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Analyzing the Impact of Value Satisfaction on Behavioral Intention to Use E-Resources

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ABSTRACT

The present study investigates the impact of perceived value metrics in driving satisfaction and behavioral intention to use e-resource among its users. Utilitarian, hedonic, uniqueness, epistemic, and economic are key values selected for the purpose of investigation in the study. This empirical study is carried out through a survey and responses have been analyzed using structural equation modelling. The target group is selected by means of simple random sampling (users of e-resources in selected business schools). Findings of the study reveal that utilitarian values, hedonic values, epistemic values, and uniqueness values have a significant impact on the usage intention of e-resources; however, economic values reflect an insignificant relationship to intention to use e-resources. The study is a distinctive piece of work on investigating the most and the least significant value(s) associated with satisfaction and usage intentions of e-resources.

Keywords: business schools, digital library, e-resources, information use, usage intention, value satisfaction

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1. INTRODUCTION

E-services are defined as "delivery of all interactive services on the internet using advanced telecommunications, information, and multimedia technologies" (Boyer et al., 2002, p. 175). One such e-service has been identified as library e-resources, where the interaction of users happens via Internet to satiate their informational needs. Saye (2001, p. 76) has described these e-resources as "the resources that are generated through some electronic medium and made available to a wide range of viewers both on and off site via some electronic transferring machine or internet." According to the Colorado Alliance of Research Libraries (2003), "Electronic serials may be defined very broadly as any journal, magazine, e-zine, webzine, newsletter or type of electronic serial publication which is available over the Internet" (cf. Bar-Ilan et al., 2003).

It has been observed that students prefer to use e-resources available in digital libraries rather than visiting library spaces (Ameen, 2019). Previous studies have also stated that e-resources are better than print resources for academic purposes (Borrego et al., 2007; Lee et al., 2012). Moreover, the COVID-19 pandemic has restricted users to using e-resources in place of print resources (Hendal, 2020). Besides this, there are various other factors which are responsible for frequent use of e-resources. A few of the most important reasons for preferring e-resources are identified as the easy accessibility of relevant information at any point in time (Thong et al., 2002; Wu & Wang, 2005). Additionally, users also perceive e-resources as valuable because of the convenience of access and speed of retrieval (Garg et al., 2017; Madhusudhan, 2010). Similarly, various factors have been explored in literature, playing a pivotal role in building perceived value of e-resources for the user.

Many researchers have mentioned the importance of perceived values in comprehending the views of customers, especially in the service industry (Ha & Jang, 2010; Jensen, 1996; Ostrom & Iacobucci, 1995). It has been observed that studies have examined perceived value from the perspective of benefits received after paying ascertained costs. According to Setterstrom et al. (2013), "perceived value increases as either the benefits from product consumption increase or the costs associated with consumption decrease." These studies have clearly mentioned that the perceived value benefits are viewed as a function of cost in case of e-resources. However, it is evident from the previous studies that a complete perceived value framework has not been applied in the context of e-resources to evaluate user satisfaction and intention to use. Thus, it will be interesting to examine how the perceived values influence satisfaction and intention to use e-resource among users. For this purpose, five values have been identified and examined: These are utilitarian, hedonic, uniqueness, epistemic, and economic. Further, the viewpoints of students have been collected and considered in determining the role of these values in influencing satisfaction and intention to use.

As far as the organization of this paper is concerned, the paper begins with an extensive review of literature in the areas of value matrices and e-resources, which also helped in drafting the research hypotheses. Subsequently, its methodology is explained, followed by analysis and results. The paper concludes with a discussion, conclusion, and scope for future research.

2. LITERATURE REVIEW

Various studies have explored the usage of e-resources on the basis of age, gender, discipline, profession, etc. across geographies (Zhang et al., 2011). Besides demographic patterns, the usage behavior of e-resources has also been determined by individual characteristics of its users such as enthusiasm, awareness, and openness to change (Madhusudhan, 2010; Sharma et al., 2011). Interestingly, while some of the past studies have considered one or more perceived value factors in their investigation, others have not. Examples for this are studies by Habiba and Ahmed (2021), Azonobi et al. (2020), and Abdul Rahman and Mohezar (2020). Habiba and Ahmed (2021) evaluated satisfaction and intention to use of e-resources from the lens of problems and constraints, whereas Azonobi et al. (2020) considered psychological and social factors along with other factors that drive students to use e-resources on a continuous basis. Abdul Rahman and Mohezar (2020) carried out a qualitative investigation and identified five factors that may have a significant relationship with continued intention to use digital libraries. However, none of these studies have included perceived values that may also have an impact on continued intention to use.

On the contrary, several studies have considered one or more perceived value factors in their investigation. For instance, a review of the literature shows that e-resources provide users with sorted and up-to-date information that helps in academic progress (Joo & Lee, 2011; Tahir et al., 2010). Students also admire certain aspects of e-resources like user-friendliness, effectiveness, efficiency, satisfac-

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tion, and learnability (Zhang et al., 2020). These reasons indicate the widespread popularity of digital resources by providing utilitarian, experiential, and hedonic benefits to users (Dominici & Palumbo, 2013; Garg et al., 2017; Sharma et al., 2011).

It is found from past literature that several factors have been explored and identified, impacting intention to use e-resources. However, the complete perceived value framework has not been applied to evaluate the intention to use in the context of e-resources. Thus, it can be safely said that while many studies have investigated the impact of dimensions of perceived values on usage of e-resources, they have not inspected the usage of e-resources considering all the dimensions of perceived values comprehensively in a single study. According to the past literature, the dimensions of perceived values not only affect the overall satisfaction of users towards e-resources but also arouse their intentions to use e-resources regularly. The concept of perceived value satisfaction has been borrowed from the well-established Expectation-Confirmation model (ECM). ECM is extensively employed to study user behavior in post-adoption of services including e-resources (Joo & Choi, 2016). Empirical applications of ECM reveal in information science literature that user satisfaction is a major factor of intention to use e-resources (Thong et al., 2006). Thus, the present study attempts to analyze the impact of the perceived values on satisfaction and intention to use e-resources.

Following the reviewed literature, the present study intends to find answers to the below mentioned research questions:

- Which perceived values are the predictors of student satisfaction and that of their intention to use e-resources?
- To what extent do these perceived values impact satisfaction and intention to use e-resources?

To answer the above research questions, six hypotheses were framed and appended with their respective theoretical concept.

2.1. Utilitarian Value

Utilitarian value is perceived when a user experiences benefits such as up-to-date information, time saving, and improved academic achievements after the use of e-resources (Ali, 2005; Cheng, 2014; Joo & Lee, 2011; Madhusudan, 2010; Ollé & Borrego, 2010; Tahir et al., 2010). Kim and Han (2009) have defined this value as "the extent of effectiveness and efficiency that is perceived by consumers when using information systems." This means that utilitarian value deals with the "ease and speed of accomplishing a task effectively and conveniently" (Pura, 2005). The majority of studies have strongly agreed that utilitarian value prompts users to adopt and use e-resources due to its direct functional advantages (Al-Debei & Al-Lozi, 2014) and also significantly influences their satisfaction levels (Carlsson et al., 2006). Hence, we hypothesize:

H1. Utilitarian value positively impacts satisfaction and intention to use e-resources.

2.2. Hedonic Value

Hedonic value is defined as "the level of pleasure and joy users experience when using a certain technology" (Garg et al., 2017). In the context of e-resources, hedonic value is achieved when e-resources successfully provide users with the experience of speedy, user-friendly, and organized output of desired information. Preciously, this value benefits users with easy access, quick search, and sorted data (Cheng, 2014; Dominici & Palumbo, 2013; Garg et al., 2017; Joo & Lee, 2011; Sampath Kumar & Kumar, 2010). Kim et al. (2005) have also found that intrinsic motivations positively impact the behavior of users. For example, amusing mobile fun elements and services satiate the emotional needs of users more than do performance-based needs (Hong et al., 2008). Such services provide users with convenient access to high quality e-resources and engage them to spend more time. In two studies, Kim and Han (2009) and Yang and Jolly (2009) empirically validated that hedonic value significantly impacts the satisfaction and intention to adopt mobile services. The findings of the above-mentioned literature influence the following hypothesis:

H2. Hedonic value positively impacts satisfaction and intention to use e-resources.

2.3. Uniqueness Value

Uniqueness value plays an important role in forming a distinct self-image (Hong et al., 2006). This value is defined as "the sense of differentiation or distinctiveness from others" (Tian & McKenzie, 2001). People tend to seek ways and means to acquire a unique product or service, the possession and usage of which may help them acquire a sense of superiority in their societal setups. For example, researchers have also proved that mobile data services play an important role in enhancing the social

image of users (López-Nicolás et al., 2008). It has also been found that individuals show off their smartphones in public (Lu et al., 2005). However, it is also noted that uniqueness is lost once the usage of a product or service becomes common among the public, and its utility dimensions are well understood and adopted across one's sphere of influence. Hence, we hypothesize:

H3. Uniqueness value positively impacts satisfaction and intention to use e-resources.

2.4. Epistemic Value

Epistemic value is defined as "the knowledge gained upon trying new things" (Pihlström & Brush, 2008). Researchers have outlined it as "the curiosity to learn new things and gain new knowledge" (Pihlström & Brush, 2008; Rouibah & Hamdy, 2009). It is found that innovators try new e-services first and then identify and evaluate the positives and negatives of that service(s) (Lu et al., 2005; López-Nicolás et al., 2008). However, findings of a study conducted by Pagani (2004) concluded that innovation increases the intent to adopt an e-service. To explore more about the role of epistemic value in arousing intention to use e-resources, we hypothesize:

H4. Epistemic value positively impacts satisfaction and intention to use e-resources.

2.5. Economic Value

A very few researchers have tried to explore the importance of economic value on satisfaction and intention to use e-resources. Agarwal et al. (2007) found price as one of the major hurdles to adopt e-services. Wu and Wang (2005) found that perceived cost of m-commerce services is negatively associated with adoption intention. Further, Chong et al. (2012a, 2012b) also reached a similar conclusion in cross-country studies with Malaysian and Chinese customers. It is evident that if the value received is not commensurate with the cost borne, users feel guilty for spending money irrationally or may accuse others of having spent excess money in providing resources of doubtful or limited usefulness. On an individual basis, undue mismatch between the cost and benefit realized from an e-resource will adversely affect usage and continued future adoption. Thus, the overall economic value offered by a product or service, or the lack of it, is generally one of the major factors in driving its adoption, or discouraging it (Carlsson et al., 2006). Such findings describe the pivotal role of economic value in influencing the willingness of users to adopt e-resources. Thus, we hypothesize:

H5. Economic value positively impacts satisfaction and intention to use e-resources.

2.6. Satisfaction and Intention to Use

User satisfaction has been found to be very important in affecting the attitude of users toward online information services (Colepicolo, 2015; Shee & Wang, 2008). The term 'satisfaction' has been described as "positive attitudes toward using the system" (Joo & Lee, 2011, p. 525). Researchers have identified a positive relationship between user satisfaction and intention to use e-resources (Cheng, 2014; Joo & Choi, 2016). Therefore, we understand that user satisfaction positively and significantly affects the adoption intention of e-resources. This satisfaction, which is a result of fulfilment of perceived values, acts as a surrogate to continued usage intention. Hence, it is hypothesized:

H6: User satisfaction positively impacts satisfaction and intention to use e-resources.

3. METHODOLOGY

The present study followed a descriptive research design and employed simple random sampling for data collection (Madhusudhan, 2010). The data was collected from respondents belonging to the top 50 business schools in the National Capital Region (India) as per the National Ranking Framework (Ministry of Education). Purposive sampling is employed in choosing business schools, assuming that the top business schools provide students with the facility of e-resources (Kumar et al., 2016). Around 2,000 Google forms (Appendix) were sent to the students of different B-schools, out of which a valid response was received from only 242 students enrolled in these business schools. The main cause was the devastating pandemic situation and, in such a situation, it was very much difficult to collect more email-ids of the students. All the students (63 percent male students and 37 percent female students) belonged to two age groups, less than 25 years (78 percent of students) and more than 25 years (22 percent of students). After filling out the demographic information in the survey, a screening question was asked, i.e., "how frequently do you use e-resources" and the options given were: "not very frequently," "frequently," or "very frequently." It was found that all the students were using the e-resources either frequently or very frequently for

their information needs.

For the instrument development (i.e., questionnaire development), the scales are adopted from previous studies. The value dimensions derived for using e-resources – utilitarian value and hedonic value scales – were adopted from Sirdeshmukh et al. (2002), and Sweeney and Soutar (2001) respectively. Uniqueness value and epistemic value scale items were borrowed from Tian and McKenzie (2001) and Lu et al. (2008), respectively. Economic value scale items were adopted from Dodds et al. (1991). The scale of satisfaction has been adopted from Thong et al. (2006) and Lee et al. (2009). Finally, items for measuring intention to use e-resources were adopted from Hu et al. (2009). The final questionnaire consisted of 26 items and was measured on a five-point Likert scale.

The adopted scale items were firstly tested by conducting a pilot study through an online survey. The collected data was analyzed to test the reliability of the scale. Internal consistency measures the consistency among a group of items that are combined to form a scale. It is "an indicator of how well the different items measure the same things" (Black, 1999). Coefficient alpha can be used to measure the reliability (Cronbach, 1951). The Cronbach alpha value of each scale is found to be more than 0.7, which ensured the reliability of each scale. Further, the exploratory factor analysis was applied to test the construct validity.

Construct validity is "the degree to which a measure is related to other measures in a way consistent with the concepts based on theory" (Carmines & Zeller, 1979). Factor analysis is commonly known as data reduction and summarization technique and is applied to measure whether the model adopted in the study is fit or not. Factor analysis has been identified as an indispensable measure for construct validity (Kerlinger, 1986). All 26 items were entered in principal component analysis and their initial communalities were found to be more than 0.5. Furthermore, all factors were found to have eigenvalues greater than one. The Kaiser-Meyer-Olkin measure of sampling adequacy for all the measures was found to be greater than 0.60. Bartlett's test of sphericity was also found significant (p=0.000 < 0.01), which proves adequate inter-correlations between variables. Factor loadings were also found to be greater than 0.4 (Hair et al., 2010). Thus, no item was dropped from the study.

4. ANALYSIS AND FINDINGS

The research model was tested through a two-step method as suggested by Anderson and Gerbing (1988) using AMOS 18.0 software. First, a confirmatory factor analysis (CFA) approach has been used to test the measurement model in order to verify the reliability and validity of the instrument. Second, through a structural equation modelling (SEM) approach, the assessment of the structural model has been performed and the developed hypotheses were tested. For critical testing of the model, the sample size should not be less than five times and should not be greater than ten times the number of parameters (Bentler & Chou, 1987). Also, a minimum sample of 200 is necessarily required to perform such a type of study (Hoetler, 1983). In this study, both the conditions of selecting appropriate sample size are satisfied as we have collected the data from 242 respondents.

4.1. Measurement Model

In the SEM method, the measurement model is evaluated to assess the reliability and validity of the instrument followed by analyzing the structural model to test hypotheses (Anderson & Gerbing, 1988). A seven factor 26-item model was set up in order to check the reliability and validity of the instrument used in this study. The CFA approach was used in order to test the measurement model and the results of the measurement model are shown in Table 1.

To analyze the measurement model, it is necessary to focus on three different types of analyses. First, it is required to check the reliability of the model, so we have computed the average variance extracted (AVE) and composite reliability (CR) for each construct and squared multiple correlation of each item of the instrument. The result shown in Table 1 reveals that the values of AVE and CR exceed the minimum cut off, i.e., 0.5 and 0.7 respectively (Hair et al., 2010; Nunnally, 1978). All these values indicate good reliability levels which subsequently highlights highly consistent results. This indicates that CFA demonstrates an acceptable range of reliability results for all constructs. The reliability of all the constructs already checked through Cronbach α coefficient whose minimum cut-off value is 0.7 (Hair et al., 1998; Nunnally, 1978). The results of the reliability coefficient are also depicted in Table 1.

In the next step, the validity of all the constructs is checked through assessing logical dimensions (i.e., face and construct validity) and statistical dimensions (discriminant and convergent validity) of validity. Since all the scales were adopted from past literature they have strongly exhibited the content and face validity of all the

Table 1. Results of confirmatory factor analysis, validity analysis, and reliability test

Construct	Measurement	Standard loading	Estimate	t-value	Cronbach alpha	Composite reliability	AVE
Economic value (ECV)	ECV1	0.824	1.263	12.940	0.863	0.867	0.685
	ECV2	0.873	1.186	13.259			
	ECV3	0.784	1.000	---a---			
Hedonic value (HEV)	HEV 1	0.636	0.909	9.590	0.839	0.846	0.586
	HEV 2	0.703	1.031	10.593			
	HEV 3	0.974	1.387	12.576			
	HEV 4	0.704	1.000	---a----			
Uniqueness value (UNV)	UNV 1	0.607	0.867	7.738	0.810	0.801	0.503
	UNV 2	0.746	1.089	9.365			
	UNV 3	0.699	1.092	9.265			
	UNV 4	0.774	1.000	---a----			
Utilitarian value (UTV)	UT1	0.759	1.266	9.054	0.814	0.821	0.547
	UT 2	0.969	1.679	9.701			
	UT 3	0.585	0.951	7.583			
	UT 4	0.574	1.000	---a---			
Epistemic value (EPV)	EPV 1	0.544	0.825	7.812	0.817	0.824	0.546
	EPV 2	0.803	1.295	11.287			
	EPV 3	0.837	13.43	11.512			
	EPV 4	0.736	1.000	---a---			
Student satisfaction (SAT)	SAT1	0.733	0.974	10.947	0.838	0.839	0.567
	SAT2	0.796	1.084	11.883			
	SAT3	0.729	0.907	10.891			
	SAT4	0.751	1.000	---a----			
Intention to use (ITU)	ITU1	0.840	1.112	11.291	0.822	0.825	0.612
	ITU2	0.791	1.058	10.884			
	ITU3	0.710	1.000	----a---			

All standard loadings are significant at $p<0.001$, a---indicates that loading was fixed.
AVE, average variance extracted.

items and constructs. As for the assessment of convergent validity, the criterion specified by Anderson and Gerbing (1988) has been adopted. According to them, for every item the standard loadings should be significant for t>1.96 ($p<0.001$), and the results of CFA shown in Table 1 verify the uni-dimensionality and good convergent validity of all the items and demonstrates that all of them are representing their constructs. Following this, to check the discriminant validity, the procedure suggested by Fornell and Larcker (1981) has been adopted in this study. As per Fornell and Larcker (1981), the square root of AVE should be greater than the correlation coefficient, which indicates that every construct is distinct from the other. The results, shown in Table 2, exhibit an accepted level of discriminant validity.

In the third analysis, we have checked the overall model fit indices. As per Bagozzi and Yi (1988) and Hair et al. (2010), the minimum acceptable values for model fit indices are good of fitness index (GFI)>0.9, adjusted goodness of fit index (AGFI)>0.8, incremental fit index (IFI)>0.9, Tucker-Lewis index (TLI)>0.9, comparative fit index (CFI)>0.9, root mean square error of approximation (RMSEA)<0.08, and $\chi 2/df<3$. The results of the fit indices of the model are $\chi 2=348.221$, $p=0.002$, $\chi 2/df=1.257$, GFI=0.907, AGFI=0.883, IFI=0.974, TLI=0.969, CFI=0.974, and RMSEA=0.033. All these values exceed the minimum cut-off criteria, hence they are accepted for the measurement model.

4.2. Structural Model

After substantiating the validity of the measurement model, the next step is to verify the structural model as well as to test the suggested hypotheses. For this purpose, SEM method is chosen in order to assess the validity of the complete research model depicted in Fig. 1. The results of the overall fit indices of the structural model

Table 2. Discriminant validity

Construct	EPV	ECV	UNV	HEV	UTV	SAT	ITU
EPV	**0.739**						
ECV	-0.003	**0.828**					
UNV	-0.036	0.160	**0.708**				
HEV	-0.083	-0.005	0.022	**0.765**			
UTV	-0.097	0.200	0.081	0.230	**0.738**		
SAT	0.100	0.172	0.305	0.267	0.579	**0.753**	
ITU	0.029	0.204	0.247	0.230	0.491	0.748	**0.782**

Bold values in diagonal lines are the square root of AVE of the constructs, and all other values are correlation coefficients for every pair of constructs.
EPV, epistemic value; ECV, economic value; UNV, uniqueness value; HEV, hedonic value; UTV, utilitarian value; SAT, student satisfaction; ITU, intention to use.

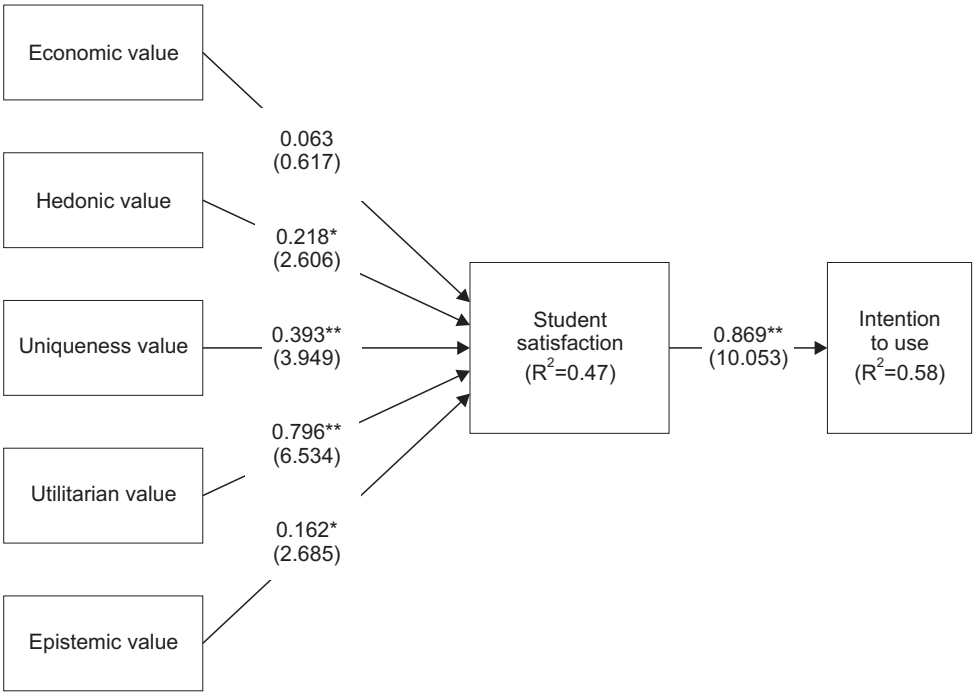


Fig. 1. Results of structural model. Standardized path coefficients are shown (t values are mentioned in parentheses), Absolute t-value >1.96, **p<0.005, *p<0.05.

are $\chi 2$=351.517, p=0.003, $\chi 2$/df=1.247, GFI=0.906, AGFI=0.884, IFI=0.975, TLI=0.971, CFI=0.975, and RMSEA=0.032. All these values exceed the minimum cut-off values prescribed by Bagozzi and Yi (1988), Hair et al. (2010), and Adams et al. (1992). Hence, these values are accepted for the structural model.

4.3. Hypothesis Testing

The results of hypothesis testing are shown in Table 3. This table shows the properties of causal paths which include standardized coefficients (β), standard error, and t-value. This table has also documented the verified results of all six hypotheses proposed in the current study. According to this table, if the p-value is less than 0.05, then the independent variable significantly impacts the dependent variable (Hair et al., 2010). Only a single hypothesis does not suggest any relationship between the economic value and satisfaction level of the students. It was not supported because of the t value, which is 0.617 (p>0.05), and it is statistically insignificant. Hypotheses

Table 3. Results of hypothesis testing

Hypothesis	Path	Standardized coefficient	Standard error	t-value	Hypothesis acceptance
H1	Economic value → SAT	0.063	0.103	0.617	Unsupported
H2	Hedonic value → SAT	0.218	0.084	2.606	Supported
H3	Uniqueness value → SAT	0.393	0.100	3.949	Supported
H4	Utilitarian value → SAT	0.796	0.122	6.534	Supported
H5	Epistemic value → SAT	0.162	0.061	2.685	Supported
H6	Satisfaction → Intention to use	0.869	0.086	10.053	Supported

SAT, student satisfaction.

2 to 5 highlighted the individual relationship of hedonic value, uniqueness value, utilitarian value, and epistemic value with student satisfaction. These all were also supported because the t values of all these hypotheses were (H2: t=2.606, $p<0.05$; H3: t=3.949, $p<0.005$; H4: t=6.534, $p<0.005$; H5: t=2.685, $p<0.05$) and all were found statistically significant. Hypothesis 6 also highlights a positive (+) relationship between student satisfaction and intention to use. This hypothesis was also supported because of the t value, which is 10.053 ($p<0.005$), and was also found statistically significant. The coefficient of determination (R^2) explains the percentage of variance in the dependent variable accounted for by independent variables (Hair et al., 2010). The explanatory power of R^2 for student satisfaction and intention to use were 0.47 and 0.58 respectively.

5. DISCUSSION

The present study empirically tested the dimensions of value metrics to drive satisfaction and intention to use e-resource among its users. For this purpose, five values were identified and empirically tested, including utilitarian, hedonic, uniqueness, epistemic, and economic values. The individual model reveals that utilitarian values, hedonic values, uniqueness values, and epistemic values significantly impact the satisfaction of users and continued usage intention of e-resources. However, economic value was not found to be affecting the intention to use e-resources significantly. It has also been found that business students perceive utilitarian value as the most influential value, arousing continuous intention as compared to hedonic values, epistemic values, and uniqueness values. In other words, business students prefer a quick and convenient way of accessing information out of e-resources to develop academic excellence. These results are in line with existing literature. The utility of the online resources has been prominently identified in its adoption as well as continued intention.

Other important values, apart from utilitarian value, are recognized as uniqueness, hedonic, and epistemic values. The uniqueness value is found to be the second most preferred user value, which means that students' satisfaction and usage intention also hinges on their personal image in today's competitive class environment. Besides this, e-resources also help students in acquiring knowledge and achieving an extra edge over their peers. Furthermore, the hedonic and epistemic values also significantly impact satisfaction and intention to use e-resources. It is possibly because of this reason that students not only strive to acquire new information but also feel relaxed and accomplished in using e-resources. These values satisfy the personal and emotional interests of the user and follow the utility value closely.

The economic value, although expected to be the most important factor affecting usage of e-resources, is found to be insignificant in the present study. This result is primarily due to the fact that the students do not have any idea about the price for getting access to e-resources. The business schools do not charge for e-resources separately and student fees are inclusive of charges for e-resource access and use. The subscription costs are paid by the institutes on a recurring basis, which students are completely unaware of (Habiba & Ahmed, 2021). Thus, the students do not have any realization of the price/cost of e-resources. This also suggests an important implication for institutions/universities in that they should make students realize the economic value of these resources.

The present study is a unique piece of work as many studies conducted on e-resources were descriptive studies and very few have contributed empirical findings. Fur-

ther, the findings of this study are in line with few previous research efforts, where utilitarian and hedonic values were found to influence the use of e-resources (Garg et al., 2017; Ha & Jang, 2010). However, in contrast to Agarwal et al. (2007) and Chong et al. (2012a, 2012b), this study reveals an insignificant impact of economic value on satisfaction and intention to adopt e-resources among its users.

