Evidence-Based Librarianship in E-Resources Acquisition Decision: Construct Validity and Reliability of Instrument

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This paper reports on the assessment of construct validity and reliability of an instrument used to measure librarians' adoption and implementation of Evidence-based Librarianship (EBL) in the acquisition decision of electronic resources. The instrument is developed based on well-established theories/models of Technology Organization and Environment (TOE), Innovation Diffusion Theory (IDT), and a Concern-based Adoption Model (CBAM) with a newly added construct, user needs, and preferences. The instrument was evaluated using the Partial Least Squares (SMART- PLS) software applications using structural equation modelling (SEM) to determine its validity and reliability through) analysis of the measurement model (outer model) and ii) analysis of the structural model (inner model). A total of 278 participants were identified from the 1040 research population. This research applied probability sampling using proportionate stratified techniques to gather responses from librarians in library and information center management. The results of both analyses indicated that the construct validity and reliability of the instrument were acceptable and moderate, respectively. The internal consistency reported a Cronbach's alpha value of 0.718 to 0.956, composite reliability of 0.70 and 0.90, average variance extracted value above 0.50. The model prediction accuracy and relevancy revealed R^2 (adoption: 0.300, implementation 0.399) and Q^2 (adoption 0.213, implementation 0.227), which were acceptable and moderate, respectively. The model has also been reported to be free from collinearity issues. Thus, the instrument is ready for use in e-resource and evidence-based library acquisition research.

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BACKGROUND

Evidence-based librarianship (EBL) research has recently attracted the attention of library and information science researchers. Fundamentally, evidence-based librarianship has been defined as,"EBL seeks to improve library practice by utilizing the best available evidence in conjunction with a pragmatic perspective developed from working experience in librarianship"(Eldredge, 1997). Differences in the research focus yield variations in the definitions of EBL. However, a consensus on the basic definition agreed with EBL "as integrating the best available evidence into important decision making"(Eldredge & Koufogiannakis, 2006). Literature has revealed nine focuses in EBL research; improving professional judgment (Booth, 2002b), librarians as researchers(Booth, 2002a), daily decision-making (Booth, 2006), decision-making (Eldredge & Koufogiannakis, 2006) quality of evidence (Brice & Hill, 2004), improving librarianship professionalism (Crumley & Koufogiannakis, 2002), the importance of research (Davidoff, Haynes, Sackett, & Smith, 1995), improving library practice (Eldredge, 1997) and problem-solving (Crumley & Koufogiannakis, 2002). Research on the adoption of EBL involves measuring the adoption level (Koufogiannakis, 2012, 2013a; Luo, 2018; Mueller, Hanson, Martinez, & Meyer, 2017) and implementation stages (Booth & Eldredge, 2010; Dalrymple, 2013).EBL research progress drives this study to develop and assess the instrument used to investigate evidence-based librarianship in e-resource acquisition decisions. This study is significant in providing variation in the EBL research instruments, in which it attempts to validate items from the management, technology, concerns, and implementation dimensions.

Research Objective

The objective of this study is to assess and report the construct validity and reliability of evidence-based librarianship in e-resource acquisition decision instruments. The instrument was developed with an emphasis on studying the library e-resource acquisition decision-making process in Malaysian libraries. This research covers academic libraries, public libraries, and special or research libraries. The instrument aims to investigate the influence of adoption, concerns, user needs and preferences on the evidence elements of EBL. It was developed by adapting constructs and items from recent researchs and the development of new items. The assessment analyzed an overall 86 items from ten constructs

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developed from four research theories and models, namely; The Technology-Organization-Environment Model (Depietro, Wiarda, & Fleischer, 1990), Five Stages of Innovation Process from the Innovation Diffusion Theory (Rogers, 2003), Concern-Based Adoption Model (Southwest Educational Development Laboratory, 2006.) and Evidence-Based Librarianship Models (Crumley& Koufogiannakis, 2002). This instrument underwent the first validity procedure, faced validity, which permitted its construct validity and reliability. Table 1 outlines the theory/model, including the variables and dimensions used in instrument development.

Table 1

Theory/Model in instrument development

Theory/ Model	References	Variables	Dimensions	Definition
TOE	(Gangwar, Date, & Ramaswamy, 2015)	Technology	Relative Advantage	perceived additional benefits that innovation holds to contribute to an individual or organizational performance
			Compatibility	the level of changes that innovation might affect the organizational value and norms
			Complexity	perceived difficulties in understanding and using innovation
		Organization	Organizational readiness	the awareness, resources, commitment and governance of the organization in adopting an innovation
			Top management support	as the involvement and initiatives from the top management toward innovation adoption
			Training and education	important elements to reduce anxiety towards technology
CBAM	Hall, Dirksen, & George (2013)	Concern	Stage of Concern	as the change of an individual within the organization as the effects of innovation implementation
EBL	Koufogiannakis (2012, 2013b)		Research evidence	Evidence derived from scientific research
			Local evidence	internal evidence that provides direct applicability
			Professional knowledge	tacit knowledge that describes the librarian knowledge that is embedded within

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	Koufogiannakis (2013a), Booth (2003), Eldredge (2016)	User needs and preferences		the personalized information for specific individuals or groups of users
IDT	Gangwar, Date &Ramasamy (2015)		Adoption	decision stages that determine the implementation or rejection
	Gangwar, Date &Ramasamy (2015)		Implementation	Decision stage that describes intensity or failure

