Research on Guangdong-Hong Kong-Macao Greater Bay Area Enterprises' Transformation and Upgrade Path Based on Lean Logistic

——Take Dongguan CS Company as an Example

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Abstract: As the Sino-U.S. Trade war continues and deepens, China's demographic dividend is decreasing year by year, and competition between enterprises in the Guangdong-Hong Kong-Macao Greater Bay Area has become more intense, especially for small and micro-manufacturing industries. How do we survive in a changing environment? Through data collection and empirical research methods, this article makes partial innovations in the enterprise's lean logistics and operation management system from the aspects of internal equipment layout, personnel distribution, and process flow, etc., and draws conclusions: in the context of the Sino-US trade war It is feasible to adopt lean logistics management to improve and upgrade the enterprise production management system. Not only has the company significantly increased benefits, but it has also obtained sustainable competitive advantages.

1. Introduction

With the continuous development of globalization and the increasingly fierce trade war between China and the United States, the competition among small and micro manufacturing enterprises in Guangdong-Hong Kong-Macao Greater Bay Area is also becoming increasingly intense. Some of them are facing survival difficulties, and some even are facing the risk of bankruptcy. Meanwhile, it is found that the United States, Japan, Germany and other developed countries have carried out a very

in-depth study on the subject of lean logistics. On the contrary, the research of lean logistics in China is still in the initial stage. There are still many problems, and the actual use is even less in China. While learning from the outstanding theoretical achievements, we should extract the essence and give full play to our independent innovation. This paper takes one enterprise, called Dongguan CS company, as a case to explore the transformation and upgrade path with the use of quantitative analysis, lean manufacturing logistics and other theories, so as to improve the its production efficiency and reduce costs.

2. Literature Review

In this part, some basic concepts are introduced firstly and then some related articles are reviewed as comprehensively as possible. First, the core of lean logistics is to pursue the elimination of all waste, including inventory, and develop a series of management methods to achieve this goal [1], which include focusing on (i) customers' demands [2]; (ii) analyzing every link of product design, manufacturing and purchasing in the value chain to find out the waste that cannot provide value-added [3]; (iii) developing a plan to create logistics value based on the principles of non-stop, no detour, no back flow and no waste [4]; and (iv) eliminating the waste logistics link in time to pursue perfection once it is detected. Second, lean site management refers to using scientific management system, standards and methods to plan, organize, coordinate and test the production site elements reasonably and effectively, including people (production workers and management personnel), machines (machines and equipment),materials(rawmaterials),methods(processing and testing methods), environment(working environment), information (communication and informationization), so as to make them in the best position to achieve the goal of high quality, high efficiency and low consumption. For one-flow mode, it refers to the reasonable allocation of operation site, personnel and equipment. Professor Daniel T Jones of Massachusetts Institute of Technology published a book named "Lean Thinking", which proposed that the core of lean production is to eliminate as much waste as possible as well as to provide the right amount of products at the right time and place. In 1999, Y. Tian, a Chinese scholar, initially introduced the concept of lean logistics, which refer to using lean thinking to manage one company's activities [5]. In 2004, T. Wang put forward two principles, including "lean logistics has only model, no set" and "service pulling", as well as four characteristics that lean logistics should have [6]. In 2004, A. Pan et al. proposed that lean logistics is to meet customers' demands as the premise, reduce redundant labor waste, adopt JIT (Just in Time), and finally achieve the strategic goal of sustainable development [7]. In 2006, Q. Liu et al. explored the importance and necessity of lean logistics for the development of Chinese companies, analyzed the current situation and problems of logistics and proposed corresponding suggestions [8].

From the discussions above, it is quite clear that lean logistics still needs to be explored theoretically and practically. Meanwhile, small and medium-sized manufacturing enterprises are forced to be upgraded urgently due to the shrink economy. In order to survive in the current competitive environment, it is a good idea to introduce lean logistics for these enterprises to keep their superiorities.

3. Company Profile

The company is located in Dongcheng Lixin Industrial District, Dongguan City. The core product series are domestic high-end specialty store display rack products, high-end display cabinets (such as the supply of display cabinets in airports and duty-free stores), and advanced hardware decoration (mainly Hong Kong customers). Although the scale is not large, with its exquisite craftsmanship,

excellent quality, accurate delivery, and good price-performance ratio, it has won a lot of high-quality hardware customers who demand high-end hardware products.

4. Analysis of the Existing Problems

4.1. Problems of Site Layout

The first sub-problem is that the workshop is crowded. As far as the business situation of the company is concerned, the workshop scale is relatively small, which leads to crowded workshop and sloppy work. For example, crowded welding procedures, large-area welding display racks, and workbenches that are too small in distance failed to allow workers to perform their work well. The second is the unreasonable regional division. Raw materials were placed everywhere. Semi-finished products were not placed in a special area and finished products were also be placed near the workbench. If workers are not careful, the finished products might get damaged. The division area was fuzzy, and there was no standard marking of channel area. The third is the circuitous waste of transportation route. What's more, the time of carrying was too much and the distance of carrying is too long, which resulted in excessive material handling during welding to grinding, and multiple repeated handling of the shears and planer.

