

Framework of the personalized logistics service theory

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Abstract: This paper focuses on the framework of personalized logistics service. Taking “provide it”, “find it” and “get it” as the guides, and based on X Party Material Flow(X-PMF), this paper formed the basic theoretical framework of Personalized Logistics Service (PLS), which includes the theories and methods of X-PMF virtual collector, information filter and logistics coordination system. Then the operating mechanism of the personalized logistics service is studied. The examples of Amazon, Dangdang and Taobao are proposed to analysis the virtual collector, information filter and logistics coordinator of the personalized logistics service system.

Keywords: Personalized Logistics Service (PLS), Long-tail Effect, X Party Material Flow (X-PMF)

1. Introduction

Serving consumers is the purpose of modern logistics, and consumers' demand has to be considered as the basic premise of logistics service. In today's internet and “rich economy” age, consumers' demand shows a tendency of personalization, so personalized logistics service must be the core process in the design and operation of logistics system. At present, many scholars at home and abroad has studied PLS from the point of customization logistics, virtual logistics and agile logistics, however, most of them only pay attention to some specific mode of PLS theory system, lack of studies of PLS theory framework from the macro level. What's more, the problem that theory and practice are not developing consistently has not been completely solved yet, e.g. “offline” PLS long-tail effect, cost control of PLS, all of them still need further empirical

research and theoretical innovation.

This paper focuses on the formation theory of long-tail effect under the environment of Internet, integrates X party logistics theory, has constructed the basic theory framework of PLS, basic theory and operation mechanism of PLS have also been discussed. All of these will provide theoretical reference for the construction of modern logistics theory system.

2. Literature Review

2.1 Long-Tail Effect In PLS

Italian economist Pareto (1897) found the Power Law Distribution after observing the phenomenon of real-world, also called Pareto Distribution or 80/20 Rule, which means that 80% of outputs are generated by 20% of inputs. Anderson (2004) presents the concept of “long-tail” for the change of consumer behavior via the Internet. Anderson thinks that companies can get the same profits by selling 80% unpopular products as selling 20% popular products. Anderson (2006) develops the long-tail theory. He points out that the culture and economy center is transferring quicker and quicker from the demand head (demand head means the few popular products and markets) to the demand tail (demand tail means the unpopular products and markets which occupy a large market share). Figure 1 shows the long-tail effect, it is a phenomenon that the most frequently occurring 20% of products represent less than 50% of occurrences, or in other words, the least frequently occurring 80% of products are more important as a proportion of the total volume.

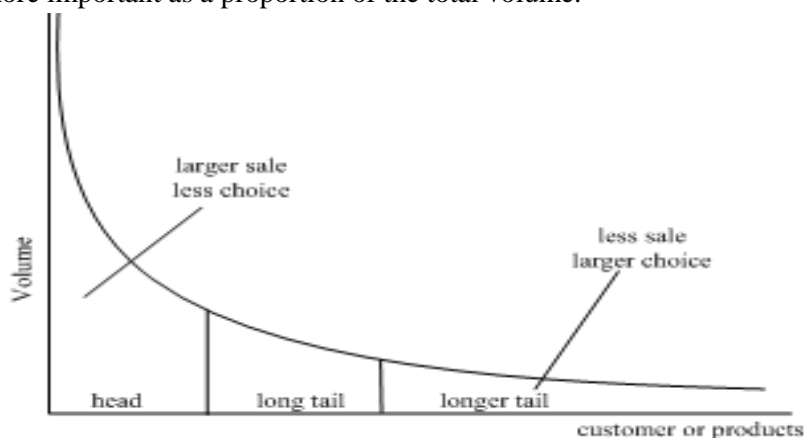


Figure 1: Long-tail effect

The editor of The Wall Street Journal Gomes (2007) finds that the long-tail does not meet the efficiency Anderson claimed, because the demand head has the most profitable product. While Anderson thinks that the demand head and demand tail must be defined dynamic. Jiang (2007) thinks that the long-tail theory does not only pay attention to the tail” of the curve shows in Figure 1, but the co-exist of the “tail” and the “head”, Tang(2009) thinks that if most of the personalized demand can be met, the long-tail effect and economies of scale of unique demand-side will appear.