LITERATURE REVIEW

EBL Framework and Process Model

The most prominent EBL framework was introduced by Eldredge (2000) who outlined seven principles that promoted EBL in the systematic decision-making process, combining multiple evidences and practical tools, offering a less rigid protocol suitable to the local context of the library. The principles are 1. EBL seeks to improve library practices by utilizing the best available evidence combined with pragmatic perspectives developed from working experiences in librarianship; 2. EBL applies the best available evidence, based on either qualitative or quantitative research methods; 3. EBL encourages the pursuit of increasingly rigorous research strategies to support decision-making which affects library practices; 4. EBL values research in all its diverse forms and encourages communication; 5. EBL represents a global approach to information seeking and knowledge development involving research but is not restricted to research alone; 6. EBL supports the adoption of practice guidelines and standards developed by expert committees based on best available evidence, but not as an endorsement of adherence to rigid protocols; and 7. In the absence of convincing reasons to pursue another course, EBL adheres to the hierarchy (or levels) of evidence so to use the best available evidence, lending priority to higher levels of evidence from the research. The flexibility of Eldredge's framework attracts others to work based on elements to develop various EBL process models. There are four most frequently used process models in EBL research:a five-step practice (Eldredge, 2000), five-stage practice (Brice & Hill, 2004), the Five As model (Booth, 2009), and Koufogiannakis's (2013b) model. The models incorporate the most similar elements into stages and steps. Several similarities in the process can be found in Stage 2 and Step 2 "Search," "Find," "Acquire," and "Assemble" carry the same meaning in the evidence-gathering process. Stage 3 and Step 3 use the term "Evaluate," "Appraise," and "Assess," which refer to the same process of assessing the validity, reliability, and usefulness of the evidence

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source. Stage 5 and Step 5, "Evaluate" and "Assess" refer to the same process of evaluating the outcome or the process. Variances in the term used by the models such as Stage 1 and Step 1 as "Formulate," "Identify," and "Ask". Stage 4 and Step 4 use the term "Apply" and "Assess". The differences in terms used in the stages varies according to the meaning of the process. Eldredge (2007) emphasizes that the model is based on the author's focus, while Booth (2009) focuses on the formulation of the question. However, Booth (2009) and Koufogiannakis (2013b) share the same elements. Table 2 presents the analysis of the terms used in the model.

Table 2

EBL Process Models

	Eldredge (2007)	Booth & Brice (2004)	Booth(2009)	Koufogiannakis (2013b)
Step/Stages			Process	
1	Formulate	Identify	Articulate	Articulate
2	Search	Find	Assemble	Assemble
3	Evaluate	Appraise	Assess	Assess
4	Assess	Apply	Agree	Agree
5	Evaluate	Evaluate	Adapt	Adapt

Evidence Source Matrix

An evidence source refers to sources where evidence can possibly be found. Several studies, such as Koufogiannakis (2012), introduced a model of evidence source that incorporates research evidence, local evidence, and professional knowledge. However, the rigid process of EBL process models in evidence appraisal creates debate among EBL researchers, which requires a detailed appraisal method for each source. Koufogiannakis (2012)categorizes evidence into hard and soft. Hard evidence is more scientific in nature and is derived from published literature, statistics, local research and evaluation, non-scholarly publications, and facts. By contrast, soft evidence is input from colleagues, tacit knowledge, feedback from users, and anecdotal evidence. In a macro view, Glasby, Walshe, and Harvey (2007)divide evidence into two different categories: theoretical via empirical research derived from ideas, concepts, and models, and experientially derived from experience with an intervention. In contrast, Booth (2000)divides evidence into three categories: research-derived evidence, librarian-observed evidence, and user-reported evidence. Similarly, Todd (2006) structures evidence into three groups: empirical evidence, professional standards and guidelines, and campus and district data. Debates pertaining to the categories or sources of evidence are endless due to the rapid

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discovery of new sources of information that might facilitate decision-making. The variation in evidence sources offers a rich dimension for this study's instrument. Table 3 presents the evidence source matrix.

Table 3

EBL Evidence Source Matrix

Evidence	Authors	Description	Example of Evidence
Research evidence	Rycroft-Malone (2004)	External evidence, Scientific research	Journal articles, books, databases and conference papers, statistics, reviews
	Koufogiannakis (2012) Kloda et al. (2015)	Scientific research, Published literature	Evidence summary, research report
	Derven & Kendlin (2011) (Cole, 2014)	Qualitative and quantitative research	Bibliometric reports
	(Gray, Joy, Plath, & Webb, 2013)	Knowledge in the knowledge transfer literature	Research findings
Local evidence	Rycroft-Malone (2004)	Information from the local context	Organizational reality
	Koufogiannakis (2011) Koufogiannakis (2012)	Found in a working environment within a specific context, directly applicable and pertaining to users.	Experience with a patron, situational observation, assessment of programs, feedback from users, and project evaluation. In-house usage statistics, feedback and comments about services, usability testing on the website
	Cole (2014) Stewart (2011)		Local statistics, evaluations and surveys, policies, discussion, comments, feedback, brainstorming Client-specific statistics, comments from user Usage report
Professional knowledge	Rycroft-Malone (2004) Abdullah (2010)	Clinical experience	Expert opinion
	Koufogiannakis (2011) Koufogiannakis (2012)	Tacit knowledge, librarians skills, and	Experience, tacit knowledge, others

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	Gabbay & Le May (2011)	"know-how", specialized knowledge	experience, Expert opinion
	Koufogiannakis&Brettle (2016)	Judgement, skillful performance Practice-based knowledge Knowledge-in-practice-in-context	Experience, intuition, common sense Reflective, critical thinking, professional judgment
User needs and preferences	Abdullah (2010) Rycroft-Malone (2004) Foudy& McManus (2005) Cole (2014) Stewart (2011)	Data from users' actual experiences Unique and complex evidence of an individual	Users opinion, User Feedback Patient personal experience (previous and current), Patient personal knowledge (about treatment and self), Patient preferences User circulation behaviour User needs, reactions and responses General trends and preferences User choice, user preferences,

