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IMPACT OF DIGITAL TRANSFORMATION ON NET INTEREST MARGIN: EVIDENCE FROM LICENSED COMMERCIAL BANKS IN SRI LANKA

Kengatharan, L.[a*], Farveen, M. N. N.[b]
[a]Department of Financial Management, University of Jaffna
lingesiya@univ.jfn.ac.lk
[b]Department of Business Finance, University of Peradeniya
nashathfarwin911@gmail.com
[*]Corresponding author

ABSTRACT

This study examines the impact of digital transformation on the financial performance of Licensed Commercial Banks in Sri Lanka, with Net Interest Margin (NIM) as the key performance indicator. A quantitative explanatory research design is adopted using panel data from 23 licensed commercial banks over the period 2020–2024. The study employs Pooled Ordinary Least Squares, Fixed Effects, and Random Effects models to analyse the relationship between multiple dimensions of digital transformation—digital penetration ratio, digital capital expenditure ratio, digital contact point ratio, digital transaction growth ratio, and IT investment ratio—and NIM. The results of the random effects model reveal that selected dimensions of digital transformation significantly enhance NIM. In particular, digital capital expenditure, digital contact points and digital penetration have significant positive effects on NIM. However, digital transaction growth and IT investment are found to be statistically insignificant. This study contributes to the limited empirical literature on digital transformation in emerging economies by disaggregating digital transformation into multiple measurable dimensions rather than using a single proxy. The findings provide important implications for theory, practice, and policy. The study extends digital transformation literature by integrating data value theory and productivity paradox perspectives. Practically, it highlights the importance of customer-centric digital strategies over mere IT expenditure. For policymakers, the results support the need to encourage efficient digital investment and adoption in the banking sector.

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1. Introduction

The banking sector constitutes a fundamental pillar of Sri Lanka's economic and financial architecture, serving as the primary conduit for financial intermediation, capital mobilization, and liquidity distribution. As of 2024, the industry comprises 24 Licensed Commercial Banks (LCBs) and 6 Licensed Specialized Banks (LSBs) operating under the supervision of the Central Bank of Sri Lanka (Central Bank of Sri Lanka, 2024). Collectively, these institutions command the largest share of total financial system assets, reaffirming their

systemic significance within the national economy. As per the annual economic review of the Central Bank of Sri Lanka (2024), the banking sector accounted for approximately 61–73 percent of total financial system assets in 2024, indicating its dominant position. Banks play a critical role in facilitating liquidity provision, payment services, and risk transformation across the economy, thereby supporting overall financial system stability. This enduring prominence highlights the crucial role of banking institutions in sustaining macroeconomic stability and facilitating long-term economic development.

In the contemporary global landscape, the banking industry is undergoing an unprecedented transformation, largely propelled by rapid technological advancements and the proliferation of digital innovations. Digital transformation, broadly conceptualized as the strategic integration of digital technologies across organizational functions, has redefined the operational paradigms of financial institutions (Westerman et al., 2014). In the banking context, digital transformation involves the adoption of technology-enabled platforms that allow customers to access financial services through mobile and online channels, thereby reducing reliance on traditional branch-based service delivery (Fitzgerald et al., 2014; Lee & Shin, 2018). This evolution has significantly expanded the scope of banking services, enabling institutions to provide a wide range of digital financial solutions, from routine transactions to more complex financial services.

The advancement of internet technologies and digital infrastructures has substantially disrupted conventional banking delivery channels, compelling financial institutions to innovate and adapt in order to remain competitive. As highlighted in the digital banking literature, the adoption of digital channels enhances service accessibility, operational efficiency, and customer experience, leading to improved engagement and service quality (Ivanov et al., 2019). Within an increasingly competitive and dynamic financial environment, digital transformation has emerged as a strategic imperative that influences competitiveness, efficiency, and long-term sustainability in the banking sector (Nambisan et al., 2017).

The onset of the COVID-19 pandemic marked a significant inflection point in the digitalisation trajectory of the banking sector. While the pandemic introduced considerable operational disruptions and financial uncertainties, it simultaneously accelerated the adoption of digital technologies across financial institutions worldwide. Banks rapidly expanded the use of digital solutions such as mobile banking platforms, automation technologies, and artificial intelligence to ensure business continuity, enhance service delivery, and respond to changing customer expectations (De’ et al., 2020; Dwivedi et al., 2020). Empirical evidence suggests that digital adoption during this period improved operational efficiency, reduced costs, and enhanced service quality, thereby influencing overall firm performance (Nambisan et al., 2017).

