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Measuring User Satisfaction of Integrated Library Systems in Public University Libraries of Bangladesh

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Abstract
The study measured the user satisfaction of integrated library systems developed by Koha in the public university libraries of Bangladesh. The survey was carried out among one hundred eighty-five users from seven public university libraries by using a structured questionnaire adapted carefully as per local arrangements after conducting a pilot survey. Individual university and category of university calculated the users' responses for satisfaction through ANOVA. Bartlett's test of sphericity and Cronbach's alpha assessed the reliability of each multiple-item scale. Moreover, KMO value, item loading, and communalities measured the validity. The overall satisfaction (3.31) ensured favorable appreciation by the users, and their satisfaction level was reasonably well. There is a significant difference (P < .018) among the satisfaction levels of users towards ILS in agricultural (3.31), engineering (3.25), science (3.75), and general (3.19) public university libraries of Bangladesh. An attempt has been made to measure the user satisfaction of Koha in the public university libraries of Bangladesh that will prompt further research on different aspects of ILS.

Keywords Koha, Integrated Library System, Open Source Software, OSILS, User Satisfaction, Public University Libraries, Bangladesh

1. Introduction

Academic libraries exist to meet up the resources needs of their users by providing the right information to the right person at the right time. For providing high-quality personalized services to its users, Information and Communication Technologies (ICTs) are used in libraries which may be categorized into three broad groups: information storage and dissemination, Integrated Library Systems (ILS), and office management tasks (Islam, 2007). For the automation of library systems, open-source, freeware, and proprietary ILSs are used in the Bangladeshi university libraries (Alam & Mezbah-ul-Islam, 2019b). There are no basic differences between the features and functions of open source, freeware, and proprietary ILSs, but the significant difference is visible in the development process and distribution (Kumar & Abraham, 2009).

An Integrated Library System (ILS) is also known as "Library Management System" (LMS) that is an "Enterprise Resource Planning" (ERP) system for a library (Alam, 2017). An ILS refers to having "all library functions under one system". The acquisition, serials control, cataloging, OPAC, circulation, patron management modules might be included in an ideal ILS (Khatun, 2015; Ahammad, 2014). An ILS has two "Graphical User Interfaces" (GUIs), i.e., one for staff another for patrons. It usually includes two relational databases, which are the bibliographic database and the patron database. All databases, functional modules, and user interfaces are integrated with each other by a unified interface (Alam, 2018). Koha is the first, mature, sustainable, and most used Open Source Integrated Library System (OSILS) around the world (Muller, 2011). An OSILS is free application software for library automation in which source code is available under GNU General Public License (GPL). The copyright holder of OSILS provides the right to "study, change, and distribute the software to anyone for any purpose". The use of Koha OSILS in libraries is gaining momentum over the world, including Bangladesh (Kumar & Jasimudeen, 2012).

User satisfaction is the most important for assessing the effectiveness of any system or service (Mezbah-ul-Islam, 2003). There are two viewpoints regarding the evaluation of user satisfaction. One is the indirect method or objective where user satisfaction is studied without taking users opinions as valid indicators, and another is the subjective or user-oriented approach that refers to the measures based on user opinions or attitudes related to the quality of a system (Mezbah-ul-Islam, 2003; Stecher, 1975). Based on the available literature, it can be concluded that very few efforts have been made to assess the user satisfaction of integrated library systems developed by Koha in the public university libraries of Bangladesh. So, it is expected to assess the user satisfaction for evaluating the effectiveness of the Koha in the public university libraries of Bangladesh.

2. Literature review

In Bangladesh, firstly, the ICDDR,B library used the UNESCO-supported software CDS/ISIS in the 1980s (Shuva, 2012). In 1998, Dhaka University Library installed the GLAS software (Rahman, 2010). BRAC University Library installed Koha OSILS in 2010 (Afroz, 2014). At present, seven public university libraries, thirteen private university libraries, three institutional libraries, and two college libraries are using Koha in Bangladesh (Alam, 2018; Koha-community, 2018). As per the official website of SLiMSBD (2018), three institutional libraries and one college library are using SliMS. However, no university libraries in Bangladesh are using SLiMS yet.

