

Blockchain-Powered Decentralisation: A New Era of Public Governance

Gideon Mekonnen Jonathan

Department of Computer and Systems Sciences (DSV), Stockholm University, Borgarfjordsgatan 12, SE-16455 Kista, Sweden

Abstract

Decentralisation, a public governance model known for its potential to enhance efficiency and public value creation, can be facilitated through digital transformation, particularly by making use of blockchain technology. Research in the information systems and public administration domains has shown that blockchain's distributed ledger systems enable transparent, tamper-resistant record-keeping and automated processes via smart contracts, reducing the need for centralised control. However, despite its promises, the adoption of blockchain in public organisations has been slow, with empirical studies yielding mixed results regarding its impact on organisational performance. This study investigated to explore whether blockchain-enabled digital transformation can facilitate decentralised public governance and subsequently improve organisational performance. Employing a mixed-methods research strategy—literature review, case study, and survey—the paper identifies and ranks critical factors that influence the relationship between blockchain-driven digital transformation and organisational performance.

Keywords

Blockchain, Decentralisation, Digital transformation, Public governance, Public value, Processes

1. Introduction

Digital transformation, which refers to “a fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity [i.e., an organisation, a business network, an industry, or society] and redefine its value proposition for its stakeholders” [1, p. 12] has been one of the topics that garnered the attention of researchers and practitioners alike. Even though the private sector has been in the forefront in the adoption of emerging technologies with the aim of radically altering business models and improving value propositions to their customers, organisations in the public sector are under pressure to embark their own transformation journey. In fact, in the past few decades, digital transformation has emerged as an essential means of improving the public service delivery, operational efficiency, transparency, and citizen engagement.

Digital transformation of the public sector has most recently become one of the top agenda for many governments seeking to enhance public service delivery through the adoption of advanced

Companion Proceedings of the 17th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modeling Forum, M4S, FACETE, AEM, Tools and Demos co-located with PoEM 2024, Stockholm, Sweden, December 3-5, 2024.


✉ gideon@dsv.su.se (G. M. Jonathan)

🌐 <https://gideon.blogs.dsv.su.se/> (G. M. Jonathan)

🆔 0000-0001-6360-7641 (G. M. Jonathan)



© 2024 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

 CEUR Workshop Proceedings (CEUR-WS.org)

technologies. This strategic shift is driven by a growing recognition of the need to modernise operations, increase efficiency, and better meet the evolving expectations of citizens in a digital age. The list of emerging technologies that are being adopted is long. However, among the innovative technologies driving this transformation, blockchain has emerged as a particularly promising candidate due to its potential to revolutionise not only the various operations and processes within organisations in the sector but also public governance. As Ølnes et al. [2] argue, blockchain's decentralised nature offers a paradigm shift in how public services can be structured and delivered. This decentralisation promises to enhance transparency, security, and citizen participation in governmental processes, potentially addressing longstanding challenges such as bureaucratic inefficiencies, lack of trust in institutions, and the need for more direct democratic engagement [3, 4]. According to Atzori [5] blockchain could facilitate a shift from traditional hierarchical, centralised governance structures to more horizontal, decentralised models. This transition holds significant promise for enhancing democratic participation, reducing corruption, and improving the efficiency of public service delivery. By leveraging blockchain's distributed ledger technology, public sector organisations can explore new models of service delivery that are more resilient, accountable, and responsive to public needs, marking a significant step forward in the ongoing evolution of digital governance. Besides, the alignment between blockchain's capabilities and the growing trend towards more participatory and distributed decision-making in the public sector suggests a promising avenue for innovation [6].

While the potential benefits of blockchain in public governance are widely discussed, the extent to which these benefits can be realised in real-world public sector contexts remains an area of active research, necessitating further empirical investigation. An assessment of implementations of the technology in public organisations in various countries (for instance, [7]) indicates that the transformative power of blockchain for the sector is a function of various factors. Prior research has identified several significant barriers to the missed opportunities not realised. These challenges include stringent legislation and regulatory uncertainty arising from the lack of clear and standardised regulations; security and privacy concerns related to the protection of sensitive data stored on blockchain networks; infrastructure limitations in developing countries such as insufficient bandwidth or lack of interoperability between different blockchain platforms; or the lack of sufficient and uninterrupted energy source in some countries with limited resources or stringent environmental policies [8, 9]. Even though the technical and external environmental issues related to the adoption of blockchain in the public sector have been explored relatively better, there is a notable gap in empirical research examining the organisational factors that influence the success of the use of the technology in such a way that it contributes to the realisation of the benefits of digital transformation. We reckon with researchers (e.g., [7]) that understanding these factors is crucial for realising the promise of improved organisational performance through blockchain-enabled decentralisation. Thus, Kenya (i.e., a country at the forefront of digital innovation in Africa) is selected for this study as it provides an ideal context to examine the intersection of blockchain technology and public sector transformation. We argue that the country offers valuable insights into the challenges and opportunities of implementing blockchain solutions in developing economies with its rapidly evolving technological landscape and ongoing efforts to improve public service delivery [10].

