A Case Study of Acceptance and Use of Electronic Library Services in Universities Based on SO-UTAUT Model

Abinew Ali Ayele[1], Dr. Vuda Sreenivasarao[2]

Deputy Director, School of Computing & Electrical Engineering, IOT, Bahir Dar University, Ethiopia[1]

Professor, School of Computing & Electrical Engineering, IOT, Bahir Dar University, Ethiopia, India[2]

Abstract: This study was mainly conducted to empirically investigate the determinants of e-library end users acceptance and use in academic libraries. The introduction of new information and communication technologies in libraries during the last two decades has altogether changed the concepts of libraries where library patrons need not necessarily go to the library physically since the library services and resources are no longer confined to the walls of the physical library. However, for these e-library services to be utilized effectively and efficiently, library end users must accept and use them. The study had applied the SO-UTAUT (Services Oriented Unified Theory of Acceptance and Use of Technology) technology acceptance model which is appropriate in a library context. In this paper, we assess the acceptance and use of e-library services in academic libraries of the different universities and identify the determinant factors that affect the acceptance and use of e-library services in academic libraries.

Keywords: e-library, e-journals, ICT, Technology Acceptance, End-Users, UTAUT, SOUTAUT, and PLS.

I.INTRODUCTION

The introduction of computers and other telecommunication technologies in libraries during the last quarter of the century has changed the concept of a library and the library profession. Information seekers are no longer confined to the walls of the library, (Kwak, *et al.* 2002; Bevis, 2003; Rosenberg, 2005; Vinitha, 2006). As ascertained by Kwak, *et al.* (2002), majority of university libraries in the U.S. are now hybrid libraries, depending on both electronic and print media based on network and physical facilities. Many university libraries including some in DCs
is part of campus-wide networks, with Internet access (Alan, 1996; Kiondo, 1997; Martey, 2004; Rosenberg, 2005). Using networked technologies, patrons can get the information required electronically from wherever it is located on the web. The main role of a librarian is now to assist end-users in searching techniques and the use of technologies. Unlike in the traditional library where users require the ability to read, a skill acquired during all the schooling years, in an e-library services environment,users require to adopt ICT and have basic information searching skills. Technology has penetrated all areas of life and the use of information and communication technology (ICT) is commonplace in the 21st century. Libraries use ICT for better service and satisfying diverse user needs. Libraries have transformed into digital and virtual libraries where books, journals, and magazines have changed into e-books, e-journals, and e-magazines. This has increased the global dissemination of information. Electronic resources such as e-journals are easily accessible in remote areas. Electronic resources solve storage problems and control the flood of information. Print sources are being digitized. The rapid growth of new technologies has changed the communication process and reduced the cost of communication for individuals. Electronic information sources can be seen as the most recent development in information technology. Electronic information sources are becoming more and more important for the academic community.
University academics are a unique population and rely on recent and timely Information and electronic resources are now used more often than print resources by them (Morse and Clintworth, 2000). Since there has been no study conducted so far to measure the use of these e-resources by University Academic Faculty Members, thus the study aimed to examine the extent to which of using the (OEJ) systems are in place to assure quality higher education production as perceived by the faculty, through the following three questions:

1. To what Extent University Academic members are using On-line Electronic Journals?

2. Is there any statistical differences (at α = 0.05) in the usage of On-line Electronic Journals by University Academic members regarding years of experience?

3. Is there any statistical differences (at α = 0.05) in the usage of On-line Electronic Journals by University Academic members regarding academic qualification?

II.LITERATURE REVIEW

Borrego, et al. (2007) observes that there have been many studies of users of electronic resources in the professional literature in the last few years. In a recent exhaustive review of the literature on the subject, Tenopir (2003) analyzed the results of over 200 studies of the use of electronic resources in libraries published between 1995 and 2003. The main conclusion of this review is that electronic resources have been rapidly adopted in academic spheres, though the behavior varies according to the discipline. Smith (2003) in his article "*Changes in faculty reading behaviors: The impact of Electronic journals on the University of Georgia* " aimed to explore the role of electronic journals in the weekly scholarly reading habits of faculty. The study showed that electronic access to journals particularly library funded access is integral to research activities, with the vast majority of respondents reported that they read at least one article from an electronic source weekly Heterick (2002) reports that more than 60% of faculty studied are comfortable using electronic resources. They believe that a variety of electronic resources is important to their research, and they consider electronic databases to be invaluable. In addition, 62% expect that they will become increasingly dependent on electronic resources in the future. The resources they use most often are online catalogs, full-text electronic journal databases, and abstracting and indexing databases. More than 70% of all respondents consider their library's online catalogue to be "very important" to their research. However, the importance of this resource varies significantly by field. Just over 60% of the economists consider their library's online catalogue to