6. CONCLUSION

The present study captures the impact of dimensions of perceived values on satisfaction and intention to use e-resources. The four dimensions of perceived value, i.e., utilitarian, hedonic, uniqueness, and epistemic values, are found to have significant impact on satisfaction and behavioural intention to use e-resources. The utilitarian value is found to be the most preferred for students' satisfaction, which resonates with a study conducted by Zeglat et al. (2016). Moreover, all these perceived values need to be taken care of to keep a high level of satisfaction among students. Nonetheless, the economical perceived value was found to have an insignificant impact on satisfaction and behavioural intention to use e-resources. Thus, following the findings of the study, it is concluded that institutions need to make their students realize the importance of the economic value of the e-resources.

6.1. Implications, Limitations, and Scope for Future Research

The present study is a distinctive piece of work and a maiden attempt at investigating the most and least significant perceived value(s) associated with satisfaction and usage intentions of e-resources. This study can be helpful for institutions and e-resource providers so as to satisfy the values perceived to be important by users. Institutions may acquire e-resources keeping in mind these perceived values factors. Institutes may also share the valuable feedback of students with e-resource providers to make them able to provide a better experience to students. Moreover, students can also participate in the co-creation of these e-resources. Therefore, future studies may explore factors associated with co-creation of e-resources and study their impact on the satisfaction level of students.

However, this study is limited in scope in the sense of selection of target user group, which was business school students at institutes in the National Capital Region. The scope can be expanded to cover other demographic dimensions, both in terms of geography and other institutions of other academic fields. This study also leaves scope for collective study of factors affecting the highlighted values. There is further scope for studying user satisfaction as a function of fulfilment of identified values in relation with e-resources, and then establishing connects between satisfaction and continued intention of usage. Moreover, the present study is generic in nature and considered all the e-resources, but future studies may consider specific e-resources and conduct case-based research for more fruitful results.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Appendix

Questionnaire

Gender: Female Male

Age Group: Less than 25 Years More than 25 Years

Experience of e-resource usage

- Never
- Rarely
- Occasionally
- Frequently
- Very Frequently

Utilitarian value (UTV)
UTV1. Using e-resources would increase my chances of acquiring information that is important to me
UTV2. Compared to the effort and time I need to put in and spend, the use of e-resources would be beneficial and worthwhile to me
UTV3. Using e-resources would help me acquire information more quickly
UTV4. E-resources would be useful in my routine academic purposes

Hedonic value (HEV)
HEV1. I expect that using e-resources would be enjoyable
HEV2. I expect to have fun using e-resources
HEV3. Using e-resources would make me feel good
HEV4. E-resources would be the services that I feel relaxed after using

Economic value (ECV)
ECV1. I expect that e-resources would be reasonably priced
ECV2. E-resources would offer a good value for money
ECV3. I believe that at the current price, e-resources would provide good value

Epistemic value (EPV)
EPV1. If I heard about a new e-resource, I would look forward to using and experiencing it.
EPV2. I always look forward to a new e-resource so that I can get access to new information sources about a desired field
EPV3. Among my peers, I am usually the first to explore new e-resource
EPV4. In general, I am hesitant to try out new e-resource

Uniqueness value (UNV)
UNV1. I often think that using e-resources would shape a more intellectual personal image about myself
UNV2. I am often on the lookout for new e-resource that will add to my personal uniqueness
UNV3. I actively seek to develop my personal uniqueness by using special e-resources
UNV4. Using e-resources is interesting and assists me in establishing a distinctive image

Student satisfaction (SAT)
SAT1. My overall experience of e-resources use was Very dissatisfied / Very satisfied
SAT2. My overall experience of e-resources use was Very displeased / Very pleased
SAT3. My overall experience of e-resources use was Very frustrated / Very contented
SAT4. My overall experience of e-resources use was Absolutely terrible / Absolutely delighted

Intention to use (ITU)
ITU1. I intend to continue using e-resources rather than discontinue its use
ITU2. My intentions are to continue using e-resources rather than any alternative means
ITU3. I would like to continue using e-resources

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Cyber Social Interactions: Information Behavior in Between Social and Parasocial Interactions

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ABSTRACT

Participants in real-time online sessions, be it (business) meetings, virtual school lessons, or social live streams, all engage in cyber social interactions. Unlike parasocial interactions, cyber social interactions are characterized by reciprocity and temporal proximity. In contrast to social interactions, they lack spatial proximity and bodily contact. This is a fairly new concept in information science that rose from technological advances and unprecedented circumstances (e.g., the rise of digital economy and knowledge workers being able to work remotely or, more recently, global lockdowns and contact restrictions). As a result, the past ways of working and socializing were transformed by making them, in some cases predominantly, virtual. Regarding the example of social live streaming we exhibit the importance of cyber social interactions for information behavior research. This conceptual article is a plea for information science to engage more in human-human online relations and interactions.

Keywords: information behavior, social live streaming, cyber social interaction, cyber social relation, social interaction, parasocial interaction

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1. OFFLINE AND ONLINE HUMAN-HUMAN INFORMATION INTERACTIONS

Studying the behavior of people when interacting with information is one essential aspect of information science. Whenever people actively or passively deal with information, researchers speak of human information interaction and human information behavior (e.g., Wilson, 2000). Even while people interact with each other, a process of information interaction takes place. However, attention was not paid to the differences between the characteristics of particular online human-human information interactions, which should not be confused with human information interactions. In this article, we exclusively focus on offline and online relations between humans. Offline human-human information interaction mainly happens during face-to-face conversations. However, when people watch TV or listen to the radio, they also receive information from other people. Once digital and online media was accepted in our everyday life, the ways of interpersonal interaction changed. It no longer only takes place either physically and in-person (as in social interactions) or through otherwise one-sided information flow (as in parasocial interactions), but now it also happens virtually. Online human-human information interaction is very diverse and includes online web conferences, VoIP calls, watching a stream or online video and, furthermore, chatting or any other form of exchanging messages.

The concepts of "social interactions" and of "parasocial interactions" are widely known in the social sciences and also in information science. A typical example of "social interactions" are face-to-face conversations between two or more people. Fundamental characteristics of face-to-face communication and, therefore, of social interactions are bodily contact, proximity, facial expressions, eye movement, gestures, and orientation, as well as verbal and nonverbal aspects of communication (Argyle, 1969). Considering mediated contexts, audience members may establish some kind of relationship towards the "media figure" during consumption of, for instance, movies, TV shows, or social media content. However, the media figure (e.g., streamer, TV show moderator, or another celebrity) is not (or not always) aware of this relationship. Horton and Wohl (1956) describe such mediated interactions as "parasocial interactions." Some studies apply the term parasocial interaction in the context of live streaming services or real-time online events (like webinars or online meetings) to describe the information behavior of their participants. Is this classification actually correct? Our studies indicate a clear "no" (see, e.g., Fietkiewicz, 2019, 2020; Fietkiewicz & Scheibe, 2017; Fietkiewicz & Stock, 2019; Fietkiewicz & Zimmer, 2020; Fietkiewicz et al., 2018, 2021; Friedländer, 2017a, 2017b; Gros et al., 2017, 2018; Honka et al., 2015; Scheibe, 2018; Scheibe & Zimmer, 2019a, 2019b; Scheibe et al., 2016, 2022; Zimmer, 2018; Zimmer et al., 2017, 2018, 2020, 2022; Zimmer & Scheibe, 2019). Describing such online interaction as "parasocial" signals a misunderstanding of the concept of parasociality (Giles, 2010). Kowert and Daniel (2021) speak of a "one-and-a-half sided parasocial relationship," but for our understanding it is no parasocial relation at all, as it does not match the characteristics of parasocial relations. The crucial difference between social interactions and parasocial interactions is the lack of reciprocity, of bodily contact, and of temporal proximity, leading to the establishing of "intimacy at a distance" (Horton & Wohl, 1956, p. 215).

Interpersonal interactions on live streaming services or during online meetings or online schooling are neither social interactions (as there is no spatial proximity and no bodily contact) nor parasocial interactions (as there is reciprocity and temporal proximity). There indeed exists a different form of human-human interaction, which we like to name "cyber social interaction." Cyber social interactions as real-time interactions in the technological world (Lanzara, 2015) or in cyber-spaces (Çakir, 2015) occupy an intermediate position between social and parasocial interactions. With the increasing importance and prevalence of this type of interaction, real-time digital environments occupy an exceptional position in the entire landscape of social media and other web-based tools (Scheibe et al., 2022; Zimmer et al., 2018) (see Fig. 1). In this brief article, we introduce and discuss the novel approaches of cyber social interactions and cyber social relations in the context of information science, especially in information behavior research.

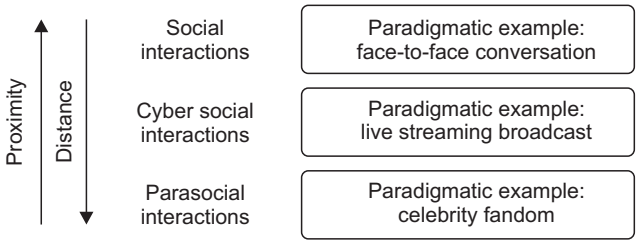


Fig. 1. Interpersonal interactions.

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2. CYBER SOCIAL INTERACTIONS AND CYBER SOCIAL RELATIONS

Cyber social interactions need to be distinguished from cyber social relations; however, both fall under cyber social behavior (McLaughlin & Wohn, 2021). Interactions are concrete interpersonal contacts in (cyber-) space and time, e.g., chatting with a live-streamer or with other viewers on a live streaming platform such as, for instance, Twitch, or answering participants' questions during a webinar. Relations are constant over a certain period of time, e.g., subscribing to a streamer and viewing his or her broadcasts because of a positive experience with presented content or interaction in the past. We find social relations (and interactions) between teachers and their students, or between colleagues in a company, but when it comes to remote schooling and online business meetings, they become cyber social interactions, which can be very diverse: Some participants turn off their cameras and others do not, some are distracted by other activities, some are concerned about privacy, and while some finally feel confident to speak out, others use this as an opportunity to stay on the sidelines and refrain from active participation.

The boundaries between the three concepts of social, cyber social, and parasocial interactions are not exact but rather open and blurred. We find increasing (temporal and spatial) proximity on the way from parasocial to social interactions, and on the opposite side the distance increases when changing from social to parasocial interactions. For instance, people with pre-existing social relations who now interact online are participating in cyber social interactions, but their behavior is also near to social interaction (Mesch & Talmud, 2006). It is possible that people who have known each other, and others who did not meet online, form new virtual communities (Chen et al., 2014; Cheung et al., 2015) as a result of their cyber social interactions. However, when we communicate with new colleagues during an online meeting (as is not seldom in the time of COVID-19), it is at the very center of cyber social interactions. We found similarly clear cyber social interactions on social live streaming services when it comes to communication with, probably unknown, users from the audience (Chen & Lin, 2018). But if we observe the cyber social interactions of viewers with prominent streamers, these interactions are close to parasocial interaction. Finally, if one observes and reads the posts of a celebrity on, for instance, Instagram, and he or she is a fan of the celebrity, it is clear one-sided parasocial interaction. If our fan comments on a post of the celebrity and the celebrity actually answers, we cross the boundary from parasocial to cyber social interactions, as reciprocity is now present in cyber-space.

Scales for measuring the extent of parasocial interactions already exist (Dibble et al., 2016; Rubin et al., 1985). It is necessary to establish similar scales for cyber social interactions as well. Further, we should empirically study this kind of behavior, more specifically people's online information behavior during real-time events. What are the differences between social and purely cyber social relations, and what differentiates parasocial and cyber social interactions?

3. CYBER SOCIAL INTERACTIONS ON LIVE STREAMING SERVICES

Live streaming platforms are a paradigmatic example for cyber social relationships (Fig. 1), as they are enabler for social actions and cyber social interactions, on which the two actor groups of streamers and viewers meet (Fig. 2). Live streaming services are social media with the following characteristics (Scheibe et al., 2016):

- they are synchronous,
- users are able to broadcast real-time content,
- mobile devices (e.g., smartphones, tablets) or computers with webcams are used for broadcasting,
- audience members are able to interact with the broadcaster and with other members of the audience via chat messages, and
- audience members can reward performers with, e.g., virtual gifts or by tipping money.

We differentiate between four kinds of live streaming services:

- general social live streaming services (without any thematic limitation; everyone may broadcast), e.g., YouNow or IBM Watson Media (formerly Ustream),
- live streaming services for selected broadcasting users, e.g., V LIVE for Korean artists (Askeridis & Ilhan, 2019),
- embedded services (as parts of other social media platforms), e.g., YouTube Live, Instagram Live, or Facebook Live, and
- topic-specific live streaming services, e.g., Twitch (mainly e-sports and digital games), Chaturbate (nudity and sexual activity), or Taobao Live (e-commerce in relation to Alibaba).

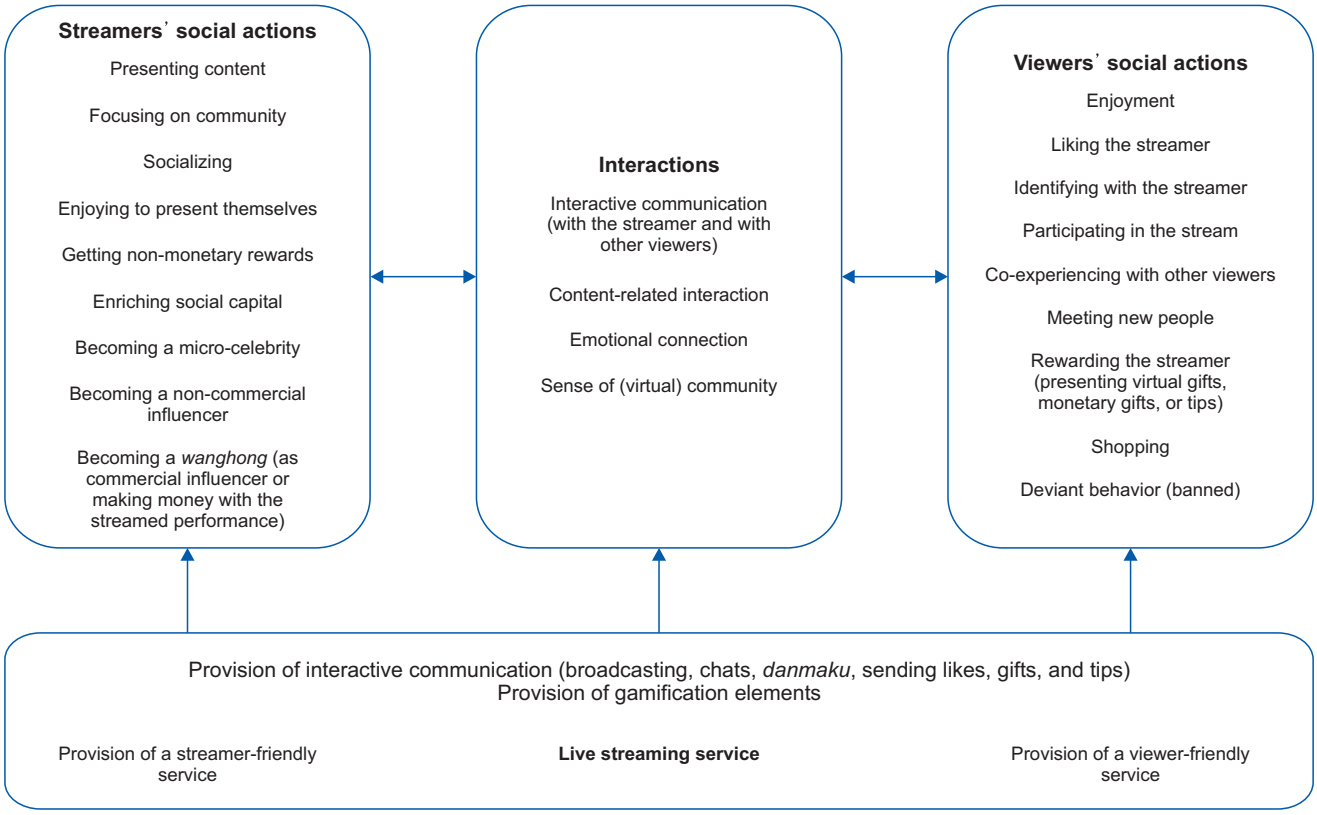


Fig. 2. Streamers' and viewers' cyber social actions on live streaming services (*Source:* Scheibe et al., 2022).

In the following paragraph, we report on findings of a systematic review on live streaming (for details and literature references see Scheibe et al., 2022).

Broadcasters' information behavior and social actions depend on the service. Streamers behave differently on, for example, Twitch, YouNow, Chaturbate, or Taobao Live. Therefore, streamers on different platforms perform different social actions and have different influences on their audience members. On Twitch, streamers report about, for instance, e-sports events (e.g., European Sports League), comment on (their own) video game playing, or simply chat with the audience. Most streamers present themselves with the help of a camera and speak to their audience with a microphone, while their screen is shown as an overlay while streaming the played game or commented event on an additional screen. Various notifications are displayed across the presentation of a stream, such as chat messages, mentions of top donors, additional donation and subscriber notifications, and sometimes banners of sponsors. Broadcasters of general live streaming services, like YouNow, stream a broad variety of content. Some, for instance, chat and share information with their audience and others make music or dancing. Sometimes streamers fulfill the communicated desire of their audience and adapt their streamed content to the audiences' wishes. Chaturbate is a topic-specific platform for sexual and nudity related content. Streamers provide sexual performances for their audiences. In the categories of women, men, couples, and trans they act as webcam models and flirt with audience members, do a striptease, or have sex in front of the cam. Some models use a professional studio for their broadcasting. Interaction between viewers and streamers may happen through chat messages and also remote-controlled vibrators. On shopping-related e-commerce live streaming platforms, e.g., Alibaba's Taobao Live, streamers get paid by audience members, by companies, or they receive a share of the profits by streaming product-related content. Streamers, for example, answer viewers' questions about the products and demonstrate the products' functions to encourage the purchase intentions of potential customers.

Streamers are community-focused as well as content-focused and they are motivated by and interested in non-monetary and monetary outcomes. Acting community-focused and communicating actively with their audience supports higher non-monetary outcomes, like audience

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engagement, and results in lower monetary outcomes, like donations, on Twitch. The majority of streamers on general live streaming services (e.g., YouNow) are motivated to broadcast live for fun and to overcome boredom as well as to get in contact with other people. About 10% of streamers even stream because they hope to become an influencer and micro-celebrity. In order to receive the audience's attention, for streamers on Chaturbate it is about creating authenticity, i.e. the authentic interaction of content (e.g., striptease) and the model's personality. Broadcasters on e-commerce live streaming platforms (like Taobao Live) are mainly interested in earning money as digital entrepreneurs or *wanghongs* (wǎng luò hóng rén; 网络红人; Chinese for "people who have gone viral on the Internet"). For them, the main motive is to create social attraction and live streaming mediated interaction.

For many streamers, broadcasting starts as a hobby. They begin as amateurs and some gain social capital and develop a fan base, leading to a hybrid form of work and play. A certain level of social recognition and social capital is necessary for streamers to be able to monetize their actions and streamed content. Especially for video game streamers who started early with the release of Twitch, the situation was very promising to become a micro-celebrity. Some professional streamers make their money through donations and tips (many broadcasters on Twitch and nearly all on Chaturbate) and some act as influencers – they cooperate with companies and other institutions. One may distinguish between unpaid influencers, who influence their audience, for example, in terms of environmental protection, and paid influencers who work with a company to draw viewers' attention to a particular product. Many of them can be found as *wanghongs* on live streaming platforms which are linked to e-commerce services such as Taobao Live. However, all cyber social actions performed by streamers, regardless of their specific motives, are targeted at the interactions with their audience.

How do viewers perceive the cyber social relations on live streaming services? What are their main motives for watching and spending time on such services? What information behaviors do viewers of social live streaming services have? What social actions do audience members perform? Watching live streams makes users happy and relieves stress. Moreover, viewers of live streams are attracted to the streamer's charisma and sometimes develop an emotional attachment to micro-celebrities. Liking the streamer, combined with interactivity as well as viewers' identification with the streamer, predicts the use of game related live streaming services. Viewers' social actions on live streaming platforms are mainly driven and motivated by their enjoyment. Watching and interacting in live streams can even help viewers to cope with difficult periods in their lives such as, e.g., mental health issues or conflicts at work and in school. In addition to social interaction, the sense of community and meeting new people motivate users to engage with other users during live streams. For some users even the lack of external support in real life is a motivation to watch live streams and to "escape reality." Sometimes deviant behavior by viewers and streamers, such as abusive behavior or solicitation of unwanted sexual acts, also results in deviant relationships, normally leading to the banning of these users.

Some audience members like to participate actively in a stream and show engagement. Possibilities for viewers to participate are very diverse on live streaming services. One can chat with other audience members and with the streamer, viewers can become a guest in a streamer's broadcast and stream with the streamer via a split screen, and one can donate a subscription to other viewers and reward the streamer with virtual gifts. Receiving rewards, for example through likes, donations, or (money-based) gifts, is essential for streamers on live streaming platforms. However, what are the incentives and motives of viewers to donate rewards which require being paid with money? Gifting rewards is an important aspect to support the streamer as well as to acknowledge the streamer's performance. Users can support a streamer by giving (non-monetary) gifts (e.g., likes, hearts), gifting money (donations or subscriptions), or paying ("tipping") streamers for desired actions (e.g., taking off a bra on Chaturbate). Supporting a streamer therefore satisfies the needs of social integrative motivated viewers.

Almost all viewers on general social live streaming services have a desire to reward streamers with special emoticons, which are virtual gifts. Especially on Twitch, viewers who are motivated by social interaction and are spending money use the service to be part of the community, to communicate with other users, and furthermore, to support the streamer. Virtual crowd and community experience, viewer-streamer interaction, and cognitive absorption (being deeply involved in using the service), influence audience members' purchase intention and are the main motives to purchase virtual gifts. Similar effects like cognitive absorption occur by experiencing flow. There seems to be a relation between sending gifts and *danmaku*, which is a kind of comment that runs across the screen (if implemented in the system). Additionally,

broadcasters' reciprocal actions have motivating effects on the viewers. Viewers send (sometimes expensive) gifts, by spending a huge amount of money, to attract the attention of the streamer and sometimes the audience, or to promote preferred stream content. So, gift giving depends on the sense of community and therefore both the viewer's relationship with the streamer and with other audience members. The more engaged viewers are with the broadcast or platform, the more likely they are to donate gifts. It should also be remembered that the viewer's sense of happiness influences the crowd's intention to donate; viewers are paying for entertainment.

The continuous viewing intentions of users lead to "stickiness" towards a specific service, show, or an individual performer. What drives the stickiness of viewers? The loyalty of users to streamers presupposes the loyalty of broadcasters to the service. Gratifications as sociability and entertainment are necessary for loyalty of viewers. In this regard, immediate feedback of users is important for the perception of media richness. Furthermore, platform attachment as well as emotional attachment towards streamers foster user stickiness. Identifying oneself with the broadcaster and the streamed content as well as emotional engagement indirectly have effects on behavioral loyalty; however, this is moderated through the intensity of interpersonal relations.

Many live streaming services provide gamification elements to support streamers' as well as viewers' motivation to continuously stream and watch content, respectively. Among other mechanics, one can find different kinds of points, levels, badges, leaderboards, and also gifts. On most live streaming services users can spend money to buy the service's virtual currency and furthermore virtual gifts for streamers. Particularly, Chinese live streaming platforms provide a great variety of game mechanics (e.g., Longzhu.com).

4. MICRO-CELEBRITIES AND *WANGHONGS*: INFORMATION BEHAVIOR OF INFLUENCERS AND STREAMERS

We now turn to the economic perspective and the opportunity of monetizing parasocial and cyber social relations (Stock, 2020). If successful, information producers with distinct relations are (1) influencers (monetizing their parasocial relationships), (2) live-streamers (monetizing their cyber social relationships), or (3) both. For Khamis et al. (2017), such persons are "micro-celebrities." If a person has many followers on social media services and great follower interaction, the person may cooperate with companies and make advertised posts. Successful persons may become influencers or affiliate partners and monetize their online reach and parasocial relations (Freberg et al., 2011). Influencers can be found in many parts of the Internet; they predominantly apply, for instance, YouTube, TikTok, Instagram, and Twitter.

On live streaming platforms, there is a further monetization possibility apart from the affiliate marketing. If a person has many subscribers or casual viewers during their live streaming performances (for instance, on Twitch, Chaturbate, or YouNow) they can make money with paid subscriptions and tips (Törhönen et al., 2019, 2021).

Besides influencers and live-streamers, there is also a third category of micro-celebrities, who can profit from both monetization opportunities. Those micro-celebrities act as influencers on live streaming platforms and combine their parasocial and cyber social relations (Ma, 2021). Especially in China and South-East Asia, shopping via live streaming services is popular. At first sight, it is similar to TV shopping channels; however, it is much more interactive. There are two groups of motivations for customers to view live streaming services for shopping, namely product-related and streamer-related motives. There seems to be evidence that the mediating role of the broadcasters as micro-celebrities is essential for viewers' purchase intentions, thus forming a web celebrity economy. A prominent example is Alibaba's live streaming service Taobao Live, where streamers present products to be sold in e-commerce. This way the streamer ends up with two sources of income—the affiliate commission (payments from the advertising companies or brands) and tips from the satisfied audience. Influencers and streamers (and combinations of both) as well as their parasocial and cyber social relations constitute the latest form of Internet-based economy, worth billions of dollars, called *wanghong* (Craig et al., 2021), particularly in China (Han, 2021).

5. CONCLUSION

The concept of "cyber social interactions" is becoming increasingly important these days. Especially with live streaming and video meetings and conversations, the terms "social interaction" and "parasocial interaction" fail to describe the novel behavioral traits. The time has come for information science, especially for the "important area" of information behavior research (Willson et al., 2022), to give the concept of "cyber social interactions" the attention

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it deserves. Information behavior is much more than information seeking behavior and includes all human activities of information production, information seeking, and information reception (Fisher et al., 2005, p. xix), be it as human-computer interaction or as human-human interaction in cyber-space. Now we have the possibility to explore human information behavior in a novel context and witness its development, for better or for worse. Our conceptual paper is a plea to engage more in human-human online relations and interactions not only in sociology, economics and business administration, and communication science, but also in information science.

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CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Predicting Online Learning Adoption: The Role of Compatibility, Self-Efficacy, Knowledge Sharing, and Knowledge Acquisition

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ABSTRACT

Online learning is becoming ubiquitous worldwide because of its accessibility anytime and from anywhere. However, it cannot be successfully implemented without understanding constructs that may affect its adoption. Unlike previous literature, this research extends the Unified Theory of Acceptance and Use of Technology with three well-known theories, namely compatibility, online self-efficacy, and knowledge sharing and acquisition to examine online learning adoption. A total of 264 higher education students took part in this research. Partial Least Squares-Structural Equation Modeling was used to evaluate the proposed theoretical model. The findings suggested that performance expectancy and compatibility were significant predictors of behavioral intention, whereas behavioral intention, facilitating conditions, and compatibility had a significant and direct effect on online learning's actual use. The results also showed that knowledge acquisition, knowledge sharing, and online self-efficacy were determinates of performance expectancy. Finally, online self-efficacy was a predictor of effort expectancy. The proposed model achieved a high fit and explained 47.7%, 75.1%, 76.1%, and 71.8% of the variance of effort expectancy, performance expectancy, behavioral intention, and online learning actual use, respectively. This study has many theoretical and practical implications that have been discussed for further research.

