

Shree Shadananada Campus

SMC Journal

Article History: Received date: January 16, 2026; Accepted date: February 1, 2026

DOI: <https://doi.org/10.3126/smcjsmc.v2i01.91605>

Driving Nepal's Digital Economy through Blockchain and Transactions

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Abstract

The exponential growth of digital financial services and blockchain technologies has reshaped the structure of modern economies. This study investigates the relationship between digital transactions, blockchain technology, and the growth of the digital economy in Nepal using time-series data obtained from Nepal Rastra Bank and the World Bank. The analysis employs summary statistics, correlation analysis, and the Ordinary Least Squares method. Given heteroskedasticity and serial correlation, heteroskedasticity- and autocorrelation-consistent (HAC) standard errors based on the Newey–West estimator are used. Blockchain readiness shows a positive but marginally significant influence, suggesting economic impact remains limited. In contrast, internet usage shows a negative and significant relationship with the digital economy. Overall, the findings suggest that Nepal's digital economy is primarily transaction-driven rather than innovation-driven. The study offers valuable insights for building financial infrastructure and improving institutional readiness to accelerate digital technologies for sustainable economic growth.

Keywords: digital economy; digital transactions; blockchain readiness; the internet users

Driving Nepal's Digital Economy through Blockchain and Transactions

Introduction

The proliferation of digital technologies, particularly digital payment systems and blockchain, has fundamentally transformed the global financial services and economic activities. Digital transactions, which include electronic payments, mobile banking, and other online financial services, have been central to the modern economy. In recent years, blockchain technology has emerged in digital financial ecosystems, providing decentralized, secure, and transparent mechanisms for transactions. These digital innovations have increasingly served as catalysts for economic growth and development, offering efficiency, transparency, and security in transactions (Sharma & Karki, 2025; Nakamoto, 2008).

These technologies have been instantaneous, low-cost, and highly secure for domestic and cross-border payment systems in rich economies. However, in developing economies, these may serve as bridges, filling gaps in financial inclusion and reducing reliance on cash-based transactions (Bech & Hancock, 2020; Suri & Jack, 2016). Markus For inclusive participation in the productive sector and access to financial services, a digital financial tool can serve as a bridge between the formal and informal economies.

The digital economy has seen notable momentum in Nepal over recent years, driven by improvements in information and communication technology infrastructure. Similarly, increasing mobile use and internet penetration, along with policy initiatives for promoting cashless transactions, boosted people's interest in digital activities. The growth and expansion of digital platforms such as mobile wallets and phone pay have significantly reshaped Nepal's payment landscape. However, the country faces many challenges: political instability, infrastructure deficits, particularly in rural areas, and a cash-based economy (Bhandari, 2019). Despite the development of electronic financial services, only a small fraction of transactions are fully digitalized, and there is a growing shift from cash-based to digital modes, while a substantial share of economic activity remains conducted in cash (Nepal Rastra Bank [NRB], 2026).

Mobile money has emerged as a transformative tool for transactions in developing countries, enabling people to save, transfer, and receive funds using a cell phone without access to a traditional bank. Suri and Jack (2016) and Nan et al. (2021) reported increases in household consumption, reductions in extreme poverty, and improvements in financial services in Sub-Saharan African countries. With the growth of digital transactions, Blockchain technology has attracted attention from policymakers, financial institutions, and the general public in Nepal. The Blockchain technology, as a decentralized, tamper-proof digital ledger, enhances financial infrastructure and services by enabling secure peer-to-peer transactions, smart contracts, currency swaps, and tokenized systems (Nakamoto, 2008; Swan, 2015).

In Nepal, there is an expansion of digital payment systems and a growing interest in blockchain technology. Such digital adoption has the potential to accelerate the growth of the digital and real economies by fostering financial inclusion, improving transaction efficiency, and securing digital infrastructure (Pokharel, 2023; Bhandari & Koirala, 2024). However, the country faces serious challenges, which include a lack of digital literacy, gaps in urban-rural infrastructure, and an inadequate supportive regulatory framework.

This study primarily investigates the nexus among digital transactions, emerging blockchain adoption, and their contributions to Nepal's digital economy. Specifically, it seeks to address two key questions: to what extent digital transaction systems influence the growth of Nepal's digital economy, and how blockchain technology readiness strengthens digital financial infrastructure and economic activities. In general, the main objective is to assess the impact of digital transactions on digital economic growth and to explore the potential role of blockchain-related technologies in economic activities. Moreover, the study considers the wider implications of these technologies for financial inclusion and economic participation.

