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Original Research

Archivist Readiness to Adopt Blockchain Technology in Managing Digital Archives

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Abstract

The adoption of blockchain technology within archival management systems has become increasingly relevant, prompting archivists to adapt their practices to accommodate its implications for digital object management. Although many countries have begun integrating blockchain technology into their archival systems, Indonesia holds the potential for more extensive and impactful applications. Despite this potential, research on the influences of blockchain technology on archives, especially about archivists' readiness, remains limited. This study assesses the influences of archivists' readiness to adopt blockchain technology for digital archives management within Indonesia. This study uses a quantitative research approach. Data were collected via random questionnaires distributed to 367 archivists across 22 Ministries and 23 Non-Ministry Government Agencies, covering 70.3% of the total population of interest. The study's findings indicate that archivists' readiness positively and significantly influences blockchain adoption for digital archives management. Both cognitive and affective aspects of archivist readiness play a partial role in facilitating this adoption. These findings underscore the importance of fostering organizational environments that empower archivists as essential human resources in the face of blockchain technology's challenges and opportunities for long-term growth. A primary limitation of this study is its focus on individual readiness, excluding broader organizational factors that could shape adoption strategies and policies. Future research should consider the role of institutional commitment, belief systems, and organizational culture in supporting technology adoption.Additionally, expanding the sample to include regional archivists may enhance understanding, as differences in technology access could significantly impact readiness levels. Future studies should also encompass various archivist roles to provide a more comprehensive view of archivist readiness for blockchain in digital archives management. Finally, examining work groups within institutions actively adopting blockchain could yield practical insights into the challenges and successes associated with this technological transition.

Keywords: Archivist, Blockchain, Digital Archives, Technology Readiness.

Introduction

The emergence of Web 3.0 heralds a transformative era, necessitating adaptability among archivists to navigate its decentralized framework characterized by interoperability and user empowerment, driven by emerging technologies such as Blockchain, Artificial Intelligence

(AI), and the Internet of Things (IoT). Within this context, blockchain technology emerges as a pivotal advancement poised to permeate the archival domain. Initially associated with cryptocurrencies like bitcoin, blockchain has transcended its financial origins to find applications across diverse sectors, including medicine, telecommunications, and agriculture. At its core, blockchain records and securely stores digital transactions through cryptographic linkage, ensuring data immutability (Gibson, 2021). Non-fungible tokens (s) have garnered attention lately, serving as unique digital assets authenticated through blockchain technology (LaFountain, 2021). This authentication mechanism presents significant potential for digital archives management, offering an immutable record of ownership and authenticity. Despite the promises of blockchain and s, challenges persist, including concerns regarding access rights, copyright infringement, and technological limitations. However, blockchain promises to address long-standing concerns about digital media's capacity for permanent and accurate information storage (Woodall & Ringel, 2020).

Within Indonesia's archival landscape, integrating e-government systems marks a notable technological stride, automating the creation of digital archives as transactional evidence. These systems aim to provide stakeholders with streamlined access to information through efficient and effective services (Harisanty & Anugrah, 2022). In parallel, initiatives to enhance archivist roles' performance, transparency, and accountability underscore the necessity for long-term digital transformation within archival institutions (Baron & Thurston, 2016). Consequently, archivists must align themselves with evolving Information and Communication Technology (ICT) developments, navigate extensive data management, and foster collaborations across interdisciplinary domains.

Archival institutions in Indonesia are increasingly recognizing the potential of blockchain technology to address the evolving challenges and opportunities in digital archives management. Integrating blockchain solutions within the archival domain offers promising prospects for enhancing data security, ensuring authenticity, and improving operational efficiency in the digital age (Argani & Taraka, 2020). However, widespread adoption faces significant hurdles despite government-led initiatives to leverage blockchain for various tasks such as education certificate validation, medical data storage, and payment systems.

One of the primary challenges hindering the integration of blockchain technology in archival practices is the presence of unclear regulatory frameworks. The absence of comprehensive regulations tailored to blockchain applications within the archival context creates uncertainty and impedes adoption efforts (Lemieux, 2019). Additionally, limited digital infrastructure, especially in remote regions, poses practical challenges to implementing blockchain solutions effectively. The inadequate internet accessibility further exacerbates these challenges, highlighting the need for infrastructure development to support blockchain implementation across diverse archival settings (Woodall & Ringel, 2020).

Despite these obstacles, notable collaborations between archival institutions and blockchain companies have emerged, aiming to develop innovative solutions for archival processes. For instance, projects like OnlinePajak demonstrate the potential of blockchain technology in streamlining education certificate verification and validation processes (Rahardja et al., 2021; Syawaludin & Munir, 2021). However, regulatory ambiguity, particularly concerning taxation and data security, remains a significant barrier to the broader adoption of blockchain solutions in archival contexts (Han & Park, 2022).

In light of these challenges, effective archive management, particularly in embracing

technological advancements, hinges significantly on the readiness of archivists. While global discourse on blockchain's implications for archival practices is emerging, scant attention has been directed toward archivists' readiness, particularly within the Indonesian context. The readiness of archivists to embrace blockchain technology and effectively integrate it into digital archives management processes represents a critical aspect yet to be adequately addressed. Thus, understanding the current readiness, challenges, and opportunities for archivists in Indonesia regarding blockchain technology adoption is imperative for facilitating its effective implementation and maximizing its benefits in digital archives management. It is evident that addressing regulatory uncertainties, enhancing digital infrastructure, and fostering collaborative efforts between stakeholders are essential steps toward facilitating the effective integration of blockchain technology in archival practices in Indonesia. By overcoming these hurdles, archival institutions can harness the transformative potential of blockchain to enhance the authenticity, security, and accessibility of digital archives, thereby advancing the preservation and management of cultural heritage for future generations.

Below are some studies examining individuals' readiness to adopt new technology. Mahendrati and Mangundjaya (2020) investigated the role of technology adoption readiness among employees of public sector government agencies in Indonesia who have implemented IT changes in the last five years. Technology adoption readiness was tested through the technology readiness index (TRI) theory as a mediator in the relationship between Individual Readiness for Change (IRFC) and Affective Commitment to Change (AC2C). It was found that there is a relationship between IRFC and AC2C with TRI as a mediator. Nurhidayat (2020) examined the readiness for blockchain use by integrating TAM and TRI. The integration of TAM and TRI could contribute to determining the level of technology acceptance of blockchain users. Similar research was conducted by Alharbi and Sohaib (2021) regarding the readiness for cryptocurrency technology adoption using TRI to measure optimism, innovativeness, discomfort, and insecurity. It was found that all aspects of TRI studied had a significant relationship with cryptocurrency adoption readiness.

This research addresses this gap by examining the influence of archivists' readiness on blockchain adoption in managing digital archives. Leveraging theories of Individual Readiness for Change (IRFC) and the Technology Readiness Index (TRI), this study aims to provide insights into cognitive and affective readiness aspects among archivists and their impact on blockchain adoption. Through this exploration, the research seeks to contribute novel perspectives to the discourse surrounding blockchain technology's integration into archival practices, particularly within the archival ecosystem. Against this backdrop, the study addresses the influence of archivists' readiness on blockchain adoption in managing digital archives in Indonesia, shedding light on the nexus between archivists' readiness and blockchain technology adoption, providing valuable insights for archival practitioners, educators, policymakers, and researchers.