E-Resources Acquisition

The growing number of EBL studies in library e-resources acquisition has nailed EBL as a key practice in library decision-making (Hayman & Smith, 2015), as it provides a structured approach to support the decision-making process, as emphasized by (Koufogiannakis & Brettle 2016). Lee and Boyle (2004) introduced preliminary stages in the electronic resource acquisition workflow to guide the library in digital collection development. The workflow includes four stages and a description of the information to be recorded in the individual stages. The first stage is awareness of resources, gathering information on the details of the resources, expected benefits, and the date of proposal. The second stage is the initial assessment and evaluation, which includes information on decisions and feedback. The third stage is negotiation, including the correspondence of the negotiations, and the final stage is order and payment, which includes information on details of the license, budget alteration, recurrent costs,

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notification to the requestor, and renewal date. In the broader term of resource acquisition, Edelman (1979) introduced the hierarchy of the collection process, which begins with collection development as a planning function, followed by the selection of the tactical process, and finally, acquisition implementation of the decision in the selection process. Later, Gorman (2003) and Gorman and Howes (1989) defined modern world collection development, which includes tangible objects owned by the library, intangible resources owned and controlled by the library, tangible objects owned by other libraries accessible by the local user, and remote intangible resources. The collection management process in the electronic era was outlined by Fieldhouse (2012), which incorporates selection and acquisition, budget allocation and management, serial and electronic resource management and access control, stock evaluation, weeding, storage and preservation, liaison, and collaboration with other institutions. In particular, in the acquisition process, Fieldhouse (2012) listed ordering, receipting, preparing items for shelves, and providing access. However, their view was challenged by Wilkinson and Lewis (2003), who mentioned that the responsibility to acquire quality materials remains the core activity within practice, even though the format has changed. Collection development has been examined since 1976, with the journal publication *Collection Management, Library Acquisition: Practice and Theory (1977).* This study investigated e-journal acquisition. Elguindi and Schmidt (2012) studied the effects of e-journals on acquisition librarians. This entailed a new job title, that of an electronic resource librarian. Similarly, Pomerantz (2010) studied the responsibilities of the electronic resource librarian and reported that most librarians' primary responsibilities are not limited to the acquisition of electronic resources only. Other than e-journal acquisition (Anderson & Crosby, 2018; Hampson & Stregger, 2017), there is usage of the resource.(Botchkarev, 2017; Chang, 2017; Chew, Schoenborn, Stemper, & Lilyard, 1986; Horner, 2017; Huryk, 2010; Ke, Kwakkelaar, Tai, & Chen, 2002) . Studies on the acquisition of electronic resources, including multimedia resources, are divided into four domains: collection development approach (Derven & Kendlin, 2011; Foudy & McManus, 2005; Gallagher, Bauer & Dollar, 2005), collection evaluation, including patron-driven acquisition, and evidence-based acquisition (Hogenboom,Sheehan & 2017;Hosburgh, 2014; Spratt, Wiersma, Glazier, & Pan, 2017; Stewart, 2011;), while the usage and utilization in various libraries, including academic and public libraries (Ayoku & Okafor, 2015; Airen,Ganiyu, & Oluwafemi, 2014; Giannetti, 2016; Montenegro et al., 2016; Tahir, Mahmood, & Shafique, 2010; Wu & Chen,

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2012) and e-resource marketing in academic libraries (Jotwani, 2014). The rich source of e-resource acquisition research demonstrates the growth of EBL study implementation. However, variations in evidence sources in e-resource acquisition need to be carefully appraised. A review of the literature suggests that this study incorporates research evidence, local evidence, professional knowledge, user needs and preferences as dimensions representing EBL.

Theoretical Framework

This study uses four (4) models/theories to develop a theoretical framework. Inclusion of the model/theory is based on the following justification:

The concern-based adoption model (CBAM) was originally employed in the education sector but has been widely used in EBM, EBP, and EBL (Thankachan & Miller, 2017). A previous study in EBL used CBAM specifically to identify the practitioners' or implementers' individual levels of concern towards practice implementation (Kang, 2016; Mina, 2017). With reference to both pieces of evidence, CBAM was found suitable for this research objective and context.

Innovation diffusion theory (IDT): The five stages of the innovation-decision process in the EBL study are used to identify the diffusion of innovation, such as evidence practice in adoption decision and implementation stages. Innovation decision stages are mostly used to identify the implementers' adoption decision stages and the level of implementation of a particular practice, intervention, or innovation. IDT has also been individually applied in studies focusing on the identification of individual perception as an influential factor in innovation adoption and acceptance, and a variety of innovations, including technology innovation and management innovation (Phelps, 2016; Rogers, 1995, 2003).

The adoption of the technology-organization-environment (TOE) framework as the main or partial research framework is typical in technology innovation-related studies. However, recently several studies opted for TOE in management innovation, such as environmental management practice (Ibrahim & Jaafar, 2016), social media marketing (Matikiti et al., 2018), and knowledge management practice (Evangelista et al., 2010). These studies have consistently reported that TOE constructs are applicable in management studies. No evidence of TOE shortcomings or inadequacy in achieving the objectives of the studies has been reported. The wide application of TOE in management innovation enlightens this research by adopting TOE as a part of the framework.

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The evidence-based librarianship model by Koufogiannakis (2012, 2013b) explains the elements of evidence used by librarians and information professionals in their daily decision-making practices. EBL is widely accepted by information professionals in various fields. Booth (2003) agreed that EBL is the best approach capable of improving professional judgements.

