Third-party Logistics System Based on Lean Logistics

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Abstract. Currently the development of third-party logistics enterprises in China is facing opportunities and challenges, and urgently needs new management model. This paper discusses the third-party logistics system based on lean logistics from four aspects: lean-agile distribution, value stream analysis, the SLP and information platform construction. This study establishing a new management model provides innovative ideas and methods to third-party logistics enterprises to effectively promote the transformation and upgrading of the third-party logistics business models.

Introduction

The emergence of lean logistics can be traced back to the beginning of the last century, in the western developed countries after the fast development of a century both theory and practice have been perfect. Womack and Jones, the professors of Massachusetts Institute of Technology, in the “The Machine That Changes The World” book in 1990 put forward to lean theory, compared with other production modes ,which all inputs are greatly reduce[1]. Michel Baudin in 2005 in the book "Lean Logistics: The Nuts and Bolts of Delivering Materials and Goods" introduced in detail the idea of lean logistics, this book can be said to make up for the defects of the previous book’s lacks of lean theory [2]. Lean Logistics improvement tools include: Process Activity Mapping, Supply Chain Response Matrix, Production Variety Funnel, Quality Filter Mapping, Demand Amplification Mapping, Decision Point Analysis, Physical Structure Mapping [3 4] , and Value Stream Mapping, Supply Chain Conformity[5].Third-party logistics needs to study and solve the problem of producing what, using what, having what, lack of what and how to meet, that is, at the right time, the necessary items with the necessary quantities are send to the exact location.

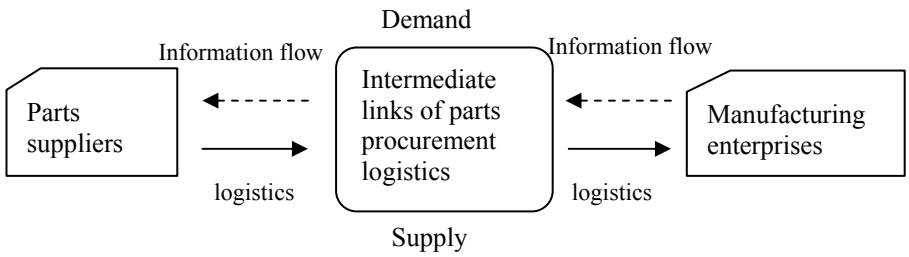

Figure 1. The Relationship of Demand and Supply

In China third party logistics development is relatively late, logistics enterprises have great difference between background and resource capacity, most of them are a great lack of the fixed business model and scientific method. By drawing on the experience of third-party logistics enterprises at home and abroad, for improving domestic third-party logistics works, this paper designs a suitable operation program for third-party logistics from the point of view of lean logistics to build the third-party logistics system based on lean logistics.

The construction of third-party logistics system based on lean logistics.

This paper discusses the third-party logistics system based on lean logistics from four aspects: lean-agile distribution, value stream analysis, the SLP (Systematic Layout Planning) and information platform construction.

Lean-agile distribution.

Lean-agile distribution is in the process of planning, organization and implementation of distribution to integrate the lean-agile cost control and agile logistics according to customer demand, the commodity turnover rate and order requirements for the optimization performance. Scheduling arrangements are discussed below under static conditions and dynamic conditions.

1)Scheduling arrangements under static conditions. In a scheduling cycle T0 orders are constituted as shown below: from T-1 cycle to T0 cycle delivery orders is n0~ np, in T0 cycle delivery orders for np~ np+q, from T0 cycle to T1 cycle distribution orders for np+q~ np+q+m. The quality of the goods of orders n1 is disposed w1, and the volume is v1. In T0 cycle ordinary callable vehicle is M1 ~ Mm, emergency vehicles for Mm+1 ~ Mm+i, tonnage and volume of Mj vehicle are respectively wj and vj.

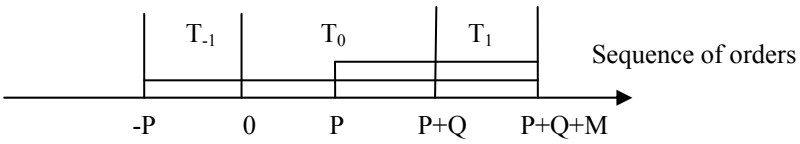

Figure 2. The Sequence of Orders

Ⅰ. When $\sum_{j=1}^{m} v_j * m_j < \sum_{t=1}^{p+q} v_t * n_i \le \sum_{j=1}^{m+t} v_j * m_j$ or $\sum_{j=1}^{m} w_j * m_j < \sum_{i=1}^{p+q} w_i * n_i \le \sum_{j=1}^{m+t} w_j * m_j$, ordinary callable vehicle cannot meet the distribution needs, some or all of the emergency vehicles arranged in accordance with the principle of agile must service, that is, the arrangements of all vehicles should take full account of the delivery time requirements.

Ⅱ. when $\sum_{i=1}^{p+q} w_i * n_i > \sum_{j=1}^{m+t} w_j * m_j$ or $\sum_{i=1}^{p+q} v_i * n_i > \sum_{j=1}^{m+t} v_j * m_j$, the emergency delivery vehicles as well as ordinary callable vehicle cannot meet the delivery needs, you must make use of the social resources in order to meet service requirements, distribution arrangements in accordance with agile distribution principle.