Literature Review

Archivist readiness

The transition of the archival world, accelerated by the shift towards the digital ecosystem, presents a unique array of challenges to archivists, particularly regarding readiness for changes in media, users, concepts, and archival tasks (Woodall & Ringel, 2020). The continuous expansion of digital archives necessitates archivists' expertise in digital preservation,

underpinned by a conceptual grasp of digital information, especially amidst the transition from Web 2.0 to Web 3.0 (Ryan & Sampson, 2018). Core values to contemplate in the conceptual understanding of digital archives encompass transparency, iteration, innovation, technological literacy, and user services. Web 2.0-based archives prompt archivists to transcend traditional skills to tackle the challenges of the industrial revolution, new media, and future users. Consequently, archivists' preparedness to confront change must be evaluated through change management.

The initial step in change management is assessing readiness for change, which can be gauged at both individual and organizational levels. Individual readiness for change pertains to individuals' perceptions of their organization's readiness to adapt. According to Holt, Armenakis, Field & Harris (2007), individual readiness for change encompasses structural and psychological factors. Building upon Holt's theory, Rafferty, Jimmieson, and Armenakis (2013) further distinguish two facets of readiness for change: cognitive and affective. The cognitive facet elucidates individuals' preparedness for change based on knowledge, skills, and ability alignment, measuring the extent to which an individual's expertise, competencies, and capabilities align with the essence of change. Archivists demonstrate high integrity in their profession, from preservation and management to archival services provided to the public. Archivists must possess cognitive abilities such as digital literacy to embrace new technologies.

UNESCO's study on the digital literacy framework broadly encompasses components of insight, skills, and behavior (Law, Woo, De la Torre & Wong, 2018). Aligned with cognitive readiness, the insight component encompasses disciplinary, epistemic, and procedural knowledge. The skills component signifies the skills dimension necessary to apply knowledge in an ever-evolving world. The behavior component signifies the ability alignment dimension that directs how insights and skills are employed (Park, 2019). Moreover, the affective facet elucidates individuals' readiness for change, encompassing appropriateness, management support, self-efficacy, and personal benefits. Appropriateness denotes the belief that the planned change aligns with future situational demands. Management support reflects the belief that organizational leaders are dedicated to the success of the change. Self-efficacy denotes the belief that individuals can adapt to support overall organizational change. Personal benefits signify the belief that the change will personally benefit the individual.

Blockchain in digital archives management

Technically, blockchain functions as a distributed ledger for processing transactions. It stores all blockchain transactions in a single register. The main distinction between blockchain and regular databases lies in security. In blockchain technology, computations cannot delete or alter records in the database. The blockchain concept encompasses five keywords: a decentralized database, peer-to-peer transmission, transparency through encryption, permanent data recording, and digital programming. We can categorize blockchain into four types based on data access: public, private, permissionless, and permissioned. A public blockchain imposes no restrictions on reading or sending transaction data.

In contrast, a private blockchain restricts access to data and transactions to specific users. This type, also known as an internal blockchain, can authenticate documents for internal use. Permissionless blockchain allows data and transaction access by several individuals or groups according to the roles defined in the blockchain network. Meanwhile, permissioned blockchain requires operator permission for data and transaction access and permission to join and perform

different functions (Galiev, Prokopyev, Ishmukhametov, Stolov, Latypov & Vlasov, 2019).

Quirion (2021) asserts that digital objects in blockchain technology are trusted archives that maintain their authentication and integrity. Authentication involves verifying the authenticity of archives. Authentic archives are those that have undergone verification processes to determine their authenticity. We consider two categories of archives authentic: those that remain unchanged since their creation and those that have undergone some changes, differing from their initial creation. These archives are genuine because they are treated as the original archives.

The link between blockchain and digital archives lies in metadata objects. Blockchain falls into the ledger technology category, taking the form of databases shared and replicated among multiple parties, updatable only according to pre-established rules. Every verified and approved data update is distributed to all parties, adding new links. This archive management form necessitates consensus or reliable transactions resistant to various disruptions. Each block is encrypted in a compact hash form. The hash in each block changes if someone tries to alter the data inside. If the block hash changes, all subsequent links become invalid because the system still recognizes the original hash (Bhatia & Wright de Hernandez, 2019). Several factors make blockchain appealing in the archival domain:

1) **Security and immutability:** Blockchain can enhance attribution for transferred and born-digital digital objects that cannot be altered (immutable). This can safeguard digital objects vulnerable to unauthorized use and copying. As a repository of always available, secure, and publicly accessible data, blockchain preserves metadata. When institutional archives are destroyed, trusted copies on the blockchain network can be accessed to recover institutional copies (O'Dair & Owen, 2019).

2) **Authenticity and integrity:** Blockchain introduces a new way for archive managers to ensure the authenticity and integrity of digital archives. Digital signatures stored alongside document hashes on blockchain technology eliminate the need for sequential signatures and certificates, enabling long-term storage (Bhatia & Wright de Hernandez, 2019).

3) **Decentralization:** Blockchain enables distributed metadata systems on a large scale, eliminating the need for centralized databases and allowing decentralized archive management.

4) **Transparency:** Large-scale distributed data and decentralization principles can enhance transparency in the management practices of digital archives on blockchain technology.

Despite blockchain technology's numerous opportunities in managing digital archives, archivists must know and anticipate some weaknesses and risks, such as ownership issues, privacy and security, authenticity risks, integrity, confidentiality, and authorization (Fachmi & Mayesti, 2022).

Hypothesis development

1) Archivist readiness

Individual Readiness for Change (IRFC) encompasses organizational members' beliefs, attitudes, and intentions, comprehensively and simultaneously influenced by the content, process, context, and characteristics of the individuals involved in the change process. The collective readiness of an organization is continuously influenced by the readiness of the individuals who comprise it through the dynamics of social information processing. Rafferty et

al. (2013) propose that IRFC can be assessed based on cognitive and affective aspects. The cognitive dimension evaluates individual readiness based on the mastery of knowledge, skills, and ability alignment according to the essence of the change. Meanwhile, the affective dimension gauges individual readiness, including appropriateness, management support, self-efficacy, and personal benefit.

Previous studies have shown a relationship between individual readiness for change and the readiness to adopt new technology. Mahendrati and Mangundjaya (2020) investigated the correlation between IRFC and affective commitment to change using TRI as a mediator variable. The results demonstrated a strong relationship between IRFC and TRI. The relationship between IRFC and TRI can be measured directly as it includes variable scales to gauge perceptions of readiness related to the implemented changes at the individual level. Similarly, Chen, Le, Yumak, and Pu (2017) researched individual readiness for technology adoption. The findings indicated that overall aspects of individual readiness significantly and positively impact technology readiness.

