

# Research on Reform of Teaching Content of Supply Chain Management Course in Application-oriented Universities

-- Based on Text Mining Analysis of Job Responsibilities

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**Abstract:** New business format and model put forward new requirements for post competence of business talents. Under the new business background, aiming at reform of teaching content of supply chain management course in application-oriented universities, Crawler Technology is used to obtain job responsibility data of current actual enterprise recruitment. Through Text Mining Technology such as high-frequency word analysis and semantic network analysis, the focus of actual job responsibilities and abilities is deeply explored, so as to clarify the focus of current supply chain management course teaching content and put forward corresponding teaching reform suggestions. The research results show that suppliers, logistics, planning and inventory and others are the main concerns of the current job responsibilities. It is suggested that the teaching content of supply chain management course should be designed from supplier and procurement management, supply chain logistics planning and scheme design, demand and inventory optimization, demand and production planning management, product cost and quality control, supply chain system coordination and optimization, and supply chain strategy and operation.

**Keywords:** Application-oriented universities, Supply chain management, Text Mining Technology, Job responsibilities, Teaching reform.

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## 1. Introduction

At present, the global economy is still facing uncertainty, so strong supply chain support is an important guarantee to smooth the domestic circulation and connect with the international circulation. In the process of building a stable and powerful supply chain, enterprise talents with supply chain management knowledge and ability are indispensable. Therefore, it is necessary for students majoring in logistics management, business administration and other related business disciplines to learn professional knowledge. At the same time, with the revolutionary development of new information technologies and industry, service industries such as commerce, trade and finance have also entered the era of Business 3.0, which is characterized by consumption upgrading, sharing economy and big data. This puts forward higher requirements for business talents, not only to master professional knowledge, but also to have the ability of innovative and feasible solutions to modern practical problems. Therefore, under the background of new requirements for business talents, the course of supply chain management theory in application-oriented universities urgently needs to meet the needs of actual job responsibilities, grasp the key contents of the course, and cultivate students' post ability to cope with challenges and solving practical problems.

In recent years, many scholars who teach the course of supply chain management have begun to study the related topics of teaching reform, but they mainly focus on teaching methods or teaching modes. For example, Cao et al. (2018) carried out a comprehensive and systematic teaching reform in three aspects: curriculum objectives, teaching methods, and

course assessment methods. In order to improve the teaching quality of supply chain management course, Jin et al. (2011) researched the teaching reforms from four aspects including teaching method, course system, assessment method, and practice and experiment. Jiang (2018) studied the application of guided inquiry teaching concept in the course of supply chain management. Zhu (2019) explored the practice of participatory teaching concept in logistics and supply chain management course. Wang et al. (2022) discussed the construction and application of curriculum content and resources, curriculum teaching content and organization and implementation, curriculum achievement evaluation methods, curriculum evaluation and reform achievements. Ma (2020) used the online and offline mixed teaching mode of Internet Plus technology to reform the course. Xiao et al. (2020) studied the problems existing in the teaching of logistics and supply chain management by case teaching method and the strategies to deal with them. Pan (2021) put forward the application path of mind mapping in supply chain management course teaching. Cheng (2022) explored and studied the change of curriculum teaching concept and teaching implementation based on CDIO concept. Fan et al. (2022) and Other scholars used new channels and methods, such as BOPPPS technology, massive open online course, CIPP model or Flip Classroom, to study the teaching reform of supply chain management course. Undoubtedly, these studies have made great contributions to the teaching reform and development of supply chain management course, but they have neglected the consideration of the demand characteristics of new commercial talents. Wu et al. (2022) researched the training of supply chain management professionals in view of the requirements of the cross-

integration of new engineering and new liberal arts. Huang et al. (2021) explored the cultivation of intelligent supply chain management talents oriented to digital intelligence. Zeng (2018) analyzed the training mode of purchasing and supply chain management talents in higher vocational education from the perspective of demand orientation. Liu (2021) discussed the subject innovation of supply chain management in the construction of new liberal arts from the perspective of business education. However, the above-mentioned teaching researches considering the demand characteristics of new commercial talents only involves macro talent training mode and subject innovation, and there is still a lack of specific reform of teaching content of supply chain management course. In the context of new business, the reform of supply chain management course should not only involve personnel training and teaching mode, but also aim at the specific course teaching content, and readjust the teaching content to improve students' practical job operation skills and meet the actual job responsibilities of enterprises.

In view of the lack of existing research, aiming at reform of the teaching content of supply chain management course in application-oriented universities, this paper takes supply chain management related positions as the object, and uses Crawler Technology to collect the job responsibility data of the actual recruitment of enterprises. And it analyzes the text features of job responsibilities by using Text Mining Technology, sorts out the main demand of current job ability, and makes clear the main teaching content points of supply chain management course, so as to put forward specific suggestions for reform.

