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Public Library Reservations

Seppo Suominen
Haaga-Helia University of Applied Sciences
Hietakummuntie 1 A, FIN-00700 Helsinki, Finland
e-mail: seppo.suominen@haaga-helia.fi
Orcid: 0000-0001-9471-9486

Abstract: Sometimes public libraries do not have enough books to satisfy the borrowing demand. Customers need to wait until they will receive to novel. The number of novel reservations is related author's record of accomplishment. A cobweb model is used to evaluate the number of reservations. The empirical results indicate that author's record has an impact on reservations. A novel by a rather experienced author with a longer list of publications has a minor reservation list since the librarian is able to purchase enough novels to satisfy the borrowing demand. Public awareness in terms of critics published in newspapers or weekly magazines has an impact on the reservation queue.

Keywords: Public library borrowing, Reservations, Cobweb Model, Helsinki Region, Author's Record of Accomplishment, Critics

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1. Introduction

Occasionally, public libraries do not have enough books to meet the expectations of readers. Then they can make a reservation and the readers later are given a notice when the book is available for borrowing. Sometimes the waiting time is long, sometimes not; it depends on the consistency of the stacks of the public library in relation to borrowing demand. Public libraries serve ordinary readers and large majorities of readers do not want to read e-books, they prefer printed books (Kajander 2020). The recent trend of the adoption of electronic books by public libraries in Finland does not solve the reservation problem due to restrictions of the license agreement, different purchasing models, unstandardized platforms, and technological barriers (Zhu 2018). The use of e-books is commonplace in university and other science libraries, while library material traditionally consists of non-fiction. Moreover, in the case of a debut writer, the library does not have any signal on the future popularity of the novel.

The purpose of this study is to investigate novel reservations by common readers in public libraries in the Helsinki region where citizens use one library card that is valid in four Helsinki area cities, Helsinki (population 628208 at the end of 2015), Espoo (269802), Vantaa (214605) and Kauniainen (9486). The largest majority are Finnish speakers (about 80 %). Finnish and Swedish are official languages in Finland, and Sami is the official language in some municipalities in Lapland. There are three different Sami languages in Lapland. The novel reservations in this study use only novels written (or translated) in Finnish.

The following table presents some descriptive statistics of the public libraries in Helsinki area where the Helmet system is operating.

Mother language at 31.12.2015	Helsinki	Espoo	Vantaa	Kauniainen
Finnish	504011	211252	175824	5634
Swedish	36004	20216	5676	3265
Sami	61	9	20	3
Other	88132	38325	33085	584
All	**628208**	**269802**	**214605**	**9486**
Collection, Finnish books	1203615	464112	297085	34200
Collection , Fiction for adults	492665	168107	93892	16422
Acquisition fiction for adults	48851	18690	9819	960
Borrowing, fiction (adult)	2142770	792235	528107	39939
Acquisition (only books) costs per resident	3,23€	3,61€	2,26€	5,75€
Personnel costs	24054189€	9956475€	5024907€	593762€
Acquisition costs, printed books	2007001€ (5.3%)	959059€ (4.6%)	476680€ (6.0%)	53812€ (5.4%)
Acquisition	198896€	74046€	66003€	5077€

costs, e-books				
Costs of premises	6798920€	5900336€	1571624€	175740€
Other costs	3915111€	3725196€	439745€	130086€

Table 1: Helmet libraty coalition statistics (source: https://tilastot.kirjastot.fi), all collection and cost statistics refers to 2015 year end, collection figures refer to number of publications at the end of 2015

The share of printed book acquisitions is about 5% of all library costs in the Helmet area. Acquisitions of eBook collections account for approximately 0.5% of all costs. Personnel costs have the largest share of all costs in the Helmet area library consortium, ten times as much as book acquisitions.

2. Book acquisitions

The librarian decides the acquisitions of the library based on her/his expertise in the field (Tuomi 2017). Book selection is a rather sensitive and discerning task, especially when the library has limited financial resources. The demand for borrowing is based on the preferences of the readers, but also the librarian's motivation to select the books she considers worth recommending to the readers. Too much patronage must be avoided but somehow the educational side must be taken into account. They must select the best quality reading material for the greatest number of readers at the lowest possible price. The choice is time-dependent, social and cultural climate and other external factors such as customs, norms, and values of their time must be taken into account. Quality is linked to the question of good and bad literature, but the distinction between these is difficult. The collection must include both popular literature and a wide range of material that is not available elsewhere. It seems that novels books become obsolete rather quickly (Kannila 1966). Gradually, books on the library shelves are like fashion magazines, books from last year or spring have little demand, we can even argue that they are not valid for anything in autumn.