This study aims to investigate how public organisations can improve the use of blockchain

technology to realise the benefit of digital transformation to facilitate the decentralisation of public governance and subsequently improve organisational performance. Even though blockchain is gaining recognition for the benefits it brings to many organisations, the attention of prior studies have been its adoption and transformative advantages in specific sectors (for instance, in the finance sector) [11]. Thus, to address the gap in the literature and meet the aim of the study, the following research question is formulated: *How do organisational and managerial factors influence the success of the use of blockchain to realise the benefit of digital transformation in improving the performance of public organisations?* By answering this question, we aim to uncover the key determinants that either enable or hinder the effective use of blockchain solutions in the public sector, with a particular emphasis on their impact on decentralisation and organisational performance. It is our conviction that the answer to the research question bridges the gap between the theoretical potential of blockchain in public governance and its practical implementation, offering valuable insights for both researchers and practitioners in the field of digital transformation.

This paper is structured in five sections. In the second section, we briefly discuss digital transformation within the public sector context and present our hypotheses along with a theoretical research model. The subsequent section presents the research methodology—the research strategy adopted along with the data collection and analysis methods. The results section briefly discusses the result of our evaluation of our measurement- and structural models. Finally, the contribution and limitations of the study will be presented.

2. Literature Review and Hypotheses Development

2.1. Digital Transformation in the Public sector

Within the context of the public sector, digital transformation is considered a comprehensive and coordinated effort to modernise the operations of organisations with a focus on creating added public value for citizens. Specifically, the aim of a digital transformation endeavour is to improve policies, processes, and services, aiming to deliver enhanced value to both citizens and businesses as well as satisfying employees within the sector [12]. In other words, the application of digital technologies is intended to benefit both internal stakeholders responsible for the creation and delivery of these services as well as external parties involved not only in the creation of public services but also users of the digital services. Thus, the management of digital transformation is a multifaceted endeavour that extends beyond technology adoption. It involves strategy formulation that addresses the interests of a long list of stakeholders. This is a daunting task that calls for aligning organisational goals, fostering a culture of innovation, implementing effective change management practices, establishing data governance frameworks, managing risks, investing in talent development, and measuring progress. Even though digital transformation is the appropriate use of various emerging digital technologies, these underlying principles remain consistent for successful digital transformation. The literature review conducted for this study indicates that, regardless of the technology used to drive transformation in an organisation, the ultimate goal is to maximise the benefits of the use of technologies in achieving the creation of added public value for customers (i.e., mainly citizens). For instance, according to Jonathan et al. [13], blockchain-driven digital transformation improved the organisational performance

of public organisations. According to the study, the adoption of the technology has resulted in improved citizen participation, operational efficiency, and public trust. Looking into the impact of digital transformation on the internal processes of public organisations, studies have reported a positive effect on knowledge management [14] and human resource development [15]. Thus we posit the following:

H1: Digital transformation positively influences organisational performance in public organisations.

Similar to digital transformation studies in the private sector, the potential benefits and significant improvements that can come through digital transformation are widely recognised in the extant literature. However, researchers (e.g., [16]) argue that the focus of prior studies has been primarily on technological advancements. At the same time, the critical role of organisational as well as internal and external organisational factors in the realisation of the benefits of digital transformation has not attracted sufficient attention. Particularly, the lack of studies investigating the management of fundamental change processes within public organisations, which can affect the design, production, and delivery of public services, is rarely explored [12, 17]. However, there is a growing consensus among scholars that effective digital transformation in the public sector requires a nuanced understanding of the unique characteristics of public organisations. For instance, Plesner et al. [18] emphasise the importance of considering bureaucratic formal structures and accountability issues when studying digital transformation in organisations within the public sector.

2.2. Determinant Factors of Digital Transformation in the Public Sector

Digital transformation, regardless of sector or industry, involves a multifaceted process of organisation-wide changes, encompassing both incremental adjustments and significant shifts. This contrasts with traditional transformations, where digital transformation is characterised by the adoption of new digital technologies to replace outdated tools, which will have implication on many aspects of an organisation. For instance, digital transformation often leads to substantial alterations in organisational processes and workflows. Thus, a digital transformation journey necessitates a redefinition of roles and responsibilities within an organisation. The most obvious challenge as emerging technologies are being introduced continuously and rapidly is that employees at various levels also need to acquire new sets of skills to discharge their responsibilities appropriately [19]. In fact, a phenomenon referred to as organisational readiness—the availability of necessary organisational resources that can enable and facilitate the adoption of emerging technologies—has been one of the important determinants of successful digital transformation. For instance, the adoption of blockchain technology was found to be influenced by organisational readiness, which entails the availability of skilled manpower as well as financial and IT infrastructure [20]. Thus we posit the following:

H2: Organisational readiness is positively associated with digital transformation success in public organisations.

