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Technology Adoption Among University Scholars: Institutional Repositories Case Study

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ABSTRACT

The emergence of institutional repositories (IRs) is seen as a new scholarly publishing model. This study aims to understand the adoption of technology from the perspective of information behavior by exploring users' characteristics of information need, awareness, and need of IRs concerning the use of IRs. Three hundred university lecturers from six state Islamic universities were observed to obtain their perception of the need for IRs using a questionnaire survey. Partial least square structural equation modeling was used for data analysis. The analyses of measurement and structural models were conducted to validate the relationship between the observed variables. The study found that the information-seeking behavior model has partially explained the use of repositories among university scholars by 53,5%. The results mean that other factors influence the use of IRs that are not examined by this research.

Keywords: Information need; information seeking behavior; institutional repository; open access; scholarly communication; technology adoption

1. INTRODUCTION

Open access institutional repositories (IRs) are an information system for managing scholarly works from university scholarship (Alonso et al., 2003; Crow, 2006). Through the IRs system, the intellectual output of scholars is preserved in digital format for perpetual access and then published in open access mode through the Internet connection (Jantz & Wilson, 2008; Lynch, 2003; Oguche, 2018). The IR system is developed as part of scholarly communication (Mgonzo & Yonah, 2014; Nemati-Anaraki & Tavassoli-Farahi, 2018; Oguche, 2018). Therefore, university members are encouraged to contribute continuously by submitting their scholarly works to the system through self-archiving.

In addition, the development of IRs is also beneficial to enhance the performance and credibility of institutions (Korkuvi et al., 2022; Schlangen, 2015; Tiwari & Gandotra, 2018). IRs can be considered part of digital library development in academic libraries. The IRs system

provides the content of information resources in digital format and services in electronic mode (e-service). Through IRs, academic libraries improve their services while maintaining sustainability in acquiring library materials for university research activities.

Historically, the emergence of IRs was part of the response of academic libraries to the pressure of high prices of scholarly journal subscriptions, referred to as the serials crisis (Alonso et al., 2003; Bashir et al., 2022; Das, 2015; Young, 2009). The rise of IRs was also triggered by the open-access publishing movement in the 1990s. The Budapest Open Access Initiative and the Bethesda Statement on Open Access Publishing are the two influential movements on the emergence of IRs. The issue of copyright monopoly by publishers and the eagerness of scholars to have free and easy access to scholarly results and to share their works and inventions have led academic libraries to develop a new scholarly publishing system (Hazzard & Towery, 2017; Wang, 2019). The IR system was built to facilitate the publication of scholarly works.

Moreover, in the last decade, the development of IRs has become an exciting topic in library and information studies. Studies have been conducted on IRs, and papers have been published to explore IRs as a foundation of university scholarships. In 2006, Gozetti (2006) has conducted a literature review on models, issues and current trends of Institutional Repositories in scholarly communication. Although the topic of repositories is no longer new, research on the topic has been continuously ongoing. Regarding research topics, repository adoption was the research focus in the early days of repositories. Today, repository research topics are increasingly varied, such as Bashir et al., (2022), Korkuvi et al., (2022), Malekani & Kavishe (2018) and Shajitha (2020). This phenomenon shows that repositories are still an exciting topic to research.

In relation the adoption or acceptance of repositories, technology acceptance models (TAM) are the most widely used models to explain the acceptance of repositories, especially in the university environment. Some technology models are introduced to explain how individuals adopt institutional repositories such as (Digby, 2021; Dulle & Minishi-Majanja, 2011; Kodua-Ntim & Fombad, 2020; Ntim & Fombad, 2021; and Ranasinghe & Min, 2018). According to the theories or models, the adoption of repositories was influenced by technological factors.

