence of the general idea within the company that supplies PSR Chain has a single client: the final customer or retailer.	Define the different customers supply chain and include it in the manual.
Different directions establish the existence of different key performance indicators (KPI) for Supply Chain	Define what the KPI will be used to measure the performance of the supply chain and include it in the manual
Little detail in the existing graphical representation of perimeter Supply Chain PSR	Create a new graphical representation of the perimeter of the company in detail and include it in the manual.
Lack of clarity regarding who is responsible for what in the flow of material and information along the supply chain	Define the responsibilities of the flow of material and information along PSR Supply Chain and include it in the manual
Personal goals based employees as the Deming cycle	When integrating the principles of Lean Manufacturing in the Supply Chain PSR, structure them in a way that is based on the culture of continuous improvement of PDCA and include it in the manual.
Lack of knowledge about the business side of the company and its importance.	Develop the topic of demand planning to give a general idea of how it affects the industrial part and include it in the manual.
General knowledge of the principles of Lean Manufacturing and the existence of Excellence System PSR	When developing the manual: - Do not stop to explain in depth the concepts but rather how they all work together to achieve the desired improvement.
Existence of a process map planning outdated Supply Chain PSR	Create SIPOC diagrams of the major planning processes generating detailed map of a section of the current state.
Lack of information about the future state of the planning of the supply chain PSR	Create documents necessary to establish the basis of the desired future state. When developing the manual: - Generate a diagram that integrates three main level planning processes. strategic, tactical and operational

Phase 2. Characterization Chain PSR Supplies

The second phase began with corrective action as to what diagnosed in the previous phase to map planning processes: work with updating and documentation of processes, further comprising further the current planning structure that presents the company . Twelve (12) SIPOC diagrams current map of PSR planning processes were created, which are listed below [7]: "Setting the resources for handling materials (Weekly)", "Create and send orders to the parts ", " Break into pieces the volume per period ", " Break into pieces calculating net requirements of parts (annual) ", " Breakdown parts calculating net requirements of parts (weekly) ", " Break into pieces the calculation of gross requirements of parts (weekly) ", " Prepare material handling (annual) ", " Prepare material handling (per period) ", " Prepare the packing process (per period) ", " Prepare the orders provisioning (per period), "" Prepare provisioning orders (weekly) "and" Sequence DMB production "[13], [14] , [15] , [16], [17] , [18] , [19].

Phase 3. Integration responsible for the implementation of PSR team

Different Lean Manufacturing principles established in the PSR Excellence System applicable to Supply Chain Company are listed below:

- Analyze and segment the customer demand: adapt the diversity of products and delivery time for different types of customers to better respond to your request.
- Increase the reliability of the supply chain: increase the reliability of commercial and industrial forecasts to meet the needs of customers at the lowest cost and inventory level possible.
- Flexible and adapt the supply chain: eliminate or reduce the limitations of plants and suppliers in order to evolve at the same pace with demand.
- Level production: reduce variations in customer demand in order to optimize investments and labor.
- Establish a pull system: only produce what the customer uses to reduce inventory and WIP.
- Working under Takt Time: producing customer pace optimizing investments and labor in addition to reducing inventory and WIP.
- Ensure the continued flow: a process parts continuously in order to optimize investments, labor and reduce inventory and WIP.

These seven (7) principles were integrated into a wheel for improvement which, following the methodology of the Deming Cycle, you find that the Chain of PSR Supplies company understands the needs of enterprise customers, improve responsiveness to these needs and increase profitability of the company under a culture of continuous improvement. This wheel of continuous improvement is presented in Figure 1 [8], [9] and [00].

Phase 4. Development Manual for the implementation of PSR Excellence System

The project culminated in the development and implementation of the Manual for the implementation of the PSA Excellence System in the supply chain of the company. Fulfilling formats and standards set by the Department of Communications, it explains the concepts primarily through diagrams and figures made after long periods of analysis. The index presents the final version of the manual is as follows [21], [22], [23].

1. Customer Supply Chain.
2. Key Success Factors of Supply Chain.
3. Definition, structure and scope of the Supply Chain.
4. Position Supply Chain within the company.

5. Excellence System Principles PSR applied to the Supply Chain.
6. Macro-planning processes Supply Chain.

Figure 1. Wheel continuous improvement of the Supply Chain PSR.

Conclusions

After a year of incorporating lean manufacturing techniques within the supply chain of the company the following results were achieved: adapt the time netrega product by type of client, work according to the Takt Time, achieve continuous flow in a 90% of operations and increase the reliability of the supply chain by 95%.

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