Koha, Evergreen, NewGenLib, PMB, and SLiMS are popular OSILS over the world. Among them, Koha is considered the most mature and sustainable OSILS (Muller, 2011). Besides, Koha is the first and full-featured OSILS, mostly used worldwide by the public, academic and special libraries. Koha is a web-based ILS with a SQL database backend with cataloging data stored in MARC and accessible via Z39.50 or SRU. The programming language is Perl and Linux is the preferred

operating system. The source code and documentation are available online under the GNU General Public License. The user interface is very configurable and adaptable and has been translated into many languages. Koha has most of the features that would be expected in an ILS, including acquisition, cataloging, circulation, serials control, union catalog, CMS, OPAC, budget, reporting, inter-library loans, patron management, auto email notification, renewal facility, overdue-fine control and various web 2.0 facilities. The supporting communities of Koha do not charge for the software but do charge for consulting, programming, migration, training, technical support, and the hosting services they provided (DeCandido & Boss, 2008; Kiriyanant, 2012; Koha-community, 2018; Muller, 2011; Sunil & Harinarayana, 2013).

Moreover, based on the available literature in Bangladesh, an insufficient number of studies has been carried out on factors for the adoption of OSILS (Alam & Mezbah-ul-Islam, 2019b), assessing user satisfaction of koha in private university libraries (Alam & Mezbah-ul-Islam, 2020a), sustainability of OSLIS in university libraries (Alam & Mezbah-ul-Islam, 2020b), the effectiveness of OSILS in university libraries (Alam & Mezbah-ul-Islam, 2019a), describing the practical experience of koha implementation (Ahammad, 2014), challenges and remedies for the adoption of OSILS (Alam, 2017), providing a customized version of Koha (Morshed, 2008), the usability of Koha interface (Khatun & Ahmed, 2018), and current trends of library automation (Haque, 2014). However, very few importances have been made to assess the user satisfaction of Koha ILS in Bangladesh. Many authors have agreed that measuring user satisfaction is the most useful and easy to evaluate information system success. Thus, it can be concluded that an effort has been made for the first time to study on assessing the user satisfaction of ILS in the university libraries of Bangladesh, and that will contribute to filling the research gaps regarding ILS in Bangladesh.

3. Research objectives

At present, there are forty-nine public, one hundred seven private, and two international universities in Bangladesh (UGC, 2021). Among them, seven public and thirteen private university libraries developed their integrated library systems through Koha (Koha-community, 2018). However, no university libraries in Bangladesh are using any other OSILS yet except Koha. The study selected seven public universities whose libraries are using Koha. Here, a question is raised that is the library users satisfied or not with the Koha in the public university libraries of Bangladesh? Besides, very few efforts have been made to study on assessing the effectiveness of the Koha in the public university libraries of Bangladesh from the user point of view. Based on the raised question, research gaps, and social impact, the study has made two specific objectives:

i. To measure the user satisfaction of integrated library systems in the public university libraries of Bangladesh.

ii. To identify the individual differences in user satisfaction of the integrated library systems by university categories.

4. Research hypotheses

The selected universities can be categorized into four types which are agricultural, engineering, science, and general. A question is raised here that is there any significant differences among the satisfaction levels of library users in different public university libraries as well as the category of public university libraries? Based on the objective and raised question, the study has formulated the following two hypotheses:

H-1: The satisfaction levels of library users towards integrated library systems in the agricultural, engineering, science, and general public university libraries of Bangladesh differ significantly.

H-2: The satisfaction levels of library users towards integrated library systems among the selected public university libraries of Bangladesh differ significantly.

