The Impact and Efficiency of Electronic Libraries in Various Districts of Punjab, Pakistan

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Abstract

The present research study was conducted with the aim to assess and analyze the impact of electronic libraries (EL) by using usability criteria which include consistency, efficiency, learning and satisfaction in digital learning and reading stimulus among the general public and youth in specific. The structural equation modeling (SEM) of variables like effectiveness (EEF), efficiency (EFT), learning ability (LER) and performance & satisfaction (PES) was followed by research design. Survey was conducted in divisional headquarters of the Punjab province to collect data. The population was N=270 persons from 9 out of 20 districts having EL facilities. The findings revealed that E-Libraries have a positive correlation between productivity, effectiveness, learning and success. Performance, efficacy and learning capacity had a substantial and positive influence on user's satisfaction. The study found that the provision of a conducive atmosphere that ensures productivity, effectiveness and learning capacity plays a vital role in enhancing performance of EL. It is proposed that we follow more efficient and dynamic methods in order to support the concept of EL for promotion of culture of digital learning philosophy among the public.

Keywords: digital learning, digital reading, PLS-SEM, electronic libraries (EL)

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Introduction

The Internet has changed thousands of citizens' lives in processing, consolidation, distribution, collection and use of information. Recent research showed that many users opt for digital sources rather than traditional analog resources which lead to an increased use of digital resources of information (Tenopir et al., 2003). An electronic library offers convenient access to resource recovery in contrast with conventional library facilities (Blandford & Buchanan, 2003). Over the years, several scholars and educators proposed different functions for electronic libraries (EL) (Xie, 2008). There is a diversity of views and interpretation of electronic libraries between individuals and any single person interested in the creation and use of Els. The EL is defined by librarians as an expansion of a conventional digital library, while the electronic library for end users is same like an Internet with advancements and improvements in terms of purpose and usefulness (Fox et al., 1995). EL was defined by Marchionini (2000) as a place where digital resources are readily available and users can access these resources with ease.

EL is a place of information and data for researchers and scholars (Okerson,2009). It is a place where individuals connect socially with each other, exchanging knowledge and new ideas. By using electronic libraries, the culture of e-learning can be promoted among people (Abuzaid & Singh, 2005). EL is the place where all content is remotely available to allow easier access to the end user (Onwuchekwa and Jegede, 2011). EL's have been a crucial source of information for educationalists, researchers and students in science and education. Traditional libraries have been turned over the years into internet-based electronic libraries which offer various resources to facilitate science, teaching and scientific learning, including e-journals, e-books, web directories and e-readings (Lee et al., 2008). Usefulness has been defined in previous studies as the degree to which an EL is efficient, effective and user-friendly in performing information tasks. Usability is an important component of the quality evaluation of EL and influences the production of EL. (Joo & Lee, 2011).

In this digital age, most individuals used electronic media for data retrieval. Libraries collect information in digital form in order to provide convenient access for end users. It is a fact that most people are obtaining data from digital sources. It is easy to retrieve digital information, which is why even analog data is transformed into a digital format. Digitization has been initiated as a tool that is now gaining ground in various organizations. EL offers a vision for digitized data and materials to make their presence known beyond the library's physical world.

Thousands of students, researchers, people from academia needed a single platform where they can access e-journal, e-books, e-lectures and

quality educational materials. Traditional libraries have no access to library stuff using internet resources in Pakistan. Research study highlighted that Pakistan's Higher Education Institutes face financial problems and infrastructure non-accessibility that hinder the development of a conducive learning environment for students. Government of Punjab (GOP) has taken an initiative to set up e-libraries in different districts of Punjab (Waqas et al., 2019) in view of this need. The key purpose of developing e-libraries is to make electronic literacy, digital culture simpler and more accessible to the general population and the entire world.

This study was undertaken to determine the performance of these ELs with the aim of filling the research gaps, investigate and analyze the variables which are necessary to guage to EL performance assessment. The research will also lead to fostering and awareness of e-learning culture amongst the masses and the extent of consumer satisfaction.