## 2. Analysis of the text Features of Job Responsibilities Based on Text Mining Technology

### 2.1. Data acquisition and preprocessing

51JOB, LIEPIN and BOSS are all professional and efficient talent recruitment platforms provided in China. Their total registered users exceed 100 million and they allow some data crawling. The job recruitment information published by the three platforms is complete in content and good in quality, and generally covers descriptions such as work place, salary and job responsibilities. Therefore, job recruitment information was collected with supply chain as the keyword from the three platforms. The specific data sources are shown in Table 1.

Table 1. Data sources

No.	Platform	Website
1	51JOB	<a href="https://www.51job.com/">https://www.51job.com/</a>
2	LIEPIN	<a href="https://www.liepin.com/zhaopin/">https://www.liepin.com/zhaopin/</a>
3	BOSS	<a href="https://www.zhipin.com/">https://www.zhipin.com/</a>

Using Crawler Technology of Python, 4187 job recruitments with supply chain as the keyword was collected from 51JOB, LIEPIN and BOSS. However, some words and sentences of job descriptions are casual and simple, which has no specific meaning, when they were posed on website. In addition, some job recruitments were published repeatedly and some has nothing to do with the keyword. Therefore, some job recruitment information is meaningless in the collected data. In order to prevent this kind of meaningless data to affect the research results, Python must be used to clean the collected job recruitment information. The collected

job recruitment information data must be cleaned and processed. The effective information quantity collected after data cleaning is shown in Table 2.

Table 2. Effective information quantity

No.	Platform	Quantity
1	51JOB	1525
2	LIEPIN	1050
3	BOSS	470
4	Total	3045

### 2.2. Analysis of the text features of job responsibilities

#### 2.2.1. Description of post basic information

The collected job recruitments include not only job responsibilities, but also work places and salaries. In order to better understand the job situation, the job cities and job salaries of the collected job recruitments are analyzed, as shown in Figure 1 and Figure 2.

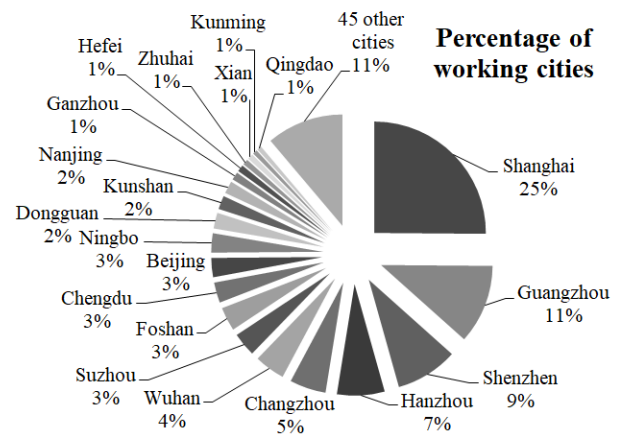


Figure 1. Percentage of working cities

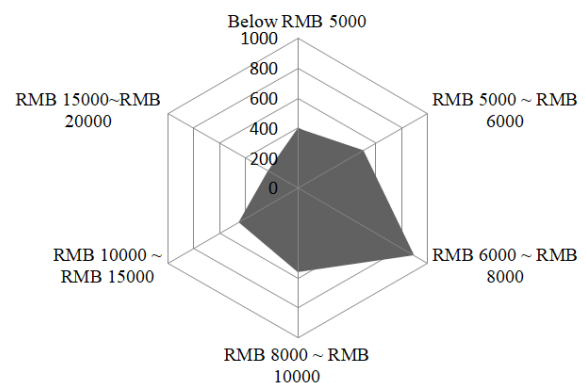


Figure 2. Post salaries

From Figure 1, supply chain related jobs are mainly concentrated in first-tier cities and new first-tier cities, among which Shanghai, Guangzhou and Shenzhen in first-tier cities account for 45% in total. Therefore, it can be seen that the first-tier cities with fast industrial development and resource accumulation are the main demand markets of supply chain management profession at present, while the new first-tier cities are the potential demand markets of it. From Figure 2, it can be seen that the range of post salaries is relatively wide, ranging from RMB 5,000 to RMB 20,000. Among them, the salary range with the largest proportion is RMB 6,000 to RMB 8,000, followed by RMB 8,000 to RMB 10,000.

Therefore, the supply chain related jobs have higher salaries. Overall, the supply chain management profession has a good treatment and prospect in the market.

### 2.2.2. The mining of job responsibility concerns based on high-frequency word analysis

The high-frequency word analysis of the collected text data in job responsibilities is executed, and the top 20 high-frequency words in the text data are selected as the main words, as shown in the following table 3.