Notwithstanding the growing body of literature highlighting the benefits of digital transformation, empirical investigations within the Sri Lankan banking context remain relatively limited. Most existing studies focus on developed economies, providing limited insights into emerging market conditions and institutional differences (Plekhanov et al.,

2023). Moreover, the heterogeneous impact of digital transformation across banks of different sizes and resource capacities has not been sufficiently examined. Larger financial institutions typically possess greater financial strength and technological capability to implement advanced digital strategies, whereas smaller banks may face constraints related to infrastructure, expertise, and capital investment (Westerman et al., 2014).

1.1 Research Problem

Despite the increasing adoption of digital technologies within the Sri Lankan banking sector, there is limited empirical evidence on whether such transformation translates into measurable improvements in core banking performance indicators (Central Bank of Sri Lanka, 2024; Vial, 2019). In particular, the effect of digital transformation on NIM, a critical indicator of banks' intermediation efficiency and income generation, remains underexplored in emerging market contexts (Zhai et al., 2022). This lack of focused empirical analysis creates uncertainty regarding the effectiveness of digital investments in enhancing financial outcomes, particularly in developing economies where institutional and technological readiness varies significantly (Vial, 2019).

Understanding this relationship is particularly important in a developing economy like Sri Lanka, where banks operate under resource constraints and increasing competitive pressures (Central Bank of Sri Lanka, 2024; Berger & Humphrey, 1997). Digital transformation requires substantial financial and strategic investment, and without clear evidence of its impact on financial performance, decision-makers may face challenges in allocating resources efficiently (Beccalli, 2007). Therefore, a focused investigation into the impact of digital transformation on NIM provides both theoretical and practical value, especially in explaining whether digital investments create measurable financial returns or reflect the productivity paradox (Brynjolfsson & McAfee, 2014).

Among various indicators of financial performance, NIM is particularly significant for banking institutions as it reflects the efficiency with which banks manage their interest-earning assets and liabilities (Goddard et al., 2004). Since digital transformation can influence cost structures, operational efficiency, and service delivery, its impact is likely to be reflected in NIM (Vial, 2019). Therefore, NIM serves as an appropriate proxy to assess the financial implications of digital transformation in the banking sector, particularly in studies focusing on efficiency and profitability outcomes (Kitsios et al., 2021).

Against this backdrop, the present study seeks to provide a focused empirical evaluation of the impact of digital transformation on NIM of Licensed Commercial Banks in Sri Lanka. By doing so, the study addresses a critical gap in the literature by offering context-specific evidence from a developing economy and contributes to a more nuanced understanding of how digital initiatives influence core banking profitability.

Westerman et al. (2014) assert that organizations exhibiting higher levels of digital maturity consistently outperform their counterparts in terms of revenue growth and profitability. Similarly, Ivanov et al. (2019) highlight the role of digital technologies in

enhancing operational efficiency and service systems, while Nambisan et al. (2017) underscore their potential to facilitate innovation and enable new business models. Collectively, these perspectives underscore the strategic importance of digital transformation in achieving sustained competitive advantage.

Within the Sri Lankan context, recent developments reveal an increasing emphasis on digital banking initiatives, including digital payment systems, mobile banking expansion, and customer-centric digital platforms (Central Bank of Sri Lanka, 2024). Despite these advancements, the extent to which such initiatives translate into tangible improvements in NIM remains an area requiring further empirical exploration.

The ongoing digitalisation of the banking sector presents both significant opportunities and complex challenges for financial institutions. While digital transformation has the potential to enhance operational efficiency, profitability, and customer satisfaction, its effectiveness is contingent upon factors such as strategic implementation, resource allocation, and the broader economic environment (Vial, 2019).

Despite growing global evidence on digital transformation, three key gaps remain. First, a literature gap exists as most prior studies focus on developed economies, with limited empirical evidence from emerging markets (Zhai et al., 2022; Vial, 2019). Second, a theoretical gap persists due to inconsistent findings between data-driven value creation perspectives and productivity paradox arguments regarding digital investments (Brynjolfsson & McAfee, 2014). Third, a methodological gap arises from the limited use of multidimensional measures of digital transformation, as many studies rely on single proxies such as IT investment. Finally, a contextual gap exists in Sri Lanka, where empirical studies examining the impact of digital transformation on core banking indicators such as NIM remain scarce (Central Bank of Sri Lanka, 2024).

