

A Study on the Construction of a Book Procurement Model in University Libraries from the Perspective of Readers—Taking the Library of Zhejiang Ocean University as an Example

Wang Meng^{1,a}, Wang Xiaoshuang^{2,b,*}, Chen Chao^{3,c}

¹Library, Zhejiang Ocean University, Zhoushan, China

²School of Information Engineering, Zhejiang Ocean University, Zhoushan, China

³Marine Science and Technology College, Zhejiang Ocean University, Zhoushan, China

^a65238382@qq.com, ^b234926292@qq.com, ^cwm78715@126.com

*Corresponding author

Abstract: The university library book procurement model based on the reader perspective is to obtain data based on the borrowing situation of 22 types of books by 5 major categories of readers, calculate the distribution column of each type of books using the borrowing proportion, and then use the expectation formula to calculate the collection situation of each type of books in the reader's expected library. Using the indicator of relevance, the repeatability in the data collection process is corrected for subsequent book procurement. The data obtained are then used to budget for the next step of book procurement. The basis for determining the procurement is to maximize reader satisfaction and minimize the funds required. To maximize reader satisfaction, the proportion of the number of books actually purchased should be as close as possible to the expected proportion.

Keywords: Model; Library; Purchase; Readers

1. Introduction

In terms of book procurement, most domestic university libraries still remain in the 'subjective first, technical second' interview stage, relying on the funding allocation of the school's annual book procurement, the experience of interviewers, suggestions from teachers and students, and recommendations from merchants to determine the annual book procurement directory^[1]. The quality and quantity of copies of purchased books are related to whether libraries can better meet the needs of readers by utilizing the limited costs invested in procurement^[2]. Procurement, as an important part of library work, directly affects and determines the structure, quality, and subsequent use of library collections. The core issue to be addressed in the book procurement process is how to deeply understand readers' book reading needs, explore their underlying logical relationships, and then use limited funds to purchase the books that readers need the most^[3].

2. At present, in addition to normal procurement, our library also adopts some book purchasing methods

2.1. Readers' self recommendation

In the OPAC system of Huiwen Information Management System, there is a recommendation for readers to purchase books. If readers find that the library does not have the books they need, they can make a recommendation in OPAC My Library. As long as the readers input the corresponding book information in the recommendation, the purchasing teacher can see the recommended books from the readers, and they will purchase them the next time they purchase books.

2.2. Yun Reading Procurement Method

In recent years, Xinhua Bookstore has launched another book purchasing method, called Yun

Reading Book Purchase. Xinhua Bookstore has launched a direct online book purchase method for readers, where readers can directly purchase books through computer or mobile devices as long as they log in and authenticate. Xinhua Bookstore will directly mail the books to the readers after seeing the order, and then return them to the library after reading, breaking the traditional purchasing model.

2.3. Organize readers to purchase directly

Every year, readers are organized to directly select and purchase books from booksellers. This is also a direct purchasing model for readers.

The above are all direct purchasing methods for readers, but only a small amount of funds were used, and the remaining large amount of funds still needs to be modeled based on readers' preferences to purchase more directly. This can directly and effectively utilize limited funds to purchase the books that our school truly needs.

3. Key issues and methods to be addressed

The process of obtaining the model is to first calculate the number of books lent by different types of readers for each type of book based on the 5 major reader types and 22 major book types of our school x_{ij} , Where i is the type of reader and j is the type of book, as the number of different types of readers varies greatly. In order to obtain fair data, the data is obtained by calculating the borrowing ratio of each type of book for each type of reader p_{ij} , Based on the proportion of different types of

readers f_i , Apply expected values and use the expected formula $E(p_j) = \sum_{i=1}^5 f_i p_{ij}$, Calculate the expected values for various types of books. Finally, the purchase amount for each type of book is calculated based on the purchase amount of our school.

3.1. Statistics of books borrowed by various readers

Based on previous book borrowing data, taking 2022 as an example, readers are first divided into five categories according to their types: undergraduate students, adult education students, teachers, administrative personnel, and graduate students. Then, data is obtained by analyzing the borrowing situation of 22 types of books based on these five categories of readers x_{ij} , wherein $i = 1, 2, \dots, 5; j = 1, 2, \dots, 22$. As shown in the table 1.

Table 1: Various types of readers borrowing books.

Reader types	undergraduate course	Adult education student	teacher	administrative personnel	postgraduate	reader type	undergraduate course	Adult education student	teacher	administrative personnel	postgraduate
A	115	0	31	3	23	N	11	0	7	7	7
B	1047	0	272	54	217	O	763	0	200	17	397
C	383	0	151	14	136	P	145	0	82	10	96
D	564	0	94	18	113	Q	176	0	110	2	268
E	108	0	10	1	1	R	115	0	20	4	20
F	480	0	174	38	389	S	88	0	29	0	172
G	763	0	223	35	481	T	1107	5	421	49	867
H	1255	0	378	37	413	U	134	0	40	1	83
I	6477	35	837	272	867	V	4	0	0	0	1
J	222	0	84	27	57	X	87	0	10	4	35
K	1146	0	280	44	236	Z	26	0	13	8	8

3.2. Statistics on the borrowing ratio of various readers

Using the proportion of borrowed books p_{ij} to calculate the distribution column for each type of book is to divide the number of borrowed books by each reader type by the total number of borrowed

books, as shown in the table 2.