Ogbodoakum, Fauzi, Ayub, Malaysia, Norhasni, and Abiddin (2022) examined the influence of individual and organizational readiness using behavioral theories on adopting new technology through the Technology Acceptance Model (TAM). The results revealed that specific dimensions of individual readiness for change, such as self-efficacy and management support, which are components of the cognitive aspect of the IRFC theory, significantly affect the readiness to adopt new technology. However, attitude dimensions, part of the IRFC theory's affective aspect, do not substantially influence the readiness to adopt new technology.

2) Blockchain adoption readiness in managing digital archives

The readiness to adopt technology can be defined as the willingness to accept and implement technological changes that indirectly alter lifestyles and work patterns. This study adopts the TRI model to measure the readiness to adopt blockchain in managing digital archives. The technology readiness model consists of four variables: optimism, innovativeness, discomfort, and insecurity (Parasuraman & Colby, 2015).

1. **Optimism** refers to a positive outlook on technology and the belief that it offers individuals and organizations increased control, flexibility, and efficiency.
2. **Innovativeness** is the tendency to pioneer technology and lead in innovative thinking.
3. **Discomfort** denotes the perception of a lack of control over technology and feeling overwhelmed by it.
4. **Insecurity,** entails a lack of trust in technology, from skepticism about its ability to function appropriately and concerns about potentially harmful consequences.

Based on previous research, this study will examine the simultaneous and partial influence of archivists' readiness on blockchain adoption in managing digital archives using the IRFC and TRI theories depicted in Figure 1.

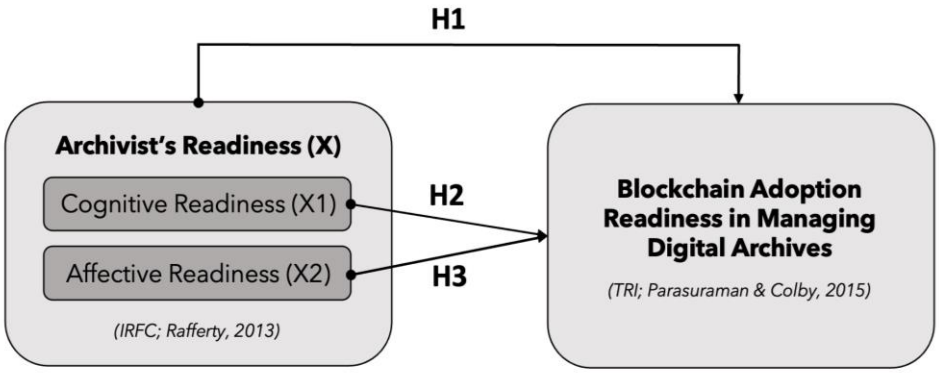

Figure 1. Conceptual framework

The framework depicted in Figure 1 illustrates three hypotheses to be tested in this study, namely:

H1: Archivists' readiness influences blockchain adoption in digital archives management;

H2: The cognitive readiness influences blockchain adoption in digital archives management;

H3: The affective readiness influences blockchain adoption in digital archives management.

Materials and Methods

This study uses a quantitative method with a survey approach to understand the matter under study by measuring archivist readiness variables' frequency, intensity, and influence on adopting blockchain technology in managing digital archives in Indonesia. The population in this study was 4,520 archivists in 22 ministries and 23 non-ministerial government agencies in Indonesia. The archivist of ministry and non-ministerial government agencies has the functional position of an archivist with the scope, function, responsibility, and authority to carry out national archival activities. Permanent PAN RB Number 13 of 2016 explains that the functional position of an archivist requires professional qualifications that require technological development in the archiving field.

Strengthening archival technology through Artificial Intelligence (AI) is the starting point for the archivist profession to support the ease of archive management. The functional position of an archivist is responsible for identifying, establishing, and preserving digital archives to make archives accessible to the public in the current era of information openness. It is necessary to support the strengthening of e-government and open government with the functional readiness of qualified archivists. The technique used is random sampling. Participants in this study only took a portion of the determined population. Based on the calculation with the Slovin formula with a margin of error of 5% and 95% confidence level on 4,520 archivists, the sample used in this study is 367 archivists.

This study collected data by distributing online questionnaires via e-mail and archivist community groups from all ministries and central non-ministerial government agencies in Indonesia. The list of questions asked in the questionnaire using a Likert scale which has a gradation of 1-5 (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree) and aims to measure attitudes, opinions, and the perception of a person or group of people about social phenomena (Sugiyono 2012). The questionnaire in this study consisted of

35 question instruments. The archivist readiness variable (X) consists of cognitive and affective aspects, which will be simultaneously and partially measured.

Cognitive readiness consists of 13 IRFC theory question items and includes knowledge, skills, and ability alignment (Rafferty et al., 2013). This study also adopts the digital literacy theory of UNESCO to develop cognitive readiness question instruments for transforming the archive's technology (Law et al., 2018). This theory consists of basic knowledge related to hardware/software, information and data literacy, communication and collaboration, digital content creation, security, problem-solving, and competencies related to careers or work. Affective readiness consists of 5 items that are measured based on the IRFC theory: suitability for change, management support, self-efficacy, and personally beneficial (Rafferty et al., 2013). The variable readiness to adopt blockchain technology in managing digital archives (Y) consists of 17 questions of optimism, innovativeness, discomfort, and insecurity dimensions based on the TRI theory (Parasuraman & Colb, 2015).

Data analysis

Validity and reliability tests were conducted on 30 respondents to assess the quality and feasibility of the instrument as a data collection tool. The validity test employed the Pearson product-moment correlation on 35 research question instruments, resulting in a Pearson correlation coefficient (r count) exceeding the critical value (r table). The critical value (r table) was determined based on the formula for degrees of freedom (df) = N-2, with N representing the sample size for the validity test. Calculations using a significance level of 5% confirmed the validity of all question instruments as the r-count values exceeded the critical value (0.3610). The validity test results can be seen in Table 1.

Table 1
Validity test

Variable	Concept	r count	r table	Results
Archivists Readiness (X)	Cognitive Readiness	0.721	0.361	Valid
		0.679	0.361	Valid
		0.721	0.361	Valid
		0.687	0.361	Valid
		0.662	0.361	Valid
		0.700	0.361	Valid
		0.706	0.361	Valid
		0.672	0.361	Valid
		0.608	0.361	Valid
		0.739	0.361	Valid
		0.694	0.361	Valid
		0.636	0.361	Valid
		0.717	0.361	Valid
	Affective Readiness	0.558	0.361	Valid
		0.542	0.361	Valid
		0.731	0.361	Valid
		0.719	0.361	Valid
		0.725	0.361	Valid
Blockchain Technology	Optimism (OPT)	0.605	0.361	Valid

Variable	Concept	r count	r table	Results
Adoption in Digital Archives Management (Y)		0.536	0.361	Valid
		0.655	0.361	Valid
		0.569	0.361	Valid
		0.640	0.361	Valid
		0.458	0.361	Valid
	Innovativeness (INV)	0.379	0.361	Valid
		0.365	0.361	Valid
	Discomfort (DSC)	0.631	0.361	Valid
		0.449	0.361	Valid
	Insecurity (ISC)	0.545	0.361	Valid
		0.669	0.361	Valid
		0.474	0.361	Valid
		0.495	0.361	Valid
		0.460	0.361	Valid
		0.521	0.361	Valid
		0.605	0.361	Valid

Reliability testing utilized the Cronbach Alpha statistical method, with a minimum threshold of 0.7. The X variable achieved a reliability coefficient of 0.833, while the Y variable obtained a coefficient of 0.924. Hence, each variable question demonstrated reliability as a dependable data collection tool.