In this context, the present study aims to provide a nuanced and context-specific understanding of the relationship between digital transformation and NIM of Licensed Commercial Banks in Sri Lanka, offering valuable implications for policymakers, regulators, and industry practitioners navigating an increasingly digital financial landscape. This study employs multiple proxies of digital transformation, including digital penetration, digital investment, and digital usage indicators, to provide a comprehensive evaluation of its impact on Net Interest Margin.

1.2 Research Objectives

Based on the identified research problem and existing empirical gap, this study aims to examine the impact of digital transformation on the NIM of Licensed Commercial Banks in Sri Lanka. To achieve this aim, the following objectives are formulated:

- To examine the impact of digital transformation on the NIM of Licensed Commercial Banks in Sri Lanka.

- To analyze the impact of specific dimensions of digital transformation (digital penetration, digital capital expenditure, digital contact points, digital transaction growth, and IT investment) on the NIM of Licensed Commercial Banks in Sri Lanka.

1.3 Research Questions

In line with the above objectives, the study seeks to answer the following research questions:

- To what extent does digital transformation influence the Net Interest Margin (NIM) of Licensed Commercial Banks in Sri Lanka?
- To what extent do specific dimensions of digital transformation (digital penetration, digital capital expenditure, digital contact points, digital transaction growth, and IT investment) influence Net Interest Margin (NIM) of Licensed Commercial Banks in Sri Lanka?

2. Literature review

This study is grounded in three complementary theories. The Data Value Theory posits that organizational value is created through effective data utilization, enabling improved decision-making and performance outcomes (Miller & Mork, 2013). The Resource-Based View (RBV) argues that firm-specific technological capabilities can generate sustained competitive advantage when they are valuable, rare, and difficult to imitate (Barney, 1991). In contrast, the Productivity Paradox suggests that investments in information technology do not always translate into improved productivity due to implementation inefficiencies and organizational constraints (Brynjolfsson & McAfee, 2014). Together, these theories provide a balanced lens for examining whether digital transformation enhances or limits banking performance.

Digital Transformation and Business Context

The Fourth Industrial Revolution has accelerated the integration of digital technologies such as cloud computing, artificial intelligence, and data analytics into business operations, reshaping traditional business models (Vial, 2019; Verhoef et al., 2021). Digital transformation is broadly defined as a continuous process of organizational change enabled by digital technologies that reconfigure structures, processes, and value creation mechanisms (Vial, 2019). Digitization refers to converting analog information into digital form, while digitalization involves using digital technologies to improve business processes. Digital transformation goes further by fundamentally reshaping organizational strategy and business models (Schallmo et al., 2017).

Digital Transformation in Banking

The banking sector has been significantly transformed through digital technologies such as mobile banking, fintech solutions, big data analytics, and AI-based systems (Lee & Shin, 2018; Gomber et al., 2017). These innovations enhance service delivery, operational efficiency, and customer experience. The COVID-19 pandemic further accelerated digital adoption in banking, forcing institutions to rely heavily on digital channels, automation, and remote service delivery systems (Verhoef et al., 2021).

Digital Transformation and Financial Performance

Empirical studies generally suggest that digital transformation improves efficiency, reduces operational costs, and enhances profitability (Zhai et al., 2022; Verhoef et al., 2021). In banking, digital channels reduce reliance on physical branches and improve transaction efficiency (Berger, 2002).

However, the literature also presents mixed findings. While some studies show positive impacts on performance, others find insignificant or delayed effects, supporting the Productivity Paradox (Beccalli, 2007). This inconsistency is often attributed to differences in technological capability, organizational readiness, and implementation quality.

In Sri Lanka, digital banking adoption has increased significantly, particularly after the COVID-19 pandemic, with widespread use of mobile banking and digital payment systems (Central Bank of Sri Lanka, 2024). However, empirical evidence on how digital transformation affects core banking performance indicators such as Net Interest Margin remains limited.

Most existing studies focus on developed economies, leaving a clear contextual gap in emerging markets like Sri Lanka (Vial, 2019; Zhai et al., 2022). Additionally, prior research often uses single proxies such as IT investment rather than multidimensional measures of digital transformation.

