

The impact of the electronic resources in Portuguese academic libraries: results of a qualitative survey.

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Abstract: In the last 10 years there have been big changes in the Portuguese academic libraries services as in other academic libraries over the world. These changes include the adoption of automatic catalogues and the electronic access to bibliographic data bases and scientific journals in full text. Nowadays physical and digital sources are together. Professors, students and researchers are able to access simultaneous to a great amount of quality information pay and open access. The Portuguese Government has been investing to improve the access to the production of knowledge so as to develop the country. It is important to know the return on the investments in university libraries. The purpose of this paper is to identify the impact of the electronic sources in the Portuguese academic libraries. This paper describes an ongoing project to assess:

- The use of electronic scientific information and the correlation to the scientific production of the Portuguese academic community according to standard performance measures indicators and bibliometrics data.
- The economic value of these library services. In order to estimate in monetary terms the value of these services for end-users we use the contingent valuation method (CVM). This study reports the results of a qualitative e-survey of academic community.

Keywords: Academic libraries, Electronic sources, Impact evaluation, Bibliometrics, Contingent valuation.

1. Introduction

During the last two decades, the idea of academic library quality services has been changing. Nowadays, efficiency, effectiveness and users satisfaction are not synonymous of large collections of publications. At present, the university libraries offer several services to disseminate and make available the information and knowledge to users.

Librarians have to manage human and information resources with the following main goals: to provide fast access to information; to satisfy the expectations of the users and to reduce the costs of the services. As a consequence, it is not surprising that one can find a vast and increasing body of literature on these subjects providing multiple methodologies to improve the quality and performance of the library services.

In an age of constant change, due to the information technologies development, to the digitalization of the society and to an increasing pressure to reduce the costs of academic library services, librarians and information managers all over the world have used assessment models and performance indicators in an effort to improve the quality of the services. It is important to evaluate the services because we must know if “we are providing the best possible service at right time, to the right people and at the right price” Davies (2008).

Academic Portuguese users seek for and use information in very different ways. This paper explores some aspects of the outputs, outcomes assessment

and the impact of electronic resources services in the Portuguese academic libraries.

Our study has three main steps:

1. Selection of the performance indicators and the scenario of the contingent valuation method (CVM) to be used.
2. Data collection and analysis.
3. Identification of the economic value of these library services in monetary terms, evaluation of the use of the *e*-resources (what type of scientific information, where and how often)

The selection of the performance indicators to be evaluated is based on the International Standards ISO 11620:1998, Amendment 1:2003 additional performance indicators for libraries and ISO 2789:2006.

In order to estimate in monetary terms the value of these services for end-users we use the contingent valuation method (CVM) and we evaluated the electronic scientific information consortium, B-on, available in the Portuguese academic libraries. This study reports the results of a qualitative *e*-survey of Portuguese academic community.

The remainder of this paper is organized as follows: in Section 2 we present the methodology used. Section 3 describes our sample and Section 4 presents and discusses the results. The final section concludes the paper.

2. Methodology

In order to evaluate the electronic services in the Portuguese universities libraries we have assumed the following International Standards ISO 11620:1998, 1:2003 Amendment, ISO 2789:2006 performance indicators: percentage of the target population using traditional library, percentage of the target population using digital library, percentage of the target population using both libraries, preferred location of use of the electronic services, service used (data bases, electronic collections, pay *e*-journals or Open Access journals), distribution of the user time saved.

According to Noonan (2003) “contingent valuation methodology (CVM) has been increasingly applied to cultural resources. This valuation employs survey to elicit a willingness to pay (WTP) from individuals for hypothetical changes in some good or services”. Mazzanti (2002) refers that “the surveys ask respondents to rate, rank, or choose among several alternatives described in terms of various levels of attributes”. In the last decade, some authors have used the contingent valuation method for monetary valuations of public, academic and special libraries services. For special and academic libraries we highlight the following studies: Harless and Frank (1999) estimate the economic value that patrons attach to reference desk service in an academic library; Chung (2007) presents a new approach to measure the economic value of the KDI School Library and Luther (2008) describes a project “that creates a quantifiable measure and a compelling position for the University of Illinois at Urbana-Champaign Library that demonstrated economic value to the university administration.”