The advantage of this study lies in its contribution to bridging the empirical research gap in Nepal, given that blockchain development is in its infancy and the evidence is limited. Thus, the findings offer valuable insights for policymakers, financial institutions, researchers, and academia, providing empirical support for the design of regulatory frameworks and policies to enhance digital infrastructure and literacy in Nepal.

The remaining part of this study is organized into four sections. Section 2 reviews relevant empirical and theoretical literature on digital transactions and blockchain technology in the context of the digital economy and identifies research gaps.

Section 3 explains the research methodology, which comprises the research design, the nature and source of the data, the variables, and the econometric models to be applied. It outlines the methods to be used for data analysis, including sampling, data processing, and regression analysis. Section 4 interprets the empirical findings, using various statistical and econometric models that align with the objectives and hypotheses, compares them with prior empirical studies conducted in national and international contexts, and highlights their implications for Nepal. Finally, the last section summarizes the major findings, draw conclusion, and provides policy implications.

Literature Review

Theoretical Stance

The nexus among digital transactions, blockchain technology, and the digital economy can be explained through several theoretical frameworks in economics, finance, and innovation. One of them is transaction-cost economics, which explains the core rationale for adopting a digital payment system. This framework suggests how to minimize the cost associated with information, settlement, and institutional arrangements between economic agents. Digital payment services significantly reduce these costs by enabling faster, lower-cost, and secure transactions in European economies (Hasan et al., 2013). Digital transactions help to participate in the financial market by reducing barriers in developing economies (Suri & Jack, 2016).

Another is financial intermediation theory, which says that digital transactions expand the digital economy, improving the efficiency of financial systems. Digital services platforms, such as mobile money, improve liquidity management by making it easier to mobilize savings and access financial services. Mobile money helped to reduce extreme poverty and household expenses in Kenya (Suri & Jack, 2016). Similarly, digital payment has boosted household incomes and remittance flows in Nepal (Bhandari & Koirala, 2024).

From a macroeconomic standpoint, endogenous growth theory holds that technological innovation serves as a long-term catalyst for economic growth. According to this framework, Blockchain technology and digital payment systems boost economic productivity by promoting entrepreneurship, creativity, and knowledge transfer. These factors enhance economic activities through a new business model and transaction efficiency (World Bank, 2016). This has been supported by empirical findings in developing nations, where broadband development is seen as digital infrastructure (Koutroumpis, 2009; Mayer et al., 2020).

In the eye of blockchain technology, the main concern it addresses is cybersecurity, which can be examined by trust theory and institutional economics. This theory suggests that safe, convenient transactions enabled by decentralized finance and an immutable ledger replace the traditional financial institutional framework. Blockchain is a trustless system that enables peer-to-peer transactions without centralized oversight (Nakamoto, 2008). Empirical evidence shows that lower coordination and verification costs are necessary for the development of digital financial services (Catalini & Gans, 2018). Further, this helps eliminate fraud, improve transparency, and promote good governance, especially in poor economies (Swan, 2015).

Regarding the economic implications of the digital economy, network effects theory and the ICT-led growth hypothesis suggest that as more people use digital payment systems, their value increases and digital economic activity grows. The extensive use of mobile money in underdeveloped countries improves platform utility and economic impact (Nan et al., 2021). Additionally, increasing participation in digital systems boosts security and creativity in blockchain ecosystems (Yue et al., 2021).

These theoretical grounds aim to explore the growth and development of the digital payments system and the rising interest in blockchain technology in Nepal. Blockchain adoption is in an early stage and faces infrastructure gaps and policy uncertainties, though digital payment systems have transformed retail businesses and remittance transactions (Bhandari, 2019; Pokharel, 2023; Sharma & Karki, 2025). Having said that, theoretical and empirical indices in the globalized world suggest that these technologies can influence the digital economy, which can further accelerate with the right policy interventions in Nepal.

Empirical Stance

A lot of literatures demonstrate a positive relationship between digital transactions and economic growth. Most of them postulate a positive relationship. A digital payments framework reduces transaction costs, improves efficiency, and enables faster financial flows. Thus, contributes to higher economic output. Hasan et al. (2013) examined the relationship between retail payment systems and real economic activity employing panel data from 27 European countries for the period from 1995 to 2009. Their studies find that adoption of electronic payment systems significantly improves economic growth, increasing consumption and facilitating business activities in Europe-based markets. Similarly, Suri and Jack (2016) demonstrate that access to mobile services in Kenya enhances financial inclusion,

increases household consumption, and significantly reduces extreme poverty.