However, the model of acceptance of technology has not been sufficiently accepted to explain the model of acceptance of repositories (Rieger, 2008, 2012; Schroeder, 2009), and therefore, it is essential to examine technology use from other perspectives. On the other hand, the theory of information needs and information-seeking behavior should be used more to approach the use of an information system. According to this perspective, individual performance and behavior are related to user needs. User need is a motivational characteristic that leads an individual to a particular action or behavior. It influences how individuals satisfy their needs. Accordingly, the use of an information system and any other technological product and innovation is related to the characteristics and needs of its users (Case & Given, 2016). In information behavior studies, information need is a determinant that motivates people to satisfy their needs by seeking information. The need of information is the critical aspect that motivates individuals to perform a specific behavior (Luthan, 2011; Hellriegel & Slocum (2011). Therefore, proposing information needs and seeking behavior as an approach to using IRs is significant. The use of IRs is related to users' needs and decisions.

In library and information studies, there are theories and models of information need and seeking behavior. Case & Given (2016) mentioned these models as the Wilson model (1996), Kuhlthau or ISP model (1991), Johnson model (2005), Ellis model (1989), Leckie, Pettigrew, and Silvain model (1996), Bystrom and Jarvelin model (1995) and Dervin model (1999). Each model has its characteristics. However, users' search behavior is influenced by their needs. For example, Wilson (2000) clearly explained that information need precedes information seeking and use. In addition, Chlomoudis et al. (2022) and Martinović et al. (2023) mentioned that information need is considered the critical factor of information-seeking behavior. Berget et al. (2020) explored that individuals seek information to change their knowledge state. This information seeking is related to individual information needs.

This paper aims to explain the use of IRs as an information system among academic scholars based on the information needs and seeking behavior perspective. The characteristics of the information need, the awareness of the need for IRs, and the actual need for the IRs system are examined to understand the use of IRs.

2. METHODS

This study selected academic libraries in Indonesia. Lecturers from six Islamic universities were selected as research respondents. Data was collected through a questionnaire survey administered to 300 respondents using a stratified sampling method. The questionnaire consists of demographic information questions and statements of users' perceptions regarding their characteristics of information need, awareness, need to use IRs, and the IR's behavior. It was developed based on theorized factors and measured using a 5-Linkert scale.

Table 1. Sample distribution

Respondents		N	(%)
University	UIN Syarif Hidayatullah Jakarta	91	31.0
	UIN Sunan Kalijaga Yogyakarta	33	11.2
	UIN Walisongo Semarang	30	10.2
	UIN Maliki Malang	59	20.1
	UIN Sunan Ampel Surabaya	64	21.8
	IAIN Salatiga	23	5.8
	Total	**300**	**100.0**

Partial least square structural equation modeling (PLS-SEM) and SmartPLS 2.0 software were used for data analysis. The analysis is conducted through the measurement model and structural model assessments. While the measurement model analysis is designed to examine the validity and reliability of the research instrument, the structural model analysis is evaluated to explore the significant relationship and the effect of users' information needs in terms of IR use. The structural model evaluation is done by evaluating the coefficient of determination (R^2), path coefficient, and effect size (f^2).

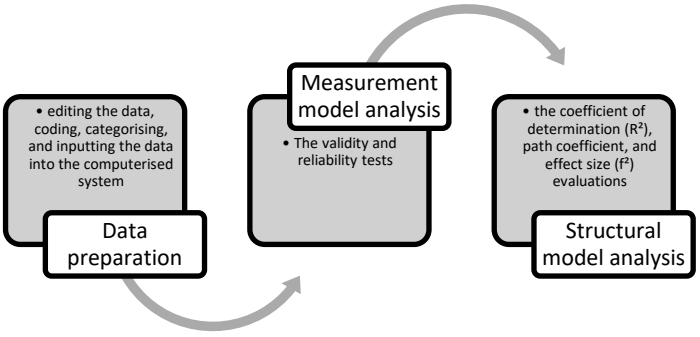

Figure 1. Data analysis procedures

3. RESULTS AND DISCUSSION

Partial least squares as a data analysis method require assessing the measurement and structural models. The measurement model assessment, or the outer model assessment, assesses the relationships between the latent variables and their indicators. On the other hand, the structural or inner model assessment is the evaluation of the relationships between the latent variables that represent the research model.