Therefore, this study addresses these gaps by examining multiple dimensions of digital transformation and their impact on bank profitability. The conceptual framework of this study is developed based on the theoretical and empirical literature on digital transformation and financial performance. Digital transformation is operationalized using multiple proxies, including digital penetration, digital capital expenditure, digital contact points, digital transaction growth, and IT investment. These variables represent different dimensions of digital transformation, such as adoption, investment, accessibility, and usage. Net Interest Margin is used as the dependent variable to measure banking financial performance. The framework posits that digital transformation influences NIM through efficiency improvements, cost reductions, enhanced customer engagement, and increased transaction volumes.

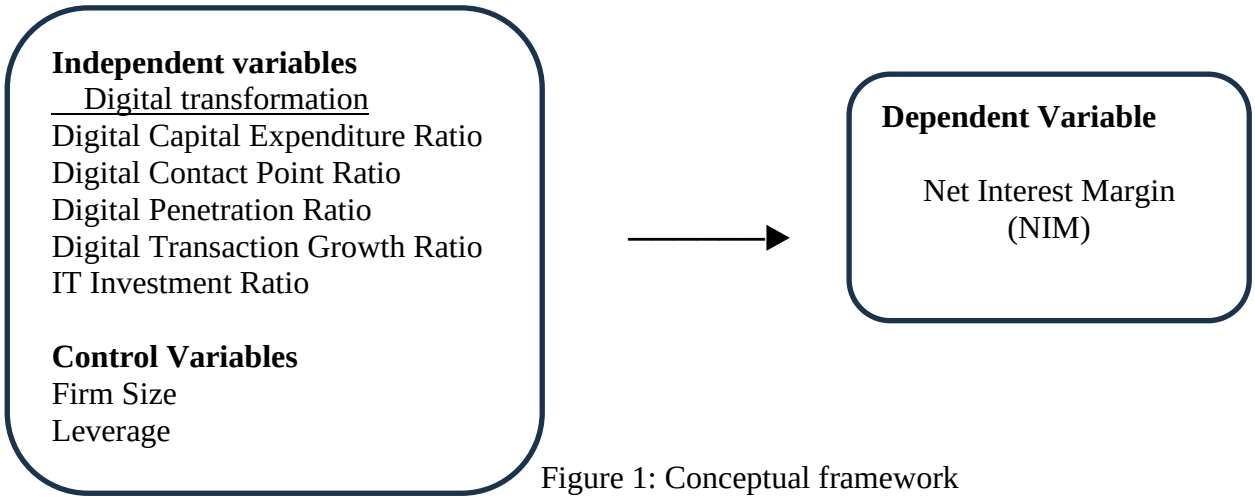

Figure 1: Conceptual framework

Source: Developed by Researchers

Based on the conceptual framework and the theoretical and empirical evidence discussed in the preceding section, digital transformation is expected to influence the NIM of Licensed Commercial Banks in Sri Lanka through various channels, including efficiency improvements, cost reductions, enhanced customer engagement, and increased transaction volumes. Accordingly, the following hypotheses are proposed:

H1: Digital transformation has a significant impact on the Net Interest Margin (NIM) of Licensed Commercial Banks in Sri Lanka. This main hypothesis is further subdivided based on the variables used to measure digital transformation, as listed below:

H1a: Digital capital expenditure ratio has a significant impact on NIM.

H1b: Digital contact point ratio has a significant impact on NIM.

H1c: Digital penetration ratio has a significant impact on NIM.

H1d: Digital transaction growth has a significant impact on NIM.

H1e: IT investment ratio has a significant effect on NIM.

3. Research Methods

3.1 Research Design

The study adopts a hypothetico-deductive approach, as it develops hypotheses based on theory and tests them using empirical data (Creswell, 2014). This study implements a quantitative explanatory research design to examine the impact of digital transformation on the NIM of Licensed Commercial Banks in Sri Lanka. The study relies on secondary data collected from the published annual reports of banks. The analysis covers a five-year period from 2020 to 2024, enabling the examination of recent trends, particularly in the context of accelerated digital transformation following the COVID-19 pandemic.

3.2 Population and Sample

The population of the study consists of all Licensed Commercial Banks operating in Sri Lanka. As of the study period, there are 24 Licensed Commercial Banks regulated by the Central Bank of Sri Lanka. The sample comprises 23 Licensed Commercial Banks, selected based on the availability and completeness of data for the study period. One bank was excluded due to missing or incomplete data. A near-census sampling technique is used since 23 out of 24 banks are included, ensuring high representativeness (Saunders et al., 2019).