2.2 The Influence of Logistics Inventory Cost On the Long-Tail Effect

Anderson (2006) points out the sources of selling physical products: one is decreasing the cost of supply chain by centralized inventory; the other one is providing infinite options for products. Bo (2006) thinks that there are three elements for long-tail market: personalized demand of consumer should be especially obvious, the inventory cost and transport cost of products should be extremely low, and the channel for information should be convenient. Bentley (2008) analyzes the long-tail effect for the optimal stock size strategy.

Long-tail business model is effective for digital distribution company. However, the managers of physical products companies have to make a tradeoff between inventory cost and profit. All the researches above show that the long-tail effect in traditional industries is decided by the control of supply chain cost. However, Long-tail theory cannot help the operation and coordination of physical long-tail logistics.

2.3 Mechanism Of PLS

Most researches about PLS focus on customized logistics, virtual logistics, and agile logistics and X party logistics, etc. Customized logistics is the combined logistics function module based on Delay Technology (Toffler, 1971; Pine II, 2000, etc; Gong, Hua, 2001; Ma, Dong, 2006, etc). Virtual logistics focuses on the resource allocation by the support of information technology (Miles, Gregory, 1994, etc; Jiang, Chen, 2007, etc). Agile logistics pays more attention to quickly and flexibility response to consumer service demand (Damen, 2001; Zhang, 2006). Hou (2003) presents X party (X-PMF) theory, and the formation mechanism of X-PMF. The X-PMF is becoming a new research tendency of PLS. Liu (2005) applies X-PMF theory to the analysis of the logistics system. Lu and Xu (2006) compare the logistics theories of China, America, Japan, etc., and gave some suggestions on the development of Chinese logistics. Hou et al.

(2006, 2008) put forward the theory and method of X-PMF; Tang (2009) points out that logistics alliance cooperation is X-PMF implementation mechanism.

X-PMF theory provides new research ideas for PLS. There were some studies about the X-PMF, however, the problem of how to provide PLS with low cost between customers and mass merchandise is still unsolved.

The Long-tail theory is an effective business operation mode for personalized customer service, but it cannot help to inventory and logistics cost control, which influence the realizing of long-tail effect. It is meaningful to combine the long-tail and an X party logistics theory, for the combined theory is of great importance to improve PLS theory.

3. PLS Theory Framework

3.1 PLS Long-Tail Effect Realizing Mechanism

In order to realize PLS Long Tail effect, three questions have to be solved. The first one is the need of infinite storage space to provide endless alternatives for decentralized mass customers, which we can call it “provide it”. The second one is to help the consumers to find personalized products by means of using quick and effective information filter, which refers to “find it”. The third one is to help the customers obtain personalized products or service quickly with lower MF cost by the virtual coordinator over Internet, which is “get it”.

As figure 2 indicates, the three questions of virtual collector, filter and logistics coordinator that are constructed based on the X-PMF theory can help to solve the questions of how to “provide it”, “find it” and “get it”, and to realize PLS long-tail effect. From designing and management point, we will discuss how virtual collector, information filter and MF coordinator help Internet markets to realize Long-tail effect in following parts.