Table 3. High-frequency words

No.	Words	No.	Words
1	supplier	11	cost
2	Logistics	12	system
3	planning	13	coordination
4	analysis	14	operation
5	procedure	15	strategy
6	inventory	16	program
7	optimization	17	in time
8	demand	18	quality
9	data	19	maintain
10	production	20	solve

Through the high-frequency word analysis, the main concerns of supply chain-related job responsibilities can be got and what the main teaching contents are in the teaching of supply chain management course can be find out. As can be seen from Table 3, supplier, logistics, planning, analysis and process are the top 5 high-frequency words, which can be defined as the first level, mainly focusing on supplier and procurement management, supply chain logistics planning and scheme design. Inventory, optimization, demand, data and production are 6~10 high-frequency words, which can be defined as the second level, mainly focusing on demand and inventory optimization, demand and production planning management. Cost, system, coordination and other words are the last 10 high-frequency words, which can be defined as the third level, mainly focusing on product cost and quality control, supply chain system coordination and optimization, and supply chain strategy and operation.

At the same time, all the high-frequency words counted are further visually analyzed by word cloud, which is shown in Figure 3. The word cloud can clearly show the high-frequency words in the job responsibility text data, and intuitively express the meaning of the text data.



Figure 3. Word cloud

From Figure 3, it can see that supplier is in the middle of the word cloud, which is the word information with the highest frequency in the text data of job responsibilities,

indicating the most important position of it in supply chain management. The middle-level data around suppliers include words such as logistics, planning, process and demand, while the outermost data includes words such as channel, cooperation, information, distribution, digitalization and category. Generally speaking, the word cloud basically covers all the teaching contents of the supply chain management course, and also highlights the most important information content in the middle of the figure, which is the main focus of job responsibilities.

### 2.2.3. Semantic network analysis

Semantic network is a kind of network graph composed of nodes and line segments. Nodes represent things, objects, states, etc. line segments represent the connections between nodes. In order to further study the inherent correlation characteristics among high-frequency words, the text mining software ROST CM6 is used to count the frequency of semantic related words of job responsibility text data and get the corresponding semantic network diagram, which is shown in Figure 4.

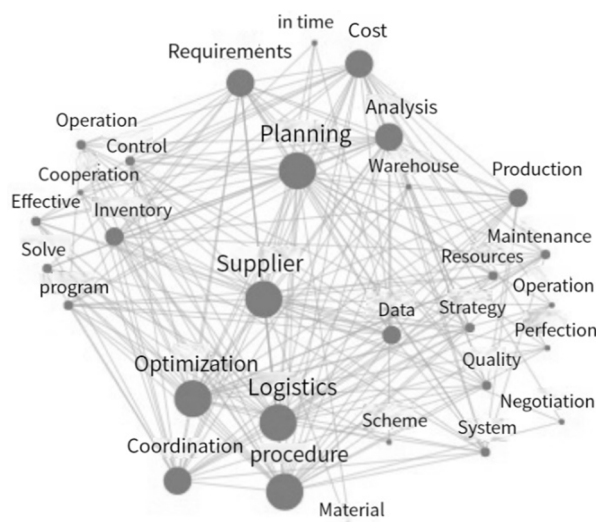


Figure 4. Semantic network

As can be seen from Figure 4, on the whole, the semantic network of job responsibilities related to supply chain is closely connected, with no isolated points and relatively prominent nodes. Supplier, logistics, procedure, optimization and planning are the key nodes of the whole semantic network diagram, which shows that these main keywords are frequently mentioned in the text data of job responsibilities. Although the ranking of these keywords is not completely consistent with the ranking of high-frequency words in Table 3, they are basically coincident, which proves once again that these words are the most important information content in job responsibilities. In addition, around these key nodes are secondary nodes such as coordination, demand, cost, analysis, production, inventory, strategy, quality, cooperation, operation and negotiation.

## 3. Suggestions on Teaching Content Reform of Supply Chain Management Course

According to the text features analysis of the above job responsibilities, it can be clear that supplier, logistics, planning, analysis, procedure and others are the concerns of

job responsibilities. They can be divided into three levels and seven main contents, namely, supplier and procurement management, supply chain logistics planning and scheme design, demand and inventory optimization, demand and production planning management, product cost and quality control, supply chain system coordination and optimization, and supply chain strategy and operation. Therefore, it is suggested that the course of supply chain management should focus on these seven main contents to carry out course teaching and extend others knowledge teaching.

#### (1) Supplier and procurement management

Supplier is an upstream enterprise and an important component of a supply chain. Supplier management and procurement are inseparable. Good supplier management contributes to the smooth completion of procurement and lays the foundation for the later production and distribution of enterprises. It is essential to take supplier and procurement management as one of the key teaching contents. From it, some contents will be studied, which are selection and construction of strategic supplier, supplier docking and relationship management, cooperation and restriction, procurement links and processes and just-in-time procurement strategy, etc. In content teaching, it is suggested to design a real simulation scene for practical teaching, such as applying bidding games to let students fully understand the supplier selection and procurement process.