5. Methodology

5.1 Research design

The questionnaire was designed for collecting primary data from library users to assess the user satisfaction with the existing integrated library systems in the public university libraries of Bangladesh developed by Koha. The variables regarding fifteen statements on user satisfaction were taken from the available related literature. Then the variables were adapted as per local arrangement consulting with professional experts. A questionnaire-based sample survey was done through a structured questionnaire to attain the research objectives and test the hypothesis after conducting a pilot survey. Descriptive statistics measured the overall user satisfaction. Besides, individual universities and category of universities computed the users' responses for satisfaction through ANOVA. The Cronbach's Alpha and Bartlett's test assessed the reliability, and item loading, commonalities, and KMO value measured the validity of this study.

5.2 Data collection instrument

The questionnaire included demographic information on library users and fifteen statements for measuring users' satisfaction levels. A 5-point Likert scale was administered containing 5 = Highly Satisfied, 4 = Very Satisfied, 3 = Satisfied, 2 = Less Satisfied, and 1 = Not Satisfied for assessing the satisfaction level of library users towards Koha.

5.3 Population and sample

The population of this study included students from the seven selected universities. Probability sampling is possible where all the units of the total populations are known, and each of them has an equal chance to be selected (Saunders, Lewis, & Thornhill, 2016). Probability sampling is almost unfeasible here, being the large population size from the seven private universities for conducting the survey. Purposive sampling is a non-probability sampling technique (Black, 2010; Saunders et al., 2016). The study considered the purposive sampling technique for collecting data from the users of the existing ILSs, and to make this study more convenient.

5.4 Data collection procedure

The conceptual and textual information related to the present study were gathered from both primary and secondary sources

of information. The researcher visited all the selected libraries and distributed the questionnaire among the students inside the library of each selected university. A total of two hundred twenty-four (83.9%) questionnaires were returned out of two hundred sixty-seven and found that one hundred eighty-five (69.3%) questionnaires were completely filled up by the library users. So, one hundred eighty-five questionnaires were considered for data analysis.

5.6 Statistical methods

The study used the SPSS 22 to calculate the descriptive statistics for overall user satisfaction on koha, ANOVA for Hypothesis test, Cronbach's Alpha and Bartlett's test of sphericity for testing reliability, and Item loading, commonalities KMO value for testing the validity of this study.

5.7 Reliability

Nunnally recommended (1978) that the values of Cronbach's Alpha should be 0.7 or higher. Cronbach's Alpha assessed the reliability of each multiple-item scale and found that the internal consistency of all items has alpha value = 0.884 and fifteen statements of user satisfaction has alpha value = 0.924 indicated that there is the good reliability of overall questionnaire items. Schierholz & Laukkanen (2007) recommended that sphericity values should be less than 0.05. Bartlett's test of sphericity (Schierholz & Laukkanen, 2007) has also been applied and found that the test has p-value = 0.001 for 15 statements of user satisfaction indicated that the internal consistency among the extracted variables is appropriate.

5.8 Validity

All commonalities of a perfectly sufficient sample above 0.5 are acceptable (Nadiri, 1970). The commonalities of the extracted from variables were shown to be between 0.512 and 0.778 for 13 statements of user satisfaction out of 15 indicated that the variance of most of the variables is within the acceptable range. The items loading of the extracted from variables were shown to be between 0.583 and 0.748 for 15 statements of user satisfaction indicated that all of the variables successfully represent the satisfaction scale. The significant level of Kaiser-Meyer-Olkin (KMO) value is 0.7 or above. The overall matrix of the KMO value is 0.912 for 15 statements that mean the sample size (185) is statistically significant for exploratory factor analysis, and there is no problem relating to the normal data.

6. Data analysis

6.1 Demographic information of the respondents

Among a total of 185 respondents, the most significant number of the respondents were from Dhaka University (43, 23.2 percent), followed by Sher-e-Bangla Agricultural University (35, 18.9 percent), Bangladesh University of Engineering & Technology (30, 16.2 percent), Khulna University of Engineering & Technology (23, 12.4 percent), Shahjalal University of Science & Technology (22, 11.9 percent), Rajshahi University (16, 8.6 percent), and Chittagong Veterinary & Animal Sciences University (16, 8.6 percent). Based on the university category, the highest number of the respondents were from general university (59, 31.9 percent), followed by engineering university (53, 28.6 percent), agricultural university (51, 27.6 percent),

and science university (22, 11.9 percent). Among the respondents, 111 (60 percent) were male, and 85 (40 percent) were female. The greater proportion of the respondents were honors students (123, 66.5 percent), followed by Masters students (45, 24.3 percent) and MPhil/PhD students (32, 6.2 percent). The demographic information of the respondents indicated that a broad cross-section of the population responded.