In our paper we consider the contingent valuation methodology (CVM) to value in monetary terms the electronic scientific information consortium, B-on, available in the Portuguese academic libraries. The model developed in our study is based on the time and costs saved by users and the benefits generated by using electronic library resources. Benefit-cost analysis intends to estimate and compare Portuguese electronic scientific information consortium, B-on, costs and the benefits to the academic community.

Data Collection

The data collection process included one questionnaire that we have sent by e-mail to thirty three Public Portuguese Universities, since 15th January 2009 to 15th March 2009. In this study we present the data that we got during these two months. This e-survey is yet ongoing.

The questionnaire was based on the International Standard performance indicators and the contingent valuation method (CVM) to assess academic library electronic services. The scenario designed in this research to value electronic services of the Portuguese academic libraries is based on a hypothetical idea. The WTP scenario describes an economic situation which forces the Portuguese electronic scientific information consortium, B-on, to stop. It is suggested that the consortium B-on will continue if the users maintain the cost of these services paying a monthly tax with values between 5 to 50 Euros. The range proposed in this study was based in data from the FCCN (2008).

Since there exists a very large number of potential users among the participating universities, the questionnaire was applied to a sample of the population. In order to make inference about the population, we used stratified sampling in each institution participating in the study.

Data Analysis

The first step of the analysis was to summarize the data collected. The next step involved the comparison between different types of users and between various scientific disciplines. We considered four groups of users: Professor/Researcher, PhD Student, Undergraduate/Master Students and Others. The scientific disciplines were aggregated in the following six groups:

- Physiques and Chemistry Sciences (Physics, Astronomy, Chemistry and Materials Science);
- Humanities and Social Sciences (Social Science, Economics, Accounting, Business, Management, Finance, Humanities Science, Library and Information Science and Decision Science);
- Earth and Planetary Sciences (Environmental Science, Earth and Planetary Sciences);
- Life and Health Sciences (Veterinary, Pharmacology, Nursing, Neuroscience, Medicine, Immunology and Microbiology, Health Professions, Dentistry and Agricultural, Biological Sciences, Biochemistry, Genetics and Molecular Biology);
- Engineering (Engineering, Energy and Chemical Engineering);
- Mathematics and Computer Sciences (Mathematics and Computer Science).

We analyzed the data with descriptive statistics (frequency tables and graphs). Next, for several pairs of variables we computed contingency tables and performed the chi-square test (χ^2). The chi-square test is used to assess two types of comparison: tests of goodness of fit and tests of independence (Maroco, 2007). A test of goodness of fit establishes whether or not an observed frequency distribution differs from a theoretical distribution. A test of independence assesses whether paired observations on two variables, expressed in a contingency table, are independent of each other – for example, whether people from different groups differ in the frequency of the use of electronic scientific journals. In our case we used the chi-square test to analyze whether two variables are independent or not.

Our statistical analysis was performed with the Statistical Package for the Social Sciences (SPSS) and with Excel (using the Data Analysis Tool).

Description of the Sample

The assessment was based on an electronic questionnaire for all the Public Portuguese academic community (professors, researchers, students, administrative staff and everyone who usually uses academic services). During two months we received 1786 answers. We divided the population into four groups: Professor/Researcher 32.4%, PhD Student 7.8%, Master and Undergraduate Students 27.8% and Other 32.0% (administrative and library staff). We also considered six groups of scientific subjects: Physiques and Chemistry Sciences, Humanities and Social Sciences, Earth and Planetary Sciences, Life and Health Sciences, Engineering and Mathematics and Computer Sciences.

4. Analysis of the Results

In this section we present the preliminary results of our study. We start by analyzing the results of user e-surveys. These results are important for knowing the user’s behaviour and what users think about the scientific electronic information access in the Portuguese academic institutions. Next we analyse the results obtained for various performance indicators and estimate benefit-cost based on user time saved and the contingent valuation method (CVM).

