

## Application of the Lean Production Mode in Small and Medium-sized Enterprises of China

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**Keywords:** small and medium-sized enterprises; lean production; one-piece flow.

**Abstract:** The implementation of lean production in small and medium-sized enterprises is an inevitable choice for Chinese enterprises to integrate into the international environment and adapt to international competition. Facing the new changes and new demands of the market, the traditional production mode can no longer meet the current market demand. Now China's economy is in the early stage of historic transformation. There may be two trends in the demand of domestic customers. The first trend includes the diversification and individuation of products and the short delivery time. It means that the demand for a single batch of goods is decreasing. At the same time, the demands for similar products in style and size are increasing; the price is getting stricter and the delivery time is becoming increasingly tense. Small and medium-sized enterprises (SMEs) are indispensable driving forces for China's economic development, but there are still some problems in the implementation of the advanced cost management model. This paper takes small and medium-sized enterprises as the research object, and analyzes the advantages of lean production. Through analyzing the current situation of the cost management mode of X Garment Company, the paper puts forward improvement strategies for the production process in view of problems encountered in practice. It forms a profound understanding that for small and medium-sized enterprises, the lean production mode is superior to the normal cost management mode. The paper also provides certain theoretical reference for solving problems existing in the same type of enterprises in China.

### 1. Introduction

With more than 30 years of reform and opening up, small and medium-sized enterprises have formed production and business models with Chinese characteristics in terms of "entrepreneurship" and "survival". However, how to "grow bigger and stronger" is the problem that most SMEs are facing at present. There may be two trends in the demand of domestic customers. The first trend includes the diversification and individuation of products and the short delivery time. It means that the demand for a single batch of goods is decreasing. At the same time, the demands for similar products in style and size are increasing; the price is getting stricter and the delivery time is becoming increasingly tense. The implementation of lean production in small and medium-sized enterprises becomes an inevitable choice for Chinese enterprises to integrate into the international environment and adapt to international competition. Industrial policies and the business environment are the key external factors affecting the development of SMEs. But how these companies boost their internal strengths and adapt to the environment is the core of development. The individualization and the upgraded customization of customer demands, the rapidly changing consumption trend, and the rising price of labor and raw materials bring fatal impacts to SMEs. Therefore, small and medium-sized enterprises must change their operation and management modes, and find a new balance among quality, cost and delivery time under the higher management level. In recent years, China has continuously encouraged the development of small and medium-sized enterprises. Many small and medium-sized enterprises have changed their thinking. They start to control cost, optimize resources allocation and improve the input-output efficiency. Traditional management concepts are no longer applicable to the current dilemma faced by SMEs. The study of lean production mode helps to enhance SMEs' understanding of advanced production management concepts, and provides research directions for social research. It is hoped that the lean production

mode can be promoted and implemented in a wider range, so as to improve the efficiency of production management in domestic enterprises.

## **2. The Theoretical Basis of Lean Production**

### **2.1 The definition of lean production**

Lean production is also called as fine production. It aims to simplify the superfluous links in the production process. Through the transformation of the production system, the change of the organizational form inside the company, the transformations of the operation form and the production system, and the improvement of the strain capacity, the production system can quickly meet the market demand and optimize the production effect. Lean production is conducive to avoiding waste, reducing production costs, shortening production cycle and improving product quality. Its ultimate goals include, connect the two links of processing and assembly and “abandon” intermediate inventory; eliminate meaningless labor and avoid waste; produce only high-quality products; take precautions to prevent equipment failure from affecting production; prepare in advance to avoid wasting time; improve equipment to shorten lead time; put safety first to avoid accidents. To sum up, there are “seven zeros”: zero inventory, zero waste, zero bad product, zero waste of working hours, zero breakdown, zero stagnation and zero disaster.

### **2.2 Basic principles of lean production management**

Traditional cost management puts the enterprise’s interests first, while the lean cost management puts the customers’ interests first, which makes the enterprise more competitive in the market.

1) Lean cost management requires enterprises to determine the value correctly. Enterprises should stand on the customers’ point of view, and determine the value of products according to customers’ needs. We can’t determine the value of our enterprise independently and vaguely; the value must be embodied in a concrete way. Customer satisfaction is the real standard of enterprise value.

2) Lean cost management requires enterprises to correctly identify the value flow. There are three types of value flows. The first flow includes procedures that create value; the second type includes unavoidable procedures that do not create value; the third group includes useless procedures that do not create value. Enterprises must stand at the users’ point of view and integrate various factors to formulate the best value flow. The third kind of value flow must be avoided.

3) Lean cost management requires clear working procedures to create value to flow and achieve zero-shift labor waste. The lean cost management mode requires enterprises to design their output volume according to the market demand. Enterprises should fully understand the market and organize production according to the market demand.

