Asian Social Science; Vol. 9, No. 15; 2013
ISSN 1911-2017 E-ISSN 1911-2025
Published by Canadian Center of Science and Education

Factor Retention Decisions in Exploratory Factor Analysis Results: A Study Type of Knowledge Management Process at Malaysian University Libraries

Che Rusuli M. S.[1], Tasmin R.[1], Takala J.[2] & Norazlin H.[3]

[1] Department of Production and Operation, Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Batu Pahat, Malaysia

[2] Department of Production, Faculty of Technology, University of Vaasa, City of Vaasa, Finland

[3] Department of Information Technology, Center For Diploma Studies, Universiti Tun Hussein Onn Malaysia, Batu Pahat, Malaysia

Correspondence: Che Rusuli M. S., Department of Production and Operation, Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Batu Pahat 86400, Malaysia. E-mail: msaufi@uthm.edu.my

Received: July 24, 2013 Accepted: August 30, 2013 Online Published: October 29, 2013

doi:10.5539/ass.v9n15p227 URL: http://dx.doi.org/ass.v9n15p227

Abstract

Structural equation modeling (SEM) is a versatile statistical modeling tool which uses in the social sciences research. Recently, in Library and Information Science (LIS) environment, structural equation modeling has gained popularity across many disciplines, due to its generality and flexibility. Its estimation techniques, modeling capabilities and breadth of application are expanding rapidly. This paper reported a structural equation modeling through an Exploratory Factor Analysis (EFA) result, which involves 300 lead users at six selected Malaysian university libraries through survey. The decision of how many factors to retain is a critical component of exploratory factor analysis. Evidence is presented that parallel analysis is one of the most accurate factor retention methods. SPSS 20 was utilized to analyze the factor analysis data. In this regards, the results of EFA could provide empirical evidence of each hypotheses construct. It is hoped that the EFA results could be used to level Confirmatory Factor Analysis (CFA) to perform full Structural Equation Modeling.

Keywords: structural equation modeling, exploratory factor analysis, confirmatory factor analysis (CFA), library and information science

1. Introduction

Structural Equation Modeling (SEM) is an extension of the general linear model (GLM) that enables a researcher to test a set of regression equation simultaneously. Structural Equation Modeling (SEM) is a technique used for specifying and estimating models of linear relationships among variables (Hair, Black, Babin, Anderson & Tatham, 2006; MacCallum & Austin, 2000). More specifically, various theoretical models can be tested in SEM that hypothesis how sets of variables define constructs and how these constructs are related to each other (Schumacker & Lomax, 2004). The use of structural equation modeling (SEM) techniques in this study is the most suitable way to evaluate the fit of the proposed model (Hair et al., 2006; MacCallum & Austin, 2000; Schumacker & Lomax, 2004). In addition, Hair et al. stated that SEM is a "new analytical tool" which in the recent decade, gains a wider acceptance to be "the dominant multivariate technique" in academic and social science studies. In fact, SEM is also a technique which has many advantageous capabilities such as SEM is able to estimate multiple and interrelated dependence relationships; it is able to characterize unobserved conceptions in these relationships; it is capable to correct measurement errors in estimation processes; and it is capable to identify a model describes the whole set of relationships. This research aimed to utilize SEM to evaluate KM processes type measurement through EFA for each of one process that could be retained. One major reason for SEM being applied in this study is due to its ability to execute simultaneous multiple assessments comprehensively (Hair et al., 2006). In addition to, Schumacker and Lomax (2004) note that researchers which use SEM are becoming more aware of the need to use multiple observed variables to better understand their area.

