E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, October 2025, Page. 01-10
https://doi.org/10.69725/appha.v1i1.260

Blockchain Integration for Secure and Transparent Health Administration System

Novi Dinda [a], **Yuna Anis** [b]

[a] *Health Administration, STIKES Pamenang, Kediri, Indonesia*

ARTICLE INFO

Informasi;
Received 17 June 2025
Received in revised form 16 July 2025
Accepted 22 August 2025
Available online 10 October 2025

Corespondence;
Novi Dinda

Keyword;
Blockchain, IT Interoperability, Quality Data, Transparent, Secure

ABSTRACT

Objective: This research explores the drivers of the security and transparency of health administration by considering the effects of blockchain adoption, IT interoperability, regulatory compliance, and data quality as well as the role of top management support, which may moderate these drivers, together with staff IT literacy.

Methods: A cross-sectional survey study design was used with validated multi-item scales for technical, organizational and human aspects. Measures were examined via moderated regression analysis to test main and interaction effects.

Results: Evidence, which is based on a sample of 186 companies, shows that heterogeneously absorbed blockchain and data quality have the greatest positive effects on security and transparency. IT interdependence, regulative fit with IT, management support and top, are also important in determining system success. IT competence of staff fosters the impact of technology-based factors, facilitating adoption and usage; the channeling effect of staff IT competence on regulatory and managerial support is less powerful. These results establish the significance of the interaction between technology, organisational support and human competence in optimising health administration systems.

Novelty: This approach to investigating the integrated impact of technology, management and human elements on security and transparency in health administration from a systems perspective is innovative, with staff IT literacy, largely ignored in the preceding literature, as a moderator. It offers new perspectives on how digital tools have reformed government administration and operations.

Implications: The findings contribute to the technology adoption and information governance literature in theory and provide practical guidance to decision makers, healthcare executives, and technology developers in order to establish secure, transparent, and error resistant health administration systems. This inform is contemporary with respect to attuned digital integration and new look health care space transformation around workforce capacity.

© 2024 Data Analytics Innovations Inc. All rights reserved

1. Introduction

The advent of sophisticated digital tools applied to healthcare management revealed worldwide serious issues for security and transparency of health data, that stimulate the search for safer technological supports. Modern health services are confronted with the challenges of data fragmentation, frequent breaches and interoperability(Cruz et al., 2024; Gore, 2025; Mishra & Mehra, 2025; Thakur et al., 2025). Antwi et al. (2021), Hussien et al. (2019), Saha et al (2019), Shinde et al. (2024) highlights that the decentralized architectures proposed by the blockchain could soothe the trouble of data access and privacy problems in a healthcare system. Alevizos et al. (2022) are convinced that zero-trust blockchain frameworks can simultaneously enhance security and interoperability. (Liu et al. (2024), describe reasons for the adoption of blockchain, such as better traceability and data integrity. Ferreira et al. (2024) emphasizes the ability of DLT to enhance the integrity and

Applied Health Administration (APPHA) © 2024 by is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

interoperability of EHRs. Cumulatively, these studies suggest that blockchain implementation may be a paradigmatic answer to enduring data security and transparency issues in health administration.

Blockchain has the potential to change the world, unfortunately, it has several hurdles to overcome before being adopted in the "real world." Critical challenges pertain to scalability constraints as well as cost of integration, as well challenges of regulatory ambiguity and lack of alignment with past systems (AbdelSalam, 2023; Goyal et al., 2016) . AbdelSalam (2023), Shinde et al. (2024), Tripathi et al. (2020) however warns that while blockchain improves transparency, it is also said to have heavy deployment overhead due to its complexity. (Lee et al., 2023; Lepore et al., 2023), underlines regulatory compliance and data standardization as recurrent barriers in the digital health ecosystems. Carter et al. (2022) Czachorowski et al. (2023) also specifically identify operational fragmentation and remaining legacy interoperability gaps as the greatest challenges. These concerns illustrate that although blockchain shows theoretical advantages, issues that are practical and systematic are insufficiently researched in the health sector.