Table 1: Demographic information of library users

Variable	Classification	Frequency	Valid Percent
University	DU	43	23.2
	SAU	35	18.9
	BUET	30	16.2
	KUET	23	12.4
	SUST	22	11.9
	RU	16	8.6
	CVASU	16	8.6
University Category	General	59	31.9
	Engineering	53	28.6
	Agriculture	51	27.6
	Science	22	11.9
Gender	Male	111	60.0
	Female	74	40.0
User Category	Honors Student	123	66.5
	Masters Student	45	24.3
	MPhil/PhD Student	17	9.2

6.7 Overall perceived services by library users regarding ILS

Table 2 illustrates that the overall mean of user satisfaction level was 3.31 on a five-point scale. Among the fifteen statements of the user satisfaction, "advanced search of your library catalog saves time" occupied the highest satisfaction mean of 3.49, followed by "book check-out system of the library is user-friendly" scored 3.40, "twenty-four hours access facility to the library catalog is available" scored 3.40, "book check-in system of the library is excellent" scored 3.38, "the OPAC of the library is easy to understand and navigate" scored 3.36, "user login facility to the user interface of Koha is attractive" scored 3.32, "reservation of book through your library catalog saves time" scored 3.31, "the automation software (Koha) works timely" scored 3.31, "users can check her/his library usages statistics through user interface easily" scored 3.31, "OPAC & user interface can be accessed from Smartphone" scored 3.30, "self-renewal service of your library is easy to use" scored 3.28, "user interface of your library catalog is impressive" scored 3.26, "receipt printing service for issue and return of books is exciting" scored 3.25, and "it is easy to make purchase suggestion through user interface" scored 3.14. On the other hand, the service statement "auto email alert service of your library is interesting" formed the lowest satisfaction mean of 3.09. All the statements of user satisfaction achieved both ends of respondents' opinion level as minimum 1 and maximum 5 indicated that all the users were not similarly satisfied with the services of existing ILS.

Table 2: Descriptive statistics of perceived services

ID	Statement	Mean	SD	Item loading	Communalities
1.	Advanced search of your library catalog saves time	3.49	.98	.644	.495
2.	Book check-out (issue) system of the library is user-friendly	3.40	.95	.658	.778
3.	24 hours access facility to the library catalog is available	3.40	1.11	.585	.527

4.	Book check-in (return) system of the library is excellent	3.38	.97	.667	.734
5.	Online Public Access Catalog (OPAC) of the library is easy to understand and navigate	3.36	.95	.707	.511
6.	User login facility of the user interface is attractive	3.32	1.02	.719	.517
7.	Reservation of book through your library catalog saves time	3.31	1.07	.716	.517
8.	The automation software (Koha) works timely	3.31	1.01	.747	.600
9.	Users can check her/his library usages statistics through user interface easily	3.31	1.05	.720	.528
10.	Online catalog & user interface can be accessed from Smartphone	3.30	1.15	.749	.605
11.	Self-renewal service of your library is easy to use	3.28	1.07	.693	.580
12.	The user interface of your library catalog is impressive	3.26	.96	.728	.537
13.	Receipt printing service for issue and return of books is exciting	3.25	1.01	.737	.577
14.	It is easy to make purchase suggestion through the user interface	3.14	1.13	.707	.521
15.	Auto email alert service of your library is interesting	3.09	1.20	.693	.482
	Overall	3.31	.73	1.000	1.000