Factor analysis is a statistical approaches that can be used to analyzed interrelationships among large number of

variables (Geldhof, Preacher & Zyphur, 2013; Hair et al., 2006; Schumacker & Lomax, 2004). According to Hair et al., these explain variables in terms of their common underlying dimensions (factors). The objective of factor analysis is to considering a way the information contained in a number of original variables into a smaller set of factor with a minimum loss of information (Hair et al., 2006). With factor analysis, the researcher or analyst can identify the separate dimensions of the structure and then determine the extent to which each variable is explained by each dimension. Given the perspective that there is no true model, the search for the correct number of factors in EFA would seem to be a pointless undertaking (Preacher, Zhang, Kim & Mels, 2013). According to Cattell (1966), if the common factor model is correct in a given setting, it can be argued that the correct number of factors is at least much larger than the number and likely infinite. In this regards, Cattell (1966) emphasized that the researcher or analyst should consider not the correct number of factors but rather the number of factors that are worthwhile to retain. With this regards, the objectives of this paper are formulated as follows:

RO1. To investigate the process type and level of knowledge management practices in the library.

RO2. To compare significant relationships between knowledge creation, knowledge acquisition, knowledge capture, knowledge sharing, knowledge record and knowledge preserving associated with Knowledge management practices.

RO3. To evaluated the significant influential relationship between KM practices and library users' satisfaction.

However, the EFA has been applied to the following hypotheses and intends to test the seven hypothetical statements.

H_1-There is a significant influence of Knowledge Creation (KCr) on KM Practices.

H_2-There is a significant influence of Knowledge Acquisition (KAc) on KM Practices.

H_3– There is a significant influence of Knowledge Capture (KCa) on KM Practices.

H_4-There is a significant influence of Knowledge Sharing (KSh) on KM Practices.

H_5-There is a significant influence of Knowledge Record (KRe) on KM Practices.

H_6-There is a significant influence of Knowledge Preserving (KPr) on KM Practices.

H_7-There is a significant influence of KM Practices on Library Users' Satisfaction.

In Malaysia, the academic library has been described as the "heart" of the learning community where it providing a place for students and faculty to do their research and advance their knowledge. Most of the early studies by Lowenthal (1990) and Tyckoson (1992) focus on assessing reference services then later studies by Edward and Browne (1995). Whilst, studies done by Kulthau (1993) introduces the concept of bibliographic instruction in helping users locate sources and to reduce uncertainties, which is felt when seeking for information and is considered as an influencing factor when judging quality reference service. In fact, Kulthau also brings in the human factor in measuring performance as she finds that the placement of student reference assistance could only result in the solution to 36% of reference enquiries and unprofessional staff's handling of reference enquiries is not satisfactory to users. Other studies have included collection sizes and budget allocations as predictors of effective service (Broady-Preston & Preston, 1999). In recent decades, knowledge management (KM) has been perceived as another potential viable response to the challenges that the LIS profession is facing in a continuously changing environment (Fagbola, Uzoigwe & Ajegbomogun, 2011; Khangala, 2004; Kumar, 2010; Maponya, 2004; Mavodza, 2010; Morris, 2001; Sarrafzadeh, Martin & Hazeri, 2010). In this situation, LIS professionals' expertise in knowledge organization, information professionals have been encouraged to make a serious contribution to the practice of KM in their organizations (Sarrafzadeh, Martin & Hazeri, 2006; Sarrafzadeh et al., 2010). Therefore, there is a need for studies on KM practices and Library User Satisfaction to substantial the gap at Malaysian university libraries because of the library collection services rated almost average by its users.

Maponya (2004) revealed that academic library collections are no longer collections comprised almost entirely of printed materials but collections comprised almost of materials in multiple formats and media. In fact recently, Information Technologies (IT) such as computers, multimedia and CD-ROMs are bringing unprecedented abilities to academic libraries in providing services and resources to the university community. Therefore, the printed version of library collections has been converted into digital form from time to time. This is what the results from User Satisfaction Survey was carried out. An average results from earlier user satisfaction survey indicates that librarians and library, maybe not aware with the linking of KM practices towards user satisfaction. These technologies however, require greater responsibility to academic librarians. The challenge for academic

librarians is to manage Library Collections, which offer users a carefully selected mix of multiple formats and media. Academic libraries should rethink their role in the whole university community.

