

Research on the Construction of Intelligent Logistics and Supply Chain System for Publishing Industry

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Abstract—Big data, digital publishing, flexible printing and other new technologies and concepts have changed the traditional publishing industry in China. The reading habit of people and forms of publication are changing, and the logistics demand of traditional publications is changing too, so the reconstruction and upgrading of logistics and supply chain system has become one important support for the deepening development of China's publishing industry. This paper masters the distributions, operation and function status of main publication and distribution organizations through analyzing the current situation of publishing logistics, and then it combines the technologies which are affecting the development and logistics demand of publishing industry in order to offer scientific suggestions for the reconstruction of logistics and supply chain system of China's traditional publishing industry.

Keywords—Publishing logistics; Intelligent logistics; Supply chain; Cloud platform

I. INTRODUCTION

As the big data, cloud computing, digital publishing, flexible printing and any other new technologies such as mobile internet and intelligent terminal have been widely used, the reading habit of people and the form of publication has changed dramatically compared with the traditional publishing period [1]. On-demand and flexible printing has reduced print volume and inventory of publications, big data technologies has made the publishing on demand (POD) and audience on demand (AOD) become possible. On this background, the totals of traditional publication especially paper books and tapes will decline inevitable. The publishing logistics and supply chain are changing significantly with the technical improvement. The current traditional publishing logistics and supply chain system can't well support the new publication industry formats, the more intelligent publication logistics and supply chain system must be designed in order to match the new publication industry formats and the demand of logistics supply chain.

This paper firstly masters the features of logistics demand based on the new industry formats through the analysis of overall condition of Chinese news publishing industry; and then, combines the application of new technologies in order to offer scientific suggestions for the reconstruction of logistics and supply chain system of our traditional publishing industry

from industry standardization, construction of industry supply chain cloud platform, function transformation of logistics institution and any other aspects. The research claims to construct the publishing industry supply chain system based on cloud platform and promote the intellectualized reconstruction and upgrade of publishing logistics system through the overall upgrading of the news publishing industry.

II. THE STATUS QUO AND PROBLEMS OF CHINESE PUBLISHING LOGISTICS

A. Logistics Institutions of Chinese Publishing Industry

Publishing logistics is the planning, executing and controlling process of forward and reverse logistical movement and storage of publications, correlative materials and information from suppliers to demanders based on the efficiency and benefit for satisfying the needs of customers [2]. Logistics is a key restriction factor of forming the national publication distribution and circulation market system. Due to historical reasons, Chinese publishing logistics level is not high and affected by the regional distribution market system. The form of publishing logistics has changed from the two-way linear structure that from the publisher to the demander to a hierarchical supply chain system. In the hierarchical supply chain system, the publication media groups and regional distribution institutions are becoming the key nodes on the upper layer, and the third-part logistics, self-run logistics of e-commerce platforms and any other logistics institutions are playing the supporting role on the lower layer.

B. Publication Media Group

According to the classification released by the State Administration of Press, Publication, Radio, Film and Television of The People's Republic of China, the publication media institutions will be divided into four categories that distribution institution, book-publishing house, audio-visual products publishing house and digital publishing house according to the major business of institution. At present, there are 116 publication media groups or group companies involving publishing business that mainly located in Beijing, Guangdong, Shandong, Shanghai. The specific distribution is shown as TABLE I and Fig. 1.

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TABLE I. DISTRIBUTION OF PUBLICATION MEDIA GROUPS IN CHINA

Province	Number	Province	Number	Province	Number
Beijing	23	Sichuan	4	Hebei	1
Guangdong	10	Chongqing	4	Heilong-jiang	1
Shandong	9	Henan	3	Hunan	1
Shanghai	8	Jilin	3	Jiangxi	1
Jiangsu	6	Inner Mongolia	3	Ningxia	1
Zhejiang	5	Yunnan	3	Qinghai	1
Fujian	4	Anhui	2	Hainan	0
Guizhou	4	Guangxi	2	Xinjiang	0
Liaoning	4	Hubei	2	Tibet	0
Shanxi	4	Tianjin	2	Taiwan	0
Shaanxi	4	Gansu	1		