A large number of literary people have been implicated in the belief that one cannot be civilized unless one has read all books of which the greatest advertisements have been published in newspapers. With an ordinary daily or weekly workload, a person cannot accommodate an excessive amount of reading, soon there might be no time for everything else except reading. According to Kannila, the library's task is to offer an alternative and real opportunity for long-term sustainable and long-term maintenance of the reading hobby. The library serves the reader in planned reading and in the development of reading hobbies with the help of book selection, shelf order, and catalogs, as well as personal advice from the staff. In the 1960s, library statistics showed that the latest literary works were not borrowed from libraries (Kannila, 1967), but the situation has changed over the last decades. Now the latest literary is rather popular, and public awareness in terms of literary awards or critics published in newspapers has a positive impact on public library loans (Suominen 2021).

Recently, libraries have increasingly been using demand-driven acquisition programs (Walker, Jiang, 2019). One of the first was the idea of using 80/20 rules: circa 80% of the number of transactions taken from a warehouse represents 20% of the number of items stocked (Trueswell, 1969). In the library setting, this indicates that 20% of novels in the library collection account for 80% of borrowings. Librarians are challenged by increasing material costs and the vast number of publications. The idea behind demand-driven acquisition programs is simply to purchase the titles that readers want to read. There are different trigger mechanisms for these programs, however, these mechanisms are more suitable for e-books. Triggers may be related to viewing (say) 10 pages of the book, spending more than 10 min, interacting with the title's content, or downloading content.

The library serves not only as a stock of books. A survey carried out in 2013 showed that most respondents ranked the use of books (adult novels) as the most important service of public libraries. The second was the availability of nonfiction material, children's literature was third, and newspapers and

magazines were the fourth important material (Quirk, El Hodiri 1974, Quick, Prior et al. 2015). Public libraries benefit local residents, in particular as a provider of fiction as well as nonfiction.

.In Finland, women are more active readers in terms of volume and omnivorousness (Purhonen, Gronow et al. 2010, Purhonen, Gronow et al. 2011). Omnivorousness is based on the composition of different literary genres. Elderly Finnish citizens (age between 55 and 74) and highly educated are more omnivores. On a Likert 5-scale measure, thrillers and whodunits are the most liked (about 30 % like very much). The second genre in this setting is biographies. The following table is from (Purhonen, Gronow et al. 2009).

	Like		**Neither like**	**Dislike**		**Have not**	
Genre	*Very much*	*Somewhat*	*nor dislike*	*Somewhat*	*Very much*	**read**	**Total (N)**
Thrillers & whodunits	29.7	33.8	20.0	2.2	1.0	13.3	100 (1339)
Scifi, fantasy & horror	8.7	17.3	26.2	13.8	10.6	23.5	100 (1329)
Romances	15.6	31.7	27.3	8.0	2.8	14.8	100 (1334)
Biographies	21.0	37.3	21.1	4.7	1.4	14.5	100 (1336)
Modern literature	7.8	20.8	34.4	8.0	3.7	25.3	100 (1334)
Classical literature	13.1	22.4	30.8	6.9	3.6	23.2	100 (1322)
Other nonfiction	15.4	41.2	28.3	2.7	0.9	11.5	100 (1331)
Poetry & plays	5.7	22.3	31.1	9.6	5.7	25.5	100 (1326)
Religious books	4.7	12.4	29.7	12.1	9.8	31.4	100 (1326)
Self-help books	5.5	21.4	30.5	7.9	5.1	29.6	100 (1328)
Leisure/Hobby books	13.5	42.9	25.1	2.3	0.6	15.7	100 (1332)

Table 2: Novels liked in Finland by genre, adapted from Purhonen, Rahkonen & Gronow 2009

Based on the above table, literature, and particularly fiction, has in public libraries a self-evident position. It is needed and borrowed. However, the role of libraries has changed from a purely book inventory to a modern learning space with an emphasis on experience, meeting and performance (Tuomi, 2017). For example, music library work in the field of art has risen as a form of service and activity despite the fact that librarians are probably literature-oriented.