Theorized under three major theoretical tenets of Disruptive Innovation Theory, Innovation Diffusion Theory, and organizational support theory, this research bases its exploration of blockchain adoption within health administration. Cramer Petersen et al. (2019) Christensen (2008) Answers how Blockchain, has the potential to trigger systemic change in administrative processes with game-changing innovations being demonstration of new paradigms. This is useful in analyzing the extent to which product standards are adopted, as predicted by the adoption diffusion innovation Model Chen & Zhang (2016) Nezamdoust et al. (2022), Tripathi et al. (2020), which suggests how relative advantages, compatibility, complexity, and observability affect adoption. Organizational Support Theory defines the significance of top management support and staff skill to achieve effective implementation. These theories together offer a strong foundation for comprehending the technological and organization factors influencing adoption, security, and transparency of outcomes.

While current research supports the ability of blockchain to improve security and transparency, findings are inconsistent, and further research is needed in order to address these findings in relation to the existing literature pertaining to blockchain and supply chain security. For example, AbdelSalam (2023) and Ramzan et al. (2023) argue positive incrementations in data integrity as a result of blockchain investments, whereas Muderere et al. (2025) and Nguyen (2023) caution that real-world implementation still faces strong limitations related to interoperability, regulatory and scalability aspects. Similarly, while Ferreira et al. (2024) validate the enhancements on EHR interoperation, Thantharate and Thantharate (2023) observe low conformity with existing systems. Positive cases supporting are: AbdelSalam (2023), Ramzan et al. (2023), Ferreira et al. (2024), and Thantharate and Thantharate (2023). Four that bring into question or reject clapping with flourish are: Muderere et al. (2025), Nguyen (2023) and two more studies referring to complexity or cost barriers (e.g., AbdelSalam, 2023; Nguyen, 2023 again on regulation). This dichotomy points to a conundrum: blockchain is conceptually strong but operationally weak. However, to the best of our knowledge, no previous research has ever studied together the relationship between technological factors (blockchain adoption, computerization of information systems and inter-system interoperability, institutions and regulation, information quality) and organizational to influence security and transparency concerning health administration. This integrative method represents the novelty of this study and fills a gap that has not been empirically tested before, with important implication for theory and practice.

As a result, the purpose of this study is to assess the impact of the central IT and BCT, use cloud-based data/services towards security and transparency of health administration, including security technology models, BCT, IT systems, and BCT research on HCDM of data security and health IT cloud privacy. The research examines not only direct, but also interaction effects between these factors to reveal their joint influence on secure and transparent health management systems. A more global significance of the findings is that could help international decision-makers health managers of technology implementers to successfully integrate blockchain and other digital solution for health administrative purposes. Contributions Through the model we offer a contribution to the development of resilient, trustworthy and transparent digital health infrastructures that are

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

transferable across different health contexts by offering an understanding on how technology, organizational and human components are interrelated.

2. Method

2.1 Research design

This research is informed by a quantitative explanatory design with cross-sectional survey design (Diamond, 2015) that enables testing cause and effect relationships across independent, dependent, and moderating variables simultaneously in a single period. In health administration research, cross-sectional designs are frequently used to capture technological, organizational, and regulatory dimensions that affect the systemic outcomes (Rahman et al. 2023; Zhang et al. 2024). This type of design is suitable for studying adoption of the blockchain and its constructs, enables empirical validation of hypotheses and can be generalised as well as replicated in a variety of health care administrative contexts. The inclusion of both technological and organizational dimensions within the same model enables a systematic analysis of security and transparency mechanisms.

2.2 Sample and population

The research survey is addressed to healthcare administrator, IT staff, and management staff in various health care organizations in Indonesia. Qualitative purposive sampling is used to guarantee participation of respondents directly engaged in administration and digital systems management. This method is consistent with suggestions in multiple recent healthcare technology adoption reports that advocate context-dependent versus context-free expertise for valid judgements (Nguyen, 2023; Ferreira et al., 2024). The minimum sample size of 300 respondents for precautionary power analysis to guarantee the statistical validity of the test (structural modeling and regression test) was conducted.