3.3 Data Collection

The study utilizes panel data for the five years period from 2020-2024 which obtained from the audited annual reports of the selected banks. Additional information was gathered from relevant financial disclosures and publications. The data collected include financial indicators and digital transformation-related variables required for the analysis.

3.4 Research Models

Pooled OLS model

$$NIM_{it} = \beta 0 + \beta 1DCR_{it} + \beta 2DCPR_{it} + \beta 3DPR_{it} + \beta 4DTGR_{it} + \beta 5ITR_{it} + \beta 6FS_{it} + \beta 7LEV_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Fixed effect model

$$NIM_{it} = \alpha i + \beta 1DCR_{it} + \beta 2DCPR_{it} + \beta 3DPR_{it} + \beta 4DTGR_{it} + \beta 5ITR_{it} + \beta 6FS_{it} + \beta 7LEV_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Random effect model

$$NIM_{it} = \beta 0 + \beta 1DCR_{it} + \beta 2DCPR_{it} + \beta 3DPR_{it} + \beta 4DTGR_{it} + \beta 5ITR_{it} + \beta 6FS_{it} + \beta 7LEV_{it} + ui + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

In the equation:

NIM_{it} is net interest margin of firm i at time t.

DCR_{it} is digital capital expenditure ratio of firm i at time t.

$DCPR_{it}$ is digital contact point ratio of firm i at time t.

DPR_{it} is digital penetration ratio of firm i at time t.

$DTGR_{it}$ is Digital transaction growth ratio of firm i at time t.

ITR_{it} is IT investment ratio of firm i at time t.

FS_{it} is firm size of firm i at time t.

LEV_{it} is leverage of firm i at time t.

$\beta 0$: intercept coefficient of firm i at time t.

β 1, β 2, β 3, β 4, $\beta 5$ & β 6 : row vectors of slope coefficient of regressors

ε_{it}: Stochastic error term of firm i at time t

3.5 Operationalization

Table 1: Operationalization of Variables

Dependent Variable			
Concept	**Variable**	**Measurement**	**Reference**
Bank Financial Performance	Net Interest Margin (NIM)	Net Interest Income ÷ Average Earning Assets	Berger (2002); Goddard et al. (2004)
Independent Variables			
Digital Adoption	Digital Penetration Ratio	Customers using digital channels ÷ Total customers	Kitsios et al. (2021); Vial (2019)
Digital Investment	Digital Capital Expenditure Ratio	IT-related capital expenditure ÷ Total assets	Brynjolfsson & Hitt (1998)
Digital Connectivity	Digital Contact Point Ratio	Digital channels ÷ Total customer touchpoints	Ivanov et al. (2019); Nambisan et al. (2019)
Digital Usage	Digital Transaction Growth	Growth rate of digital transactions	Vial (2019); Verhoef et al. (2021)
IT Spending	IT Investment Ratio	IT operating expenses ÷ Total operating expenses	Beccalli (2007)
Control Variables			
Size Effect	Firm Size	Natural log of total assets	Berger & Humphrey (1997); Goddard et al. (2004)
Financial Structure	Leverage	Total debt ÷ Total assets	Berger & Bonaccorsi di Patti (2006)

Source: Authors own creation

4. Data Analysis

4.1 Descriptive statistics

Table 2 presents descriptive statistics for the dependent, independent, and control variables used in the study. The dataset comprises 115 observations from 23 Licensed Commercial Banks over the period 2020–2024. The average NIM is 4.79% (SD = 2.19%), with a minimum of 0.89% and a maximum of 13.32%, indicating variability in profitability across banks. Among the digital transformation measures, the Digital Capital Expenditure Ratio averages 5.34% (SD = 5.67%), while Digital Penetration and Contact Point Ratios average 41.28% (SD = 13.42%) and 68.50% (SD = 12.25%), respectively, reflecting differences in technology adoption and service delivery channels. Digital Transaction Growth

Ratio and IT Investment Ratio average 51.62% and 20.50%, respectively, with substantial variation, suggesting heterogeneous implementation of digital initiatives across banks. The control variables, firm size (mean = 26.966, SD = 0.9783) and leverage (mean = 0.9201, SD = 0.0407), indicate relative homogeneity in size and capitalization within the sampled banks.