Table 2: Distribution columns for each type of book

Type j READER i	A	B	C	D	E	F	G	H	I	J	K
Undergraduate course	0.6686	0.6585	0.5599	0.7148	0.9000	0.4440	0.5080	0.6025	0.7631	0.5692	0.6717
Adult education student	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0000
teacher	0.1802	0.1711	0.2208	0.1191	0.0833	0.1610	0.1485	0.1815	0.0986	0.2154	0.1641
administrative personnel	0.0174	0.0340	0.0205	0.0228	0.0083	0.0352	0.0233	0.0178	0.0320	0.0692	0.0258
postgraduate	0.1337	0.1365	0.1988	0.1432	0.0083	0.3599	0.3202	0.1983	0.1021	0.1462	0.1383
Book type	N	O	P	Q	R	S	T	U	V	X	Z
undergraduate course	0.3438	0.5541	0.4354	0.3165	0.7233	0.3045	0.4520	0.5194	0.8000	0.6397	0.4727
Adult education student	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000
teacher	0.2188	0.1452	0.2462	0.1978	0.1258	0.1003	0.1719	0.1550	0.0000	0.0735	0.2364
administrative personnel	0.2188	0.0123	0.0300	0.0036	0.0252	0.0000	0.0200	0.0039	0.0000	0.0294	0.1455
postgraduate	0.2188	0.2883	0.2883	0.4820	0.1258	0.5952	0.3540	0.3217	0.2000	0.2574	0.1455

In order to make expectations, it is necessary to consider the proportion of readers in the entire school, as the number of readers varies greatly. Therefore, it is necessary to give expectations to each type of reader and calculate the proportion. Otherwise, if there are many undergraduate and graduate students who do not calculate the proportion to expect, there will be an error with actual needs. Only in this way can the needs of each type of reader be accurately calculated, and the proportion of loan readers in the entire school be considered $f_i(i=1,2,3,4,5)$ (As shown in the table 3), Using the

Expectation Formula $E(p_j) = \sum_{i=1}^5 f_i p_{ij}$, $j = 1, 2, \dots, 22$ Calculate the expected situation of each type of book among readers(As shown in the table 4).

Table 3: Proportion of reader types

Type	The proportion of reader types to the total number of people f_i
undergraduate course	0.725
Adult education student	0.041
teacher	0.070
administrative personnel	0.017
postgraduate	0.146

Table 4: Expected values listed by readers

reader type	A	B	C	D	E	F	G	H	I	J	K
$E(p_j)$	0.5172	0.5099	0.4508	0.5479	0.6597	0.3863	0.4258	0.4788	0.5758	0.4503	0.5191
Book type	N	O	P	Q	R	S	T	U	V	X	Z
$E(p_j)$	0.3002	0.4542	0.3755	0.3138	0.5520	0.3147	0.3919	0.4344	0.6092	0.5070	0.3830

3.3. Statistics on the borrowing ratio of various readers

Borrowing ratio based on book classification p_j (Table 5), The proportion of different types of books borrowed, adjusting readers' expectations for each type of book. Using formulas $x_j = E(p_j) \times$ Borrowing ratio, Calculate readers' expectations for each type of book in their minds, Final utilization $x_j / \sum_{j=1}^{22} x_j$ Determine the proportion of each type of book in the minds of readers to the total number of books(As shown in the table 6).

Table 5: Book classification borrowing ratio

Class number	Subtotal of classification	Borrowing ratio	Class number	Subtotal of classification	Borrowing ratio	Class number	Subtotal of classification	Borrowing ratio
A	172	0.71%	I	8488	35.00%	S	289	1.19%
B	1590	6.56%	J	390	1.61%	T	2449	10.10%
C	684	2.82%	K	1706	7.03%	U	258	1.06%
D	789	3.25%	N	32	0.13%	V	5	0.02%
E	120	0.49%	O	1377	5.68%	X	136	0.56%
F	1081	4.46%	P	333	1.37%	Z	55	0.23%
G	1502	6.19%	Q	556	2.29%			
H	2083	8.59%	R	159	0.66%			

Table 6: Readers' expectations

Book Type	A	B	C	D	E	F	G	H	I	J	K
Readers' expectations	0.74%	6.8%	2.6%	3.6%	0.66%	3.48%	5.33%	8.31%	40.7%	1.46%	7.38%
Book Type	N	O	P	Q	R	S	T	U	V	X	Z
Readers' expectations	0.08%	5.21%	1.04%	1.45%	0.73%	0.76%	8.00%	0.93%	0.03%	0.57%	0.18%

3.4. Budget allocation of book procurement funds

Based on the final calculation of readers' expectations for each type of book, taking the book procurement fund of 3 million yuan in 2023 as an example, The funds allocated for various books are as follows table 7.

Table 7: Purchase various books and allocate them by oneself (Unit: ten thousand)

Book Type	A	B	C	D	E	F	G	H	I	J	K
Allocation of procurement funds	2.22	20.4	7.8	10.8	1.98	10.44	15.99	24.93	122.1	4.38	22.14
Book Type	N	O	P	Q	R	S	T	U	V	X	Z
Allocation of procurement funds	0.24	15.63	3.12	4.35	2.19	2.28	24	2.79	0.09	1.71	0.54

Using the above data to make a budget for the next step of book procurement, the basis for determining the procurement is the readers' expected proportion of each type of book, which is as close as possible to the books that readers like in their hearts and can also maximize the allocation of funds.

4. Summary

By utilizing readers and various types of books, calculate the borrowing situation of each type of reader and the borrowing situation of each type of book, add corresponding expected values, accurately calculate the borrowing situation of previous library collections, and provide an accurate procurement model for next year's book purchase. This can greatly utilize procurement funds to purchase the types of books that readers need to borrow.

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