

Design of Integrated Logistics Management and Control Program - SX Case Study

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Abstract. With the rapid growth of global trade, more and more foreign trade processing companies, enterprises have put forward new requirements for technology and management, and logistics management and control integration has received more and more attention. This article through field research on the SX company's production process, discovered the problems in the SX company's production process, proposed the use of EDI electronic ordering system, established KPI key performance indicators, based on the number of handling optimization warehouse layout and the use of RFID wireless radio frequency technology solution, Improve the integrated logistics management and control of SX, improve the production efficiency of SX, and reduce production costs.

1. Introduction

As China's economy becomes more and more open, a large number of foreign-invested enterprises have settled in China, making the competition among SMEs increasingly fierce and the prospects for development are not optimistic. SMEs should constantly improve their own management methods and improve their own competitiveness.

The integration of logistics management and control is an important part of scientific management, and manufacturing companies should all develop in the direction of management and control integration. The realization of the integration of logistics management and control enables the senior manager of the company to understand the operations in a timely and intuitive manner, achieve data sharing between the control system and the management system, and change the independent situation of each link in the logistics process. Facilitate the enterprise's unified planning, rational use of logistics resources, and maximize the level of logistics services.

The rapid development of small-scale clothing enterprises, a wide variety of production and management, how to conduct effective scientific production is a key issue for the development of enterprises, the key to scientific management lies in effective management and control. By grasping the quantity of each step of the product from raw material to finished product, the entire production process is under control.

The rest of the paper is organized as follows: section 2 provides an overview of the progress in the study of logistics management and control integration. The section 3 combines the current status of SX's production and operation and discusses the problems of the company's storage center. In section 4 proposes SX's logistics management and control integration solution and conclude the paper in Section 5.

2. Related literature

The integration of logistics management and control refers to the integration of logistics management information system and logistics control system as a whole. On the basis of full information sharing,

the integrated management of the entire logistics process is realized. This process includes receiving all orders from the customer's order to start the raw material purchase to the final product production.

The research on the integration of logistics management and control is developed along with the management requirements of enterprises. After undergoing continuous polishing, the theoretical methods tend to mature. In this process, many scholars have made contributions.

The control of production logistics can increase production efficiency. Deng elaborated the design and implementation method of network communication in warehouse monitoring system, the design cost is low, and the system integration of general equipment and technology for management control is realized.[1] Darvish, M. and Coelho, L. C. realized that significant improvements can be achieved by adopting an integrated approach while considering various decisions and co-optimizing them. They consider a production distribution system that involves location, production, inventory, and distribution decisions. The goal is to minimize the total cost while meeting the requirements within the delivery time window.[2]

On the other hand, RFID technology has been rapidly applied in the integration of logistics management and control. Kirch, M., Poenicke, O., and Richter, K. proposed that with automatic identification and positioning technology, the smart logistics area is created for logistics and production processes. And described two RFID base use cases, thus showing the potential of using smart logistics technology.[3] Xiao, Shen, etc considered that the arrangement and deployment of production areas based on RFID technology can realize real-time tracking of tagged objects and collection of instant product information. The RFID-based production logistics can promote the effective integration of manpower, machinery, materials, methods, and the environment.[4]

At last, MRP is integrated into the control model. Qiao and Geng analyzed the production process of manufacturing companies and established a control model based on MRP/JIT/TOC integration. The effectiveness of the integration of production process management and control was verified.[5] WU M, XIONG, SQ compared MRP and TOC, and used the model as an example to analyze their advantages and disadvantages, and their practical application in production.[6]

Based on the above studies we can see that scholars at home and abroad have their own unique insights on the integration of logistics management and control at different levels and in different directions. They mostly start with technologies in logistics management and control integration, including EDI electronic ordering systems, KPI key performance indicators, RFID wireless radio frequency technology, at the same time with specific cases to prove. Different research methods are used to solve the problems encountered in the actual situation. The development of enterprise logistics management and control integration is to meet the needs of the company's development. He not only promotes the development of the enterprise, but also improves the overall management level of the manufacturing industry. The following problems exist in the integration of logistics management and control in manufacturing enterprises in China:

2.1 There is a lack of scientific management concepts.

From the perspective of integration of logistics management and control, the production capacity of a manufacturing enterprise is crucial, and production efficiency and quality are the core competitiveness. If a manufacturing enterprise lacks scientific management concepts, no rules, no plans for production, does not prepare sufficient raw materials for production in advance, and labor preparation, the production efficiency is inevitably low, or when the raw materials are out of stock in order to guarantee the production progress, Subsequent filling will not guarantee product quality.

2.2 Lack of practical application of related technologies

Most manufacturing and manufacturing companies still adopt traditional recording methods. They do not use RFID wireless radio frequency technology to scan goods in and out of warehouses. Raw materials are not specifically and accurately recorded in and out of warehouses. There is no accurate

understanding of the state of the goods in the library. This thought that there was enough stock. When the ingredients were found, the goods had been deteriorating or insufficient.

2.3 A lack of awareness of quantitative assessment

raw material procurement is ordered from suppliers that can be supplied, because there is no KPI key performance indicator, there is no quantitative score for suppliers, there is no ranking, you may choose suppliers with poor supplier credit Situation, falsely reported inventory quantity, delay in production progress due to product quality.

2.4 Poor communication of information

The integration of logistics management and control is a process in which various links in production are closely linked and become an interlocking process. However, due to poor communication of information, some links in the middle are disconnected and can no longer be integrated into one.

2.5 Lack of talents with integrated logistics management and control.

The integration of logistics management and control technologies is rarely used in enterprises. One important reason is that there are few people who have such technologies, and there are few technical talents. Enterprises cannot apply the technology smoothly to solve problems in practice.

3. A case of logistics management and control integration

3.1 company background

SX Company is oriented to customer needs and closely follows the development trend of the industry. Order-based production, order-based procurement, strict control of each company's production processes, in order to meet customer demand as the starting point, has been the customer has been well received.

SX's main brands are international brands, and undertake various types of processing. The fall and winter series are the main products; cashmere, leather garments, cotton garments, and Nimban are the main OEM business. SX Company is now expanding its scale and starting to develop a small number of independent designs. , independent production, independent store sales of products. With the continuous expansion of SX's business volume, the increasing number of customer needs, and the simple management of production processes, can no longer meet the company's needs for production.

3.2 The problems of SX Company

3.2.1 Lack of effective management of suppliers

SX company has 5 kinds of commonly used materials, provided by the 8 fixed suppliers, and other less commonly used or less used accessories, low value, a wide variety, the supplier is uncertain.

For the selection and management of suppliers, SX's selection criteria are the lowest cost of its own, and the homogenization of products provided by suppliers is serious. Among the many suppliers, whoever gives a lower price, who will be given priority .

SX company is order-based production, generally after customer orders, in accordance with customer orders replenishment purchase, procurement, suppliers provide a serious homogenization of raw materials, so the competition is very fierce, in addition to some differences in color categories, the basic relates to less than update Replacement. In order to get an order, some suppliers misreported the inventory, but they did not have enough material stock or insufficient inventory to guarantee arrival within the specified date. As a result, they could not deliver on time and the company's production schedule was delayed.

The company's assets in terms of materials are mainly concentrated on finished leathers and fabrics. Finished hides include light skins and furs. The value of these raw materials is relatively high.

It can be seen from the 28 rule that the main contradiction in the company's management suppliers lies in the suppliers of finished hides and fabrics. Management, in which the fabric is divided into clothing cloth and lining cloth, the value of the lining cloth is relatively low, and the finished leather and clothing cloth are order-based purchases. However, in order to prevent out-of-stock shortage caused by hostile competition from suppliers, the company will generally pick up more finished hides and fabrics during the busy season. However, the stocks will occupy funds, the company's capital flow will slow, the order turnover will slow down, and the company's business volume will decrease. .