Moreover, frequency distribution analysis was employed to assess archivist readiness and willingness to adopt blockchain technology for managing digital archives. Data descriptions included minimum, maximum, average, median, mode, and standard deviation values for each archival readiness variable (X) and adoption of blockchain technology in digital archive management (Y). These values were categorized into intervals based on Likert scale criteria ranging from 1 to 5, enabling interpretation of the average archivist readiness variables according to predetermined categories.

The classical assumption test ensured the data's standard distribution, linearity, and absence of heteroscedasticity. The normality test, conducted using the Kolmogorov-Smirnov method with a significance level > 0.05, confirmed usually distributed data (significance value = 0.200 > 0.05). Similarly, the linearity test, with a significance level > 0.05, indicated a linear relationship between archivist readiness and blockchain technology adoption in managing digital archives (significance value = 0.328 > 0.05). Furthermore, the heteroscedasticity test, employing the Glejser method with a significance level > 0.05, revealed that the tested variable was free from heteroscedasticity (significance value = 0.568 > 0.05). The classical assumption test results can be seen in Table 2.

Table 2
Classical assumption test

No.	Classical Assumption Test	*p*-value	Criteria	Results
1.	Normality	0.200	Asym Sig > 0.05	*Clear*
2.	Linearity	0.328	Asym Sig > 0.05	*Clear*
3.	Heteroscedasticity	0.90	Asym Sig > 0.05	*Clear*

The hypothesis testing involved simple regression analysis to examine the simultaneous effect of archivist readiness on blockchain adoption in managing digital records (H1). Additionally, T-tests were conducted to assess the partial effect of archivists' cognitive and affective readiness on blockchain adoption (H2 and H3). Finally, a coefficient determination test was performed to quantify the overall impact.

Results

Respondent demographic

The data used in this study is primary data derived from randomly distributing questionnaires to 367 archivists in 34 ministries and 30 non-ministerial government institutions in Indonesia. Based on the questionnaires distributed, are 367 respondents from 22 ministries and 23 non-ministerial government institutions in Indonesia. This implies that the collected respondents represent 70.3% of archivists from all ministries and non-ministerial government institutions in Indonesia. Respondent demographic criteria can be seen in Table 3.

Table 3
Respondent Demographic

Characteristic	Frequency	Percentage (%)
	Institutions	
Ministry	168	45.8
Non-Ministerial Government Institutions	199	54.2
	Gender	
Male	159	45.3
Female	208	56.7
	Age	
<30	118	32.2
30-35	68	18.5
35-45	130	35.4
>45	51	13.9
	Functional Position	
Junior Clerical Archivist	52	14.2
Intermediate Clerical Archivist	24	6.5
Senior Clerical Archivist	15	4.1
Junior Archivists	165	45.0
Intermediate Archivist	90	24.5
Middle-Senior Archivist	21	5.7
Senior Archivist	0	0
	Work Periode	
<5	146	39.8
5-10	50	13.6
10-15	99	27.0
>15	72	19.6
	Education	
Associate	85	23.2
Bachelor	231	62.9

Characteristic	Frequency	Percentage (%)
Masters	51	13.9
PhD	0	0
	Already familiar with blockchain technology in managing digital archives	
Already	187	51.0
Not yet	180	49.0
	The source used to study blockchain technology in managing digital archives	
Independent learning from	292	66.2
mass media	22	5.0
Training organized by the	43	9.8
agency	44	10.0
Government	10	2.3
Formal Education	30	6.8
Seminar		
Others		
	Plans for implementing blockchain technology in managing digital archives at agencies	
Not planning yet	253	68.9
Not implemented yet, but	108	29.4
already planning	6	1.6
Already implemented		

Table 2 shows that 56.7% of the research respondents. Then the age of 34-45 years was dominated by 35.4%, followed by 32.2% of respondents in the age <30 years. Based on their functional position, 45% of respondents are junior archivists, and 24.5% are intermediate archivists. The majority had a working period of <5 years at 39.8%, followed by 10-15 years at 27.0%, and were dominated by archivists with a bachelor's degree of 62.9%.

In addition, the respondents' demographic also provides an archivist's awareness of the presence of blockchain technology in the management of digital archives. The results were quite balanced between 51% of archivists who were already familiar with blockchain technology and 49% of those who were not familiar with its presence. Most (66.2%) of respondents are familiar with blockchain technology in managing digital archives by studying independently through mass media.

Even though 68.9% of respondents stated that their agencies had no plans to adopt blockchain technology in managing digital archives, 29.4% of respondents stated that institutions had plans and 1.6% of respondents stated that institutions had already implemented it. It implies that some ministries and non-ministerial government agencies in Indonesia have started to realize and support adopting blockchain technology in managing digital records in Indonesia.

Description of archivists readiness (X)

The archivist readiness variable (X) consists of 18 questions with a score of 1-5 for each answer. The lowest total ideal score is 18 and the highest is 90. Based on statistical calculations on research data with 367 archivist respondents, the lowest total score is 72, the highest total

score is 86, the average value is 79.05, the median is 79, and the standard deviation is 3.067. The frequency distribution of variable X can be seen in Table 4.

Table 4
Frequency Distribution of Archivist Readiness

Criteria	Interval Class	Frequency	Percentage (%)	Category
Strongly Disagree	18 - 32	0	0	Very Poor
Disagree	33 - 46	0	0	Poor
Neutral	47 - 60	0	0	Average
Agree	61 - 75	47	12,8	Good
Strongly Agree	76 - 90	320	87,2	Excellent
Total		**367**	**100**	

Table 3 shows the score category with the highest frequency in the 76-90 interval class by 320 respondents. The lowest was in the 61-75 class interval by 47 respondents, and there were no respondents with a score in the 18-60 class interval. It implies that the average score of the archivist readiness variable is in the perfect category. Archivist readiness for technological change needs to pay attention to cognitive and affective readiness (Rafferty et al., 2013). A descriptive analysis of each dimension of archivist readiness shows that archivists in Indonesia already have good mental and affective readiness.

Cognitive archivists readiness

Regarding cognitive aspects, archivist readiness is measured based on the dimensions of mastery of knowledge, skills, and ability alignment. In the knowledge dimension, two indicators get a perfect category and three get a good category. As many as 55.9% of archivists understand how to use hardware and software to support work activities. It implies that archivists are used to managing records in a digital environment. To support digital archive management, as many as 66.8% of archivists already understand basic terms in the proper use of digital technology. Armed with good basic terminology skills, 52% of archivists already understand procedures for searching relevant data and information and the challenges of searching via the internet. Along with the rapid digital transformation in archiving, 50.1% of archivists understand global technological developments. As many as 49.0% of archivists were aware of national plans and targets in digital technology developments and their relevance to tasks and functions related to managing digital archives.