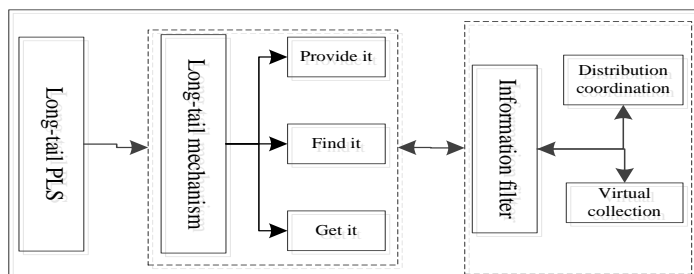


Figure 2: PLS long-tail effect realization mechanism

3.2 Design Of PLS Long-Tail Virtual Collector

For the high venue rental, operators of store will not provide all the unpopular products. The behavior of consumer is changing with the development of the economy and information technology, such as the diversified and personalized demand. With the reasonable logistics inventory cost, the store is difficult to meet all the personalized demand of consumers. With the development of the information technology, the businesses based on Internet occupy more and more market share. PLS long-tail virtual collector can provide coordinated service between the centralized supply and diversified, small demand, and establishes the realizing mechanism of “provide it” for consumers. There are kinds of virtual collector, such as product collector, logistics collector and X-PMF mixed collector and so on.

(1) Product collector

Virtual product collector is an organization mode that collects countless kinds of products together by information technology, and provides infinite virtual shelf for products so as to make the products be found easily.

The products of different types and from different places can be displayed to different consumes via the Internet. So the demand and supply can be centralized. By this way, the type of products can be expanded without increase the cost, and the drawback of unmatched locations between suppliers and demanders in traditional market can be eliminated. The problem of “provide it” in realizing long-tail effect is solved too.

The diversified product is a basic element for a successful products collector, which not only needs unpopular products, but also popular products. The products collector has all the information of the products. Every collector has to lower the standard for entering the market and to allow more and more kinds of product to find their consumers through it. The personalized demand of every consumer can be met in this way.

Products collector can not only provide personalized supply at low cost, but also help the production decision of the suppliers.

(2) Logistics collector

Logistics collector is an organization mode that collects sustainable logistics organizations together by information technology. With the development of the economy, various size, various service types of logistics enterprise have appeared mushroomed like, logistics collector provides the platform for them to display to help them find their customer and to realize their values. In logistics collectors, logistics enterprises are put on the virtual shelves like products. Every logistics enterprise’s information is also included in the collector, e.g.

Service scope, logistics facilities and service type, etc. every kind of consumers can choose the suitable logistics service online. After being serviced, consumers' feedback information will be stored in the collector to promote the development of logistics products.

(3)X-PMF mixed collector

The general name of different kinds of physical unit in the long-tail space is physical long-tail. Physical Long-tail is not only tangible products, but expanding to PMF agent. X-PMF virtual collector is a huge network system that integrates different kinds of PMF in different places. Figure 3 tells us its function process.

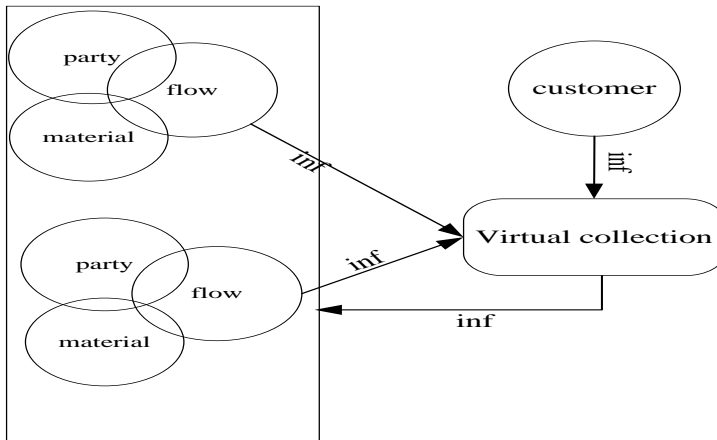


Figure 3: X-PMF mixed collector function process

X-PMF mixed collector provide infinite choices for consumers, and it is the organization mode that controls the cost of long-tail effect, not only can help realize “inventory virtualized” to provide enough big storage space for party, material and flow, but form personalized service interconnected state “4A” (anybody can get anything at any place in any time) to help consumers “find it”, then establish personalized service network basis for “get it”.

3.3 The Framework Of PLS Information Filter

Virtual collector makes products diversified, and improves consumers' choosing space. However, it brings confusion to consumers' decision, for example, how to find his satisfied item in mass item information. So, it needs necessary filter between diversified products choices and personalized product decision. Here we present the concept of information filter-it is the converter between diversified choices and personalized decision. The information filter can help consumers realize “find it” effectively in mass products to push demand move towards the tail of the long-tail and combine supply and demand together.

