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Analysis of Factors that Influence Users' Willingness to Pay for the Services of Iranian Academic Libraries by Using the Contingent Valuation Method

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Abstract

Background: The demand for evaluation methods of Academic libraries has resulted from the fact that universities are being recognized as an important economic asset of national competitiveness. This realization has led to an attempt to verify the effectiveness of investment in higher education, and Academic libraries also have had a chance to reconsider and promote the importance of their existence to their universities.

Objectives: The aim of the study was to estimate the economic value of a variety of academic library services and identify demographic, individual, sociological and technology factors affecting users' willingness to pay by using the contingent valuation method.

Methods: The study populations are the users of university central libraries (including students, faculty members and employees of the universities) under the supervision of the Ministry of Science, Research and Technology of Iran. The data collection instrument was a two-dimensional questionnaire with 48 questions, constructed by the researcher. 854 respondents completed the questionnaire. The data was analyzed using logistic regression. A two-stage Heckman method was used to correct for selection bias.

Results: Demographic and individual factors were found to be more effective than other factors, such as sociological factors and technology, in predicting users' willingness to pay. The variables of education, monthly income, job, gender, and research had the most impact on willingness to pay. On the other hand, Hekman's two-stage method, although it can be distinguished among the factors affecting the acceptance of the willingness to pay as well as the factors affecting its degree, Overall, Willingness to pay estimated Less than the other two methods(Linear &logistic regression).

Contributions: Libraries and information centers in Iran are facing a lot of budget problems. In this research, the researcher seeks to find Effective factors to estimate the economic value of libraries and their services to the users. Economic valuation increases the value and credibility of a system, which Provides useful information for decision makers, planners and managers to decide on solve of problems

Keywords: economic value, willingness to pay, contingent valuation, logit model, two stage Heckman, academic libraries, library services

I. INTRODUCTION

Estimating the economic value of cultural resources presents an important and growing field of applied research. Valuation of cultural programs and assets offers a way for decision-makers to compare the intangible benefits (and costs) of various alternatives (Noonan, 2003). Valuation estimates make the opportunity costs of different allocation decisions transparent. Armed with valuation estimates, policy makers can see the benefits of undertaking certain projects, cultural institution managers can weigh different alternatives, and analysts can undertake more complete cost-benefit analyses.

Recently, the value of a university library has become a key part of the performance of a university. The value of a university library represents the contribution made by various types of library services to the success of professors and students, through subjective judgments of users who benefit from these services. The intangible character of value and the subjectivity of value judgment are the main reasons that value measurements are difficult to carry out. Therefore, a university library's value should be investigated and in-depth research on measurement methods should be conducted in order to draw more valid conclusions regarding this topic. Users of these libraries have different profiles. Although they share a common academic or professional interest in research, their approaches differ widely. This study attempted to measure a university library's service value using the contingent valuation method (CVM), and to identify factors that affect the variability in value assessments with regard to the measurement strategies. CVM is a technique that was designed to elicit value assessments from people for non-market goods and services (Shaffer, 2011). CVM and the closely related "contingent choice" methods have become increasingly popular in cultural economics. Empirical researchers use this method to explore the non-market values of various cultural resources (Chung H & Ko, 2009). In comparison to the revealed preference method which derives value estimates from existing, comparable, market behaviors, CVM provides both direct (in the sense that value is stated by respondents) and realistic approaches to obtaining value assessments for goods and services that do not lend themselves readily to quantification. The values generated between the university library services and the user are divided into individual services such as circulation services, reference services, space services, interlibrary loan/document delivery, user education sessions, and integrated services where respective disparate services are combined (Saracevic & Kantor, 1997). The purpose of this article is to explore factors that influence university library users' economic value assignments for a variety of library services. Specifically, the study investigated the effect of institutional and user characteristics as well as the presence of payment card information in the CVM survey on users' willingness to pay values.

II. LITERATURE REVIEW

RIN and RLUK's (2011) report entitled *The Value of Libraries for Research and Researchers* measured the correlation between the number of students doing research, the procurement of research funding, and the research performance evaluation of the university against the number of the library books, library staff, and library budget of 67 higher education institutions in England. They also analyzed the value of services the library provided to researchers and the library's level of contribution to research performance. His report did not measure the values contributed to various aspects of the university by the library; its range was also limited to values provided by studies and researchers. Therefore, to measure the university library's return-on-investment (ROI), an in-depth review of the value contributed by each service and the measurement method of that value is required.