3. A Model

If the author is well known and has already published several works, the selection process in both the publishing house and the library is easier than for a new author. We are using a reverse cobweb model for analysing the library borrowing reservations. The cobweb model is a simple illustration of a dynamic system which can generate either convergent or divergent sequences. The model assumes that the expected price actual price in the previous period, and supply is a function of expected price and the actual price adjusts to demand to clear the market. Suppose the borrowing demand D_t for a certain author (book) depends on the market price of the book p_t and expectations concerning the quality of the book $r_t(a_{t-1})$ where a_{t-1} refers to author's recognition as a writer (previous books)

$$D_t = bp_t + r_t(a_{t-1}) \ where \ b > 0 \quad (1)$$

If the book is expensive, borrowing demand is high due to the high price. If the market price is high, consumers (readers) are willing to accept a rather long queueing time and not to purchase the novel from a bookstore. Evidence, however, shows that borrowing demand is negatively related to purchasing price (Suominen 2021). Assume that the supply function S_t is related to previous season popularity of the author's book from the previous season and negatively related to market price of the market, since the library has a limited and binding budget for purchasing the books. The cobweb model in Figure 1 is convenient for analyzing novel reservations.

$$S_t = cp_{t-1} + r_{t-1}(a_{t-2}) \ where \ c < 0 \quad (2)$$

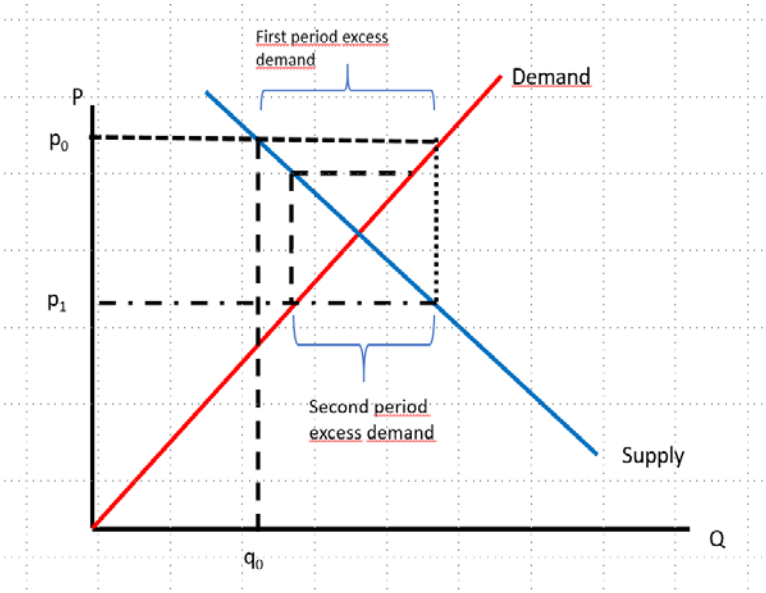

Figure 1: a cobweb model for library borrowing

If the library purchasing officers have made a consistent number of books, the demand and supply are equal and there is no need to make a reservation $(D_t \leq S_t)$ and each borrower receives the book (novel) immediately; however, public libraries do not always have enough books, and readers need to wait until they are able to borrow the book. If the supply does not fulfill the expectations, the readers need to wait (in figure 1: First period excess demand).

$$D_t > S_t \ or \ bp_t + r_t(a_{t-1}) - cp_{t-1} + r_{t-1}(a_{t-2}) > 0 \quad (3)$$

If demand and supply are equal, then

$$p_t = \frac{c}{b}p_{t-1} - \frac{r_{t-1}(a_{t-2}) - r_t(a_{t-1})}{b} \quad (4)$$

If the price remains unchanged from period to period (from novel to novel), i.e. $p_t = p_{t-1} = p_e$. Assume that the debut writer has no history (t = 0) and the initial price of the first novel is p_0, the solution of the first order difference of equation (4) is

$$p_t = (p_0 - p_e)\left(\frac{c}{b}\right)^t + p_e \quad (5)$$

The solution (5) expresses the path of the price as a function of time.