However, there is a need to support the needs of the users since the teaching and learning patterns in universities changed. With the same school of thought with Maponya, Foo et al. (2002) stresses that one main challenge facing academic libraries in the networked online environment is to exploit all forms of digital and telecommunication technologies and find new ways and means to provide feasible forms of collections, services and access to library materials. Foo et al. (2002) state that as academic libraries become more involved with information infrastructure building, it is appropriate to iterate the four main components of information organizations in the information age such as software, hardware, human resources and data/information. Different organizational cultures in such situations must be addressed to ensure the success of these mergers. In other words, academic librarians should extend their information management roles and enhance their knowledge management competencies. It is important for academic libraries to determine, manage and focus their knowledge assets (i.e. library collections) to avoid duplication of efforts. Knowledge management process involves the creation, acquisition, capturing, sharing, record and preserving of knowledge.

2. Methods

A set of questionnaire developed in this study was based on the comprehensive literature review (see Appendix) to set a measurement standard to construct structural model fitted. Every each of items develops were used unique code namely KCr1, KCr2, KCr3, KCr4, KCr5 and KCr6 as Knowledge Creation. During this study, EFA is used to explore the possible relationships in only the most general form to allow multivariate technique to estimate a relationship(s) (Hair et al., 2006). The items defining each research construct in this study were developed on the basis of theoretical rationale. Through EFA on a sample of data, the SPSS will generate and find the number of every latent variable in plausible model in this study. Hair et al. (2006) state that EFA is recommended as a precursor to confirmatory factor analysis (CFA) in this study. However, EFA was not used to explore the number of factors for research constructs, but rather to address and examine the unidimensionality of the constructs prior to the application of CFA. Next, Hair et al. (2006) suggests the Bartlett test of sphericity, a statistical test for presence of correlation among variable. In this study, a measure of sampling adequacy (MSA) tests was performed using EFA to ensure that the variables are sufficiently intercorrelated to produce representative factors. In the SPSS software, the MSA is measured by the value of Kaiser-Meyer-Olkin (KMO) and the factorability of the correlation matrix is assumed if the Bartlett's test of sphericity is statistically significant (i.e., $p < 0.05$) and the MSA value is greater than 0.50 (Hair et al., 2006).

3. Results

Exploratory Factor Analysis (EFA) has widely been suggested as the appropriate tool when a theory is absent or new scales are being developed (Hair et al., 2006; Schumacker & Lomax, 2004). These identified factors are tested by using EFA method to examine their construct validity (Schumacker & Lomax, 2004). These factors are (1) Knowledge Creation, (2) Knowledge Acquisition, (3) Knowledge Capture, (4) Knowledge Sharing, (5) Knowledge Record, (6) Knowledge Preserving and (7) Library users' satisfaction. The exploratory factor analysis is done by applying the SPSS version 20. The objective of executing the EFA is twofold: (1) to attain good constructs' validity at this preliminary level and (2) to ensure only variables with high factor loading are retained.

3.1 EFA for Knowledge Creation

Four variables from the knowledge creation factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 1.

Table 1. KMO and Bartlett's test of variables for the knowledge creation

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.735
Bartlett's Test of Sphericity	Approx. Chi-Square	461.243
	df	15
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.735. This indicates good partial correlation

exhibited in the data for this study. Tabachnick and Fidell (2007) and Hair, *et al.* (2006) stated that the MSA must exceed 0.50. The Bartlett's test of Sphericity result is 0.0001 which means very significant. According to Hair, *et al.* (2006) states the significant level of *p* at less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge creation factor. Therefore, the variables of knowledge creation factor explain 45.3% of variance as shown in Table 2.

Table 2. Total variance explained for variables of the knowledge creation factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.717	45.287	45.287	2.717	45.287	45.287
2	1.159	19.321	64.608			
3	.723	12.044	76.652			
4	.603	10.052	86.704			
5	.439	7.320	94.024			
6	.359	5.976	100.000			

Extraction Method: Principal Component Analysis.

