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"Big data" Analysis for Inventory Diagnosis on A Publishing House

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Abstract: According to the statistics of the State Administration of Press, Publication, Radio, Film and Television, the national Xinhua Bookstore system and publishers self-run publishing units are facing an increasing inventory year by year. At the end of the year 2014, inventories have exceeded the 100 billion yuan mark. Big data analysis is beginning to attract the attention of all walks of life. Publishing house inventory data is also a kind of big data, which can be used as small data in big data for definition and characteristic analysis. This work analyzed the ultimate data of A Publishing House-inventory "big data", and subdivided its inventory composition data into four aspects including textbooks, books, topic selection sections and inventory turnover rate. With the help of reverse inference, problems in various links of the publishing house were diagnosed, such as market research, topic selection planning, production, marketing, etc. The decision of optimizing the publishing house was then adjusted accordingly, making it possible for the publishing house with its inventory to develop in a healthy way.

1. Introduction

The official statistics are as shown in the figure. During the "Twelfth Five-Year Plan" period, the year-end inventory of the above-mentioned self-run publishing units are growing year after year, yet varying in the growth rate. Among them, the growth rate hit the highest in 2013, up to 14.55%; the figure went down to the lowest level in 2014, being 4.74%. (Figure 1)

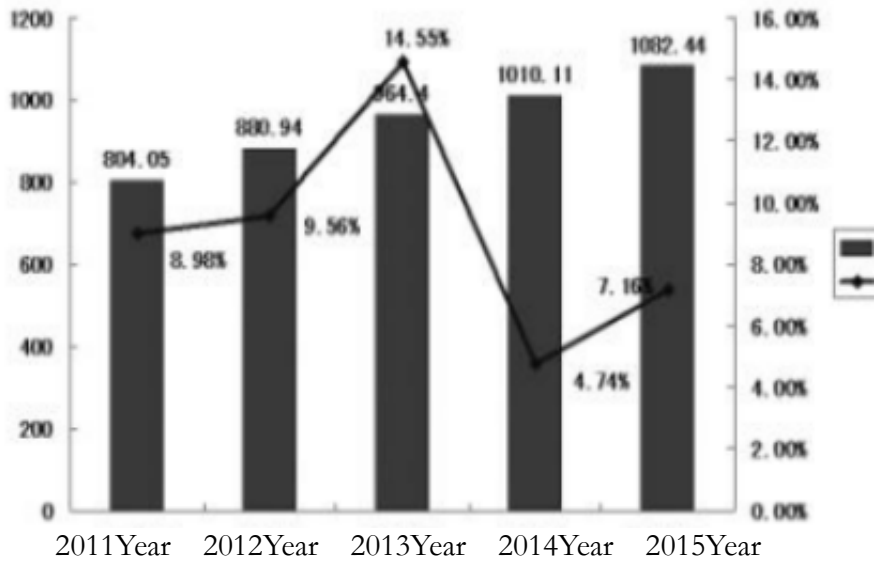

Figure 1: Comparison of the year-end inventory of the Xinhua Bookstore system and self-run publishing units nationwide from 2011 to 2015 (unit: 100 million yuan)

Looking at the inventory value, 2014 was marked at the 100 billion yuan. The high inventory is obviously a bad signal and will hinder the healthy development of the publishing industry.

John Rauser, one of the scientists who worked with Amazon, the world's largest e-commerce company, gave a relatively simple definition of big data. He believes that any amount of data that exceeds the processing power of a single computer may belong to big data. Big data features "4V", and Volume is the first one, indicating the huge amount of data information previously mentioned. The second is its Variety, that is, types of data are many. Apart from traditional formatted data, there are also text, video, pictures and other information materials. The third is that the processing speed, i.e. Velocity, is very fast, which means that the huge amount of data information would not slow down the application processes. The last but not the least is Veracity, which refers to the accuracy and high quality of the data. Big data analysis has become most welcomed in all walks of life. In publishing industry, the inventory data is classified upon its own definition and characteristics into the small data of the big data, which is the small data of big data. Through the analysis of the ultimate data of the publishing house, the so-called inventory "big data", the problems existing in various links of the publishing house may be reversely diagnosed to adjust the decision-making on the healthy development of the inventories and the publishing house.

The following is an analysis and diagnosis based on the big data of a certain publishing house's inventory [1-4].