Instrument development

This instrument is developed based on Technology-Organization-Environment (TOE) Model, Concern-based Adoption Model (CBAM), Innovation Diffusion Theory (IDT) 5 Stages in Innovation Decision Process Model, and Evidence-based Librarianship (EBL) Model. The EBL model was first introduced by Crumley and Koufogiannakis (2002) and explains the elements of evidence used by librarians and information professionals in their daily decision-making practice. However, this study utilized Koufogiannakis's (2012, 2013b) instrument to measure librarians' conception and use of evidence sources in decision-making. Three dimensions of the EBL model–research evidence, local evidence, and professional knowledge–measure the implementation of EBL in e-resources acquisition. The scale used for all items was a 7-point Likert scale. Refer to link https://doi.org/10.6084/m9.figshare.20171231for the entire instrument.

METHODS

Research Design

This study employs a quantitative method using survey research techniques. The survey instrument was assessed using SMART PLS-SEM 3.0, to determine its validity and reliability. The smart PLS-SEM 3.0 analysis of validity and reliability was divided into two analyses: i) analysis of the measurement model (outer model) and ii) analysis of the structural model (inner model).

Population

The research instrument was intended to investigate librarians' adoption and implementation of EBL in the acquisition of electronic resources, and the unit of study concentrated on practising librarians within library and information center management. This research identified 1,040 librarians: 30 librarians from the National Library of Malaysia, 160 librarians from public and state libraries, 100 librarians from special and research libraries, and750 librarians from academic/higher institution libraries. The librarians' portfolios were categorized into four levels of library management and acquisition positions: library top management (head of the library and chief librarians), head of department, head

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of a unit, and other positions involved in electronic resource acquisition decisions.

Sampling

A sample is a representative group of cases from the population, and the sample must consist of all characteristics of the population as a whole (Picardi & Masick 2014).The sample size was identified based on the (Krejcie & Morgan, 1970) sample size table, which indicated 278 samples for 1000-1099 number of populations. In sampling out the 278 samples, this research applied probability sampling techniques using the proportionate stratified sampling techniques. This technique provides an equal chance for members of the population to be chosen as the sample (Kumar, 2014). Calculation of the proportionate stratified sampling identified 50 (17.9%) samples for the first stratum (public and national libraries), 201 (72.1%) samples from the second stratum (academic/ higher institution libraries), and 27 (10%) samples from the third stratum (special and research libraries). The calculation is based on the following equation:

$$nh = \left(\frac{Nh}{N}\right) * n$$

Where: nh = sample size for stratum h, Nh = the population size for the stratum h, N = total population size and n = total sample size.

Data Collection

Data were collected via a survey mailed to librarians. Two approval processes were involved: approval from the faculty and approval from the selected libraries before sending out the survey or scheduling a face-to-face meeting. A request for approval to explain the objectives, responsibilities, and eligibility to participate in the survey was emailed to the selected libraries. A dual-mode approach was utilized to reach the maximum number of respondents owing to varying geographical locations. The dual approach included completing the survey in the presence of the researcher for libraries in the central area of the country (Klang Valley) and filling out the survey without the presence of the researcher for libraries located at a distance.

Response Rate

This study achieved a high response rate of 89.9% (250 responses) out of the total 287 samples. This was above the response rate in library science research, where the normal percentage was between 63%-75% (Burkell, 2003). The Approval Approach, similar to the personal invitation approach (Rogelberg & Stanton, 2007; Solomon, 2001), was applied, whereby a personalized cover letter

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was sent to individual respondents with the questionnaire. Using the approval approach, an invitation letter was sent to the head of the library to seek approval prior to sending out the questionnaire to the respondents. Approval from the head of the library can be a vital influence for librarians to respond to a survey, as it represents a top-down decision. (Rookey, Le, Littlejohn, & Dillman,2012) reported a high average response rate level of 76% from respondents who agreed to participate. Applying the approval approach is a practical technique for increasing the response rate.

The response rate calculation was based on two methods: the initial response rate (IRR) and usable response rate (URR). The IRR calculates the total responses received, whereas the URR only counts valid and usable responses. Analysis of the response rates revealed that out of the 260 total responses received (IRR), 250 were identified as usable responses (URR) after the screening process. The ten responses with discrepancies were categorized as unusable and were excluded from the data analysis.

Data Analysis

Analyses of the instrument construct validity and reliability were performed using the Smart PLS-SEM 3.0. According to Ibrahim and Tain (2016), the analysis involved two-level models:

i. Analysis of the measurement model to assess the instrument construct validity using internal consistency of the Cronbach's alpha (CR) value, the convergent validity using factor loading and average variance extracted (AVE) values, and discriminant validity using Fornell-Larcker's criterion and cross-loading value(Hair, Hult, Ringle, & Sarstedt, 2017; Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014);

ii. Analysis of the structural model to assess the construct reliability using the model predictive accuracy analyses. The model predictive accuracy involved coefficient determination (R^2), predictive relevance (Q^2), effect size (f^2), and VIF (Collinearity Statistics).

RESULT

Construct validity and reliability are reported in two sections:

i. Analysis of the measurement model (outer model) and

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ii. Analysis of the structural model (inner model). Both the outer and inner models follow the Smart PLS-SEM 3.0 requirements of structural model analysis.