Keywords: online learning adoption, Unified Theory of Acceptance and Use of Technology, compatibility, knowledge acquisition, knowledge sharing, self-efficacy

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1. INTRODUCTION

The rapid development of information technology (IT) helps provide rich educational content over the Internet, which is known as online learning. This refers to the integration of education and the learning process with modern technologies. Flexibility and accessibility are the main advantages of this learning technology (Wu et al., 2010). Moreover, online learning facilitates the learning process, reduces costs, and provides accessible education (Mahande & Malago, 2019). Besides these advantages, several issues and challenges need more effort to achieve the desired goals of online learning. In its early application, limited access and communication represented its key drawbacks (Chin, 1999). With time, this was replaced with other issues such as isolation, lack of motivation and direct guidance, and lack of experience (Abbad, 2021; Bouhnik & Marcus, 2006; Dutton et al., 2001).

Despite the spreading use of online learning technologies around the world, developing countries still face many challenges. This is due to the low rate of technology acceptance, the unavailability of adequate technical and human infrastructure, and the lack of information sharing and institutional cooperation (Kim & Park, 2018). Accordingly, online learning systems are not gaining popularity in developing countries (Farid et al., 2015). In Iraq, for example, after the partial and full shutdown due to the COVID-19 pandemic, all educational institutions adopted distance and blended education. However, many obstacles still prevent the successful application of this technology in Iraq (Al-Azawei et al., 2016; Al-Radhi, 2008). To address such issues, it is necessary to understand what can affect users' acceptance and adoption of online learning technology (Ashraf et al., 2016). Thus, identifying factors that may affect online learning adoption can help educational institutions apply specific strategies to attract students towards this technology (Park, 2009).

Consequently, it is necessary to make further efforts to expose the common factors that may influence learners' decisions in adopting online learning technology, particularly in developing countries. This present study, therefore, aims to (1) investigate learners' adoption of online learning in Iraq as a case of developing nations, (2) extend the Unified Theory of Acceptance and Use of Technology (UTAUT) model to understand the influence of other theories on technology acceptance, (3) improve the predictability of UTAUT by integrating new variables, and (4) highlight constructs that can help predict effort expectancy and performance expectancy, as this has been neglected in the original UTAUT. The research draws upon UTAUT (Venkatesh et al., 2003). However, it proposes an integrated model based on four theories, namely UTAUT, compatibility, online self-efficacy, and knowledge sharing and knowledge acquisition. Two motivations are behind this extension. First, this can address the deficit of UTAUT by investigating the influence of the integrated theories on online learning adoption. Second, these theories can complement each other, as they look towards technology acceptance from different angles, particularly in online learning systems.

2. PREVIOUS WORK AND THE PROPOSED MODEL

Implementing IT relies on user acceptance (Davis, 1989). The acceptance may refer to user satisfaction with this particular technology to accomplish the activities and tasks for which the technology was intended (Al-Azawei, 2019; Walldén et al., 2016; Wixom & Todd, 2005). Ignoring learners' perceptions, on the other hand, can negatively affect the acceptance of educational technologies (Alowayr & Al-Azawei, 2021).

To reach the desired acceptance, many efforts have been made in several domains including psychology, sociology, and information system (IS), to develop theoretical models for predicting and explaining user acceptance of IT or IS (Chao, 2019). The technology acceptance model (TAM) of Davis (1986) is a widely cited theory in this field. However, some studies have pointed out many disadvantages of TAM related to external variables of its perceived usefulness and perceived ease of use (Chao, 2019; Tsai et al., 2018). Therefore, Venkatesh et al. (2003) proposed another theory which is the so-called UTAUT. It has attracted considerable attention in online learning acceptance research (Abbad, 2021; Alowayr & Al-Azawei, 2021; Mahande & Malago, 2019).

Although UTAUT has been widely used and adopted, there is controversy and doubt about its capability to explain users' technology acceptance. This may indicate that the factors and variables used in UTAUT may not be sufficient to determine the required level of technology adoption. Accordingly, previous research modified and extended UTAUT (Chao, 2019; Cimperman et al., 2016; Khalilzadeh et al., 2017; Mtebe et al., 2016). Such literature suggested that adding several different external variables could improve the model's predictability. In online learning, Alowayr and Al-Azawei (2021) extended the model based on the self-determination and expectation-confir-

mation theories. Based on UTAUT, Kim and Lee (2020) built a conceptual framework of effective information communication technologies-based instruction.

To address some of UTAUT's limitations, this present study extends it by constructing an integrated framework based on four well-known theories. Here, four external variables are integrated with UTAUT, which are compatibility, online self-efficacy, knowledge sharing, and knowledge acquisition. This study, therefore, investigates the effect of these four external constructs as depicted in the proposed research model (see Fig. 1).

2.1. Unified Theory of Acceptance and Use of Technology

UTAUT is a research theory based on psychology and sociology, developed from previous models (Venkatesh et al., 2003). Practically, UTAUT is used for the explanation of user perception and acceptance behavior. The original UTAUT model consists of four essential variables and four moderators. Performance expectancy is the belief of users that the system (specific technology) can help to improve job performance, while effort expectancy refers to users' beliefs that technology does not need a high mental effort. Social influence means the social pressure on users' decisions and their perceptions when other parties important to them believe that they should use the technology. Finally, facilitating conditions refer to users' beliefs that technical and organizational infrastructures are available to support the use of technology (Venkatesh et al., 2012). Moreover, UTAUT proposed four key moderators, namely the voluntariness of use, experience, gender, and age.

Aliaño et al. (2019) highlighted that effort expectancy, performance expectancy, and social influence were determinants of behavioral intention to use online learning. Furthermore, Davis (1986) confirmed that effort expectancy is a predictor of performance expectancy. In UTAUT, Venkatesh et al. (2003) found that behavioral intention and facilitating conditions were predictors of actual use. Accordingly, the hypotheses proposed in this study are:

H1: Effort expectancy significantly affects behavioral intention

H2: Effort expectancy significantly affects performance expectancy

H3: Performance expectancy significantly affects behavioral intention

H4: Social influence significantly affects behavioral intention

H5: Facilitating conditions significantly affect the actual use

H6: Behavioral intention significantly affects the actual use

2.2. Compatibility

Compatibility refers to the degree to which innovations are perceived as in agreement with the current values, needs, and past experiences of probable adopters (Rogers, 1995). In online learning technology adoption, the compatibility theory has emerged as one of the important factors that may affect the behavioral intention of users to adopt modern technology (Cheng, 2015; Isaac et al., 2019;

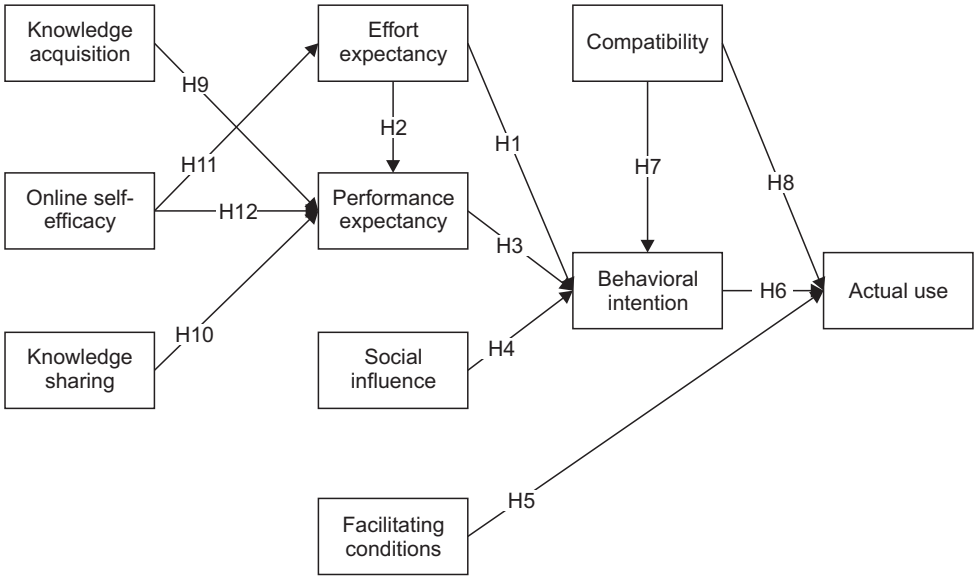


Fig. 1. Proposed research model.

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Ozturk et al., 2016). Chang et al. (2005) showed that there is a need for more effort to demonstrate the importance of this factor in e-learning systems. Moreover, a significant relationship between real usage of mobile learning adoption and compatibility was found (Cheng, 2015). In this research, we assume that the compatibility factor positively affects both behavioral intention and actual use.

H7: Compatibility significantly affects behavioral intention

H8: Compatibility significantly affects actual use

2.3. Knowledge Acquisition and Knowledge Sharing

A large number of enrolled students in educational institutions could raise challenges and issues related to knowledge acquisition and knowledge sharing (Al-Emran et al., 2019). Such issues could be addressed by online learning systems (Al-Emran & Teo, 2020). Nevertheless, a few efforts demonstrate the impact of these two factors on the adoption of online learning. In this context, knowledge acquisition and knowledge sharing might have an influential effect on learners' intention to adopt online learning technology and/or performance expectancy (Al-Emran & Teo, 2020; Lau & Tsui, 2009).

Knowledge acquisition means how a learner gains new knowledge by extracting, structuring, and organizing knowledge from one source (Al-Emran & Teo, 2020; Huang, 2020). Al-Emran et al. (2018) revealed that knowledge acquisition was a determinant of performance expectancy and effort expectancy. Knowledge sharing means the spread of diverse resources among individuals involved in particular activities. Previous studies indicated a positive relationship between knowledge sharing and performance expectancy (Al-Emran et al., 2018; Cheung & Vogel, 2013). According to this discussion, the current study suggested the following hypotheses:

H9: Knowledge acquisition significantly affects performance expectancy

H10: Knowledge sharing significantly affects performance expectancy

2.4. Online Self-efficacy

Self-efficacy is another widely used cognitive factor that is related to users' motivational beliefs. It refers to users' evaluation of their personal ability to complete tasks and goals well (Bandura, 1986). In an online learning context, self-efficacy is "a student's self-confidence in his or her ability to perform certain learning tasks using the e-learning system" (Tarhini et al., 2014).

In line with the above, self-efficacy shows a significant effect on adopting online learning (Qiao et al., 2021; Zhang & Liu, 2019). Thus, the motivation of students to use online learning systems is highly related to their successful adoption (Wang & Newlin, 2002). Earlier literature showed that self-efficacy was a determinant of both performance expectancy and effort expectancy (Wu, 2017; Yilmaz, 2016; Zhang & Liu, 2019). According to this discussion, we assumed that

H11: Online self-efficacy significantly affects effort expectancy

H12: Online self-efficacy significantly affects performance expectancy

3. RESEARCH METHODOLOGY

This study adopts a survey research design to examine the cause and effect relationships among the proposed research model. One of the advantages of this research is that the subjectivity issues are not found, as researchers rely solely on the statistical findings to understand the possible causality associations between different constructs.

3.1. The Research Instrument

The distributed online questionnaire included the main page that presented the key aims of the questionnaire, its filling out time, ethical considerations, and a few instructions to answer its questions correctly. This was followed by general questions to collect demographic information from the research participants. The third part consisted of items that were designed to measure students' perceptions and intention to use online learning. Overall, 38 questions were designed based on previous literature to cover the ten constructs of the proposed research model, namely behavioral intention, actual use, knowledge acquisition, knowledge sharing, performance expectancy, online self-efficacy, effort expectancy, facilitating conditions, social influence, and compatibility (see Appendix). A five-point Likert scale was adopted, ranging from one which means 'strongly disagree,' whereas five refers to 'strongly agree.'

3.2. The Research Participants

This study recruited undergraduate and postgraduate students from a public university in one of the center governorates in Iraq. Of about 400 students, 264 responded voluntarily to the online questionnaire with a response rate of 66%. The research subjects agreed to take part in

this study based on submitting the questionnaire as an indicator of their consent. It was also illustrated in the questionnaire that all collected data would be used for research purposes only and would not be shared with a third party.

Out of the 264 participants, 93 (35.2%) were man and 171 (64.8%) were woman. Regarding the age class, 202 (76.5%) were aged from 18 to 22, while only 62 (23.5%) were 23 years old or over. In terms of the study type, 182 (68.9%) were from the morning study, whereas 82 (31.1%) were from the evening study. Table 1 shows the key features of the research participants.

3.3. Data Collection

The research data were collected in the second semester of 2020-2021. The participation was voluntary, and the authors provided a general view of the purpose of the study before filling out the research questionnaire. The questionnaire was distributed online via Google Classroom, as it was the online learning platform used by the university. All received responses were valid because all questions were required to prevent submitting incomplete answers. The filling procedure of the research questionnaire took from 10 to 15 minutes. Here, the convenience sampling approach was adopted. The research data were analyzed using SmartPLS software package version 3.0 (Ringle et al., 2015). The *p*-value was set to 0.05.

Table 1. Participants' information

Variable	Value (n=264)
Year	
First	107 (40.5)
Second	44 (16.7)
Third	31 (11.7)
Fourth	80 (30.3)
Postgraduate	2 (0.8)
Gender	
Man	93 (35.2)
Woman	171 (64.8)
Age (yr)	
18-22	202 (76.5)
23 or more	62 (23.5)
Study type	
Morning	182 (68.9)
Evening	82 (31.1)

Values are presented as number (%).

4. RESULTS

The proposed theoretical model was investigated using partial least squares (PLS). In comparison to traditional statistics, such as regression, this method has many advantages. First, it can be used to examine the association among a series of constructs (Al-Azawei, 2017). Moreover, according to Chin (1998), structural equation modeling (SEM) is a superior method for theory development and prediction. Finally, previous research on predicting users' behavior has widely adopted this technique (Al-Azawei & Alowayr, 2020; Ameen et al., 2019; Shin & Kang, 2015). The collected data were analyzed in two steps. The first was validating the research survey, whereas the second was examining the predictability of the independent variables to the dependent constructs.

4.1. Validating the Research Questionnaire

The significance of confirming reliability and validity comes from the influence of both measurements on the quality of the gathered data (Pallant, 2013). Moreover, the impact of reliability and validity cannot be about the quality of data only, as those characteristics can also affect the research findings and recommendations (Al-Sabawy, 2013). In SEM, examining reliability and validity is a step prior to investigating the structural model. This is to confirm the questionnaire's validity. In this research, convergent, construct, and discriminant validities were validated.

The reliability can be evaluated based on measuring the unidimensionality of each factor in the research model. Based on the threshold proposed by Hulland (1999), the unidimensionality of the research questionnaire was supported because the outer loadings of all indicators used to measure the research constructs were greater than 0.7. Moreover, Cronbach's alpha and composite reliability (CR) were all greater than 0.7 as assumed by Pallant (2013). Based on Tables 2 and 3, it is clear that the outer loadings of all indicators used to measure a particular variable are greater than 0.7; as well, Cronbach's alpha (internal consistency) and CR are more than the threshold of 0.7. Thus, the research questionnaire has confronted all thresholds recommended and this, in turn, clearly supports its reliability and validity. The Cronbach's alpha and CR of all constructs ranged from 0.824 to 0.940 and from 0.896 to 0.957 for both measurements respectively.

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Table 2. Outer loading

Item	AU	BI	Comp	EE	FC	KA	KS	OSE	PE	SI
BI1		0.935								
BI2		0.897								
BI3		0.946								
BI4		0.904								
COMP1			0.913							
COMP2			0.948							
COMP3			0.915							
EE1				0.879						
EE2				0.890						
EE3				0.887						
EE4				0.895						
FC1					0.888					
FC2					0.885					
FC3					0.808					
KA1						0.892				
KA2						0.905				
KA3						0.876				
KA4						0.895				
KA5						0.836				
KS1							0.752			
KS2							0.822			
KS3							0.860			
KS4							0.900			
KS5							0.858			
OSE1								0.873		
OSE2								0.917		
OSE3								0.910		
PE1									0.878	
PE2									0.910	
PE3									0.861	
PE4									0.873	
SI1										0.923
SI2										0.926
SI3										0.926
USE1	0.910									
USE2	0.912									
USE3	0.910									
USE4	0.746									

AU, actual use; BI, behavioral intention; Comp, compatibility; EE, effort expectancy; FC, facilitating conditions; KA, knowledge acquisition; KS, knowledge sharing; OSE, online self-efficacy; PE, performance expectancy; SI, social influence.

Table 3. Construct reliability and validity

Factor	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted
Actual use	0.893	0.908	0.927	0.761
Behavioral intention	0.940	0.940	0.957	0.848
Compatibility	0.916	0.917	0.947	0.857
Effort expectancy	0.910	0.911	0.937	0.788
Facilitating conditions	0.824	0.826	0.896	0.741
Knowledge acquisition	0.928	0.928	0.946	0.777
Knowledge sharing	0.895	0.897	0.923	0.705
Online self-efficacy	0.883	0.888	0.928	0.810
Performance expectancy	0.904	0.905	0.933	0.776
Social influence	0.916	0.916	0.947	0.856

Table 4. Discriminant validity

Factor	AU	BI	Comp	EE	FC	KA	KS	OSE	PE	SI
AU	0.872									
BI	0.797	0.921								
Comp	0.812	0.832	0.926							
EE	0.673	0.666	0.716	0.888						
FC	0.695	0.702	0.723	0.727	0.861					
KA	0.759	0.772	0.752	0.719	0.679	0.881				
KS	0.673	0.715	0.653	0.691	0.735	0.815	0.840			
OSE	0.735	0.737	0.755	0.691	0.764	0.696	0.679	0.900		
PE	0.782	0.793	0.750	0.739	0.746	0.819	0.773	0.730	0.881	
SI	0.647	0.688	0.707	0.677	0.692	0.697	0.656	0.677	0.687	0.925

AU, actual use; BI, behavioral intention; Comp, compatibility; EE, effort expectancy; FC, facilitating conditions; KA, knowledge acquisition; KS, knowledge sharing; OSE, online self-efficacy; PE, performance expectancy; SI, social influence.

Convergent validity refers to a type of measurement validity for multiple indicators according to the notion that indicators of one construct will act alike or converge, whereas construct validity means how well the indicators of one variable converge or how well the indicators of different variables diverge (Bernard, 2012). Average variance extracted (AVE) between 0.5 and 1 is a good indicator to confirm the convergent validity (Fornell & Larcker, 1981). Table 3 confirms the convergent validity of the research questionnaire. On the other hand, the discriminant validity of a research measurement was also proved as discussed by Alowayr and Al-Azawei (2021). Based on Table 4, the discriminant validity has also been supported. Finally, construct validity can be evaluated based on the goodness of fit (Al-Sabawy, 2013) as indicated in Table 5.

4.2. Findings of the Proposed Model

Table 6 shows that ten out of twelve hypotheses were supported based on the path association among the proposed variables, whereas Fig. 2 illustrates R^2 and β values of the model after performing the PLS. According to this analysis, the results indicate that performance expectancy

($\beta_{PE\rightarrow BI}$=0.371, p<0.001) and compatibility ($\beta_{Comp\rightarrow BI}$=0.514, p<0.001) were significant predictors of behavioral intention to explain 76.1% (R^2=0.761) of the variance of this construct, supporting hypotheses H3 and H7. On the other hand, effort expectancy ($\beta_{EE\rightarrow BI}$=-0.043, p=0.428) and social influence ($\beta_{SI\rightarrow BI}$=0.100, p=0.055) were not determinants of behavioral intention, and so hypotheses H1 and H4 were rejected.

Regarding the predictors of actual online learning use, the findings show that facilitating conditions ($\beta_{FC\rightarrow AU}$=0.152, p=0.007), behavioral intention ($\beta_{BI\rightarrow AU}$= 0.345, p<0.001), and compatibility ($\beta_{Comp\rightarrow AU}$=0.416, p<0.001) were determinants of this construct to explain 71.8% (R^2=0.718) of its overall variance. Such results supported hypotheses H5, H6, and H8.

The results also confirm that four constructs were predictors of performance expectancy, namely effort expectancy ($\beta_{EE\rightarrow PE}$=0.193, p=0.002), knowledge acquisition ($\beta_{KA\rightarrow PE}$=0.392, p<0.001), knowledge sharing ($\beta_{KS\rightarrow PE}$=0.186, p=0.008), and online self-efficacy ($\beta_{OSE\rightarrow PE}$=0.198, p=0.003). These variables explained 75.1% (R^2=0.751). Thus, hypotheses H2, H9, H10, and H12 were confirmed. Finally, online self-efficacy ($\beta_{OSE\rightarrow EE}$=0.691, p<0.001) was also a significant predictor of effort expectancy to explain 47.7% of its variance. This confirms hypothesis H11.

Table 5. Model fit

The goodness of fit	Saturated model	Estimated model
SRMR	0.046	0.084
d_ULS	1.581	5.288
d_G	1.150	1.298
Chi-square	1,666.087	1,746.200
NFI	0.843	0.835

5. DISCUSSION

This research extends UTAUT to investigate the accep-

Table 6. Research findings

Hypothesis	β	Mean	SD	T-value	*p*-value	Findings
H1: Effort expectancy -> Behavioral intention	-0.043	-0.043	0.055	0.793	0.428	Rejected
H2: Effort expectancy -> Performance expectancy	0.193	0.193	0.062	3.117	0.002	Supported
H3: Performance expectancy -> Behavioral intention	0.371	0.371	0.067	5.547	0.000	Supported
H4: Social Influence -> behavioral intention	0.100	0.100	0.052	1.923	0.055	Rejected
H5: Facilitating conditions -> Actual use	0.152	0.156	0.057	2.683	0.007	Supported
H6: Behavioral intention -> Actual use	0.345	0.341	0.067	5.147	0.000	Supported
H7: Compatibility -> Behavioral intention	0.514	0.513	0.054	9.538	0.000	Supported
H8: Compatibility -> Actual use	0.416	0.416	0.070	5.951	0.000	Supported
H9: Knowledge acquisition -> Performance expectancy	0.392	0.393	0.074	5.321	0.000	Supported
H10: Knowledge sharing -> Performance expectancy	0.186	0.185	0.070	2.661	0.008	Supported
H11: Online self-efficacy -> Effort expectancy	0.691	0.692	0.040	17.358	0.000	Supported
H12: Online self-efficacy -> Performance expectancy	0.198	0.197	0.068	2.922	0.003	Supported

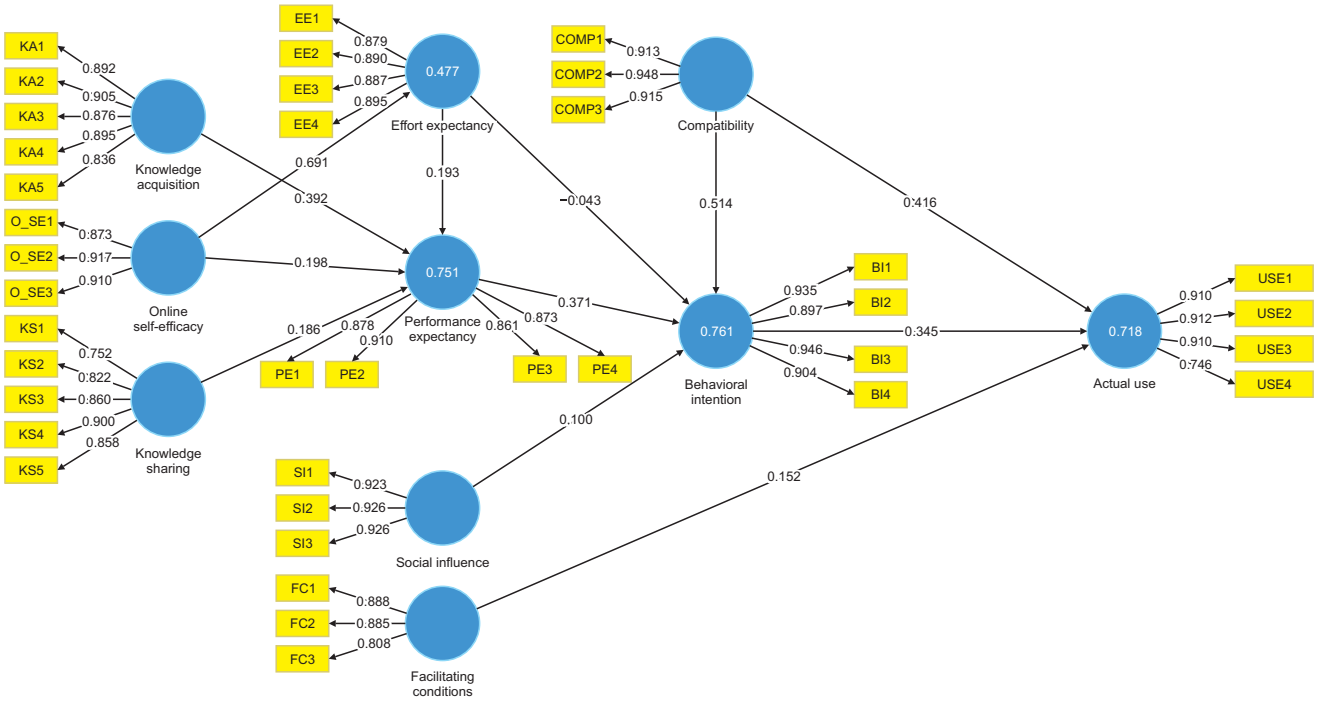


Fig. 2. Findings of the proposed model.

tance of online learning. It takes into account compatibility as a direct predictor of behavioral intention. The study also assumes that knowledge acquisition and knowledge sharing are determinants of performance expectancy, whereas online self-efficacy is proposed as a predictor of effort expectancy and performance expectancy. Thus, this research addresses some of the weaknesses in the original UTAUT, as it did not explain what can affect effort and performance expectancies. It also ignored the role of compatibility in examining online learning adoption. Table 7 summarizes the key findings of the proposed hypotheses. From Fig. 2, it is clear that knowledge acquisition was the strongest predictor of performance expectancy ($\beta_{KA\rightarrow PE}$=0.392). Compatibility, on the other hand, was the best predictor of both behavioral intention ($\beta_{Comp\rightarrow BI}$=0.514) and actual use ($\beta_{Comp\rightarrow AU}$=0.416). This reveals that extending UTAUT with the new constructs such as knowledge acquisition and compatibility has a significant influence on improving its predictability.

As for the predictors of performance expectancy, all proposed variables, namely effort expectancy, knowledge acquisition, knowledge sharing, and online self-efficacy, were determinants of this construct, supporting hypotheses H2, H9, H10, and H12. These four constructs explained 75.1% of the variance of performance expectancy. In agreement with our results, earlier research revealed that effort expectancy is a predictor of performance expectancy (Al-Emran et al., 2020; Davis, 1989), indicating that users can perceive the usefulness of technology if its use does not require a high mental effort. Moreover, other studies also found that both knowledge acquisition and knowledge sharing were predictors of performance expectancy (Al-Emran & Teo, 2020). This means that online courses should be designed in a way that allows participants to share knowledge and improve its acquisition. Thus, when students are capable of sharing and acquiring knowledge through online learning technology, their perceptions about technology usefulness in improving their overall performance can be enhanced as well. The research analysis also shows that online self-efficacy had a direct and positive relationship with performance expectancy. This may indicate that when learners are self-confident about their personal abilities in using online learning technology, their perceptions regarding its usefulness will be increased accordingly.