4) Lean cost management requires enterprises to strive for perfection. This requires enterprises to continuously make improvement according to the changing needs of customers, focus on the interests of customers, create more profits for customers and benefit other people as well as the company.

### **2.3 Definition of one-piece flow**

One-piece flow is a production management concept. It is a more efficient and flexible production mode which aims to reduce waste and production costs, and then rationally allocate and optimize production factors, so that each factor can play its role. The idea of one-piece flow originates from the concept of lean production and is a very effective tool for lean production. The essential feature is the continuous flow and the proper connection between various processes. It can shorten the online cycle of products such as the flowing status, and thus allow the company to keep no semi-finished products. The mode can also improve the production efficiency, and timely discover problems in the production process, so as to maximize the cost reduction and realize the optimization of production.

## **2.4 Advantages of one-piece flow production model**

The traditional production mode has the problems of low efficiency and lots of inventories. The lean production idea focuses on reducing inventory and pursuing the state of no inventory. It has obvious advantages over the traditional production mode from following aspects.

### **2.4.1 The on-line production cycle of products is relatively short.**

Under the single-piece flow production mode, the whole process from putting on production to finished products is in the state of flowing line, and there is no backlog of semi-finished products. The output of all kinds of products is stable at each stage, and the daily product capacity can be clearly quantified and planned, so that the production schedule can be accurately controlled and the needs of customers can be met in time.

### **2.4.2 The production efficiency is relatively high.**

Under the one-piece flow production mode, the product output is fast. The number of products in the production line is small; the daily delivery volume is stable. The production space is compact. The mode can improve the product quality and delivery punctuality, and makes the planned production more convenient. When changing the product style, the separation between the two types is clear. Meanwhile, the production efficiency is very high.

### **2.4.3 Workers are proficient in repetitive movements; the training costs are relatively low.**

Under the one-piece flow production mode, every process of the production is carefully designed and refined by the enterprise. Employees repeat the same process, which simplifies the working content. Therefore, the training cost for new employees is reduced, which is well adapted to the phenomenon of replacement of labor workers and reduces the risk of labor instability.

### **2.4.4 It is easy to find quality problems in the production process.**

Under the single-piece flow production mode, the products are no longer mass-produced like the traditional production mode with more defective products. The more standardized production process can quickly expose quality problems existing in the production line, and timely discover and modify them, thus reducing the risk of defective products caused by mass production and improving the quality of products.

## **3. Case Study of Lean Production in X Garment Company**

### **3.1 Current situation of the production process of X Garment Company**

For the customized ready-made clothes business of X Company, the current main processes include three major links: the revision and design of ready-made clothes, the production of ready-made clothes (including four working procedures of cutting, sewing, ironing and packaging), as well as the check and acceptance of ready-made clothes. The design department, the production department and the quality inspection department are involved in this process

X Company is currently using the traditional production mode. After receiving an order, the first thing is to design the product in the design department. The second step is to purchase the cloth, accessories and production equipment needed for ready-made clothes. Then the production department starts the four processes: cutting and sewing the raw materials, then ironing and packaging the clothes according to the sample designed. After production, packed ready-made clothes are sent to the quality inspection department for sampling inspection and supervision. The basic flow chart is as follows.

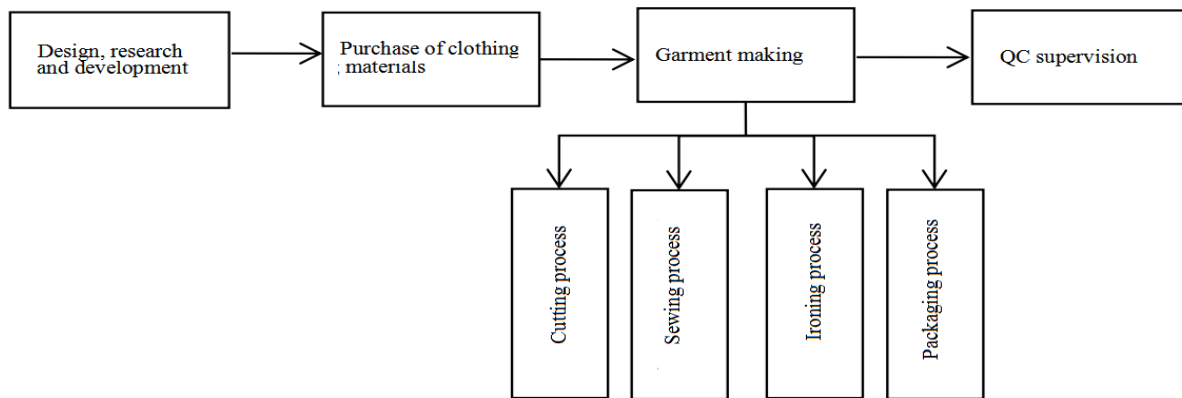


Figure 1 Flow Chart of Garment Production

### 3.2 Problems in the production model of X Garment Company

#### 3.2.1 Mass production with long waiting time

After the X Garment Company receives the order, the design department needs to analyze and summarize the sizes, design a unified template, and calculate the total amounts of cloth required, the number of accessories and equipment changes. Then the design department should contact the production department for purchasing, cutting and other processes. The waiting time is long; the cloth purchased requires a lot of inventory space. A large number of semi-finished products also need to be stored, which can result in waste.