Melo and Pires (2011) measured the economic value of the Portuguese electronic scientific information consortium. The economic value of the consortium was measured in two ways: the value of the time saved by using the service and the contingent valuation method (CVM). The benefit-to-cost (B/C) ratios derived from both methods were 1.91 and 3.32, respectively. As a means of quantifying the value of the library, ROI or B/C calculations are now being extended to cover the value of all key library products and services.

Ko (2012) show that a higher baseline out-of-pocket WTP or willingness to pay has a positive impact on the average out-of-pocket WTP value. Other results of this study show that WTP is higher for men and that it grows with the level of education achieved.

Ko (2015) show that assessing the economic value of academic libraries has emerged as a new approach to the evaluation of library services. Using contingent valuation method, we collected willingness-to-pay amounts for five different library services from users at four universities in Korea. Based on past research and the results from a preliminary survey at two institutions, we formulated five hypotheses that tested the efficacy of the factors predicting variations in willingness-to-pay values. The results indicate that university characteristics such as the type of institutions (public versus private) and core mission (research versus instruction) did not seem to affect differences in the service value assessments. The presence of payment cards in the data collection also did not seem to give variability in willingness-to-pay values. The only factor that seemed to affect these values turned out to be users' status: faculty members consistently assigned higher amounts than students. For economic valuation methods to be fully appreciated, we need reliable data collection methodologies and more systematic approaches to the factors affecting value assessments. This study is still in its infancy due to the small scope of participating institutions and users; however, this is just a first step towards the proper economic evaluation of library services.

III. Research methodology

The contingent valuation method (CVM) is one of the main value measurement methods based on statements of users. It is used to measure the value of libraries, indicating the value obtained by users from the direct use of libraries. Since value is completely measured based on the statements of users in the CVM, data were collected by user surveys & analyzed using regression analysis to develop models that explain the user responses. We sought to model the willingness-to-pay of the library users as a function of the frequency of use, whether the user or not, the type of user, the scientific area of the user, and the institution of the user. Hence, the dependent variable, willingness-to-pay, can take only two values: 1 if the user wants to pay some amount per month to continue having access to the services of library, and 0 if the user does not want to pay. The dependent variable is thus dichotomous. Three commonly used statistical approaches to analyze dichotomous response variables are: linear probability model, Logit model and Probit model. Logistic regression is the appropriate regression analysis to conduct when the dependent variable is dichotomous (binary). Logistic regression is used to describe data and to explain the relationship between one dependent binary variable and one or more nominal, ordinal, interval or ratio-level independent variables.

Gujarati (576:1995) affirms that Linear probability model (LPM) is simple and it has several limitations, for instances, this model assumes that the conditional probabilities increase linearly with the values of the explanatory variables, for instances, the probabilities will tend to taper off as the values of the explanatory variables increase or decrease indefinitely. This author says that "in group data, Logit and Probit estimates are fairly straightforward."

Logit model

The logistic regression is a useful way of describing the relationship between one or more outcomes expressed as a probability, that has only two possible values such as (yes=1 and no=0).

For the statistical analysis, the population is the users of central libraries, including students, faculty members and staff of universities under the supervision of the Ministry of Science, Research and Technology of Iran. Central libraries across the country were sampled using a two-stage cluster sampling method. Initially, ten central libraries were selected from state universities in different geographical regions of the country. At each central library, library users were sampled randomly. To determine the appropriate sample size for estimating the willingness to pay, the Michelle-Karson formula (Michelle & Carson, 1989) has been used. In which the sample size relies on a certain deviation, the willingness to pay is estimated from the willingness to real payment.

Table1. M & C Sampling (Michelle and Carson, 1989)

	D=0/05	D=0/10	D=0/15	D=0/20
V=1/5 · a=0/10	2571	243	286	161
V=1/5 · a=0/05	3458	865	385	217
V=2 · a=0/10	4570	1143	508	286
V=2/5 · a=0/05	6147	1537	683	385
V=2/5 · a=0/10	7141	1786	794	447
V=2/5 · a=0/05	9604	2401	1608	601

$$n = \left(\frac{1/96 \times 0/89}{0/06} \right)^2 = 845$$

Following the formula, a sample size of 845 was calculated. But, because of the formula used to determine the sample size in the conditional valuation method, you must select a number which is 10% close to the number obtained in the Michel and Carson Table (Table 1). The table proposes 865 people as a research sample. In the study, 854 completed questionnaires were collected.

