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# Research Hotspots and Development Trends on JIT Production Mode

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**Abstract:** JIT production mode plays an important role in production operation management in China. At present, the JIT production method in China has begun to take shape, but there are still some research directions that are not clear, and there are few achievements in using visualization methods to study new energy industry clusters. This article analyzes the relevant research literature on JIT production mode from 2003 to 2023, sorts out the research hotspots and evolution trends, and shows that: (1) domestic research on JIT mode has been ongoing since 2003, and with the continuous deepening of the market economy, JIT production mode is still a key consideration for enterprise production and operation; (2) The trend of refining the focus of research on JIT production mode; (3) The research on JIT production mode is still in the preliminary development stage, and the indicator system needs to be improved.

**Keywords:** JIT; Research hotspots; Development trends; Literature research

## 1. Introduction

JIT production method is a model implemented by Toyota Motor Corporation in the 1960s to improve production efficiency. The accurate and reasonable use of this method played an important role in helping Toyota overcome its first energy crisis. With the success of its application in Japan, it began to attract the attention of entrepreneurs in neighboring countries and gradually spread to Japanese and local enterprises in Europe and America. This production management method is known as the "Japanization Model" by Western enterprises.

The Japanese automotive industry has gone through a long process from its inception to today: at the beginning, Japan introduced technology and equipment and localized it, which enabled the automotive industry to take shape; Subsequently, a large-scale production system was established, and the influence of the automotive industry gradually expanded. This model was widely recognized in Japan; With the application and promotion of JIT production method, Japan has begun to strengthen exports, and its products have also been recognized by countries around the world, greatly enhancing the international influence of Japanese products. Toyota has something very worth learning from. In the stage of introducing technology and equipment, the Japanese automotive industry adheres to the principle of specific analysis of specific problems. While drawing on the production model of the American automotive industry, it also combines its own production characteristics for production. From the beginning, Ono Naichi and others understood that although the production method of the American automotive industry was at the forefront of the world, based on the socio-economic situation in Japan at that time, a more flexible and adaptable production method was needed. In the context of that time, Naichi Ono integrated the characteristics and advantages of various production methods such as single piece production and batch production, and created a high-efficiency and high-quality production method suitable for small-scale mixed production, namely Just in Time (JIT) production.

Although the existing JIT production system is relatively mature and there is abundant research on JIT production methods in China, few scholars have used literature research methods to explain the overall situation and knowledge structure of this sector. In response to the existing shortcomings, this article uses bibliometric and other comprehensive analysis methods to comprehensively sort out the relevant literature on JIT production mode. The purpose of this article is to clearly display the changes in literature, hot topic evolution trends, and future development directions of this sector, in order to provide some reference for the further development of JIT production mode application and research in China.

## 2. Content research and analysis

Based on the analysis of hot topics and keywords in the literature, this article will explore the future research directions of JIT production mode from three aspects: the application fields of JIT production mode, the technical requirements of JIT production mode, and the operation

methods of JIT production mode.

## 2.1 Application Fields of JIT Production Method

The concept of JIT (Just In Time) operation has a long historical origin. Ford Motor Company began operating in JIT production in the 1920s, and the 1920s to 1970s were the peak of JIT production mode operation innovation. Among them, Toyota Motor Corporation of Japan had the most extensive influence on JIT production mode operation. For just in time operation, people usually use many terms to describe it, such as "zero inventory", "lean production", "inventory management" and "production system". At the same time, the requirements for material requirement planning have also been strengthened. JIT just in time operation emphasizes the organization of all operational processes, so that each operational process can coordinate with each other at the most appropriate time, thereby improving production efficiency. From the perspective of JIT mode as a whole, its definition is very simple, but in actual operation, many factors need to be examined. To achieve success, a company not only needs to change the mindset of its internal personnel, but also needs to integrate its production and operation mode well with practice. At the same time, it needs to go through careful planning, strict control, and implementation work. These steps alone require the company to spend years to achieve.

Since the late 1970s, Chinese enterprises have gradually been exposed to and integrated this production management method with domestic realities. The first application of Kanban management in just in time production management by domestic enterprises, although only using a single means of just in time production management, has to some extent promoted the popularization and promotion of lean production management ideas in China's manufacturing industry. Tang Huaichao et al<sup>[1]</sup> took Shougang's automotive panel assembly process as an example, and further explored the application of JIT production mode in the automotive industry. Through multiple aspects of resource optimization management, they established Shougang's benchmark position in automotive panel assembly processing, and also provided good learning experience for processing units located around Shougang, which invisibly laid the foundation for the smooth sales of Shougang's automotive panel assembly. Subsequently, the just in time production model gradually became popular in China's manufacturing industry and extended to various fields.