Results for the performance indicators

The user e-surveys involved 1786 answers. Table 1 and 2 summarize the results of these surveys based on the International Standard performance indicators. Table 1 shows the percentage use of the various types of libraries and the place where users access electronic library services. Table 2 presents the percentage of users who know the Portuguese electronic scientific information consortium, B-on, and the percentage use of the various information e-resources.

The first item in Table 1 indicates the percentages of respondents who said they had used the library services in the previous 12 months. The figure show that this percentage varied from 4.3 to 63.3, depending on the various library services and the type of user. The data reveal the extent to which the services have been used. The higher scores (63.3, 50.4, 40.4 and 58.2) shows that the majority of users have used both digital and traditional academic library services. The only group of users for whom this is not true are the Undergraduate/Master students, who use more traditional libraries. It is also interesting to note that among Professors/Researchers and PhD Students there is a relatively large proportion of users who only use digital library services.

Table 1: Results of user e-surveys (percentages of the target population using traditional library, traditional and digital library, both libraries, preferred location of use of the electronic services)

User	Traditional library (%)	Digital and traditional library (%)	Digital library (%)	Do not use libraries (%)	Where do you access library e-resources? (%)			
					In the library	In a computer of the university	University campus with your laptop	At home
Professor/Researcher	6.7	63.3	27.2	2.8	6.7	55.4	54.0	51.4
PhD Student	4.3	50.4	38.1	2.2	10.8	46.0	72.0	51.8
Undergraduate/Master Student	45.7	40.4	4.4	9.5	42.5	27.6	58.9	47.7
Other	23.1	58.2	10.5	8.3	43.5	34.3	50.7	45.8

The next item shows the places where e-resources were used (the percentage varied from 6.7 to 72.0). These data reveal that a lot of users have their own

laptop and access these libraries services in the university campus (for instance, 72% of the PhD students use this mode of access). In addition a large percentage of Professors/Researchers access scientific information in a computer in the institution but not in the library (55.4%). Around 50% of the users access the library e-resources at home. This suggests that many users access the electronic scientific information well into the night and over the weekend.

Table 2: Service used (Portuguese consortium B-on, bibliographic data bases, paid e-journals in full text and Open Access journals)

User	Kwnoledge of B-on (%)	What type information resources do you use? (%)		
		Bibliographic data bases	Paid full text journals	Open Access Information
Professor/Researcher	89.4	40.0	84.0	44.6
PhD Student	87.1	41.0	79.9	52.5
Undergraduate/Master Student	39.4	19.7	28.8	17.3
Other	62.8	30.9	50.2	35.3

The first item in Table shows the percentage of users who know the Portuguese electronic scientific information consortium, B-on. Around 90% of the Professors/Researchers and of the PhD Students know this resource. On the contrary, among the Undergraduate/Master Students only 39.4% know this consortium (we have computed this percentage separately for undergraduates and master students, the results are similar for the two groups). This suggests that it is urgent to promote the knowledge of this e-resource among these students. This is particularly true for master students since master programs require more research work than undergraduate ones.

The last item in Table 2 shows information about the percentage use of bibliographic data bases, paid electronic journals and Open Access information. The paid full text journals have the highest percentage use with values ranging from 84.0 for Professors/Researchers to 28.8 for Undergraduate/Master students.

The aim of this project is to provide a detailed analysis of how academic community in Portugal have responded to the provision of scholarly electronic information and how this has shaped their information-seeking behaviour and their use of such e-resources. The next chart, Figure 2, compares the percentage use according to the type of information (bibliographic data bases, paid full text journals and Open Access information) and by subject. The chart reveals several interesting facts. First the highest percentage use values are for paid full text journal independently of the subject. Second academic users have researched Open Access information but the percentage use varies quite a lot among scientific areas. Third the less research-intensive use is in the bibliographic data bases.