In developing economies, the digital transaction system has been improved, deepening access to credit and financial facilities. However, a significant challenge persists, particularly regarding access to payments and the efficiency of cross-border transactions. Bech and Hancock (2020) argue that efforts to improve cross-border payment systems would be more effective if they were based on better data that could accurately measure the scale of existing inefficiencies and their underlying causes. This empirical evidence in South Asia suggests that mobile and electronic payments contribute positively to economic performance, underlining digital payment systems as a foundation of economic growth.

Globalization and technological progress have been key forces in transforming financial systems, with effects on internationalization and automation in the payment system. These systems not only became evidence in retail payments, but have also substantially reshaped wholesale, or interbank payment systems. In this regard, for the financial stability and operational efficiency, knowing the implications is a must. Bech et al. (2008) identified 10 major long-term trends in large-value payment systems worldwide, driven by technological innovation and structural shifts in the financial sector. Their finding suggests that banks are using settlement systems equipped with advanced liquidity management features to manage risks, costs, and returns effectively.

Mobile money has been a transformative financial innovation in developing economies, delivering financial services via mobile phones. In Sub-Saharan Africa, it has been a viable digital tool for improving socioeconomic development, thanks to its ease of access, security, and low cost. Nan et al. (2021) conducted a systematic review of 82 empirical studies examining the socioeconomic effects of mobile money use in Sub-Saharan Africa. Their findings show that mobile money adoption has generated diverse socioeconomic benefits, including improvements in household welfare, business performance, community development, and the financial sector.

Blockchain technology has gained widespread recognition for its potential to transform financial systems and business models by enabling decentralized financial services, smart contracts, and secure transactions without the need for traditional intermediaries. Nakamoto (2008) introduced blockchain as the underlying technology for cryptocurrencies, while subsequent research has expanded its applications to include payments, non-fungible tokens, smart contracts, and supply

chain management.

Swan (2015) examined the blockchain as an emerging information technology with wide-ranging potential applications. Studies show that one notable contribution is “blockchain thinking,” which can be conceptualized as cognitive and computational processes that leverage blockchain properties. This approach thinking as an input–output processing system in a decentralized manner. This shows advances in artificial intelligence and human capital development, enabling blockchain applications beyond financial use cases.

Extensive empirical evidence indicates that blockchain technology can improve the functioning of the financial system by reducing verification and networking costs (Catalini & Gans, 2018). In developing economies, blockchain-based applications are particularly valuable for addressing trust, fraud, and weak institutional frameworks. Although large-scale empirical evidence remains limited, existing research indicates that blockchain adoption can strengthen digital payment infrastructure and support broader digital economic activities.

Recent research has examined the use of blockchain outside the financial sector. Basile et al. (2023) developed the Blockchain Circular Economy Index (BCEI) to assess the suitability of blockchain platforms for circular economy applications, highlighting transaction costs and energy consumption as key determinants. Yue et al. (2021), using bibliometric analysis, find that while technological research on blockchain focuses on system design and payment innovation, economic research increasingly examines macroeconomic impacts and legal digital currencies. Caldarelli (2024) further notes that while some blockchain applications in circular economy practices face feasibility challenges, others may succeed if supported by appropriate tokenomics and digital infrastructure.

The digital economy has been widely studied in developing-country contexts, where digital technologies are considered as tools for overcoming structural barriers and boosting economic development. The World Bank (2016) emphasizes that digital technologies can promote inclusive growth by expanding access to markets, services, and information, although their effectiveness depends on complementary investments in infrastructure, human capital, and regulatory capacity.

Empirical findings are mixed. Koutroumpis (2009) demonstrates that broadband infrastructure positively affects economic growth, although the magnitude of this effect varies across countries. Mayer et al., (2020) further show that broadband

speed, rather than penetration alone, plays a critical role in driving growth, particularly in low-income countries. These studies underscore the importance of policy design and initial development conditions in determining the economic impact of digitalization.

In the Nepalese context, Sharma and Karki (2025) give a bibliometric analysis revealing increased academic interest in blockchain applications in financial services, particularly in payment systems, fraud prevention, and smart contracts. Pokharel (2023) examines the development of digital capitalism in Nepal, identifying both persistent challenges—such as infrastructure gaps and regulatory weaknesses—and promising opportunities arising from widespread smartphone adoption and a technologically literate youth population.

Bhandari and Koirala (2024) examine the significance of digital payment systems for remittance transfers, emphasizing their contribution to household incomes and national GDP while identifying challenges related to digital literacy and trust, particularly in rural areas. Earlier, Bhandari (2019) documents the evolution of Nepal's digital economy, highlighting the expansion of electronic banking services alongside the continued dominance of cash transactions.