Table 2: Descriptive Statistics

Variables	Obs	Mean	St.Dev.	Minimum	Maximum
Net interest margin	115	0.0479	0.0219	0.0089	0.1332
Digital Capital Expenditure Ratio	115	0.0534	0.0567	0.0023	0.3076
Digital contact point ratio	115	0.685	0.1225	0.3349	0.9222
Digital penetration ratio	115	0.4128	0.1342	0.0847	0.7623
Digital transaction growth ratio	115	0.5162	0.1851	0.08	0.94
IT investment ratio	115	0.205	0.128	0.0245	0.5514
Firm size	115	26.966	0.9783	24.672	29.25
Leverage	115	0.9201	0.0407	0.8192	0.9938

Source: Survey data

4.2 Correlation analysis

Table 3 provides initial insights into the relationships between digital transformation indicators, firm characteristics, and NIM of licensed commercial banks in Sri Lanka. Among the digital variables, Digital Transaction Growth Ratio exhibits the positive association with NIM ($r = 0.332$, $p < 0.001$), indicating that banks experiencing higher growth in digital transactions tend to achieve higher interest margins. Digital Capital Expenditure Ratio ($r = 0.078$, $p = 0.042$) and Digital Contact Point Ratio ($r = 0.103$, $p = 0.027$) also show positive but weak correlations with NIM, suggesting a limited yet statistically significant influence on bank profitability. In contrast, Digital Penetration Ratio ($r = -0.040$, $p = 0.671$) and IT Investment Ratio ($r = 0.092$, $p = 0.330$) are not significantly associated with NIM, implying that merely increasing customer access to digital platforms or IT spending does not automatically translate into higher net interest margins. Regarding firm characteristics, Firm Size ($r = -0.221$, $p = 0.018$) and Leverage ($r = -0.255$, $p = 0.006$) are negatively correlated with NIM, indicating that larger and more leveraged banks tend to experience slightly lower interest margins. Overall, the correlation results highlight that specific aspects of digital transformation, particularly transaction growth, are more strongly linked to profitability, whereas structural factors such as size and leverage also play a meaningful role. The observed correlations provide a foundation for further regression analysis to quantify the distinct impact of each variable on NIM.

Table 3: Correlation Analysis

Correlation **Probability**	NIM	DCR	DCPR	DPR	DTGR	ITR	FS	LE √
Net Interest Margin (NIM)	-----							
Digital Capital Expenditure Ratio (DCR)	0.078	-----						
	0.042							
Digital Contact Point Ratio (DCPR)	0.103	-0.008	-----					
	0.027	0.929						
Digital Penetration Ratio (DPR)	-0.040	-0.072	0.280	-----				
	0.671	0.444	0.003					
Digital Transaction Growth Ratio (DTGR)	0.332	0.080	0.267	-0.124	-----			
	0.000	0.399	0.004	0.187				
It Investment Ratio (ITR)	0.092	-0.041	-0.191	-0.241	0.444	-----		
	0.330	0.663	0.041	0.009	0.000			
Firm Size (FS)	-0.221	-0.773	-0.184	0.114	-0.289	-0.047	-----	
	0.018	0.000	0.049	0.226	0.002	0.616		
Leverage (LEV)	-0.255	-0.637	0.353	0.330	0.056	-0.031	0.370	-----
	0.006	0.000	0.000	0.000	0.553	0.745	0.000	

Source: Survey data

4.3 Multicollinearity test

Variance Inflation Factor (VIF) analysis was performed to assess multicollinearity among independent variables and the results are presented in Table 4 below. The centered VIF values range from 1.311 (DPR) to 4.250 (DCR), which are well below the commonly accepted threshold of 10, indicating that multicollinearity is not a serious concern in the dataset. Similarly, the uncentered VIF values are high for the constant and firm size, but this is expected in panel data and does not affect the explanatory variables. These results confirm that the independent variable digital transformation indicators (DCR, DCPR, DPR, DTGR, ITR) and firm characteristics (FS, LEV) can be reliably included in the regression models without causing instability in coefficient estimates.

Table 4: Results of the Multicollinearity test

Variable	Coefficient variance	Uncentered VIF	Centered VIF
Constant	0.013971	4513.908	NA
DCR	0.004128	8.060178	4.250156
DCPR	0.000328	51.29494	1.576101
DPR	0.000227	13.82906	1.311305
DTGR	0.000147	14.27330	1.613610
ITR	0.000280	5.263012	1.466699
FS	1.04E-05	2437.085	3.175887
LEV	0.004532	1242.249	2.403739

Source: Survey data

4.4 Regression Analysis

The results of the panel data regression analysis are presented in Table 5. Three models: Pooled Ordinary Least Squares (OLS), Fixed Effects, and Random Effects were estimated to examine the impact of digital transformation on the NIM of Licensed Commercial Banks in Sri Lanka during the period 2020–2024.