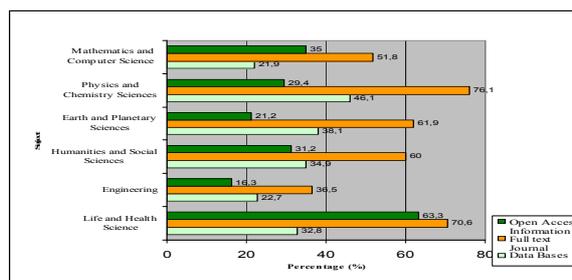


Figure 2: Percentage of use for data bases, paid full text journals and Open Access information by scientific area.

Results for benefit-cost analysis

Table 3 presents the distribution of the user time saved when accessing the Portuguese electronic scientific information consortium B-on. For each group of users we estimated the average time saved per month. The average time saved for Professors/Researcher and PhD Student is quite high (8.79 and 9.85 hours per month, respectively) whereas for Undergraduate/Master Students the average time saved is 4.44 hours per month. The next step involved the calculation of the average time saved in a year as well the estimation of the average time saved for all Professors/Researchers, PhD Students and Undergraduate/Master Students from Portugal, about 402914 users, according to data from GPEARI (2008). The time saved can be converted in monetary terms by multiplying the number of hours saved by the value of time for each type of users. To estimate the value of time we used the salary or scholarships for each group of users, considering data from the Portuguese legislation (professors and researchers salaries, PhD Students financial support and university monitor salary for Undergraduate/Master Students). The idea is that each hour saved in accessing journals can be used in some other activity (for instance, writing papers, working on the PhD or Master theses or preparing classes), thus we can value each hour by the value that it would have in these alternative uses. Adding up the value of the time saved for all the groups we obtained an estimate of the benefits of the Portuguese electronic scientific information consortium, B-on. Using this estimate we calculated the benefit-cost ratio for this resource, obtaining a ratio 1:5.35 based on the estimated benefits of time saved by using the resource.

Table 3: Distribution of the users time saved

User	How much time do you save using B-on (number of hours for month)?							Average time saved (hours/month)
	0 (%)	1 - 3 (%)	4 - 6 (%)	7 - 9 (%)	10 - 12 (%)	13 - 15 (%)	16 or more (%)	
Professor/Researcher	6.7	14.0	20.4	11.6	10.0	5.9	20.8	8.79
PhD Student	7.2	9.4	14.4	11.5	15.1	5.0	24.5	9.85
Undergraduate/Master Student	5.2	14.5	11.1	5.2	2.2	0.6	1.0	4.44
Other	7.5	15.0	15.0	7.9	5.2	2.3	9.6	6.86

Table 4 shows the frequency distribution of the maximum willingness to pay (WTP) to continue access Portuguese electronic scientific information consortium, B-on. The hypothetical scenario considers values ranging from 5 to 50 Euros per each month.

The results on the left side of table show that there is a large percentage of the users declaring that they are not willing to pay anything in order to continue to have access to the B-on services. Harless and Allen (1999) refers that “in contingent valuation studies, it is common to have some participants who, at least initially, refuse to answer or respond that their maximum WTP is zero as a protest response.” We believe that this problem also occurred in our study. To solve this problem we decided to analyse the data in two different manners. In the first approach we considered all the users including those who do not want pay anything for this service. This approach will underestimate the true total willingness to pay as some zeros are just protest answer and thus do not really mean that the user does not give any value to the service. In the second approach we excluded all the users who declared to have a zero WTP and consider the frequency distribution among the positive WTP values. This approach overestimates the total WTP since some zeros might be truthful, i.e., some users might not give any value to the service. By using these two approaches we are able to obtain an interval estimate for the users WTP.

Table 4: Frequency of maximum willingness to pay (WTP) to continue to access Portuguese electronic scientific information consortium B-on. The hypothetical scenario considers that the user needs to pay a monthly tax with values ranging from 5 to 50 Euros.