On the skills dimension, four indicators get a good category. As many as 53.1% of archivists already have the skills to operate applications and use commonly used features to support work activities. As many as 51.2% of archivists already have the skills to map the relevance of digital technology developments to the tasks and functions of managing digital records. As many as 49.6% of archivists already have the skills to quickly adapt to digital technology to increase work effectiveness and efficiency. As many as 50.7% of archivists

already have skills in utilizing digital technology for decision-making.

In the capability alignment dimension, one indicator gets an excellent rating and three get a good rating. As many as 55.9% of archivists can already control the risks of using digital technology very well. As many as 66.8% of archivists understand the weaknesses and ethical consequences of communicating and working through digital technology well. As many as 52.0% of archivists understand the ethics and regulations for presenting data/information related to digital content very well. As much as 50.1% of archivists can accept policy innovations for institutions that positively impact improving the quality of service to the public.

Affective archivists readiness

The concept of affective readiness for archivists consists of dimensions of suitability for change, management support, self-efficacy, and personal benefit. On the change suitability dimension, one indicator gets a perfect category. As many as 55.3% of archivists stated that they strongly agreed that the technological changes were taking place in response to the demands of the present and future situations. The management support dimension consists of one indicator as very good. As many as 66.8% of archivists strongly agree that their leaders commit to succeeding and supporting technological change. The change suitability dimension consists of one indicator that gets a good category. As many as 52.0% of archivists can adapt quickly to support technological changes. On the personally beneficial dimension, two indicators get a very good category. As much as 50.7% of archivists strongly agree that changes in technology will provide personal benefits. In addition, 52.3% strongly agree that changes in technology will improve performance at work.

Description of blockchain technology adoption in digital archives management (Y)

The readiness to adopt blockchain technology in digital archives management variable (Y) consists of 17 questions with a score of 1-5 for each answer. The lowest ideal score is 17 and the highest is 85. Based on statistical calculations on 367 archivists' responses, the lowest total score was 64, the highest was 79, the average was 71.06, the median was 71, the mode was 72, and the standard deviation was 3.155. The Y-variable frequency distribution diagram can be seen in Table 5.

Table 5
Frequency distribution of blockchain technology adoption in digital archives management

Criteria	Interval Class	Frequency	Percentage (%)	Category
Strongly Disagree	17 - 30	0	0	Very Poor
Disagree	31 - 44	0	0	Poor
Neutral	45 - 58	0	0	Average
Agree	59 - 71	191	52,0	Good
Strongly Agree	72 - 85	176	48,0	Excellent
Total		**367**	**100**	

Table 5 shows the score category with the highest frequency in the class interval 59-71 by 191 respondents. This was followed by 176 respondents in 72-85 class intervals, and no respondent had a score in the 17-58 class interval. This implies that the average score of blockchain technology adoption readiness in digital archives management is in a good category. Blockchain technology adoption readiness in digital archives management must pay attention to perceptions of optimism, innovation discomfort, and insecurity (Parasuraman & Colby, 2015).

A descriptive analysis of readiness to adopt blockchain technology in digital archives management shows that archivists in Indonesia are optimistic about the opportunities offered. The optimism dimension consists of six indicators, all receiving a good category. As many as 49.6% of archivists are optimistic about transaction flexibility and effectiveness in real-time digital archive management. As many as 50.4% of archivists are confident that blockchain technology in managing digital archives has a high level of authentication. As many as 51% of archivists are optimistic about efficiency in digital archive management because it carries a decentralized system. As many as 53.4% of archivists are confident that blockchain technology can increase transparency through an open service. As many as 52.9% of archivists are optimistic that blockchain can be implemented in the archive world. As many as 43.6% of archivists are optimistic that archival institutions in Indonesia can adopt blockchain.

Of course, to realize the opportunities offered by new technology adoption, archivist innovation is needed to transform blockchain technology into a benefit for the archives fields in Indonesia. The innovativeness dimension consists of 2 indicators, all of which receive a good category. As many as 46.3% of archivists tend to be pioneers regarding technological change and thought leaders. As many as 34.1% of archivists are interested in innovating in developing blockchain technology in digital archives management.

However, archivists feel uncomfortable about adopting new technology by looking at the current conditions. The discomfort dimension consists of two indicators. As many as 46.9% of archivists agree that there is discomfort over the lack of collaboration between actors to capture talent and support the adoption of blockchain technology in managing digital archives. As many as 46.3% of architects agreed that there would be a convenience for inadequate data governance regarding privacy, ownership, and data ownership mechanisms.

Apart from the inconvenience of the current conditions, there are also concerns about the challenges presented by blockchain technology adoption in digital archives management. The insecurity dimension consists of seven indicators. As many as 50.4% of archivists are concerned about a lack of qualified human resources. As many as 47.4% of archivists have a high level of concern about the risks posed. Approximately 46.3% of archivists are concerned about privacy and security in managing digital archives based on blockchain technology. About 50.1% are very worried about illegal transactions in managing digital archives based on blockchain technology. As many as 50.4% of archivists are very concerned about being the center of digital attention. As many as 47.4% of archivists have a very high level of concern about technical challenges. As many as 56.1% of archivists have a high level of concern about the issue of regulatory alignment between government agencies in managing digital archives based on blockchain technology.

Hypothesis testing

A simple linear regression analysis using the SPSS 26 program aims to determine the magnitude of the influence of the archivist readiness variable (X) on the adoption of blockchain technology in the management of digital archives (Y). The linear regression analysis performed in Table 6, with a significance level of <0.05, shows the significant influence of archivist readiness on adopting blockchain technology in managing digital archives with a significance value of 0.000 > 0.05.

Table 6
Simple Regression Analysis Result

Model		B	Std. Error	Beta	t	Sig
1	(Constant)	10.945	2.869		3.815	.000
	X	.761	.036	.739	20.971	.000

Dependent variable: Blockchain technology adoption

A partial t-test aims to find out whether there is an influence between the cognitive and affective readiness of archivists on the adoption of blockchain technology in the management of digital archives. The partial t-test with a significance value of <0.05 shows the significance value for the archivist's cognitive readiness is 0.000 <0.005. It implies that H0 is rejected, and the cognitive archivist's readiness influences the adoption of blockchain technology in the management of digital archives in archival institutions in Indonesia (H2) is accepted.

Likewise, the affective readiness variable of archivists is known to have a significant value of 0.000. H0 is rejected because the significance value is less than 0.05. It implies that the affective archivist's readiness influences the adoption of blockchain technology in the management of digital archives in archival institutions in Indonesia (H3) is accepted. The partial test results can be seen in Table 7.

Table 7
Partial Test result (T-Test)

Model		B	Std. Error	Beta	t	Sig
1	(Constant)	11.404	2.937		3.883	.000
	Cognitive Readiness	.735	.050	.531	14.737	.000
	Affective Readiness	.804	.070	.416	11.548	.000

Dependent variable: Blockchain technology adoption

The coefficient determination test aims to measure the magnitude of the influence of the dependent and independent variables. Table 8 shows the R Square value is 0.546, which implies that the influence of archivist readiness, both from cognitive and affective aspects, on the adoption of blockchain technology in managing digital archives simultaneously was 54.6%. Because the results are close to 1 or 100%, it implies that the independent variables provide almost all the information needed to predict the variation of the dependent variable. Meanwhile, 0.454 or 45.4% is influenced by other factors outside the archivist's cognitive and affective

readiness.