be "very important", while nearly 90% of humanists regarded it as such. In fact, the home library catalogue is the most important electronic resource for humanists, by a large margin. Based on their replies, it is as important to their research as personal computers. Sandra L. De Groote, M.L.I.S. and Josephine L. Dorsch, M.A.L.S.(2001)examined research Online journals: impact on print journal usage. The research tried to determine the impact of online journals on the use of print journals and interlibrary loan (ILL). Results of the statistical analysis showed print journal usage decreased significantly since the introduction of online journals $(F(1,147) = 12.10, P < 0.001)$. This decrease occurred regardless of whether a journal was available only in print or both online and in print. Interlibrary loan requests have also significantly decreased since the introduction of online journals $(F(2,30) = 4.46, P < 0.02)$.

Blecic(1999) established a correlation between in-house use, circulation, and citation by faculty, which suggests that the gathering of many types of data is impractical and that one method may be used with the confidence that it correlates with other types of uses Electronic information resources are increasingly in use for cores at all levels of higher education (Macdonald 2001).

III. ON-LINE ELECTRONIC JOURNALS

Academics use On-line Electronic Journals for diverse purposes as demonstrated in the literature. Obaje and Camble (2008) report that On-line Electronic Journals are mostly used for literature searches during project/dissertation and thesis writing as well as personal research by staff. Academics at Obafemi Awolowo University, Ile-Ife, use On-line Electronic Journals mostly for literature search in research and professional growth (Omotatyo, 2010). Kumar and Kumar (2008), however, highlighted six reasons for using On-line Electronic Journals. Users in the study use On-line Electronic Journals in support of their study (70%) and teaching (59%). One third of respondents used the sources for project work. (88%) medical science users accessed OEJ sources for study, followed by engineering (67%) and management studies (55%). In Catalan Universities, electronic journals were consulted for both research and teaching by 53.6% of the respondents to a survey. They were consulted only for research by 37.4% and only for teaching by 2.7%. Respondents in Exact and Natural Sciences and Engineering mainly use journals for research, whereas those in Biomedicine use them for both teaching and research. When the results are disaggregated by age, respondents under the age 30 mainly use them for research, respondents in the 41-50 age group use them for both teaching and research, and respondents over 51 use them for teaching and research or only for teaching. Disaggregated by academic position, only the associate professors showed a high proportion of use for teaching (35.9%) (Borrego et. al. 2007).

IV. TECHNOLOGY ACCEPTANCE MODEL (TAM)

The Technology Acceptance Model (TAM) displays how users accept and use new technology. The model describes the factors that influence users' decisions about how and when they will use new technology, notably. Perceived usefulness (PU) - This was defined by Fred Davis as "the degree to which a person believes that using a particular system would

enhance his or her job performance". Perceived ease-of-use (PEOU) - Davis defined this as "the degree to which a person believes that using a particular system would be free from effort" (Davis 1989).The TAM

has been continuously studied and expanded. The two major upgrades are the TAM 2 (Venkatesh & Davis 2000 & Venkatesh 2000) and the Unified Theory of Acceptance and Use of Technology (or UTAUT, Venkatesh et al. 2003).Several researchers have replicated Davis's study to provide evidence on the relationships between usefulness, ease of use, and system use (Adams, Nelson & Todd 1992; Davis 1989; Hendrickson, Massey & Cronan 1993;