User	How maximum willingness to pay (WTP) to continue access scientific e-resources (Euros for month)?														
	Including the value zero (%)										Excluding the value zero (%)				
	0	5	10	15	20	30	40	50	5	10	15	20	30	40	50
Professor/Researcher	27.5	24.0	20.0	6.9	10.1	4.6	0.8	6.1	33.1	27.6	9.5	13.9	6.4	1.1	8.4
PhD Student	37.1	24.1	15.5	6.0	10.3	3.4	0.9	2.6	38.4	24.7	9.6	16.4	5.5	1.4	4.1
Undergraduate/Master Student	34.9	32.3	19.3	5.2	7.3	0.5	0.0	0.5	49.6	29.6	8.0	11.2	0.8	0.0	0.8
Other	36.2	28.9	17.2	4.7	7.0	3.2	0.4	2.9	45.2	26.9	7.3	11.0	5.0	0.0	4.6

We estimated the value for benefit-cost, based on the contingent valuation method accepting null values, 1:2.38, as well as for the case do not accepting null values, 1:3.62.

Bibliometric data from Portugal

The electronic scientific information access in the academic libraries services started in 2000. This has led to a revolution in the scholarly communications landscape. Figure 2 shows the number of scientific Portuguese documents published for the subjects Life and Health Science, Engineering, Humanities and Social Sciences, Earth and Planetary Sciences, Physics and Chemistry Sciences and Mathematics and Computer Science from 1996 to 2007.

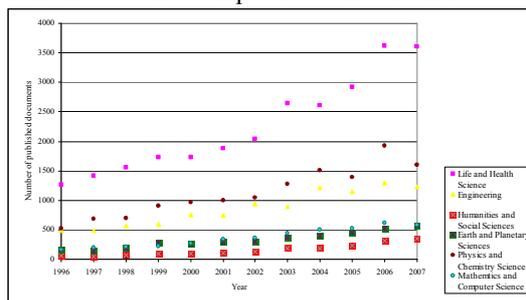


Figure 2: Number of scientific documents published for the following subjects Life and Health Science, Engineering, Humanities and Social Sciences, Earth and Planetary Sciences, Physics and Chemistry Sciences and Mathematics and Computer Science from 1996 to 2007 (SCImago, 2007).

Figure 2 shows a clear increase in the number of articles published since 2001. If we compare the number of articles published in the period 2005-2007 (the last three years) with the number of articles published in the period 1998-2000 (last three years before the introduction of the B-on) we conclude that the number of articles more than duplicates (growth rate is 105.6%). The increase is visible in all scientific domains with growth rates varying from 92.6% in Engineering to 255.9% in Humanities and Social Sciences.

This data supports the statement of the Research Information Network (2009) “Publishers began to provide full-text articles in scholarly journals about ten year ago. This has led to a revolution in the scholarly landscape.”

5. Conclusions

F. W. Lancaster (1993) has underlined that is “exceptionally difficult, if not completely impossible, to express the benefits of library service in monetary terms”. Nevertheless Hider (2008) refers that in the last decade:

Has identified some recent “waves” of libraries evaluation where the aim has been to quantify the benefit derived by the end user (...) Moreover, these studies tended to overlook other ways in which organizations benefited from

information services, such as by increasing work effectiveness.

Regarding this idea in our article we present some preliminary conclusions of an ongoing project about the valuation of the electronic resources services in Portuguese academic libraries. The results of the study reveal that information-seeking behaviour and the use of the electronic scientific information of the Portuguese academic community have changed. Nowadays a large percentage of professors, researchers and PhD students use traditional and digital library services simultaneous. On the other hand, Undergraduate/Master students do not use both types of services so much, about 40.4%. In this group of users about 60.6% do not know the Portuguese scientific information consortium B-on. This is partially expected since in the first years of graduation the scientific information's needs are less. However this result also suggests that it is necessary to promote and inform potential users about the existence of this resource.

Readers use electronic scientific information from the academic libraries well into the night and over the weekend.

We find evidence that the primary means of gaining access to the knowledge in academic community is now through paid full text e-journal. We agree with the conclusion of the Research Information Network (2009) "electronic journals are a huge success (...) across all subjects". Open Access information evidences to be an excellent e-resource for academic users.