The introduction and integration of new technologies with existing systems and processes, as well as making organisation-wide adjustments, requires a coordinated and strategic approach that aligns organisational objectives and fosters a shared vision. A well-formulated strategy is essential as many public organisations must navigate complex and often intangible organisa-

tional goals. Prior studies have shown that leaders in the public sector struggle to guide their organisations through the complex landscape of digital transformation [17, 21]. According to the extant literature, developing and implementing an effective strategy can be particularly challenging in the public sector given its pluralistic nature and diverse stakeholders with often conflicting interests [13, 22, 23]. Unfortunately, the lack of digital strategy supporting the digital transformation of governments at different levels has been cited as one of the reasons many digitalisation efforts in the public sector fail [24]. The presence of multiple stakeholders with competing objectives can hinder progress and create obstacles to crafting a robust digital strategy for transformation initiatives. However, overcoming these challenges necessitates a strong commitment to a shared vision and a unified organisational goal, which can significantly facilitate the digital transformation journey. Thus we posit the following:

H3: *Digital strategy is positively associated with digital transformation success in public organisations.*

Even though a robust strategy and the availability of the right resources to support digital transformation are essential, the role of leaders with the competence to realise the benefits of digital transformation is crucial. In addition to being competent in mobilising human resources within an organisation and formulating robust digital transformation strategies, transformational leaders promote an organisational culture that encourages experimentation with emerging technologies and innovation. According to the extant literature, transformational leaders—with the ability and will to inspire, motivate and empower employees—create an environment where essential skills necessary to make use of emerging technologies are developed, and radical ideas are embraced [25]. Thus we posit the following:

H4: *Transformational leadership is positively associated with digital transformation success in public organisations.*

Similar to the adoption of any emerging technology in a digital transformation journey, the adoption of blockchain requires a proactive and adaptive approach to navigate the rapidly evolving landscape, a phenomenon referred to as organisational agility. Organisational agility encompasses the ability to not only anticipate future trends (both opportunities and needs) but also to swiftly make the necessary changes in response [25]. In the context of blockchain, agile public organisations are expected to be adept at identifying potential applications, evaluating their feasibility, and implementing solutions that align with their strategic objectives and address pressing societal challenges. This involves reconfiguring existing digital assets and capabilities to achieve successful digital transformation [26]. Prior studies have also found the critical role of organisational agility in digital transformation success [25]. Thus we posit the following:

H5: *Organisational agility is positively associated with digital transformation success in public organisations.*

The extant literature highlights the important role of stakeholder involvement in successful digital transformation initiatives [27, 13]. This assertion is particularly relevant in the context of blockchain-driven digital transformations, where the decentralised nature of technology can introduce complexities in stakeholder management. The rationale is that one of the most significant benefits of blockchain technology lies in its potential to reduce transaction costs significantly [28]. This reduction can facilitate more efficient and transparent exchanges between internal and external actors, potentially leading to novel institutional structures to govern these interactions [29]. Thus, maintaining favourable stakeholder relationships in a pluralistic

environment with diverse stakeholders with potentially conflicting objectives is crucial to realise the benefits of successful digital transformation [21]. Thus we posit the following:

H6: *Stakeholder relationship is positively associated with digital transformation success in public organisations.*

The theoretical research model shown in Figure 1 demonstrates the conceptualisation of the study. The model depicts the seven constructs. The findings from the literature review and the analysis of our interview data are the basis for the development of the model as well as the measurement items used.

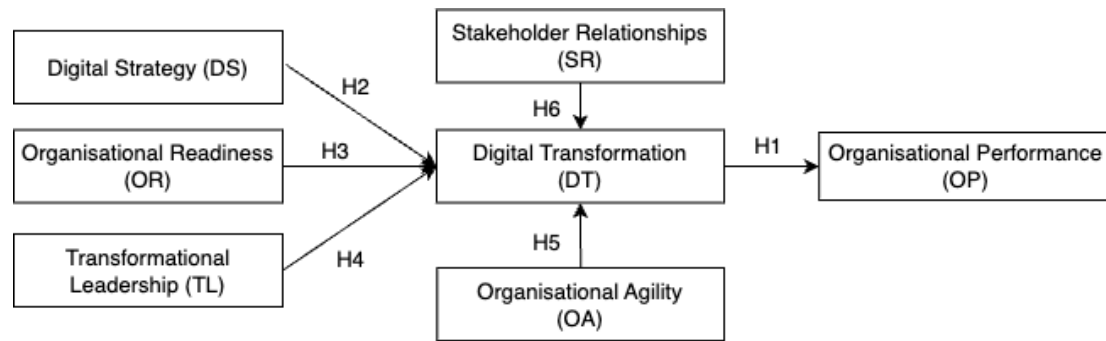


Figure 1: Theoretical research model.

3. Research Methodology

3.1. Research strategy

This study employed a mixed-methods research strategy, combining exploratory and confirmatory elements—a systematic literature review, an exploratory case study and a quantitative survey. This methodological choice is grounded in the recognition that mixed methods can enhance research rigour. A systematic literature review was deemed appropriate for establishing the theoretical foundation and identifying gaps in current knowledge. This review synthesised existing research on digital transformation and decentralisation of public governance, providing context for the study and informing the development of subsequent research phases. The exploratory case study was undertaken to gain in-depth insights into how digital transformation is contributing to the decentralisation of public governance and improving organisational performance. A quantitative survey was developed and conducted in Kenya based on the insights from the literature review and the case study (see [30] for detailed results). This survey aimed to test hypotheses derived from earlier phases and to establish the strength of the relationships between the constructs discussed in the qualitative part of the research.