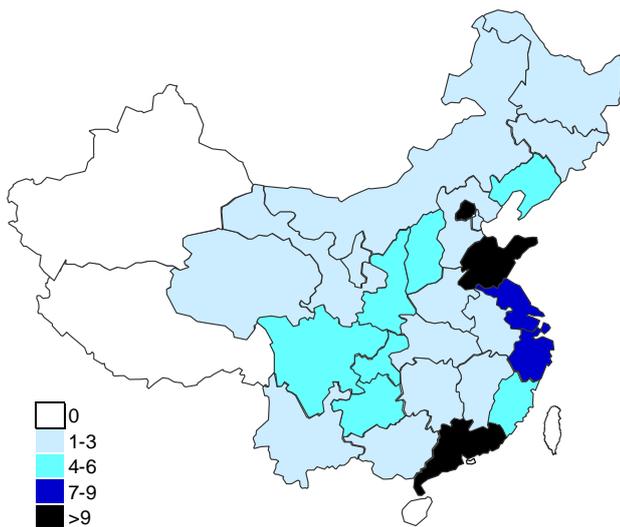


Fig. 1. Distribution of publication media groups in china.

According to the data shown as TABLE I and Fig. 1, large-scale publication media groups or group companies involving publishing business have cover the whole country except four provinces including Hainan, Xinjiang, Tibet and Taiwan. Although there is no large-scale publication media group in the four provinces, the local press has been able to support for the local publishing market. Large-scale publication media groups will be able to integrate the market information and coordinate the regional publishing logistics planning, which makes the publication media groups as the guide and coordinator on the upper layer of the publishing logistics and supply chain system [3].

C. Distribution Institution

The distribution institutions are the middle layer nodes of the supply chain system to deal with issuing, distributing and promoting marketing for the publication of publication media groups or publishing companies. At present, there are 126 distribution institutions that mainly located in Beijing, Shandong, Liaoning, Jiangsu, Shanghai and Guangdong. The specific distribution data is shown as TABLE II and Fig. 2.

TABLE II. DISTRIBUTION OF DISTRIBUTION INSTITUTIONS IN CHINA

Province	Number	Province	Number	Province	Number
Beijing	32	Hubei	3	Gansu	1
Shandong	10	Sichuan	3	Guangxi	1
Liaoning	9	Tianjin	3	Hainan	1
Jiangsu	8	Zhejiang	3	Heilong-jiang	1
Shanghai	7	Anhui	2	Jilin	1
Guangdong	6	Guizhou	2	Inner Mongolia	1
Shaanxi	5	Hebei	2	Ningxia	1
Hunan	4	Jiangxi	2	Tibet	1
Yunnan	4	Qinghai	2	Xinjiang	1
Fujian	3	Shanxi	2	Taiwan	0
Henan	3	Chongqing	2		

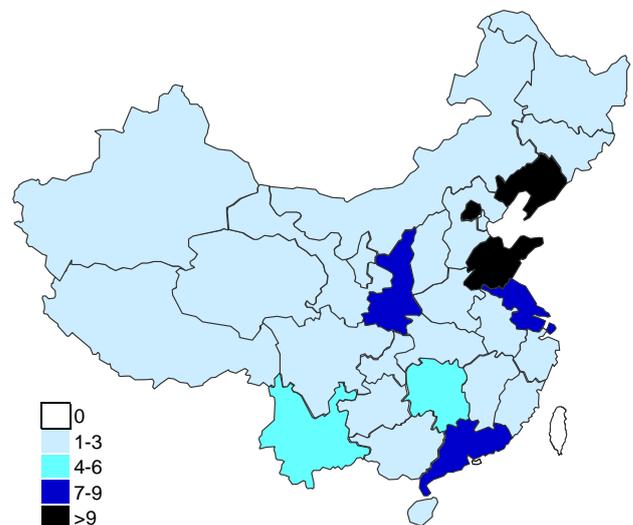


Fig. 2. Distribution of distribution instistutions in china.

According to the data shown as TABLE II and Fig. 2, all provinces in China except Taiwan have their own distribution institutions or publishing chain operation enterprises. Most distribution institutions or publishing chain operation enterprises concentrate in the east and south, and radiate across the country to do the issuing, distributing and promoting marketing work.

D. Publishing Logistics Distribution Center, Third-part Logistics, Self-run Logistics of E-commerce Platform

According to the reliable data, the head publication distribution institutions have established 37 logistics centers, and nationwide publishing chain operation enterprises have established 7 logistics centers, so each province owns on average 1.5 publication logistics centers to do the publication exhibition and marketing work on the lower layer of the publishing supply chain system. Beijing International Book City located in Beijing Tongzhou district is one of the most famous publication logistics distribution center for dealing with book exhibition, storage and distribution. Most publications delivered to the areas around Beijing will be gathered in Beijing International Book City before exhibition and delivery. Otherwise, there are at least 72 professional publication logistics centers in 8 economic zones in China to deal with book exhibition, storage, distribution and other work for the province and region, these regional publication logistics institutions have become the important execution nodes in the publishing supply chain system.