Ⅲ. When $\sum_{i=1}^{p+q} v_i * n_i < \sum_{j=1}^{m} v_j * m_j$ or $\sum_{i=1}^{p+q} w_i * n_i < \sum_{j=1}^{m} w_j * m_j$, ordinary callable vehicle can meet all transporting needs. At this time, we must consider orders n_{-p}~ n_{-1} or orders n_{p+q+1}~ n_{p+q+m} as supplement.

The widespread operation model in logistics enterprises is third case.

2)Scheduling arrangements under the dynamic condition. The scheduling arrangements in practice are dynamic. The dynamic nature of the scheduling arrangements is caused by the following factors: variability of scheduling cycle; randomness orders; change of the transported vehicle; the separation of scheduling arrangement and distribution performance.

At a particular time, the determined orders are n_1~ n_{p+q}, in which n_1~ n_p are the ordinary orders generated in the current or previous scheduling cycle, n_{p+1}~ n_{p+q} are emergency orders, in current scheduling cycle random orders are n_{p+q+1}~ n_{p+q+t}.

Ⅰ. When p=0, q=0, only the newly generated random orders n_{p+q+1}~ n_{p+q+t};

Ⅱ. When p=0, q≠0, the emergency orders and the newly generated random orders for the period n_{p+q+1}~ n_{p+q+t};

Ⅲ. When p≠0, q=0, there are the ordinary orders and the newly generated random order n_{p+q+1}~ n_{p+q+t};

Ⅳ. When p≠0, q≠0, there are the emergency orders, the ordinary orders as well as the newly generated random orders n_{p+q+1}~ n_{p+q+t}, in accordance with the lean-agile requirements the

ordinary orders and emergency orders are combined distribution to make it into the first three cases.

Value stream analysis.

Value stream is all activities process about enterprise value creation from customer order to drawing up the detailed progress to deliver, which is the information flow of the whole process. Value streams must flow smoothly and eliminate waste, the key is all the steps of a task linked up in an optimal way to form a non-disruptive continuous flow. In the implementation process, firstly, clarify that the goals of the current process is the end-customer demand; secondly, explore the optimal logistics path to eliminate all non-value behavior. Production of the whole supply chain is sales-oriented by the way of the Kanban pull equalization production or supply chain synchronization production, etc., thus which will not appear excess inventory in the various aspects of the supply chain.

The SLP (Systematic Layout Planning) based on lean thinking.

The central task of the logistics system based on lean thinking is to reduce possibly the costs in production process and in the planning process. Specifically, in the planning of the logistics system based on lean thinking the SLP is made two kinds of optimization: the design of push-pull combination and dynamic design.

1) Data collection. Production (P), quantity (Q), routing (R), supporting service (S) and time (T), and the area, corporate financial strength, staff situation, customer's expectation from the system.

2) The analysis of product process. To draw process diagram determines the necessary step, the most effective order as well as the intensity and quantity of movement the material goes through in the production process

3) The logistics process of production sites. (1) Determine the type of facility layout.(2) Analyze operating units and operating activities. (3) Develop the initial program of facilities planning on the basis of the above analysis.

4) Production system simulation model. The application logistics system simulation software simulates the production process of an existing system, then you can clearly see the plant layout, process route, the logistics process, program completion, equipment utilization and so on, and then evaluation the initial program, look for troubles and the "bottleneck" which affects the efficiency.

5) The continued improvement of the program. Firstly, enterprise one by one improves the problem which the simulation analysis found, eliminates waste, improves the "bottleneck" link, and optimizes existing programs. Then, the modified scheme will be simulated again and be improved again, until it reaches the desired optimum standards.

The lean logistics information platform.

Modern logistics must be associated with a high level information flow, which requires that the entire system must have efficient and accurate command and dispatch system. In construction of lean logistics information platform, enterprises should be according to their own development needs and unified planning within the entire supply chain, as various logistics node, and complete autonomously internal common logistics information platform construction in line with the standardization. Logistics IT platform construction needs to have EDI exchange host systems, network systems (switches, routers, etc.), security system (firewall device, password system, etc.), Internet access line and other hardware devices. Each link must be configured to conform to a uniform standard, such as barcode technology, RF technology so that rapidly contact in the network environment of the Internet / EDI logistics center and customers system, to realize the information operation of the logistics basic operating process. After completing each logistics node information construction, the enterprise needs to effectively integrate the node information resources to further promote the logistics information. This process is constructed mainly by the management sector of different nodes. Enterprises need to set up a logistics association to coordinate industry issues and implement corporate self-regulation and access system.

Conclusion

The focus of the program is to build a third-party logistics system to systematically integrate logistics operation including the value chain analysis, the construction of logistics information management system and logistics distribution optimization. This paper hopes to provide useful suggestions to implement and build lean logistics system for domestic third-party logistics enterprises to realize the integration and sharing of logistics information system, effectively reduce parts logistics operation costs and increase efficiency so as to promote and improve the core competitiveness of enterprises .

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