Without an effective supervisory evaluation system, it is not possible to screen out the most appropriate and credible supplier at the first time when an order is needed. Only when the suppliers are evaluated and screened can similar situations be avoided as much as possible for the next order.

3.2.2 Disposal of logistics planning

SX Company builds its own warehouses. In similar companies, the warehouse scale is relatively large. The shipment and purchase path are the same, and the vacancy near the elevator entrance is a temporary storage area that has been allocated according to the material list and is waiting for the receipt of the production department. The warehouse includes a hall and a small hall. The materials are stacked according to types and are simply divided into areas. The halls are generally stacked with larger area and higher value materials such as piled cloth, bundled finished leather and so on. The small hall made three partitions with partitions and was divided into four compartments. The largest one placed three rows of high-level shelves. The shelves were filled with a wide range of accessories, including zippers, buttons, hats, ribbons, etc. . Then the two similarly-sized compartments are the tally area and the office area. The tally area is placed according to the bill of materials, but the materials for the batching list have not yet been completed. Under normal circumstances, this material list needs to be equipped with 10 types of materials, but There are only 5 kinds of stocks, then these 5 kinds will be placed in the tally area first, waiting for the remaining 5 kinds of arrivals to be delivered together with a good library. Two office desks and a bookshelf are placed in the office area to store bills of materials, material in and out of stores, and records with suppliers. The remaining one compartment is very small, and generally some auxiliary tools such as tape measure, weight scale, electronic scale, plastic bag, and hemp rope are placed for some sundries and ingredients.

SX Company has one floor as a storage area. The storage area is divided according to the size of the raw materials, but the storage areas are disorderly stacked because the company lacks professional logistics management personnel, there is no scientific method to plan the reservoir area, and the company has no The awareness of management in the reservoir area.

3.2.3 Material information communication is not smooth

There are often cases where the type and quantity of materials do not match those of the incoming and outgoing accounts. However, since the difference is generally small, the company never pursues them. At the same time, when several supervisors are handed over, each supervisor will have his own unique way to record items, so The same kind of material appeared, which was different on the incoming and outgoing records, resulting in the inability to determine the exact quantity of the inventory, which in turn led to repeated orders or insufficient stock but failed to order in time.

The materials are roughly classified according to the category, but they are simply divided according to the purpose. The confusion in the area makes the picking work difficult. There are also many common problems. For example, according to the ordering principle, the supplier only provides a piece of cloth, but this time only half a horse is needed for picking, and the rest will be put in storage in the cloth area, but due to the small quantity, it will be It is arbitrarily shelved in a corner, and when it is needed next time, it is not easy to find and time-consuming. In addition, due to the low value of the accessories, the number of materials has been neglected in the material management, the commonly used accessories will be ordered in large quantities at one time, and then slowly use, and some other custom accessories designed for special styles, Depending on the order quantity, it may be ordered by the supplier and ordered according to the quantity requested.

SX's record of inbound and outbound delivery is still the most traditional handwriting record, but due to the constant replacement of the warehouse manager (the person in charge of the record), each individual has his own recording habits, resulting in multiple standards for material records and the actual type of materials in the warehouse. The number is often not matched with the books, often making out of stock and out of stock frequently.

4. SX company logistics management and control integration program design

4.1 Using EDI and KPI to manage suppliers

For SX company management suppliers, EDI and KPI can be combined to improve information sharing between SX and suppliers and establish specific indicators to measure suppliers.