As such, all variables of knowledge creation factor have loading value higher than 0.50 as shown in Table 3.3. Hair, *et al.* (2006) stated that each individual variable must have value 0.5 and above. Therefore, these values indicate that they are highly interrelated with each other.

Table 3. Component matrix of the knowledge creation factor variables

	Component
	1
KCr1	.687
KCr2	.601
KCr3	.615
KCr4	.636
KCr5	.730
KCr6	.754

Extraction Method: Principal Component Analysis.

3.2 EFA for Knowledge Acquisition

Five variables from the knowledge acquisition factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 4.

Table 4. KMO and Bartlett's test of variables for the knowledge acquisition

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.767
Bartlett's Test of Sphericity	Approx. Chi-Square	412.508
	df	10
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.767. This indicates good partial correlation exhibited in the data for this study. The Bartlett's test of Sphericity result is 0.0001 which means very significant.

The significant level of p is less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge acquisition factor. Therefore, the variables of knowledge creation factor explain 52.3% of variance as shown in Table 5.

Table 5. Total variance explained for variables of the knowledge acquisition factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.617	52.332	52.332	2.617	52.332	52.332
2	.981	19.625	71.958			
3	.551	11.021	82.978			
4	.460	9.191	92.169			
5	.392	7.831	100.000			

Extraction Method: Principal Component Analysis.

All variables of knowledge acquisition factor have loading value higher than 0.50 as shown in Table 6. Therefore, these values indicate that they are highly interrelated with each other.

Table 6. Component matrix of the knowledge acquisition factor variables

	Component
	1
KAc1	.780
KAc2	.772
KAc3	.809
KAc4	.529
KAc5	.692

Extraction Method: Principal Component Analysis

3.3 EFA for Knowledge Capture

Five variables from the knowledge capture factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 7.

Table 7. KMO and Bartlett's test of variables for the knowledge capture

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.769
Bartlett's Test of Sphericity	Approx. Chi-Square	501.741
	df	10
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.769. This indicates good partial correlation exhibited in the data for this study. The Bartlett's test of Sphericity result is 0.0001 which means very significant. The significant level of p is less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge acquisition factor. Therefore, the variables of knowledge capture factor explain 56.4% of variance as shown in Table 8.

Table 8. Total variance explained for variables of the knowledge capture factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.818	56.363	56.363	2.818	56.363	56.363
2	.792	15.833	72.196			
3	.685	13.694	85.890			
4	.374	7.490	93.380			
5	.331	6.620	100.000			

Extraction Method: Principal Component Analysis.

All variables of knowledge capture factor have loading value higher than 0.50 as shown in Table 9. Therefore, these values indicate that they are highly interrelated with each other.

Table 9. Component matrix of the knowledge capture factor variables

	Component
	1
KCa1	.807
KCa2	.755
KCa3	.617
KCa4	.746
KCa5	.813

Extraction Method: Principal Component Analysis.

3.4 EFA for Knowledge Sharing

Six variables from the knowledge sharing factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 10.

Table 10. KMO and Bartlett's test of variables for the knowledge sharing

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	506.991
	df	15
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.821. This indicates strong partial correlation exhibited in the data for this study. The Bartlett's test of Sphericity result is 0.0001 which means very significant. The significant level of p is less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge acquisition factor. Therefore, the variables of knowledge sharing factor explain 49.8% of variance as shown in Table 11.

Table 11. Total variance explained for variables of the knowledge sharing factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.986	49.772	49.772	2.986	49.772	49.772
2	.962	16.032	65.804			
3	.619	10.314	76.118			
4	.557	9.278	85.396			
5	.503	8.390	93.786			
6	.373	6.214	100.000			

Extraction Method: Principal Component Analysis.

All variables of knowledge sharing factor have loading value higher than 0.50 as shown in Table 12. Therefore, these values indicate that they are highly interrelated with each other. However, these KSh5 factor is usually not stable because it's account to have probable error of variance.