Common information filters are search engine and personalized recommendation system, etc. These filters push demand move towards the tail, help consumers find their own demand in infinite choices to help the potential of long-tail market release. Information filter can filter all the information in the collector and only present consumers the most relevant information with their demands. For example, search engine provides comprehensive search mode and a series navigator, every page in the virtual collector provides such search device to help consumers search and guide users to choose.

Consumers have different functional requirements on the logistics service platform, so, PLS information filter also provide logistics service scheme that is suitable to consumer's personalized demand to realize consumers "find it".

3.4 Construction of Long-Tail Logistics Coordinator

Under the condition of demand side scale economy, implementation of long-tail effect depends on the low cost and efficient combination of demand and supply. However, all of these cannot be realized without the support of logistics distribution system. Through the comprehensive connection of online platform and offline PMF agent system, head-end platform display and back-end logistics coordination ability, X-PMF long-tail physical virtual coordinator gets through the information channel and distribution channel to provide logistics distribution methods and strategies for consumers "get it" in a short time, then the scientific question "get it" of long-tail effect be solved.

3.4.1 PMF Physical Long-Tail Interaction Mechanism

With the high-speed development of information technology and the extensive application of Internet, the competition among supply chains is increasingly fierce. Hou (2008) presents that if PMF agent be imprisoned in the original company, it would not be able to realize the competitive advantage of logistics ability and achieve the optimal logistics system, but may be a suboptimal combination which would lead to logistics organization comprehensive efficiency descend. Logistics organization can be further decomposed, and it is easier for them to decompose out the PMF agent which is the relatively independent and more fundamental structure unit. The PMF agent is nurtured and optimized in accordance with the feature of element, independence and modularity. Motivated by information network technology, system management technology and technology development such like factors, by PMF agent release and reorganize interaction mechanism, different logistics agents or core competency establish a new connection to realize agent reorganization within a

certain scope ,in this way, a more competitive X party logistics organization is formed.

3.4.2 PLS Long-Tail Logistics Coordinator Mode

With the support of technology and the Internet, the demand side scale economy motivates the logistics organizations in virtual collector (“provide it”) decompose in the direction of many PMF agents to form X-party material flow organization. These PMF agents have the feature of independence and modularity and they are capable of realizing the long-tail effect when the market needs it. With the help of information filter (“find it”), every consumer makes their own personal choice, and then varieties of demand information will be provided to the virtual coordinator, the formed PMF agent reorganizes cross-organization and cross-sector within a certain scope, and forms a certain scale X-party material flow. The formed PMF agents are dynamic and variable, and they can quickly reconstruct, establish, integrate and coordinate internal and external resources according to consumers’ demand with the help of information technology, finally result in X-PMF collaborative adaptable logistics solutions. This process can be illustrated in figure 4.

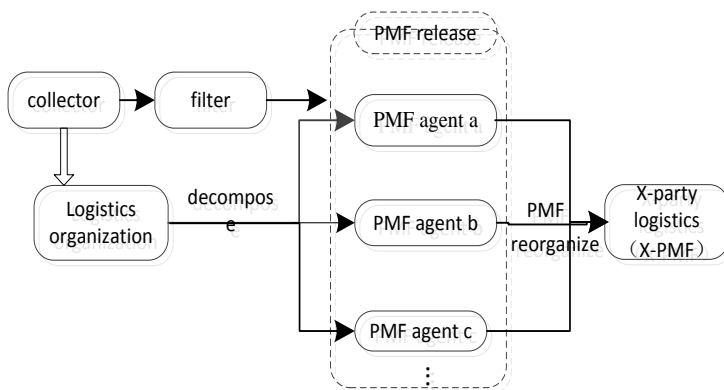


Figure 4: Virtual coordinator mode

In the long-tail effect realizing process, figure 5 shows the role of virtual coordinator, it plays the role of connecting demand and supply, and by coordination and optimization, it enables the supply realized and the demand satisfied with low cost and quicker response.