Besides the professional publication logistics institutions, the third-part logistics and self-run logistics of e-commerce platform also support for the construction of publication logistics and supply chain system. As the representatives, Amazon and JD.com are the famous e-commerce platforms with self-run logistics department; which's traditional and digital publications occupy a large share in publication market. The self-run logistics departments owned by e-commerce platforms are responsible for delivering the merchandises including publications sold by their own, that makes the self-run logistics be another important kind of execution nodes in the publishing supply chain system.

In conclusion, the regional publication logistics and supply chain system has the characteristics that making the large-scale publication media groups with high industrial concentration as the guide and coordinator, the regional publication industry bases as the link, publication logistics centers as the main part, and the third-part logistics and self-run logistics of e-commerce as the assistance. The structure of regional publishing supply chain in China is shown as Fig. 3.

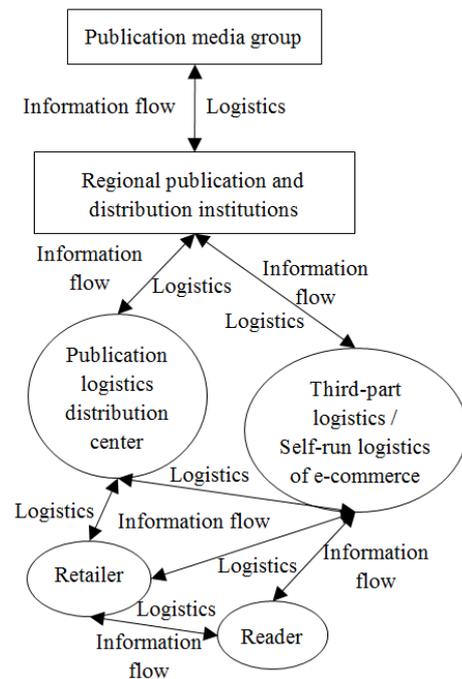


Fig. 3. The structure of regional publishing supply chain in China

As the structure of regional publishing supply chain in China shown in Fig. 3, although there are some information flows and logistics flows exchanges among the nodes in the lower layer of the current regional publishing supply chain system, there is no unified information sharing and coordination among the nodes in the upper layer of the supply chain system, in other words, the regional publishing supply chain among different areas are still separated and have not been integrated yet. This kind of regional publishing supply chain system will hinder the information communication among the publication media groups as the decision-making nodes in different areas, and the execution nodes in the middle and lower layers including the regional publication and distribution institutions, publication logistics distribution centers, third-part logistics and self-run logistics of e-commerce will only pay close attention to the vertical information and logistics flows in their areas and neglect the lateral communication among the nodes in the same layer of different areas. The storage logistics decisions with incomplete information will make the low efficiency and higher logistics cost, that will directly affect the development of the whole publishing industry. One of the main causes of this phenomenon is the informatization level of Chinese publishing industry is not high, and it still lack of a unified information standard [4]. This cause makes the enterprises in publishing industry difficult to complete the information integration, and make decisions based on traditional experiences rather than advanced decision making concept such as big data analysis; meanwhile, the standardization system of publication industry is not detailed enough, which makes the hardware equipment of storage and delivery lower universality and the higher cost of storage and delivery. These two causes are the main obstacles to establish the modern intelligent logistics and supply chain system of Chinese news and publication industry.

III. DESIGNING THE INTELLIGENT LOGISTICS AND SUPPLY CHAIN SYSTEM FOR CHINESE PUBLICATION INDUSTRY

To solve the information integration of publishing industry and change the inefficient decision making mode based on experience, the publishing enterprise and other related business must accept the new technologies and construct the new logistics and supply chain system in order to adapt the new industry environment changed by new technologies such as digital publishing, big data and so on [5]. To improve the intellectualization of publishing industry, industry standardization, information collection, function transformation of the nodes in traditional publishing logistics and supply chain system should be completed first in order to construct the publishing industry intelligent logistics and supply chain system based on cloud platform [6].

A. *Standardization System Construction for Publishing Industry*

As the industry informatization started late in our country and the informatization process of publishing industry started from enterprises in micro-level, so there is no an industry standardization system at the very start. Lacking of the industry standard makes it difficult to complete information integration after the enterprise informatization. On the other hand, although there is already a publication national standard, the publication national standard is too broad that makes the equipment involving publication storage, transfer and deliver not unified and various. The variety of equipment reduces the efficiency of equipment, raises the logistics cost and hinders the promotion and use of new technologies. So, it's urgent to set detailed standards including at least information organization and physical publication by the industry management agency. The physical publication standards should enforce the unified publication characteristics such as size and thickness and logistics equipment such as unit type, tray dimension in order to improve the universality and applicability of the equipment, which will increase the overall logistics efficiency.