Online self-efficacy as a reference of learners' self-expectation was a predictor of effort expectancy to explain 47.7% of its variance, confirming hypothesis H11. Bandura (1986) assumes that people's expectations of efficacy can determine subsequent behavior in terms of the beginning and continuous coping behavior. According to Lin (2021), the self-efficacy of people may reveal

Table 7. Summary of the research hypotheses and findings

Hypothesis	Findings
Hypotheses for predicting performance expectancy	
H2: Effort expectancy -> Performance expectancy	Supported
H9: Knowledge acquisition -> Performance expectancy	Supported
H10: Knowledge sharing -> Performance expectancy	Supported
H12: Online self-efficacy -> Performance expectancy	Supported
Hypotheses for predicting behavioral intention	
H1: Effort expectancy -> Behavioral intention	Rejected
H3: Performance expectancy -> Behavioral intention	Supported
H4: Social influence -> Behavioral intention	Rejected
H7: Compatibility -> Behavioral intention	Supported
Hypotheses for predicting actual use	
H5: Facilitating conditions -> Actual use	Supported
H6: Behavioral intention -> Actual use	Supported
H8: Compatibility -> Actual use	Supported
Hypotheses for predicting effort expectancy	
H11: Online self-efficacy -> Effort expectancy	Supported

the motivational level of effort invested in an endeavor and this, in turn, could indicate that an individual with a low self-efficacy level will not persist in adopting or using technology. Based on our analysis, it is obvious that when students have a high level of self-efficacy, a low effort will be required to perform a particular action.

It was also found that two constructs out of four were determinants of behavioral intention, namely performance expectancy and compatibility, confirming hypotheses H3 and H7 to explain 76.1% of the variance of behavioral intention towards online learning use. On the other hand, this analysis rejects hypotheses H1 and H4. Overall, our findings are in agreement with earlier research that performance expectancy is a determinant of behavioral intention (Alowayr & Al-Azawei, 2021; Wang & Lin, 2021). This means that students are willing to continue using online learning because of its usefulness in improving their performance. The research analysis also shows that compatibility had a significant effect on intention to use. Such a finding is consistent with the outcomes of Wang and Lin (2021). This may indicate that students had a high level of compatibility in online learning settings and this, in turn, reflected their positive attitudes towards online classes. On the contrary, social influence and effort expectancy had no significant influence on behavioral intention. This may indicate that students had positive perceptions of the advantages of online learning regardless of the effort that is required to adopt it or the perspectives of other people who are important to the students. In an earlier research study (Al-Azawei & Alowayr, 2020), it was also found that both effort expectancy and social influence did not affect students' decision or perception to use mobile learning technology in the Iraqi context. A possible explanation for the weak influence of effort expectancy is that as students are part of the youth, they use online technologies daily, so their experience in dealing with them is great. Moreover, Ameen and Willis (2018) also revealed that the social influence of Iraqi students did not affect behavioral intention.

The research findings suggest that facilitating conditions, behavioral intention, and compatibility were determinants of online learning's actual use, which explained 71.8% of the variance of this construct and supported hypotheses H5, H6, and H8. In UTAUT, Venkatesh et al. (2003) assume that facilitating conditions could be a predictor of technology's actual use. This assumption was confirmed in our research to indicate that educational

institutions have to provide reliable information and communication technologies infrastructure, and support all users to ensure the successful application of online learning. Furthermore, based on previous literature, behavioral intention towards a particular action can indicate that people will actually perform it (Ajzen & Fishbein, 1980). Finally, in this research, compatibility was the strongest predictor of online learning usage. This means that students might perceive the consistency of this technology with their individual needs, particularly after the spread of the COVID-19 pandemic worldwide. It also suggests that when learning technology is compatible with learners' individual needs and practice styles, their actual use will increase accordingly. Such an outcome is in line with the findings of earlier literature that real usage of mobile learning can be predicted by compatibility (Cheng, 2015). In agreement with the UTAUT hypotheses (Venkatesh et al., 2003), technology's actual use can be positively enhanced if users feel that there is direct organizational support for technical issues that they may face.

Based on the research findings and analysis, many theoretical and practical implications can be drawn. Theoretically, this research extends previous work on online learning adoption, particularly in the case of developing countries. Furthermore, it extends current technology acceptance theories according to the integration of UTAUT with variables from the social cognitive theory (self-efficacy), compatibility theory (compatibility), and knowledge management topic (knowledge sharing and knowledge acquisition). Accordingly, this research is among the early literature that investigates the extension of UTAUT in an online learning context. From the practical view, this research provides clear guidance for decision-makers, teachers, and online technology designers to apply innovative means in online learning to enhance knowledge sharing and acquisition among learners. Moreover, educational institutions should ensure that both academic staff and students have high confidence in their personal abilities to use the technology, as this could affect their decision to adopt it. Finally, as compatibility was a predictor of behavioral intention and actual use, online learning courses should be designed in a manner that responds to learners' individual expectations and preferences.

6. CONCLUSION

This research aimed at extending UTAUT to understand online learning acceptance. To achieve this aim, four constructs were integrated with UTAUT, namely compatibility, knowledge acquisition, knowledge sharing, and online self-efficacy. Although UTAUT suggested that effort expectancy and performance expectancy are determinants of adoption behavior, it does not explain what can affect these factors. Accordingly, the present study confirmed that knowledge acquisition and/or sharing as well as online self-efficacy had a significant role in predicting such constructs. Moreover, this research supports the necessity of considering compatibility in predicting both behavioral intention and actual behavior.

In regard to future research directions, it is recommended to carry out a longitudinal research design to understand the phenomenon under investigation over a longer period. Furthermore, choosing a sample from different disciplines and cultures should be another aim of future research. Finally, researchers also need to analyze the role of knowledge sharing and knowledge acquisition in other contexts of the learning process.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Appendix. The research questionnaire

Factor	Reference
Knowledge acquisition	Al-Emran and Teo (2020)
KA1. Online learning facilitates the process of acquiring knowledge.	
KA2. Online learning allows me to generate new knowledge based on my existing knowledge.	
KA3. Online learning enables me to acquire knowledge through various resources.	
KA4. Online learning assists me to acquire the knowledge that suits my needs.	
KA5. Online learning can assist our university with better knowledge acquisition.	
Knowledge sharing	
KS1. Online learning facilitates the process of knowledge sharing in anytime anywhere settings.	Al-Emran and Teo (2020)
KS2. Online learning supports discussions with my instructor and classmates.	
KS3. Sharing my knowledge through online learning strengthens my relationships with my instructor and classmates.	
KS4. Online learning enables me to share different types of resources with my class instructor and classmates.	
KS5. Online learning facilitates collaboration among the students.	
Performance expectancy	
PE1: I find online learning useful in my daily study.	Venkatesh et al. (2012)
PE2: Using online learning increases my chances of achieving tasks that are important to me in my study.	
PE3: Using online learning helps me accomplish tasks more quickly.	
PE4: Using online learning increases my productivity in my study.	
Effort expectancy	
EE1: Learning how to use an online learning system is easy for me.	Venkatesh et al. (2012)
EE2: My interaction with the online learning system is clear and understandable.	
EE3: I find the online learning system easy to use.	
EE4: It is easy for me to become skillful at using the online learning system.	
Social influence	
SI1: People who are important to me think that I should use online learning	Venkatesh et al. (2012)
SI2: People who influence my behavior think that I should use online learning.	
SI3: People whose opinions that I value prefer that I use online learning.	
Facilitating conditions	
FC1: I have the resources necessary to use an online learning system.	Venkatesh et al. (2012)
FC2: Online learning system is compatible with other technologies I use.	
FC3: I can get help from others when I have difficulties using an online learning system.	

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Appendix. Continued

Factor	Reference
Behavioral intention	
BI1: I intend to use online learning in the future.	Venkatesh et al. (2012)
BI2: I will always try to use online learning in my daily study.	
BI3: I plan to use online learning in the future.	
BI4: I will recommend other students use online learning.	
Actual use	
AU1: I frequently use online learning system in my study.	Al-Azawei (2019)
AU2: I depend upon an online learning system in my study.	
AU3: I use an online learning system daily.	
AU4: I use an online learning system often.	
Compatibility	
Comp1: Online learning is compatible with my values.	Isaac et al. (2019)
Comp2: Online learning is compatible with my lifestyle.	
Comp3: Online learning is compatible with my needs.	

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An Exploratory Analysis of Online Discussion of Library and Information Science Professionals in India using Text Mining

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ABSTRACT

This paper aims to implement a topic modeling technique for extracting the topics of online discussions among library professionals in India. Topic modeling is the established text mining technique popularly used for modeling text data from Twitter, Facebook, Yelp, and other social media platforms. The present study modeled the online discussions of Library and Information Science (LIS) professionals posted on Lis Links. The text data of these posts was extracted using a program written in R using the package "rvest." The data was pre-processed to remove blank posts, posts having text in non-English fonts, punctuation, URLs, emails, etc. Topic modeling with the Latent Dirichlet Allocation algorithm was applied to the pre-processed corpus to identify each topic associated with the posts. The frequency analysis of the occurrence of words in the text corpus was calculated. The results found that the most frequent words included: library, information, university, librarian, book, professional, science, research, paper, question, answer, and management. This shows that the LIS professionals actively discussed exams, research, and library operations on the forum of Lis Links. The study categorized the online discussions on Lis Links into ten topics, i.e. "LIS Recruitment," "LIS Issues," "Other Discussion," "LIS Education," "LIS Research," "LIS Exams," "General Information related to Library," "LIS Admission," "Library and Professional Activities," and "Information Communication Technology (ICT)." It was found that the majority of the posts belonged to "LIS Exam," followed by "Other Discussions" and "General Information related to the Library."

Keywords: discussion forum, Lis Links, text mining, topic modelling, Latent Dirichlet Allocation

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1. INTRODUCTION

The Internet and Web 2.0 technologies have facilitated the academic community, including library professionals, with many platforms like mailing lists and discussion forums to disseminate or seek information (Muñoz-Cañavate et al., 2017a, 2017b; Shukla & Dawngliana, 2018). Common mailing list, discussion forums in Library and Information Science (LIS) include Lis-Forum[1], IFLA-L[2], and Lis Links[3]. Despite the growth in many social media platforms, these platforms are popular among students and working/retired professionals to seek professional knowledge on different topics, disseminate professional information, or announce conference/workshops/seminar/job advertisements (Muñoz-Cañavate et al., 2017a; Sawant & Sawant, 2016). The professionals articulate their information needs on these platforms and are more active in discussion forums than on blogs for the information needed (Muñoz-Cañavate et al., 2017b). In different fields, online discussion forums have been used commonly for seeking or sharing information (Arden et al., 2014). The asynchronous nature of these forums makes them more popular as they can be accessed anytime from anywhere at the convenience of the community's user (Coulson, 2005).

The plethora of intellectual interactions available on online platforms makes them a knowledge repository of solutions to the various problems faced by professionals. This vast amount of valuable information in the form of online conversations is the ideal data source for deriving valuable insights into the information needs of professionals (Abdillah & Adriani, 2015). In recent times, the analysis of these online discussions has become an emerging area of research interest (Singh et al., 2021) and has attracted researchers to evaluate the needs of professionals. The study of these online conversations can unveil hidden insights about the information needed by the user. There are multiple advantages of considering online discussions as data sources for behavioral information studies compared to the traditional questionnaire, survey, and interview. Firstly, users explicitly expresses their issues whenever they encounter them. The discussion forum stores the problem posted and the respective solution or information posted by the different users of the community. This makes the online forums warehouse all types of information needed by community members at other times. Secondly, many people's interactions can be captured and analyzed using different computer-assisted analyses, whereas formal surveys and interviews capture limited interactions only (Pandapotan et al., 2015). Hence, it saves time in data collection and analysis. Lastly, this online data is unbiased in the research context. Among the many advantages, online discussion data has some drawbacks too. The demerit of this data is that forum participants are the people who have Internet access through mobile/computer appliances, thus they cannot be representative of the whole population. The data is most suitable for exploratory analysis and less for hypotheses testing (McKenna & Thomson, 2014).

In this study, we have explored the online discussion of Indian LIS professionals on Lis Links, an online social networking platform for LIS professionals of India. It has more than 29,000 members posting over 10,000 messages in its discussion forum (Barman, n.d.). This study aimed to answer the following two research questions:

RQ1: What topics are discussed by LIS professionals on the online forum of Lis Links?
RQ2: What are the trending topics of discussion among the LIS Professionals of India?

2. RELATED WORK

In recent times, online discussions on different platforms have become a goldmine of data for researchers to understand people's behavior on various parameters deeply. The analysis of this online data is broadly classified into two categories: manual content analysis, and computer-assisted analysis like text mining or social network analysis. Both approaches have been widely used to analyze data from popular social media platforms, like Facebook, Twitter, Youtube, or StackOverflow. However, in the case of online forums, a great deal of research has been conducted using manual content analysis, and very few studies using computer-assisted analysis like text mining or social network analysis. In this review, the studies based on these techniques have been discussed.

Omidvar et al. (2014) proposed a novel method for finding experts in the AskMe forum. The data were extracted using a crawler and processed utilizing a wordnet dictionary and social network analysis. Abdillah and Adriani (2015) developed a recommendation system that used reviews posted on the forum as the backend data source. The author used Indonesia's most famous restau-

[1]http://ncsi.iisc.ernet.in/mailman/listinfo/lis-forum
[2]https://mail.iflalists.org/wws/info/ifla-l
[3]http://www.lislinks.com/

rant review forum data, i.e. Open Rice Indonesia. The system used Latent Dirichlet Allocation (LDA) for extracting the topics from the reviews. The results show that the method significantly recommends the restaurant based on the user's interest. Wang and Tang (2016) investigated online debates on traditional Chinese medicine in one popular Chinese BBS Tianya Forum. The authors used text mining methods to perform stance analysis. The data was extracted using the crawling mechanism. Later, this data was pre-processed before LDA analysis to discover the topics. Kahani et al. (2016) computed LDA analysis on the Eclipse forum to identify prominent discussion topics. MALLET software was used for LDA analysis. The study highlights the key insight about issues in Eclipse's plugin architecture and documentation, and the support for setting up the initial tool. Kim et al. (2017) examined 17,381 forum articles and 627,122 user comments on the online bitcoin forum to predict the price fluctuation of bitcoin. The crawled data was analyzed using topic modeling to extract the topics from the user comments. The study indicated the fluctuation in bitcoin prices with an accuracy rate of over 80%. The study showed the most prominent words of ten topics as a word cloud.

Munezero et al. (2017) employed text analysis techniques on open source software discussion forums to identify sales leads. The results highlighted new insights from the dataset, which were impossible by manual analysis of this vast data. Zarra et al. (2018) visually analyzed the two sets of a corpus of 15,000 and 25,000 discussions on StackOverflow. LDA analysis in R was used for extracting the topic, and D3.js was used for the visualization. Özcan-Tok et al. (2019) used text mining and regression analysis techniques to investigate four years (2013-2017) of comments of farmers and traders related to potatos, onions, lemons, and apples on a discussion forum. They found that these forums contain valuable information. Qian and Gui (2021) investigated 14,933 health-related posts posted by users of senior online communities. They crawled the corpus of data from Yinling and Keai and used text mining methods to conceptualize the health information needed. The study found that the senior users seek four types of remedies, i.e., coping with aging, dietary nutrition, physical exercise, and mental health. However, the main focus of the senior user is physical health issues. Ahn et al. (2021) examined tweets and retweets in the English language related to disasters to explore the information providers on Twitter. The data was collected using Twitter API and the weepy library of Python. The data was cleaned by removing duplicate tweets and standardized by lemmatization. The authors implemented LDA on standardized data using Python Scikit-learn's Library.

Saranya and Geetha (2020) implemented a topic model on clothing reviews of 2,000 users on the YELP website. The pre-processing of the data to clean the data included converting text to lowercase, removing punctuation, stopwords, and white spaces, and stemming. They used LDA

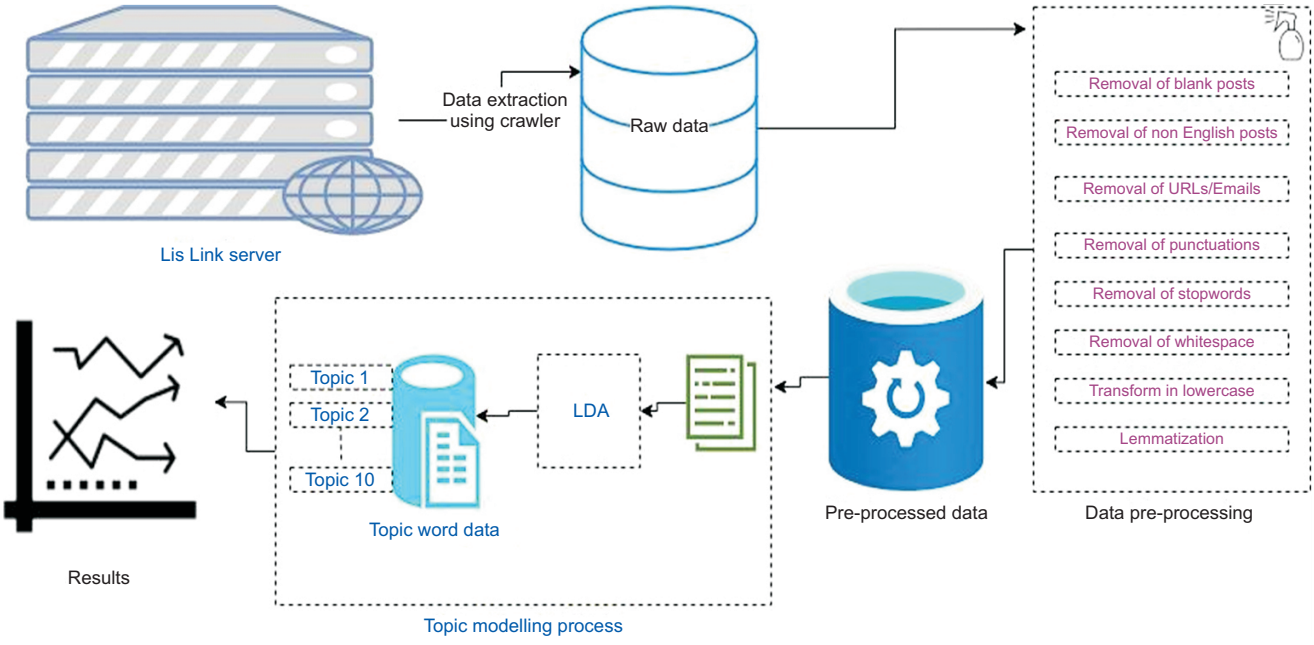


Fig. 1. Methodology of data analysis.

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as topic modeling algorithms to extract key topics from the dataset. The most frequent words with a minimum of 50 were plotted as a wordcloud. They found that the word "dress" was the most frequent.

The above review highlighted the studies of different domains conducted using LDA. This shows that LDA can be regarded as promising for analyzing online discussion forum data. Therefore, the present research is concentrated on the LDA-based topic modeling of online discussion on Lis Links.

3. METHODOLOGY

In this section, we discuss a detailed approach to performing topic modeling on the discussion forum of Lis Links. Fig. 1 shows the methodology of the analysis of text data of Lis Links forum based on the framework presented by Garg and Kanjilal (2019). This includes data collection, pre-processing, and topic modeling.

The data was extracted from Lis Links using R programming. This raw data was pre-processed with operations like removing blank posts, non-English posts, URLs, and email stopwords. Finally, the data was analyzed, and the ten topics were extracted using LDA with ten as the value of k. The post with high gamma scores was selected under that topic. Lastly, based on the gamma score, we visualized the topic-wise word cloud of ten words from 10 topics.

3.1. Data

A total of 10,286 posts were extracted using the crawler from Lis Links. The present study's analysis is focused on the text dataset, so it is essential to harvest only text content. Therefore, the crawling program was written in R using the package "rvest" to extract the text data.

The extracted data was stored in CSV format. The extracted dataset consists of 10 attributes, namely PostID, PostUser, PostDate, PostTime, PostCategory, PostTitle, PostBody, PostView, PostReplyCount, and PostUrl. However, the goal of this study will suffice with the analysis of text data of PostBody. Therefore, we have considered the content of PostBody as it contains detailed information about the post. The sample of the dataset is shown in Table 1.

Table 1. Sample dataset

PostID	PostUser	PostDate	PostTime	Post View	PostReply Count	PostTitle	PostBody	PostCategory	PostUrl
4102	Mohit Garg	February 21, 2014	17:49	734	2	DRTC Admision Notification	DRTC exam dates are out for two year MS in Library and Information Science. They are the best institutes of library science where you will get stipends also. There are no fees for the course. Highly motivated course. Kindly consult the attached file for admission notification.	Other Discussions	http://www.lislinks.com/forum/topics/drtc-admision-notification

3.2. Data Pre-Processing

Data pre-processing is one of the key steps in all data-based research to remove unwanted noise from the data. However, this is essential in enhancing text data quality

(Hariharakrishnan et al., 2017). Many studies have shown that the pre-processing of data is a critical and most time-consuming process (Press, 2016). The standard methods for pre-processing text data include lower casing of text data, stemming, lemmatization, and removal of punctuation, numbers, HTML tags, special characters, stopwords, etc. However, the type of methods used for pre-processing the data is application-dependent (Ignatow & Mihalcea, 2017). For example, we called two additional ways in this study before going for general pre-processing. The process was divided into two stages. Firstly, the blank posts and non-English posts were removed. The Lis Links also provide the functionality of posting images, documents, etc., in the discussion forum. The developed program for data extraction from Lis Links is limited to working with text data only. It does not extract anything other than text from the post, so the program will not harvest anything from the post containing only an image, document, etc., resulting in blank posts. Fig. 2 shows the example of a post where the image was embedded in the post body. Also, there is a possibility that somebody has posted blank posts without any messages. Fig. 3 shows the example of one such post without any content.

The character count of the PostBody of each post was calculated using R to identify the blank posts. The character size of each post was stored in the primary data frame. Analysis found that the posts with a character count from 0 to 7 were blank posts, which have no relevant content, except for the one case where the post only has one word. Therefore, we have removed all these blank posts that were either blank or having less informative text content.

India is a diverse country with multi-language-speaking people. The 22 languages (including Hindi and English) are officially listed as per the Eighth Schedule of the Constitution of India (The Editors of Encyclopaedia Britannica, 2019). Lis Links supports the features of posting content in regional languages with the help of Unicode. It makes Lis Links a national platform to cater to the needs of all LIS professionals in India. Therefore, there is a possibility that posts may contain regional languages also. Each post of a regional language on the Lis Links is stored as a sequence of Unicode. The original post posted in the Hindi language is shown in Fig. 4. The table shows the same post extracted from the Lis Links server data.

The one word of Hindi language is stored as a sequence of Unicode character tags. The R program has fetched the text content and the Unicode of non-English posts.



Fig. 3. Blank post.



Fig. 2. Example of post containing image and extracted blank.

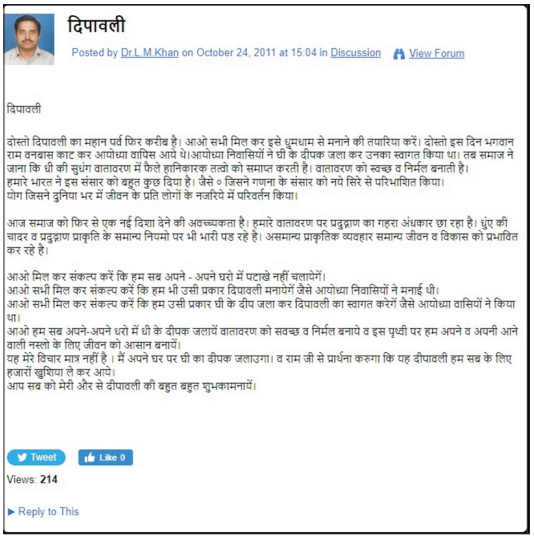


Fig. 4. Regional language post.

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The word "दिपावली" is made up of seven Unicode character tags: द (U+0926), "ि" (U+093F), "प" (U+092A), "ा" (U+093E), "व" (U+0935), "ल" (U+0932), and "ी" (U+0940). This is how each post in regional language can easily be identified consisting of Unicode characters. The presence of pattern <U+ was searched and stored as a separate data frame using the pattern matching function in R. These posts were checked manually to avoid any English posts and have some Unicode characters due to some unwanted space or character. The sample of one such post is shown in Table 2. Finally, those posts were considered for the final dataset, which was in English but had one or two Unicode characters. The other posts of regional language were identified and excluded from the final dataset.

In the second stage, URLs were removed from the data. Firstly, a regex was defined for all possible pattern matching of URLs. The URLs were extracted and removed based on this regex. The regex used for URL matching is defined as "(http[^]*)|(ftp[^]*)|(www\\.[^]*)." Similarly, the email mention was removed and stored as a separate CSV file. The regex used for email matching is defined as "\\S*@\\S*."

The removal of URL and email strings may again leave some of the posts empty. These posts were identified and removed from the primary dataset. After removing URLs and emails from the posts, punctuation and white spaces were removed from the text corpus. The stopwords were removed from the dataset in the next step. The stopwords are words that do not contain much information about the analysis. The list of stop words of SMART (System for the Mechanical Analysis and Retrieval of Text) information retrieval system is the most popular in text analysis. This system was developed in the 1960s at Cornell University (Lewis et al., 2004). The SMART list consists of 571 stop words removed from the dataset (Hvitfeldt & Silge, 2021). The other popular stopword list is snowball stopwords given by Porter (n.d.). Apart from these, there can be some domain and platform-specific stopwords. The removal of these stopwords depends on the purpose of the study. Words like "dear," "greetings," "hello," "hi," "please," "kindly," etc., are commonly used words in writing any correspondence to a person or organization. These are also known as salutations. The use of salutations is done to establish strong communication. Previous studies have found that salutations were common practice in writing an email (Hiranburana, 2017; Lee, 2004). The web-based discussion forum interface and workflow are different from email-based forums. Therefore, we have not excluded these words from exploring the use of salutations on the discussion forums of Lis Links.

The text corpus of Lis Links was converted to lowercase to avoid the issue of similar words considered as different tokens. For example, the system finds Book, BOOK, book, BooK as four tokens, while the literal meaning of all these words is the same. After the lower-casing of the words, the system will identify the word "book" with a frequency of four.

The transformation of different words into root words is an important phenomenon in text analysis. It helps identify the similar token used differently as per the language's grammar. For example, "Libraries" and "Library" convey the same meaning of context related to the library. It can be achieved by applying either stemming or lemmatization. Lemmatization is mapping the word with the root word with the dictionary meaning, while stemming is just matching to words after removal of smaller suffixes like *ies*, *y*, etc. This is why we have used lemmatization in this study to consider dictionary words for the analysis. It will also help to interpret the results quickly with the right words. The removal of numbers is a common practice in pre-processing of online data. However, we did not remove the numbers, as numbers also contain helpful information in the context of this study. The year of examination, admission, or question paper is the key information element to classify the discussion of LIS professionals. This is why we have not removed the numbers from the dataset.

Table 2. Extracted data of regional language

PostID	PostUser	PostDate	PostTime	Post View	Post ReplyCount	PostTitle	PostCategory	PostUrl
8732	Dr. L. M. Khan	October 24, 2011	15:04	194	0	<U+0926><U+093F><U+092A><U+093E><U+0935><U+0932><U+0940>	Other Discussions	http://www.lislinks.com/forum/topics/2013205:Topic:224441

3.3. Post-Pre-Processing

The pre-processed data was considered to visualize the most frequent terms and modeling of the topics. In this research, we have used LDA for extracting the topics from the text corpus. LDA is the most popular topic modeling technique in big data analysis (Garg & Rangra, 2022; Li & Lei, 2021).

The "topic models" package was used for LDA analysis (Grün & Hornik, 2011). The document term matrix (DTM) was created from the pre-processed corpus of the Lis Links discussion forum posts. As the term suggests, DTM is a matrix that consists of the number of occurrences of a term in the document.