EDI Electronic Ordering System is currently only used by a few companies. The core of EDI lies in electronic data exchange. EDI is a tool and method of data exchange. The EDI electronic data exchange system is used in the development of management and control integration. It is also the sharing of information between producers and suppliers, providing guarantees for production, preventing suppliers from falsely reporting inventory, delaying delivery, and delaying production progress. According to one of the characteristics of EDI, business documents are transmitted between enterprises. The document data adopts common standards and formats. The transmission process ensures that the data is complete, consistent, and reliable. It ensures the continuous exchange of partner data and the automatic transmission of data through computers to computers. No manual intervention is required and there is an application that automatically responds to it.

4.1.1 SX company EDI implementation steps

SX Company sends relevant data from its own information system to the supplier's information system for a total of three steps:

Step one, SX company first writes the original purchase as a file, and then extracts the application file data from the application system database to generate a flat file (standard intermediate file). The flat file is then generated by the translation software in an EDI standard format file.

Step two, standard data files to be formed by SX will be transmitted to EDI service centers through EDI data communication and switching networks and then forwarded to supplier computer systems.

Step , after the supplier's computer system receives the sent message, it first accesses the EDI mail system through the communication network, and then opens his own mailbox to obtain the EDI message sent by SX. The format is verified and translated. The map will be restored to an application file. The application file is the original purchase order of SX, and it is also the supplier's order.

4.1.2 Establishing supplier KPI

KPIs are key performance indicators. It is the key driver that most influences the creation of value.

Through the procurement content of SX's raw materials, fully combining the characteristics of each supplier, we have selected four dimensions of product quality, on-time delivery, delivery quantity and after-sales service

4.1.3 Determination of index weights

After setting key performance indicators for various types of suppliers, the department's supervisors and suppliers are consulted to determine the proportion of various indicators in each category of suppliers, as shown in Table 1.

Table 1. KPI Weights of Various Suppliers.

	product quality	On time delivery	Quantity	Service
Accessories	30%	30%		30%
Cloth type	20%	40%	30%	10%
Finished leather	40%	30%	20%	10%

Business information between SX and its suppliers has been transformed into standardized and standardized documents that are freely exchanged through the network, replacing a large number of documents and tickets, improving the accuracy of information processing and reducing the error rate.

4.2 According to the frequency of arrival and re-planning reservoir area

In general, companies use different types of warehouses to store different types of materials. In the production activities, materials are often moved in and out, and the workload is heavy.

The number of weekly visits to each item in the warehouse is shown in Table2. Relocate the warehouse according to the following method to minimize total handling

Table 2. Weekly access to SX’s warehouse items.

goods	frequency	Cargo area unit	goods	frequency	Cargo area unit
zipper	20	1	Cloth	10	1
Garment	25	1	lining	20	1
Hat and nylon rope	35	1	Light skin	10	2
Garlic	40	2	Fur	10	2

Calculate zipper $20/1=20$, Garment $25/1=25$, Hat and nylon rope $35/1=35$, Garlic $40/2=20$, cloth $10/1=10$, zipper $20/1=20$, light skin $10/2=5$, fur $10/2=5$

Relocate the warehouse as shown in Figure 1:

Light skin	Light skin	zipper	Garment
Cloth	Garlic	Garlic	Treasure Area(doorway)
Fur	Fur	lining	Hat and nylon rope

Figure 1.layout of SX company’s warehouse.

In the production process, goods are often moved in and out, the workload is large, and the rationalization of the warehouse arrangement can improve the picking efficiency, especially in the season of production, and improve the efficiency of the distribution order.

The clear and orderly warehouse layout also reduces many difficulties for the warehouse's non-periodic inventory. The goods are categorized and placed at a glance.

4.3 Using RFID and information system to manage inventory products

RFID is a wireless communication technology that can identify specific targets and read and write related data through radio signals.

The basic principle of RFID is a basic RFID system, including three parts: tag, reader, and application system.

The RFID radio frequency technology combined with the EDI system is implemented in SX as follows:

Step one, the supplier sends the goods delivery information to the SX company's logistics department in advance, and is automatically processed by the computer information system to generate the pre-inventory information.