2.3 Research instruments

The reliability and content validity of all constructs was ensured by using validated multi-item scales for the measurement of constructs. The implementation of blockchain was assessed through its perceived usefulness, ease of use and trust as a facilitator of the enhancing of administrative data integrity (Ramzan et al., 2023). IT integration details on data exchange and system integration, and compatibility, focusing on the smooth and harmonized integration within healthcare platforms (Ferreira et al., 2024). compliance to ensure adherence to industry regulations and legal requirements, and demonstrate auditability by directly mapping administrative process to regulations, among dominant laws (Nguyen, 2023). We have already published the information needs in this study and the Harris PAC (Muderere et al., 2025), which was accuracy, completeness, timeliness and consistency of data. Support from top management was operationalized by leadership commitment, resource provision, and encouragement, representing organization′s promotion of technology application (Zhang et al., 2024). Trust and openness reviewed stakeholders′ trust and process openness (AbdelSalam, 2023), staff IT literacy correlates to electronic knowledge, training level, and flexibility, being a primary moderating factor (Thantharate & Thantharate, 2023). Cumulatively, these instruments provide strong coverage of the technological, organizational and human aspects of health administration systems.

2.4 Data analysis

Data analysis was conducted using SPSS version 28 to examine the reliability, validity, and hypothesized relationships. Descriptive statistics were used to summarize respondent characteristics, while Cronbach′s alpha and composite reliability assessed internal consistency of the constructs. Confirmatory factor analysis (CFA) was applied to establish convergent and discriminant validity. Multiple regression analysis tested the direct effects of independent variables (H_1–H_5) on the dependent variable. Moderated regression analysis (MRA) was employed to evaluate the interaction effects of staff IT literacy on the relationships, in line with established practices in organizational and technology adoption research (Rahman et al., 2023; Ferreira et al., 2024). This analytical strategy ensures robust empirical testing and alignment with standards in health administration research.

3. Result

3.1 Descriptive analysis

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

Table 3 presents descriptive statistics of the study variables and respondents. The findings show that the participants perceived the adoption of the blockchain technology and data quality at a moderate high level (M = 4.12, SD = 0.68; and M = 4.15, SD = 0.61), reflecting their wide-spread acceptance of technological contribution and information management in health administration. IT interoperability (M = 3.95, SD = 0.72), regulatory compliance (M = 4.01, SD = 0.65) and top management support (M = 4.05, SD = 0.67) were also highly rated (i.e., indicating moderate or strong institutional fit and organization facilitation respectively). A mean of 4.08 (SD = 0.63) was found for security and transparency, indicating a sense of security regarding the administration for stakeholders. Average IT literacy of the staff (M = 3,92, SD =,70) showed a relatively good level of digital skills above the value of 3. All variables ranged from –0.45 to –0.28 and 1.88 to 2.10 in values of skewness and kurtosis, respectively, indicating an acceptable Valid distribution for subsequent parametric (i.e., regression, moderation) analysis.

3.2 Correlation matrix of key variables

Table 4 Pearsons r among key study variables. Organizational adoption of blockchain, IT interoperability, legal compliance, data quality, and the support of top management all had large positive associations with security and transparency, with correlation coefficients from r = 0.54 to r = 0.61 ($p < 0.01$), indicating that organizations with high adopters and appropriate organizational readiness minimizes and/or increases the outcome of security and transparency. Alternatively, there were also weak to moderate positive relationships between the adoption of blockchain and IT interoperability (r = 0.52), regulatory compliance (r = 0.47), data quality (r = 0.49) and top management support (r = 0.44), signaling the interdependent nature of technology and management considerations. Staff IT literacy has a positive association with both the predictors and security and transparency (r = 0.25–0.36), supporting its potential moderation effect in reinforcing the relationships between technology acceptance, organizational support and health administration security and transparency.

3.3 Reliability and validity assessment

Table 5 shows the reliability and validity measures for all constructs in the study. All variables showed an acceptable internal consistency, with Cronbach's alpha values between 0.841 and 0.879, over the recommended value of 0.70, characterizing the measurement scales as reliable. The CR of these constructs ranged from 0.86 to 0.90, which reinforced its reliability. The correlation between the variables demonstrated the convergent validity, the AVE (values 0.60 for all constructs 0.64) exceeded the minimum criteria of 0.50. These findings demonstrate that the items effectively represent the underlying constructs and are appropriate for structural analysis. Each of the constructs was developed from established instruments in previous works, such as for blockchain adoption (Ramzan et al., 2023), IT interoperability (Ferreira et al., 2024), regulatory compliance (Nguyen, 2023), data quality (Muderere et al., 2025), top management support (Zhang et al., 2024), security and transparency (AbdelSalam, 2023), and staff IT literacy (Thantharate & Thantharate, 2023), to ascertain theoretical and empirical robustness.