Measurement Model Assessment

The first step of the analysis using PLS-SEM is the measurement model evaluation. This analysis was carried out to examine the relationship between latent variables or constructs and their indicators by conducting validity and reliability tests. Reliability is related to the consistency of the instrument to be measured, while validity is related to the degree to which the indicators measure its constructs. According to Kimberlin & Winterstein (2008), a reliable instrument is an instrument that has high stability and consistency as well as measurement. In contrast, a valid instrument relates to the instrument's construct, content, and criterion to be measured.

In PLS-SEM analysis, reliability is measured by examining indicator and composite reliability. External loadings measure indicator reliability, while composite reliability is determined by internal consistency reliability and the Cronbach alpha test (Vinzi, 2010). Reliability coefficients range from 0.00 to 1.00, with higher coefficients indicating higher levels of reliability. The measurement is considered reliable if the construct (construct reliability) is higher than 0.70. However, if the research is exploratory, 0.4 or higher is acceptable for indicator reliability and 0.6 or higher for composite reliability.

Validity testing is carried out by assessing convergent and discriminant validity. Convergent validity is measured by factor loadings and AVE (Average Variance Extracted), and it should be 0.5 or higher. On the other hand, discriminant validity is assessed by comparing the AVE value and the correlation values with other constructs. In this case, the square root of the AVE values for all constructs should be greater than the square of the correlation with other constructs.

The results of the study indicate that the degree of reliability and validity of the instrument is shown by the analysis of item factor loadings of all constructs. The results of factor loading analysis indicate that all construct are more significant than 0.7, indicating that all indicators of each construct are reliable. The reliability of the instrument) is also demonstrated by the composite reliability and Cronbach alpha values for all constructs, which are more significant than 0.7.

Table 2. Composite Reliability and Cronbach Alpha

Variables	AVE	Composite Reliability	R Square	Cronbach's Alpha
INCHA	0,7412	0,9661	0,000	0,9606
IRNEED	0,7446	0,9668	0,4175	0,9617
Awareness of IRs	0,7994	0,9598	0,2803	0,9492
USE	0,7856	0,9482	0,5349	0,9318

Table 3. Latent variables correlation

Variables	INCHA	IRNEED	Awareness of IRs	USE
INCHA	0,7412	0,000	0,000	0,000
IRNEED	0,666	0,7446	0,000	0,000
Awareness of IRs	0,5295	0,6462	0,7994	0,000
USE	0,4916	0,6852	0,6379	0,7856

In terms of validity, all constructs' factor loadings and AVE values are more significant than 0.5 as the minimum value (see table 1 for factor loading and table 2 for AVE value). The AVE values for all constructs are also more remarkable than the squared correlation with other constructs. This indicates that all constructs and their indicators are valid.

Based on the analysis of the measurement model, it can be concluded that the study's instruments meet the reliability and validity requirements. The constructs and their indicators in this research model are reliable and valid.

Structural Model Assessment

The structural or internal model assessment examines the relationships between the latent variables or constructs. This assessment is performed by examining the R-square (R^2), path coefficients, and effect size (F^2) (Hair et al., 2012). The R-square is evaluated to assess the influence of exogenous latent variables on endogenous variables. The minimum value of the R-squared should be greater than 0.1 (10%) for all observed latent variables. The path coefficient represents the strength or significance of the relationship between latent variables. In PLS-SEM, the path coefficient analysis is carried out using the bootstrapping method. This path analysis is also helpful for hypothesis testing. The value of the path coefficient is standardized and varies from 0 to 1 (Yahaya et al., 2019). On the other hand, the effect size (F^2) measures the impact of the independent variable on the dependent variable. It is carried out by omitting certain independent constructs from the model and evaluating the change in the value of R-squared (R^2). The considered effect size is above 0.02 (Ghozali & Latan, 2015).

The results of the structural model evaluation are presented in the following figures.