The pooled OLS results indicate that Digital Capital Expenditure Ratio, Digital Contact Point Ratio, Digital Penetration Ratio, and Digital Transaction Growth Ratio exhibit positive coefficients, suggesting that digital transformation variables are associated with higher NIM. In contrast, IT Investment Ratio shows an inconsistent effect across models. Among the control variables, Firm Size and Leverage demonstrate negative coefficients, indicating an inverse relationship with NIM. To determine the most appropriate model, several diagnostic tests were conducted. The F-test comparing pooled OLS and fixed effects is significant, indicating the presence of individual-specific effects. The Breusch–Pagan Lagrange Multiplier (LM) test confirms that the random effects model is preferable to pooled OLS. Furthermore, the Hausman test yields an insignificant result ($p > 0.05$), indicating that the random effects model is consistent and efficient.

Based on these results, the random effects model is selected as the most appropriate specification for interpreting the relationship between digital transformation and NIM. Under this model, Digital Capital Expenditure Ratio, Digital Contact Point Ratio, and Digital Penetration Ratio maintain positive associations with NIM, while Digital Transaction Growth shows a marginal effect. IT Investment Ratio does not exhibit a statistically meaningful relationship. Firm Size and Leverage continue to display negative associations with NIM. Overall, the regression results suggest that digital transformation contributes to banking performance primarily through investment, accessibility, and usage-related dimensions, while structural characteristics such as size and leverage also play a significant role.

Table 5: Results of the Panel Data Regression Analysis

Variable	OLS	Random Effects	Fixed Effects
	Coefficient	Coefficient	Coefficient
	Prob.	Prob.	Prob.
Contant	0.5685	0.5692	0.9192
	0.0000	0.0007	0.0263
Digital Capital Expenditure Ratio	0.2479	0.2372	0.2638
	0.0002	0.0028	0.0061
Digital contact point ratio	0.0187	0.0177	0.0302
	0.0345	0.0487	0.4157
Digital penetration ratio	0.0265	0.0211	0.0276
	0.0413	0.0455	0.1763
Digital transaction growth ratio	0.0379	0.0216	0.0351
	0.0023	0.0566	0.0429
IT investment ratio	-0.0096	0.0160	0.0384
	0.5683	0.4953	0.2734
Firm size	-0.0088	-0.0110	-0.030033
	0.0072	0.0301	0.0814
Leverage	-0.3379	-0.2685	-0.114845
	0.0000	0.0051	0.4962
No of observations	115	115	115
R-squared	0.3023	0.1438	0.8210
Adjusted R-squared	0.2567	0.1371	0.7600
F-statistic	6.6248	20.8205	13.451
Prob(F-statistic)	0.000002	0.0000	0.0000
F Test		11.2018	
(Pooled VS Fixed)		0.000	
Breusch & Pegan Lagrange Multiplier Test (Pooled VS Random)			95.312 0.0000
Hausman test			
Chi square		4.3648	
P value		0.7369	

Source: Survey data

4.5 Hypotheses Testing

The hypotheses of this study were tested using the random effects model, which was identified as the most appropriate specification based on the Hausman test results. The findings reveal that digital transformation has a significant impact on the Net Interest Margin (NIM) of Licensed Commercial Banks in Sri Lanka, thereby partially supporting the main hypothesis (H1). This significance is observed particularly in relation to the digital penetration ratio, digital capital expenditure ratio, and digital contact point ratio. However, the remaining two variables: digital transaction growth ratio and IT investment ratio do not show a statistically significant impact on NIM. This result is consistent with prior studies such as Westerman et al. (2014) and Vial (2019), which emphasize that digital transformation enhances organizational performance through improved efficiency, innovation, and customer-centric strategies. It also aligns with data value theory, which posits that digital capabilities enable firms to leverage data for improved decision-making and financial outcomes (Miller & Mork, 2013).

With regard to the sub-hypotheses, the digital penetration ratio (H1a) shows a positive and significant impact on NIM ($\beta = 0.0211$, $p = 0.0455$), consistent with Kitsios et al. (2021), who argue that increased adoption of digital platforms enhances accessibility and customer engagement, leading to improved financial performance. This supports the view that higher digital usage enables banks to generate value from customer data, in line with data value theory.