Research Gap

Even though the global literature on digital transactions, blockchain technology, and their economic significance has expanded, developing economies like Nepal still face several critical gaps. Most existing studies focus on the effects of digital transactions on the aggregate economy, the welfare economy, or financial inclusion, while there remains limited attention to the growth and development of the digital economy (Hasan et al., 2013; Suri & Jack, 2016; World Bank, 2016). Moreover, literature examines digital transactions and blockchain technology separately within the digital financial ecosystem (Catalini & Gans, 2018; Swan, 2015). Blockchain adoption in developing countries has largely been conceptual, lacking concrete evidence measuring digital economic outcomes (Nakamoto, 2008; Yue et al., 2021).

In the context of Nepal, the existing literature primarily provides descriptive analyses of digital payments, remittances, and financial metrics. This reveals a notable lack of data-driven investigation on how digital transactions and blockchain technology affect the development and growth of the digital economy (Bhandari, 2019; Bhandari & Koirala, 2024; Pokharel, 2023). Additionally, contextual factors

such as digital literacy, urban-rural infrastructure disparities, and regulatory preparedness may significantly reduce the digital financial efficiency in developing economies (Koutroumpis, 2009; Mayer et al., 2020; Sharma & Karki, 2025).

This study aims to bridge these gaps by providing empirical evidence on the roles of digital transactions and blockchain technology in the development of Nepal's digital economy.

Data and Methodology

Research Design

The conceptual framework for this study is grounded in perspectives on financial innovation and institutional quality. These suggest that digital innovations reduce transaction costs and increase efficiency, thereby stimulating growth and development in the digital economy (Beck et al., 2008). Further, blockchain readiness followed by quality regulation and digital infrastructure development improves trust and transparency for digital economic development (Catalini & Gans, 2018). Therefore, digital economic growth and development can be modeled as a function of digital transactions, blockchain readiness, and internet usage.

On this basis, this study adopts a quantitative, empirical research design to examine the relationship between digital transactions and blockchain technology and their role in the growth of Nepal's digital economy. Due to data constraints, the study followed a proxy variable approach where the digital economy is represented by the value of the digital transaction ratio to GDP, a natural logarithm is applied to the digital transaction to improve robustness, and a blockchain readiness index has been developed by using several fintech indicators, institutional, and policy variables. The Internet user index has been used as a control variable in econometric models, as is common in empirical research.

For effective empirical analysis, the study employs several statistical and econometric techniques, including descriptive statistics, correlation analysis, and Ordinary Least Squares (OLS). Given the diagnostic tests' indications of heteroskedasticity and serial correlation, the study uses Heteroskedasticity and Autocorrelation Consistent (HAC) estimators to ensure robustness.

Variable Specification

Since Nepal has a limited digital economy index, this study uses proxy variables commonly used in empirical studies.

Dependent Variable

The digital economy (DE) is measured as the total value of digital transactions relative to Gross Domestic Product (GDP). This reflects the scale and intensity of digital economic activities. Although GDP does not fully reflect institutional quality and digital infrastructure, these factors are taken into account in the macroeconomic scaling effect, which influences digital economic growth and development. This approach aligns with previous studies that used transaction-based indicators to measure digital economic development (Hasan et al., 2013; World Bank, 2016). This can be calculated as:

$$DE = \frac{\text{(value of total digital transaction)}}{GDP} \times 100 \dots\dots\dots (1)$$

Independent Variable

The key explanatory variables, digital transactions (DT) and blockchain-related financial infrastructure (BC), are to be used in the study. Digital transactions, which shows value and size of electronic payment systems- mobile banking, electronic fund transfers, wallet-based payment, etc., reflecting digital payment adoption in the economy. The blockchain technology, which enables decentralized financial and other activities such as smart contracts, significantly influences both the real and monetary economies. These variables are used in existing studies on the digital economy and financial development (Koutroumpis, 2009; Mayer et al., 2020). Natural logarithm is applied in digital transactions value as:

$$DT = \ln (\text{total no.of digital transaction})\dots\dots\dots (2)$$

Due to data constraints on blockchain technology in Nepal, institutional quality and fintech technology adoption have been used as proxies for blockchain technology. Khera et al. (2022) construct a composite digital index by standardizing individual indicators. In this regard, the blockchain readiness index (BRI), following the composite index can be calculated as:

Composite Index

$$Index_t = \frac{1}{n} \sum_{i=1}^n Z_{it} \dots\dots\dots(3)$$

Where, $Z_{it} = \frac{X_{it} - \bar{X}}{\sigma^2 X}$ (standardized value of the indicator X at time t), $\sigma^2 =$

Standard deviation of X

Control Variable

The Internet user index is used as a control in the model. This reflects the percentage of the population using the internet.