Salient Features

More than three thousand printed books, research papers and magazines compose of each EL. The electronic library has a hall with a capacity of over 50 people which contains new IT equipment, laptops and Wi-Fi tablets. Every EL has created a modern, state-of-the-art security system to safeguard the digital and physical capital. ELs provide the general public with cost-free facilities.

Problem Statement

Study of the factors that influence e-libraries' success and the assessment of customer satisfaction with their services.

Research Questions

There were two research questions in the current study:
1.   Does the Electronic Library play any part in stimulating the general public's e-learning and e-reading?
2.   What are the factors influencing electronic library performance?

Purpose of the Research

The purpose of present study was to assess the effectiveness of EL's established in nine (09) divisional headquarters of Punjab. The major aims of this research were as follows:
•   Analyzing the factors that impact e-library efficiency

- Evaluating e-library performance, effectiveness and learning and its impact on user's satisfaction
- Analysis of impact of e-learning culture on youth and general public

Electronic Libraries (EL) was an intervention of Youth Affairs & Sports Department in collaboration with Punjab Information Technology Board (PITB) for establishment of ELs in districts (20) of Punjab province. GOP has invested millions of rupees to inspire the culture of e-reading and e-learning among the public to develop e-libraries. Although it aims to promote the digital content of the general public and promote a culture of reading and learning amongst them, the successes of these e-learning and e-reading culture are still unknown to the general public.

Literature Review

The development of digitalization of knowledge calls for ELs to evaluate the output. Several research projects have been carried out over the years to meet the challenges and the changing features of digital content. There are different points of view which must be examined for assessing electronic performance: (1) Internal evaluation being performed by internal developers and users. (2) External evaluation being performed by researchers or end users. In academic studies external evaluation approach was widely used for the evaluation and usefulness of EL.

Marchionini (2000) argued that the evaluation of performance is a scientific activity with hypothetical and practical consequences. Performance evaluation tests EL usability, user satisfaction and recommends growth (Chowdhury & Chowdhury, 2003). A framework for performance assessment of an automated library had been developed by Fuhr et al., (2007) through various evaluation practices that include observations and surveys. The proposed EBP model consists of four constructs: data/collection, system/technology, user and user. In accordance with this model framework, material and users should be connected together. He concluded that usability and utility (efficiency, efficacy & learning ability) are necessary to determine the performance assessment of EL. Blandford et al. (2004) pointed out in the research report that observational studies were used to evaluate performance and user satisfaction of ELs. Different Studies had shown that a conducive EL environment that ensures performance, efficiency and learning capacity, played a key function in improving EL usability and had a positive effect on user satisfaction overall (Karoulis and Pombortsis, 2003).

The Nielson model was a standard for the evaluation and accessibility of digital libraries (EL). He proposed five features for

assessing EL efficiency and usability including consistency, efficacy, learning capability, errors and satisfaction. In research, it had been shown that quality, efficiency and learning capacity are interconnected with output and satisfaction of the users in EL (Karoulis and Pombortsis, 2003). Gould (1988) clarified that the usability of EL's often requires reliability and responsiveness of devices, a user interface, tools to learn and read in different languages. Ferreira and Pithan (2005) provided another model for conducting performance assessment by suggesting that characteristics of personality and system efficiency should be taken into account when carrying out a usability study. Saracevic (2004) said evaluations of accessibility and performance were important for optimizing the system's flexibility and customer satisfaction. To decide the functionality and accessibility of the EL, he used four classifications: assessment, content, process and format. Xie (2008) proposed to include device features, easy access to information collection, navigation and support functions, as part of a User-based EL performance evaluation requirement. Ward and Hiller (2005) indicated that the measurement of performance measurement to test library resource usability required time and effort to complete the task properly and customer input for product or service. Jeng (2006) had also put forward an EL performance evaluation system with four usability criteria including effectiveness, quality, happiness and learning.

The aforementioned analysis of past research studies validated the criteria for EL usability performance evaluation. Limited number of past studies had developed and validated instrument for EL's performance evaluation and measurement These studies were mainly based either on experimental methods or on methods of evaluation. The users feedback to measure and evaluate the performance of Els was missing in past studies. The present study was conducted to bridge the gap of past studies and measure user's perspective on the performance of electronic libraries. Current research was carried out using a questionnaire survey methodology to determine the effectiveness of EL from an end user perspective.