Analysis of the construct validity and reliability of the measurement model was based on:

i. Internal consistency

Internal consistency analysis using Cronbach's alpha and composite reliability resulted in all dimensions being accepted at a score from 0.718 to 0.955, which exceeded the cut-off point of >.07 Cronbach's alpha. The composite reliability (CR) value was acceptable (Gefen, Straub, & Boudreau, 2000)with all dimension values of n > 0.70.

ii. Convergent Validity

Convergent validity was assessed using indicator loading and the average variance extracted (AVE) value. It was considered satisfactory since all dimension values exceeded the cut-off point of >.50(Byrne, 2010; Fornell & Larcker, 1981; Hair, Sarstedt, et al., 2014). For item loading, the cut off value for this report was accepted at 0.6, where 0.4 – 0.6 was considered acceptable (Hair, Black, Babin, & Anderson, 2010). Thus, the model achieved internal consistency and convergent validity.Table 4 describes the construct's Cronbach's alpha, CR, AVE value, and item loadings.

Table 4

Measurement Model Analysis

Construct	Items	Loading	CA	CR	AVE
Relative Advantage			**0.955**	**0.962**	**0.762**
	RELADV1: Using EBL enables me to accomplish tasks more quickly.	0.863			
	RELAD2: Using EBL improves my quality of work	0.940			
	RELADV3: Using EBL makes my job easier	0.899			
	RELADV4: Using EBL improves my job performance	0.930			
	RELADV5: Overall, I find using EBL to be advantageous in my job	0.770			
	RELADV6: Using EBL enhances effectiveness on my job	0.905			
	RELADV7: Using EBL gives me greater control over my work	0.881			
	RELADV8: Using EBL increases my work productivity	0.777			
Compatibility			**0.954**	**0.970**	**0.916**
	COMPAT1: EBL fits well with the way	0.963			

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	I work				
	COMPAT2: EBL fits well into my working style	0.973			
	COMPAT3: The implementation of EBL is compatible with my work way	0.935			
Complexity			**0.718**	**0.887**	**0.780**
	COMPLEX1: EBL is flexible to use	0.837			
	COMPLEX2: Using EBL exposes me to the sensitivity of information as evidence	0.853			
	COMPLEX3:Using EBL, I find it difficult to integrate my currency work with the evidence*	**0.145**			
	COMPLEX4: Gathering evidence takes up too much of my time	0.606			
Organizational Readiness			**0.794**	**0.879**	**0.708**
	ORGRED1: My organization hires highly specialized personnel for EBL	0.864			
	ORGRED2: We have sufficient resources to implement EBL	0.824			
	ORGRED3: We allocate some amount of budget to implement EBL	0.837			
Top Management Support			**0.928**	**0.949**	**0.824**
	TMS1: My top management exhibits a culture of innovativeness	0.831			
	TMS2: My top management provides strong leadership and engagement in the implementation of EBL	0.938			
	TMS3: My top management is likely to consider the adoption of EBL as strategically important	0.941			
	TMS4: My top management is willing to take risks involved in the adoption of EBL	0.918			
Training and Education			**0.933**	**0.957**	**0.882**
	TAE1: My organization provides me complete training in practicing EBL	0.917			
	TAE2: My level of understanding has substantially improved after going through the training program on EBL	0.963			
	TAE3: The training gave me confidence in implementing EBL	0.936			
Concern			**0.965**	**0.968**	**0.549**
	CEBL1: I am concerned about librarians' attitudes toward EBL	0.641			
	CEBL2:I am concerned about not having enough time to organize myself each day*	**0.512**			
	CEBL3:I am concerned about the conflict between my interest and my	**0.494**			

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responsibilities *	
CEBL4: I am concerned about revising my use of EBL	0.969
CEBL5: I am concerned about how EBL affects library users	0.716
CEBL6: I am concerned about evaluating my impact on users	0.672
CEBL7: I am concerned about the time spent working with non-library problems related to the EBL	0.687
CEBL8: I am concerned about my inability to manage all that the EBL requirements	0.677
CEBL9: I am more concerned about another innovation	0.667
CEBL10:I am not concerned about EBL at this time*	**0.387**
CEBL11: I now know other approaches that might work better*	**0.573**
CEBL12: I have very limited knowledge of EBL*	**0.427**
CEBL13: I am preoccupied with things other than EBL*	**0.477**
CEBL14: I spend little time thinking about EBL*	**0.497**
CEBL15: I would like to know the effect of the reorganization on my professional status	0.752
CEBL16: I would like to develop working relationships with both our library and outside library using EBL	0.762
CEBL17: I would like to help other libraries in their use of EBL	0.707
CEBL18: I would like to know who will make the decisions in EBL practice	0.757
CEBL19: I would like to discuss the possibility of using EBL	0.798
CEBL20:I would like to know what resources are available if we decide to adopt EBL*	**0.279**
CEBL21: I would like to know how my work is supposed to change	0.753
CEBL22: I would like to familiarize other personnel with the progress of this new approach	0.765
CEBL23: I would like to revise EBL approach	0.605
CEBL24: I would like to excite my library users about their part in EBL	0.768
CEBL25: I would like to know what the use of EBL will require in my	0.844