Source of Data

This study employs secondary **quarterly time-series data** of Nepal covering the period from the fiscal year **2077/78 (2020) first quarter to 2082/83 (2025) second quarter**. The data are collected from official and reliable international and national sources. Data on digital transactions, including the volume and value of electronic payments, are obtained from Nepal Rastra Bank (NRB, 2026). The indices representing digital infrastructure and institutional factors are sourced from the Global Findex Database (GFD, 2026) and the World Bank's World Development Indicators (WDI, 2026).

Table 1

Description of Variables

Variables	Proxies	Unit	Description	Source
<i>Dependent variable</i>				
Digital Economy (DE)	Total value of digital transactions and GDP	Decimal	Reflection of digital economic growth and development	NRB
<i>Independent variable</i>				
Digital Transaction (DT)	Total number of digital transactions	Natural log of the total number of digital transactions	Scale the digital transaction system	NRB
Blockchain Readiness Index (BRI)	Internet user index, regularity quality index, and fintech index (wallet, connectips, internet banking & mobile banking)	Decimal	Measure the country's preparedness to adopt blockchain technology	GFD WGI NRB

Variables	Proxies	Unit	Description	Source
<i>Control variable</i>				
Internet User	Internet index	Percentage %	Reflection of people access to internet	GFD

Note. NRB = Nepal Rastra Bank (Central Bank of Nepal), GFD = Global Findex Database, WGI = Worldwide Governance Indicator

Model Specification

To analyze the relationship between digital transactions, blockchain technology, and digital economy growth, the study specifies the following empirical model:

$$DE = f(DT, BRI, InTusers)$$

The econometric model

$$DE_t = \alpha + \beta_1 DT_t + \beta_2 BRI_t + \beta_3 InTusers_t + \varepsilon_t \dots \dots \dots (4)$$

Where, DE = Digital Economy, DT = Digital Transaction, BRI= Blockchain Technology Readiness Index, InTusers = Internet Users Index, α & β Parameter and ε = Error Term

To measure **heteroskedasticity and autocorrelation**, the null hypothesis of the error term is assumed to be:

$$E(\varepsilon_t) = 0$$

$$var(\varepsilon_t) = \Omega$$

Where, Ω = **heteroskedasticity- and autocorrelation-consistent covariance matrix.**

The **HAC (Newey–West) estimator** of the variance–covariance matrix of $\hat{\beta}$ is:

Where, bandwidth (lag length), Bartlett kernel weights, Size of sample and Residuals

The stability is tested through histogram and normality test. The histogram shows graphically, while **Jarque–Bera (JB)** provides statistically, which is measured as:

$$\widehat{var}(\hat{\beta}) = (X'X)^{-1} \left(\sum_{k=-q}^q \omega_k \sum_{t=k+1}^T \hat{\varepsilon}_t \hat{\varepsilon}_{t-k} X_t X'_{t-1} \right) (X'X)^{-1} \dots \dots \dots (5)$$

Where, q =bandwidth (lag length), $\omega_k = 1 - \frac{|k|}{q+1}$ =Bartlett kernel weights, T =Size of sample and $\hat{\varepsilon}_t$ = Residuals

Results and Discussion

Summary Statistics

Table 1 presents summary statistics of the variables, that includes mean, maximum, minimum, and standard deviation. The statistic provides an overview of the distribution of variables.

Table 2
Summary Statistics

Variables	Mean	Maximum	Minimum	Standard Deviation
DE	3052.62	6820.35	1247.23	1384.21
DT	19.23	20.13	18.15	0.61
BRI	-3.18	0.76	-1.94	0.91
InTusers	50.47	56.00	38.85	6.83

Note: DE = Digital Economy, DT= Digital Transactions, BRI = Blockchain Readiness Index, InTusers = Internet users

The mean value of DE is 3052.62, with a minimum of 1247.23 and a maximum of 6820.35, indicating the rapid expansion of digital activities during the sample period. The high standard deviation (1384.21) indicates greater volatility, reflecting different digital development phases.