Table 8
Coefficient of determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.739 [a]	.546	.545	2.12778

Predictors: (Constant) Archivist Readiness

Discussion

The advancement of technology in the archival world drives archivists' readiness to accept and adapt to change quickly. We must measure archivists' readiness to face change management. Change management refers to the approach used in transitioning individuals, teams, and organizations to achieve desired goals in the future. Adopting blockchain technology in the archival domain demands archivists' readiness to understand, accept, and adapt to new technology. We can measure the readiness for change through cognitive and affective readiness (Rafferty et al., 2013).

Archivists' cognitive readiness can be measured through mastery of knowledge, skills, and alignment of abilities. Meanwhile, archivists' affective readiness can be measured through the suitability of change, management support, self-efficacy, and personally beneficial factors. Research findings show that archivists in Indonesia already have excellent cognitive and affective readiness to face digital transformation in the archival world. Archivists' cognitive readiness is a framework of digital literacy needed to measure the level of knowledge, skills, and alignment of abilities in utilizing hardware/software, information and data literacy, communication and collaboration, digital content creation, security, problem-solving, and career-related competencies. Digital literacy, at the core of digital governance, demands a shift from anticipatory governance systems to adaptive ones according to technological advancements (Ramos, 2017).

Research results on cognitive readiness show that archivists in Indonesia already have an excellent level of knowledge, skills, and alignment of abilities regarding digital transformation, which are, on average, in the superb category. In line with the development of integrated archival information systems in Indonesia through Presidential Regulation Number 95 of 2018 concerning Electronic-Based Government Systems (SPBE), it encourages the utilization of technology in the archival field by central and regional government agencies. The creation of archives, which initially used paper, is now based on electronic formats; the use of archives, which was done initially offline, is now done online; archive storage, which was previously in archive depots, is now stored in databases; and letter delivery, which was initially manual, is now digital.

One form of SPBE transformation in the archival domain in Indonesia is marked by the emergence of the Integrated Dynamic Archival Information System (SRIKANDI), which allows the use of standard applications in dynamic archive management by archivists in each Ministry/Agency. The emergence of archival applications that can be used nationally indicates that archival institutions in Indonesia already understand the urgency of system interoperability

to ensure authentic and relevant archive accessibility according to needs. This encourages archivists to equip themselves with knowledge of hardware and software commonly used in digital archive management activities according to technological developments.

Research results on the affective readiness of archivists in Indonesia generally obtain an excellent rating. Two dimensions receive the highest scores in the superb category: the suitability of change and self-efficacy. The results show that archivists strongly agree that the technological changes suit current and future demands. Most research respondents are Generation Y and Z, familiar with internet technology daily, and have open minds toward change. The characteristics of Generation Y and Z, who quickly grasp IT developments, make respondents more reactive to technological changes in their surroundings. It was found that archivists have very high confidence in their ability to adapt swiftly to supporting technological changes occurring in the archival world. This condition drives the suitability for change and self-efficacy to be in the very high category.

Other dimensions receive a good category with the highest scores in the management support dimension. This result indicates that archivists believe leaders are seriously committed to the success and support of technological changes. Management support is an excellent contributor to encouraging performance, motivation, and interest in technology adoption. There is a feedback loop between management support, encouragement, and performance interest. Archivists, as archive managers, will feel more prepared to face changes with adequate IT infrastructure support. When adopting new technology, the availability of infrastructure such as technical facilities, physical facilities, systems, software/hardware, training, and skills development will drive the commitment of leaders and staff to achieve organizational change goals together.

They were followed by the personally beneficial dimension, which shows that archivists believe that technological changes will provide personal benefits and can improve performance at work. The personally beneficial dimension is a psychological mechanism needed by every individual when faced with affective readiness for change. Affective readiness based on personally beneficial indicators is related to job satisfaction and intention to change. Personally beneficial refers to direct or indirect benefits that affect job contexts, such as psychological, political, and social aspects. The digital transformation in the archival domain triggers archivists' belief in the personal benefits of technology, such as self-development through technology to improve performance.

According to Regulation Number 6 of 2016 by the Head of ANRI, archivists in Indonesia must know about archive management and other knowledge, such as history, culture, economics, and technology, to support archival tasks. Archivists must also have skills in using facilities and infrastructure to present archives quickly and accurately according to needs.

Archivists must have a professional attitude and high integrity towards their profession in carrying out archival tasks from preservation and management to archival services to the public. Therefore, capacity development is needed according to the essence of information technology transformation to benefit current and future generations. Based on the research conducted, it was found that archivists responded positively to the readiness for blockchain adoption in digital archive management through the measurement of contributor (positive) dimensions, namely OPT and INV, as well as inhibitor (negative) dimensions, namely DSC and ISC.

Most archivists are already aware of the opportunities offered by blockchain technology in managing digital archives. Based on preliminary observations conducted on several Ministries

and Non-Ministerial Government Institutions in Indonesia, the National Archives of the Republic of Indonesia stated that the blockchain topic has begun to be discussed through non-formal discussion forums to discuss the opportunities and challenges of blockchain utilization in the archival domain. One is through discussions between the ANRI archivist functional group and the Indonesian Blockchain Association (ABI) with the theme "Utilization of Blockchain Technology in Archiving" conducted on August 25, 2022.

In line with research findings, the highest value of the OPT dimension is blockchain, which can increase transparency in managing digital archives through service openness. One honorary member of ABI stated that the decentralization principle in blockchain allows service interoperability and data sharing transparency between government agencies in Indonesia but functionally still requires one agency to be designated as a validator to conduct filtering and verification to ensure the authenticity and integrity of the stored archives. They considered that every digital object stored in blockchain technology could not be deleted or modified. Thus, archival institutions in Indonesia need to determine the type of blockchain adopted, such as permissionless for interagency interoperability and private for agencies acting as validators.

Archival institutions in Indonesia can utilize this opportunity to optimize the knowledge and skills of archivist functional positions in their agencies to adapt to shifts in tasks and performance when blockchain adoption occurs. We will focus on the content presented and the archival context to filter and verify accurately. This is supported by research results that show the highest value in the INV dimension, namely, archivists agreeing to be pioneers in technology change and thought leaders.

The adoption of blockchain in managing digital archives enables the integration of archival management, hardware, blockchain technology, and cloud services. This integration can realize archival digitization that fulfils the functions of storage, management, collaboration, and availability of statistical data information in trusted digital archival management (traceability). Archival institutions in Indonesia can consider archivists' optimism as an innovation opportunity in adopting blockchain-based digital archive management technology, namely:

1. Collaboration and digital data sharing processes

Blockchain technology with decentralized service schemes allows digital data sharing and collaboration processes across institutions digitally. Blockchain adoption enables connectivity in managing digital archives between departments or agencies. The availability of collaboration services and data-sharing processes between agencies on a large scale is an effort to achieve flexibility and effectiveness in real-time transactions, efficiency, and transparency. Collaboration and data-sharing processes across departments or agencies can be done through access control requirements to be consulted, copied, or modified after approval from the verifier. Agencies can also implement smart contracts that allow cross-agency collaboration more efficiently while maintaining the security and credibility of digital archives.