Table 12. Component matrix of the knowledge sharing factor variables

	Component
	1
KSh1	.705
KSh2	.727
KSh3	.787
KSh4	.797
KSh5	.405
KSh6	.737

Extraction Method: Principal Component Analysis.

3.5 EFA for Knowledge Record

Six variables from the knowledge record factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 13.

Table 13. KMO and Bartlett's test of variables for the knowledge record

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.869
Bartlett's Test of Sphericity	Approx. Chi-Square	779.402
	df	15
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.869. This indicates strong partial correlation exhibited in the data for this study. The Bartlett's test of Sphericity result is 0.0001 which means very significant. The significant level of p is less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge acquisition factor. Therefore, the variables of knowledge record factor explain 59.9% of variance as shown in Table 14.

Table 14. Total variance explained for variables of the knowledge record factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.593	59.891	59.891	3.593	59.891	59.891
2	.689	11.479	71.370			
3	.613	10.224	81.594			
4	.400	6.672	88.266			
5	.367	6.121	94.387			
6	.337	5.613	100.000			

Extraction Method: Principal Component Analysis.

All variables of knowledge record factor have loading value higher than 0.50 as shown in Table 15. Therefore, these values indicate that they are highly interrelated with each other.

Table 15. Component matrix of the knowledge record variables

	Component
	1
KRe1	.797
KRe2	.770
KRe3	.802
KRe4	.810
KRe5	.783
KRe6	.672

Extraction Method: Principal Component Analysis.

3.6 EFA for Knowledge Preserving

Five variables from the knowledge preserving factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 16.

Table 16. KMO and Bartlett's test of variables for the knowledge preserving

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.799
Bartlett's Test of Sphericity	Approx. Chi-Square	484.758
	df	10
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.799. This indicates good partial correlation exhibited in the data for this study. The Bartlett's test of Sphericity result is 0.0001 which means very significant. The significant level of p is less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge acquisition factor. Therefore, the variables of knowledge preserving factor explain 56.9% of variance as shown in Table 17.

Table 17. Total variance explained for variables of the knowledge preserving factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.845	56.904	56.904	2.845	56.904	56.904
2	.755	15.106	72.009			
3	.606	12.118	84.127			
4	.457	9.138	93.265			
5	.337	6.735	100.000			

Extraction Method: Principal Component Analysis.

All variables of knowledge preserving factor have loading value higher than 0.50 as shown in Table 18. Therefore, these values indicate that they are highly interrelated with each other.

Table 18. Component matrix of the knowledge preserving variables

	Component
	1
KPr1	.763
KPr2	.850
KPr3	.690
KPr4	.764
KPr5	.692

Extraction Method: Principal Component Analysis.

3.7 EFA for Library Users' Satisfaction

Six variables from the library users' satisfaction factor are tested with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. Results of the KMO and Bartlett's test are shown in Table 19.

Table 19. KMO and Bartlett's test of variables for the library users' satisfaction

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	528.383
	df	15
	Sig.	.000

The KMO measure of sampling adequacy (MSA) results is 0.821. This indicates strong partial correlation exhibited in the data for this study. The Bartlett's test of Sphericity result is 0.0001 which means very significant. The significant level of p is less than 0.05. The small value (0.0001) indicates that there exist sufficient correlations among variables of knowledge acquisition factor. Therefore, the variables of library users' satisfaction factor explain 51.0% of variance as shown in Table 20.

Table 20. Total variance explained for variables of the library users' satisfaction factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.062	51.036	51.036	3.062	51.036	51.036
2	.922	15.370	66.407			
3	.620	10.331	76.738			
4	.536	8.928	85.666			
5	.451	7.513	93.179			
6	.409	6.821	100.000			

Extraction Method: Principal Component Analysis.

All variables of knowledge preserving factor have loading value higher than 0.50 as shown in Table 21. Therefore, these values indicate that they are highly interrelated with each other.

Table 21. Component matrix of the library users' satisfaction variables

	Component
	1
LUS1	.627
LUS2	.756
LUS3	.731
LUS4	.791
LUS5	.775
LUS6	.581

Extraction Method: Principal Component Analysis.