3.2. Data Collection Methods

This study is conducted in three stages. First, a systematic literature review was conducted to establish a theoretical base and provide the state-of-the-art. The extant literature in the

Information Systems (IS) and public administration domains was deemed relevant for the review. Thus, the search for relevant studies was conducted in databases indexing databases known to index premier journals in these two fields. The aim was to establish the current developments and adoption of digital transformation in the public sector as well as understand its impact on the decentralisation of public administration. However, our focus was to identify studies that looked into the application of digital technologies and the factors that determine its success in improving the performance of public organisations. Thus, we used a combination of keywords (i.e., “*digital transformation*”, “*digitalisation*”, “*public governance*”, “*decentralisation*”, “*centralisation*”, “*public organisations*”, “*public administration*”, “*organisational performance*”) while searching for IS and public administration journals. The literature search resulted in 28 relevant articles, i.e., 12 in the information systems research area and 16 from the public administration literature.

The second phase of data collection involved semi-structured interviews conducted between March and April 2023. The primary objective was to gain in-depth insights into how public sector practitioners plan and implement digital transformation to achieve the benefits of decentralised governance, improving the performance of public organisations. A purposive sampling strategy was employed to select interview participants, aligning with recommendations from previous digital transformation studies. Specifically, experts in the field of digital technologies and their application in public administration were sought [31]. Participants were identified through a combination of random email outreach to CIOs and public administrators attending a conference and referrals from existing respondents. The final sample included eight CIOs, two CDOs, and three IT managers responsible for digital transformation. A total of 13 interviews were conducted, generating over 12 hours of recorded data that were subsequently transcribed. The decision to use non-probability sampling was based on the study’s aim to provide in-depth insights rather than generalise findings to a wider population. By focusing on “experts” as defined by Bogner et al. [32], the sampling strategy ensured that only respondents with the necessary experience and positions could provide valuable information. According to Ritchie et al [31], the non-probability sampling strategy ensures that only respondents with the experience and position to have relevant information were selected for the study. The third part of our study involved collecting quantitative data to run a confirmatory analysis based on the literature review results and interviews. The final number of respondents who returned a complete response to the survey questionnaire is 208 (see Table 2).

Measurement items derived from the extant literature were used to test the research model and the hypotheses posited. For all measurement items, 7-point Likert Scales were adopted. The unit of analysis for the study is the public sector. Thus, the questionnaires are formulated so that respondents answer how the various factors, identified according to the literature review and analysis of interviews, determine the impact of digital transformation (i.e., the adoption of blockchain in the decentralisation efforts) on the performance of public organisations. The online survey questionnaire was pre-tested with 15 leaders randomly selected from three public organisations. Only minor revisions were necessary to address issues raised by pre-test participants. The questionnaire with the active link to the survey was sent to 550 experts. In addition to the demographic questions, a dummy question was also included to exclude unserious responses. The online survey, active for 45 days (between August and September of 2024), resulted in 208 complete questionnaires with a response rate of 37.8 per cent.

Table 1: Demography of respondents, their roles and organisational affiliations.

Organisation Type	n	%	Role	n	%
Regional government	23	11.1	Executive	28	13.4
City administration	48	23.1	Middle management	117	56.3
Ministry	93	44.7	Team leader	37	17.8
Public University	29	13.9	Specialist	26	12.5
Justice	7	3.4	Sex	n	%
Other	8	3.8	Male	148	71.2
			Female	60	28.8
Organisational Size (Number of employees)	n	%	Age	n	%
100-250	21	10.1	20-30	43	20.7
251-1000	112	53.8	31-40	85	40.9
1001-5000	26	12.5	41-50	51	24.5
>5000	49	23.6	>51	29	13.9

3.3. Data Analysis Methods

Consistent with the aim of the study—(1) exploring how the digital transformation of public organisations using blockchain technology can facilitate the decentralisation of public governance to improve organisational performance, and uncovering the determinants enabling or hindering the effective implementation of blockchain solutions—we employed both qualitative and quantitative data analysis methods.

Thematic data analysis method was chosen for the qualitative part of the study (i.e., the systematic literature review and case study). The method has gained popularity among IS researchers since it is not tied to particular theoretical or epistemological stances [33]. The choice was justified for this study since we aimed to categorise the impact of specific factors relevant to the phenomenon we set out to investigate. Regarding the literature reviews, the selected articles were analysed using a concept matrix, as suggested by Webster and Watson [34]. The analysis of the interview data was according to the six-step thematic analysis procedure by Braun and Clarke [35]—transcribing and familiarising with the data, generating initial codes, sorting codes and grouping them into potential sub-themes, reviewing the sub-themes, defining, grouping and naming the sub-themes into themes, and producing the report. It is worth mentioning that after the recorded interviews were transcribed by the researchers who conducted the interviews, the transcription was sent to the respondents to make sure there what had been said was captured. Prior research on digital transformation and decentralisation of public governance was consulted as a basis for coding (i.e., inductive coding).