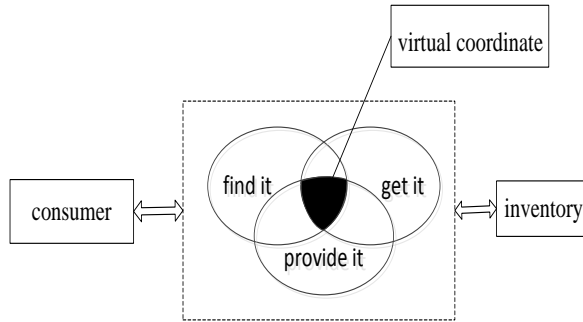


Figure 5: Operation of virtual coordination

From above analysis of PMFS theory framework, we can find PMFS Long Tail effect realizing mechanism in e-commerce practice, figure 6 tells us that.

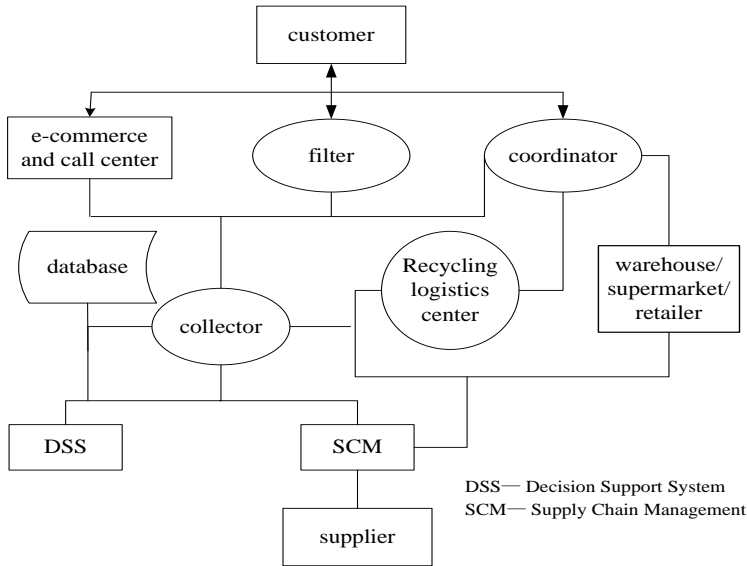


Figure 6: PLS long tail effect realizing mechanism

From here we see that the combination of virtual collector, information filter and logistics coordinator provide solutions to “provide it”, “find it” and “get it” three scientific questions and leads to the final goal-customer success.

4. Case study

What makes the Amazon and Taobao, Dangdang has strong competitiveness? It is the success of their personalized service. We will analysis them in detail to see how it is achieved.

4.1 Amazon's Virtual Collector

Amazon provides personalized choice to varieties of consumers, makes elaborate division of small demand products, and enables channel extend to the consumer's office and home. "Anything can be sold at anytime" mode provides infinite choices to consumers in the premise of virtualized inventory.

Not only this, Amazon also provides varieties of optional delivery ways and delivery deadline. There are land, sea and air three different delivery ways. According to the different destinations and whether the ordered products are available, there are varieties of delivery deadlines, such as deliver in one day, deliver in two days, etc. Logistics collector offers kinds of logistics service option, which enables Amazon to make a convenient and flexible distribution service to its consumers.

In Amazon "marketplace" mode, products still are put on shelves around the world. However, they have been already written into a unified dictionary and displayed in the same center market-Amazon.com. In this way, small businesses that hold inventories can directly pack and deliver products if consumers order the same product. In the support of modern information technology, Amazon organizes different PMF agents from different places together to be a large-scale logistics network system, namely, X-PMF virtual collection has been realized. X-PMF virtual collection enables Amazon to form personalized service interconnected state "4A".