Jiangxi Publishing Group is the first publication media group that advocates construct press and publishing industry standard system. Suffering from lacking of standard system, it's difficult for Jiangxi Publishing Group to collect and organize the data from its affiliated companies, which seriously restricts the intellectualized upgrade of the group. So, Jiangxi Publishing Group has released some standards to support for

the constructing the supply chain system based on cloud platform.

In a word, standardization system construction is an urgent work; the standardization system is the basics of efficient information exchange and sharing and physical logistics, and it's also the important support for the scientific management.

B. *Construction of the Publishing Supply Chain System Based on Cloud Platform*

The primary stage of publishing industry informatization has almost completed yet, different type of enterprise involving publishing business has achieved informatization management for day-to-day business, and massive amounts of data is emerging moment by moment. Based on the enterprise informatization, the publishing media enterprise and logistics institution have the capability of collecting, organizing and analyzing the massive data in order to make decision scientifically based on data analysis. Accurate publishing service and marketing based on reader's habit and preference have come true in some enterprises involving publishing business, the process of big data upgrade in enterprises management on the enterprise level has begun. The application of big data makes enterprises master and forecast the reader's demand and market demand much more precisely in order to control the print for reducing inventory levels and increasing logistics efficiency. But the information and data mastered by one enterprise is incomplete and unilateral, and the processes of big data upgrade are not the same in different enterprises, even lots of enterprises have not started this process yet. To avoid the difficulty in information integration after publishing industrial informatization based on the bottom-up model, the industry management agency should set up the upper level planning as soon as possible including setting unified information exchange and sharing standards and constructing cloud platform of publishing industry. More specifically, industry information should be organized uniformly and a data warehouse should be established for relevant enterprises to make and optimize their decisions, meanwhile, the algorithm and software of big data should be provided to make the enterprises apply the complete information and data conveniently. To do so, the enterprises involving publishing business will forecast the reader's preferences such as market demand, requirement type, reading form and so on, that will reduce the inefficient storage and logistics. The publishing industry intelligent logistics and supply chain system based on industrial cloud platform is shown as Fig. 4.

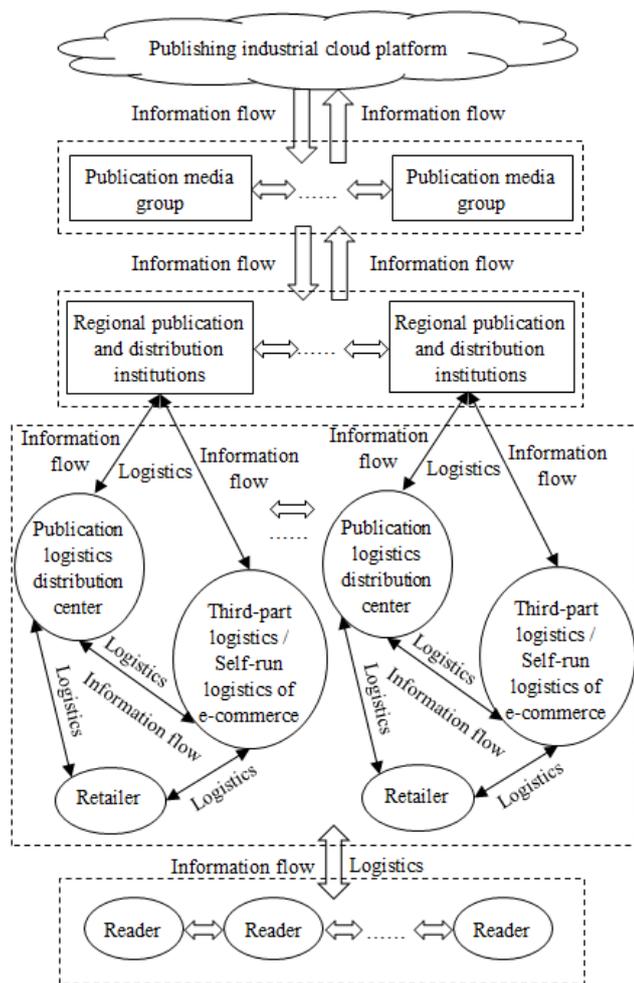


Fig. 4. The publishing industry intelligent logistics and supply chain system based on industrial cloud platform.