The mean values of DT and BRI are 19.23 and -3.18, respectively, with DT ranging from 18.15 to 20.13 and a low standard deviation (0.61), indicating gradual rising digital development. BRI stand is from -1.94 to 0.76, with a standard deviation of 0.91. This reflects a lack of blockchain-related infrastructure. InTusers shows a mean value of 50.47, ranging from 38.85 to 56.00, with a standard deviation of 6.83. This indicates steady expansion in internet penetration across the population.

Correlation Analysis

Table 3
Correlation Matrix

	DE	DT	BRI	InTusers
DE	1.00			
DT	0.7868**	1.00		
BRI	0.5952**	0.8624**	1.00	
InTusers	0.5798**	0.9047**	0.9497**	1.00

Note: Statistical significance: *P<.05, **P<.01

The correlation coefficients indicate the strength and direction of relationships between the dependent and explanatory variables, as summarized in Table 2. DE exhibits a strong positive correlation with digital transactions DT at 1% significant level. This implies that increased in digital payment systems closely associated with the expansion of the digital economy. DE is also moderately and positively correlated with BRI at 1% level of significance. indicating that improvements in blockchain-related infrastructure, regulatory quality, and digital preparedness are needed for a higher level of digital economic development.

Similarly, InTusers show a positive and significant association with DE at 1% significance level. This highlights the importance of internet access as a foundational requirement for digital economic activities. Correlations between explanatory variables are strong according to statistical information. Internet penetration, digital transactions, and blockchain readiness are likely to evolve in Nepal.

OLS Estimation

Table 4

Results of OLS Regression

Independent Variable	Dependent Variables			
	Digital Economy (DE)			
	Coefficient	Std. Error	t-Statistic	Prob.
Digital Transaction (DT)	3259.404	650.1188	5.013552	0.0001**
Blockchain Readiness Index (BRI)	612.5414	587.4664	1.042683	0.3109
InTusers	-224.3963	93.91610	-2.389328	0.0280*
Constant	-48311.23	10712.93	-4.509618	0.0003**
R ²	0.73			
Adj. R ²	0.68			
DW statistic	1.2506			
F-statistics	16.3436 (0.0000)**			

Note: Statistical significance: *P<.05, **P<.01

This table presents the empirical results of the OLS regression. The regression examines the nexus among digital transactions (DT), the blockchain readiness index (BRI), and internet users (InTusers) in the growth and development of the digital economy in Nepal. The coefficient of DT is positive and statistically significant at the 1% level ($\beta = 3259.40$). This implies that an expansion in digital transaction services significantly contributes to the digital economic activities in Nepal.

The marginal change of the blockchain readiness index (BRI) is $\beta = 612.54$, which shows a positive but statistically insignificant. This indicates that, although blockchain-related infrastructure, regulatory preparedness, and digital payment platforms positively influence the digital economy, their direct effects on economic activity have yet to be observed. Interestingly, internet users (InTusers) exhibit a negative and statistically significant relationship with the digital economy ($\beta = -224.40$). This result suggests that an increase in internet users does not automatically translate into digital economic growth.

The value of R^2 is 0.73, and an adjusted R^2 is 0.68. This indicates the model's strong explanatory power despite the limited sample size. Overall, the F-statistic is significant (16.34), indicating a good fit of the model. However, the Durbin-Watson statistic (1.25) indicates positive serial correlation in the residuals.

HAC-Corrected Estimation

Table 5

Re-Estimation of Regression

Independent Variable	Dependent Variables			
	Digital Economy (DE)			
	Coefficient	St. Error	t-Statistic	Prob.
Digital Transaction (DT)	3259.404	709.4929	4.593992	0.0002**
Blockchain Readiness Index (BRI)	612.5414	330.2329	1.854877	0.0801
InTusers	-224.3963	73.10536	3.069492	0.0066**
Constant	-48311.23	11685.65	4.134234	0.0006**
	0.73			