The final stage of data analysis involved the quantitative data collected from the online survey questionnaire. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to test the proposed hypotheses and theoretical model (Figure 1). As a second-generation multivariate data analysis method [36], PLS-SEM has gained widespread popularity among researchers in information systems and related fields [37]. Previous studies on digital transformation and adoption of blockchain in public organisations have also successfully utilised

this technique [38, 39]. PLS-SEM was particularly well-suited for this study due to its ability to assess the influence (i.e., causal prediction) of various factors on digital transformation and adoption of blockchain technology to improve organisational performance. Moreover, given the purposive sampling strategy and relatively small sample size (n=208) of potential respondents in public organisations, PLS-SEM was a preferable choice compared to other SEM techniques. Hair et al. [37] recommends PLS-SEM for studies with limited sample sizes, suggesting a minimum of ten times the number of independent variables. This study met this criterion.

Following the recommendations of Hair et al. [37], the PLS-SEM analysis was conducted in two stages—evaluation of the measurement model and assessment of the structural model. Given that all constructs in this study are formative, the evaluation of the measurement model focused on assessing convergent validity, indicator collinearity, statistical significance, and the relevance of indicator weights. Subsequently, the structural model was evaluated using three criteria—collinearity, the model's predictive power, statistical significance, and the relevance of path coefficients. The analysis was performed using SmartPLS software, version 3.3.9 [40].

4. Results

The literature review results and analysis of the interviews already published [30] indicate that blockchain-enabled digital transformation plays an important role in driving decentralised public governance. The study highlights Kenya's ongoing transition to decentralised governance following its 2020 constitutional reforms, which introduced county governments. Despite political and bureaucratic challenges, the responses from the study participants indicate that digital transformation has already begun supporting the decentralisation of public governance by improving the efficiency of government services, promoting transparency, and enhancing citizen participation. For instance, the application of blockchain and e-government platforms such as eCitizen and iTax enabled secure and efficient public service delivery, facilitating citizen engagement and reducing administrative redundancies.

The interviews revealed several blockchain applications in Kenya's public sector. For instance, Kenya's Land Registry System with the Hyperledger Fabric platform provides smart contracts for title deed transfers, property ownership verification, land subdivision processing, and mortgage registration. This has streamlined the service provided by different land registry offices creating multiple channels. The academic certification system, an Ethereum-based Solution, is used for smart contracts to improve the processes of certificate issuance, verification, and access control. The application of blockchain in the agriculture supply chain was also found to enhance food traceability and payments to farmers and ensure product quality. Using the VeChain platform, this solution enables IoT integration (including temperature sensors, humidity monitors, and GPS tracking), as well as smart contracts (automated payments, quality verification, and supply chain milestones).

However, the findings also highlight that while Kenya's public sector still lags behind the private sector in digital maturity. While the ongoing technological advancements hold significant potential for transforming governance, empowering citizens, and increasing public trust [30], several organisational and managerial issues must be resolved to realise the anticipated benefits of emerging technologies. The following sections present the result of the quantitative part of

the study, focusing on the relationship between our seven constructs—*digital transformation, organisational performance, digital strategy, organisational readiness, transformational leadership, organisational agility, and stakeholder relationship*.

The analysis started with estimating the path coefficients and assessing the collinearity statistics. As we ran the PLS-SEM algorithm, we selected a path-weighting option with maximum iterations of 10000. In the next step, we did a bootstrapping with the same maximum iterations to calculate significance. The result of the PLS-SEM analysis is shown in Figure 2.

4.1. Measurement Model

At the beginning of our analysis, we computed variance inflation factors (VIFs) for each item to assess the potential for multicollinearity among the formative indicators. As recommended by Hair [41], a VIF value greater than 5 is generally considered indicative of a significant collinearity problem. Our analysis revealed that none of the formative indicators exhibited a VIF value exceeding this threshold, suggesting a negligible level of multicollinearity among the constructs. This assessment is essential for ensuring the reliability and validity of our measurement model.

To evaluate the statistical significance and relevance of the indicator weights, we examined the t-values associated with each weight. Our analysis revealed that 12 measurement items exhibited t-values exceeding the 1% significance threshold of 2.576, indicating statistically significant contributions to their respective constructs. Since the literature [41] cautions against automatically discarding indicators with non-significant weights, we further assessed the absolute contribution of all indicators to their constructs. The outer loadings of all formative indicators were found to be greater than 0.50, confirming their substantial contribution to the corresponding constructs. Given these findings, we retained all indicators in the measurement model, and no collinearity issues were identified.

4.1.1. Structural Model

To evaluate the potential for multicollinearity among the predictor constructs in the structural model, we calculated variance inflation factors (VIFs) for each construct. A VIF value exceeding 5 is generally considered indicative of a significant collinearity problem. Our analysis revealed that none of the predictor constructs exhibited a VIF value above this threshold, suggesting a negligible level of multicollinearity. This finding is essential for ensuring the reliability and validity of the structural model [37].