As the publishing industry intelligent logistics and supply chain system based on industrial cloud platform shown as Fig. 4, the cloud platform is located at the top layer to organize and save the public data source and analytic strategy of big data for the press and publication industry. The second layer is the decision-making level composed with publication media groups as the decision-making nodes. After obtaining the data and information for decision making, the decision-making nodes that publication media groups will analyze the customer's preference and forecast the market demand in order to make scientific decisions of publishing service. The regional publication and distribution institutions will implement these publishing service decisions. During the process of decision and information exchange, there is not only the vertical information exchange between different layers, but also the lateral information exchange among the different institutions in the same layer; this information transmission mechanism will ensure the regional and overall decisions much more scientific and accurate. Then, the publication logistics distribution centers, third-part logistics and self-run logistics of e-commerce will implement the specific logistics works. The information exchange among different nodes in the execution layer is also the web structure with vertical and lateral

information flows instead of traditional vertical information transmission mechanism. The information participated in exchange includes not only the storage information of publications such as book but also the transportation real-time information, that will enhance the storage and logistics efficiency through the quantitative analysis; meanwhile, the real-time information and data merging from the process of logistics implement will be collected and send to the upper layer for adjusting and optimizing decision making. After the reader getting the publications, the feedback information of logistics and publication products will be collected in time and transmit from the reader layer to the upper layer, and then the publishing industry cloud platform will receive and append the feedback information and data to perfect the decision making information. This is a typical intelligent supply chain system driven by big data.

C. Function Transformation of the Nodes in Traditional Publishing Supply Chain System

The publishing intelligent supply chain system based on cloud platform will enhance the scientificity and accuracy of the decisions, and the enterprises can provide the efficient publishing service and publications with higher benefits through the accurate prediction of market demand; meanwhile, as the market demand could be predicted precisely, the enterprises can produce and print the publications according to the demand by the on-demand printing technology instead of traditional printing with specified quantity [7]. To do so, the storage level of physical publications will be reduced obviously. In this way, the function of participants and nodes in traditional publishing logistics and supply chain system must transform especially the large-scale publication logistics distribution center [8]. In era of traditional publishing, as the restrict of printing technology and unscientific decision, it's necessary to produce and print the publications with sufficient quantity for storage, so the publication logistics distribution center with storage function is the key supporter for regional publishing logistics. But as the storage level of physical publications reduced obviously by using intelligent supply chain system and new printing technology, the storage function will weaken largely; so the function and role of publication logistics distribution center must be redefined. Although the storage and distribution function provided by publication logistics distribution center is weakening, the exhibition function cannot be replaced. Using Beijing International Book City as an example, along with the rapid development of e-commerce and digital technology, the impact of Beijing International Book City on publications storage and distribution is depressing, it cannot adapt to the market environment with diverse needs according to original design and plan. To deal with the industry and market environment change, Beijing International Book City is paying more attention to the book exhibition especially the education assistant book with large demand, industry forum and other relevant publishing services. Beijing International Book City started to hold the international education book exhibition every year from 2012 including book-order conference and book fair for attracting books purchasing by institutional and personal customers. In this way, the Beijing International Book City has realized the publication logistics and distribution through its exhibition function.

IV. SUMMARY

Today, the publishing logistics is no longer the simple system just involving storage and delivery; it has become a modern intelligent supply chain system with logistics and information driven by the cloud platform. The upgrade of Chinese publishing logistics is not only the single area upgrade but also one important part of the whole publishing industry upgrade based on big data and cloud computing. From the beginning of publishing decision, the publication (product) will be chosen according to the potential market demand provided by big data in cloud platform. Then, the publication (product) will be launched (issued) to targeted areas and timing according to the analysis of big data in cloud platform. The accurate decision making will reduce the inefficient storage level obviously. During the logistics process, it's important to collect the real-time data and information from publication logistics distribution centers, retails, third-part logistics, self-run logistics of e-commerce platforms in order to enhance the storage, delivery efficiency and optimize the logistics project. It's not hard to see that this kind of publishing logistics supply chain system possess the on-demand, efficient and intelligent features, these features will make the enterprises in publishing industry deal with the present complex and changeable market environment much better and support for the further development of our press and publication industry.

From the structure of publishing logistics supply chain system, we can know that the key support for this system is the data and information flow, and all the logistics operations are driven by data. Although this intelligent supply chain possesses many advantages, there are several problems hindering its construction such as lacking of the standardization system and

information exchange, function transformation of nodes in logistics supply chain system and so on [9]. So, constructing the intelligent logistics supply chain system is a step by step process with an overall planning.

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