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	immediate future				
	CEBL26: I would like to modify our use of EBL based on the experiences of our library users*	**0.208**			
	CEBL27: I would like to coordinate my efforts with others to maximize the EBL's effects	0.777			
	CEBL28: I would like to have more information on the time and energy commitments required by the innovation	0.796			
	CEBL29: I would like to know what other libraries are doing in this area	0.730			
	CEBL30: I would like to determine how to supplement, enhance, or replace EBL	0.766			
	CEBL31: I would like to use feedback from library users to change the approach	0.801			
	CEBL32: I would like to know how my role will change when I am using EBL	0.798			
	CEBL33: I would like to know how EBL is better than what we have now	0.747			
	CEBL34: Coordination of task and people is taking too much of my time	0.670			
	CEBL35:Currently, other priorities prevent me from focusing my attention on the EBL*	**0.558**			
User Needs and Preferences			**0.880**	**0.914**	**0.683**
	UNAP1: I normally consider individual user needs in acquisition decision	0.719			
	UNAP2: I normally consider user behavior (activity and action) in acquisition decision	0.866			
	UNAP3: I normally consider user circulation behavior (pattern of usage) in acquisition decision	0.896			
	UNAP4: I normally consider user feedback in acquisition decision	0.916			
	UNAP5: I normally consider faculty/department priorities in acquisition decision	0.710			
Adoption			**0.865**	**0.918**	**0.788**
	ADOP1: Adopting EBL is advantageous	0.843			
	ADOP2: Considering adopting EBL in the near future	0.918			
	ADOP3: Adopting EBL is beneficial, but I am still researching on it	0.876			

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	ADOP4: Declining the adoption of EBL*	**0.260**			
Implementation			**0.960**	**0.964**	**0.625**
	RESEV1: I refer to a research report in acquisition decision	0.761			
	RESEV2: I refer to supplier statistical report in acquisition decision	0.809			
	RESEV3: I refer to literature report in acquisition decision	0.752			
	RESEV4: I refer to reviews in the acquisition decision *(Example: publisher's review and reader's review)*	0.798			
	RESEV5: I refer to systematic reviews in acquisition decision	0.859			
	RESEV6: I refer to bibliometric reports in acquisition decision	0.818			
	LOCAL1: I refer to the internal standard *(Standard Operating Procedure)* in acquisition decision	0.779			
	LOCAL2: I refer to the best practice in acquisition decision	0.781			
	LOCAL3: I refer to unpublished survey reports in acquisition decision*	**0.327**			
	LOCAL4: I refer to in-house usage statistics in acquisition decision *(Example: ILL report)*	0.807			
	LOCAL5: I refer to collection analysis report in acquisition decision *(Example: Circulation report)*	0.841			
	PROK1: I refer to professional standard in acquisition decision *(Example: Standard PerpustakaandanKolejdanUniversiti Awam)*	0.848			
	PROK2: I refer to professional guidelines in acquisition decision *(Example: IFLA Standard for Information Literacy)*	0.848			
	PROK3: I consider professional tacit knowledge in acquisition decision	0.735			
	PROK4: I consider my own experience in acquisition decision	0.677			
	PROK5: I consider other librarians' experience in acquisition decision	0.750			
	PROK6: I consider expert opinions in acquisition decision.	0.758			

*Note. * Item loading below 0.7 are suggested to be retained due to AVE > 0.5*

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i. Discriminant validity

Discriminant validity was assessed using the Fornell-Larcker criterion and item cross loading. The Fornell-Larcker test revealed that the individual construct loading was greater than in another construct loading and obtained a value of less than 0.1 as in the model suggested by Chin (1998);Adoption=0.888, Compatibility=0.957, Complexity=0.883, Concern=0.751, Local evidence= 0.887, Practice=0.775, Organizational readiness=0.894, Professional knowledge = 0.826, Relative advantage=0.873, Research evidence = 0.885, Top management support=0.908, Training and education=0.939 and User needs and preferences=0.826. Thus, the model met the requirements for discriminant validity. Table 5 presents the Fornell and Larckercriteria. The items were assessed for discriminant validity using their cross-loading values. Item loading must be higher in the construct than in another construct. The loading indicator requirement item loaded at 0.7 or higher was recommended, but lower loadings (0.4) are adequate (Hair, et al., 2014). A loading of 0.6 was acceptable for this study, and discriminant validity was achieved. Table 6 explains the item cross-loadings.

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i) Fornell-Larcker Criterion

Table 5

Fornell-Larcker Criterion

	Adoption	Compatibility	Complexity	Concern	Implementation	Organizational Readiness	Relative Advantage	Top Management Support	Training and Education	User Needs and Preferences
Adoption	**0.888**									
Compatibility	0.457	**0.957**								
Complexity	0.413	0.829	**0.883**							
Concern	0.619	0.411	0.450	**0.741**						
Implementation	0.475	0.406	0.404	0.572	**0.791**					
Organizational Readiness	0.355	0.439	0.455	0.197	0.429	**0.842**				
Relative Advantage	0.438	0.781	0.767	0.423	0.354	0.353	**0.873**			
Top Management Support	0.458	0.489	0.512	0.446	0.487	0.628	0.404	**0.908**		
Training and Education	0.348	0.327	0.305	0.384	0.473	0.680	0.196	0.708	**0.939**	
User Needs and Preferences	0.467	0.332	0.291	0.602	0.537	0.142	0.338	0.274	0.289	**0.826**