4. Discussion

After presenting the analyses, three important results have been shown. Firstly, Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy for knowledge creation, knowledge acquisition, knowledge capture, knowledge sharing, knowledge record, knowledge preserving and library users' satisfaction factors) are within the required range. Therefore, the KMO value of 0.70 and above indicates strong partial correlation and is suitable for factor analysis (Hair et al., 2006). The KMO values are 0.735, 0.767, 0.769, 0.826, 0.869, 0.799, and 0.821 for knowledge creation, knowledge acquisition, knowledge capture, knowledge sharing, knowledge record, knowledge preserving and library users' satisfaction factors respectively. The highest KMO value is 0.869 (knowledge record factor). The lowest KMO value is 0.735 (knowledge creation factor). Thus, all factors will be included in the further analysis. All Bartlett's tests of Sphericity have shown good results. All small values which less than 0.05 indicate that there are significant relationships among variables (Hair et al., 2006; Tabachnick & Fidell, 2007). Lastly, EFA for all factors (knowledge creation, knowledge acquisition, knowledge capture, knowledge sharing, knowledge record, knowledge preserving, and library users' satisfaction factors) attain good loadings to become a factor retention. The value of loadings for all indicators are above 0.50 (good level), except for one indicator. There is indicator of KSh5 (0.405) from the knowledge sharing process factor. This indicator was excluded from the subsequent SEM analysis due to overlaps factor loading (less than 0.5). The low factor loadings indicate that the explained variance is much less in the measure than the error variance. In these instances, the researcher or analyst requires that exploratory factor analysis take into confirmatory approach, that is, access the degree to which data meet the expected structure of the analyst.

Acknowledgements

The authors would like to acknowledge their supervisor for the guidance in preparing this paper. The authors are also indebted to prior literature research that has been made related to Knowledge Management (KM) area

especially in Library and Information Science (LIS) environment. The authors also wish to thank the editor for the extensive assistance in the final revision of this paper for publication.

References

Broady-Preston, J., & Preston, H. (1999). Demonstrating quality in academic libraries. *New Library World, 100*(3), 124-129. http://dx.doi.org/10.1108/03074809910267518

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*(2), 245-276. http://dx.doi.org/10.1207/s15327906mbr0102_10

Edwards, S., & Browne, M. (1995). Quality in information services: do users and librarians differ in their expectations? *Library & information science research, 17*(2), 163-182. http://dx.doi.org/10.1016/0740-8188(95)90020-9

Fagbola, O., Uzoigwe, C., & Ajegbomogun, V. O. (2011). Libraries Driving Access to Knowledge in the 21st Century in Developing Countries: An Overview. *Library Philosophy and Practice*, 1-7.

Foo, S., Chaudhry, A., Majid, S., & Logan, E. (2002). *Academic libraries in transition: Challenges ahead*. Paper presented at the Academic Library Seminar.

Geldhof, G. J., Preacher, K. J., & Zyphur, M. J. (2013). *Reliability Estimation in a Multilevel Confirmatory Factor Analysis Framework*.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis*. New Jersey: Pearson University Press.

Khangala, B. N. (2004). *An investigation into the prevalence of knowledge management practices within the libraries of two institutions on the verge of a merger: Cape Technikon and Peninsula Technikon*. Stellenbosch: University of Stellenbosch.

Kulthau, C. C. (1993). A principle of uncertainty for information seeking. *Journal of Documentation, 49*(4), 339-355. http://dx.doi.org/10.1108/eb026918

Kumar, A. (2010). Knowledge management and new generation of libraries information services: A concepts. *International Journal of Library and Information Science, 1*(2), 24-30.

Lowenthal, R. A. (1990). Preliminary Indications of the Relationship between Reference Morale and Performance. *RQ, 29*(3), 380-393.

MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual review of psychology, 51*(1), 201-226. http://dx.doi.org/10.1146/annurev.psych.51.1.201

Maponya, P. M. (2004). Knowledge management practices in academic libraries: a case study of the University of Natal, Pietermaritzburg Libraries. *SCECSAL Proceedings*.