#### 3.2.2 High defective rate

The traditional production mode adopted by X Garment Company is usually bundled production for orders and mass production according to the number of ready-made clothes. The quality problems can easily be hidden. There are many semi-finished products on the reproduction line, which can easily lead to a large number of products with poor quality. Moreover, the distribution of product numbers is more extensive, and cannot be customized for personal size. The customer satisfaction is not high. The probability of replacement and modification is relatively high; the rate of defective products is also high.

### 4. Implementation Plan of One-piece Flow Production in X Garment Company

The production mode applied by X Garment Company has many problems. In order to improve the production efficiency, reduce inventory waste and solve existing problems, we intend to reform the lean production mode.

#### 4.1 Changing the inherent production concept of employees in X Garment Company

People often regard the implementation of lean production model and cost management system as the work of managers and financial staffs. They do not realize that the process needs the participation of all employees from various workshops and departments. Therefore, first of all, we should teach managers and employees about the lean production concept. The company needs to set aside a certain period to training the staff about the lean production theory, which makes all employees deeply understand the company's current situation and the reform mode. The management level needs to establish the consciousness of innovative management; the grass-roots employees should have great the enthusiasm of making changes. This consciousness lays the foundation for the transformation of the company's production mode, and can also reduce the resistance in the implementation of lean production. It is beneficial to the sustainable development of the company.

#### 4.2 Refine production procedures to eliminate bottleneck operations

In order to achieve the lean production, enterprises should change production procedures and the

plant layout, so as to make them meet the requirements of flow-shop operation. The cutting process should classify the samples of ready-made clothes and cut cloth according to certain rules, so as to avoiding rework. The handling process can affect the layout of production line. The company needs to reduce the frequency and distance of delivery, and group workshops of the clothes production together.

The bottleneck process refers to the least efficient process in a day's assembly line. The bottleneck process should be removed or reduced through the job compression and reordering, so as to improve the production efficiency as well as the overall production capacity of the whole production line.

#### **4.3 Strengthening process cost control**

Effective cost control can help enterprises to increase profits and reduce costs. It is also an important way to guide enterprises to carry out production and operation activities rationally, and improve the corporate economic responsibility. The improper use and protection of machinery and equipment may lead to the increase of product obsolescence and the increase the cost. The frequent maintenance of equipment and early scrap of fixed assets should be carried out. The material supply and production links are not properly coordinated. Sometimes excessive materials in warehouses lead to excessive warehousing costs, and sometimes the production and supply are inadequate due to the lack of materials. These conditions are not conducive to the implementation of lean production.

### **5. Comparison of X Garment Company's Production Efficiency after Changing the Production Mode**

#### **5.1 The waiting time of each process is obviously reduced**

Through the trial run of lean production mode and the adjustment of the whole process, the waiting time between different production processes has been significantly reduced; the waiting time of semi-finished products in the flow has also been reduced.

#### **5.2 Improvement of product quality and decrease of defective product rate**

Through the trial operation of lean production mode and the adjustment of the whole process, the quality problems in the production line of X Garment Company can be found and corrected in time. The quality of products has been effectively improved, and the defective rate has been raised.

### **6. Conclusion**

Small and medium-sized enterprises refer to medium-sized and small-sized enterprises, as well as micro-enterprises which are legally established within the territory of the People's Republic of China and operate on a smaller scale. Small and medium-sized enterprises generally have the characteristics of small scale of operation, low threshold of establishment, large quantity, low educational level and strong applicability. They spread throughout the tertiary industry of China, including manufacturing, transportation, tourism, wholesale and retail industries. Through lean production, small and medium-sized enterprises can continuously reduce costs, improve product qualities, improve the work efficiency, minimize inventory and eliminate unnecessary wastes. These changes can improve customer satisfaction, improve the flexibility of small and medium-sized enterprises in the market, reduce the overtime of employees, ease labor relations, encourage employment and promote social stability. This paper explains the theory of lean production mode, and analyzes the advantages of lean production. The applied analysis is carried out with the X Garment Company as the research object. Existing problems and improvement suggestions on cost management are put forward for X Garment Company. Through lean production, the product price can be lower than that of other enterprises in the same industry; the company can make more profits. In this way, the company can have a greater competitiveness, and improve the market share of products. It is of great significance to increase employment, promote

economic growth, encourage scientific and technological innovation and maintain social harmony as well as stability. The paper also provides a theoretical reference in solving problems existing in the same type of enterprises of China.

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