2. Authenticity and credibility of digital archive storage

Digital archive management includes the reliability of storage systems, data security, and compliance requirements. Digital archive management through innovative contract authentication processes allows digital archive certification that cannot be deleted or modified.

This scheme guarantees authenticity and proves archive ownership as a digital asset.

3. Verification throughout the digital archive lifecycle

Although digital signatures and stamps with centralized authentication systems can currently enhance the authenticity and credibility of digital archives, in their overall lifecycle, it will not be easy to guarantee long-term verification capabilities. Blockchain-based digital archive management will guarantee the long-term authenticity of digital archives throughout their lifecycle because every content change or transaction will be permanently recorded (Shaoqin, Jiangtao & Shangzhuo, 2022).

It was also found that most archivists are aware of the challenges offered. Archivists are highly uncomfortable with the lack of collaboration and inadequate data governance related to privacy, ownership, and data acquisition mechanisms in managing blockchain-based digital archives. There is also a deep concern about the need for more competent human resources, risks posed, privacy and security, illegal transactions, the digital divide, and issues of regulatory alignment between government institutions in managing blockchain-based digital archives.

The risk indicator with the highest concern is the digital divide over the adoption of blockchain in managing digital archives in Indonesia. Nye (2015) mentions that the digital divide challenges blockchain adoption. The digital divide is often associated with uneven access to technology nationally and globally. However, in its development, blockchain is indeed used as one of the solutions to overcome the digital divide through connectivity capabilities between systems on an enormous scale and even allows system interoperability between countries.
There are three levels of digital divide (Ragnedda & Ruiu, 2017):

1. People cannot access technology.
2. People cannot use technology.
3. People cannot obtain actual outcomes from technology use.

Access to technology for archivist functional positions in Indonesia is essential because the implementation of SPBE requires infrastructure to ensure accessibility of access services accessibility from the government to the public. Although archival institutions in Indonesia have begun to realize SPBE, the transformation carried out is still at the level of equalizing the capabilities of government and public institutions, both central and regional, in accessing and using digital information systems. Optimizing integrated information systems with archival institution business processes is still in development. This indicates that the maximal exchange of "value," a characteristic of digital transactions, is still not optimal.

Ragnedda and Destefanis (2019) state that the digital divide is a broader social consequence involving differences in connectivity levels, capabilities, skills, and individual motivation in technology adoption. Differences in individual acceptance levels based on these components will affect how technology is accessed and used, and benefit from blockchain adoption in managing digital archives. In other words, only some receive the same benefits in blockchain utilization. Thus, it is not enough to ensure equal access and use of new technology; blockchain adoption in managing digital archives must be balanced with providing competent digital skills to enable equal receipt of "value" as an actual outcome of adopting new technology.

Furthermore, another concern in the very high category is the alignment between regulations among government institutions. Based on observations and interviews, one coordinator of the archivist functional position at the Constitutional Court stated that the opportunities for blockchain that their institution can utilize are the availability of case files more quickly and securely to minimize loss or errors, and efficiently because it allows storing born-digital archives. However, it is stated that achieving optimal adoption of blockchain-based digital archive management will take longer. Therefore, if blockchain is adopted later, the agency will still store all archives, paper, and media transfers until clear regulations are issued, such as storing born-digital archives without physical archives, ensuring all risks that may occur. Wang (2021) states that in adopting blockchain technology, six risks need to be anticipated, namely spoofing, tampering, repudiation, information disclosure, denial of service, and elevation of privilege (STRIDE):

1. **Spoofing** is an exploitation of authentication to transfer ownership illegally. Formal verification of smart contracts must be done to prevent ownership leakage.
2. **Tampering** is a modification action on data that violates integrity. Metadata and ownership confirmed on blockchain technology cannot be changed. However, data stored outside blockchain technology can be manipulated in the form of file changes.
3. **Repudiation** is an illegal operation in the system where the system rejects or denies that an attack has occurred.
4. **Information disclosure.** The threat of information leakage occurs when information is exposed to unauthorized users, violating confidentiality. Information transparency in the scheme can be a gap that allows hackers to view information that should not be accessible or is not their right.
5. **Denial of Service (DoS) attacks normal network functions, making** servers unavailable to users as desired.
6. **Elevation of privilege** is a threat when certain parties obtain privileges they should not have. Thus, these parties can exploit access management to data, feature implementation, and operating systems related to file systems, such as the ability to cross directories. This threat can be prevented by formal verification through smart contracts.

Based on the influence test between IRFC and TRI, it was found that archivists' readiness has a positive and significant effect on blockchain adoption in managing digital archives. This indicates that individual readiness for change can influence the adoption process and archivists' intentions as users and decision-makers in the archival field to adopt blockchain in managing digital archives. The cognitive and affective readiness possessed by individuals will significantly affect as contributor constructs in supporting sub-variables optimism and innovativeness to adopt proposed new technology and also acting as an inhibitor construct as an anticipatory attitude in preventing discomfort and insecurity about the risks posed (Kamble, Gunasekaran & Arha, 2019; Razali, Muhamad, Ishak & Saad, 2021).

The results show that archivists' readiness based on cognitive and affective aspects simultaneously influences blockchain adoption in managing digital archives by 0.546. The indicators in the independent variables have provided the necessary information to predict the variation of the dependent variable by 54.6%. Meanwhile, the remaining 45.4% is influenced by other factors outside archivists' cognitive and affective readiness.

Conclusion

The adoption of blockchain technology is accelerating across various fields, particularly in areas that rely on archives as the backbone of their business processes and organizational functions. For archivists responsible for managing digital assets, staying informed about technological advancements such as blockchain and understanding its implications for archival practices is essential. With several countries already incorporating blockchain solutions, Indonesia will likely soon explore broader blockchain applications, particularly in managing digital archives. However, more research remains to be done precisely to examine the impact of blockchain adoption on the archival sector, especially concerning the readiness of archivists to adapt to this technology.

This study addresses this gap by evaluating how archivists' readiness influences the adoption of blockchain in managing digital archives in Indonesia. Using a quantitative approach, data were gathered from a random survey of 367 archivists across 22 ministries and 23 non-ministerial central government agencies, representing 75% of the population in these sectors. The findings indicate the readiness level among archivists for the digital archival transformation in Indonesia is exceptionally high, classified as "very good," with a remarkable total average score of 79.05. Respondents, primarily representing Generation Y and Z, demonstrate a profound familiarity with internet technology in their daily lives, thereby fostering a culture of openness to change. The rapid adaptability of Generation Y and Z to technological advancements renders them highly responsive to technological changes within their environment.

Regarding readiness for blockchain adoption in managing digital archives, it is rated as " good," with an average score of 71.06. Respondents' responses to the OPT and INV sub-variables (contributors/positive) garnered average scores. Most archivists in Indonesia express optimism regarding the opportunities presented by blockchain adoption in the archival domain. Similarly, respondents' answers on the DSC and ISC sub-variables (inhibitors/negative) also received favorable average scores. The elevated levels of discomfort (DSC) and insecurity (ISC) indicate that archivists in Indonesia understand the challenges they are likely to encounter should archival institutions adopt blockchain in managing digital archives.