The questionnaire was based on the International Standard performance indicators¹ and the contingent valuation method (CVM) to assess academic library services. We considered five groups of users: professors, PhD students/researchers, Master's students, undergraduate students and others. The survey was carried out in July–August 2016. The wording of the questionnaire was examined carefully during pilot valuations in autumn 2016 and in March 2017. From the pilot study, it was found that the respondents' answers could be influenced by the order of the questions asked. Therefore, it was necessary to analyze in detail the individual variants of the questions asked and check their informative value. Regarding the diversity of services provided by university libraries, the survey categorized the measured service targets into lending services, reference services, electronic scholarly information services, user education sessions, and facility provisions, and it allowed the respondents to state the WTP value for each service. The question type to obtain WTP amounts was open ended.

IV. FINDINGS

Table 1. Profile of respondents

Variable	Variable value	Frequency	Percentage
Sex	Female	478	56
	Male	376	44
Education	Diploma	7	0.09
	Assistant	11	1.3
	Bachelor	388	45.5
	Master's	321	37.6
	Ph.D	127	14.8
Occupation	Student	749	87.7
	Faculty member	39	4.5
	Employee	31	3.6
	Researcher	21	2.5
	Other	14	1.7
Income	Below 100000 Rial	206	24.1

¹ . <https://www.iso.org/standard/56755.html>

	100000-500000	381	44.7
	500000- 1000000	74	8.6
	1000000-1500000	83	9.7
	1500000-2000000		
	Up to 2000000	98	11.5
	Other sums	12	1.4

Table 1 shows the number and profile of respondents in terms of gender, education, job, and income. 56% of the sample was women and 44% men. Bachelor's, Master's, and Ph.D. degrees have the highest number of respondents. Students (87.7%) are the biggest group of users of the central library services of universities. Nearly half the respondents have an income level of 100.000 to 500.000 Rial.

Table 2. The result of estimating the Logit model with the simultaneous input of variables, for the probability of willingness-to-pay monthly for the use of central library services

Variables	B	S.E.	Wald	Sig.	Marginal effect
Constant	5.486	0.122	19.141	0.000	0.884
Gender (Female)	-1.109	0.275	4.032	0.029	0.276
Gender (Male)	-1.230	0.509	2.416	0.024	0.288
Job (Student)	2.029	0.870	2.332	0.000	0.395
Job (Faculty)	2.589	0.092	28.141	0.010	0.304
Job (Employee)	2.753	0.852	3.231	0.003	-0.195
Job (Researcher)	2.241	0.149	15.040	0.015	0.462
Job (Other)	1.285	0.881	1.458	0.033	0.108
Education (Diploma)	1.815	0.396	4.583	0.000	0.112
Education (Undergraduate)	2.190	0.326	6.717	0.010	0.203
Education (Bachelor's degree)	2.162	0.526	4.110	0.030	0.383
Education (Master's)	2.026	1.307	1.550	0.001	0.487
Education (Ph.D.)	1.577	0.889	1.751	0.007	0.535
Income (below100.000)	1.128	0.757	1.490	0.019	0.194
100. 000to 500.000	1.742	1.538	1.132	0.027	0.268
500.000 to 1.000.000	1.097	0.989	1.109	0.020	0.338
1.000. 000to 1.500,000	1.570	0.310	5.064	0.043	0.529
2.000.000 up	1.125	0.579	1.943	0.023	0.614
No income	1.229	0.956	1.285	0.002	0.071

Other sums	0.887	0.984	0.0901	0/040	0.129
-2 Log likelihood 689.715 Percent of Right Prediction%78 Cox & Snell R Square 0.038 Nagelkerke R Square 0.063					

In the Logit model, the estimated initial coefficients (see Table 2) only show the effects of the explanatory variables on the probability (more precisely, log odds) of the dependent variable having the value of 1, and do not have a quantitative interpretation. In other words, the coefficients obtained from estimating the logit model do not show the final effect of independent variables on the dependent variable. The positive and negative coefficients only indicate the direction of the effect of the independent variable on the dependent variable: a positive coefficient indicates that increasing the value of the independent variable will increase the probability of the dependent variable having the value of 1. Therefore, to investigate the effect of the explanatory variables on the dependent variable, the Marginal effect is examined. The final effect illustrates the magnitude of the change in predicted probabilities for a tendency to pay extra users for a change unit in a particular variable.