> Post 1: "pgdlan ignou clear write exam focus thesis work humble request send format synopsis proceed thank"
> Post 2: "dear friend kindly suggest net library information science coach chennai effective online coach upcoming net exam kindly suggest good study material book syllabus advance"

The above two posts are pre-processed posts. The sample DTM of five terms from these two posts is shown in Table 3.

The above matrix shows that the term "exam" appeared once in both posts. The words "clear," "focus," "format," and "humble" appeared only in the first post, while the second post has a zero count for these terms.

Now, this DTM was used as an argument for the LDA function of the package "topic models." The value of k was set to 10. The k represents the number of topics to be extracted from the dataset. The value of k is the essential parameter in LDA analysis, describing the number of topics to be extracted from the text corpus. The smaller value of k represents the lesser number of general topics, while the larger value of k represents more specific topics. There is no best value of k for all studies, and its value varies for different datasets (Kahani et al., 2016).

Previous studies on mailing lists, an online forum of LIS professionals, have categorized discussions into 7 to 12 categories (Pujar et al., 2014; Siddique et al., 2020). Also, at present, Lis Links has nine (9) pre-defined categories for structuring discussions on the forums. Therefore, we have assumed the value of k to 10 based on the evidence of such previous studies on LIS domain and existing categories on Lis Links.

The extracted topics with their corresponding words were visualized as a Wordcloud. Finally, based on these ten topics, the posts were labeled. The frequency distribution of these topics was calculated.

3.4. Ethical Considerations

The analysis of content posted by people on online and social media platforms has become an emerging research topic among scholars of different academic discipline. These research efforts are supported by the easy availability of vast amounts of data and advanced tools for the whole analysis process. Popular platforms like Facebook, Twitter, and YouTube even provide APIs for accessibility of bulk content posted on these platforms. One essential question that arises here is, who has the right to the content posted on these platforms. Is it the user who has posted the content or the organization that owns the platform?

Sometimes online researchers misunderstand this. If they have access to a tool (data scraping tool) or know how to program, then no other permission is required to access the data. But this is not always the case. The users who posted their experience, reviews, etc., on the platform are generally unaware that the content will be analyzed in different research contexts. The user's consent is a key aspect of any research involving human participants. Before starting research, mutual agreement between researchers and participants should be done regarding how their data will be used. It is common to declare this agreement when collecting data through questionnaires/surveys/interviews, etc. to maintain the confidentiality of the respondent. However, this is quite impossible in online spaces, as the number of users is large compared to traditional survey-based research.

Therefore, it is important for researchers to first understand privacy and data concerns before starting any

Table 3. Document term matrix example

Posts	Terms				
	Clear	Exam	Focus	Format	Humble
Post 1	1	1	1	1	1
Post 2	0	1	0	0	0

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research based in an online environment. A good number of studies have considered the analysis of public data as per ethical standards. The data is publicly available if the content on the online platforms is accessible without any restrictions or requirements of login/passwords (Betts et al., 2014; Buck & Ralston, 2021; Eastham, 2011).

The discussion forum of Lis Links is publicly available and does not require any password to see content posted by any of the users. However, a login is required to start a new post or reply to existing posts. Therefore, the discussion forum of Lis Link can be considered a publicly accessible platform. In this study, we have extracted only the text of the discussions posted on Lis Links. No personal information or images were collected for this research.

Because of the above discussion it was not deemed necessary to obtain consent from each user who posted content on the Lis Link discussion forum. However, written permission has been taken from the creator of Lis Links to pursue this research.



Fig. 5. Wordcloud of frequent words in discussions on Lis Links.

4. RESULTS

The analysis of wordcloud and topic modeling was conducted on pre-processed data.

4.1. Wordcloud

Wordcloud is an easy-to-understand and powerful visual representation of the most frequent words in a text dataset (Bashri & Kusumaningrum, 2017; Dewi et al., 2020). The word cloud originated from the tag cloud used for Flickr (a social networking site) for multiple grouping of photographs (Miley & Read, 2011). In text analytics, word clouds are commonly used for presenting the overall picture of the text content, also known as text summarization (Heimerl et al., 2014). The font size of a word in the wordcloud is the indicator of the frequency of a word (Miley & Read, 2011). The most frequent word is displayed in larger font sizes than other words. This helps get an intuitive idea about the topics discussed in the text.

Fig. 5 illustrates the wordcloud of the 800 most frequent words in the Lis Links posts. The minimum frequency of the words was set to 20. Fig. 6 shows the frequency chart of the 25 most common words. The term "library" appeared in a larger size in pink color, followed by the word "information" in green. This shows the highest occurrence of the words "library" and "information" in the postings of Lis Links. This is not surprising, as Lis Links is a library domain-specific platform. The existence of the words "book," "university," and "librarian" shows that

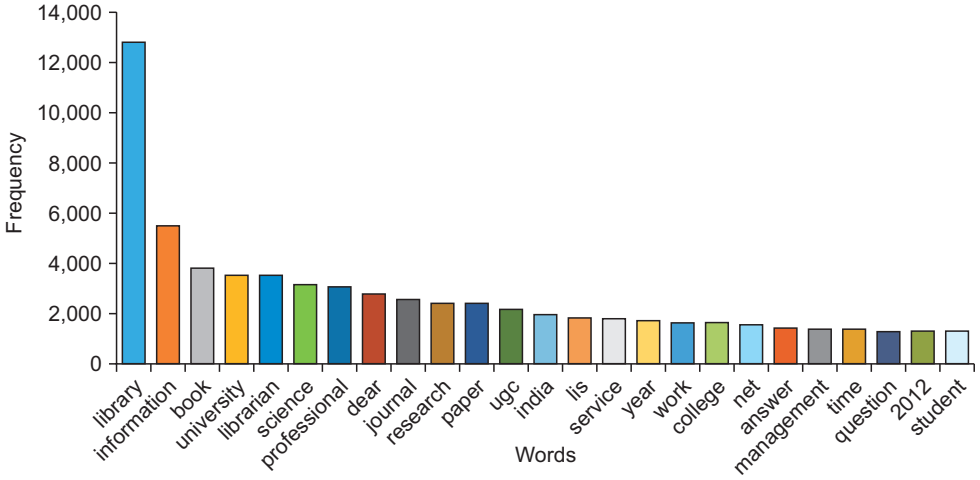


Fig. 6. Twenty-five most frequent words.

Table 4. Word wise beta score

Topic	Word	Beta	Word	Beta
1	koha	5.12E-57	software	3.86E-32
2	koha	9.70E-62	software	0.00022
3	koha	2.44E-20	software	0.000809
4	koha	0.000149	software	0.001037
5	koha	1.26E-77	software	0.000978
6	koha	6.54E-61	software	1.21E-31
7	koha	8.06E-26	software	0.001942
8	koha	6.85E-36	software	5.02E-05
9	koha	2.82E-70	software	0.000133
10	koha	0.01039	software	0.014984

users have discussed institutional or profession-related things in the posts. The terms "UGC," "question," and "answer" indicate posts related to UGC examinations. The word "2012" in a significant font size refers to one of the issues related to the 2012 UGC NET (University Grant Commission National Eligibility Test) Exam. This was the year when Lis Links had the maximum number of posts. Upon further analysis of the dataset, the words "research," "journal," and "paper" were mainly used as a means of posting the discussion related to research. Some posts also appeared to be related to call for papers, data collections using surveys, etc. Thus the frequent words gave an intuitive idea that discussions related to examinations were common in the forums. The most frequent words related to examinations were "application," "question," and "answer." The salutation words "dear" and "kindly" show that LIS professionals post discussions with due gratitude.



Fig. 7. Comparative Wordcloud of words in each ten topics.

4.2. Topic Modeling

The basic assumption of the topic modeling algorithm is that each text document is distributed over a certain fixed number of topics and these topics consist of a specific group of words. The analysis retrieves a group of terms of 10 topics from the text corpus. The most prominent ten words of each topic are listed in Table 4. These groups of words for each topic were selected based on the beta score. The beta score is per topic per word probability. It estimates the occurrence of a word in each of the topics. The table shows the probability of the words "koha" and "software" in all ten topics. Analysis shows that both words have the highest probability for Topic 10 compared to other topics. Thus, the words "koha" and "software" were selected for Topic 10. Similarly, the words of other topics were considered based on high beta score.

Fig. 7 shows the comparative word cloud of the most probable words of all ten topics. The font size of the word is dependent on the beta score. The higher the beta score, the bigger the font size of the word will be. The analysis found that the words "librarian," "post," "college," and "pay" belong to Topic 1; "2012," "India," and "current" are related to Topic 2; "dear," "professional," and "kindly" belong to Topic 3; "code," "information," and "classification" relate to Topic 4; "journal," "research," and "paper" relate to Topic 5;

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"ugc," "net," and "candidate" form Topic 6; Topic 7 consists of the words "library," "book," and "public"; "university," "science," and "department" are generated from Topic 8; "librarian," "post," and "pay" belong to Topic 9; and "software," "koha," and "online" form Topic 10.

LDA analysis identifies the per-document-per-topic probability of representation of all ten topics in the post. It is a probability of estimating the proportion of words from the post that formed the given topic. In the next step, the important task is to select the best topic discussed in the post. This can be achieved in multiple ways based on the type of application, i.e., either by the highest probability or by setting the threshold value (Barravecchia et al., 2022). Each one of the approaches has its limitations. But in the literature, the standard approach for selecting a topic is based on the highest probability (Jelodar et al., 2019). All the posts were classified based on the high per-document-per-topic probability, also known as a gamma score.

Table 5 shows the assignments of ten topics from one sample post. The score of 0.2482 of Topic 1 of the post indicated that Topic 1 has a 24.82% representation in the post. The score of 0.5721 shows that 57.21% of the proportions of the post are related to Topic 10; similarly, 14.93% for Topic 3. A minor percentage of representation was observed for Topic 2 and from Topic 4 to Topic 9. This shows that the post consists mainly of Topic 10, Topic 1, and Topic 3, with a major representation of Topic 10. Therefore, Topic 10 has been assigned to the post. Similarly, the topic with a high probability (gamma score) was assigned as a topic with each post. Table 5 shows an example of all ten topics and their related probability of one post.

In the final step, it is necessary to transform these topics into human understandable topics. The title of the topics as Topic 1, Topic 2,...., and Topic 10 make no sense unless it is known what these topics are broadly discussing. Therefore, we have assigned the human-readable topics based on the constituents of words of each topic. The categorization of the posts by earlier studies on LIS discussions was also considered (Pujar et al., 2014; Siddique et al., 2020). The posts' ten categories or topic names are shown in column 3 of Table 6.

Topic 1 is described by the words "librarian," "post," "college," "assistant," "pay," "library," "university," "ugc," "interview," "school," etc. It shows that Topic 1 is related to the "LIS Recruitment" post. Recruitment is the process of finding suitable employees for the organization. Generally, the discussion of recruitment is surrounded by the advertisement of the post, pay or remuneration of the post,

Table 5. Gamma score of post per topic

PostUser	PostDate	PostTime	PostView	PostReply	PostTitle	PostCategory	PostURL	PostClassified	Gamma score
Ramkisan more	April 6, 2020	16:44	158	5	Enabling Web OPAC in e-Granthalaya 3.0 Software	Other Discussions	http://www.lislinks.com/forum/topics/enabling-web-opac-in-e-granthalaya-3-0-software	Topic 1	0.2482
								Topic 2	0.0043
								Topic 3	0.1493
								Topic 4	0.0043
								Topic 5	0.0043
								Topic 6	0.0043
								Topic 7	0.0043
								Topic 8	0.0043
								Topic 9	0.0043
								Topic 10	0.5721

Table 6. List of topic word and new category

Topic	Words	Category name
Topic 1	librarian, post, college, assistant, pay, library, university, ugc, interview, school	LIS Recruitment
Topic 2	2012, india, download, current, affair, indian, week, jun, world, bank	LIS Issues
Topic 3	dear, professional, lis, link, friend, kindly, library, information, member, share	Other Discussion
Topic 4	library, information, iii, answer, correct, ans, code, classification, TRUE, system	LIS Education
Topic 5	journal, library, information, research, paper, science, publish, international, author, management	LIS Research
Topic 6	ugc, net, candidate, paper, exam, answer, mark, question, result, test	LIS Exams
Topic 7	library, book, journal, college, public, year, professional, school, student, dear	General Information related to Library
Topic 8	university, library, science, information, india, research, librarian, department, phd, prof	LIS Admission
Topic 9	library, work, information, make, read, librarian, time, knowledge, book, professional	Library and Professional Activities
Topic 10	library, software, user, koha, service, open, datum, access, system, online	Information Communication Technology (ICT)

specification/profile of the job, etc. Hence Topic 1 was named LIS Recruitment, consisting of messages where professionals discussed job-related matters. The sample post labeled as "Topic 1" or "LIS Recruitment" is shown in Table 7. The post discusses an advertisement for school librarians by DSSSB.

Topic 2 talks about the "LIS Issues" through the words "2012," "India," "download," "current," "affair," "Indian," "week," "jun," "world," "bank," etc. The LIS issues are all about the problems related to the LIS domain faced by people. The sample of the posts labeled as Topic 2 in Table 7 shows the concern of professionals.

Topic 3 represents the topic of "Other Discussion," which consists of the words "dear," "professional," "lis," "link," "friend," "kindly," "library," "information," "member," "share," etc. It consists of posts related to multiple subtopics of LIS.

The fourth topic highlights the post related to "LIS Education" which consists of the words "library," "information," "answer," "correct," "ans," "code," "classification," "TRUE," "system," etc. This means the discussions are related to LIS courses, theoretical concepts of LIS, etc.

The words "journal," "library," "information," "research," "paper," "science," "publish," "international," "author," and "management" suggest that Topic 5 discusses "LIS Research." The components of research include data collection, analysis, and publication. Therefore, we concluded that Topic 5 is related to LIS research.

Topic 6 consists of the words "ugc," "net," "candidate," "paper," "exam," "answer," "mark," "question," "result," "test," etc. These words revealed that Topic 6 talks about the post related to LIS exams. The examination process involves the candidate, question paper, answer key, marks of the question paper, exam name like UGC NET, exam results, etc.

The words "library," "book," "journal," "college," "public," "year," "professional," "school," "student," or "dear" highlight that the posts were broadly discussing "General Information related to the Library." It includes information about some special libraries and their services, or achievements of any particular library.

Topic 8 discusses admission notification and its related subtopics. The words include "university," "library," "science," "information," "India," "research," "librarian," "department," "phd," or "prof."

The analysis found that in Topic 9, library and professional activities were widely discussed. The top 10 words in this category are "library," "work," "information," "make," "read," "librarian," "time," "knowledge," "book," and "professional." The professional has a keen interest in organizing activities in the library to enhance usage.

In Topic 10, the generated words contain "library," "software," "user," "koha," "service," "open," "datum," "access," "system," and "online." A professional posted a post related to information and communication technology on this broader topic. The terms "software" and "koha" signify discussions related to open source software for library man-

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Table 7. Classification of posts as per revised category

Sl. No.	PostTitle	PostCategory	PostClassified	Revised PostCategory
1	DSSSB Librarian 197 Post: Advertisement No. 04/20, Post Code 92/20 Kept in Abeyance	Circular of Importance to LIS	Topic 1	LIS Recruitment
2	How to Get Experience When No One is Interested to Recruit a Fresher	Other Discussions	Topic 2	LIS Issues
3	Where to Purchase Rare Books?	Other Discussions	Topic 3	Other Discussion
4	How many Auxiliary tables are there in DDC 23rd Edition	Other Discussions	Topic 4	LIS Education
5	Call for Chapter for the Book on "Virtual and Online Classrooms: Digital Resources, Internet Learning and Open Courseware"	Call for Articles for Publication	Topic 5	LIS Research
6	NTA UGC NET June 2020 Notification	UGC NET / SET Examination	Topic 6	LIS Exams
7	IFLA Recognised the Initiative taken by Kota Public Library in Covid-19 and Global Public Libraries	Other Discussions	Topic 7	General Information related to Library
8	CUTN, M.Lib.I.Sc. and Ph.D. Online application is extended till 23rd May 2020	Admission Notification	Topic 8	LIS Admission
9	How to Conduct "Meet the Author" Program in CBSE School	Other Discussions	Topic 9	Library and Professional Activities
10	Enabling Web OPAC in e-Granthalaya 3.0 Software	Other Discussions	Topic 10	Information Communication Technology (ICT)

Table 8. Distribution of post as per revised category

Topic	Human readable topic	Number of posts	%
Topic 1	LIS Recruitment	1,067	10.73
Topic 2	LIS Issues	185	1.86
Topic 3	Other Discussion	1,557	15.66
Topic 4	LIS Education	636	6.40
Topic 5	LIS Research	845	8.50
Topic 6	LIS Exams	1,621	16.30
Topic 7	General Information related to the Library	1,442	14.50
Topic 8	LIS Admission	937	9.42
Topic 9	Library and Professional Activities	707	7.11
Topic 10	Information Communication Technology (ICT)	946	9.51
Grand total		9,943	100.00

agement systems like koha.

Table 8 shows the distribution of posts as per the revised category. The analysis found that most of the discussions were in the category of "Lis Exams." It shows that LIS professionals are keen to seek or share information related to LIS exams. LIS exams is one of the key topics where study material, question papers, and proper guidance are required for passing the exam. In India, the popular LIS

exams include UGC NET, UGC JRF (University Grant Commission Junior Research Fellowship), SET (State Eligibility Test), KVS (Kendriya Vidyalaya Sangathan), NVS (Navodaya Vidyalaya Samiti), MOOC, and university entrance exams. The UGC NET exam is a national level exam for qualifying the eligibility test for an assistant professor, assistant librarian, and jobs of the same cadre. These jobs are the highest job level at the entry level in India. UGC JRF is the national level exam for getting a fellowship for pursuing the MPhil/Ph.D. in India. Under this scheme, Rs. 25,000/- per month is given to each qualified candidate for the initial two years and Rs. 28,000 per month for the next two years with the annual contingency of Rs. 10,000/- per annum. It was also found that professionals actively interact on topics related to "General Information related to the Library" (14.50%, 1,442), LIS Recruitment (10.73%, 1,067), ICT (9.51%, 946), and LIS Admission (9.42%, 937). Few discussions were observed on the theme "LIS Issues" (1.86%, 185).

5. DISCUSSION

This study employed text mining-based methods to conceptualize the online discussions of LIS professionals. The raw corpus of the discussions in the text format was extracted from Lis Links and pre-processed using different packages of R. Frequency analysis found that the most frequent words were library, information, university, librarian, book, professional, science, research, paper, question, answer, management, etc. The word cloud was plotted to show the frequency of all such common words compared to other words.

Further, the popular topic modeling algorithm LDA was implemented on the text corpus to identify the topic of discussion among LIS professionals. The document per topic probability (gamma score) and topic per word probability (beta score) are the important parameters for identifying the right topic for each document and constituent words for each topic. The beta score of each topic per word was calculated, and words were assigned to each topic based on the highest beta score. Similarly, the gamma score for each post per topic was calculated, and topics were assigned based on the highest gamma score. The ten topics identified were "LIS Recruitment," "LIS Issues," "Other Discussion," "LIS Education," "LIS Research," "LIS Exams," "General Information related to Library," "LIS Admission," "Library and Professional Activities," and "Information Communication Technology (ICT)." The topics were closely related to various previous studies of content analysis of online discussions of LIS professionals (Choi et al., 2019; Pujar et al., 2014; Siddique et al., 2020).

Each post on the forum was labelled with one of these topics and the frequency distributions of all ten topics were calculated. The results revealed that most discussions were tagged under the topic of "LIS Exams." This showed the most significant interest of the LIS professionals in virtually sharing Information related to various jobs exams like KVS and NVS, and professional examinations like NET/SET, with the LIS community.

These findings affirm that LIS Links is a good platform for discussing LIS exams. For example:

> "Hi.. Everybody can anyone tell me any trusted institution or place or person name and who provide the coaching for UGC-NET exam for library science in Delhi..."

The example shows that professionals are looking for a coaching institution or tutor for UGC-NET (University Grant Commission-National Eligibility Test). LIS professionals also post on the forum to grab the attention of fellow community members on different issues like disparity in salary grade or anomalies in the exams. For example:

> "Please anyone move Supreme Court in Unequally and Unfair Result in UGC-NET June 2012. Like West Bengal School Service Commission. Please any body move this situation. I hope This result not to fair in our society. please move. hope success."

> "Sign the Petition Kindly join hands for the cause of disparity created by UGC in the pay level of Library Information Assistant and sign the petition to support the profession and the professionals. Dhttp://chng.it/r6GZ9pFp"

The above two are examples of encouraging professionals to participate in raising their voices against issues. This study's overall findings show that the discussion forum of Lis Links is an effective channel of communication for a wide range of topics. It has become a support system for the community of Indian LIS professionals in the online sphere.

6. THEORETICAL AND PRACTICAL IMPLICATIONS

This study contributes to research in the literature on

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the analysis of online data/user-generated content and management of online forums for LIS professionals. For a better understanding of online engagements of LIS professionals, this study implemented text mining-based methods and identified the key topic of discussions. LIS researchers commonly use survey methods to know the various challenges professionals face.

Rather than depending on survey data, LIS practitioners can analyze online conversations on different platforms to explore the trends of discussions among LIS professionals. The findings of this study can help organizations/policy makers/senior LIS professionals to understand the issues faced by professionals in their day-to-day life. The findings offer user-based categories that can be used for managing and organizing discussions on Lis Links. This study provides a detailed implementation workflow, and the same can be applied on similar forums, email lists, or different social media platforms.

7. LIMITATIONS

In addition to the number of contributions, this study has a few limitations. First, the present study only focused on LIS professionals registered with Lis Links online discussion forums; this could be a case of a statistically biased sample (Barbierato et al., 2022).

Second, this study could not extract the replies of community members on each post, and this limitation restricted the investigation of response analysis of the professionals and how they reacted to the particular post. Social media platforms like Facebook have the feature of reacting in five different ways and with comments, but Lis Links has the feature of commenting only. Social network analysis of these responses could provide insightful results. Third, the present analysis framework considered online discussion in the text format only and excluded other formats like images, pdf, or URLs of any external source. However, posts with both attachments and enough text content to model the discussion were considered for the analysis. One such example is shown below:

> "Here is the total list of LIS candidates qualified from each center in July 2018 UGC NET Attached here: List1.pdf"

Posts which did not have any information about the attachment or URL mentioned in the posts could not be included in the analysis. One such sample of a post is given below:

> "Kindly consult the attached file or consult this link: http://kvsangathan.nic.in/EmploymentDocuments/EMP-NTC-27-10-14.PDF"

Fourth, the LDA topic model is based on the bag of words model, where semantic context is ignored. Lastly, we have assumed the value of k (number of topics) to be 10, based on the themes created by the previous studies, which resulted in a general category of topics. The study with high value of k will generate more specific topics.

8. CONCLUSION

In recent times, topic modeling algorithms, especially LDA, have attracted researchers from all domains for extracting topics from text data originating from different sources. The present study results are explorative and help in understanding the topic of discussion among LIS professionals. It also provides implications for the development and management of online discussion platforms for LIS professionals. This paper provides a structured procedure for implementing the LDA technique and models the online discussions of LIS professionals expressed on Lis Links within ten topics. The LIS professionals have actively posted their discussions on these ten topics. However, most of the conversations were concentrated on "LIS Exams," and very few discussions were found on "LIS Issues."

To the best of our knowledge, the present study is the first attempt in the domain of LIS to use a text-mining-based methodology for analysis of an online discussion forum of LIS professionals. Earlier studies on the forum or the email list used the manual content analysis methodology for classifying topics. Future research could compare these study results with the analysis of discussion on other community-based and social media platforms. As discussed in the limitations, future research can also be taken up to analyze these images and PDFs through image processing to present the granularity of the results. Further exploration of LDA on other Indian LIS forums is needed for a deeper understanding of the categories of the posts. The combination of high and low value of k may be used to identify both general categories and their specific subcategories.

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CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Human Resources Management at the Library of the House of Representatives of the Republic of Indonesia during the COVID-19 Pandemic

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ABSTRACT

This study aims to understand human resource management in the Library of the House of Representatives of the Republic of Indonesia (DPR RI) during the COVID-19 pandemic. This institution had to change its work procedures, including its management of human resources. The research uses a qualitative approach with a case study method. Data was collected through interviews, observations, and document analysis, carried out from October to December 2020. The findings show that working from home practices had the following impacts: reduced ability to concentrate while working; many forced changes to the work programme; and problems of miscommunication due to work instructions being conveyed through a WhatsApp group. In response to the situation, the planning function of management was used to suspend the recruitment of interns; the organizing function was divided up tasks into two or three working days a week; the actuating function was seen in the willingness of leadership to motivate staff and to optimize resources by providing training; and the controlling function was realized in an online presence and online reporting mechanisms. It was concluded that the implementation of human resource management in the library was achieved through flexibility and staff empowerment. This involved carrying out initiatives and controlling their effectiveness in response to whatever changes were required by the latest pronouncements from government. Obstacles were still encountered in the implementation of these changes, especially in relation to the organizing function of management, where some conflict was seen between the DPR RI librarians.

Keywords: human resources management during a crisis, special library, working from home, flexibility management, Library of the House of Representatives of the Republic of Indonesia

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1. INTRODUCTION

The human resources (HR) of an organization must be people who are ready, willing, and able to contribute to its organizational goals (Leuwol et al., 2020). HR management is a key activity within an organization, and as such needs to be able to respond to the unexpected and the unpredictable, particularly when this involves a major crisis, such as an economic recession or the outbreak of a disease that causes the collapse of several major aspects of life, including health, the economy, and social life. Ideally, HR management can influence the progress and development of any institution, including libraries. The optimal performance of a special library is usually accompanied by the implementation of a good HR management function. This is not easy to do, because every individual member of staff is different, from their character, nature, and norms of behaviour, to the social values they adopt. In addition, as Baba (2020) points out, libraries are complex organizations, labour-intensive and challenging to manage. There is no exception here when it comes to special libraries that have their own particular areas of focus. Therefore, good HR management is required to achieve the main objectives of a special library, namely, to function as a means of research and development for the institution(s) that it serves.

HR management in a time of crisis has been examined in several studies. In Zagelmeyer and Gollan's (2012) research, the global financial crisis is shown to have changed the parameters of HR management within companies, resulting in a greater degree of flexibility. A more flexible approach to HR management is also supported by the research conducted by Akingbola (2020). This study focused on the impact of the COVID-19 pandemic on the health of employees within the non-profit sector, and the potential implications of this for HR management. These studies show that the implementation of HR management during a crisis needs to be carried out flexibly. This was certainly true during the financial crisis, but it is possibly even more important during a public health crisis, such as the current COVID-19 outbreak, where the main focus has to be on the health of an organization's staff. This requires flexibility in undertaking work, so that the organization can continue to run effectively whilst accommodating the requirements of individual members of staff. For this study, research was conducted with this idea in mind.

The COVID-19 pandemic that has been affecting Indonesia since March 2020 has forced employees of government and private institutions to practice working from home (WFH). The appeal to work from home was expressed in the Circular Letter of the Head of the Manpower, Transmigration and Energy Office of DKI Jakarta Province Number 14/SE/2020. The pandemic is an extraordinary situation that has caused a crisis in almost all fields, but especially in health and the economy. Syafrida and Hartati (2020) showed in their research how COVID-19 has had a negative impact on community life and damaged people's standards of living. These events forced the management of the special library to change or at least adjust all work programmes that had been previously planned, in order to incorporate activities that could be carried out online.

The physical closure of the building had a massive impact on the management of HR in the library. Major adjustments had to be made, with the librarians' work schedules being divided up much more flexibly, and training and development, usually done face to face, having to be carried out virtually using tools such as webinars and focus groups. Strategies also had to be formulated to ensure that healthy interpersonal relationships between all the librarians were maintained even though they were unable to see each other in person.