Similarly, the digital capital expenditure ratio (H1b) demonstrates a positive and significant effect on NIM ($\beta = 0.2372$, $p = 0.0028$), indicating that investment in digital infrastructure enhances banking efficiency and profitability. This finding is consistent with the Resource-Based View (RBV), which posits that strategic investment in valuable and difficult-to-imitate technological resources can generate sustained competitive advantage (Barney, 1991). Empirical support is provided by Beccalli (2007), who confirms that technological investments can improve efficiency and financial outcomes in banks. However, this result contrasts with the productivity paradox perspective, which suggests that IT investments do not always translate into performance gains due to inefficiencies in implementation and utilization (Brynjolfsson & Hitt, 1998).

The digital contact point ratio (H1c) also exhibits a positive and significant relationship with NIM ($\beta = 0.0177$, $p = 0.0487$), aligning with Ivanov et al. (2019) and Nambisan et al. (2019), who emphasize the role of digital customer interaction channels in enhancing customer experience and retention. This supports the argument that customer-centric digital transformation strategies contribute to improved financial outcomes.

In contrast, the digital transaction growth ratio (H1d) shows an insignificant effect on NIM ($\beta = 0.0216$, $p = 0.0566$), thereby not supporting the hypothesis. This finding contradicts Jatić et al. (2017), who found that digital transactions improve efficiency and reduce operating costs, although the strength of this relationship may vary across institutions.

Similarly, the IT investment ratio (H1e) is statistically insignificant (β = 0.0160, p = 0.4953), leading to the rejection of the hypothesis. This supports the productivity paradox perspective and aligns with Beccalli (2007), who argues that IT investment does not automatically translate into improved financial performance without effective utilization.

Overall, the findings indicate that while certain dimensions of digital transformation significantly contribute to bank profitability, the impact is not uniform across all variables. The results highlight that strategic implementation, effective utilization of digital investments, and customer-centric approaches are critical for translating digital initiatives into improved financial performance.

5. Conclusion

This study empirically examined the impact of digital transformation and bank characteristics on the financial performance of 23 licensed commercial banks in Sri Lanka during the period 2020–2024. Panel data regression analysis identified the random effects model as the most appropriate specification for generalizing the findings across banks.

The findings reveal that selected dimensions of digital transformation have a significant impact on the NIM, highlighting the critical role of strategic digital initiatives in enhancing bank profitability. In particular, digital penetration, digital capital expenditure, and digital customer engagement (digital contact point ratio) positively and significantly influence NIM, indicating that banks benefit from increased digital adoption, investment in digital infrastructure, and improved customer interaction channels. However, IT investment alone is not statistically significant, emphasizing that digital spending must be effectively integrated into a broader strategic framework to generate financial benefits. Additionally, larger banks and banks with higher leverage tend to experience lower NIM, indicating challenges associated with operational complexity and financial burden.

Overall, the study supports the notion that strategic digital transformation is a key driver of financial performance in the Sri Lankan banking sector, while traditional financial and structural factors, such as bank size and leverage, continue to influence profitability. Accordingly, bank managers are encouraged to focus on targeted digital initiatives that enhance customer engagement, improve transaction efficiency, and optimize capital allocation.

Theoretical Implications

This study contributes to the existing literature on digital transformation and bank performance by integrating and reconciling the contrasting perspectives of data value theory and the productivity paradox theory. The findings demonstrate that digital transformation does not exert a uniform effect on financial performance; rather, its impact varies across different dimensions such as digital penetration, capital expenditure, and customer interaction channels. By disaggregating digital transformation into measurable components, this study extends prior research that often relies on single proxies, thereby providing a more nuanced

understanding of how digital initiatives influence profitability in the banking sector, particularly within an emerging economy context.

Practical and Policy Implications

From a practical perspective, the findings suggest that bank managers should prioritize strategic digital investments, particularly in digital capital expenditure and customer-facing technologies, rather than focusing solely on aggregate IT spending. Enhancing digital customer engagement and improving service delivery channels can contribute to greater operational efficiency and improved profitability.

From a policy perspective, regulators and policymakers can play a crucial role in facilitating digital transformation by providing supportive frameworks, incentives, and regulatory guidance that encourage effective digital adoption. Such initiatives can enhance efficiency, innovation, and competitiveness across the banking sector.

Directions for Future Research

Future studies may explore the long-term impact of digital transformation on risk-adjusted performance, incorporate alternative performance measures beyond NIM, and extend the analysis to other emerging economies to enhance the generalizability of the findings.

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