In the second step, we evaluated the predictive power of our structural model by assessing the R^2 values for endogenous constructs—digital transformation (DT) and organisational Performance (OP). Partial Least Squares (PLS) estimation is based on the variance explained in the model. The R^2 values, ranging from 0 to 1, indicate the proportion of variance in the endogenous construct that is explained by its exogenous predictors [41]. According to established guidelines, R^2 values of 0.75, 0.50, and 0.25 are generally considered to represent substantial, moderate, and weak explanatory power, respectively. As shown in Figure 2, the result of the theoretical research model indicates that the five exogenous predictors (DS, OR, TL, OA and SR) explain the variance of digital transformation is moderately, i.e., 52.8%. The variance of the other endogenous construct OP is explained by DT moderately, i.e., 67.2%.

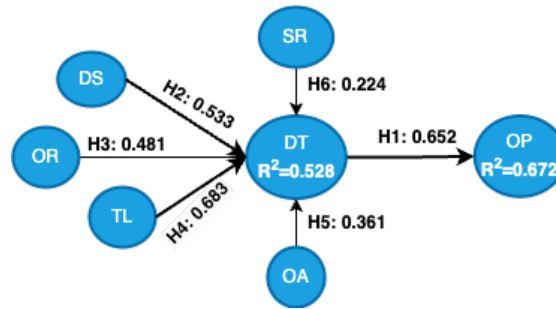


Figure 2: Results of the theoretical research model evaluation.

Next, the path coefficients' statistical significance and relevance were evaluated. Path coefficients explain the strength of the effect one variable has on another. According to Cohen [42], the power of the prediction as measured by path coefficients might be strong (0.5 or higher), moderate (higher than 0.3, but less than 0.5), or small (higher than 0.1 but less than 0.3). As shown in Table 2 and Figure 2, all paths in the theoretical research model were found to be statistically significant, above the recommended threshold in the literature [42, 37]. This provides strong support for our proposed theoretical model. However, the degree of influence among the constructs varies, ranging from strong to moderate to small [42]. At first glance, the path coefficients reveal that digital transformation in the public sector has a strong positive impact on improved organisational performance. A more detailed examination of the relationships between the five factors and digital transformation shows that transformational leadership and digital strategy have a significant influence on the success of digital transformation in the public sector. In contrast, organisational agility and organisational readiness demonstrate a moderate influence on digital transformation success, while stakeholder relationships exhibit the least impact.

5. Discussion and Conclusion

This study set out to contribute to the scant literature on digital transformation in the public sector, focusing on a specific technology—blockchain—and how it can be used to support the decentralisation of public governance. To answer the research question—*How do organisational and managerial factors influence the success of the use of blockchain to realise the benefit of digital transformation in improving the performance of public organisations?*—a mixed-method approach was adopted. The findings highlight the significant role of digital transformation in supporting the transition from traditional to decentralised governance. Consistent with the findings of the prior studies [5], our interviewees in Kenya argue that blockchain-enabled digital transformation has improved the creation of what Moore [43] referred to as public value. In contrast with organisations in the private sector, scholars recommend measuring the performance of public organisations in terms of citizens' expectations met [24]. The responses from the qualitative study indicate that decentralised public governance enabled by digital transformation and the changes in legislation have resulted in the right direction towards meeting citizens' expectations.

Particularly, the interviewees provided various examples of how decentralisation has improved public value, e.g., operational efficiency, citizen participation, citizen empowerment, and public trust [30].

The survey results indicate a strong causal association between digital transformation and organisational performance in the public sector ($\beta=0.652$). The finding is consistent with the findings of prior studies conducted in organisations in the private [44, 45, 46].

Table 2: Outcomes of the structural equation modelling analysis.

Hypotheses and path	Path Coefficient (β)	P-Value	Decision
H1: DT→OP	0.652	0.002	Supported
H2: DS→DT	0.533	0.000	Supported
H3: OR→DT	0.481	0.001	Supported
H4: TL→DT	0.683	0.000	Supported
H5: OA→DT	0.361	0.001	Supported
H6: SR→DT	0.224	0.011	Supported

In response to the how question, the findings of the study attempted to establish the organisational and managerial factors that determine the success of digital transformation. The analysis establishes organisational readiness, digital strategy, transformational leadership, organisational agility, and stakeholder relationships as factors influencing the success of blockchain-driven digital transformation. According to the path coefficients, the influence of the three of these factors was strong. Transformational leadership seems to be the most determinant factor affecting digital transformation in the public sector ($\beta=0.652$). The finding supports prior studies that found the role of transformational leadership important for digital transformation success (e.g., [19, 13]). Digital strategy was the second most important factor affecting the success of digital transformation ($\beta=0.533$). The lack of robust digital strategies in the public sector is reported in the extant literature [24]. Researchers in the application of blockchain in the public sector have also found digital strategy to be a critical success factor. In third place, organisational readiness was an important determinant of successful digital transformation, consistent with prior research on blockchain adoption [4, 2].

On the other hand, the study puts organisational agility ($\beta=0.361$) and stakeholder relationship ($\beta=0.224$) at the bottom of the list of determinant factors influencing digital transformation success. This is interesting, given the recognition of stakeholder relationships as one of the important issues supporting the co-creation of public value within the context of public organisations [25]. Our interviewees also acknowledge the significance of consulting and interacting with multiple stakeholders to serve or co-create value for citizens. Moreover, empirical studies in Europe [7] indicate that blockchain adoption in public organisations is likely to succeed with less stakeholder complexity.