For this study, the researchers chose the Library of the House of Representatives of the Republic of Indonesia, hereinafter abbreviated as the DPR RI Library, as the research location. During the COVID-19 pandemic, all activities at the DPR RI Library, both primary functions (such as library services to users) and facilitating activities, were initially carried out virtually via the website and social media of the DPR RI Library, and library employees relied on communication through a WhatsApp group (WAG). Later on, though, it was decided that there were still some employees who needed to come into work as usual, because there were administrative activities that could not be undertaken from home.

2. STATEMENT OF THE PROBLEM

When confronted with the crisis of the COVID-19 pandemic, the DPR RI was forced to make its library staff work from home. This meant that the management of the DPR RI Library had to make adjustments in their HR management policies. However, the library actually became more active and effective in carrying out its services compared to before the pandemic, even though its work was now being conducted online. The research question sought to explore how changes in HR management in response to the problems posed by the COVID-19

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pandemic were implemented in the DPR RI Library. The issues involved were examined in the light of George R. Terry's theory of the four main functions of management, and the concept of HR flexibility in dealing with changes in the work environment proposed by Stueart et al. (2012). A particular objective was to identify any strengths and weaknesses in the workings of the four main HR management functions during this period. This research is vital for understanding the implementation of HR management in the library in the face of this crisis. The significance of the research is that it provides valuable input for improving the library's strategic policy for dealing with any crisis period that may occur in the future.

3. THEORETICAL REVIEW

3.1. Human Resource Management

HR management is a formal process within an organization that is designed to ensure the effective use of the knowledge, skills, abilities, and other attributes of employees to achieve organizational goals (Word & Sowa, 2017). Effective HR management involves considering what systems exist for every stage in the work relationship, from job design, recruitment, and selection of individuals to fill the job, through to training, development, and the evaluation of individual performance within the job. HR management has been the focus of much of the literature that examines the finding, motivating, developing, and monitoring of the right talent.

In order for libraries to remain active even during a pandemic, of course good management is needed, and one aspect of this is HR management. Good HR management must pay attention to the principal functions of management. According to George R. Terry (Adeyoyin et al., 2012; Stueart et al., 2012), there are four of these functions, namely: planning, organizing, actuating, and controlling.

The first stage is the planning function, which involves an array of HR activities, including recruitment, selection, and job analysis, all designed to help the organization achieve its goals. HR planning must be able to provide guidelines regarding the requirements for the recruitment and development of the staff that need to be employed in an organization. The second stage is the organizing function, which covers the entire process of arranging staff resources, duties, authorities, and responsibilities in such a way as to create an organization that can move as a unified whole towards its predetermined goals (Putri & Maralis, 2019). The third stage is the actuating function, a process that involves fostering employee enthusiasm and guiding staff to work actively to implement plans to achieve their goals. This includes providing education and training activities, leadership, communication, and effective utilization and motivation of the workforce. Fourth is the controlling function, which involves assessment, correction, and evaluation of all the work done by employees, as well as supervision of this work as it is being carried out.

3.2. Special Libraries and Librarians Facing Change

Special libraries form part of a parent organization, offering information and knowledge services relating to particular subjects for their particular clientele. These libraries are found in the profit sector, in non-profit organizations, and in the public sector (Fraser-Arnott, 2020). Special libraries have emerged to address the unmet, specific information needs of individual organizations. In addition to requiring all the usual professional and technological capabilities, librarians at these institutions are expected to have knowledge of the particular subjects relevant to their parent institution, for example, law, the environment, and so on.

According to Stueart et al. (2012), library change can be driven both by external factors, such as global economic trends and the ever-continuing development of information technology, and by internal factors, such as changes in staffing, organizational structure, financial conditions, or leadership, which can affect all aspects of the library. When dealing with such changes, there are four key issues that need to be addressed by library staff, namely:

1) Empowerment. This involves encouraging and empowering staff to take the initiative to improve operations, reduce costs, and improve product quality and customer service. Empowering professionals with greater authority and increased responsibility encourages creative freedom. It also develops the ability of employees to disseminate ideas that can drive change and improvement across the full range of the information services provided by the library. Employees remain at the heart of the life of knowledge-based organizations that are undergoing change, and the success of such organizations depends on the knowledge and commitment of their staff.

2) Organizing Change. Change within an organization tends to be designed to increase organizational alignment, so that communication and decision making become faster and more visible to staff at the appropriate level. In general, such changes cannot simply be depicted using an organizational chart. Organizing change is complicated, and managing employee participation is a balancing act,

between maintaining the appropriate levels of management control, helping staff to get work done more quickly, and offering opportunities for learning and development (Uzuegbu & Nnadozie, 2015).

3) Resistance to Change. Resistance to change is often destructive, not least because of the emotional, philosophical, and procedural conflicts that can arise between individuals and groups during the implementation process. Within an organization, therefore, this issue needs to be handled carefully through consultation and negotiation, and the change process facilitated through discussion, information, and education (Adeyoyin et al., 2012). Resistance can occur for several reasons. Staff may not understand or may not want to understand the need for change; they may be sceptical that the change will be a success; they may feel threatened; they may be satisfied with the status quo; or they may feel the speed at which change is occurring is placing too great a stress on themselves or the organization.

4) Flexibility. The ability to adapt to meet changing needs is the essence of good planning in change management. Any planning that is too rigid to accommodate the unexpected will be wasted. That is why it is important to review plans regularly, in order to revise priorities that may have changed in the short term and identify goals that have already been achieved. There are three categories of flexible working, namely flexi-time, tele-homeworking, and part-time. However, in reality, these three categories can be combined to complement each other, and then adapted to the needs of the organization. In this respect, flexible working involves offering staff the ability to exert control over their own way of working (Atkinson & Hall, 2011; Mungkasa, 2020; Possenriede & Plantenga, 2011).

4. METHODOLOGY

This research used a qualitative approach combined with the case study method of analysis. Qualitative research is inductive, because researchers develop ideas, insights, and understanding from collecting data and use these to assess pre-formed models, hypotheses, or theories (Taylor et al., 2015). The case study method is an empirical investigation that examines contemporary phenomena in the context of daily life. One of the situations faced by the DPR RI Library staff during the pandemic was that the library work programme that had been planned since the beginning of the year had to undergo many changes. In light of this, a qualitative case study was deemed the most appropriate method for trying to understand the dynamics of the approach to HR management and the flexibility strategies employed during the pandemic. In this study, the main data obtained came from field observations supported by interviews and information from each of the informants, describing the impact on them of the changes in work patterns required during the pandemic.

The selection of informants was done using the purposive sampling technique. The criteria to be an informant were: membership of the leadership of the DPR RI Library with more than two years of service; or more than three years of service on the staff and an understanding of the implementation of HR management. There are actually 17 library staff, consisting of 1 head of library, 4 administrative staff, and 12 librarians. However, only 6 people were responsive in providing answers. They have been given the following pseudonyms: 1) Dimas (male), junior librarian, 20 years of service; 2) Tony (male), junior librarian, 10 years of service; 3) Rani (female), librarian, 20 years of service; 4) Dian (female), head of library section, 2.5 years of service; 5) Asri (female), middle librarian, 20 years of service; and 6) Sinta (female), advanced executive librarian, 21 years of service.

Data collection was done through interviews, observation, and document analysis. It was carried out from October to December 2020, using online media and direct observations in the field, and adhering to all relevant health protocols. The questions asked in the interview sought to address how staff worked in terms of the different management functions, and how they interacted with each other in the face of changing methods of working. The answers of the informants showed certain patterns that were used as the basis of the analysis for answering the research questions. Data analysis in this study used the three stages of coding set out by Strauss and Corbin (in Alhassan et al., 2019). The first stage is open coding, which is the process of describing, examining, comparing, conceptualizing, and categorizing data. The second stage is axial coding, which is the process through which data is put back together in a new way by making connections between categories. The third stage is selective coding, which is the process of systematically analysing the relationship between the categories to select a core category which reflects the central conclusion of the study. The findings are presented in the form of a report which is accompanied by statements from the informants from the results of the interviews and field observations.

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5. FINDINGS AND DISCUSSION

5.1. Profile of the DPR RI Library

DPR RI (*Dewan Perwakilan Rakyat*) stands for the People's Representative Council of the Republic of Indonesia. Structurally, the library is part of the Secretariat General of the DPR RI, which is directly responsible to the leadership of the DPR RI. For administration purposes, the library is under the Data and Information Centre (known as Pusdatin DPR RI), which is led by a central head (Perpustakaan DPR RI, 2018). Within the overall organizational structure, the role of HR management is to determine the division of responsibilities and the roles required, and to coordinate the work involved in order for the library to achieve its goals (Ahmady et al., 2016). The library was established in 1951. When the Government of the Republic of Indonesia was still in the form of the United States of Indonesia (RIS) and domiciled in Yogyakarta, the library moved to Yogyakarta. This library is a continuation of the "Bibliotheca Volksraad" owned by the Dutch East Indies government in Indonesia, and part of the collection is a relic of the Volksraad library. Since the capital of the Republic of Indonesia moved to Jakarta, the library has been located within the complex of the DPR RI Building, Senayan, South Jakarta, in what was formerly the Balai Pustaka Building.

The vision of the DPR RI library is to be an excellent parliamentary library offering a range of information, collections, and services to support the duties and functions of the DPR RI. To support its vision, the library provides data and information services that are fast, precise, accurate, renewable, and available on a regular basis to members of the DPR. The various services available include book lending, on-site reading services, the DPR e-library, e-resources, e-clipping, an e-paper, and the latest integrated service information system (known as SIPINTER). For all these services, the DPR RI library is open to all work units within the council. The DPR RI library is a special library that deals with issues related to Indonesian politics and development.

In addition to its central function of supporting the activities of the DPR RI, the library is also open to the general public as a centre for knowledge and learning, but with more limited services and with access to the printed collections only available in the building. With a focus on research, this library is a special library that has actively held literacy activities for its users during the pandemic, including webinars, book reviews, and bibliobattles.

The DPR RI Library has 17 staff, consisting of the head of the library section, 4 administrative staff, and 12 librarians. Most of the 17 staff in the DPR RI Library are graduates in library and information science. Observations by the researchers suggested that Dimas and Rani were the most approachable members of staff here. Dimas appeared the most self-assured because he actively communicates with other colleagues and was very open to the researchers. After the researcher had finished interviewing all the librarians who were in that day, it was Dimas who invited the researcher to tour the library and take pictures with him as a form of documentation to complete the report. The next most confident member of staff was Rani. She is a librarian who is diligent in providing new ideas to the head of the library division in relation to user services and other library activities such as webinars and focus group discussions (hereinafter abbreviated as FGDs).

Under normal conditions, HR management in the DPR RI is carried out in accordance with the usual four main functions of management, namely planning, organizing, actuating, and controlling. As part of the planning function, the library arranges various programmes for staff, such as training and seminars, which are conducted face to face. In the organizing function, superiors provide face to face instructions to subordinates, but communication is still carried out downward and upward. In the actuating function, the library usually recruits student interns regularly every year. In the controlling function, the library controls the presence of staff, reports on performance in each section, and reports on every activity in each of the units on a regular basis.

5.2. Organizational Climate

The working climate at the DPR RI Library during this pandemic appears to have been friendly and well-structured. The library staff were focusing on their respective work and chatting occasionally to relieve tension. Even though a shift system was currently in force, this did not dampen the spirit of the workers. In fact, they were happy when it was their turn to work in the office, because they found the facilities in the office better and more conducive to performing their work compared to the much less satisfactory facilities at home.

> …Usually if I do it, this is because of the facilities available, such as computers or work tools, which I do not have to support me at home. But for other colleagues, there may also be issues of signal interference. Not all employees have Wi-Fi installed at home, and the government doesn't provide Internet credit subsidies to

help with this. (interview with Tony, 2/11/2020)

From Tony's statement, it can be concluded that the facilities for WFH were not always adequate, and that not all librarians had Wi-Fi installed in their homes, which meant that some staff had their work hindered by problems such as signal interference. Tony's opinion was supported by Rani's statement.

When I wanted to do a job during WFH, it was difficult. It could be difficult to get a signal, and the computer at home wasn't good enough and didn't have the appropriate capacity for the job. Unlike in the office. That's why I prefer to work directly in the office. (interview with Rani, 2/11/2020)

Rani's statement here is proof that she personally preferred working in the office rather than WFH, because she felt the technical resources and facilities available at home were not as good as in the office. Dian made a related point about communications.

Miscommunication can happen. We used Zoom more for staff meetings to reduce the chances of misunderstanding or miscommunication. (interview with Dian, 10/11/2020)

This statement from Dian, the head of section, shows her awareness that virtual communication actually has a weakness, namely allowing miscommunication. It was also clear from what Dian had to say that the relationship between the staff and the head of the library works both ways here, because Dian is always open to staff who want to provide input or suggest new ideas (Rosinski et al., 2014).

For me, management is an open process. It can work top-down and possibly bottom-up. For example, my junior colleague can give me input. Or I can offer an idea and the others carry it out. (interview with Dian, 10/11/2020)

5.3. WFH Practice during a Pandemic

The following are some issues relating to WFH practices that were experienced by the librarians during the COVID-19 pandemic.

5.3.1. Challenges in Implementing WFH

The initial period of the pandemic that occurred from March to May 2020 forced the librarians of the DPR RI Library to work full-time from home. This presented a new problem for them, in that they could not focus on work because of distractions from domestic issues. This especially affected the housewives on the staff. This situation reflects the study of Clapp et al. (2011), which shows that workers often lose focus during WFH due to the large number of distractions caused by secondary tasks, which disturb their work in ways that would not happen in the office (Mustajab et al., 2020). This situation was referred to in a statement by Sinta.

During WFH, I couldn't focus because there were a lot of distractions at home. With many children, my focus was divided between teaching the schoolchildren and working. (interview with Sinta, 2/11/2020)

Sinta's comment shows that WFH, especially for those librarians who were also active housewives, meant having to juggle their time between work and household matters. Although this informant had difficulty maintaining her focus while WFH, communication between library staff ran quite smoothly, because apart from communicating through their WAG, they also occasionally communicated via Zoom. This was done to minimize miscommunication. Librarians are accustomed to using information technology at work, from well before this pandemic occurred, so there are no "technology blind" librarians.

From June until the time this article was written, the library was implementing a shift system policy of allowing 50% of the total number of librarians to work in the office. As part of the process of setting this up, all staff and the head of the library had to agree to sign up to it. Each librarian was under obligation to work in the office twice in every five working days, with the working hours of 08.00-15.00 WIB. The implementation of this remained flexible, due to the fact that some librarians chose to work every day in the office on the grounds that the facilities in the office were more satisfactory and the environment more suitable. In addition, there were librarians who came in to work on days when they would normally be at home in order to fill in for colleagues who were absent, due, for example, to illness.

5.3.2. Major Changes to the Work Programme Caused by the Pandemic

The COVID-19 pandemic occurred suddenly and the DPR RI Library did not have any special preparations in place beforehand. As a government library, the library

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is required to follow directions from the central government through the Secretariat General of the DPR RI. This pandemic meant that all activities planned for the DPR RI Library, which had been prepared and determined at the beginning of the year, had to undergo changes or adjustments.

> The work programme plans have changed a lot. Work has become chaotic. For example, procurement has been delayed, and cataloguing has also been hampered because not everything required for this can be brought home. (interview with Sinta, 10/11/2020)

However, the library still needed to run effectively and efficiently. This is in line with the statement of the International Labour Organization, which recommends that the management practice of every organization must be adapted to the situation, one aspect of which is changing the existing work plan to suit current conditions (International Labour Organization, 2020). The need to shift so many of its jobs to a virtual basis did not cause the DPR RI Library to lose its way, because when the instruction came at the beginning of the pandemic to implement WFH for all civil servants, the leadership of the DPR RI Library Council immediately held a coordination meeting via Zoom to work out the division of tasks during this period. The division of tasks implemented was actually not very different from that before the pandemic, because each librarian already knew their respective jobs, and was still going to get credit for promotion or for civil servant class for each item they worked on.

The work carried out by the librarians during WFH included the following:

1) Procurement of monograph collections
2) Creation of an e-paper containing the latest news, especially anything related to statements issued by the DPR RI
3) Making e-clippings containing news related to the DPR RI, such as the recently ratified Job Creation Law.
4) Management of the information system SIPINTER, which contains journals, articles, books, and collections of laws
5) Service to users, from both the DPR RI and the general public

As for the controlling function, the results of the work in the form of proposals for procurement of book titles for the library were sent to the email accounts of the leadership of the DPR RI Library, while the results of e-papers and e-clippings that had been done were directly uploaded to the library website by whichever librarian had worked on them, with their respective names included. Other work was reported through the librarian's diary on the employee portal website, so that the leadership of the DPR RI Library could see and control the work of the librarians, and monitor whether they had performed their duties.

5.3.3. Planning for Work That Could Not Be Done from Home

Some of the librarians were concerned that while they had to work from home during the pandemic, there were some jobs in the library that could not be done from home, such as cataloguing, self-scanning, circulation and lending services, and administrative activities carried out by the library administration section of the DPR RI. For re-enumeration activities and book lending services, adjustments could be made, such as postponing certain services and actions until the situation improved. This approach was in line with the concept of flexibility. As noted by Stueart et al. (2012), any planning that is too rigid to accommodate any changes that may occur is futile. It is always important to review the work programme plan periodically in order to revise any priorities that may change in either the short or the long term.

The interview results show that the greatest difficulties in implementing WFH were faced by the library administration staff of the DPR RI. Whereas the other librarians could work independently from home full-time, the administration staff needed to continue to work closely with the leadership of the DPR RI Library, which made it very difficult to carry out the work of library administration from home. As Dian put it:

> The most difficult thing is WFH, right? Because in the office there is a process of revision, a signature, and a letterhead required for any letters. So if a revision is needed in any of my correspondence, it takes a long time to get this working online. I may not be sure that the administration officer checked the email that day. But working in the office, it can be corrected straight away and signed on the same day. So, much faster. In addition, there is the data problem. For example, for budget disbursement, all the data and documents are in the office. Not all of our documents are in digital form. (interview with Dian, 10/11/2020)

5.3.4. Staff Development

HR development is an important strategy within an organization, playing a key role in improving employee skills, motivation, and innovation, and in enhancing the general performance of individuals and the organization (Stueart et al., 2012; Vinesh, 2014). As a way of optimizing the performance and skills of the DPR RI Library's staff during the pandemic, three activities in the form of FGDs were held. These were conducted via Zoom, and involved speakers who were experts not only in librarianship but also in other fields, such as motivation and innovation. The topics of the FGDs that were held were: 1) Assessment of the credit score for librarian functional positions (held in August); 2) Knowledge management and problem solving for librarians (in October); and 3) Innovation in the development of library services (in November). The three FGDs were attended by all DPR RI librarians.

These activities aimed to develop insight and skills and also to encourage innovation in staff who were having to work flexibly during the pandemic. In addition, they were also designed to raise the spirits of the librarians, who may have been struggling during WFH because they were not used to being at home all day. This statement is in line with Parry and Battista's view (2019) that not all employees can overcome the challenges posed by the current crisis by themselves, so organizational leaders need to help them improve their skills, especially in relation to digitalization, and maintain motivation by holding training sessions and conducting other online HR development (Gigauri, 2020; Stueart et al., 2012).

5.4. Human Resource Management at the DPR RI Library

In terms of the planning function, the library decided at the start of the pandemic to stop taking on any new staff, such as temporary employees or interns. This was in response to the high spread of the coronavirus. The library sought instead to optimize its existing staff to do all the work required during the pandemic. In November 2020, however, the library opened up again some internship opportunities for students, which were carried out virtually. The disadvantage of not taking on additional staff such as apprentices was that the librarians could have been overwhelmed by the amount of work they had to do, since the volume of work during the pandemic was the same as in the pre-pandemic period. However, employee health was always the top priority. In addition, the library was also forced to change several programme activities, such as cancelling self-scanning, and allowing some activities to run more slowly. It can be concluded from this that the planning function was used to make numerous changes to the existing plans, while at the same time implementing flexibility so that services could continue to run.

With regard to the organizing function, the HR management team divided up the tasks and responsibilities of each staff member using communications made through a social media application, i.e. a WAG. However, miscommunication and misperceptions were prone to occur. The library leadership occasionally communicated via Zoom instead, using this tool to help implement the revised work schedule when they set up a shift system of working two days in the office and three days from home. However, the leadership did not force its staff to work full-time at home for three days, in view of the difficulties with facilities. In this function, the leadership was very open to their staff if anyone had any creative ideas which they wanted to raise in relation to the library programmes during the pandemic. The weakness of organizing through electronic media is that there can often be misunderstandings in interpreting the text of WAG messages, and this can cause conflicts between staff members.

In terms of the actuating function of management in the DPR RI Library during the pandemic, here there was some resistance from the staff. They complained that the WFH system prevented them focusing properly on work. The change in the situation was very different from what they were used to, and the new way of working took them somewhat by surprise. Fortunately, this problem of resistance was overcome by the management through additional motivation and efforts to adjust the work situation. In addition, this function also revealed a degree of flexibility in the use of online FGDs as a tool for staff development and training (Stueart et al., 2012). These FGDs were attended by almost all the library staff, which was important because it helps open horizons and broaden the knowledge of librarians to allow them to continue to innovate in developing library services (Laksmi & Fauziah, 2016). The weakness of these online FGDs was that they were prone to technical problems, and not all the employees had adequate tools to participate online. This is in line with the statement by Nyumba et al. (2018), that online FGDs can only be accessed by participants who have Internet access, that they are vulnerable to technical problems such as poor network or loss of connectivity, and that they often fail to capture nonverbal data. It can be concluded that the actuating function was used to empower staff and to give them additional flexibility by loosening deadlines for activities that could not be undertaken

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at home, such as circulation services, cataloguing of the library's collections, or self-scanning.

In the control function, managers had to carry out monitoring across all areas because of the many changes that occurred during the pandemic. This function had to address the issue of flexibility more than any of the others. Flexibility was applied in several staffing activities, as follows:

1) Attendance was carried out in two ways. Employees who worked in the office could make use of a fingerprint attendance machine, while employees who were WFH could mark their attendance online via the DPR RI employee website. Employees on WFH were also required to register their attendance in the morning and sign out in the evening when their working hours were over.
2) Staff uploaded daily work records to the employee portal to provide reports to the leadership.
3) Where there was a special job from the leadership that needed to be checked immediately, such as a list of book titles for procurement, the employee sent the work directly to the manager's email.
4) Staff uploaded their work on the e-paper and e-clippings to the DPR RI Library website by attaching their respective names.

In order to understand the whole analysis, Fig. 1 may be consulted.

It can be concluded that out of all the various jobs necessary to the librarians' work, not everything could be done at home. This meant that the librarians felt that their work was being hampered. However, by applying the concept of flexibility, the work plan that had been made could at least still run, even if many aspects of its implementation had to be postponed. Based on the evidence of the actions taken at the DPR RI Library during the pandemic, it can be seen that the processes of HR management were carried out with an emphasis on the concept of flexibility. Flexibility at work helps employees maintain a balance between their professional and their personal lives (Davidescu et al., 2020; Possenriede & Plantenga, 2011; Rosinski et al., 2014).

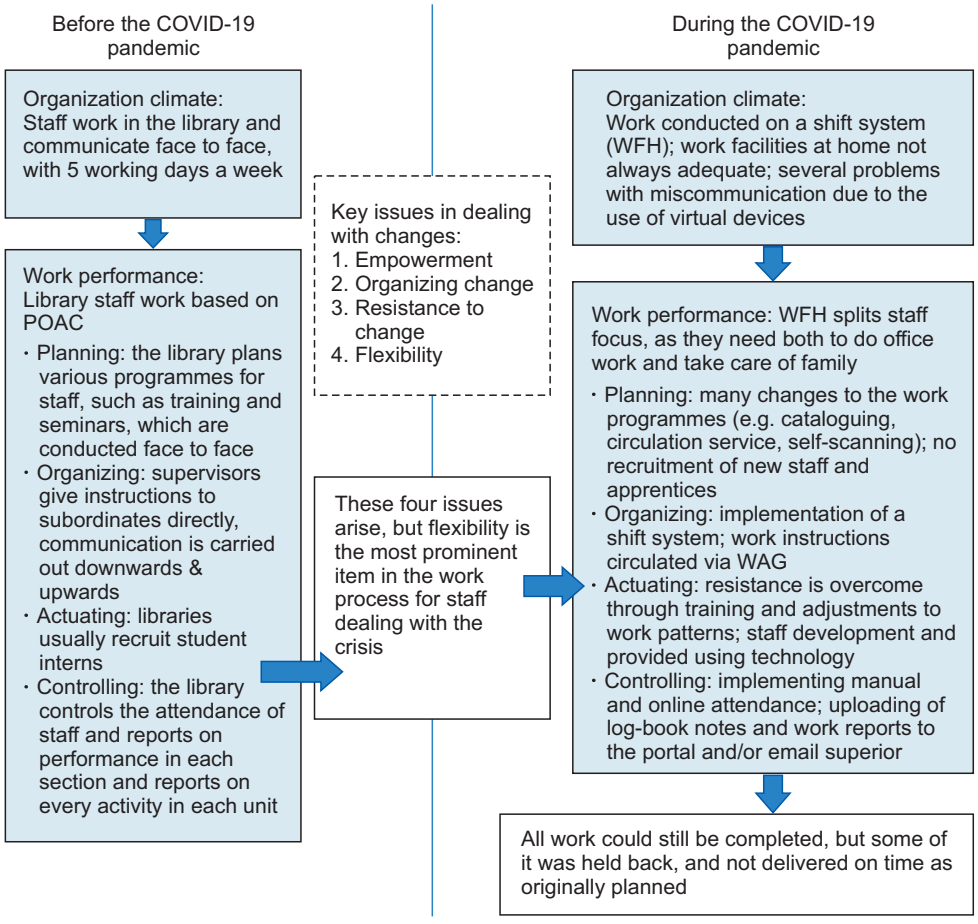


Fig. 1. Significant changes in human resources management, before and during the pandemic. WFH, working from home; WAG, WhatsApp group.

6. CONCLUSION

HR management functions in the DPR RI Library during the COVID-19 pandemic, ranging from planning, organizing, and actuating through to controlling, were carried out flexibly. Flexibility in the planning function was implemented by stopping the recruitment of new employees. The library planned instead to optimize its existing staff resources by holding HR development activities. With regard to the organizing function, the DPR RI Library coordinated activities through WAG, and occasionally used Zoom to avoid misunderstandings in communication. Flexibility in the actuating function was achieved by the library through the use of online FGDs to develop the skills of the staff in critical and creative thinking. In terms of this function, the librarians also had their own way of maintaining their motivation for work during the pandemic. The pattern of library leadership is top-down and bottom-up, so that the relationship between leadership and staff goes two ways, meaning the staff could play an active role in developing the work plans that needed to be carried out during the pandemic. Finally, the controlling function was carried out by the library leadership through conducting an assessment and evaluation of its staff, as well as through giving warnings to any staff whose work results were less than optimal.