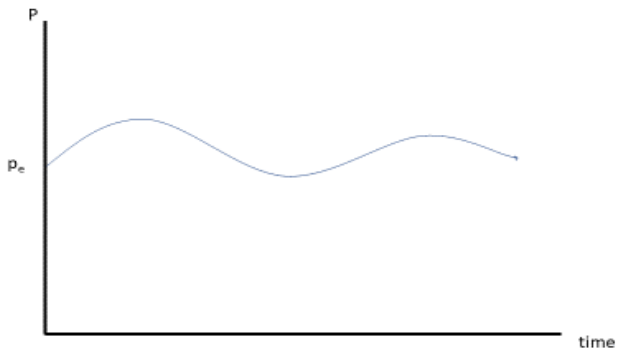

Figure 2: price oscillation if the process is stable

Assume that the library purchases a small number of books (q_0) of the debut writer at a reasonable price p_0. The novel turns out to be a hit and demand exceeds supply, so the borrowers need to wait until they can borrow the book from the public library. Library managers then notice this excess demand and they decide to purchase a larger number of second novel of the writer based on a long waiting list. However, this may lead to oversupply and the borrowers do not have to wait for the second book of the author. They can receive the book immediately from the library, which is a signal to library managers, and they reduce the purchases of the third novel, and so on. The figure above illustrates a situation where the demand remains constant over the years; however, the writer recognition has a dynamic effect on demand. If due to writer recognition demand increases over time up to (say) the 5th novel, the excess demand remains in the early years of the writer career.

Moreover, the cobweb model indicates that price is related to book reservations if the writer's experience has been taken into account. The simple model

characterizes the idea that writer recognition has an impact on how borrowers need to wait until they are able to borrow the book from the library. If the absolute value of $\left|\frac{c}{b}\right| < 1$ the first term in equation (5) will vanish eventually and the oscillation of price path will fall away (Figure 2) Moreover, if $\left|\frac{c}{b}\right| > 1$, the price oscillations will increase and the market is unstable. The price oscillation is not important in this study; the focus is the excess demand (or excess supply) of borrowing demand. Evidence from Helmet public libraries (Helsinki area) indicates that borrowing demand is highest when the author has published more than ten but less than 30 novels. Hence, we have a hypothesis arguing that oscillation and scarcity in terms of long queues is probable in the case of rather new (young) writers who have published a limited number, less than ten of novels.

Moreover, we know that readers prefer books that have been recently added to the library collection (Suominen 2021)

4. Data and Analysis

The data covers reserved books on 2 March 2016 at the Helmet library coalition (Helsinki, Espoo, Vantaa, and Kauniainen public libraries), but only those books that have been borrowed rather diligently. These books can be found on the list of the most borrowed (top 100) during a three-month period in spring (April – June 2015), summer (July – September 2015), autumn (October – December 2015) or winter (January – March 2016) before 2 March 2016. The top 100 list is available for each quarter of the year. A longer period of top 100 borrowed books is not available. The table below presents some descriptive statistics, including correlation coefficients of the variables.

			Correlation coefficients									
	Mean	Std.dev.	Res	Stock	Order	Borr	Days	Publ	Price	HS	SK	FA
Reservations	617.5	412.4	1									
Stock, books	218.2	99.8	0.48	1								
Ordered	3.6	13.3	0.14	-0.16	1							
Borrowed	976.5	382.5	0.53	0.81	0.06	1						
Days	26.9	33.2	0.01	0.20	-0.07	0.10	1					
Publications	13.5	14.9	-0.24	-0.17	0.03	-0.01	0.10	1				
Retail price	28.9	5.9	0.07	0.11	0.09	0.11	0.14	-0.20	1			
HS	0.30	0.46	0.22	0.35	-0.11	0.34	0.02	-0.23	.27	1		
SK	0.27	0.44	0.30	0.11	-0.03	0.08	0.01	-0.23	-0.08	0.17	1	
Finlandia A	0.03	0.16	0.33	-0.01	0.00	-0.03	-0.02	-0.13	-0.11	0.26	0.27	1

Table 3: Descriptive statistics of the variables

Since only the top books by borrowing (mean 976.5 during a three-month period) have been used in the analysis, the average book had more than 600 reservations in 2 March 2016. The Helmet library coalition has had a bit more than 200 books of a particular novel in its collection (stock books). The variable 'days' refers to the time between the last day of the three-month period (a quarter) and the 2 March if the book belongs to the list of the 100 best sellers. Most books in the reservation list are on the list rather close to first appearance to top 100 list (average day is 26.9), e.g. if the first appearance in the top 100 list is between October and December 2015 then the "days" variable is the number of days between 31.12.2015 and 2.3.2016 i.e. 63. The author's publication number (mean 13.5) is the key variable in the analysis. The retail price is from the www.suomalainen.com website. Suomalainen kirjakauppa is the leading bookstore in Helsinki region. It has three stores in Espoo, ten in Helsinki and five in Vantaa, and an online bookstore on the Internet. The purchase price in the analysis is the price on-line. Helmet Library coalition is probably able to purchase books at a lower price since the buying volume is up to several hundred per novel; however, the library price is not known. HS and SK refer to

published critics is the leading newspaper (Helsingin Sanomat) in Finland or to a weekly magazine (Suomen kuvalehti) of high standard. About 30% of the books that have been reserved have been reviewed in Helsingin Sanomat or Suomen kuvalehti. Most books have been reviewed on either Helsingin Sanomat or Suomen kuvalehti only on the other, since the correlation coefficient of these variables is low (0.17). The last variable Finlandia A refers to the most known literacy award in Finland (dummy variable, 1 if a candidate for receiving the award, otherwise 0). The stock of books in the library coalition and borrowed are positively correlated.