2. Stock Basics 2020

December 2019-November 2020, this is the annual statistical time period, the same below, referred to as Year 2020. (Table 1-Table 2)

Table 1: Comparison of inventory in 2020 and the same period in 2019 (issued data with a sample book)

Years	Quantity/Book	Fixed price/Yuan	Stock	Turnover

	Issued	In stock	Issued	In stock	varieties	rate
2019	13754997	4313006	357914385	189953414	5877	2
2020	13509049	4405862	339370141	206326271	5878	2
Increased amount	-227265	92856	-17640512	16372857	1	-23.46%
Growth rate	-1.65%	2.15%	-5.18%	8.62%	0	-12.48%

3. Stock Composition 2020

Table 2: 2020 inventory classification by inventory (based on purchase, sales and stock)

Stock Classification	Quantity/Book		Fixed price/Yuan		Stock varieties	Turnover rate	Percentage by fixed price	Percentage by quantity
	Issued	In stock	Issued	In stock				
Electronic audiovisual publications	2650	9614	44695	193703	41	0	0	0
Reference book	841	827	26936	26464	1	1	0	0
Textbook	7835693	2888529	16776444 6	113266343	4026	1	1	1
Teaching Reference	4916	2828	127208	73219	6	2	0	0
Teaching Assistant	3695476	224296	45212453	6367454	418	7	0	0
Social Science & Foreign Language Books	18170	8	512336	140	2	3,665	0	0
Books	1793734	1126550	113066959	74741558	1089	2	0	0
Monographs	157569	153210	12615107	11657390	295	1	0	0
Total	13509049	4405862	33937014 1	206326271	5878	2	100.00%	100.00%

4. Data analysis and Diagnosis

In 2020, a total of 13.509 million copies were issued, with a total of 333,370,100 yuan in fixed price.

In 2020, there were 5878 varieties in stock, totaling 4.41 million copies, and the fixed price on stock was 206.3263 million yuan, and the inventory turnover rate was 164.48%.

From the above chart, here is the analysis of inventory in 2020 from the perspective of inventory classification:

First, textbooks and books accounted for the largest proportion in terms of fixed price and inventory quantity, respectively: 54.90%, 65.56% and 36.22%, 25.57%.

Second, with respect to variety, textbooks and books are also on the top of the chart, respectively: 4,026 and 1,089 (5,115 in total, accounting for 87% of 5,878).

The following analysis is conducted as per four aspects: teaching materials by level, teaching Market books level, inventory by subject selection section, and inventory turnover rate.

4.1 Teaching Materials by Level

4.1.1 Data analysis of Teaching Materials by Level

Table 3: 2020 textbooks by level

Teaching material level	Quantity/Book		Fixed price/Yuan		Stock varieties	Turnover rate	Percentage of total fixed price	Percentage of total books number
	Issued	In stock	Issued	In stock				
Undergraduate	13314655	1170412	52830348	49924532	1689	1	0	0
Higher Vocational Education	10619442	959643	43570171	38130860	1433	1	0	0
Reference book	946	2530	270696	486462	3	1	0	0
Monographs	327	52554	18966	2242047	27	0	0	0
Postgraduate	5378	883	261154	51214	1	5	0	0
Elementary and middle school	41957331	10284	28069714	461752	19	61	0	0
Middle vocational	893329	131339	29877450	1521351	128	20	0	0
Specialty	9587	550306	389712	20015425	698	0	0	0

Total	74 98 70 5	2877 951	155288 211.2	1128 3364 2.7	3998	137.6 3%	100 .00 %	100.00%

(1) Comparing the stock size, undergraduates, vocational colleges, and junior colleges have the relatively large inventory quantity and the fixed price, respectively: 40.67% and 44.25%, 33.34% and 33.79%, and 19.12% and 17.74%.

(2) The above-mentioned three kinds of books with large inventory and varieties are also the publisher's mid-end hit products, with their turnover rates at 105.82%, 114.26% and 1.95%. The turnover rate of specialties publications is quite low.

(3) The turnover rate of the textbooks for primary and secondary schools and popular books is the highest, while the turnover rate of academic monographs is 0.85%, at the lowest. Among the levels of secondary vocational, undergraduate, higher vocational and full-time education, the turnover rate of the books for secondary vocational schools is highlighted. (Table 3)

4.1.2 Diagnosis

Specialty stocks accounted for a large proportion and the turnover rate was low. The reason for the investigation was therefore reversed. This is a problem left over from history. Now there are very few textbooks from technical colleges remaining, and they cannot be sold from the perspective of sales.

Solution: Keep 10% of the inventory, and deposit the rest as waste books, i.e. turning them into pulp.

The turnover rate of secondary vocational textbooks came up to the top of them, at 1890%. The reasons for the investigation are: first, the country's efforts to vigorously develop vocational education have created a huge market demand; and the second is that this publishing house has too few types of similar textbooks. The development efforts should be increased to increase the number of topics selected for secondary vocational teaching materials.