6.9 Individual difference in satisfaction by university category

The category of university computed the library users' responses for satisfaction level towards the existing ILSs through ANOVA test. This study showed that the overall satisfaction level of ILSs in the university libraries of Bangladesh was a significant difference (P<.018) among the users of agricultural, engineering, science, and general public university libraries of Bangladesh. The results indicated that the library users of the science public university libraries (3.75) were significantly most satisfied, followed by agricultural (3.31), engineering (3.25), and general (3.19) public university libraries of Bangladesh with the services provided by the Koha. Besides, it is found that among the users of agricultural, engineering, science, and general public university libraries had a significant difference in six satisfaction statements out of 15, which were online public access catalog (P<.042), book check-out system (P<.004), book check-in system (P<.021), making purchase suggestion through the user interface (P<.026), the automation software (Koha) works timely (P<.021), and "OPAC & user interface can be accessed from Smartphone (p<.010). But the satisfaction levels of the user interface of Koha (P>.084), self-renewal service (P>.296), auto email notification (P>.070), online book reservation system (P>.153), user login facility to user interface (P>.062), twenty-four hours access facility to the OPAC (P>.075), receipt printing service for confirmation of circulation service (P>.067), user login facility to Koha (P>.552), users can check her/his library usages statistics through the user interface (P>.835) were not significant

difference among the users of agricultural, engineering, science, and general public university libraries of Bangladesh.

6.10 Individual difference in satisfaction by different universities

Individual universities computed the library users' responses for satisfaction towards ILSs through ANOVA test. This study showed that the overall satisfaction level of existing ILSs in different public university libraries of Bangladesh was significantly different (P<.001). The results indicated that the library users of the KUET (3.77) were significantly most satisfied, followed by SUST (3.75), SAU (3.33), CVASU (3.26), DU (3.23), RU (3.08), and BUET (2.86) with the services provided by the existing ILSs. Besides, it is found that among the users of the selected public university libraries had a significant difference in eleven satisfaction statements out of fifteen, which were User interface (P<.001), Book check-out (issue) system (P<.001), Book check-in (return) system (P<.001), Self-renewal service (P < .001), Online book reservation system (P<.001), making purchase suggestion through the user interface (P < .011), login facility to user interface (P < .002), twenty-four hours access facility to OPAC (P<.010), The automation software (Koha) works timely (P<.025), "OPAC & user interface can be accessed from Smartphone (P<.001), and receipt printing for confirmation of circulation service (P<.001). But the satisfaction levels of OPAC (P<.057), auto email notification (P<.060), the advanced search of OPAC (P<.230), and usages statistics facility through the user interface (P<.098) were not significantly different among the users of different public university libraries of Bangladesh.

7. Discussion

User satisfaction is the most important for assessing the effectiveness of any system or service. This study was conducted among 185 library users of seven public university libraries of Bangladesh to assess the effectiveness of the Koha ILS. The demographic information of the sample indicated that a broad cross-section of the population responded. The study assessed the overall and individual differences in satisfaction level of users towards ILS through descriptive statistics and ANOVA. The Cronbach's Alpha indicated that there is a good reliability of overall questionnaire items. Bartlett's Test recommended that the internal consistency of the data is appropriate. The overall matrix of the KMO value is 0.927 for 15 statements of user satisfaction on ILS that means the sample size (185) is statistically significant for exploratory factor analysis, and there is no problem relating to the normal data. The commonalities of the extracted from variables were shown to be between 0.512 and 0.778 for 13 statements of user satisfaction out of 15 indicated that the variance of most of the variables is within the acceptable range. The items loading of the extracted from variables were shown to be between 0.583 and 0.748 for 15 statements of users' satisfaction recommended that all the variables successfully represent the user satisfaction scale.

The findings of the study show that the advanced search facility of OPAC, Book check-out system and twenty-four hours access facility to OPAC attained the

exclusive recognition of the users whereas online purchase suggestion, auto email notification, and receipt printing service formed the least perceived mean of fulfilling the need. The library users were satisfied with the services of existing ILS, and the level of satisfaction was reasonably well. However, forty-two percent of respondents did not use the services of ILS, even about seven percent of users were not aware of the services of existing ILS. All the statements of user satisfaction achieved both ends of respondents' opinion level as minimum one, and maximum five indicated that all the users were not similarly satisfied with the services of existing ILS.