Segars & Grover 1993; Subramanian 1994; Szajna 1994). Attention has focused on testing the questionnaire used by Davis. Adams et al. (1992) replicated the work of Davis to demonstrate the validity and reliability of the instrument and measurement scales. Hendrickson, et al. (1993) found high reliability and good test-retest reliability. Szajna (1994) found the instrument valid.
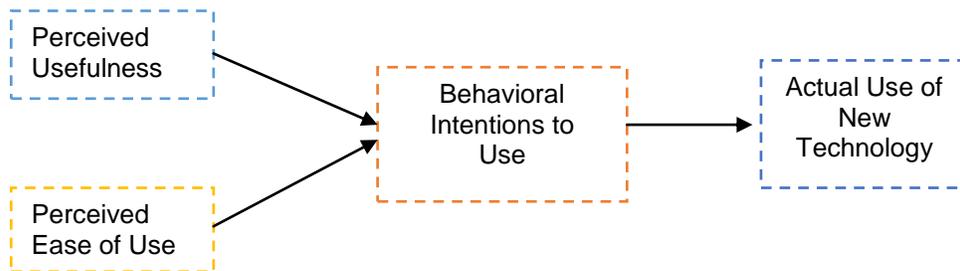

Figure 1: Technology Acceptance Model (TAM). Source: Davis et al. (1989)

V. THE UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT)

A study of the determinants found in major acceptance and use models by Vanketesh, et al. (2003) reviews the subject literature systematically and compares eight previous models and the predictive factors specified by each. By so doing, the authors developed a new model the "Unified Theory of Acceptance and Use of Technology model" in Figure 2.
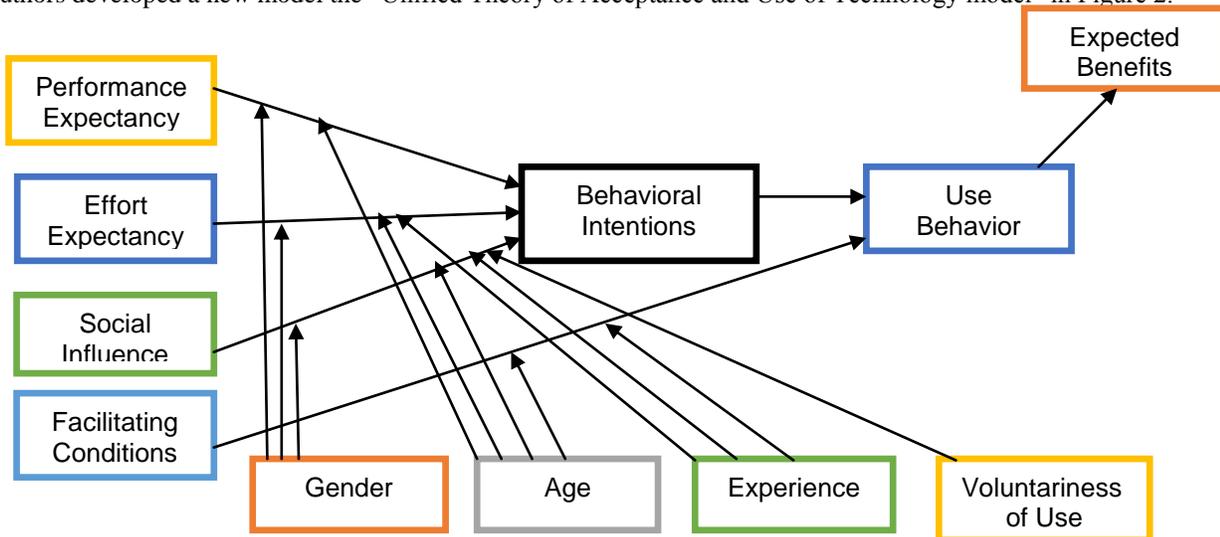

Figure 2. Service Oriented Unified Theory of Acceptance and Use Model (2009). Source: Modification from Venkatesh et al. (2003)

International Journal of Innovative Research in Computer and Communication Engineering
Vol. 1, Issue 4, June 2013