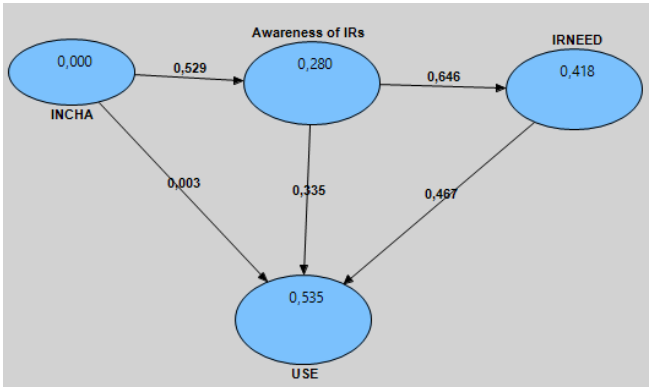

Figure 2. Coefficient of Determination (R^2)

Figure 2 shows the result of the coefficient of determination analysis. The R-squared value of using IRs is 0.535 (53.5%). Since the minimum of the R-square is 0.1 (10%), the use of IRs is influenced by the construct of information need. Acceptance is explained by 53.5%. Other factors not discussed in this study influence the remaining 46.5% of IR use. However, the influence is moderate, according to Sanchez (2013), who mentions that the value of R-square is low with $R<0.30$, moderate with $0.30<R<0.60$, and high with $R>0.60$, or according to Ghozali (2015), who states that the value of R-square 0.75, 0.50 and 0.25 describe that the influence is high, moderate and low respectively.

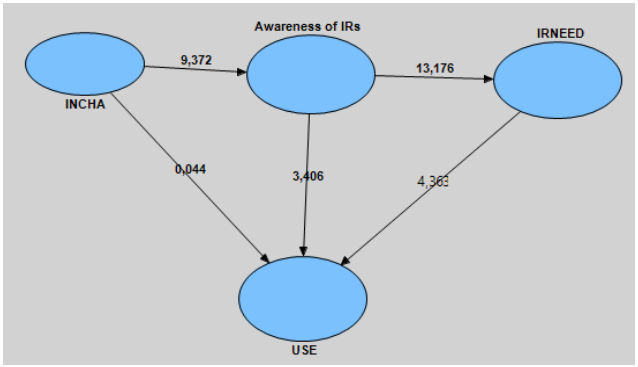

Figure 3. PLS Bootstrapping Results

Figure 3 describes the values of the path coefficient. Urbach & Ahlemann (2010), mentioned that a path coefficient of more than 0.1 is desirable to be responsible for specific effects in the model and should be significant at least at 0.05 level of significance. The results show that all constructs have significant correlations except the correlation between INCHA and USE. The correlation is considered insignificant since the value of the path coefficient of INCHA and USE is 0.044.

According to Cohen (1988), the recommended values for estimating the magnitude of path coefficients are 0.02, 0.15, and 0.35, representing small, medium, and large relationships, respectively. The path coefficient from INCHA to awareness of IRs, from awareness of IRs to IRNEED, from awareness of IRs to USE, and from IRNEED to USE are 9.372, 13.176, 3.406, and 4.383, respectively, indicating that the correlations are very significant (high correlation).

However, more than examining the significant relationship between the constructs is required. To understand the effect of a particular variable, it is necessary to evaluate the effect size of each construct. The effect size provides the substantive effect of the exogenous variable on the endogenous variable. It is measured by observing the change in R-squared value when a particular construct is eliminated. The results of the effect size of the constructs are shown in the following table.