Information is considered as the fulcrum for power and prosperity and very essential for economic and social development of the society. The revolution in Information and Communication Technology has bridged knowledge gap by providing free flow of information. With this technology driven revolution, information was started delivering in digital format with greater speed and economy which triggered in development of digital library.

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bridged knowledge gap by providing free flow of information. With this technology driven revolution, information was started delivering in digital format with greater speed and economy which triggered in development of digital library.in twenty first century change is considered key element and makes lots of challenges for individuals' life which most imposed in result of technology influence. Education is one of areas that have been affected form technology. In recent years, by development of information and communication technologies, new forms of education appeared named web or online learning.

Methodology

The study was quantitative and descriptive in nature and based on primary and secondary outcomes. The goal was to examine variables influencing the efficiency of EL in nine (09) districts of Pakistan. Primary data collection has taken place through survey questionnaires completed by respondents in these districts of Punjab. Secondary data has been collected from related books and magazines. For data analysis with PLS-SEM, the Smart PLS 3.2.9 platform is used. Data collected in survey study is typically not always distributed and this software does not enable assumptions about data normality to be attained (Chin et al., 2003).
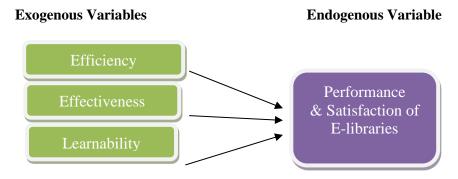
Design of Research

This current study was undertaken to investigate the success factor of EL in Punjab. For this analysis, the survey study design had been pursued. To ensure the validity, previous research studies were consulted and all the measurement items were taken from those studies. However, minor changes were done to make them adequate and relevant for the present study. The questionnaire consisted of 19 research questions requesting information on the provision of equipment, environment, user friendliness etc. Two experts were consulted to verify and authenticate the survey questionnaire after pilot testing for its validity and reliability. Efficiency (EFY) was measured using four items adopted from the research study conducted by Joo & Lee (2011) and Xie (2008). Effectiveness (EFT) was measured using five items adopted from the research study conducted by Joo & Lee (2011). Learnability (LER) was measured using four items adopted from the research study conducted by Xie (2008). This was a scale of 19 items with the scale of 1 to 5 (main items), starting from strongly disagreed (1) to strongly agreed (5). The higher the score, the stronger the engagement, and vice versa.

Sample/Sampling

The target population for the present study was limited to actual users of ELs who had used the facility (Els) at least once or more. A Survey questionnaire was designed/adopted to collect the data. Face-to-face interaction with the actual users of ELs was used as a method of survey at ELs at different times of the day, over 2-week period. 270 questionnaires were distributed, out of which 236 questionnaires were returned from the respondents and 34 respondents did not opt to respond. Random sampling was used for selection of samples (Michael, 2011; Peyravi et al., 2009; Henry, 1990). Out of 236 completed questionnaires, 11 questionnaires were incomplete. Accordingly remaining 225 responses were analyzed by using Smart PLS software.

Consent letter was received from concerned departments to ensure ethical considerations before data collection, and participants were informed of the protection and security of their knowledge and identities. The value of ethical problems was maintained during testing.

The findings of EL's are focused on this component of analysis. Three variables including e-library efficiency, effectiveness and learning ability.

Research Design and conceptual framework

Exogenous Variables   **Endogenous Variable**

Figure 1: Research Design

Study Hypotheses

Three hypotheses had been suggested, based on the study model given above:

H1: EFY had direct and positive impact on performance of EL's
H2: EFT had direct and positive impact on performance of EL's
H3: LER had direct impact on performance of EL

Efficiency (EFY)

Efficiency means attaining the desired level of objectives while using inadequate resources. Efficiency refers to the resources used in completing a task; and subjective satisfaction refers to positive attitudes toward using the system (Joo & Lee, 2011).