This research offers valuable insights into the factors influencing the adoption of blockchain technology and its subsequent impact on the overall success of digital transformation in the public sector. The strong positive causal relationship between the studied constructs underscores the importance of allocating resources to pursue the adoption of emerging technologies with the aim of improving organisational performance. Thus, understanding these factors' varying degrees of influence can inform strategic decision-making.

It is essential to interpret the findings of this study within the context of its limitations. To

start with, the cross-sectional nature of the survey data limits the ability to establish causal relationships over time. Longitudinal studies could provide a more comprehensive understanding of the dynamics of the introduction and integration of new technologies as part of the continuous digital transformation journey undertaken by public organisations. Moreover, managing blockchain and other emerging technologies in pursuit of digital transformation in today's dynamic environment presents significant challenges. Thus, evaluating the influence of the factors discussed within the context of changing internal and external environments could offer valuable insights for practitioners. Moreover, the sampling strategy employed in this study also warrants consideration. The non-random selection of respondents may have introduced potential biases that affected the findings of the study. Additionally, the cultural context of Kenya might have influenced the responses, necessitating further research in similar public organisations in other countries/regions.

References

- [1] C. Gong, V. Ribiere, Developing a unified definition of digital transformation, *Technovation* 102 (2021) 102217.
- [2] S. Ølnes, Beyond bitcoin—public sector innovation using the bitcoin blockchain technology, in: *International Conference on Electronic Government and the Information Systems Perspective*, Springer, 2015, pp. 253–264.
- [3] M. Janssen, P. Brous, E. Estevez, L. S. Barbosa, T. Janowski, Data governance: Organizing data for trustworthy artificial intelligence, *Government information quarterly* 37 (2020) 101493.
- [4] F. R. Batubara, J. Ubacht, M. Janssen, Challenges of blockchain technology adoption for e-government: a systematic literature review, in: *Proceedings of the 19th annual international conference on digital government research: governance in the data age*, 2018, pp. 1–9.
- [5] M. Atzori, Blockchain technology and decentralized governance: Is the state still necessary?, *Journal of Governance and Regulation* 6 (2017) 45–62.
- [6] A. Alketbi, Q. Nasir, M. Abu Talib, Novel blockchain reference model for government services: Dubai government case study, *International Journal of System Assurance Engineering and Management* 11 (2020) 1170–1191.
- [7] D. Allessie, M. Sobolewski, L. Vaccari, F. Pignatelli, Blockchain for digital government, Luxembourg: Publications Office of the European Union (2019) 8–10.
- [8] M. Janssen, V. Weerakkody, E. Ismagilova, U. Sivarajah, Z. Irani, A framework for analysing blockchain technology adoption: Integrating institutional, market and technical factors, *International journal of information management* 50 (2020) 302–309.
- [9] D. Meijer, J. Ubacht, The governance of blockchain systems from an institutional perspective, a matter of trust or control?, in: *Proceedings of the 19th annual international conference on digital government research: governance in the data age*, 2018, pp. 1–9.
- [10] B. Ndemo, T. Weiss, *Digital Kenya: An entrepreneurial revolution in the making*, Springer Nature, 2017.
- [11] M. Janssen, V. Weerakkody, E. Ismagilova, U. Sivarajah, Z. Irani, A framework for analysing