Hypothesis-1: The satisfaction levels of library users towards integrated library systems in the agricultural, engineering, science, and general public university libraries of Bangladesh differ significantly. A hypothesis was formulated earlier to assess is there any significant difference in satisfaction levels of library users towards ILS among the agricultural, engineering, science, and general public university libraries of Bangladesh. For this purpose, an ANOVA test has been done with overall and fifteen variables regarding user satisfaction of the ILS. The findings of the study show that there is a significant difference (P<.018) among the satisfaction levels of users towards ILS in agricultural, engineering, science, and general public university libraries of Bangladesh indicated that the library users of the science public university libraries (3.75) were significantly most satisfied, followed by agricultural (3.31), engineering (3.25), and general (3.19) public university libraries of Bangladesh with the services provided by the Koha. Besides, it is found that among the users of agricultural, engineering, science, and general public university libraries had a significant difference in six satisfaction statements out of fifteen which were OPAC, book check-out system, book check-in system, making purchase suggestion through the user interface, Koha automation software works timely, and OPAC & user interface can be accessed from Smartphone.

Hypothesis-2: The satisfaction levels of library users towards integrated library systems among the selected public university libraries of Bangladesh differ significantly. Another hypothesis was formulated earlier to evaluate is there any significant difference in satisfaction levels of library users towards ILS among the different public university libraries of Bangladesh. For this purpose, an ANOVA test has been done with overall and fifteen variables regarding user satisfaction of the ILS. The findings of the study show that there is a significant difference (P<.001) among the satisfaction levels of users towards ILS in different public university libraries of Bangladesh indicated that the library users of the KUET (3.77) were significantly most satisfied, followed by SUST (3.75), SAU (3.33), CVASU (3.26), DU (3.23), RU (3.08), and BUET (2.86) with the services provided by the existing ILSs. Besides, it is found that among the users of different public university libraries had a significant difference in eleven satisfaction statements out of fifteen, which were user interface (P<.001), book check-out system, book check-in system, self-renewal service, online book reservation system, making purchase suggestion through the user

interface, login facility to the user interface, twenty-four hours access facility to OPAC, Koha software works timely, OPAC & user interface can be accessed from Smartphone, and receipt printing service for confirmation of circulation service.

8. Conclusion and Recommendation

The study assessed the user satisfaction of existing ILS in the public university libraries of Bangladesh from the students' viewpoint. The findings of the study showed that the advanced search facility of OPAC, book check-out system, and twenty-four hours access facility to OPAC attained the exclusive recognition of the users whereas online purchase suggestion, auto email notification, and receipt printing service formed the least perceived mean of fulfilling the need. The library users were satisfied with the services of their existing ILS, and their level of satisfaction was reasonably well. So, the existing integrated library systems developed by Koha are efficiently performing in the public university libraries of Bangladesh. But, forty-two percent of respondents did not use the services; even a small portion of the respondents was not aware of the services of Koha ILS. The library users of the science public university libraries were significantly most satisfied, followed by agricultural, engineering, and general public university libraries of Bangladesh with the services provided by the Koha. It is also found that the library users of KUET were significantly most satisfied, whereas the library users of BUET were least satisfied with the services provided by the existing ILSs.

The findings have several significant implications for both practice and future research on the ILS. It will help to build consciousness among library professionals and users regarding their ILS. Moreover, an effort has been made to assess the satisfaction of ILS in the university libraries of Bangladesh for the first time that will trigger further study on the continuous evaluation of the effectiveness of the existing ILS. As forty-two percent of the respondents did not use the ILS services, even a small proportion of the respondents were not aware of the services; an initiative should be taken by the concerned authority to orient the existing services and facilities of their ILS to the users.

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