4.2 Books by Level

4.2.1 Inventory data analysis by level

Table 4: 2020 Books by Level

Book level	Quantity/Book		Fixed price/Yuan		Stock varieties	Turnover rate	Percentage of fixed price to the total	Proportion of the number of inventory books to the total
	Issued	In stock	Issued	In stock				
Undergra duate	79180	78492	3328667	4525532	87	73.55%	6.06%	6.98%
Higher Vocational Education	531	183	18609	2745	1	677.92%	0	0
Reference book	14684	24088	1992846	3964270	27	50.27%	5.31%	2.14%
Books	1344241	8E+05	94414750	57127200	776	165.27%	76.47%	75.14%

Monographs	1450	3560	47968	106424	4	45.07%	0.14%	0.32%
Postgraduate	132656	2E+05	6416185	7472294	140	85.87%	10.00%	13.42%
Elementary and middle school	240580	22409	7400616	1511619	53	489.58%	2.02%	0
Total	1813322	1E+06	113619640.3	74710082.7	1088	152.08%	100.00%	100.00%

(1) According to the size of inventory, the inventory quantity and fixed price of popular books were recorded as high as 76.47% and 75.14%.

(2) The turnover rate of popular books was acceptable, compared to that of primary and secondary schools that was at the highest level. Note that the inventory and circulation of these books were relatively small. (Table 4)

4.2.2 Diagnosis

Among popular books, the lowest turnover rate fell on reference books, simply due to large investment and long publishing cycle. Publishers are expected to figure out whether they are in a situation with reference books depending on their own specialties. From the above chart analysis, the publishing house focuses on textbooks, being not good at making reference books. It is recommended to reduce publication of reference books. The highest turnover rate was found on the primary and secondary school books. However, due to the limited variety of existing books, this publisher might as well put in more efforts in this regard. (Figure 2)

4.3 Inventory Classification Data according to the Selected Topic Section

Table 5: 2020 Inventory Summary by Sector

Branch	Issue number	Inventory quantity	Fixed price of issue	Fixed price of inventory	Stock varieties	Turnover rate	Percentage of total fixed prices	Percentage of total inventories
Vocational Education Publishing Center	2423450	789425	58885464.85	34815787.85	970	169.13%	16.87%	17.92%
Science and Technology Branch	810410	625427	24907407.6	24551321	1121	101.45%	11.90%	14.20%
Social and Cultural Branch	1214665	523008	36951143.6	23275533.4	645	158.76%	11.28%	11.87%
Beijing Publishin	618782	275215	55098465.6	21894992.8	174	251.65%	10.61%	6.25%

g Center								
Construction Branch	592078	502243	24444985.6	21880427.8	652	111.72%	10.60%	11.40%
Art Branch	353716	397361	20943708	21761913.3	541	96.24%	10.55%	9.02%
Economic Management Branch	513478	490944	21037598.3	21574575.4	665	97.51%	10.46%	11.14%
Book Branch	333397	324499	16913426	18441616.2	237	91.71%	8.94%	7.37%
Foreign Language Branch	280815	353286	40095297.1	11836049.55	588	338.76%	5.74%	8.02%
Chuchen Company	90143	47704	3359682.7	1865581.8	60	180.09%	0.90%	1.08%
Academic Center	19145	21723	1505376	1668304	28	90.23%	0.81%	0.49%
Delegated Daily	13704	22039	919415	1409751.8	29	65.22%	0.68%	0.50%
Publishing house	3717296	31246	34292115.2	1323622.9	158	2590.78%	0.64%	0.71%
Electronic audiovisual agency	770	1742	16055	26793	10	59.92%	0	0
Total	13509049	4405862	339370140.6	20632627 1	5878	2	100.00%	100.00%