#### (2) Supply chain logistics planning and scheme design

Logistics is the circulation process of physical objects and the foundation of the supply chain. Therefore, logistics management is an important and indispensable part of supply chain management. It is essential to take supply chain logistics planning and scheme design as one of the key teaching contents. From it, some contents will be studied, which are classification and function of supply chain logistics, logistics network planning and integration, logistics problem analysis and scheme design, etc. In content teaching, it is suggested that the teaching should be carried out through the real case of Changfeng teaching platform, and at the same time, students should be organized to design logistics planning schemes based on logistics problems of actual enterprises.

#### (3) Demand and inventory optimization

Demand is the forefront of the supply chain and the source of the whole supply chain operation. Inventory is one of the most common ways to meet the demand. Doing a good job in demand forecasting and inventory optimization is helpful to improve the operational efficiency of the overall supply chain. It is essential to take demand and inventory optimization as one of the key teaching contents. From it, some contents will be studied, which are consumer identification and demand forecasting, inventory control methods, inventory optimization strategies, warehouse layout and optimization, etc. In content teaching, it is suggested to teach through the real case of Changfeng teaching platform or to simulate the corresponding operation with Legendary Supply Chain Game software.

#### (4) Demand and production planning management

There is an inseparable relationship between production and demand. Production needs to be planned according to market demand, and demand needs to be met by production. Doing a good docking plan between demand and production is conducive to improving consumer satisfaction and enhancing the competitiveness of supply chain. It is essential to take demand and production planning management as one

of the key teaching contents. From it, some contents will be studied, which are demand forecasting methods, production control methods, planning decision-making mode, production operation process management and optimization, etc. In content teaching, it is suggested that Legendary Supply Chain Game software be used to simulate the demand forecasting and production planning.

#### (5) Product cost and quality control

Product cost and quality are the main influencing factors related to enterprise survival and consumer purchase, respectively. Controlling product cost and quality is helpful to improve the competitiveness of enterprise products in the market. It is essential to take product cost and quality control as one of the key teaching contents. From it, some contents will be studied, which are product cost accounting method, quality control measures and system construction, product quality continuous improvement plan, etc. In content teaching, it is suggested to simulate the operation of product cost input and control and quality management through Legendary Supply Chain Game software.

#### (6) Supply chain system coordination and optimization

There are frequent exchanges of workflow, material flow, capital flow and information flow among supply chain enterprises, so the coordination of their operations has a great influence on the overall performance of the supply chain. It is essential to take supply chain system coordination and optimization as one of the key teaching contents. From it, some contents will be studied, which are The performance and causes of supply chain coordination problems, incentive problems of supply chain operation, supply chain coordination mechanism and common supply contracts, etc. In content teaching, it is suggested to design simulation games to understand the several common supply chain imbalances, such as designing beer games to simulate the phenomenon of demand variation and amplification.

#### (7) Supply chain strategy and operation

The strategy and operation of enterprise supply chain is the key to the success of enterprise operation in market economy environment. It is essential to take supply chain strategy and operation as one of the key teaching contents. From it, some contents will be studied, which are types of supply chain, strategic characteristics of supply chain, construction and optimization of supply chain, integrated supply chain management, supply chain operation mechanism, etc. In content teaching, it is suggested to simulate the operation of supply chain strategy and operation through Legendary Supply Chain Game software.

## 4. Conclusion

With the revolutionary development of new information technology and industry, the world has entered the Internet Plus era. The new technology and new format put forward new requirements for the knowledge and ability of business talents. Therefore, under the current new business background, aiming at the reform of teaching content of supply chain management course, Crawler Technology is used to obtain job recruitment information of supply chain management related occupations. The Text Mining Technology is used to analyze the text features of the job responsibilities, so as to get the main concerns of the job responsibilities to clarify the main teaching content points of the supply chain course. And then, some corresponding reform suggestions are put forward.

Teaching content is the main information intentionally transmitted in the process of interaction between learning and teaching, and it is the key content to cultivate students' post competence. Facing the rapid development of knowledge and technology, the main teaching content of supply chain management should be adjusted and changed according to the development of the times and the actual post requirements of enterprises. Under the current demand of new business talents, the teaching content of supply chain management can focus on seven contents, which are supplier and procurement management, supply chain logistics planning and scheme design, demand and inventory optimization, demand and production planning management, product cost and quality control, supply chain system coordination and optimization, and supply chain strategy and operation. In teaching, besides teaching, it is suggested to be good at using case teaching platform, simulation game and supply chain game software to enhance the teaching effect of teaching content. Only by keeping pace with the times and reasonably adjusting the teaching content can it cultivate and improve students' ability to meet challenges and solve practical supply chain management problems.

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