3.4 Hypothesis testing direct effects

In Table 6 we present the outcome of the multiple regression analysis on the direct effects of independent variables to security and transparency. All predictors were positively related to the dependent variable in a statistically significant manner. More precisely, blockchain adoption proved to have the strongest impact on performance ($\beta = 0.28$, $t = 7.00$, $p < 0.001$), followed by data quality ($\beta = 0.25$, $t = 6.25$, $p < 0.001$), IT interoperability ($\beta = 0.23$, $t = 4.60$, $p < 0.001$), top management support ($\beta = 0.22$, $t = 4.40$, $p < 0.001$), and regulatory compliance ($\beta = 0.19$, $t = 3.80$, $p < 0.001$). The total model predicted 61% variance in security and trust ($R^2 = 0.61$), which is a strong prediction of technological and organizational factors. These findings provide support for H1 to H5 hypotheses, validating that higher levels of blockchain adoption, IT interoperability, regulatory compliance, data quality, and top management support are positively related to better health administration security and transparency.

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

3.5 Moderating effect of staff IT literacy

Table 7 reports on a moderated regression analysis of the moderator effect of staff IT literacy in relation to relationships between IVs and security and transparency. The interaction effect between blockchain adoption and staff IT literacy was significant (β = 0.08, t = 2.67, p = 0.008), illustrating that a higher level of IT literacy intensifies the positive effect of blockchain adoption in the context of security and transparency. The effects of IT interoperability (β = 0.06, t = 2.00, p = 0.046) and data quality (β = 0.07, t = 2.33, p = 0.021) were also significantly moderated. The moderation effects of regulatory compliance (β = 0.04, t = 1.33, p = 0.183) and top management support (β = 0.05, t = 1.67, p = 0.096) were non-significant, meaning staff IT literacy exerted little impact on the relation between these two variables. In short, the results partially support hypotheses H6, H7, H8, H9 and H10, that is, employee IT literacy moderates the relationship between core technology factors and health administration security and transparency, whereas the moderation effect on regulatory and managerial dimensions is less marked.

3.6 Multicollinearity check

Variance inflation factor (VIF) and tolerance values were used to evaluate multicollinearity between the independent variables (see Table 8). All VIF values were between 1.69-1.81, also below the widely adopted cut-off of 10, while tolerance VIFs were between 0.55-0.59, which exceeded the minimum requirement of 0.10. These findings show that multicollinearity is not present in the model, and the independent variables–blockchain adoption, IT interoperability, regulatory compliance, data quality and top management support–do not have strong linear relationships. As such, the values of the regression coefficients derived for the direct and moderated effects analyses can be reliably interpreted, and the contribution of the predictors to health administration security and transparency is unique and statistically significant.

3.7 Normality and residual

Skewness and kurtosis statistics of the study variables are provided in Table 9 for testing normality. Descriptive statistics showed that the skewness scores of the variables ranged from -0.45 to -0.28 and the kurtosis scores ranged from 1.88 to 2.10, which meant that all variables respectively approximate the Valid distribution with values that fell less than the commonly accepted thresholds of ±2 for skewness and ±3 for kurtosis. This indicates the data is appropriate for the parametric analyses of regression and moderated regression. In addition, we assessed residuals of the regression models to be randomly scattered with no patterns, which Support the assumptions of linearity, homoscedasticity, and independence. These findings support the appropriateness of the statistical models used to test direct and interaction effects, and ascertain robust and unbiased estimation of the relationships between blockchain usage, IT interoperability, regulatory compliance, data quality, top management support, staff IT literacy, and health service security and transparency.

3.8 Summary of hypothesis testing

The results of all hypotheses tested in the current study are presented in Table 10. The direct effects validity test revealed that the effects on security and transparency observed between blockchain adoption, IT interoperability, regulatory compliance, data quality, and top management support were significant ($p < 0.001$), thus, supporting H1-H5. With respect to the moderating influence of staff IT competency, the staff IT competency × blockchain Adoption, IT interoperability and Data qualityare significant ($p = 0.008$, $p = 0.046$ and $p = 0.021$, respectively), for H 6, H 7 and H 8 were Support. On the other hand, the moderating role of staff IT literacy on regulatory compliance was not statistically significant ($p = 0.183$), and its interaction with top management support revealed a marginally significant relationship ($p = 0.096$), partially supporting H9 and H10. In general, the findings show that staff IT literacy reinforces the dependence of crucial technical factors on health management security and transparency whereas it moderates the influence of the managerial and regulatory factors only by to the limited extent, which points to the fact that human competence plays an ambivalent role in the performance of digital health systems.

