

## Discussion on the Necessity of Flexible Production of Chinese Enterprises under the Background of E-commerce

Ying Zhang<sup>\*</sup>

Department of Economics and Management, Weifang University, Weifang, Shandong, China

yzh5-2@163.com

<sup>\*</sup>corresponding author

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**Abstract:** As the factory of the world, China's e-commerce is booming, and the retail landscape has undergone tremendous changes. This kind of change will inevitably have a huge impact on the production management of Chinese enterprises. The division and structure of the industrial chain will be changed by a production mode: the flexible production mode. Starting from the current business environment in China, this article analyzes the necessity, conditions and strategies adopted by enterprises for flexible production.

### 1. Introduction of Flexible Production

In the first 20 years of the 20th century, Ford firstly applied Taylor's scientific management principles to the organizational process of production, and successfully created the production model of "fewer varieties and large-batch production", which is named as Rigid Production Line and finally promoted the process of industrialization. The rigid production mode has properties of high production efficiency, high output and low unit cost; but it comes at the expense of losing production diversification and personality. With the continuous development of the economy, the form of competition of enterprises is also changing. The competition of price, quantity and quality becomes fiercer. More importantly, the drawbacks of the rigid production mode have gradually appeared, which has been reflected as following: excessive inventory leads to an increase in cost, and the sensitivity to adapt to market demand becomes lower. Moreover, the production model only exists when the market environment at that time is the seller's market.

Flexible Production was initially conceived by Theo William-son, an employee of British Molin's company, in the 1960s. In 1965, Molins patented the invention; however, the first manufacturer of implementing flexible production successfully was the MAALROSE company. It produced the world's first computer numerical control (CNC) automatic line for processing a variety of diesel engine parts in 1963. In 1967, the British company Molins announced the "System 24" (Molim system-24), which used computers to decentralized control processing equipment and work 24 hours a day. After that, the idea of flexible production formally shaped. Flexible production is an automated manufacturing system consisting of several CNC equipment, material handling devices and computer control systems. It can be quickly adjusted to changes in manufacturing tasks and product varieties.

Flexible Production enables multi-variety and small-batch production methods. It is a market-oriented, on-demand, and advanced production method to adapt to the change of market demand and fierce market competition. It has advantages of enhancing the flexibility and adaptability of manufacturing enterprises, shortening the production cycle, improving equipment utilization and labor productivity, improving product quality. Therefore, it is a production model with strong demand and strong vitality.

In the 21st century, market competition is getting more intense, overcapacity appears in many industries, the product life cycle is getting shorter and shorter, market demand is diversified and personalized, which all require companies to have stronger adaptability. It is extremely limited to produce any commodity rapidly, which can satisfy customers, solely relying on the work of a

company. Therefore, the flexible production model will be an inevitable choice for Chinese companies.

## **2. The Development of E-commerce Promotes the Transition of Enterprises to Flexible Production Mode**

In recent years, the booming development of e-commerce has caused most domestic industries to reshuffle, and various industries are also facing tremendous pressure. The change in the pattern of the retail industry has led to the closure of enterprises and the tide of closing stores. On the one hand, domestic demand is weak under the influence of the overall economic environment. On the other hand, factors such as intense competition for homogenization and excessive growth of production scale have led to problems such as excessive inventory, and difficulties in capital turnover in various industries.<sup>[1]</sup>

All innovations in the production sector stem from changes in the consumer sector. E-commerce has changed the layout of the retail industry and the profit distribution mode, so that manufacturers can directly connect with consumers and the role of intermediaries is diluted. Besides, there are many advantages to manufacturers. For instance, they can directly understand and meet users' needs, save lots of time, shorten links and constrain costs of intermediate processes such as inventory, logistics, sales and distribution.

According to eMarketer, global retail e-commerce sales will reach 3.563 trillion US dollars in 2019, and the top five retail e-commerce market share will reach more than 82 percent. By 2022, the share of these markets will reach more than 85 percent.<sup>[2]</sup>

In 2018, the total amount of e-commerce transactions in China exceeded 30 trillion yuan, a tenfold increase in 10 years. In 2019, China's retail e-commerce sales will increase by more than 30 percent, reaching nearly 2 trillion US dollars, which is more than half of total global sales. Sales in the US retail e-commerce market will reach \$600.63 billion, an increase of nearly 15 percent year-on-year. Sales in the UK will reach \$137.08 billion, an increase of nearly 11 percent over 2018. Retail e-commerce sales growth in Japan and South Korea are expected to increase by 4 percent and 11.1 percent, respectively.<sup>[3]</sup>

In the context of e-commerce, flexible production will emerge with a new model that connects people's needs, data analysis with machine production, and combines various software and big data analysis to satisfy customers' demand on different levels. Meanwhile, the order-based restructuring of industrial production mode has combined different types of manufacturers with overseas customers, which brings unprecedented solutions to stimulate productivity. In the meantime, the Internet will significantly improve the labor efficiency of traditional industries and bring tremendous changes and opportunities to many industrial fields. The market space brought can be limitless.