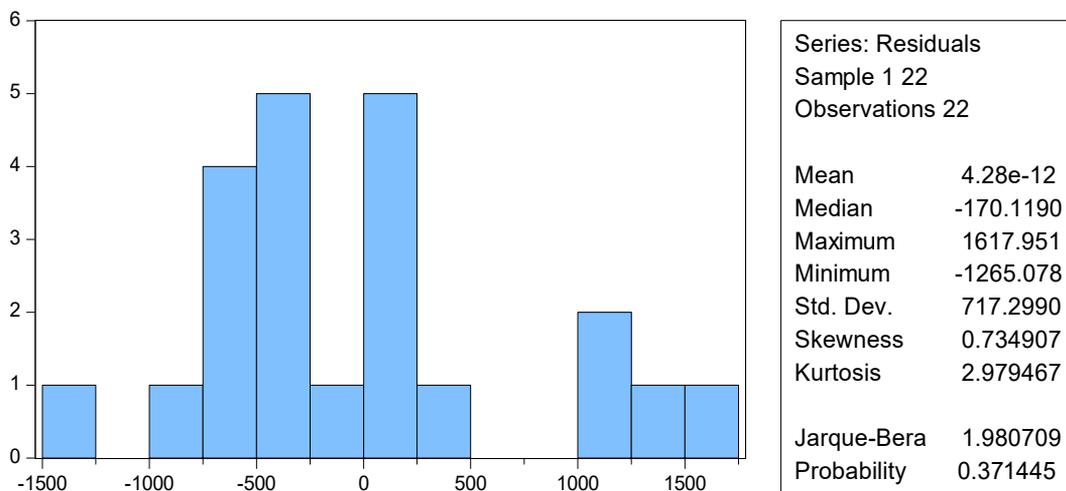
Adj.	0.68
Durbin-Watson Statistic	1.2506
F-statistics	16.3436 (0.0000)**
Wald F-statistic	32.73577 (0.0000)**

Note: Statistical significance: *P<.05, **P<.01

The regression is re-estimated using Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors based on the Newey–West estimator with a Bartlett kernel to address heteroskedasticity and serial correlation. This corrects the model using robust statistical inference, as shown in the table. All the parameter coefficients remain the same, with corrected standard errors and t-statistics. All Probability values also show slight changes at the same level of significance as in the prior regression results.

The Wald F-statistic (32.74, $p < 0.01$) indicates the model is highly significant at the 1% significance level. The R^2 , adjusted R^2 remain same as earlier estimation. This indicates that the prediction of the explanatory variables explains variations in the digital economy in Nepal.

Histogram-Normality Test



The histogram and normality test are used to examine whether the residuals from the estimated regression model are normally distributed. This is the assumption for

valid statistical inference.

The histogram of residuals shows that the distribution is approximately symmetric and bell-shaped, which closely follows the normal distribution. This visual evidence suggests that the residuals do not exhibit severe skewness or kurtosis.

The Jarque–Bera (JB) statistic further supports this observation. Since the probability value of the JB test exceeds 5% significance level, the null hypothesis of normally distributed residuals cannot be rejected. Therefore, the residuals satisfy the normality assumption and the model's unbiasedness.

Discussion

This study examined the roles of digital transactions, blockchain readiness, and internet usage in shaping Nepal's digital economy. Using time-series data, the study employed OLS and HAC (Newey–West) standard errors. The findings provide several significant insights for Nepal's digital transformation.

Firstly, digital transactions (DT) have emerged as the most significant determinant of the digital economy. Transaction-based digital financial activities are the primary channel for economic growth in Nepal, as confirmed by DT's positive, highly significant coefficient. This finding is consistent with the other studies of digital finance and fintech that emphasize the efficiency of payment, financial inclusion, and digital transaction are key drivers of digital economic growth (Beck et al., 2016; Suri & Jack, 2016). Several digital activities mobile banking, wallets, interbank platforms, and QR-based payments, have strengthened the nexus between digital financial services and economic activities.

Secondly, the blockchain readiness index (BRI) shows positive but insignificant effects on the digital economy. This suggests there should be improvements in regulatory quality, institutional preparedness, and digital infrastructure associated with blockchain technology, although it has already begun to influence digital economic growth. The weak statistical evidence reflects that Nepal is in the early stages of blockchain adoption. This finding aligns with prior literature that argues blockchain contributes to economic performance only after reaching a certain threshold of institutional maturity and regulatory clarity (Catalini & Gans, 2020).

Thirdly, internet usages show negative but statistically significant relationship with digital economic activities in Nepal. This result suggests that internet access does not improve economic outcomes. Also, internet usage may be dominated by

other digital activities such as entertainment, information access, and social media, leading to a weaker connection with transaction-based productivity in Nepal. Vu (2011) has reported similar findings in developing economies where digital access expands faster than digital economic utilization.

Overall, the findings suggest that Nepal's digital economy is driven more by digital financial transaction usage than access to infrastructure. Blockchain readiness requires greater support from institutional development and regulatory perspectives, which currently play evolving roles. The internet penetration should be complemented by digital skills to increase and generate meaningful economic outputs.

Conclusion and Policy Implication

Summary

This study examined the digital economic implications of digital transactions and blockchain technology in Nepal, employing time-series data. The digital economy (DE) was proxied by the transaction-based indicators ratio to gross domestic product (GDP), whereas digital transactions, the blockchain readiness index, and internet users were explanatory variables. Seeing the detection of heteroskedasticity and serial correlation, the study applied OLS estimation with HAC.