The coefficient of determination in the R²(R square) model given in Table 2 indicates the degree of variation of the dependent variable which is explained by the independent variables. This value is between one and zero, and the closer one indicates the power of the model. In table (3), there are four logarithms of likelihood, the correct prediction percentage, the Cox & Snell R, and the value of the Nagelkerke R factor. These values are the alternatives used in regression models instead of R². Interpreting these values is not easy with R² and is mainly used to compare the variables of a model. The magnitude of the logarithm of likelihood is equal to: 689.715. These stats the question of how much the research model measures the amount of annual interest it estimates inefficiently or poorly. The model is better whatever the amount of this statistic less.

The amount of the Marginal effect of the explanatory variable of gender indicates that men and women Respectively at 0.276 and 0.288 units, they are more likely to pay more for the use of central library services and the consequence is that gender does not have an effect on the willingness to pay more for the annual use of central library services. The amount of the Marginal effect of the job description variable indicates that assuming the other conditions are fixed, the employees with the employee's job will reduce the likelihood of accepting the proposed amounts in their willingness to pay more for the annual use of central library services by up to 0.195 units In general, Users with researcher, student and faculty jobs are more likely to pay more than 0.462, 0.395, 0.304 units, respectively. Also, the amount of variables describing the level of education shows that assuming the other conditions are stable; the average increment of a variable of this variable increases the likelihood of accepting proposed amounts in a desire to pay more for annual use of central library services to 0.535 units. The amount of the Marginal effect of the explanatory variable the level of monthly income of users also shows that, assuming the other conditions are constant, the average income drop to one million Rial, the probability of accepting the proposed amounts in the desire to pay more for the annual use of central library services Decreases to 0.071 units.

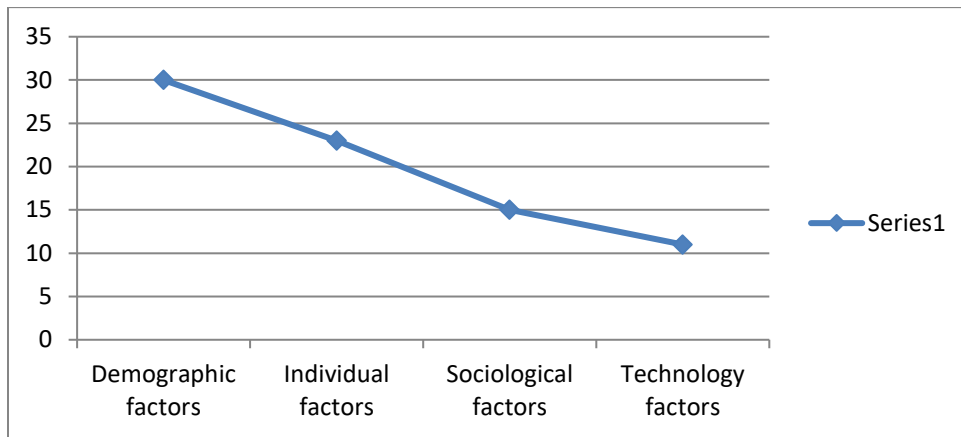


Figure1. The effect of quadruple factors on the willingness to pay for users of central library libraries

The comparison of four factors (Figure 1) in the Willingness to pay shows that demographic factors have the most impact on the value of services and the willingness to pay library users Then there are individual factors, sociological factors and technology factors.