4.2 "Logistics Recommendation" Strategy

As the C2C E-commerce enterprise, Taobao does a quite good job. In the background of logistics outsourcing, supply chain flattening background, although many sellers of Taobao want to establish their own logistics system, it is hard to be achieved. However, Taobao explored its own unique logistics strategy-logistics recommendation. Taobao makes contracts with logistics companies. The contracted companies enter the list of Taobao's logistics recommendation, and these companies can directly fulfill consumers' orders through the information platform that connected with Taobao. The application of "logistics recommendation" mode standardizes Taobao's logistics operation. Facing mass logistics products, consumers can make their personalized choice with the help of the strategy. This solution motivates the connection of Taobao and consumers' demand.

4.3 X-Party Material Flow Virtual Coordinator from Dangdang

When talk about B2C E-commerce logistics distribution, let's see how Dangdang does its distribution firstly. See figure 7.

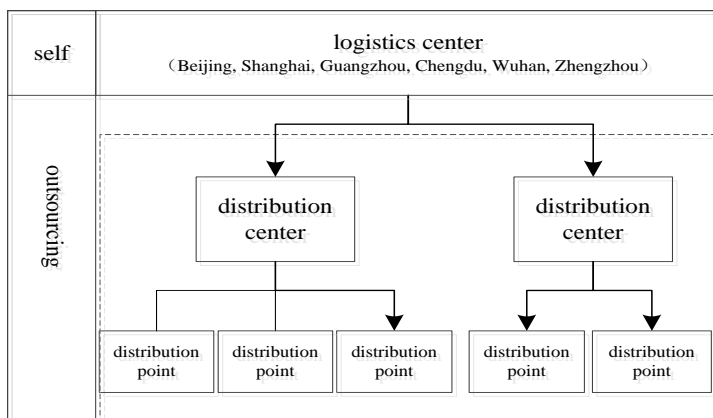


Figure 7: Distribution System of Dangdang

From figure 7, we can find that the distribution channel of Dangdang is “self-built logistics center-distribution center- distribution point- consumer”. Dangdang connect self- built and outsourcing logistics together. It selects the hardware and effective management of third-party logistics supplier and authorizes its own logistics department to monitor operation. Dangdang doesn't adopt a single mode to meet enterprise logistics requirement but integrate outsourcing and self-operate two kinds of logistics management forms together under a unified command and schedule without participation of the fourth-party logistics. Dangdang organizes and coordinates long-tail PMF agents effectively, and realizes the X party logistics structure $X = 1 + 3$ (namely, the first-party logistics and the third-party logistics).

5. Conclusions

With the development of world economy, consumer's behaviors change quickly and have a tendency of being personalized. IT system makes available of infinite products, lower searching cost and PMFS possible. Based on these three characteristics, e-commerce is playing a more and more important role in consumer's life, and Long Tail is a common phenomenon in digital products. Literatures ignore the phenomenon in physical products. Because of the nature of physical products, they have to be delivered to consumers with the help of MF service. What kind of MF service can lead to this phenomenon in physical

products? How can physical products suppliers can be benefited from Long Tail effect? There are substantial literatures on X-PMF, which is a new tendency of PMFS, but there no study combines realization of Long Tail effect and X-PMF together. Our findings have significant implications to physical products Long Tail effect realization. Combining realization of Long Tail effect and X-PMF, starting from the three problems-“provide it”, “find it” and “get it” that enable the Long Tail effect to be realized, this paper studied physical MF operation & management and established framework PMFS system. In PMFS system, virtual collector, information filter and virtual coordinator were designed to provide theoretical basis for e-commerce personalized service. Successful cases in e-commerce were analyzed with the PMFS system theory we presented. Our findings make a comprehensive analysis of physical products Long Tail effect realization, which can be considered as a process of meeting consumer’s personalized demand and a guidance for e-commerce.

Evidently, there is no statistics analysis for proofing our theory. Whether the effect of Long-tail can be realized needs to be analyzed by statistics. In our future studies, firstly, we will do more empirical researches by means of statistics analysis to provide convince evidence for our presented theory; secondly, more comprehensive theories in every part of PMFS system (virtual collector, information filter, MF coordinator) will be analyzed.

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