This research successfully validates all proposed hypotheses. It reveals that archivists' readiness (X) significantly and positively influences the adoption of blockchain in managing digital archives (Y) simultaneously, with a coefficient of determination of 54.6%. Additionally, the results demonstrate the partial influence of sub-variable X on variable Y. The findings support the research by Mahendrati and Mangundjaya (2020) and Chen et al. (2017), which demonstrated that an individual's readiness to change impacts their readiness to adopt new technology. Consistent with Mahendrati and Mangundjaya (2020), this study also shows that the IRFC (Individual Readiness for Change) concept by Rafferty et al. (2013) influences the TRI (Technology Readiness Index) concept by Parasuraman & Colby (2015).

Cognitive readiness (X1) partially and significantly impacts the adoption of blockchain in managing digital archives (Y). This conclusion is supported by a regression coefficient analysis result of +0.735, suggesting that for every one-unit increase in cognitive readiness, there is a corresponding 0.735-unit increase in readiness for blockchain adoption in managing digital archives. This study found that the cognitive aspects of archivists' readiness, including knowledge, skills, and alignment of abilities, affect the adoption of blockchain for managing

digital NFT archives. This research adds knowledge mastery and skill dimensions measurements to the cognitive readiness sub-variable, reinforcing and supporting Ogbodoakum et al.'s (2022) findings. Ogbodoakum found that cognitive readiness, particularly in the attitude dimension, influences readiness for adopting new technology.

Similarly, affective readiness (X2) also partially and significantly influences the adoption of blockchain in managing digital archives (Y). Supported by a regression coefficient analysis result of +0.804, it indicates a positive and significant impact. This implies that for every one-unit increase in affective readiness, there is a corresponding 0.804-unit increase in readiness for blockchain adoption in managing digital archives. Overall, the accepted hypotheses underscore that the higher the level of archivists' readiness, encompassing both cognitive and affective aspects, the greater the readiness for blockchain adoption in managing digital archives in Indonesia.

Implications

Based on the research findings, archivists' cognitive and affective readiness influences the contributor and inhibitor constructs in adopting blockchain for managing digital archives in Indonesia. These research findings have practical implications for archival institutions in Indonesia to understand the opportunities and challenges they face in preparing their organizational ecosystems, especially regarding the readiness of archivists. There are four practical implications of this research:

1. The cognitive readiness of archivists in Indonesia affects their readiness for adopting blockchain in managing digital archives. The level of knowledge, skills, and alignment of archivists' abilities needs to be maintained to sustain optimism and innovativeness and anticipate discomfort and insecurity regarding the adoption of blockchain in managing digital archives in Indonesia. Archival institutions must equip archivists with knowledge and skills through regular digital literacy programs, open discussions regarding technological advancements in the archival domain, and fostering a digital culture in daily performance.
2. The affective readiness indicates that archivists in Indonesia have confidence that any technological changes occurring in the archival domain align with present and future needs, can adapt quickly to changes, and receive management support to ensure the success of technological changes. To maintain the practical readiness of archivists, which is already in the excellent category, archival institutions need to ensure that technology adoption is supported by adequate infrastructure, secure and reliable connectivity, and funding availability to support innovation and regulatory harmonization.
3. The OPT and INV sub-variables act as contributors, providing opportunities for archival institutions in Indonesia to adopt blockchain while considering the benefits and innovations in managing digital archives. The opportunities for benefits and innovation to be considered include collaboration and digital data-sharing processes, authenticity and credibility, and verification throughout the lifecycle of digital archives.
4. The DSC and ISC sub-variables act as inhibitors that need to be anticipated by archival institutions. Archivists express high levels of concern regarding the digital divide, illegal transactions, technical challenges, and privacy security. Therefore, the results of this research can serve as considerations for archival institutions to ensure the development of digital transformation capabilities, provision and equalization of infrastructure, cybersecurity, and

privacy awareness when deciding to adopt blockchain in the archival domain.

Recommendations

The findings from this analysis offer valuable insights for digital archives as they navigate the adoption of blockchain technology. Understanding the key influencing factors can aid archivists and policymakers in the archival field in seizing opportunities and addressing the challenges associated with blockchain adoption in archival institutions. Here are some comprehensive recommendations for archival institutions considering the adoption of blockchain:

1. **Identify potential benefits**. Archival institutions must thoroughly assess the potential benefits of blockchain technology for managing digital archives. This identification process is crucial to ensure that blockchain is adopted in a manner that aligns with organizational goals and requirements. Given the complex interoperability needs of government agencies, segmenting the adoption process can help gauge the complexity of integrating blockchain into the archival landscape. Proper adoption of blockchain promises not only institutional benefits but also efficiency gains in enhancing archivists' performance.
2. **Ensure long-term vision and commitment**. To foster readiness for adopting beneficial technology like blockchain, archival institutions must cultivate a culture of long-term vision, responsibility, and optimal resource management. Management support is pivotal in achieving this readiness, as it encompasses navigating new regulatory requirements, acquiring and integrating resources, reengineering business processes, establishing information exchange systems, and developing new skills and competencies.
3. **Address discomfort and insecurity**: It's essential to acknowledge and address archivists' discomfort (DSC) and insecurity (ISC) regarding the risks associated with adopting blockchain in managing digital archives. By fostering an environment where individuals feel optimistic, innovative, and supported, archival stakeholders can enhance readiness for embracing new technologies like blockchain. Proactively addressing discomfort and insecurity surrounding blockchain adoption will enable stakeholders to make informed decisions and be prepared for change.
4. **Evaluate benefits against established archival science**: While considering the adoption of blockchain for long-term digital archive management, archival institutions should balance the benefits of this technology with the fundamental principles of established archival science. Cognitive and affective readiness among stakeholders is crucial for navigating the opportunities and challenges associated with blockchain adoption. Embracing an adaptive mindset towards learning and planning for new technologies is essential for successful blockchain adoption in archival institutions.
5. **Provide detailed explanations and guidelines**: Detailed explanations regarding security policies and procedures related to the risks and challenges of blockchain adoption are paramount. These guidelines ensure that archivists are well-equipped to address potential security concerns and navigate the complexities of blockchain technology. By providing comprehensive guidance, archival institutions can maintain archivist readiness and foster a smooth transition towards blockchain adoption in managing digital archives.

This study has several limitations that underscore the need for further research into

blockchain adoption in digital archival management. Primarily, it focused solely on individual readiness within the change management theory, neglecting the influence of organizational readiness. Future research could enhance this perspective by incorporating organizational factors, such as organizations' commitment and belief, to create a more holistic understanding of change management. Moreover, the study's sample was limited to national-level archivists in ministries and non-ministerial government agencies, which restricts the applicability of the findings across different contexts. Expanding future research to include regional archivists could yield a more comprehensive understanding, as variations in access to information and technology across regions may significantly impact readiness. Furthermore, examining archivist work groups within institutions actively adopting blockchain technology could reveal practical insights into the challenges and successes faced during this transition.

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