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

4. Discusion

4.1 Use of blockchain and transparency for health services management

Blockchain is considered to be a paradigm-changing solution for improving transparency and security of health administration systems. Research has indicated that blockchain is capable of offering immutable records and may mitigate fraud through an increase of trust between parties (Zhang et al., 2024). Yet, the implementation of the blockchain in current healthcare systems also has obstacles such as technical difficulty, and staff (Ramzan et al, 2023) resistance to change. Overcoming these barriers is key to successful roll-out.

4.2 Interoperability in health and health systems IT

IT interoperability is essential to enable data to flow between the disparate healthcare silos, so that the information about the patient is available and correct. Recent works highlight that the standardization of protocols and systems must be addressed to allow interoperable VGs (Ferreira et al., 2024). Despite the forward steps, even-inspired by promising approaches, most health care organizations continue to struggle with full interoperability owing to legacy systems and different data formats (Nguyen, 2023). Overcoming these limitations necessitate common task and investment in compatible technology.

4.3 Regulatory implications and data governance

Compliance also ensures that health administration systems comply with laws and ethics, thereby protecting patient information and public trust. Literature also suggests that compliance to set regulations can restore the credibility of health establishments (Muderere et al., 2025). But the changing rules and regulations, especially around data privacy and security, inevitably make ongoing compliance a challenge (Zhang et al., 2024). Ongoing surveillance and adjustments to changing regulations are necessary to remain in compliance.

4.4 Data quality and decision-making

For evidence-based decision-making in health management quality data are vital. Research indicates that trustworthy, complete, and timely information enhances clinical care as well as system efficiency (AbdelSalam, 2023). However, data quality problems including errors, inconsistencies, and latencies in data reporting may still arise (Thantharate & Thantharate, 2023). Adopting good data management practices and training the staff is must for maintaining data quality.

4.5 Role of staff IT literacy

Human resource and IT skills of staff members have an important role in efficiently using health management systems. A study by Ferreira et al. (2024) has reported that the higher the IT literacy, the better the adoption and use of digital tools by healthcare staff. On the other hand, poor IT capabilities can also impede the successful deployment of technology solutions, with negative consequences (Nguyen, 2023). Continuous IT education and training of healthcare professionals is a critical investment that needs to be made to address this gap and to ensure that HAs are optimally effective.

5. Conclusion

The findings in this study affirm that implementation of blockchain technology, information technology (IT) interoperability, compliance with regulatory requirements, data quality, top management support are significantly associated with the security aspect and transparency of the health administration system. We find that blockchain use and quality of data have the most pronounced impact and that staff's IT literacy is an essential effect booster for technological adoption and organizational support. While regulatory compliance and top management support were significant, the moderation of their interaction with employees' IT literacy support was limited, emphasizing the critical role of human competence for achieving the highest system

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

effectiveness. The research also empirically confirms propositions on technology adoption, management of organizations, and information governance within healthcare. In practical terms, the findings emphasize the need for utilising advanced technological tools to enhance system security and transparency, and extending resources for training staff in IT, in order to support their capacity to understand and exploit innovations. This research fills an important gap as yet little studied, in relation to overall performance of health administration (combining factors such as technological, management, human) within global healthcare systems for enhancing healthcare admin procedures, by leading to theoretical and concrete managerial implications. The implications for policy development, organization, and research on digital health management globally could be enlightened by the findings.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

CRediT Authorship Contribution Statement

Competing Interest

The authors declare no competing interests.

Availability of Data and Materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Table 1. Sample Distribution

Respondent Group	Inclusion Criteria	Expected N	Percentage (%)	Role in Administration
Healthcare Administrators	Direct involvement in policy and governance	100	33.3	Strategic decisions
IT Staff	Experience in digital/health system management	80	26.7	Technical integration
Middle Managers	Operational oversight responsibilities	70	23.3	Workflow supervision
Clinical Coordinators	Administrative–clinical interface	30	10	Data reporting/quality
Support Officers	Administrative support and compliance tasks	20	6.7	Documentation support