Effectiveness (EFT)

Effectiveness is defined as the ability of users to attain specific goals. Effectiveness is related to the completeness at which users achieve specified goals; (Joo & Choi, 2015).

Learnability (LER)

Learnability means as how quickly a user understands and learn a system (Xie & Du, 2018).

Results and Discussion

A problem with self-reported questionnaires used in social sciences may be the common method variance (CMV). Statistical or procedural remedies can be used to reduce this CMV (Podsakoff et al., 2003). In order to detect CMV, a statistical approach was considered to use the Harman single-factor analysis. Exploratory Factor Research results found that in this sample the first factor clarified a variation in 17.3%, which was well below 50% (Babin et al., 2016).
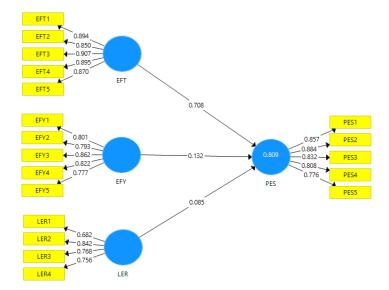

Figure 2: Measurement Model

The conclusions of the calculation model are given in Figure 2. Cronbach Alpha (CA) and Composite Reliability (CR) were used for testing the internal consistency.

As both CA and CR values were greater than 0.70, no internal consistency problem was found in Table 1 below (Hair et al., 2017). For all constructions used in this research, high reliability was therefore available. Average Variance Extracted (AVE) For the evaluation of convergent validity, extracted and external loadings of all measures are tested (CV). AVE should surpass 0.50 and external loadings should exceed 0.708 (Hair et al., 2017). External loadings will, however, differ from 0.60 to 0.7 in case of exploratory research. Both AVE values were above 0.50 for this study and the outer loadings ranged from 0.682 to 0.907. The results shown in Table 3 were then guaranteed by the CV.

Table 1
Reliability and Validity

Constructs and Items	Outer Loadings	CA	CR	AVE
Effectiveness (EFT)		.930	.947	.781
EFT1	.894			
EFT 2	.850			
EFT 3	.907			
EFT4	.895			
EFT5	.870			
Efficiency (EFY)		.870	.906	.659
EFY1	.801			
EFY2	.793			
EFY3	.862			
EFY4	.822			
EFY5	.777			
Learnability (LER)		.764	.848	.584
LER1	.682			
LER2	.842			
LER3	.768			
LER4	.756			
Performance (PES)		.890	.918	.693
PES1	.857			
PES2	.884			
PES3	.832			
PES4	.808			
PES5	.776			

Correlation of Heterotrait-Monotrait (HTMT) was used for Discriminant Validity (DV). Both values need to be lower than 0.90 (Henseler et al., 2015). For all latent constructs, DV was then present as all values were below threshold value of 0.90 (table 2).

Table 2
Discriminant Validity

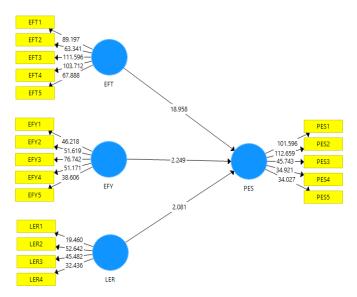| Constructs	EFT	EFY	LER	PES
EFT				
EFY	0.717			
LER	0.324	0.184		
PES	0.555	0.450	0.873	

Structural Model:

Figure 3. Structural model

The Findings of structural model have been explained in Figure 3. The Variance Inflation Factor (VIF) was considered while assessing the problem of multi-collinearity between the constructs. It was not anticipated to cross 5 (Hair et al., 2017). VIF values for three partnerships were 2.317, 1,713 and 1.246. For an estimation of the explanatory capacity of all three exogenous latent buildings, the R2 value was registered (Table 3). According to Hair et al, values of 0.25, 0.50 and 0.75 indicate poor, moderate and major explanatory capacity (2017). The R2 value of 0.809 showed that the three exogenous constructs in the performance of E-libraries provided a variance of 80.90 percent. The constructs' predictive value was calculated in Q2 and should be above zero (Richter et al., 2016). To discuss statistical importance, blindfolding protocols were used. Q2 findings of 0.327 demonstrated the presence of statistical value.