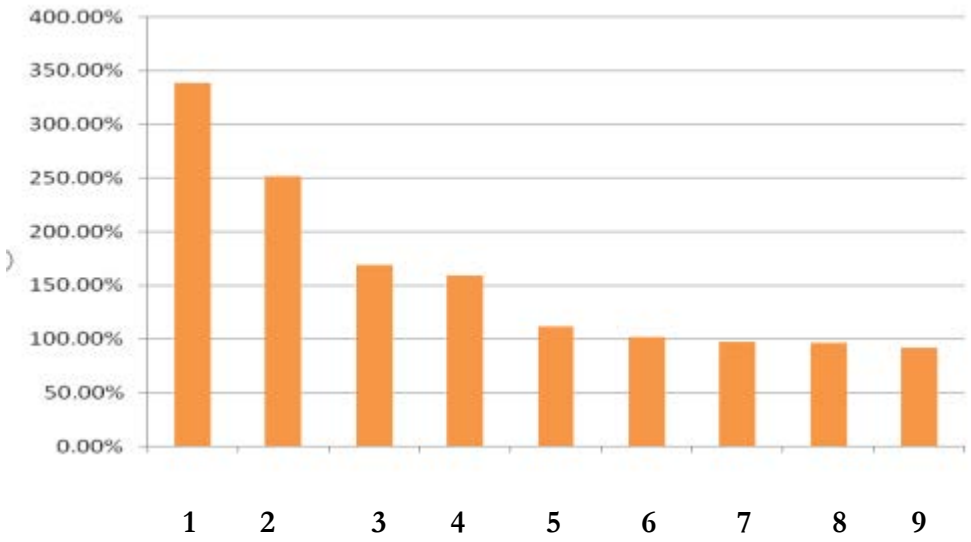

Figure 2: Turnover rate

1 Foreign Language Branch
2 Beijing Publishing Center
3 Vocational Education Publishing Center
4 Social and Cultural Branch
5 Construction Branch
6 Science and Technology Branch
7 Economic Management Branch
8 Art Branch
9 Book Branch

4.3.1 Data analysis

Looking back to the above chart, the 2020 inventory can be found something new in the topic selection section:

(1) Vocational education, science and engineering, social culture, Beijing Publishing Center, architecture, art, and economic management presented a relatively high fixed price, taking up more than 10%.

(2) In other word, the top 10 departments accounted for 96.95% of the entire agency. Again, the turnover rate of these departments: the foreign language branch boasts the highest turnover rate, followed by the Beijing Publishing Center. (Table 5)

4.3.2 Diagnosis

In view of the high turnover rate, foreign language books showed a large sales volume of sector items, which requires intensive cultivation in order to become high-quality competitive products. The turnover rate of market books needs to be strengthened. Generally speaking, the turnover rate of market books should be relatively high to reflect the popularity of books by readers.

The topic selection of market books of this publishing house needs to be adjusted. (Table 6)

4.4 Turnover rate on Stock Age

Table 6: 2020 Inventory Summary by Stock Age

Teaching material level	Quantity/Book		Fixed price/Yuan		Stock varieties	Turnover rate	Percentage of total fixed prices	Percentage of total inventories
	Issued	In stock	Issued	In stock				
That year	7736331	2141362	191856293	98333564	1893	2	0	1
1 years+	4916676	900853	110687535	45938280	1406	2	0	0
2 years+	393053	467244	18679146	25117196	910	1	0	0
3 years+	133855	212805	6345648	11210752	504	1	0	0
4 years+	86737	202911	3216188	7695767	379	0	0	0
5 years +, 10 years-	239087	475342	8487925	17840520	770	0	0	0

10 years+	3310	5345	97406	190194	16	1	0	0
Total	13509049	4405862	339370141	206326271	5878	2	100.00%	100.00%

4.4.1 Data analysis

As evidenced by the above chart, the analysis results on the year 2020 inventory may be revealed from the perspective of the publication year:

(1) The fixed price and inventory quantity of books published that year came up to the largest level, 47.66% and 56.53% respectively;

(2) The second is the stock time for more than 1 year (less than 2 years), and these proportional figures are 22.26% and 32.62%, respectively.

Similarly, the above two stocks are also highlighted at the highest corresponding turnover rates, respectively: 195.11% and 240.95%.

4.4.2 Diagnosis

From the perspective of the entire inventory structure, books published within two years account for 89% of the entire inventory, indicating that most of the books currently in inventory are new books in the last two years, and the sales of new books in these two years are also the best, inventory and sales volume. It is positively correlated. Products must be constantly updated to improve turnover.

5. Conclusions

Data analysis performed in this work was targeted at the inventory data of a publishing house from the stock structure, the textbook and book classification. This was followed by investigating their turnover rates by subdividing the textbooks and books, respectively, on account of the level, the selected topic section and the stock age. Here are conclusions from back inference. First, the publishing house was limited to a single classification, where the proportion of textbooks and market books took up a large scale. The publishing house is recommended to abandon the special subjects and certain market books. Second, more efforts should be made on the planning and drafting of secondary vocational textbooks so as to make more academic publishing. In this way, the development of undergraduate and higher vocational textbooks may be stabilized. Third, the marketing need to be more investigated on the promotion of textbooks and market books marked with a large stock to be able to increase their turnover rates. Fourth, products are welcomed to be constantly updated because the turnover rate of new products is high. The adjustments in the above four aspects surely act as an active role in destocking process, so the publishing house with its inventories may take a chance to go back to the healthy way.

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