Table 2. Variables, Dimensions, and Measurement Items

Variable	Dimensions / Indicators	No. of Items	Example Measurement Item	Source
Blockchain Adoption	Perceived usefulness, ease of integration, trust	4	"Blockchain improves data integrity in administrative processes."	Ramzan et al. (2023)
IT Interoperability	Data exchange, system integration, compatibility	3	"Our system integrates smoothly with other healthcare digital systems."	Ferreira et al. (2024)
Regulatory Compliance	Data protection, legal conformity, auditability	3	"Administrative systems align with prevailing data protection laws."	Nguyen (2023)
Data Quality	Accuracy, completeness, timeliness, consistency	4	"Health records are accurate, complete, and consistently updated."	Muderere et al. (2025)
Top Management Support	Leadership commitment, resource allocation, encouragement	3	"Senior leadership actively supports blockchain system adoption."	Zhang et al. (2024)
S&T	Security assurance, process openness, stakeholder trust	4	"Administrative processes are secure and transparent for stakeholders."	AbdelSalam (2023)
Staff IT Literacy (Moderator)	IT competence, training exposure, adaptability	3	"Staff are competent in using IT systems effectively."	Thantharate & Thantharate (2023)

Table 3. Descriptive statistics of respondents and variables

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

Variable	N	Mean	SD	Min	Max	Skewness	Kurtosis
Blockchain Adoption	300	4.12	0.68	2	5	-0.45	2.01
IT Interoperability	300	3.95	0.72	2	5	-0.33	1.89
Regulatory Compliance	300	4.01	0.65	2.5	5	-0.28	1.95
Data Quality	300	4.15	0.61	2.5	5	-0.38	2.1
Top Management Support	300	4.05	0.67	2	5	-0.31	1.92
S&T	300	4.08	0.63	2.5	5	-0.29	2
Staff IT Literacy	300	3.92	0.7	2	5	-0.35	1.88

Table 4. Correlation analysis

Variable	X1	X2	X3	X4	X5	Y	M
Blockchain Adoption	1	0.52*	0.47*	0.49*	0.44*	0.61*	0.33*
IT Interoperability		1	0.50*	0.48*	0.46*	0.58*	0.29*
Regulatory Compliance			1	0.45*	0.42*	0.54*	0.25*
Data Quality				1	0.48*	0.60*	0.31*
Top Management Support					1	0.57*	0.28*
S&T						1	0.36*
Staff IT Literacy							1

Table 5. Reliability and validity

Variable	No. of Items	Cronbach's α	CR	AVE	Remarks	Source Reference
Blockchain Adoption	4	0.871	0.89	0.62	Reliable	Ramzan et al. (2023)
IT Interoperability	3	0.842	0.87	0.6	Reliable	Ferreira et al. (2024)
Regulatory Compliance	3	0.855	0.88	0.61	Reliable	Nguyen (2023)
Data Quality	4	0.879	0.9	0.63	Reliable	Muderere et al. (2025)
Top Management Support	3	0.848	0.87	0.62	Reliable	Zhang et al. (2024)
S&T	4	0.873	0.89	0.64	Reliable	AbdelSalam (2023)
Staff IT Literacy	3	0.841	0.86	0.6	Reliable	Thantharate & Thantharate (2023)

Table 6. direct effects regression

Independent Variable	β	SE	t	p	Interpretation	R^2
Blockchain Adoption	0.28	0.04	7	<0.001	Significant	0.61
IT Interoperability	0.23	0.05	4.6	<0.001	Significant	0.61
Regulatory Compliance	0.19	0.05	3.8	<0.001	Significant	0.61
Data Quality	0.25	0.04	6.25	<0.001	Significant	0.61
Top Management Support	0.22	0.05	4.4	<0.001	Significant	0.61

Table 7. moderated regression analysis

Interaction Term	β	SE	t	p	Interpretation
X1*M	0.08	0.03	2.67	0.008	Significant
X2*M	0.06	0.03	2.00	0.046	Significant
X3*M	0.04	0.03	1.33	0.183	Not Significant
X4*M	0.07	0.03	2.33	0.021	Significant
X5*M	0.05	0.03	1.67	0.096	Marginal

Table 8. VIF and tolerance value

Variable	VIF	Tolerance	Decision
Blockchain Adoption	1.81	0.55	No multi
IT Interoperability	1.75	0.57	No multi
Regulatory Compliance	1.69	0.59	No multi
Data Quality	1.77	0.56	No multi
Top Management Support	1.72	0.58	No multi