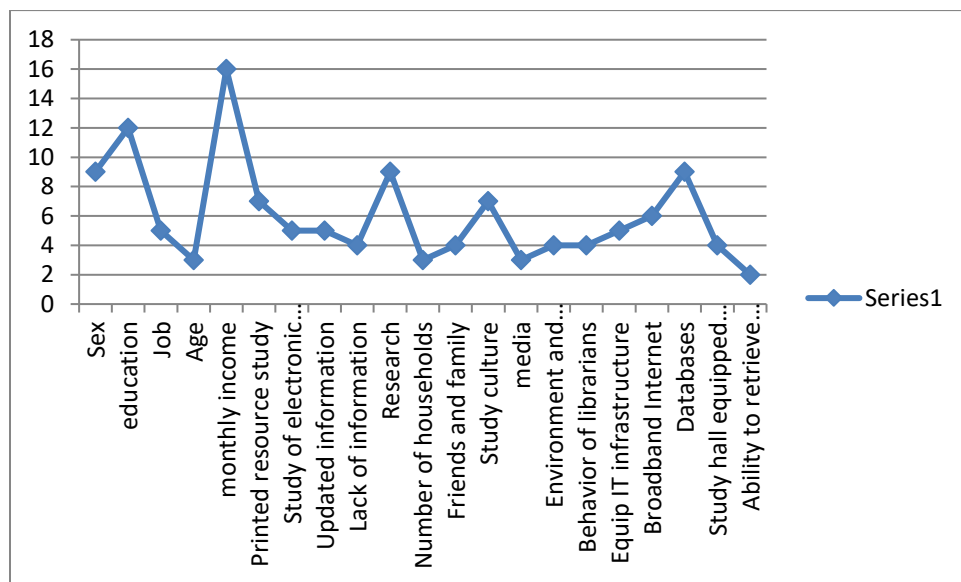


Figure2. The effect of variables of each of the four factors of research on the willingness to pay users of central library libraries

Also, the comparison of the variables related to each of the four factors (Figure 2) shows that among the demographic factors, the variables of education have the highest impact, and then the variables are gender, occupation and age. In relation to individual factors, the most effect is on the monthly income variable of users, after which the variables of the research, the study of printed information resources, the acquisition of information, the study of electronic information resources, and there is lack of information. In relation to sociological factors The most impact It is related to the variable of study-and-book culture and then the variables of friends and family groups, the environment and welfare conditions, the impact of media, the number of households and how the librarian is treated. In relation to the factors of technology, most impact is related to access to full-text databases, followed by variables such as equipping technology

infrastructure, high-speed Internet access, equipping the study lounge with the Internet, and the ability of individuals to retrieve digital information.

Table 3. The results of the two-stage Heckman method for determining the factors affecting the payment of central library services

Variables	Two-step Heckman method					
	First step (probit)				Second step (linear regression)	
	Coefficient	t-value	Aggregate elasticity	Marginal effect	Coefficient	t-value
Constant	10.9	1.33	0.011	0.563	0.233	0.831
Sex	21.8	0.884	0.32	0.096	0.216	0.910
Occupation	8.563	1.102	0.042	1.603	1.003	1.001
education	0.096	0.227	-0.53	0.923	.0163	2.93
Monthly income	1.603	0.066	0.68	0.83	0.99	2.16
Number of households	0.923	1.004	-0.108	0.81	0.412	2.24
Doing research	0.83	1.88	0.071	5.2	1.127	3.03
The culture of reading and reading	0.81	1.02	0.144	0.888	2.23	2.04
Environment, amenities	5.2	0.055	0.37	0.197	1.145	4.01
Librarians behavior	2.23	0.154	0.63	0.233	0.819	3.13
Access to databases	0.197	0.821	0.126	0.453	0.333	1.8
Internet speed	0.019	1.033	0.38	8.563	0.085	3.01
inverse mill ratio	0.453	0.159	0.0048	0.096	0.281	1.114
Percent of Right Prediction %76 Log likelihood Test 62.45 -2 Log likelihood 128.49 P-Value 000 Cox & Snell R Square 0.037 Nagelkerke R Square 0.066						

The results of the two-stage Heckman model are presented in Table 3. The r square value statistics states that 4.6% of the average changes in the willingness to pay by independent variables are explained. Total weight stretch for educational explanatory variable was calculated 0.053 Which shows With other factors remaining on average An increase of %1 in accountable responses, Increases the likelihood of paying users As much as 0.053 Indeed, people with a Master's degree and Ph.D. tend to pay more. For the explanatory variable, the number of households, total elastic mass, was -0.108, which shows that, with the remaining factors remaining constant, on average, with an increase of %1 in the number of households, the likelihood of the user's willingness to pay decreases At a rate of 0.108 .The next variable is income, which is an important economic factor in the willingness to pay for library services in critical situations. The total gross weight gain of the variable income was %0.68 which shows When %1 of respondents' incomes increase and other conditions remain the same, the willingness to pay will be as high as %68. The photographed image variable is statistically significant at %1 level. The coefficient of this variable describes the error resulting from the sample selection. If the fraction of this variable is statistically larger

than zero, deleting the zero observations from the observation set causes the estimation of estimated model factors. In addition, the meaning of the desire ratio indicates that there are significant differences between the variables affecting the willingness to pay and the effective variables on the willingness to pay difference.