Note. *Square root of the AVE on the diagonal*

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ii) Item Cross Loading

Table 6

Item Cross Loading

Items	Adoption	Concern	Implementation	Technology-Organization-Environment	User Needs and Preferences
ADOP1	**0.899**	0.433	0.390	0.339	0.488
ADOP2	**0.938**	0.483	0.488	0.510	0.635
ADOP3	**0.899**	0.508	0.449	0.445	0.552
CEBL1	0.378	**0.659**	0.171	0.258	0.443
CEBL16	0.351	**0.680**	0.167	0.307	0.388
CEBL17	0.360	**0.645**	0.292	0.428	0.369
CEBL18	0.337	**0.655**	0.194	0.274	0.406
CEBL19	0.395	**0.676**	0.207	0.358	0.434
CEBL20	0.327	**0.733**	0.186	0.357	0.456
CEBL21	0.452	**0.746**	0.242	0.318	0.573
CEBL22	0.370	**0.628**	0.336	0.378	0.474
CEBL23	0.380	**0.714**	0.383	0.580	0.385
CEBL24	0.348	**0.692**	0.356	0.597	0.340
CEBL25	0.339	**0.769**	0.166	0.406	0.365
CEBL26	0.366	**0.750**	0.351	0.568	0.360
CEBL27	0.467	**0.759**	0.426	0.516	0.368
CEBL28	0.387	**0.797**	0.163	0.394	0.421
CEBL29	0.405	**0.779**	0.189	0.352	0.465
CEBL30	0.261	**0.693**	0.337	0.352	0.363
CEBL31	0.353	**0.763**	0.290	0.406	0.423
CEBL32	0.361	**0.784**	0.267	0.430	0.465
CEBL33	0.333	**0.686**	0.245	0.245	0.459
CEBL34	0.395	**0.658**	0.319	0.398	0.377
COMPAT1	0.350	0.414	0.261	**0.783**	0.258
COMPAT2	0.323	0.431	0.169	**0.760**	0.224
COMPAT3	0.355	0.453	0.377	**0.770**	0.367
COMPLEX1	0.392	0.331	0.188	**0.687**	0.280
COMPLEX2	0.450	0.494	0.475	**0.778**	0.458
LOCAL1	0.506	0.372	**0.706**	0.232	0.294

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Items	Adoption	Concern	Implementation	Technology-Organization-Environment	User Needs and Preferences
LOCAL2	0.420	0.349	**0.866**	0.280	0.254
LOCAL3	0.184	0.149	**0.682**	0.266	0.104
LOCAL4	0.329	0.184	**0.801**	0.279	0.144
LOCAL5	0.363	0.302	**0.821**	0.321	0.178
PROK1	0.517	0.425	**0.798**	0.420	0.428
PROK2	0.476	0.160	**0.709**	0.284	0.273
PROK5	0.295	0.256	**0.766**	0.327	0.241
PROK6	0.364	0.361	**0.829**	0.409	0.292
PROK3	0.336	0.256	**0.800**	0.382	0.240
RELADV1	0.392	0.492	0.267	**0.868**	0.399
RELADV2	0.458	0.470	0.338	**0.859**	0.424
RELADV3	0.347	0.407	0.337	**0.867**	0.325
RELADV4	0.387	0.483	0.408	**0.875**	0.413
RELADV5	0.525	0.466	0.340	**0.788**	0.392
RELADV6	0.473	0.471	0.429	**0.876**	0.407
RELADV7	0.255	0.387	0.262	**0.787**	0.333
RELADV8	0.270	0.399	0.284	**0.841**	0.297
RESEV1	0.354	0.280	**0.753**	0.370	0.207
RESEV2	0.280	0.196	**0.824**	0.226	0.067
RESEV3	0.230	0.246	**0.804**	0.346	0.162
RESEV4	0.319	0.300	**0.825**	0.413	0.253
RESEV5	0.419	0.287	**0.848**	0.387	0.276
RESEV6	0.397	0.361	**0.742**	0.478	0.251
TMS1	0.221	0.376	0.250	**0.520**	0.265
TMS2	0.181	0.313	0.515	**0.540**	0.201
TMS3	0.204	0.380	0.402	**0.620**	0.250
TMS4	0.294	0.398	0.423	**0.619**	0.262
UNAP1	0.429	0.535	0.229	0.455	**0.788**
UNAP2	0.554	0.520	0.331	0.293	**0.889**
UNAP3	0.564	0.468	0.319	0.303	**0.800**
UNAP4	0.471	0.532	0.282	0.493	**0.864**
UNAP5	0.519	0.388	0.121	0.328	**0.800**

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Analysis of the structural model reports the construct validity and reliability was based on:

i. Model Predictive accuracy analysis

ii. Coefficient Determination (R^2)

The model predictive accuracy was assessed using the coefficient of determination (R^2). This analysis followed the rule of thumb suggested by Hair et al. (2014), which indicated 0.75, 0.50, and 0.25 as substantial, moderate, and weak levels of predictive accuracy, respectively. As this model's R^2 score was at Adoption (0.300) and Implementation (0.399), its predictive accuracy was considered moderate, as shown in Table 7.

Table7

R^2 Score

	R Square
Adoption	0.300
Implementation	0.399

i. Predictive Relevance (Q^2)

The predictive relevance of the model was measured using the Q^2 value. $Q^2$was 0.213 for adoption, and 0.227 for implementation. This indicates that the model has sufficient predictive relevance, as the cutoff point was Q^2> 0 (Cohen, 1988).

ii. Effect Size

Cohen's f^2 analysis (Cohen, 1988)was used to evaluate the effect size of the predictor construct. This analysis followed the rule of thumb suggested by Cohen (1988), which considers large, medium, and small effect sizes of 0.35, 0.15, and 0.02, respectively. The result indicated that adoption (0.024) had a small effect on implementation, while complexity (0.013), compatibility (0.002), organizational readiness (0.000), relative advantage (0.025), top management support (0.034), and training and education (0.004) had a small effect on adoption. Concerns (0.077) and user needs and preferences (0.081) had a minor effect on implementation. Table 8 displays the effect sizes of these variables.

Table 8

Effect Size

	Adoption	Implementation
Adoption		0.024
Compatibility	0.013	
Complexity	0.002	
Concern		0.077

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Organizational readiness	0.000	
Relative advantage	0.025	
Top Management support	0.034	
Training and education	0.004	
User Needs and preferences		0.081

i) VIF (Collinearity Statistics)

Collinearity is critical for the assessment of the structural model. According to (Kock & Lynn, 2012), despite discriminant validity (vertical collinearity), the lateral collinearity issue (predictor criterion collinearity) may create misleading research findings. It was important to assess the VIF value of the predictor constructs to ensure that there was no multi-collinearity among the constructs. The VIF value cut off used in this study followed the recommendation of(Hair et al., 2010), which must be below 5. Any value higher than 5 indicated potential collinearity problems. Table 9 displays the constructs' VIF values. All constructs obtained values below five; thus, this structural model was free from collinearity problems.