4.2. Problems of Production Efficiency

On the one hand, unreasonable production distribution was the major problem which was caused by the imbalance between the work efficiency and the business volume as well as the waiting among the processes. The last process took more than 2.5 minutes while the connecting process only took less than 20 seconds, which leaded to many times of stagnation between the two processes. Therefore, the time workers wait for the completion of the previous step is a waste of personnel cost. On the other hand, common action waste in the workshop includes two hands free, one hand free, sudden stop of operation action, excessive operation action, left and right hand exchange, too much walking, too large turning action, repeated action and unnecessary action, etc. The waste of these actions resulted in unnecessary consumption of workers' time and physical strength.

4.3. Problems of Personnel Management

For this company, responsibilities of each person and each department are not confirmed. For example, the product department, who has small number of staff but large tasks, can't meet the needs of customers completely. For key positions and business positions, who has huge workload, can't meet customer requirements neither. What's worse, the responsibilities of staff are not clear. Therefore, welders often do the work of carrying, which wastes the cost of personnel. Welding is a technical work, but the welders who have high value in the workshop undertake the tasks of moving and packaging, which greatly wastes its own value. What' more, there is no leader in the group, so it is difficult to take the lead in future work. Besides, another problem is the lazy working attitude. The implementation of hourly wages by employees is an important cause of delays in workers' work.

5. Improve Production Plan Formulation and Implementation

5.1. Site Management Improvement Plan

Moving to a new workshop is regarded as the first step. Because the workshop area was too small, the company's managers decided to rent a new workshop to rebuild production. The new workshop is located in the Kapok Industrial Zone, Qishi town, Dongguan city. The new workshop, which is 118

meters long and 19 meters wide, belongs to the long production workshop. We will re-plan the workshop from equipment layout and aisle marking base on the new workshop area is determined and won't be changed. The second step is to conduct one-flow mode layout. It requires a one-flow workshop layout to reduce reconfiguration processes and the distance between processes. The implementation of one-flow production scheme in the workshop is to make the equipment and logistics follow the design of the flow, reducing the handling time in the workshop. For example, if the workshop has a large passageway and exit in the middle, the finished product area shall be set close to the middle passageway, and the finished products produced on both sides of the passageway can be transported to the factory，with the shortest distance and without hauling goods back and forth.

5.2. Measures to Improve Production Efficiency

To improve production efficiency, one measure is to establish the reasonable production distribution. Specially, a customer-centered production planning system is explored. To ensure that the customer needs are met, and the demand information is accurately transmitted to the production department, the production department shall be responsible for the scheduling and control of the production plan. Also, allocating the personnel and their tasks reasonably is also carried out. The other measure is to Use IE (Industrial Engineering) methods to eliminate waste that occur during the process. According to the job analysis, only 41% of jobs are profitable, which means 59% of the non-productive operations can be optimized.

5.3. Measures to Improve Personnel Management

The main measures include re-planning the functions, setting up groups in the workshop, leading and supervising by the team leaders, providing new promotion space and retaining talents with high reward. Simple jobs in high-cost positions are allocated to low-cost employees. For example, 30% of text-based simple tasks for business managers with a monthly salary of 20,000 CNY are assigned to clerks with a monthly salary of 3500 CNY.

5.4. Improving the Wage System Is Another Measure

With Using Toyota's working methods, we set up the production efficiency target and incentive mechanism - piecework wage system. Adhering to the principle that the growth rate of wages and workshop economic benefits are synchronous, the growth rate of average real income of employees is consistent with the growth rate of workshop labor productivity. Constructing the incentive mechanism of appropriate wage stimulated the enthusiasm of the company's employees.

6. Result Evaluation

The short-term effect is to solve the problem of short delivery time. Compared with the previous operation mode, customer satisfaction was improved by 20%. The execution ability of individuals and teams was significantly enhanced. The separation of key jobs gave full play to the maximum efficiency of human and machine in a limited time and reduce the overtime cost of personnel.

7. Conclusions

This paper takes DGCS as an example to study how to reduce its cost and increase the efficiency. Through on-the-spot investigation of the specific situation of the company, the specific problems and

key points are analyzed. Then, the lean logistics is used to establish a set of production efficiency improvement plan, which is constantly improved in the implementation. Finally, the actual effect of the plan is discussed. At the same time, by evaluating the benefit of the scheme we can find that the whole scheme brings good economic benefits for the company. This sets an example not only for the similar companies, but also for many small and medium-sized enterprises that are still in labor-intensive.

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