The data is examined with regression analysis which is a common method in cultural economics including for example book sales (Asai, 2016; Ashworth et al., 2010; Ponzo & Scoppa, 2015; Schmidt-Stölting et al., 2011). The results of the regression analysis (below, Table 4) show that well-known and recognized authors with a substantial number of publications are related with less reservation (model 3). The library management is able to purchase enough books and borrowers do not need to wait. The result is not valid in model 2 in which the cumulative number of borrowings is not used as explaining variable.

n = 204	Model 1	Model 2	Model 3
Stock # books at library collection	0.624 (0.404)	2.182*** (0.246)	
Ordered, but not yet in collection	4.704** (1.657)	6.664*** (1.690)	4.024* (1.603)
Borrowed, cumulative	0.482*** (0.102)		0.611*** (0.059)
Days since First Borrowed	-0.525 (0.657)	-0.929 (0.686)	-0.296 (0.642)
Publications of the author	-4.369** (1.561)	-2.426 (1.586)	-5.035*** (1.506)
Retail price	3.475 (3.930)	4.115 (4.136)	3.200 (3.940)

HS	-115.5*	-77.72	-109.9*
	(54.2)	(56.46)	(54.28)
SK	133.5**	144.6**	133.3**
	(50.1)	(52.72)	(50.29)
FAward cand.	810.8***	775.8***	803.6***
	(135.6)	(142.6)	(136.0)
constant	-60.20	16.65	-37.85
	(129.2)	(135.0)	(128.9)
R^2	0.481	0.424	0.477
F	21.92***	19.73***	24.19***

Table 4: Regression analysis. Dependent = Reservations on 2 March 2016

The regression models can explain roughly a bit less than 50 per cent (R^2) of the variation in public library reservations. The F-statistics reveals that the models are reasonable. The regression model is classical since anything special on the error term has not been assumed. Then a standard linear regression model is suitable. If an explanatory variable coefficient does not significantly differ from zero, then the variable has no impact on the variable to be explained. For example the price variable is not significant according to the cobweb model, where the price should not be relevant and important for reservations (excess demand). Public awareness in terms of Finlandia award candidates is essential, as well as critics published in Suomen kuvalehti, however, critics published in Helsingin Sanomat have a negative impact on reservations. It seems that critics in Helsingin Sanomat results in consumers to buy the book while Suomen kuvalehti leads to consumers to lend the book from the library.

5. Conclusions

This study aims to have a look at public library book reservations. In the case of a novice writer, the library management does not have any signal on the borrowing demand. When the author has a long publication history, the library has enough information on the borrowing demand and we should not observe

large reservations since the library has been able to purchase enough books to satisfy the demand. Hence, the number of publications by the author should be negatively related to book reservations. Using data from Helsinki area Library Coalition including public library data from four cities of the capital region, Helsinki, Espoo, Vantaa, and Kauniainen, the regression analysis results indicate that the number of author publications is negatively related to book reservations. The cobweb theory also highlights the idea of having no relation between the retail price of the book and library reservations. The results favour this argument. Public awareness in terms of being an award candidate or critic published in the high standard magazine Suomen kuvalehti has a positive impact on reservations. However, critics published in a leading newspaper, Helsingin Sanomat has a negative impact on reservations, probably due to higher buying demand if criticized in Helsingin Sanomat. The last argument has not been studied, but it offers us a reasonable explanation.

Librarians who are responsible for the collection of public libraries a novice writer is challenging since nobody knows anything. The number of books at the library is randomly selected since there is no information concerning the borrowing demand of the author's novels. Therefore each librarian should negotiate an agreement with option to purchase more novels to the library if the novel turns out to be popular with high borrowing demand.

The library reservation variable is strictly speaking, the reservation number of 2nd March 2016, only one day situation, and this might lead to some difficulties since the seasonal library borrowing demand has not been taken into account.

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