As shown in Table (4), the Heckman method is a two-stage process has made a distinction between factors affecting the willingness to pay Factors affecting its amount, Because the variables of the study and reading culture, the number of households on the willingness and unwillingness to pay for a variety of library services, and the variables of gender, occupation, environment and amenities, access to databases and Internet speeds on the amount of willingness to pay and only two variables have a significant effect on the level of education and monthly income of respondents in both stages.

The average amount of willingness to pay was calculated for each individual to use general services central Library by using the integral presented in equation (1)

$$E(WTP) = \int_0^{MaxA} F_{\eta}(\Delta U) dA = \int_0^{MaxA} \left(\frac{1}{1 + \exp(-(\alpha^* + \beta A))} \right) dA \quad , \alpha^* = (\alpha + \gamma Y + \theta S) \quad \text{equation (1)}$$

after estimating the Logit model using the STATA 12 software and Significant consideration the estimated coefficients, The expected value of the willingness to pay by numerical integration in the range of zero to the highest bid for willingness to pay by the person responsible for the monthly amount is 92830 Rials which according to the number of users in the library research community, will be total economic value of library services central equivalent 9810720000 Rial .

V. CONCLUSION

Recently, the value of a university library has become a key area of the actual performance of a university. The

value of a university library assesses the contribution made by the library services with various properties to the success of professors and students through the subjective judgment of users who actually benefit from these services.

Yet, According to that the community has used libraries for free now; it seems a bit complicated to accept money for library services. To establish a link between library services and information products and the economic system must Values set for library and information goods and services. So the ideal is that to be determined a common basis for comparing goods and information services and the library and commodities and the economic system Value of goods and information services of libraries. It is a function of the amount of interest income from the use of those services and information products is provided by the users in the schools which is not always the same value for all people and is different, so they value them based on the benefits it generates. Undoubtedly, it is vital determining the economic value of academic libraries for funding, support and, eventually, their existence. Academic libraries services are an essential element for measuring them. Decommissioning of the budget, receiving government-financed expenditures, economic change, emphasis on revenue generation and the value of monetary policy it requires the use of resources in the library and careful consideration of them. Cost it is observed as a tool to help plan for the provision of resources and review the need for and use of library services and products. Technology has played an important role to expedite the cost of libraries. Providing public access to dedicated databases and the Internet, Provides ease of access for users to information in libraries in the real time. As demand for such services increases, Libraries should set a fee for each use of library

resources by people who really need library services and they can pay their money. Finally, can be said, this study has been promising from a managerial point of view, so that shows users of libraries aware of library services. They are of significant importance for willingness to pay and support for its improvement and development. It therefore provides justifiable decision makers and authorities to support the quality of library services and to prevent of little importance of display libraries.

According to the results of the research on the willingness to pay for a variety of academic library services, it is suggested Librarians of Central Libraries of Universities to be considered the nature of the services provided, the type of users, the use of information obtained and how much this information is used, geographic area, etc. Emphasizing those users should exceed the expectations of services provided by central libraries. When libraries look away, they act as a source of traditional knowledge which people use to gain access to information, and they need to be more in line with the demands of users and users and try in this way, Will cause Fertility of information economics in libraries.

According to the results of the research, it is suggested that sociological factors, such as the media, have a significant influence on the culture of reading and reading, and the level of willingness to pay users, the media by disseminating the culture of reading and reading and encouraging the audience to do so, eliminates one of the obstacles to the culture of reading and book recession.

To create a comprehensive admission and determine the correct method of conditional valuation of library services, is suggested other studies be done with all three methods (linear regression, logit, probit) mentioned in this research and to be analyzed the sensitivity of computing interest to all components of the model such as revenues, projected sums, social, economic, and cultural conditions of customers, As well as the number of views and approve or reject the use of the Hackman two-step method for evaluating library functions. The results show that the factors studied are all important explanatory variables of the willingness to pay for b-on and important determinants of demand for Academic library services. Moreover, the demand for services is quite sensitive to the 'price'.

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