Table 4. Effect size table

Paths	R^2 (Incl.)	R^2 (Excl.)	f^2
INCHA>>USE	0,535	0,535	0
IRNEED>>USE	0,535	0,473	0,133333333
Awareness of IRs>>USE	0,535	0,441	0,202150538

Table 4 shows the effect size of INCHA, Awareness of IRS, and IRNEED on the use of IRs. Two constructs, Awareness of IRS and IRNEED, have an effect size of 0.13 and 0.2 on the use of IRs, while INCHA has no effect size on the use of IRs. The actual need for IRs is higher than the effect of awareness of IRs on the use of IRs. However, there is no effect on the user characteristics of information needed for the IR's use. Hair is et al. (2013) and Hanseler et al. (2009) stated that the values of $0.02<0.15$, $0.15<0.35$, and >0.35 for the effect size (f^2) indicate the small, moderate, and substantial respectively. The effect size of awareness of IRs and IRNEED is, therefore, a moderate effect.

Discussion

The study results provide valuable insights into the adoption of technology, particularly institutional repositories (IRs), in the context of academic libraries in Indonesia. These results can be discussed and expanded upon in the context of technology adoption from the perspective of information behavior. Firstly, the results indicate that Information Need can be viewed as a driver for technology adoption. The study highlights that information need is a significant driver of technology adoption, accounting for more than 50% of the variance in the use of IRs (53.3%). This finding aligns with the theory that technology adoption often occurs when individuals perceive a need for the technology to fulfill their information needs. In this case, IRs serve as a solution for university lecturers to access scholarly resources, and this adoption is primarily motivated by the need for information (Deinzer et al.,2017). Secondly, the results reveal the importance role of institutional repositories in providing information. Institutional repositories are shown to play a crucial role in meeting the information needs of university lecturers. This emphasizes the importance of institutions investing in and maintaining these repositories to support their academic community (Afzali, 2012). It also

underscores the role of technology in facilitating access to academic information, making it more convenient for users to access and use scholarly resources.

However, the development of institutional repositories has challenged by the information literacy and skills of university lecturers. The study highlights the need to improve the information literacy skills of academic staff. This is a critical aspect of technology adoption because individuals must possess the necessary skills to effectively use digital tools and resources (Wilson & Maceviciute, 2013). Academic libraries and institutions can play a pivotal role in providing training and support of others research information systems in this regard (Jeffery & Asserson, 2009).

Other challenges came from technology adoption. The study points out some challenges related to the adoption of IRs, such as incomplete or outdated content, and issues related to user awareness (Joo et al., 2019). These challenges resonate with the idea that technology adoption is not just about providing the technology itself but also ensuring its quality, relevance, and user-friendliness (Udo-Anyanwu et al., 2023). Addressing these challenges is crucial for enhancing technology adoption. The findings also mention the importance of user experience (UX) and design in the successful implementation of IRs. This aligns with the concept of user-centered design, which emphasizes tailoring technology to meet the specific needs and preferences of users. Poor UX and design can hinder technology adoption, even if the information need exists (González-Pérez et al., 2020; Narayan & Luca, 2017; Subiyakto et al., 2021). Lastly, while information need is a significant factor in technology adoption, the study acknowledges that other factors also influence the use of IRs. The findings stated that there are other factors influencing the adoption of IRs in academic libraries. This aligns with the broader literature on technology adoption, which suggests that multiple factors, including perceived ease of use, perceived usefulness, and external influences, can impact an individual's decision to adopt technology.

Overall, the study results discussed in the context of information behavior provide valuable insights into the factors that influence the adoption of technology, particularly institutional repositories, in academic settings. It underscores the importance of aligning technology adoption with the specific information needs of users, addressing challenges, enhancing user experience, and promoting information literacy to support successful technology adoption in academic libraries.

4. CONCLUSION

The utilization of repositories by educators in higher education is intricately connected to their information requirements. The satisfaction of information requirements, particularly for their scholarly pursuits, has emerged as one of the rationales for resorting to repositories. Nonetheless, there exist additional rationales for abstaining from their utilization. As the model demonstrates, information requirements partially affect the employment of IRs, contributing to 53.5% of their utilization. Ergo, other factors also exert an influence on the use of IRs. Consequently, the findings extend an invitation to all researchers to undertake further investigations in this domain. Aside from the attributes of information requirement, consciousness, and necessity of IRs, there exist other determinants of IR utilization that have not been encompassed within the purview of this investigation.

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