The empirical analysis contributes to the limited literature on Nepal's digital economy by providing evidence-based insights into how fintech-driven transactions and emerging digital readiness factors influence economic outcomes.

Findings and Conclusion

This study provides empirical evidence on the roles of digital transactions and blockchain readiness in shaping the digital economy in Nepal, drawing on theories of financial innovation, digital economy development, and institutional quality.

The first key finding is that digital transactions have a positive, statistically significant effect on the digital economy. This result supports financial innovation theory, which argues that innovations in payment systems reduce costs associated with transactions, settlement, and information, and provide market participation opportunities, thereby improving economic growth (Beck et al., 2016). In Nepal, the expansion of mobile banking, digital wallets, QR payments, and inter-banking payment platforms has translated digital access into economic activities.

The second is that blockchain readiness has a positive but weaker influence on the digital economy. This finding aligns with the institutional and technological readiness perspective, where certainty about regulatory frameworks, infrastructure development, and institutional capacity helps develop advanced technologies, contributing to digital economic performance. (Catalini & Gans, 2020). The significance of blockchain readiness in Nepal suggests that blockchain-related technology adoption is at an early stage, with significant potential for positive change in digital economy development.

The internet's relation with the digital economy appears negative in the third finding. This is consistent with the ICT-led growth hypothesis and network effects perspective. This highlights that access alone does not improve digital economic growth if its channels do not connect with productivity in the economy (Vu, 2011). This finding suggests that internet use may have been for social media and other non-economic purposes. To conclude, the digital economy in Nepal is driven more by functional digital transactions than by access to digital technologies. It can be argued that the economic impact of digitalization depends not merely on digital connectivity but also on other financial services that play a significant role in sustaining digital economic growth.

Policy Implications

The empirical findings yield valuable insights for policy implications in Nepal. First and foremost, policymakers and the government believe they should prioritize expanding and integrating digital payment system ecosystems. Mobile banking, wallet, QR payment, and other digital transaction platforms can accelerate digital economic growth in Nepal.

Second, although blockchain technology has long-term potential, it remains limited unless there is certainty regarding regulatory frameworks and institutional transparency. Given these issues addressed, blockchain applications then integrate into various financial services.

Investment decisions from the public administration should focus on digital literacy, cybersecurity, trust in digital platforms, and digital entrepreneurship to transform internet penetration into a productive economy. Finally, coordination among regulatory institutions is essential to build an advanced, innovation-driven digital economy.

APPENDIX

The raw data used in this study were obtained from the *Payment Systems Indicators* published by Nepal Rastra Bank (NRB, 2082) and the World Bank database. The value of the digital economy (DE) and digital transactions is constructed by aggregating total digital transactions. For the blockchain proxy, a composite index is constructed following the methodology proposed by Khera et al. (2021). The detailed construction methodology and normalization procedures are discussed in the Data and Methodology section.

Dependent and Independent Variables

Year		DE	DT	BRI	INT_users
2020	Q1	1262.1284	18.1515	-1.9421	38.8
	Q2	1247.2375	18.3079	-1.8547	38.8
2021	Q3	1814.3511	18.4935	-1.7492	38.8
	Q4	2308.5185	18.4963	-1.6623	38.8
	Q1	2404.9037	18.6979	-0.2964	45.2
	Q2	2556.5380	18.6825	-0.1796	45.2
2022	Q3	2779.2924	18.7799	-0.0900	45.2
	Q4	3168.8629	18.9435	-0.0321	45.2
	Q1	2886.2529	19.0119	0.3688	53.8
	Q2	1892.4396	19.0301	0.4132	53.8
2023	Q3	1991.1220	19.1390	0.4471	53.8
	Q4	2371.2576	19.3377	0.4961	53.8
	Q1	2561.3663	19.5437	0.4981	55.7
	Q2	2232.0885	19.4865	0.5233	55.7
2024	Q3	2918.1988	19.6186	0.5665	55.7
	Q4	3653.6044	19.8449	0.5996	55.7
	Q1	5348.5829	19.8626	0.6397	55.8
	Q2	3865.5305	19.8245	0.6781	55.8
2025	Q3	3382.3476	19.9567	0.7067	55.8
	Q4	4843.6214	20.1048	0.7283	55.8
	Q1	6820.3575	20.1294	0.7670	56.0
	Q2	4849.1593	19.6953	0.3735	56.0

Sources: Author's Construction

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