Table 3
Direct Effects

Paths	VIF	f²	Beta	T Value	LL	UL	Decision
EFT -> PES	2.317	0.492	0.708	18.958	0.634	0.781	Supported
EFY -> PES	1.731	0.396	0.523	13.069	0.015	0.244	Supported
LER -> PES	1.246	0.384	0.484	12.842	0.005	0.165	Supported

Effect sizes had also been debated using (f2) values to determine the individual influence of the exogenous on endogenous composition (Hair et al., 2017). According to the Cohen (1988) guidance, the 0.02, 0.15 and 0.35 values show small, medium and high impact scales. Table 3 reveals important impact sizes (f2) of 0,492, 0,396 and 0,384 respectively. Finally, the bootstrapping process was used with 5000 subsamples to assess the research hypothesis. Table 3 displays findings from direct relationships between buildings using a single tail through a standardized beta, t value, and a corrected interval of trust. Lower Limit stands for LL and Ultimate Limit stands for UL. The first theory indicates a strong connection between the efficiency and efficiency of E-Libraries. A substantial positive performance effect has been found in efficacy (Beta=0.708; T value=18.958; LL=0.634, UL=0.781). Although t is greater than 1,645, between nil, LL and UL do not straddle. The argument, however, was accepted. There is a positive influence observed on performance effects in the second hypothesis (beta = 0.176; t value = 3.087; LL = 0.063; UL = 0.285). The second hypothesis (H2) was thereby sponsored. Furthermore, a marginally positive effect of learning on performance was seen by the third hypothesis (beta = 0.484; T value = 12.842; LL=0.005, UL=0.165). This hypothesis has also been endorsed.

Conclusion

The study revealed that users can find a resource-finding task quickly by using ELs and there are sufficient number of devices for finding e-resources like e-lectures and videos in e-libraries. Els guaranteed swift responses in searching academic resources with stability and was useful in helping users to find digital printed materials, documentaries, audios and videos under one roof. Thus, we can say that the ELs play any part in stimulating the general public's e-learning and e-reading. The findings of present research study revealed that Effectiveness (EFT), Efficiency (EFY) and Learnability (LER) were important factors influencing electronic library performance. The results further indicated a favorable and significant relationship between effectiveness (EFT) and performance satisfaction (PES).

Similarly, a strong correlation exists between efficiency (EFY, performance and satisfaction (PES). There was also a fundamental connection between LER and performance satisfaction (PES). In performance measurement of ELs, we should conclude that quality, efficiency and learning are important considerations. The study indicated that having a conducive environment to ensure quality, performance and learning were important factors to improve the effectiveness of ELs and had dramatically positive consequences for overall customer satisfaction (Karoulis and Pombortsis, 2003).

Implications of the Study

This study can help to define factors which impact the quality and accessibility of Els from the end user's point of view. This analysis contribution is development of performance assessment process for the electronic libraries (Els) from the end users perspective including performance metric criteria based on the product of linkages between productivity, efficiency, learning and user's satisfaction by developing learning standards and strategies.

Recommendations

In order to instill the notion of digital literacy and digital reading among the masses, the study recommended to adopt a more productive and vibrant approach for promoting ELs. The present study recommended for establishment and replication of EL's in all parts of Pakistan so that every citizen of Pakistan can enjoy the benefits of digitalization. Government of Punjab officially pays for all costs relating to ELs operation, which implies that fee should be charged from end users to guarantee the self-sustainability of ELs. In order to enhance and boost their performance, workshops for capacity building of employee should be conducted regularly.

Limitations of the Study

This study has some limitations on the generalization of findings because e-libraries efficiency has been analyzed in only nine districts of Punjab and it has not covered all districts because of mobility, time and financial constraints. Future studies can make assessment of remaining 11 centers out of 20 in Punjab Province, which may lead to better generalization of results. Furthermore, its self-sustainability model may become a topic of future research.

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