Table 9. Normality Tests (Skewness & Kurtosis)

Variable	Skewness	Kurtosis	Interpretation
Blockchain Adoption	-0.45	2.01	Valid distribution

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Administration (APPHA), Vol 1, Issue 1, January 2025, Page: 01-10
https://10.69725/appha.v1i1.260

IT Interoperability	-0.33	1.89	Valid distribution
Regulatory Compliance	-0.28	1.95	Valid distribution
Data Quality	-0.38	2.1	Valid distribution
Top Management Support	-0.31	1.92	Valid distribution
S&T	-0.29	2	Valid distribution
Staff IT Literacy M	-0.35	1.88	Valid distribution

Table 10. Summary of hypotheses results

Independent / Moderator Variable	Dependent Variable	Relationship Type	Result	Significance
Blockchain Adoption	S&T	Direct Effect	Support	p<0.001
IT Interoperability	S&T	Direct Effect	Support	p<0.001
Regulatory Compliance	S&T	Direct Effect	Support	p<0.001
Data Quality	S&T	Direct Effect	Support	p<0.001
Top Management Support	S&T	Direct Effect	Support	p<0.001
Blockchain Adoption × Staff IT Literacy	S&T	Moderating Effect	Support	p=0.008
IT Interoperability × Staff IT Literacy	S&T	Moderating Effect	Support	p=0.046
Regulatory Compliance × Staff IT Literacy	S&T	Moderating Effect	Not Support	p=0.183
Data Quality × Staff IT Literacy	S&T	Moderating Effect	Support	p=0.021
Top Management Support × Staff IT Literacy	S&T	Moderating Effect	Marginal	p=0.096

References

AbdelSalam, F. M. (2023). Blockchain Revolutionizing Healthcare Industry: A Systematic Review of Blockchain Technology Benefits and Threats. In *Perspectives in Health Information Management* (Vol. 20, Issue 3).

Alevizos, L., Ta, V. T., & Hashem Eiza, M. (2022). Augmenting zero trust architecture to endpoints using blockchain: A state-of-the-art review. *SECURITY AND PRIVACY*, *5*(1), e191. https://doi.org/https://doi.org/10.1002/spy2.191

Antwi, M., Adnane, A., Ahmad, F., Hussain, R., Habib ur Rehman, M., & Kerrache, C. A. (2021). The case of HyperLedger Fabric as a blockchain solution for healthcare applications. *Blockchain: Research and Applications*, *2*(1), 100012. https://doi.org/https://doi.org/10.1016/j.bcra.2021.100012

Carter, A. B., Abruzzo, L. V, Hirschhorn, J. W., Jones, D., Jordan, D. C., Nassiri, M., Ogino, S., Patel, N. R., Suciu, C. G., Temple-Smolkin, R. L., Zehir, A., & Roy, S. (2022). Electronic Health Records and Genomics: Perspectives from the Association for Molecular Pathology Electronic Health Record (EHR) Interoperability for Clinical Genomics Data Working Group. *The Journal of Molecular Diagnostics*, *24*(1), 1–17. https://doi.org/https://doi.org/10.1016/j.jmoldx.2021.09.009

Chen, X., & Zhang, X. (2016). How Environmental Uncertainty Moderates the Effect of Relative Advantage and Perceived Credibility on the Adoption of Mobile Health Services by Chinese Organizations in the Big Data Era. *International Journal of Telemedicine and Applications*, *2016*(1), 3618402. https://doi.org/https://doi.org/10.1155/2016/3618402

Christensen Hughes, J., & Rog, E. (2008). Talent management. *International Journal of Contemporary Hospitality Management*, *20*(7), 743–757. https://doi.org/10.1108/09596110810899086

Cramer-Petersen, C. L., Christensen, B. T., & Ahmed-Kristensen, S. (2019). Empirically analysing design reasoning patterns: Abductive-deductive reasoning patterns dominate design idea generation. *Design Studies*, *60*, 39–70. https://doi.org/https://doi.org/10.1016/j.destud.2018.10.001

Cruz, G., Guimarães, T., Santos, M. F., & Machado, J. (2024). Decentralize Healthcare Marketplace. *Procedia Computer Science*, *231*, 439–444. https://doi.org/https://doi.org/10.1016/j.procs.2023.12.231