The technology and mode of flexible production will mature and upgrade. The flexible production enterprise workshop should have an intelligent and automated software system. Since it allows to rearrange quickly, the modular design is the core component of the assembly system in the workshop. In addition, the modular design integrated with various technologies and has unlimited transformability. Besides, the process can be freely combined, and its assembly system can meet the changes in production yield and variety to achieve personalized production.

For example, if the consumer enters the e-commerce platform and has checked the materials, colors, sizes, shapes, etc. of the order products, the data will be transferred to the manufacturer through the daemon of the e-commerce platform. Then, the seller will produce through the flexible manufacturing workshop. Therefore, for consumers, full customization can be achieved.

## **3. China's Current Business Environment Provides Conditions for Companies to Achieve Flexible Production**

### **3.1 There is a relatively complete industrial chain in China**

The industrial chain contains four dimensions: value chain, enterprise chain, supply chain and space chain. These four dimensions form an industrial chain in the process of balancing each other. The essence of the industrial chain is to describe an enterprise group structure with some internal connections. The upstream link of the industrial chain delivers products or services to the downstream links; while, the downstream links provide feedbacks to the upstream links. All the enterprises and organizations involved in the process have interchanged values in the industrial chain. A relatively completed industrial chain means that the industrial structure is integrated, the industrial relevance is tight, the resources are sufficient, and basically, meet the needs of all aspects of the production process for the enterprise.

### **3.2 The technical conditions tend to mature in China**

CIMS - Computer/contemporary Integrated Manufacturing Systems, is a complicated system that combines three elements of the production process: people, technology, management with related information and logistics; and eventually optimize and utilize the integration by comprehensively using modern management technology, manufacturing technology, information technology, automation technology and system engineering technology. It is the footstone of flexible production.<sup>[4]</sup>

The simulation technology uses simulation hardware and software to reflect system behavior or process through simulation experiments with some numerical calculations and problem-solving techniques. For example, in the forging simulation process, the designer needs to set the analysis variables and optimize targets according to the process and the mold structure, and then, forge the shape by computer simulation, systematically analyze the influence of the process conditions and the mold structure on the forming. This technology is a basic method to achieve flexible production.

Various standardization and database construction techniques tend to mature. Standardization is to stipulate uniform technical standards in terms of product quality, variety specifications, parts and components in order to meet the needs of scientific development and organizational production. More specifically, electronic data interchange standards, product data exchange standards and hypertext data exchange standards enable rapid, timely and accurate information exchange between enterprises. It is the technical support for achieving integration between enterprises.

## **4. The Development of Flexible Production for Chinese Enterprises**

It is essential to simplify the structure. The structure of most enterprises in China is huge and bloated, resulting in the reduced sensitivity of dynamic changes. To achieve flexible production, companies must simplify the structure of their organizations into a flat organizational form for virtual companies, reducing unnecessary levels of structure, thereby increasing the flexibility of the enterprise.

It is significant to rebuild corporate culture and establish a win-win concept. Enterprises should recognize the importance and necessity of connecting with other enterprises and sharing resources. The opportunities will fleet away if the products cannot be provided in time; therefore, only cooperation can make a profit together. Non-core enterprises in the alliance should actively cooperate with the core companies and completing their assigned task conscientiously. Only under this circumstance can they seek for survival and development. In the alliance, core enterprises must establish a sense of leadership and realize that win-win is the premise of cooperation.

It is vital to cultivate high-quality employees. In the face of a rapidly changing market, it is necessary to cultivate employees' ability to accept new things and the ability to master new technologies. The power of decision-making should be placed at the grassroots so that each employee can make quick and correct decisions about issues related to their work. Hence, it is required to have a group of high-quality employees to achieve flexible production.

It is meaningful to establish a business alliance. According to the National Bureau of Statistics, at the end of 2018, there were 369,000 small and medium-sized enterprises, decreasing by 6,494 compared with the data at the end of 2017. It is also the first time that a negative growth ever happened since 2011. This demonstrates the weak competitiveness of individual enterprises and the

insufficiency of manufacturing resources. In order to make up for this deficiency and improve the utilization rate of enterprise resources, regional enterprise alliances can be established under the guidance of the government and industry associations. Building alliances could realize the resource sharing between enterprises in both vertical and horizontal directions in order to improve the strength and flexibility of alliance members.

## 5. Concluding Remarks

E-commerce is booming around the world. It has changed customers' purchasing habits and will definitely change their lifestyle and consumption patterns in the near future. The potential individualized needs of consumers are being stimulated constantly, so the production methods of enterprises must change to fulfill the requirements of customers. Flexible production requires the modularization of enterprise products. In other words, it is required to simplify the product into multiple functional modules that are compatible and replaceable and to achieve any combination and output of these functional modules to meet the ever-changing needs of users. To achieve flexible production, there will be significant challenges to the process flow of the enterprise's products and the flexibility of automation technology. Moreover, this kind of challenge is often not only based on technology solely but also on many other aspects, such as the support of the industry chain, the upgrade of enterprise management, the adjustment of the structure of enterprise personnel and so on.

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