VI. DEVELOPMENT OF SERVICE ORIENTED UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY MODEL (SO-UTAUT):

We further use path coefficients and R2 to evaluate the entire model analysis and goodness of fit. The goodness of fit values (R2 and Adjusted R2) measures how well the model parameter estimates are able to predict the model performance and also generate the sample covariance matrix. The technique works in such a way that the postulated model is taken as true and adjusts the parameter estimates while minimizing the covariance difference between population parameters and the sample estimates. The study model is analyzed using PLS-Graph. Results of the PLS-Graph are depicted in Figures 3.
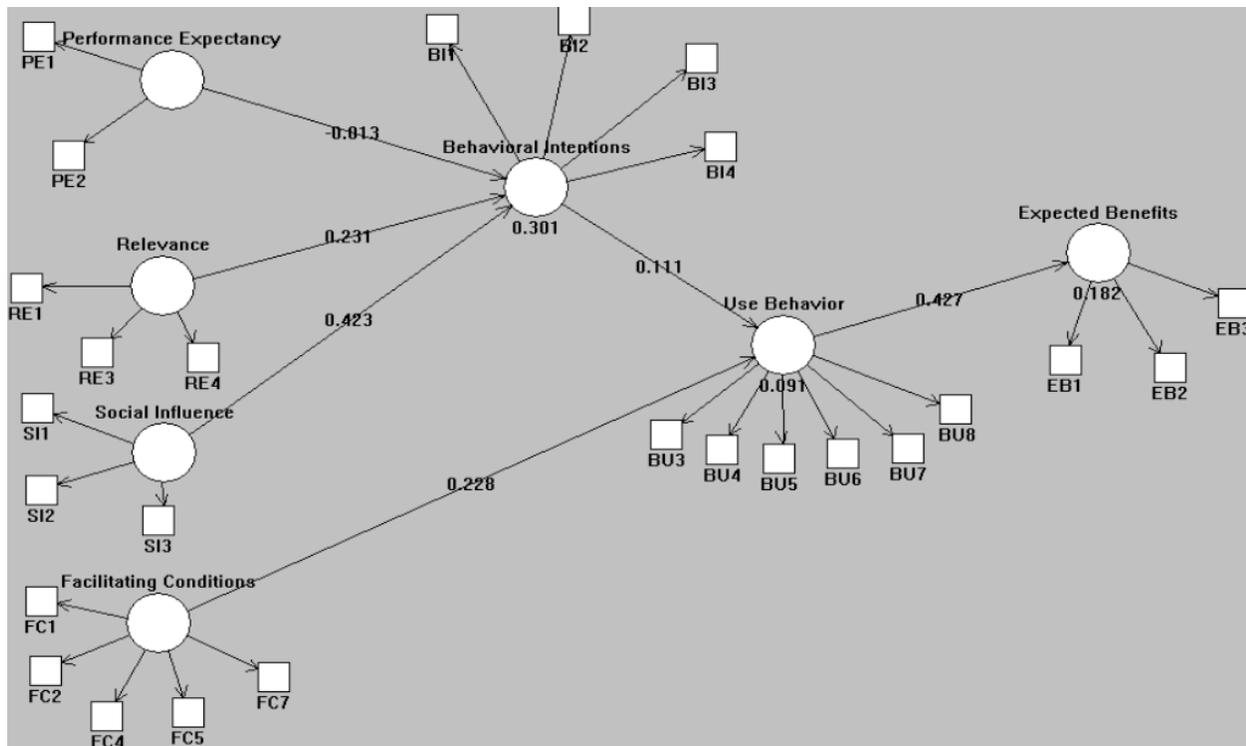

Figure 3: SOUTAUT Structural Model

Legend			
AVE	Average Shared Variance	FC	Facilitating conditions
PE	Performance expectancy	BI	Behaviour intentions
RE	Relevance	UB	Use behaviour
SI	Social Influence	EB	Expected benefits

The hypotheses were established according to the modified UTAUT model called SO-UTAUT and analyzed based on the SEM technique, PLS graph beta testing. PLS-Graph path coefficients or Beta results and regressions as predicated by the empirical model paths (Figure 3) and partial correlation coefficients produced by SPSS software were used for analysis.

Hypothesis1: Performance Expectancy positively affects Behavioral intention to use E-library services.
Hypothesis2: Relevancy positively affects Behavioral intention to use E-library services.
Hypothesis3: Social Influence positively affects Behavioral intention to use E-library services.
Hypothesis4: Facilitating Conditions positively affects Usage Behaviors of E-library services end-users.
Hypothesis5: Behavioral intention to use E-library services positively affects use behavior.
Hypothesis6: Behavioral Usage positively affects the Expected Benefits of E-library services.
Hypothesis7: Awareness positively moderates the SO-UTAUT model independent constructs towards their respective dependent constructs.