Looking at the flexibility applied to the four functions of managing HR in the DPR RI Library during the pandemic, it was found that the most flexible and efficient functions in their implementation were the actuating function and the controlling function. The weakest function was the organizing function, because the process of organizing the library's work and staff became more prone to conflict between the employees, and in fact miscommunication could not be avoided here. Both the leadership and the library staff have to be able to adapt to all conditions by restraining their emotions and not being concerned with their respective egos, because if the library's internal environment is experiencing problems, what is most affected is the service it provides. Based on the results of the analysis, suggestions for the DPR RI on how to carry out effective HR management in crisis conditions would be to coordinate and communicate more carefully, and to monitor all activities more vigorously. Last but not least, this research can be developed further on other important issues, such as the processes of staff empowerment, organizing change, and managing staff resistance to change. The theoretical implications show that in facing a crisis, the concept of flexibility is not a stand-alone solution. It needs to be approached in terms of the specific type of crisis that is being faced, as well as the conditions, type, and policies of the institution concerned, and how far members of the organization are willing to engage in a learning process.

This research has contributed to the development of HR management, especially when the library is facing a crisis. This research can be developed further on other important issues, namely in the process of empowerment, organizing change, or managing staff resistance to change. The theoretical implication shows that in facing a crisis, the concept of flexibility is not a solution that can stand alone, but needs to be balanced with a series of other policies and a focus on the learning process.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Awareness and Perceptions of Korean Researchers on Open Access

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ABSTRACT

This study aims to determine the awareness and perceptions of Korean researchers regarding mandatory open access (OA) and OA publishing of publicly-funded research papers. In July 2019, Korean researchers who had published in Science Citation Index Expanded journals as first authors and corresponding authors participated in an online survey distributed via e-mail. A total of 1,172 valid responses were collected and analyzed using SPSS 18. The results indicated that the level of awareness of OA differed significantly based on occupation and research experience (p<0.001). Although 52.56% of the respondents had experienced OA publishing, only 22.35% had self-archiving experience. Regardless of the amount of publishing cost support, researchers showed a high level of willingness to publish OA articles. Yet, since the importance of impact factor was evaluated to be very high, at present OA publication might have a limited role as a publication platform.

Keywords: open access, publishing, perceptions, Korean researchers, OA policy

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1. INTRODUCTION

The national-level management of public research outcomes provides various benefits, including the reinforcement of national knowledge competitiveness, enhancement of public interest, protection of research copyright, and increased use of research. The Korean government established "regulations on the management of national R&D [research and development] projects" to ensure the systematic management of national R&D outcomes. Additionally, the Korea Institute of Science and Technology Information (KISTI) was designated as the dedicated organization for the management of papers and reports related to national R&D, their distribution for public usage, and the building of a public utilization system. However, owing to various operational issues, such as copyrights and licenses, the management system has not yet developed into a one-stop system wherein the original full texts of research conducted under public funds can be utilized. Additionally, problems related to the repurchasing of papers funded by the government has led to increased expenditure.

Internationally, more specifically in Europe, legislative systems and policies have been developed and implemented for mandatory open access (OA) of publicly-funded research papers. A representative example is "cOAlition S," which was launched in September 2018 by eleven European research fund organizations. It aims to realize full and immediate OA to academic research. "cOAlition S" is responsible for implementing the ten principles of OA, termed "Plan S," and the European Commission and the European Research Council have joined these attempts. Universities that lead academic research and global publishers that dominate academic research publications have also made efforts to prepare for the rapidly changing academic information market. Such efforts were based on in-depth research about the attitude and perception of OA among targeted researchers as well as on prospects in the usage and preferences of academic information (Saenen & Borrell-Damián, 2019; Taylor & Francis, 2014).

Despite domestic and international movements toward OA in academic research, few studies have been conducted on OA and related activities. Moreover, OA can lead to successful changes only when researchers recognize the need for it and actively participate in OA publishing. Authors' perceptions about OA for academic research remain limited, and they deem it useful only for investigative reporting. Further studies on OA are warranted to promote the development of policies regarding OA for investigations funded by taxpayers' money and to establish a systematic foundation for this type of access to research. Hence, this survey-based study aimed to identify the awareness and perceptions of Korean researchers regarding the obligation of OA and OA publishing in public research. We intended to provide stakeholders with feasible policy implications and methods to support OA publications for publicly-funded research. The OA publications targeted in this study refer to publicly-funded research papers.

2. PREVIOUS STUDIES

Surveys on researchers' perceptions of OA are mainly focused on large overseas publishers and European research organizations. Particularly, Taylor & Francis (2014) conducted a perception survey with all authors who published papers in their journals from 2013 to 2014. According to the survey, the distribution of authors by continent was 33% in the Americas, 30% in Europe, 11% in Asia, and 7% in Australia. This study reflects on the need of the publishing industry to respond to the changing academic publishing environment by extensively examining the perceptions of authors—the primary agents of OA publishing—including their prospects for future publishing environments and various types of OA.

Empirical studies on researchers' perceptions of OA have been published in the United States of America (USA) and the United Arab Emirates (UAE). Rodriguez (2014) analyzed the results of a survey conducted with 224 professors and researchers at mid-sized public universities in Michigan. The survey queried participants' awareness of OA publishing, experience, and related issues by age, rank, experience, and specialty. The findings indicated that while researchers were aware of OA, they had limited awareness of OA publishing. Furthermore, their perceptions of issues related to OA were little affected by their age, seniority, or experience of OA. Kaba and Said (2015) surveyed professors of Al Ain University, UAE, regarding their awareness, state of use, and perception of OA. Although it was difficult to generalize the results because there were only 34 respondents, the study offered brief information about how OA is perceived among researchers in the Middle East. Shuva and Taisir (2016) conducted online surveys to understand Bangladeshi faculty members' awareness, perceptions, use of OA journals, and motivational factors that influence faculty members to choose OA journals for publication, and suggested the importance of the qualities of prestige and editorial practices

associated with traditional international journals.

Since 2014, the European University Association (EUA) has collected data and reported on the attitudes, perceptions, and opinions of institutional managers, librarians, up-and-coming researchers, and researchers from European universities regarding whether or not they support OA and OA operating systems. The fourth survey, conducted in 2017/2018, revealed that the incentives which researchers receive for publishing in OA journals were related to administrative and monetary support for the publication of their achievements. Further, the biggest obstacle for OA publishing was related to concerns about copyright violations with publishers. Thus, to expand OA publishing, various types of support from different institutions are warranted.

Aiming to identify the exact level of awareness of OA among researchers in the humanities and social sciences and provide policy-based information, Narayan et al. (2018) investigated the perceptions and attitudes of 121 humanities and social science professors included in the Australian Listserv toward OA. They analyzed 49 responses collected using questionnaires regarding the selection of journals that respondents contribute to and their recognition of OA; they also conducted a research performance evaluation. Australian researchers chose the journals and publishers to which they contribute based on their reputation and the journal's impact factor (IF); whether or not the journal was OA was considered one of the least important factors. The level of researchers' awareness of OA was the highest for repositories in universities and the lowest for hybrid OA. Narayan et al. (2018) surveyed various types of OA, such as Green OA (a paid-for service that allows self-archiving), Gold OA requiring Article Processing Charges (APC), Green OA with an embargo, and Gold OA without APC, among others.

Majhi et al. (2018) asked 116 researchers from India's Odisha regarding their awareness of OA, preference for OA for academic literature, APC support, use of OA, and inhibiting factors of OA use. Their results showed that younger researchers had a higher level of awareness of OA. Additionally, more than 85% of the respondents said they needed to recognize the value of OA as academic literature and encourage publishers to expand the use of OA. The reasons for low OA publication rate were high cost, poor screening processes, and lack of institutional support. To improve the quality of OA, they stated that OA publishers should strengthen the screening system, include OA publications in reputable index databases, and be exempt from APC, among other factors.

Wakeling et al. (2019) conducted a large survey on the motivations, understanding, and experiences of authors of OA mega-journals; 11,883 authors registered on Scopus (including 128 Korean researchers) were surveyed and 15 mega-journals were included. More than two-thirds of the authors who published their papers in OA mega-journals did not understand that the journals operated a soundness-only peer review, which means that only the validity of the study is evaluated.

Lee (2019) independently analyzed data on the perception of Korean researchers regarding OA and compared it with similar data from the USA and South American countries. Regarding the screening criteria of the OA mega-journals, authors from Korea, Taiwan, India, China, and Brazil were misinformed about the topic. The proportion of respondents who submitted to OA mega-journals because of OA was the lowest among the comparison countries. Furthermore, it seemed necessary to formulate measures to increase researchers' understanding of OA to promote various OA policies in the future.

Seo et al. (2016) conducted a perception survey related to OA on 396 professors, students, and researchers from colleges related to science and technology. The survey revealed that 45% of undergraduate and graduate students had heard of OA for the first time. Of the 31 professors who responded, 14 did not consider OA when submitting a thesis.

Kim (2018) conducted a survey to explore awareness and publication status for OA research with 1,257 Korean researchers who published papers in Science Citation Index Expanded (SCIE)-listed journals as corresponding authors between 2016 and 2017. Among these researchers, the most important criteria for selecting journals to contribute to were whether the journal was registered with a reputable index database, IF, reputation, and influence. Although it varied by field, they preferred the big-three publishers. More than 50% of respondents said that OA was important and that they were interested in it because it made their research more accessible. Moreover, 58% of the authors had overseas OA publishing experience, with 10% having reported being willing to publish 40% of their papers in OA journals. Researchers in their 20s said they did not know much about OA because they lacked such publishing experience, while researchers in their 40s thought that the quality of OA was poor. Of the respondents, 56% were supported by APCs.

In summary, studies on researchers' perceptions of OA had the following characteristics. First, most surveys were aimed at a small number of researchers in a particular

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academic field and focused on fragmentary aspects, such as their awareness of and publishing experience in OA journals. Second, surveys by institutions such as commercial publishers and the EUA focused on researchers' perceptions of the future publishing market. Third, most questionnaires corresponding to the current status of OA were insufficient in yielding direct and practical results that could be translated to policy implications for obligating public research to be published in OA journals.

3. SURVEY DESIGN

We conducted an online survey to examine Korean researchers' awareness, perceptions, attitudes, and prospects on the OA publication of publicly-funded research papers based on their journal publishing behavior. A questionnaire was filled out on Google Forms, and a link to the questionnaire was sent via e-mail to a total of 116,423 authors registered in KISTI's NDSL who published papers in SCIE journals as first author or corresponding author. The survey went on for four days, from July 14, 2019. In total, 1,172 valid responses were analyzed (response rate: 1.01%). The findings were analyzed using SPSS 18 through descriptive statistics and a comparison of means between groups (t-test, ANOVA verification).

The questionnaire was designed as shown in Table 1. Survey questions were constructed based on items found in the research conducted by Taylor & Francis (2014) on the perception of researchers about OA and Kim's (2018) questionnaire on the perception of Korean researchers about the topic.

4. RESULTS

4.1. Respondents' Characteristics

Of the respondents, 38.8% were in their 40s, 37.2% were in their 30s, and 3.4% were in their 60s and older; 35.1% were engineers, 23.7% were either medics or pharmacologists, and 23.6% were natural scientists. Researchers from all four subjects showed great interest in OA-related issues. Regarding affiliations, 69.3% of the respondents were affiliated to universities, 16.8% to government-funded research organizations, 7.2% to private companies, and 6.7% to hospitals. Regarding publishing experience, 33.4% of the respondents had experience in publishing and academic activities, allowing us to expect more reliable responses about their OA perceptions (see Table 2).

Table 1. Survey questions by category and contents

Category	Item contents	
Publishing an academic paper	• The importance given to the journal being registered with major index databases for researchers' intentions to publish in that journal • Criteria for selecting journals for researchers' intentions to publish in that journal	
OA publishing	• Level of awareness of OA concepts (OA, Green, Gold) • OA information sources • Publishing experience with Green OA • Publishing experience with Gold OA	• Gold OA publication type • Reasons for publishing with Gold OA • Sources of funding for Gold OA publication • Reasons for not publishing with Gold OA • Likelihood of publishing in OA journals in the future
APC	• APC fee value • Scope of amount willing to pay for APC	
Awareness of mandatory OA for publicly-funded papers	• Awareness of mandatory OA • [Free comments] Regarding mandatory OA • Recognizing the benefits of OA for authors • [Free comments] Regarding the benefits of OA for authors	
Providing information on OA	• OA-related information desired by the researcher • OA-related information sources	
Policy recommendation	• [Free comments] Policy needed to secure mandatory OA for publicly-funded research	
Respondents' characteristics	• Age, field of study, occupation, research experience, type of affiliated institution, participation in academic activities, area of research activities	

OA, open access; APC, article processing charges.

Table 2. Respondents' characteristics

Category	Classification	Percentage (%)	Number of respondents
Age	20s	8.1	95
	30s	37.2	436
	40s	38.8	455
	50s	12.5	146
	60s and older	3.4	40
	Total	100	1,172
Field of study	Humanities	1.1	13
	Social sciences	9.2	108
	Natural sciences	23.6	277
	Engineering	35.1	411
	Medicine and pharmacology	23.7	278
	Agricultural and marine sciences	4.4	51
	Art and physical education	1.0	12
	Interdisciplinary studies	1.9	22
	Total	100	1,172
Occupation	Graduate student	13.4	157
	Researcher	33.7	395
	Professor	48.5	569
	Others	4.4	51
	Total	100	1,172
Affiliation	University	69.3	812
	Government-funded research organization	16.8	197
	Company	7.2	84
	Hospital	6.7	79
	Total	100	1,172

We intended to examine researchers' intentions to publish in a specific journal and use this data as basic information for promoting future OA publishing. Of the respondents, 81.1% (950) said that it was important for them in order to publish in a specific journal to know whether it was registered in SCIE, Social Science Citation Index (SSCI), Arts and Humanities Citation Index (A&HCI), Scopus, or the Korean Citation Index (KCI) (see Table 3).

After conducting stratified analysis by occupation, we observed a significant difference (p=.000<.001). We then conducted Scheffe's test, showing that journal indexing in various academic databases was more important for professors (M=4.83) than for researchers (M=4.67) regarding their intentions to publish in a specific journal.

After conducting a stratified analysis by research experience, we observed a significant difference (p=.006<.01). We then conducted Scheffe's test, showing that journal indexing in various academic databases was more important for researchers with 10-15 years of experience (M=4.82) than for those with less than five years of experience (M=4.62) regarding their intention to publish in a specific

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Table 3. Stratified analysis of the importance of the journal being indexed in various academic databases for researchers' intentions to publish by occupation

Occupation	M	SD	Scheffe	F	*p*
Graduate student	4.73	0.616	Professor > Researcher	6.993	0.000
Researcher	4.67	0.643			
Professor	4.83	0.483			
Others	4.69	0.510			

M, mean; SD, standard deviation.

Table 4. Stratified analysis of the importance of the journal being indexed in various academic databases for researchers' intentions to publish by research experience

Research experience	M	SD	Scheffe	F	*p*
Less than 5 years	4.62	0.749	Less than 5 years to 10 years or more to less than 15 years	3.630	0.006
5 years or more to less than 10 years	4.76	0.564			
10 years or more to less than 15 years	4.82	0.469			
15 years or more to less than 20 years	4.78	0.482			
More than 20 years	4.79	0.542			

M, mean; SD, standard deviation.

journal (see Table 4).

We also conducted stratified analyses for differences in the importance given to journal indexing in various academic databases for researchers' intention to publish by field of study and an affiliated organization. However, these two analyses did not show significant differences.

When choosing a journal for publishing their research, 32% of the participants considered "reputation and influence" as an important criterion (e.g., IF), 28.4% considered "topic consistency," and 17.8% considered "likelihood to pass peer review" (see Table 5).

Table 5. Criteria for selecting the journal for publishing researchers' studies

Selection criteria	N	Percentage (%)
Reputation and influence (IF)	1,040	32.0
Topic consistency	922	28.4
Likelihood to pass peer review	577	17.8
Duration for publication	391	12.0

IF, impact factor.

4.2. Awareness of OA and OA Publishing

4.2.1. Awareness of OA

We observed that the level of awareness of OA was at 3.16, denoting a medium level; however, when divided by type, the level of awareness of Green OA and Gold OA was 2.38 and 2.49, respectively. Hence, it was at a low level. Awareness of OA among humanities sociologists at the University of Technology Sydney (UTS) in Australia was 3.35, which is the highest level of awareness of Green OA through the UTS repository (Narayan et al., 2018) (see Table 6).

Stratified analysis by occupation showed that the level of awareness of OA differed significantly for all concepts. Specifically, for the concept of OA, the level of awareness was higher among professors (M=3.38) than among graduate students (M=2.66) and others (M=2.84; p=.000<.001). For Green OA, it was higher among professors (M=2.51) than among graduate students (M=2.09; p=.001<.01). For Gold OA, it was also higher among professors (M=2.66) than among graduate students (M=2.15; p=.000<.001).

Stratified analysis by research experience showed that the level of awareness differed significantly regarding all concepts of OA. For the concept of OA, awareness was higher in researchers with five years or more to less than 10 years of experience (M=3.08), 10 years or more to less than 15 years (M=3.36), 15 years or more to less than 20 years (M=3.25), and more than 20 years (M=3.41) than in those with less than five years of experience (M=2.67; p=.000<.001) (see Table 7).

Regarding the level of awareness of Green OA, it was higher for researchers with 10 years or more to less than 15 years of experience (M=2.52), 15 years or more to less

Table 6. Level of awareness of OA by occupation

Category	Occupation	M	SD	Scheffe	F	*p*
OA concept	Graduate student	2.66	1.361	Professor > Graduate student, Others	14.4741	0.000
	Researcher	3.08	1.331			
	Professor	3.38	1.256			
	Others	2.84	1.347			
Green OA	Graduate student	2.09	1.162	Professor > Graduate student	5.389	0.001
	Researcher	2.32	1.184			
	Professor	2.51	1.242			
	Others	2.35	1.146			
Gold OA	Graduate student	2.15	1.208	Professor > Graduate student	8.695	0.000
	Researcher	2.38	1.233			
	Professor	2.66	1.293			
	Others	2.37	1.246			

OA, open access; M, mean; SD, standard deviation.

Table 7. Level of awareness of OA by research experience

Category	Occupation	M	SD	Scheffe	F	*p*
OA concept	Less than 5 years (a)	2.67	1.350	(b, c, d, e) > a	10.331	0.000
	5 years or more to less than 10 years (b)	3.08	1.367			
	10 years or more to less than 15 years (c)	3.36	1.256			
	15 years or more to less than 20 years (d)	3.25	1.222			
	More than 20 years (e)	3.41	1.260			
Green OA	Less than 5 years (a)	2.08	1.108	(c, d, e) > a	5.671	0.000
	5 years or more to less than 10 years (b)	2.29	1.383			
	10 years or more to less than 15 years (c)	2.52	1.215			
	15 years or more to less than 20 years (d)	2.51	1.200			
	More than 20 years (e)	2.54	1.334			
Gold OA	Less than 5 years (a)	2.06	1.128	(b, c, d, e) > a	7.863	0.000
	5 years or more to less than 10 years (b)	2.44	1.257			
	10 years or more to less than 15 years (c)	2.66	1.273			
	15 years or more to less than 20 years (d)	2.56	1.237			
	More than 20 years (e)	2.68	1.369			

OA, open access; M, mean; SD, standard deviation.

than 20 years (M=2.51), and more than 20 years (M=2.54) than for those with less than five years of experience (M=2.08; p=.000<.001).

Regarding the level of awareness of Gold OA, levels were higher for researchers with five years or more to less than 10 years of experience (M=2.44), 10 years or more to less than 15 years (M=2.66), 15 years or more to less than 20 years (M=2.56), and more than 20 years (M=2.68) than for those with less than five years of experience (M=2.06; p=.000<.001).

4.2.2. OA Publishing

Regarding OA publishing experience, 262 researchers (22.35% of all respondents) had the experience of self-archiving over the past three years (using Green OA), and 616 researchers (52.56%) had the experience of OA publishing (Gold OA).

Among the 616 researchers with OA publishing experience, 32.8% (n=202) were researchers in engineering, 29.1% (n=179) were in medicine and pharmacology, and 24% (n=148) were in natural sciences (see Table 8, Fig. 1).

Among the 616 respondents with OA publishing experience, 31% (n=191) had five or more years to less than 10 years of experience, 27% (n=164) had 10 or more, but less than 15 years of experience, and 15% (n=91) had 15 or more to less than 20 years of experience.

OA publications were most frequently performed by university researchers (70%); namely, the group of re-

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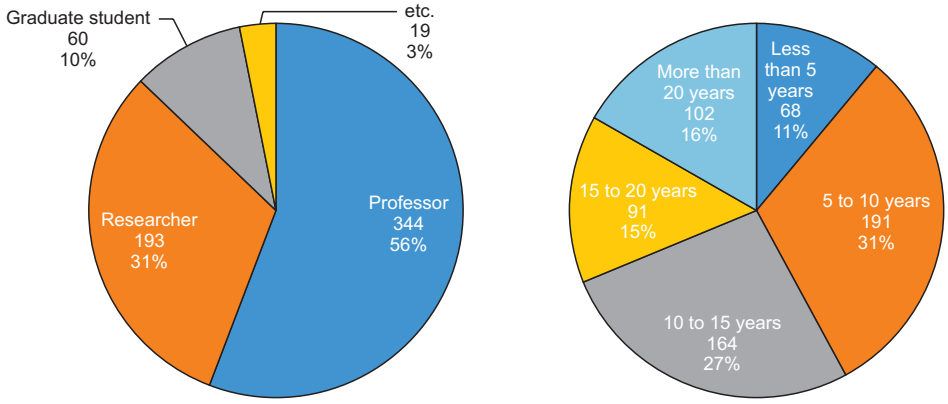


Fig. 1. OA publishing experience by occupation and research experience. OA, open access.

Table 8. OA publishing experience by field of study

Category	N	Percentage (%)
Humanities	3	0.5
Social sciences	37	6.0
Natural sciences	148	24.0
Engineering	202	32.8
Medicine and pharmacology	179	29.1
Agricultural and marine sciences	29	4.7
Art and physical education	6	1.0
Interdisciplinary studies	12	1.9
Total	616	100

OA, open access.

Table 9. OA publishing experience by affiliation

Affiliation	N	Percentage (%)
University	431	70.0
Government-funded research organization	91	14.8
Company[a)]	37	6.0
Hospital	45	7.3
Others	12	1.9
Total	616	100

OA, open access.
[a)]Includes affiliated research organizations.

Table 10. Type of OA publication

Type of OA publication	N	Percentage (%)
APC-based Gold OA journal	326	52.9
Free Gold OA journal	102	16.6
Hybrid OA journal	43	7.0
Not sure	145	23.5
Total	616	100

OA, open access.

searchers in our sample with extensive experience in OA publishing appeared to be university faculty researchers with 5 years or more to less than 10 years of research experience (see Table 9).

Regarding the type of OA publication, 52.9% of the respondents published in an APC-based Gold OA journal, and 23.5% did not know the type of OA that the journal they contributed to used (see Table 10).

For stratified analysis of the type of OA publication by research experience, each group by experience was set to 100%. The results showed that the longer the research experience, the more researchers had experience in publishing in free Gold OA journals and APC-based Gold OA journals. The number of respondents who did not know the type of OA that the journal they contributed to used decreased with an increase in research experience. However, publishing experience in hybrid OA journals accounted for a certain percentage regardless of research experience or occupation (see Fig. 2).

Regarding the reasons for publishing OA articles, "I think it will be used a lot" accounted for 21.75% of the responses, "I think it will be published fast" accounted for 21.59%, and economic reasons (e.g., only APC cost support) accounted for 11.36% (see Table 11).

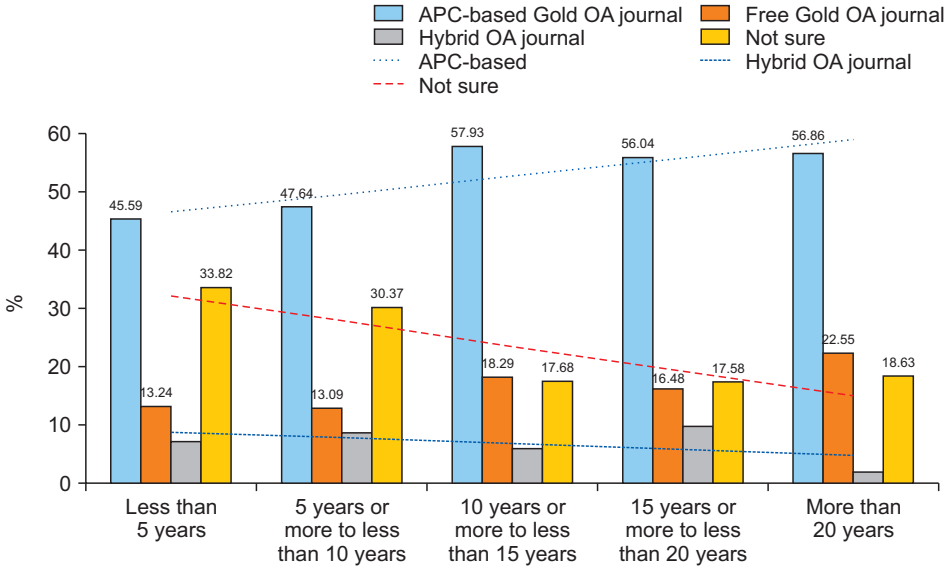


Fig. 2. Trends in types of OA publication by research experience. OA, open access; APC, article processing charges.

Table 11. Reasons for publishing the research in OA journals

Reasons	N	Percentage (%)
Easy to use	89	14.5
Will be used often	134	21.8
Fast publication	133	21.6
APC support	70	11.4
Good recognition	101	16.4
Recommended contribution	58	9.4
Others	31	5.0
Total	616	100

OA, open access; APC, article processing charges.

Table 12. Funding for OA publication cost

Ways to procure OA publication cost	N	Percentage (%)
Paid in full by the affiliated organization	92	14.9
Paid partially by the affiliated organization	64	10.4
Paid in full by research funds	311	50.5
Paid partially by research funds	55	8.9
Personally paid	52	8.4
Not paid	35	5.7
Others	7	1.1
Total	616	100

OA, open access.

4.2.3. OA Publishing Costs

Approximately half of the respondents with OA publishing experience paid their OA publication costs in full using research funds. Regarding funding for OA publication cost, 14.9% of the researchers had the costs paid in full by their affiliated organization, followed by partial support from the affiliated organization (10.4%; see Table 12).

OA publishing occurs more commonly in the fields of study of natural sciences, engineering, and medicine. Stratified analysis for funding for OA publication cost by field of the study showed that cases of publication cost being paid in full by research funds occurred most commonly in engineering, followed by natural sciences and medicine. Moreover, cases of publication costs being paid in full by the affiliated organization occurred most commonly in engineering. Regarding cases of publication costs being paid partially by the affiliated organization and personal funds, these occurred most commonly in medicine (Fig. 3).

According to researchers who reported having OA publishing experience, most of them paid $1,500-2,000 to cover the costs of OA publication (26%), with the average cost being $1,334.18.