Step two, when entering the warehouse, the RFID reader at the entrance to the warehouse will automatically scan the relevant information of the goods to the management information system.

Step three, the system compares the actual warehousing information with the pre-inventory information. If it is correct or the error is within the specified range, then the warehousing is permitted and the pre-inventory information is converted into inventory information; if an error occurs, the system outputs a prompt Information is resolved by the head of the logistics department.

Step four, after the goods are in place, the electronic label of the goods will be scanned again. The warehouse management system will confirm that the goods have been stored in this place and can be delivered according to the order in the future.

Step five, when the goods are delivered to the warehouse, as with the warehousing, through the RFID reader at the outlet of the exit of the warehouse, the cargo information is transmitted to the information system and compared with the material list. If it is correct, the goods will be delivered

smoothly. Corresponding deduction; if there is an error, the information system outputs prompt information.

The simultaneous collection of large quantities of data unique to RFID technology eliminates the need for precise alignment, freeing the company from a large number of repetitive tasks. Mass data in and out of warehouse is collected, transmitted, checked, and updated in real time through the RFID system, improving work efficiency and accuracy.

5. Conclusion

This article first introduces the research background and related theories of logistics management and control integration. In combination with the actual situation of SX's production process, three methods have been applied to specifically address the issue of SX's integration of logistics management and control. On this basis, the problems existing in the integration process of SX's production process were analyzed and solved, and the causes of the problems were analyzed. For the reasons, propose corresponding solutions and improve the production process. We have made improvements from supplier management assessments, location optimization, and raw material management. Finally, based on the proposed theory, this paper proposes specific solutions to the problems existing in the process of SX's logistics management and control integration. The main findings of this article are as follows:

This paper combines the EDI electronic ordering system with the KPI supplier performance appraisal system to scientifically and effectively manage suppliers, reducing the delay in timely delivery due to suppliers' misreporting of inventory and malicious bidding, and delaying the company's production progress. The company provided guarantees on time.

This paper applies the method of re-planning the reservoir area based on the frequency of inbound and outbound warehouses, re-plans the SX company's warehouse area, improves the picking efficiency, reduces the difficulty of warehouse management, and the manager's ingredients can correspond to the area picking to improve work efficiency.

This paper integrates RFID radio frequency technology and management information system to manage warehouse materials, making the categories, quantity and status of raw material materials clear and clear, effectively solving the problem of inconsistency between accounts and actual inventory, reducing consumption, reducing the number of inventory, management People greatly reduce the workload.

References

- [1] Huaiyong deng, Design and Realization of Management and Control System of Warehouse Based on Vc6, *Proceedings of the 2014 4th International Conference on Intelligent Structure and Vibration Control (ISVC 2014)*, pp. 236-240, 2014.
- [2] DARVISH M, COELHO L C, Sequential versus integrated optimization: Production, location, inventory control, and distribution, *European Journal of Operational Research*, vol.268, pp. 203-214,2018.
- [3] KIRCH M, POENICKE O, RICHTER K, RFID in Logistics and Production - Applications, Research and Visions for Smart Logistics Zones. *Proceedings of the 16th International Scientific Conference Reliability and Statistics in Transportation and Communication*, pp 526-33, 2017
- [4] XIAO JJ, SHEN Y, CHU BB, et al, Study of Logistics Management in Workshops Based on RFID, *Proceedings of the 2015 6th International Conference on Manufacturing Science and Engineering*, pp. 1894-1899, 2016.
- [5] Qiao DP,Geng JX, Research on Production Process Control for Discrete Manufacturing Enterprise Based on Integration of MRPii/jit/toc, *Trans Tech Publications*, pp. 167-171, 2013.

- [6] WU M, XIONG SQ, Study on Integrated Production Management Model of Mrp II , Jit and Toc, *Proceedings of 2017 International Conference on Advances in Materials, Machinery, Electrical Engineering (AMMEE 2017)*, pp. 33-35, 2017.