VII. RESULTS

The figure bellow (Figure 7.1) shows that 251 (90.94%) of the respondents were male and the remaining 25 (9.06%) of the respondents were female. Hence, the majority of respondents were males. This is because the proportion of female academic staffs and post graduate students is very small in the universities.
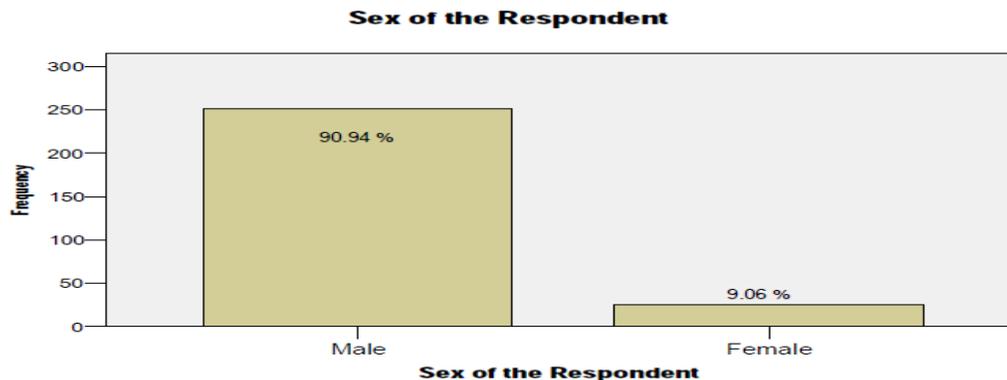

Figure 7.1 Percentage of respondents by Gender

The Majority of respondents' age lay between 25-34 years followed by 18-24 years and 35-44 years which account 58.7%, 21.7 and 13.4% of the total respondents' age category respectively. The following tables7.1and 7.2 clearly depicts the frequencies, percentages and cumulative percentages of the respondents' age in each category.

Respondents' Age Range	Frequency	Cumulative Frequency	Percent	Cumulative Percent
18 – 24	60	60	21.7	21.7
25 – 34	162	222	58.7	80.4
35 – 44	37	259	13.4	93.8
45 – 60	16	275	5.8	99.6
> 60 +	1	276	0.4	100.0
Total	276	276	100.0	

Table 7.1 Age Ranges of Respondents participated in the survey.

In terms of streams of strata, the distribution of respondents was as follows: 129, 50, 77 and 20 of respondents were from Social Science (46.7%), Natural Science (18.1%), Technology & Informatics (27.9%) and Health Science (7.2%) streams respectively.

	Streams	Frequency	Cumulative Frequency	Percent	Cumulative Percent
1	Social Science	129	129	46.7	46.7
2	Natural Science	50	179	18.1	64.9
3	Technology & Informatics/IT	77	256	27.9	92.8
4	Health Science	20	276	7.2	100.0
Total		276	276	100.0	

Table 7.2 Distribution of Respondents by Streams

Moreover, 70.3% of the respondents have enough PC/Laptop access as shown in figure 7.2 bellow that may help them to use the e-library services available in their university.
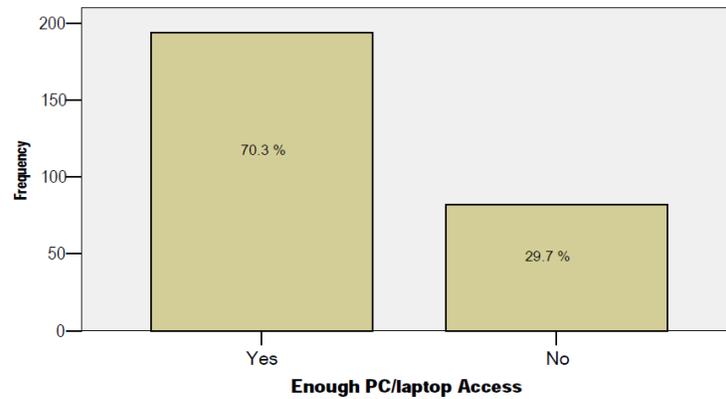

Figure 7.2 PC/Laptop Access.