Among the fields of natural sciences, engineering, and medicine and pharmacology, which had the largest number of OA publications, and regarding the APC range of $1,500-2,000, 9.5% of the engineering researchers and

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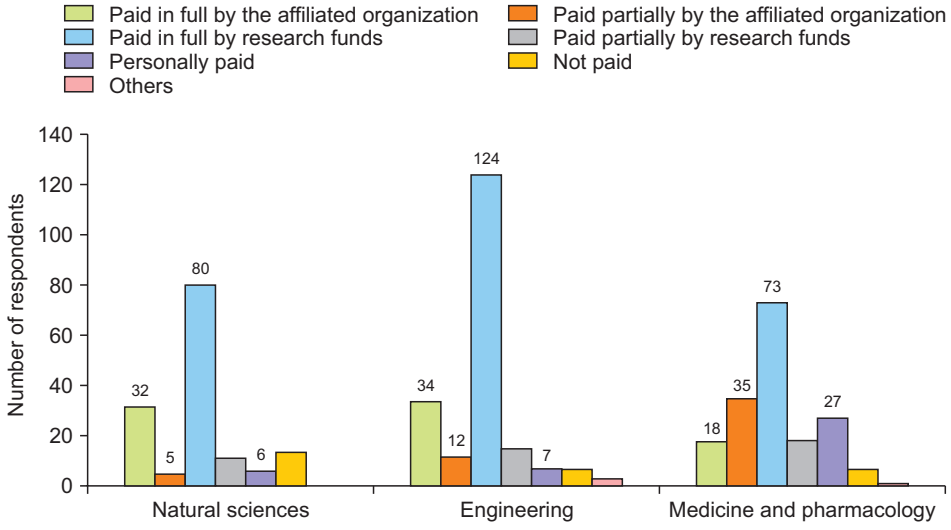


Fig. 3. Funding of OA publication cost by fields of study (natural sciences, engineering, medicine). OA, open access.

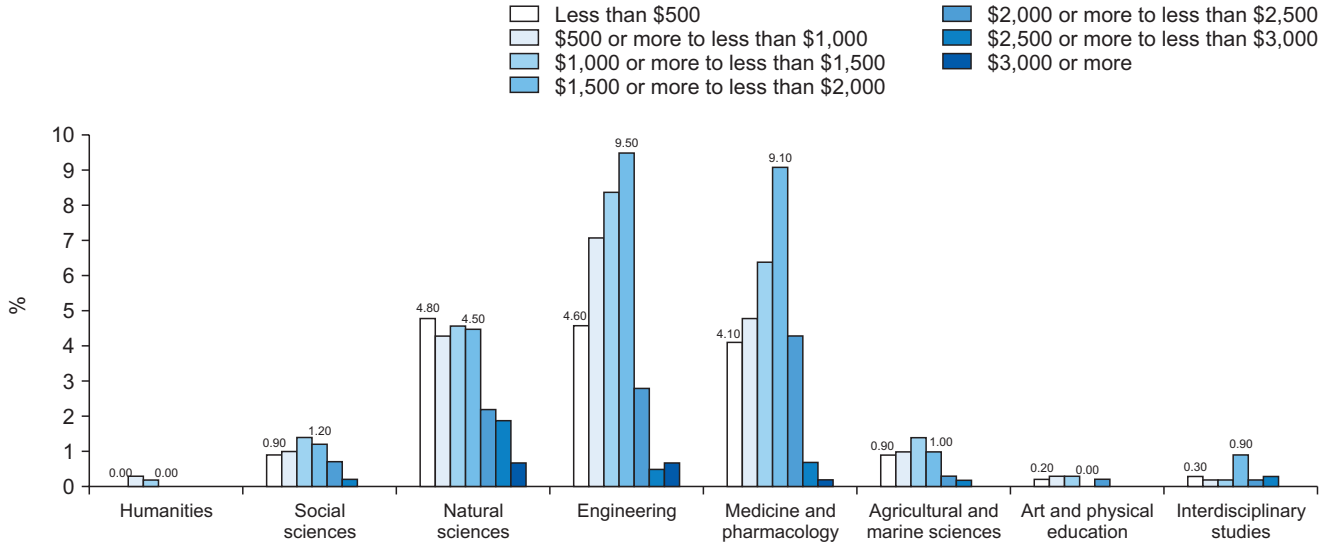


Fig. 4. Money spent on OA publication by field of study. OA, open access.

9.1% of the medicine and pharmacology researchers reportedly incurred such costs. Meanwhile, the APC range of less than $500 appeared the most in the natural sciences field, with 4.8% of researchers reportedly incurring such costs. Particularly, in the field of natural sciences, publishing costs tended to be within the range of less than $500, $1,500, and $2,000, and the difference was non-significant (i.e., less than 5% between these ranges). Hence, it appears that natural science researchers incurred relatively lower publishing costs compared with researchers in the fields of engineering, medicine, and pharmacology.

Although there were differences in APC costs between the three fields of study, the actual APC payments—which were revealed by researchers in each field—did not differ significantly by field of study, as shown in Fig. 4.

4.2.4. Reasons for Not Publishing and Future Willingness to Publish OA

Around half of the respondents with OA publishing experience paid their OA publication costs in full using research funds. Regarding funding for OA publication cost, 14.9% of the researchers had the costs paid in full by their affiliated organization, followed by partial support from the affiliated organization (10.4%) (see Table 12).

We also examined researchers' willingness to publish OA articles by employing a 5-point scale. Regardless of the amount of publishing cost support, researchers showed a high level of willingness to publish OA articles, at 4.17.

Except for those in the humanities field, more than 70% of the researchers responded that they were "willing to publish" and "very willing to publish" an OA article.

4.3. Perceptions of Mandatory OA and Benefits

4.3.1. Perceptions of Mandatory OA

We examined researchers' perceptions about mandatory OA by asking them about potential justifying factors for its use in publicly-funded research papers. Researchers reported that the major justifying factor was "the free use of papers increases their utilization, and they should be disclosed free of charge" (M=4.28). This was followed by "papers published with public funds should serve as public goods" (M=4.22), and "it should be disclosed to the people as it was funded by taxpayers' money" (M=4.18), respectively.

After conducting stratified analyses for the justifying factors of mandatory OA for publicly-funded research outcomes by field of study and research experience, we found no statistically significant differences. The results of Scheffe's test showed that there were significant differences by occupation; specifically, for respondents in the "others" category. The response "it should be disclosed to the people as it was funded by taxpayers' money" (M=4.51) was higher for "others" (M=4.51) than for professors (M=4.11) (p=.014<.05). Moreover, more than professors (M=4.13) (p=.007<.05), respondents in the "others" category deemed the response "papers published with public funds should serve as public goods" (M=4.51) as more important. There were no statistically significant differences in the other five items (see Table 13).

After conducting Scheffe's test for researchers' perceptions of the justifying factors regarding mandatory OA for publicly-funded research outcomes by affiliations, we observed significant differences. More participants affiliated with companies (M=4.26) responded that they deemed justifiable the use of mandatory OA for publicly-funded articles to allow for them to "participate in international trends" over participants affiliated with government-funded research organizations (p=.023<.05). The other six items showed no statistically significant differences (see Table 14).

4.3.2. Perceptions of the Benefits of Mandatory OA

For Korean researchers, the greatest benefits of mandatory OA for publicly-funded research papers were "increase in citations" (M=3.93), "increase in the disclosure of research" (M=3.77), and "increase in the reproduction of research outcomes" (M=3.65). Accordingly, the greater accessibility and dissemination of research that OA provides were perceived as the advantages of OA publishing for domestic researchers. To identify differences in these perceptions by field of study, research experience, and occupation, we conducted a stratified variance analysis, but

Table 13. Researchers' perceptions of the justifying factors regarding mandatory OA for publicly-funded research outcomes by occupation

Category	Occupation	M	SD	Scheffe	F	*p*
Funded by taxpayers' money	Graduate student	4.18	0.939	Others > Graduate student	3.564	0.014
	Researcher	4.25	0.910			
	Professor	4.11	1.097			
	Others	4.51	0.612			
Role of public goods	Graduate student	4.21	0.892	Others > Graduate student	4.079	0.007
	Researcher	4.30	0.848			
	Professor	4.13	1.070			
	Others	4.51	0.674			

OA, open access; M, mean; SD, standard deviation.

Table 14. Researchers' perceptions of the justifying factors regarding mandatory OA for publicly-funded research outcomes by affiliation

Category	Affiliation	M	SD	Scheffe	F	*p*
Participate in international trends	University	3.96	1.017	Company > Government-funded research organization	3.176	0.023
	Government-funded research organization	3.87	1.007			
	Company	4.26	0.886			
	Hospital	4.08	1.023			

OA, open access; M, mean; SD, standard deviation.

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no significant statistical differences were found.

After conducting Scheffe's test, we found that "ease of publishing" was more important for researchers affiliated with hospitals (M=3.31) than for those affiliated with government-funded research organizations (M=3.19) (p=.028<.05). Furthermore, "benefits in abiding by recommendations of funding agency" was more important for researchers affiliated with hospitals (M=3.56) than for those in government-funded research organizations (M=3.08) (p=.001<.01). There were no statistically significant differences in the other five items (see Table 15).

4.4. Role of Institutions and Information Desired by Researchers

4.4.1. Sources of OA-related Information

Regarding the sources of OA-related information, 432 respondents (36.86%) received information through media sources, such as papers, news articles, and blogs, followed by fellow researchers (21.5%), conferences and seminars (17.5%), affiliated libraries (8.36%), and research fund organizations (7.17%). Hence, the participating researchers acquired OA-related information predominantly through personal activities and their networks.

Stratified analysis for the acquisition of knowledge through these sources of OA-related information by occupation showed that researchers, professors, and others most frequently acquired information through media sources, while graduate students did so through fellow researchers. Hence, student researchers obtained relevant OA information from their informal networks.

The sources of OA-related information by research experience are shown in Fig. 5. Considering that graduate students have the shortest research experience, our results allow us to infer that the longer the research experience, the higher the tendency to obtain OA-related information through media sources and the lower the tendency to ob-

Table 15. Perceptions of the benefits of mandatory OA for publicly-funded articles by affiliation

Category	Affiliation	M	SD	Scheffe	F	*p*
Ease of publication	University	3.26	1.177	Hospital > Government-affiliated research organization	0.287	0.028
	Government-affiliated research organization	3.19	1.183			
	Company	3.23	1.046			
	Hospital	3.31	1.161			
Benefits in abiding by recommendations	University	3.39	1.087	Hospital > Government-affiliated research organization	5.535	0.001
	Government-affiliated research organization	3.08	1.083			
	Company	3.27	1.019			
	Hospital	3.56	1.057			

OA, open access; M, mean; SD, standard deviation.

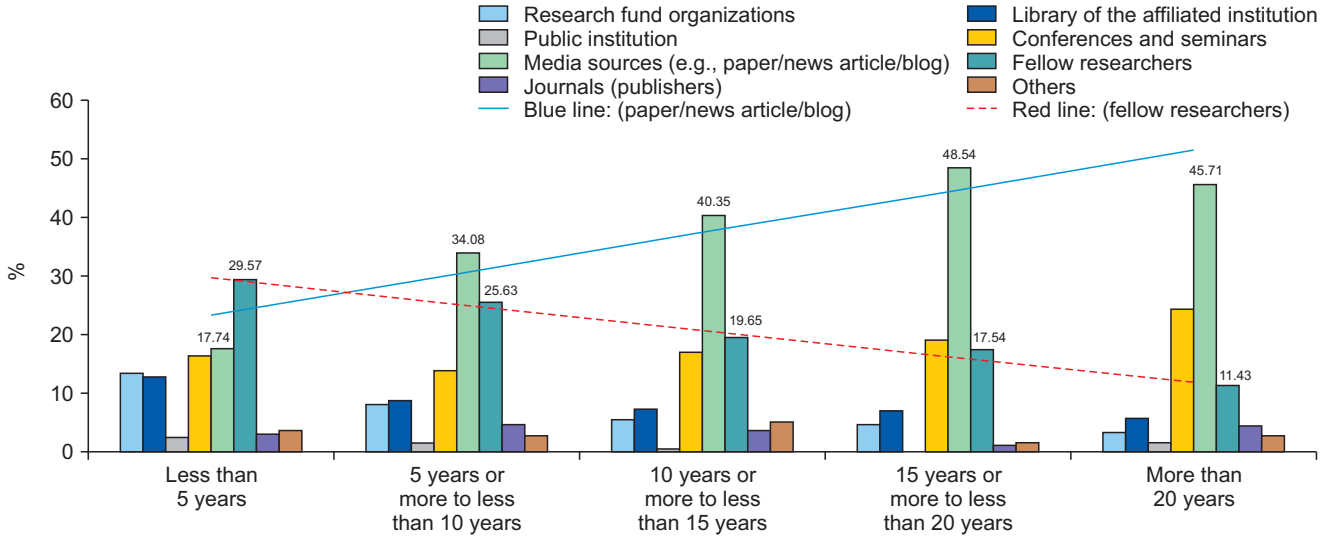


Fig. 5. Trends in sources of OA-related information by research experience. OA, open access.

tain information through fellow researchers.

This survey showed that 36.86% of the respondents obtained OA-related information through media sources, followed by personal relationships or academic activities such as academic societies, and seminars. Finally, very little information was obtained through institutions, such as research funding organizations, affiliated libraries, and government-run organizations.

The most requested OA-related information by respondents was a "list of excellent OA journals," which was followed by information on help for publishing an OA article (e.g., how to submit a manuscript and avoid predatory journals).

Notably, researchers perceived that OA-related information should be provided by research funding agencies (30.89%) and national agencies such as government-run organizations and affiliated libraries.

Researchers reportedly wanted to receive from government-run organizations information directly related to OA trends and publication (e.g., how to look for excellent OA journals and detect predatory journals, and how to submit a manuscript from institutions that fund their research).

5. DISCUSSION

The survey results of Korean researchers' perceptions and awareness on OA provided several implications with regard to OA policies and the legal system for mandatory OA of publicly-funded research papers. First, 81.1% of the researchers responded that two of the major criteria when choosing journals to publish their articles were whether the journal was indexed in reputable academic databases and its IF. These results might indicate the need for a way to reflect these criteria in the OA publishing environment to promote OA of a public research paper, for example, linking OA incentives to researcher and journal IF.

Second, professors and researchers with longer research experience were highly aware of OA, albeit most showed a lower level of awareness of specific OA-related information (e.g., on Green OA and Gold OA). Particularly, the level of awareness of Green OA, through repositories of universities and institutions, was lower than that of Gold OA through OA journals. This shows that Korean researchers' level of awareness of Green OA was low, especially when compared with that of Australian researchers and their favorable attitudes toward Green OA (Taylor & Francis, 2014). Therefore, it might be necessary to raise awareness of Green OA among researchers as a starting point to promote OA besides a re-examination of the operation and use of government- and university-run institutional repositories.

Third, the results showed that the longer the research experience, the more likely researchers were to obtain OA-related information through formal media sources. Meanwhile, the shorter the research experience, the more likely they were to obtain such information through informal networks. Thus, graduate students and upcoming researchers, who are not yet active in official academic activities, reported that it was easier to acquire OA-related information through informal and personal connections. However, such behavior could limit their ability to obtain accurate and systemic information. Therefore, OA education should be systematically provided to subsequent generations to ensure they have an accurate understanding of OA, which is the most basic prerequisite for its expansion. Moreover, strategies for the dissemination of OA-related information must differ depending on the level of research experience of the target population. Hence, we see the need to strengthen the role of affiliated libraries in the expansion of OA.

Fourth, the OA-related information most researchers reportedly wanted was a list of excellent OA journals by field. Additionally, they also wanted to obtain such information through their funding institutions or government-run organizations. Particularly, it seemed that researchers tended to recognize OA-related information as a type of information that should be managed and disseminated by the state; hence, there is space for consideration and discussion about the role of university libraries in such contexts.

Fifth, although 52.9% of OA publications were published in APC-based Gold OA journals, 23.54% of the respondents in our survey did not know in what type of OA journals their papers were published. These results are similar to those from a survey targeted at domestic researchers who contributed to OA mega-journals (Lee, 2019). A cited author found that Korean researchers had a lower level of awareness of OA mega-journals and OA journals than those in the USA, the United Kingdom, and Germany. Additionally, the response of Korean researchers regarding reasons for publishing a paper in OA mega-journals was related to the lack of frequency of such research compared with other countries. Given that this may be an obstacle to the implementation of OA-related policies in Korea, we see the need to improve the level of awareness of OA among domestic researchers.

Meanwhile, 21.75% of the respondents chose OA pub-

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lishing because they thought "it would be used often," and 21.59% chose it because they thought "it would expedite publication," hence demonstrating that they value the efficiency of the usage and publication of OA articles. Further, cost-related reasons to choose OA publishing (e.g., APC support) accounted for only 11.36% of the total. Thus, it is necessary to expand the research achievements and the efficiency and quickness of publication (e.g., by expediting and expanding financial incentives or benefits for researchers) for OA articles.

Sixth, the most significant reason not to contribute to OA journals was the financial burden such contribution entails. This shows that cost alleviation should be considered as an important factor in the future development of OA policies. The second largest reason was related to the lack of awareness about publishing procedures and the submission process for such articles, showing the need to develop, distribute, and provide education on OA-related information and its provision systems.

Seventh, respondents' perceptions of the justifying factors regarding the use of mandatory OA for publicly-funded research differed by occupation. For those in the "others" category, the major justifying factor included the fact that such research is publicly-funded with taxpayers' money. Thus, these research efforts need to play their role as public goods. For professors, the major justifying factor was the possibility of free usage for research findings. We interpreted these results by considering the fact that professors, who receive more support for their academic publications than other groups, view the need to obligate OA for public research from the direct perspective of usage. However, other groups were more indirect in their expressions toward the desire to utilize research findings for free by focusing on the value of taxes and public goods. Therefore, policies for institutional researchers (e.g., professors and affiliated researchers) and independent researchers should be designed differently according to the needs of each group; this will allow for establishing relevant policies that expand OA articles and the use of OA journals in the future.

Eighth, researchers that showed the highest level of awareness of the benefits of mandatory OA for publicly-funded research were those affiliated with hospitals and companies. For those affiliated with hospitals, the focus was on the greater time efficiency and expanded reproduction (e.g., ease of publishing, reduced publishing time, and benefits in abiding by recommendations) that OA articles could provide. For researchers affiliated with companies, the emphasis was on the use of research (e.g., increased citations, improved collaboration, and a higher level of research disclosure).

This study demonstrates that, although Korean researchers have some awareness about OA, they have a low awareness about specific types of OA, features of publication depending on the type, publication process, publication experiences, and so on. A majority of researchers have the expectation that fast publication through OA will increase the number of references because of freedom of access. However, since the importance of IF is evaluated to be very high, at present OA publication has a limited role as a publication platform that can be used generally and practically by researchers.

6. CONCLUSION

The worldwide spread of the open science movement goes beyond OA and open data, advancing towards publicly sharing all research-related achievements, allowing research outcomes to contribute to the development of the entire human race beyond a specific group. Particularly, R&D in the science and technology sectors is changing the paradigm toward open science in an attempt to converge research and collaboration through data sharing, as this will allow for the creation of greater value. There is also a widespread perception that government-funded research achievements should contribute to the interests of the entire country, not to specific individuals or communities. Hence, laws, institutions, and policies are implemented in Europe and the USA to support OA for publicly-funded research achievements. Under these circumstances, this study sought to collect baseline data for the future establishment and implementation of OA policies by conducting surveys on researchers' perceptions, as these are the primary agents of academic publications and OA articles.

Our results showed that researchers deemed journal indexing in reputable academic databases as the most important factor for their selection of journals in which to publish their articles. Furthermore, they also reportedly expected more usage of their studies upon publishing them through OA. Therefore, a variety of tools must be devised regarding OA-related topics, such as a method for researchers to assess the impact of a certain index database and performance evaluations to be applied to OA for publicly-funded OA articles. Moreover, practical stakeholders in OA publishing need to devise institutional tools and incentives to encourage the publication of OA articles and collect and manage related information.

The ultimate goal of mandatory OA for publicly-

funded articles is to expand the use of taxpayers' money, ensuring that there are no boundaries for access to the produced information. Hence, we suggest that stakeholders justify the benefits of mandatory OA for researchers based on the perspective of expanding citation (usage) rather than from the perspective of giving meaning to taxpayers' money or public goods. Fundamentally, the effect of increased research usage caused by the implementation of mandatory OA for publicly-funded articles should be continuously measured and presented as an outcome of the use of OA in public research.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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All articles should be submitted in single column text on standard Letter Size paper (21.59 × 27.94 cm) with normal margins.

2. Length :

Manuscripts should normally be between 4,500 and 9,000 words (10 to 20 pages).

3. File Type :

Articles should be submitted in Microsoft Word format. To facilitate the manuscript preparation process and speed up the publication process, please use the manuscript template.

4. Text Style :

- Use a standard font (e.g., Times New Roman) no smaller than size 10.
- Use single line spacing for paragraphs.
- Use footnotes to provide additional information peripheral to the text. Footnotes to tables should be marked by superscript lowercase letters or asterisks.

5. Title Page :

The title page should start with a concise but descriptive title and the full names of authors along with their affiliations and contact information (i.e., postal and email addresses). An abstract of 150 to 250 words should appear below the title and authors, followed by keywords (4 to 6).

Author1
Affilliation, Postal Address. E-mail
Author2
Affilliation, Postal Address. E-mail

ABSTRACT
A brief summary (150-250 words) of the paper goes here.

Keywords: 4 to 6 Keywords, separated by commas.

6. Numbered Type :

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All articles should be submitted in single column text on standard letter size paper (21.59 × 27.94 cm) with normal margins[1. Text should be in 11-point standard font (e.g., Times New Roman) with single line spacing. [1 Normal margin dimensions are 3 cm from the top and 2.54 cm from the bottom and sides.

2. SECTIONS

The top-level section heading should be in 14-point bold all uppercase letters.

2.1. Subsection Heading 1

The first-level subsection heading should be in 12-point bold with the first letter of each word capitalized.

2.1.1. Subsection Heading 2

The second-level subsection heading should be in 11-point italic with the first letter of each word capitalized.

7. Figures and Tables :

All figures and tables should be placed at the end of the manuscript after the reference list. To note the placement of figures and tables in text, "Insert Table (or Figure) # here" should be inserted in appropriate places. Please use high resolution graphics whenever possible and make sure figures and tables can be easily resized and moved.

Figure

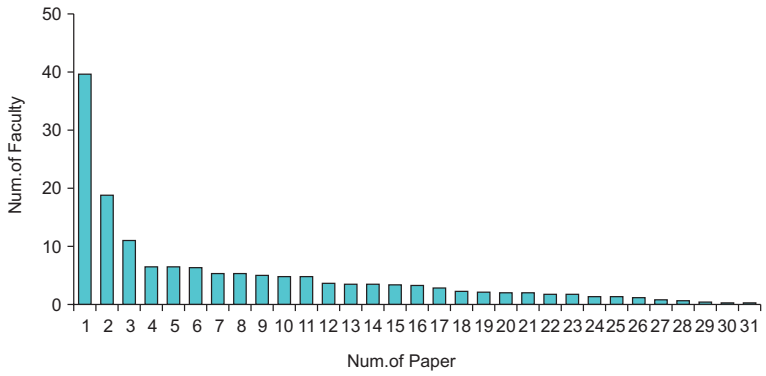


Fig. 1. Distribution of authors over publication count.

Table

Table 1. The title of table goes here

Study	Time period study	Data
Smith Wesson (1996)	1970 - 1995	684 papers in 4 SSCI journals
Reeves [a (2002)	1997 - 2001	597 papers in 3 SSCI journals
Jones Wilson [b (2011)	2000 - 2009	2,166 papers in 4 SSCI journals

[a Table footnote a goes here
[b Table footnote b goes here

8. Acknowledgements :

Acknowledgements should appear in a separate section before the reference list.

9. Conflicts of Interest :

Authors of manuscripts must disclose any potential conflicts of interest at the time of submission. Statements on conflict of interest have no influence on the editorial decision to publish.

10. Citations :

Citations in text should follow the author-date method (authors' surname followed by publication year).

- Several studies found... (Barakat et al., 1995; Garfield, 1955; Meho & Yang, 2007).
- In a recent study (Smith & Jones, 2011)...
- Smith and Jones (2011) investigated...

11. Reference List :

Reference list, formatted in accordance with the American Psychological Association (APA) style, should be alphabetized by the first authors last name.

Journal article

- Author, A., Author, B. & Author, C. (Year). Article title. *Journal Title*, volume(issue), start page-end page.
- Smith, K., Jones, L. J., & Brown, M. (2012). Effect of Asian citation databases on the impact factor. *Journal of Information Science Practice and Theory*, 1(2), 21-34.

Book

- Author, A., & Author, B. (Year). *Book title*. Publisher Name.
- Smith, K., Jones, L. J., & Brown, M. (2012). *Citation patterns of Asian scholars*. Sage.

Book chapter

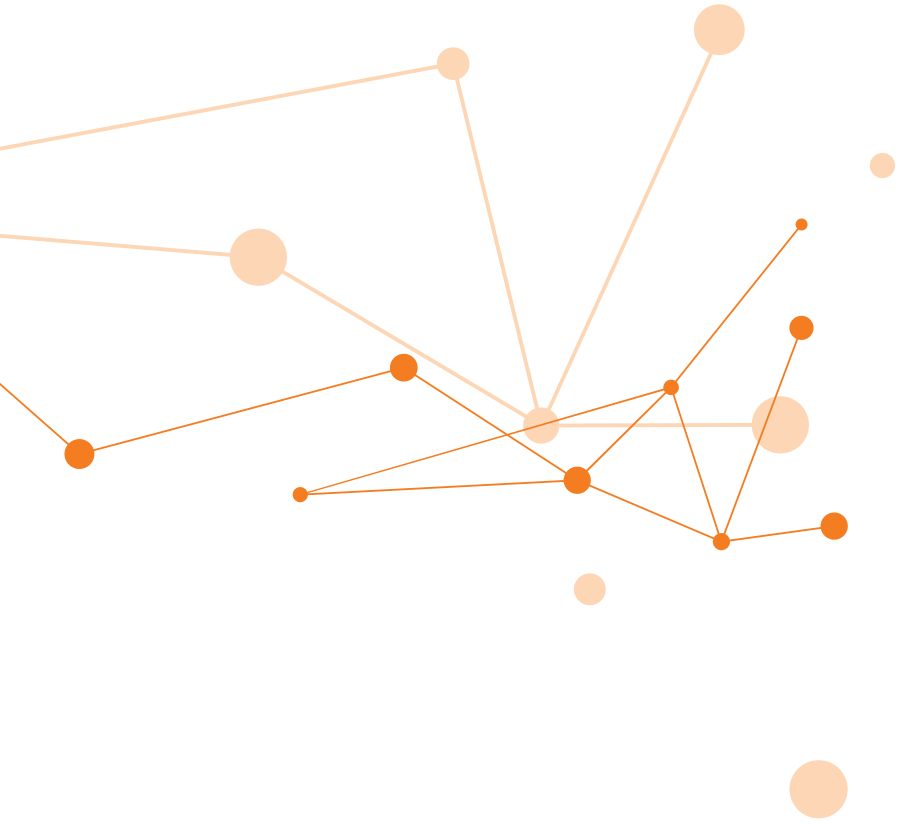
- Author, A., & Author, B. (Year). Chapter title. In A. Editor, B. Editor, & C. Editor (Eds.), *Book title* (pp. xx-xx). Publisher Name.
- Smith, K. & Brown, M. (2012). Author impact factor by weighted citation counts. In G. Martin (Ed.), *Bibliometric approach to quality assessment* (pp. 101-121). Springer.

Conference paper

- Author, A., & Author, B. (Year, Month Day). Article title. In A. Editor & B. Editor (Eds.), *Conference title* (pp. xx-xx). Publisher Name.
- Lin, H., Sun, B., Wu, J. & Xiong, H. (2016, June 24-26). Topic detection from short text: A term-based consensus clustering method. In B. Yang (Ed.), *2016 13th International Conference on Service Systems and Service Management (ICSSSM 2016)* (pp. 1-6). IEEE.

Online document

- Author, A., & Author, B. (Year). *Article title*. URL.
- Smith, K. & Brown, M. (2010). The future of digital library in Asia. *Digital Libraries*, 7,111-119. http://www.diglib.org/publist.htm.



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