Mavodza, J. (2010). *Knowledge management practices and the role of an academic library in a changing information environment: the case of the Metropolitan college of the New York.*

Morris, A. (2001). *Knowledge management: opportunities for LIS graduates*.

Preacher, K. J., Zhang, G., Kim, C., & Mels, G. (2013). Choosing the optimal number of factors in exploratory factor analysis: a model selection perspective. *Multivariate Behavioral Research, 48*(1), 28-56. http://dx.doi.org/10.1080/00273171.2012.710386

Sarrafzadeh, M., Martin, B., & Hazeri, A. (2006). LIS professionals and knowledge management: some recent perspectives. *Library Management, 27*(9), 621-635. http://dx.doi.org/10.1108/01435120610715527

Sarrafzadeh, M., Martin, B., & Hazeri, A. (2010). Knowledge management and its potential applicability for libraries. *Library Management, 31*(3), 198-212. http://dx.doi.org/10.1108/01435121011027363

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (2nd ed.). New Jersey: London: Lawrence Erlbaum Associates.

Tabachnick, B. G., & Fidell, L. S. (2007). Using Multivariate Statistics: Pearson Education Inc. *Boston, MA*.

Tyckoson, D. A. (1992). Wrong Questions, Wrong Answers. *The Reference Librarian, 17*(38), 151-173. http://dx.doi.org/10.1300/J120v17n38_18

Appendix. Sample of KMP-LUS Questionnaire

KMP-LUS Questionnaire

Linkage between Knowledge Management Practices and Library Users' Satisfaction at Malaysian University Libraries

Part A. Demographic

1. Name of your Institution/University

1	UUM		11	UNIMAP	
2	USM		12	UNITEN	
3	UPSI		13	UPNM	
4	UiTM		14	UTHM	
5	UPM		15	UKM	
6	UM		16	UTeM	
7	UIAM		17	USIM	
8	UTM		18	UMT	
9	UNIMAS		19	UMP	
10	UMS		20	UMK	

2. Gender

[ ] Male [ ] Female

3. What is your age group?

[ ] 21-25 years old [ ] 26-30 years old [ ] 31-35 years old [ ] 36-40 years old [ ] Over 41 years old

4. Semester of study:

[ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ] 6 [ ] 7 [ ] 8 [ ] 9 [ ] 10

5. Do you think KM Practice should be applied in the library?

[ ] Yes [ ] No

6. Which types of Knowledge Management Practice do you think is most applicable in the library?

[ ] Knowledge Creation [ ] Knowledge Acquisition [ ] Knowledge Capture [ ] Knowledge Sharing

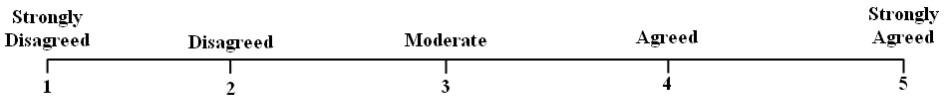
[ ] Knowledge Record [ ] Knowledge Preserving

7. "Knowledge Record (KRe)" and "Knowledge Preserving (KPr)" is good to be practiced in the university/academic libraries?

[ ] Strongly Disagree [ ] Disagree [ ] Moderate [ ] Agree [ ] Strongly Agree

Part B. Knowledge Management Process

For each statement, please indicate by ticking [✓] in the box that best matches the degree of its impact according to your experience.



Section 1: Knowledge Creation (KCr)

Items	Question	SD	D	M	A	SA
KCr1	I believe that my University Library creates new knowledge.					
KCr2	I believe that my University Library uses students' feedback for knowledge creation.					
KCr3	I feel that my University Library needs to manage consciously and explicitly the processes associated with the creation of knowledge.					
KCr4	I feel that knowledge creation process typically involves a number of individuals.					