Respondents have been introduced about the basic concepts of e-libraries and their services in the questionnaire for the purpose of clarity. Then after, they were asked if they have enough skills that enable them to use the available electronic library services. Therefore, the survey indicated that 39.13% of the respondents have enough skills to use the e-library services. Moreover, 47.83% of respondents answered the question "To some extent", to indicate that they have some basic skills but fill uncomfortable about the sufficiency of their skills to utilize ICT services provided in the universities that they are in. In contrary, 13.04% of respondents responded that they have no ICT skills at all that enable them to use e-library services.
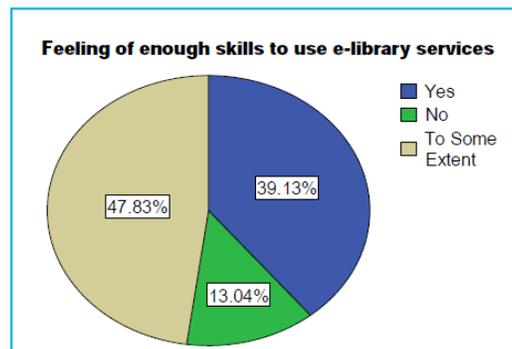

Figure 7.3 Respondents Skill Feeling to use e-library services.

Respondents were asked about their awareness of the available e-library services to indicate their answers by way of saying "Yes", "No" and "To some extent". The majority of respondents (57.97%) responded "To some extent" to indicate that they have only limited awareness about the existence of e-libraries resources and didn't know well and in detail. 20.65% of respondents do not know anything about the existence of the e-library services at all. Only 21.38% of the respondents were well aware of the existence of the e-library services. The figure bellow (Figure 7.4) depicted these facts as follows.
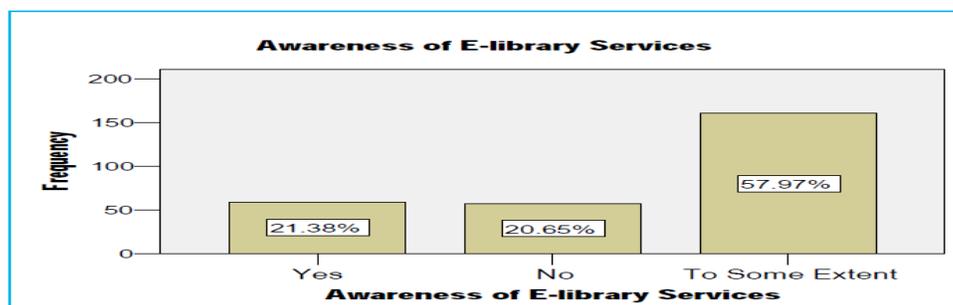

Figure 7.4 Respondents Awareness of E-library services

In general, the study has found out that, there is no significant difference in awareness of e-library services that existed between universities, academic staffs & postgraduate students, and among streams (faculties/colleges/institutions). It can clearly be observed from the following figures (Figure 7.5 and Figure 7.6).
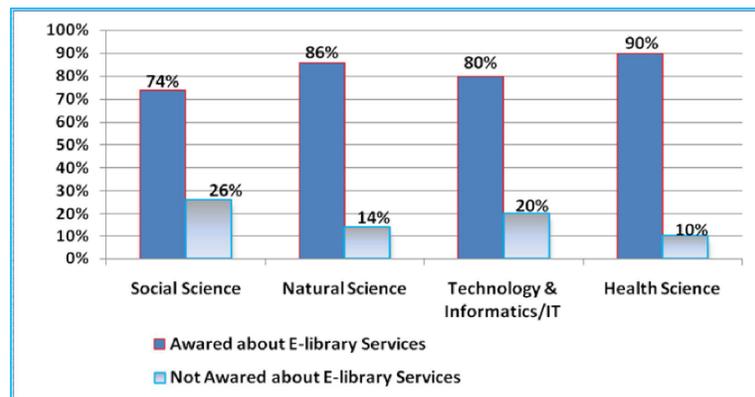