- blockchain technology adoption: Integrating institutional, market and technical factors, *International journal of information management* 50 (2020) 302–309.
- [12] I. Mergel, N. Edelmann, N. Haug, Defining digital transformation: Results from expert interviews, *Government information quarterly* 36 (2019) 101385.
- [13] G. M. Jonathan, E. Perjons, L. Rusu, Digital transformation-driven decentralisation of public governance, *Procedia Computer Science* 239 (2024) 1220–1229.
- [14] A. Alvarenga, F. Matos, R. Godina, J. CO Matias, Digital transformation and knowledge management in the public sector, *Sustainability* 12 (2020) 5824.
- [15] N. K. Betchoo, Digital transformation and its impact on human resource management: A case analysis of two unrelated businesses in the mauritian public service, in: 2016 IEEE International Conference on Emerging Technologies and Innovative Business Practices for the Transformation of Societies (EmergiTech), IEEE, 2016, pp. 147–152.
- [16] A. Meijer, V. Bekkers, A metatheory of e-government: Creating some order in a fragmented research field, *Government Information Quarterly* 32 (2015) 237–245.
- [17] R. Mu, M. Haershan, P. Wu, What organizational conditions, in combination, drive technology enactment in government-led smart city projects?, *Technological Forecasting and Social Change* 174 (2022) 121220.
- [18] U. Plesner, L. Justesen, C. Glerup, The transformation of work in digitized public sector organizations, *Journal of Organizational Change Management* (2018).
- [19] J. Jöhnk, P. Ollig, S. Oesterle, L.-N. Riedel, The complexity of digital transformation-conceptualizing multiple concurrent initiatives., in: *Wirtschaftsinformatik (Zentrale Tracks)*, 2020, pp. 1051–1066.
- [20] T. Clohessy, T. Acton, Investigating the influence of organizational factors on blockchain adoption: An innovation theory perspective, *Industrial Management & Data Systems* 119 (2019) 1457–1491.
- [21] P. Panagiotopoulos, B. Klievink, A. Cordella, Public value creation in digital government, *Government Information Quarterly* 36 (2019) 101421.
- [22] M. Meyerhoff Nielsen, Governance lessons from denmark's digital transformation, in: *Proceedings of the 20th Annual International Conference on Digital Government Research*, 2019, pp. 456–461.
- [23] J.-L. Denis, A. Langley, L. Rouleau, Strategizing in pluralistic contexts: Rethinking theoretical frames, *Human relations* 60 (2007) 179–215.
- [24] A. Scupola, I. Mergel, Co-production in digital transformation of public administration and public value creation: The case of denmark, *Government Information Quarterly* 39 (2022) 101650.
- [25] G. M. Jonathan, I. Reyshav, Workforce agility and digital transformation in the public sector, in: *Proceedings of the 2024 Computers and People Research Conference*, 2024, pp. 1–4.
- [26] P. C. Verhoef, T. Broekhuizen, Y. Bart, A. Bhattacharya, J. Q. Dong, N. Fabian, M. Haenlein, Digital transformation: A multidisciplinary reflection and research agenda, *Journal of Business Research* 122 (2021) 889–901.
- [27] G. Vial, Understanding digital transformation: A review and a research agenda, *The Journal of Strategic Information Systems* (2019).
- [28] D. W. Allen, C. Berg, B. Markey-Towler, M. Novak, J. Potts, Blockchain and the evolution

- of institutional technologies: Implications for innovation policy, *Research Policy* 49 (2020) 103865.
- [29] R. Beck, C. Müller-Bloch, J. L. King, Governance in the blockchain economy: A framework and research agenda, *Journal of the association for information systems* 19 (2018) 1.
- [30] G. M. Jonathan, E. Perjons, L. Rusu, Digital transformation-driven decentralisation of public governance, *Procedia Computer Science* 239 (2024) 1220–1229.
- [31] J. Ritchie, J. Lewis, C. M. Nicholls, R. Ormston, et al., *Qualitative research practice: A guide for social science students and researchers*, sage, 2013.
- [32] A. Bogner, B. Littig, W. Menz, Introduction: Expert interviews—an introduction to a new methodological debate, in: *Interviewing experts*, Springer, 2009, pp. 1–13.
- [33] R. E. Boyatzis, *Transforming qualitative information: Thematic analysis and code development*, sage, 1998.
- [34] J. Webster, R. T. Watson, Analyzing the past to prepare for the future: Writing a literature review, *MIS quarterly* 26 (2002) xiii–xxiii.
- [35] V. Braun, V. Clarke, Reflecting on reflexive thematic analysis, *Qualitative Research in Sport, Exercise and Health* 11 (2019) 589–597.
- [36] C. Fornell, D. F. Larcker, Evaluating structural equation models with unobservable variables and measurement error, *Journal of marketing research* 18 (1981) 39–50.
- [37] J. Hair, C. L. Hollingsworth, A. B. Randolph, A. Y. L. Chong, An updated and expanded assessment of pls-sem in information systems research, *Industrial management & data systems* 117 (2017) 442–458.
- [38] M. R. Kabir, Behavioural intention to adopt blockchain for a transparent and effective taxing system, *Journal of Global Operations and Strategic Sourcing* 14 (2021) 170–201.
- [39] S. M. Jasimuddin, N. Mishra, N. A. Saif Almuraqab, Modelling the factors that influence the acceptance of digital technologies in e-government services in the uae: A pls-sem approach, *Production planning & control* 28 (2017) 1307–1317.
- [40] C. Ringle, D. Da Silva, D. Bido, Structural equation modeling with the smartpls, Bido, D., da Silva, D., & Ringle, C.(2014). *Structural Equation Modeling with the Smartpls*. *Brazilian Journal of Marketing* 13 (2015).
- [41] J. F. Hair Jr, Next-generation prediction metrics for composite-based pls-sem, *Industrial Management & Data Systems* (2020).
- [42] J. Cohen, A coefficient of agreement for nominal scales, *Educational and psychological measurement* 20 (1960) 37–46.
- [43] M. H. Moore, *Creating public value: Strategic management in government*, Harvard university press, 1995.
- [44] V. Barba-Sánchez, A. Meseguer-Martínez, R. Gouveia-Rodrigues, M. L. Raposo, Effects of digital transformation on firm performance: The role of it capabilities and digital orientation, *Heliyon* 10 (2024).
- [45] J. Yu, J. Wang, T. Moon, Influence of digital transformation capability on operational performance, *Sustainability* 14 (2022) 7909.
- [46] G. M. Jonathan, Digital transformation in the public sector: Identifying critical success factors, in: *16th European, Mediterranean, and Middle Eastern Conference, EMCIS 2019*, Dubai, United Arab Emirates, December 9–10, 2019, Springer, 2020, pp. 223–235.