Aabø (2009) refers that:

As recipients of high proportion of the public funds for cultural activities, public libraries meet demands for more accountability. Academic libraries, too, meet similar types of demands, being asked for performance measurement, cost justifications, and return on investment from administration of their university or college.

This paper tried to answer these demands. We estimated benefit-cost, for the Portuguese electronic scientific information consortium B-on, using the estimated value of the time saved to measure the benefits, obtaining a ratio of 1:5.35. We also calculated benefit-cost, based on the contingent valuation method including nil values, 1:2.38, as well as not including nil values, 1:3.62. Considering these results, we conclude that the Portuguese scientific electronic information services from universities are overall well worth their price as viewed from the academic population's perspective.

References

- Aabø S. (2009). Library valuation studies and return of investment. Paper presented at the *17th BOBCATSSS Symposium: Challenges for the New Information Professional: University of Porto – Faculty of Engineering, Porto, Portugal*.
- Chung, H.-K. (2007). Measuring the economic value of special libraries, *The Bottom Line: Managing Library Finances*, Vol. 20, No. 1, 30-44.
- Davies, E. (2008). What does success look like? Evidence-based assessment of the academic library. Proceedings of *17th Conference of Greek Academic Libraries: Academic library evaluation as a measure of Institutional Quality Assessment*. University of Ioannina, Ioannina, Greece. Retrieved December 10, 2008. Available at: <http://17conf.lib.uoi.gr/files/a3.Davies.pdf>.
- FCCN - Fundação para a Computação Científica Nacional (2008). *B-on: Boletim Estatístico 2007*, Retrieved October 5, 2008. Available at: http://www.b-on.pt/dmdocuments/Boletim_estatistico_2007.pdf.
- GPEARI- Gabinete de Planeamento, Estratégia, Avaliação e Relações Internacionais (2008). *Estatísticas Nacionais: Ensino Superior*, Retrieved 6, 2008. Available at: <http://www.estatisticas.gpeari.mctes.pt/?action=5&idt=58>
- Harless, D. W. and Allen, F. R. (1999). Using the Contingent Valuation Method to

- Measure Patron Benefits of Reference Desk Service in an Academic Library, *College & Research Libraries*, Vol.60, No. 1, 56-69.
- Hider, P. (2008) Using the contingent valuation method for dollar valuations of library services, *Library Quarterly*, Vol.78, No.4, 137-158.
- ISO 11620 (1998). *Information and documentation – library performance indicators*. International Organisation for Standardisation (ISO), Geneva.
- ISO 11620 (2003). *Information and documentation – library performance indicators: amendment1: additional performance des bibliothèques*. International Organisation for Standardisation (ISO), Geneva.
- ISO 2789 (2006). *Information and documentation – international library statistics*. International Organisation for Standardisation (ISO), Geneva.
- Lancaster, F. W. (1993) *If You Want to Evaluate Your Library*. 2nd ed. University of Illinois Press, Champaign.
- Luther, J. (2008). University investment in library: What's the return? : A case study at University of Illinois at Urbana-Champaign, *Library Connect*, Elsevier, San Diego. Retrieved January 6, 2008. Available at: <http://libraryconnect.elsevier.com/whitepapers/lcwp0101.pdf>.
- Maroco, J. (2007). *Análise estatística: com utilização do SPSS*. Sílabo, Lisboa.
- Mazzanti, M. (2002). Valuing Cultural Heritage Services by Choice Modeling Experiments: Visitor Study at the Galleria Borghese in Rome. Paper presented at the 12th Biennial ACEI Conference, Rotterdam, The Netherlands.
- Noonan, D. S. (2003). Contingent Valuation and Cultural Resources: A Meta-analytic Review of Literature, *Journal of Cultural Economics*, 27, 159-176.
- SCImago. (2007). *SJR — SCImago Journal & Country Rank*. Retrieved April 03, 2009. Available at: <http://www.scimagojr.com>
- Research Information Network (2009). *E-journals: their use, value and impact: a research information network report*. Retrieved April 01, 2009. Available at: http://www.rin.ac.uk/files/E-journals_use_value_impact_April2009.pdf