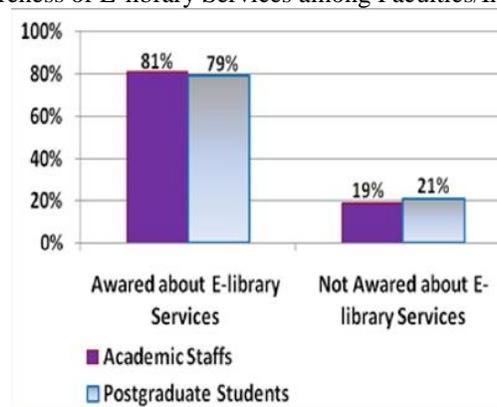Figure 7.5 Awareness of E-library Services among Faculties/Institutes/Colleges.

Figure 7.6 Awareness of E-library Services between Universities; and Academic staffs & Postgraduate Students.

VIII.RECOMMENDATIONS

In the light of the study findings, the researcher recommended the following:

1. More studies should be encouraged and trained.
2. Faculty members should be encouraged and trained.
3. Comparative Studies on the usage of OEJ can be conducted at different universities and institutes.
4. Libraries, information centers and other bodies should swiftly but systematically move to automate their routines and create an enabling environment in order to facilitate ease and wider access to electronic resources in general and online journals in particular.
5. Due to heavy use of e-journals, this research further recommends that libraries and information centers should improve upon e-journal; subscriptions should be open or restricted access.
6. Most journal articles are published in puff format, and a pdf reader is available online for free download and installation. Libraries and information centers should check for the latest version and install it on the system to make journal downloads easier.

IX. CONCLUSION

A model for studying levels of end-users' acceptance and use of ICT services has been developed. Using the data collected through questionnaire survey methodology, the study has tried to investigate the determinant factors that affect the acceptance and use of e-library service end users using the SO-UTAUT model. The SO-UTAUT model has been empirically tested and proved that, it fits to the current study setting and can predict the acceptance and use of e-library services in universities. Moreover, the path coefficients for all the independent constructs and dependent constructs are

positive. Hence they indicate or demonstrate a positive inclination of end users towards the acceptance and usage of electronic library services. These results (positive path coefficients) are somehow similar to Tibenderana and Ogao (2008b) where the independent constructs (Relevancy, Social Influence and Facilitating Conditions) except 97 Performance Expectancy have positive path coefficients. However, this study demonstrates significant differences on the Performance Expectancy construct which is the most significant determinant factor (the highest positive contributor, 36.2%) in explaining users' inclination/intention to use e-library services. The study findings shade light on levels of end-users' accept and use of hybrid library services in universities especially those in less developed countries. The study also confirms the efficiency and robustness of the UTAUT model to determine acceptance and use of a technology.

REFERENCES

[1]   Prisca Tibenderana, Patrick Ogao, J. Ikoja-Odongo and James Wokadala "Measuring Levels of End-Users' Acceptance and Use of Hybrid Library Services" International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2010, Vol. 6, Issue 2, pp. 33-54.

[2]   Nayereh Shahmohammadi "On-Line Electronic Journals Use Among University Academic Faculty Members Of Islamic Azad University, Karaj Branch" Asian Journal Of Natural & Applied Sciences, Vol. 1. No.1. March 2012, pp 26-32.

[3]   Venkatesh, V. (2000). "Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model". Information Systems Research 11: 342–365.

[4]   Venkatesh, V., & Davis, F. D. (2000.) "A theoretical extension of the technology acceptance model: Four longitudinal field studies". Management Science 46(2): 186-204.

[5]   Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2.003) "User acceptance of information technology: Toward a unified view". MIS Quarterly 27(3): 425-478.

[6]   Ajzen, I., (1991). The theory of planned behavior. Organizational Behavior and Human DecisionProcesses, vol. 50, no. 2, pp. 179-211.

[7]   Alan, F. (1996). Dhaka University Library Automation (DULA): An Appraisal Report and Proposals for Action. Dhaka. University of Dhaka.

[8]   Anandarajan, M., M. Igbaria, M. & Anakwe, U. P. (2002). IT Acceptance in a Less-Developed Country: A motivational Factor Perspective. International Journal of Information Management, vol. 22, pp: 47-65.