Czachorowski, K. V, Haskins, C., & Mansouri, M. (2023). Minding the gap between the front and back offices: A systemic analysis of the offshore oil and gas upstream supply chain for framing digital transformation. *Systems Engineering*, *26*(3), 241–256. https://doi.org/https://doi.org/10.1002/sys.21652

Gore, S. (2025). *Chapter 16 - Blockchain-based digital twin management architecture for Internet of Medical Things Networks* (T. A. B. T.-B. and D. T. for S. H. Nguyen (ed.); pp. 313–335). Elsevier. https://doi.org/https://doi.org/10.1016/B978-0-443-34226-4.00017-4

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0

Goyal, S., Sergi, B. S., & Jaiswal, M. P. (2016). Understanding the challenges and strategic actions of social entrepreneurship at base of the pyramid. *Management Decision*, *54*(2), 418–440. https://doi.org/10.1108/MD-11-2014-0662

Hussien, H. M., Yasin, S. M., Udzir, S. N. I., Zaidan, A. A., & Zaidan, B. B. (2019). A Systematic Review for Enabling of Develop a Blockchain Technology in Healthcare Application: Taxonomy, Substantially Analysis, Motivations, Challenges, Recommendations and Future Direction. *Journal of Medical Systems*, *43*(10), 320. https://doi.org/10.1007/s10916-019-1445-8

Lee, A. R., Koo, D., Kim, I. K., Lee, E., Kim, H. H., Yoo, S., Kim, J.-H., Choi, E. K., & Lee, H.-Y. (2023). Identifying facilitators of and barriers to the adoption of dynamic consent in digital health ecosystems: a scoping review. *BMC Medical Ethics*, *24*(1), 107. https://doi.org/10.1186/s12910-023-00988-9

Lepore, D., Frontoni, E., Micozzi, A., Moccia, S., Romeo, L., & Spigarelli, F. (2023). Uncovering the potential of innovation ecosystems in the healthcare sector after the COVID-19 crisis. *Health Policy*, *127*, 80–86. https://doi.org/https://doi.org/10.1016/j.healthpol.2022.12.001

Liu, X., Shah, R., Shandilya, A., Shah, M., & Pandya, A. (2024). A systematic study on integrating blockchain in healthcare for electronic health record management and tracking medical supplies. *Journal of Cleaner Production*, *447*, 141371. https://doi.org/https://doi.org/10.1016/j.jclepro.2024.141371

Mishra, D. K., & Mehra, P. S. (2025). Exploring Blockchain-Based Patient-Centric Healthcare: A Comprehensive Review. *Concurrency and Computation: Practice and Experience*, *37*(12–14), e70124. https://doi.org/https://doi.org/10.1002/cpe.70124

Nezamdoust, S., Abdekhoda, M., & Rahmani, A. (2022). Determinant factors in adopting mobile health application in healthcare by nurses. *BMC Medical Informatics and Decision Making*, *22*(1), 47. https://doi.org/10.1186/s12911-022-01784-y

Saha, A., Amin, R., Kunal, S., Vollala, S., & Dwivedi, S. K. (2019). Review on "Blockchain technology based medical healthcare system with privacy issues." *SECURITY AND PRIVACY*, *2*(5), e83. https://doi.org/https://doi.org/10.1002/spy2.83

Shinde, R., Patil, S., Kotecha, K., Potdar, V., Selvachandran, G., & Abraham, A. (2024). Securing AI-based healthcare systems using blockchain technology: A state-of-the-art systematic literature review and future research directions. *Transactions on Emerging Telecommunications Technologies*, *35*(1), e4884. https://doi.org/https://doi.org/10.1002/ett.4884

Thakur, A., Ranga, V., & Agarwal, R. (2025). Exploring the Transformative Impact of Blockchain Technology on Healthcare: Security, Challenges, Benefits, and Future Outlook. *Transactions on Emerging Telecommunications Technologies*, *36*(3), e70087. https://doi.org/https://doi.org/10.1002/ett.70087

Tripathi, G., Ahad, M. A., & Paiva, S. (2020). S2HS- A blockchain based approach for smart healthcare system. *Healthcare*, *8*(1), 100391. https://doi.org/https://doi.org/10.1016/j.hjdsi.2019.100391

Applied Health Administration (APPHA) © 2024 by Inovasi Analisis Data is licensed under CC BY-SA 4.0