Table9

VIF Value

	Adoption	Implementation
Adoption		1.657
Compatibility	3.953	
Complexity	3.860	
Concern		2.035
Organization Readiness	2.188	
Relative Advantage	2.983	
Top Management Support	2.560	
Training and Education	2.630	
User Needs and Preferences		1.606

DISCUSSION

The validity and reliability assessment, including measurement and structural model analysis, indicated that the instrument was in good order. The internal consistency value of Cronbach's alpha showed that all constructs' scores were between 0.718 and 0.965, indicating that the scale was highly reliable and that the items were highly related to the construct (Cronbach, 1988). Internal consistency measured by the composite reliability (CR) value was within the acceptable range, where the acceptable CR value should be between 0.70 and 0.90(Gefen et al., 2000).The convergent validity value of AVE should account for

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at least 50 % of the indicator variance (AVE > 0.50) (Hair et al., 2014) to prove the construct sufficiently explains the indicator's variance. The AVE value of the constructs in this instrument showed a maximum 0.90 and a minimum of 0.50. Constructs with a low AVE value should be complemented with an acceptable CR value to be accepted(Ramayah & Chuah 2017). Discriminant validity, which measures the loadings of each indicator, requires that the loading of the individual indicator be higher in the designated construct compared to other constructs on a diagonal. The loadings are indicated by the Fornell–Larcker criterion and item cross-loading. Analyses of the instrument provided evidence of fulfilling the discriminant validity requirements. All constructs explained the variance of its indicator (high square root of the AVE in its indicator) and the high item cross-loading value on the assigned indicator variable compared to other variables. The measurement model had a satisfactory and acceptable value to meet the requirements of construct validity and reliability.

Structural model analysis begins with a model-predictive relevancy assessment. The coefficient of determination (R^2) was used to measure the model predictive accuracy, which assessed the effect of the exogenous construct (independent variables) on the endogenous construct (dependent variables), and the acceptable effect range was between 0.75, 0.50 and 0.25 (Hair et al., 2014). Model R^2 values were considered moderate at 0.300 (adoption) and 0.399 (implementation). A predictive relevance analysis of Q^2wasused to compare the original value with the predictive value to calculate the predictive error. A model with a low predictive error has high predictive accuracy. The Q^2 value should be greater than zero in the endogenous construct. Based on the above requirement, both endogenous constructs in the instrument (adoption = 0.213, implementation = 0.227) indicated sufficient prediction relevancy values. The third analysis was effect size (f^2), which measured the relative impact or strength of the explanation of exogenous variables on the endogenous variables (Cohen, 1988). The effect size of model prediction accuracy was rated for medium and small effect sizes. The collinearity statistical analysis of the variance inflation factor (VIF) used to identify each construct was assessed separately. VIF indicates the overlapping of variables when measuring the same construct. The value according to Hair et al. (2014) was VIF<5.0, indicating potential collinearity. The results of the analysis revealed no collinearity issues in the instrument because all the values obtained were less than 5. Overall, the instrument met all the analysis

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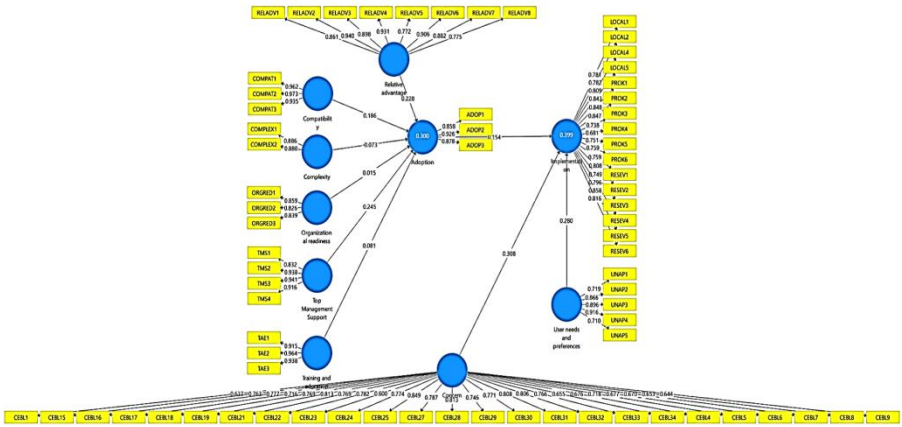
requirements for construct validity and reliability assessment. The overall measurement model is displayed in Figure1.

Figure 1

Measurement Model



CONCLUSION

The construct validity and reliability assessment of the instrument provided evidence of acceptable validity and reliability, and the structural model revealed a collinearity problem. Thus, the instrument is valid and reliable for measuring the adoption and implementation of evidence-based librarianship in electronic resource-acquisition decisions. The instrument was developed based on well-established theories/models (TOE, IDT, and CBAM), and the newly added construct (user needs and preferences) was significantly validated in the extended frame work. This has methodologically contributed to the valid instrument of EBL adoption and implementation in e-resource acquisition; libraries and librarians may benefit from the instrument in terms of developing practice guidelines for e-resource acquisition, including the needs and preferences of users and concerns of librarians. Furthermore, the guidelines in acquisition decision-making will consequently contribute to transparent decision-making and further enhance the professional image of librarians.

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