[9]   Anderson, J. E. & Schwager, P. H. (2004). SME Adoption of Wireless LAN Technology: Applying the UTAUT Model. In Proceedings of the 7th Conference of the Southern Association for Information Systems. Retrived on 20 September 2006.

[10]   Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions and behavour. Social Psychology Quarterly, vol. 55, no. 2, pp. 178-204.

[11]   Baba, Z. & Broady, J. (1998). Organisational Effectiveness Assessment: Case Studies of the National Library of Wales and Perpustakaan Negara Malaysia. In: Pat Wressell & Associates,(Ed.). Proceedings of the 2nd Northumbria International Conference on Performance Measurement in Libraries and Information Services. Newcast le Upon Tyne: Information North, pp. 319-339.

[12]   Baruchson-Arbib S. and F. Shor (2002). The Use of Electronic Information Sources by Israeli College Students. The Journal of Academic Librarianship, vol. 28, no. 4, pp. 255-257.

[13]   Bar-Ilan, J., Peritz, B. C. & Wolman, Y. (2003). A Survey on the use of electronic databases and electronic journals accessed through the web by The academic staff of Israeli universities. Journal of Academic Librarianship, vol. 29, no. 6, pp. 346-361.

[14]   Bevis, D. M. & Graham, J. B. (2000). The Evolution of an Integrated Electronic Journal Collection. Journal of Academic Librarianship, vol. 29, no. 2, pp. 115-119.

[15]   Bishop, A. P. (2002). Measuring Access, Use and Success in Digital Libraries. Journal of Electronic Publishing. Retrieved on 10 February 2007,

[16]   Brown I., Rijk K. D., Patel K., Twum-Ampofo, Y., & Belle, J. P. (2006). T-Commerce: an Investigation of Non-Adoption in South Africa. Proceedings of the Conference on InformationScience Technology and Management (CISTM2006) Chandigarh, India, July 16-18. Retrieved on 23 June 2007.

[17]   Buttenfield, B. (1999). Usability Evaluation of Digital Libraries. In Digital Libraries: Philosophies, Technical Design Considerations, and Example Scenarios. Ed. D. Stern. New York: Haworth Press.

[18]   Carlsson, C., J. Carlsson, K. Hyvonen, J. Puhakainen, and P. Walden, (2006). Adoption of Mobile Device/Services - Searching for Answers with The UTAUT. In Proceeding of the 39th Hawaii International Conference on System Sciences, pp.1–10.

[19]   Chau, P. Y. K. & Hu, P. J. H. (2001). Information technology acceptance by individual professionals: A model comparison approach. Decision Science, vol. 32, no. 4, pp. 699– 719.

[20]   Chin, W. W. (1996). The Partial Least Square Approach to Structural Equation Modeling. In Advanced Structural Equation Modelling: Issues and Techniques, pp. 296-335.

[21]   Cody-Allen, E. & Kishore, R. (2005). An Extension of the UTAUT Model with E-Quality, Trust & Satisfaction Constructs. Retrieved on 28 September 2006, from http://portal.acm.org/citation.cfm?id=1125196.

BIOGRAPHY

Abinew Ali Ayele received his M.Sc. Degree in Information Science from Addis Ababa University from 2010.Corrently working as Deputy Director, School of Computing and Electrical Engineering, IOT, Bahir Dar University, Ethiopia. His main research interest is Data Mining, E-Technology. He has got 2 years 10 months of teaching. He is a member of various professional societies like SDIWC and SCIEI.

Dr. Vuda Sreenivasarao received his M.Tech degree in computer science and engineering from Sathyabama University from 2007.He received PhD degree in computer science and engineering from Singhania University, Rajasthan, India from 2010. Currently working as Professor in School of computing and Electrical Engineering, IOT, Bahir Dar University, Ethiopia. His main research interests are Data mining, Fuzzy logic, Mobile communication and Network Security. He has got 13 years of teaching experience. He has published 29 research papers in various international journals and one Springer international conference paper. He has Editorial Board / Reviewers memberships in various international journals. He is a life member of various professional societies like IEEE, ACM, MAIRCC, MCSI, SMIACSIT, SMSCIEI, MIAENG, MCSTA, MAPSMS, MSDIWC and MISTE.