In recent years, China has begun to practice the just in time production model in assembly line production enterprises such as the automotive industry, electronics industry, and manufacturing industry. The productivity of these enterprises has significantly improved. For example, companies such as the First Automobile Manufacturing Plant, the Second Automobile Manufacturing Plant, and Shanghai Volkswagen Co., Ltd. have used the just in time production model reasonably and effectively according to their own situations, gaining valuable practical experience and significantly improving their economic benefits.

## 2.2 Technical requirements for JIT production mode

The JIT production method has three sub objectives: organizational flexibility, labor flexibility, and equipment flexibility.<sup>[2]</sup> Among them, organizational flexibility refers to the decentralization of decision-making power in enterprises when using just in time production methods, which should be flexibly allocated by various levels of supervisors or production supervisors, rather than concentrating power in the hands of a single person. Due to the operational characteristics of just in time production, a dynamic organizational structure based on groups should be adopted in practical applications, and flexible changes should be made with changes in production plans; Labor flexibility mainly reflects the fluctuation of labor demand in the production process with changes in market demand. In the just in time production mode, labor is required to possess multiple skills and be able to flexibly apply their strengths to play a role in production operations. Similarly, management personnel have a good understanding of labor skills and can flexibly arrange personnel for production according to different production methods; Equipment flexibility is a production technology that is completely opposite to rigid assembly line production. In the process of using just in time production, adopting flexible production can greatly improve overall work efficiency. Flexible production represents a production method without fixed rhythms and non sequential transmission. In just in time production mode, the reasonable and effective use of flexible production can enable enterprises that meet small-scale production to approach the production efficiency of large-scale production enterprises, while also possessing flexibility that rigid production does not have. Producing the required products according to the required quantity when needed "is very in line with the" zero inventory "and" zero defect "goals of just in time production mode. For enterprises, the most ideal state is to produce products that can flexibly adapt to changes in market demand and meet the needs of target users. Therefore, enterprises should pay more attention to market changes in the production process and strive to achieve "zero inventory" and "zero waste" as much as possible.

## 2.3 Operation method of JIT production mode

In implementing JIT production, Kanban is the most important production management tool. Kanban is a production scheduling tool used to control the production site and can intuitively reflect the on-site operation situation. Specifically, it is to reflect the overall information of production operations on a card, and the form of the card varies depending on the type of enterprise. The information on the kanban usually

includes many details such as part number, product name, container type, container capacity, kanban number, and part appearance. Kanban management can be said to be the most unique part of just in time production mode, so "Kanban mode" is also another term for just in time production mode. Professor Yasuhiro Maeda, who teaches at Tsukuba University in Japan, once pointed out: "Just in time production exists as a complete technological complex, and kanban management is a part of just in time production, existing only as a production management tool in just in time production. If we equate just in time production with kanban management, it is a very wrong understanding."<sup>[3]</sup>

As mentioned earlier, the essence of just in time production is a comprehensive production management technology, and Kanban is a tool for implementing management. Only by applying Kanban management methods under the premise of process integration, production balance, and production synchronization can we maximize production efficiency. Therefore, when using JIT production and kanban methods, the most important thing is to analyze the specific problems and comprehensively reform the production system according to the specific situation of the enterprise, in order to improve the adaptability of JIT production and kanban methods and the smoothness of the enterprise's production process.

### 3. Conclusion

This article uses literature analysis method to systematically sort out the relevant research literature. Combining the literature in the above research with the main content of JIT, the relevant research on JIT production mode in China is gradually advancing, and some achievements and practical experience have been accumulated. However, overall, the research on JIT production mode is still in its early stages, lacking mature and solid theoretical support as well as sufficient practical experience. At the same time, the integration of theory and practice is insufficient, and interdisciplinary research is lacking. It still requires the participation of multidisciplinary researchers and scholars to deeply integrate research from various disciplines and break through the limitations of current research. This article will provide suggestions from the following aspects:

(1) Improve the theoretical framework. Build more theoretical frameworks that combine JIT production methods and better integrate new requirements into the theoretical framework; At the same time, based on our own actual situation, we will analyze specific problems and develop a reasonable company management system and future development institutional framework.

(2) Explore a more systematic and complete indicator evaluation system. Currently, there are relatively few relevant indicator systems for evaluating JIT production methods in China, and it is difficult to comprehensively evaluate the true level of lean production and inventory management of a company with the existing indicator system; In addition to the popularity of the Internet and the rapid development of the digital economy, the corresponding indicator system should also be adjusted.

At present, the research and application of JIT production management mode in China has a relatively short development time, and the number of relevant literature that effectively combines with practice is relatively small. The homogenization phenomenon of research results is prominent, and further expansion and improvement are needed in this field of research.

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