KCr5	Knowledge creation implies more participation of library users.					
KCr6	Knowledge creation involves all the management effort.					
Section 2: Knowledge Acquisition (KAc)						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
KAc1	I feel that knowledge acquisition needs to be among the goal of my University Library.					
KAc2	I feel that my University library as an organization may need to look outside its own boundaries to outsource or acquire new knowledge.					
KAc3	I believe that the library can acquire knowledge through training programs, conferences, seminars and workshops.					
KAc4	My University Library uses to buy products or resources in the form of manuals, blueprints, reports and research reports for their students.					
KAc5	I know that University Library is subscribing to online databases, electronic journals and electronic books for Communities of Practice.					
Section 3: Knowledge Capture (KCa)						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
KCa1	I feel that my University Library should develop ways of capturing internal knowledge to identify people's expertise.					
KCa2	I feel that my University Library needs to be aware of the aim for capturing the knowledge that exists within them.					
KCa3	My University library streamlines its day-to-day operations towards capturing institutional memory (books, documents, videos, databases, etc.)					
KCa4	I know that University library is the central department to initiate knowledge capture.					
KCa5	I know that if the knowledge capture is organized, it would be easier for me to identify and use the knowledge.					
Section 4: Knowledge Sharing (KSh)						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
KSh1	My University library encourages sharing culture within Communities of Practice (CoP).					
KSh2	My University library encourages student to provide feedbacks; whenever I attended conferences, workshops, seminars or training.					
KSh3	My University library encourages the use of Institutional Repository (IR) to share the knowledge within the university communities.					
KSh4	I know that my University library encourages the use of face-to-face conversations inclusive of meetings, gatherings, discussions, etc.					
KSh5	I feel that my University library needs to promote sharing activity among librarians, student, staffs etc.					
KSh6	My University library staff always prepared themselves with useful knowledge and willing to share when needed.					
Section 5: Knowledge Record (KRe)						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
KRe1	I know that my University library streamlines its daily operations to record institutional memory (documents, videos, theses, patents, etc.)					
KRe2	My University library records and organizes library special collection.					
KRe3	I feel that my University library do the record keeping guided by level of confidentiality, security, etc.					

KRe4	I know the University library will have no doubt of maintaining its own records to serve as a memory of the past for future references.					
KRe5	My University library is fully computerized and provides Internet services for the purpose of seeking and retrieving all universities' records.					
KRe6	I know that knowledge record is important and good to be practiced.					
Section 6: Knowledge Preserving (KPr)						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
KPr1	I know that my University library streamlines its daily operations to preserve institutional memory (documents, videos, theses, patents, etc.).					
KPr2	I feel that my University library is responsible for preserving records, or gaining knowledge.					
KPr3	I feel that modern day University library needs to get outside the routines of the traditional library (cataloguing, indexing, etc.) to preserving knowledge.					
KPr4	I know that my University library has concentrated on the preservation of their materials or collections from loss.					
KPr5	I believe that knowledge preservation is important and good to be practiced.					
Section 7: Knowledge Managament Practices						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
KMP1	I feel that KM practices have the potential to make my University libraries more relevant.					
KMP2	I know that KM practices and its processes are related and have a significant influence.					
KMP3	I feel that for my University library to accomplish its KM Practices, it all depends on the quality of products and service delivery.					
KMP4	I know that my University library has developed and applied KM practices in Library collection services and other library services to encourage the use of knowledge.					
Section 8: Library Users' Satisfaction						
Items	**Question**	**SD**	**D**	**M**	**A**	**SA**
LUS1	I feel that the availability of resources (products and services) in library has a significant influence on user satisfaction.					
LUS2	My library is embedding knowledge management practice in processes, products and services in order to meet user satisfaction.					
LUS3	I feel that my University library has taken serious attention to user's complaint to meet their user satisfaction.					
LUS4	I feel that my University library needs to pay more attention in generating new knowledge to meet user satisfaction.					
LUS5	I feel that obtaining loyal users is by having products and services that meet customer's requirement.					
LUS6	I know that library user satisfaction is influenced by user expectation.					