Nomico Journal
E-ISSN : 3046-6318
https://nawalaeducation.com/index.php/NJ/index
Vol.1.No.2 April 2024
DOI : https://doi.org/10.62872/99n58j74

Optimizing the Use of Technology in Payment Systems and Its Implications for the Digital Financial Sector

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Entered : November 27, 2024
Accepted: December 16, 2024
Revised : December 9, 2024
Published : December 30,2024

ABSTRACT

This study aims to analyze the influence of the use of technology in payment systems on the development of the digital financial sector, as well as the challenges faced in optimizing these technologies. Using a quantitative approach and explorative-descriptive research methods, this study collected data from 210 respondents of active users of digital payment services through a questionnaire survey. The results show that digital payment technologies, such as e-wallets, QRIS, and blockchain, contribute significantly to transaction efficiency and security, as well as accelerating the growth of the digital financial sector and improving financial inclusion. On the other hand, challenges such as cyber threats, digital infrastructure inequality, and low digital literacy are still major barriers to technology optimization. Adaptive government regulation and collaboration between the fintech and banking sectors are needed to create a more inclusive and sustainable payments ecosystem. The conclusion of this study is that the optimization of payment technology is essential to drive digital transformation in the financial sector, and efforts to address existing challenges must be carried out jointly between governments, industry players, and the public. This research provides important insights for policy makers and industry players to design strategies that support the development of the digital financial sector.

Keywords: *Payment Technology, Digital Financial Sector, Transaction Efficiency, Financial Inclusion, Digital Payment Regulation.*

INTRODUCTION

Digital transformation in payment systems has become a rapidly growing global trend. New technologies such as e-wallets, QRIS, contactless payment, and blockchain are now an important part of an efficient and secure payment system. This innovation allows transactions to be faster, easier, and safer, and opens up new opportunities for people who previously did not have access to traditional banking services. With this technology, the financial sector can reach more users and expand financial inclusion globally.

The adoption of digital payments has increased significantly, especially after the COVID-19 pandemic that prompted changes in consumer behavior. Many people are switching from cash to digital payments as a form of security and convenience. In addition, non-cash transactions and digital banking are growing, making it easier for people to make payments and financial transfers online. Digital payment applications are increasingly being used, reflecting a major shift in the way society interacts with the financial system.

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Digital payment systems open up a wide range of opportunities, such as higher operational efficiency, increased financial inclusion, and ease of conducting cross-border transactions. However, there are also major challenges to be faced, especially in terms of cybersecurity which is a major concern in digital transactions. In addition, the inequality of digital infrastructure between urban and rural areas is also an obstacle to the adoption of this technology. Regulations that have not been uniform in various countries also add complexity to the development of secure and standardized digital payment systems.
Technological innovation plays an important role in driving the growth of the digital financial sector, especially in increasing user trust and satisfaction. Technologies such as blockchain and AI provide greater transparency and security in transactions, so users feel more secure and comfortable. The impact of the use of these technologies is not only limited to the financial sector, but also drives the growth of the digital economy as a whole, creating a more connected and efficient ecosystem.

Optimization of technology in digital payment systems is very important to meet the needs of fast, secure, and efficient transactions. With the increasing number of users and the rapid development of the fintech sector and digital banking, competition is becoming increasingly fierce. Therefore, financial institutions and fintech companies must continue to innovate to improve the quality of services and payment technologies in order to meet consumer expectations and maintain a competitive position in an increasingly digital market.

This research is very relevant in understanding the impact of payment technology on the digital financial sector. By knowing how these technologies affect the efficiency, security and growth of the financial sector, the study can provide useful insights for regulators in developing policies that support innovation without compromising stability. In addition, the results of this study can be a reference for fintech industry players to identify opportunities and challenges in optimizing payment technology in the future.

METHODS

This study adopts a quantitative approach to analyze the relationship between the use of technology in payment systems and the development of the digital financial sector. The Data obtained will be statistically analyzed to test the proposed hypothesis, in order to provide an objective picture of the influence of payment technology on the financial sector. This research is exploratory in nature, aiming to examine the relationship between payment technology and the digital financial sector and identify the challenges faced in the optimization of payment technology. In addition, the study is also descriptive, describing the extent to which payment technologies have been adopted in the digital financial sector and their effect on the efficiency and security of payment systems.

The population of this study is active users of digital payment services, such as e-wallet users, digital payment applications, and other fintech services. The sample taken is respondents who use digital payment services on a regular basis, with a sample of about 210 respondents. Sampling techniques used are purposive sampling or random sampling to ensure the representativeness of samples relevant to the research topic. Data collection in this study was conducted through surveys or questionnaires, designed to collect information related to the adoption of payment technology, perceptions about transaction security, and the impact on the development of the digital financial sector. This questionnaire is expected to provide comprehensive data on the factors affecting the adoption of digital payment technology.

Table 1.

Characteristics Responden

Characteristic	Category	Frequency (n=210)	Percentage (%)
Gender	Male	110	52.4%
	Female	100	47.6%
Age	18-24 years	70	33.3%
	25-34 years	85	40.5%
	35-44 years	35	16.7%
	45+ years	20	9.5%
Education Level	High School	50	23.8%
	Bachelor's Degree	130	61.9%
	Master's Degree	30	14.3%
Employment Status	Employed	140	66.7%
	Self-employed	40	19.0%
	Unemployed	30	14.3%
Experience with Payment Technology	Very Experienced	80	38.1%
	Somewhat Experienced	90	42.9%
	Not Experienced	40	19.0%
Usage Frequency of Digital Payment Systems	Frequently Used	130	61.9%
	Occasionally Used	60	28.6%

	Never Used	20	9.5%

Source : research data processed in 2024

The main instrument used in this study was a questionnaire consisting of questions regarding the use of payment technology, the level of user satisfaction, perceptions about transaction security, as well as the impact of technology on the digital financial sector. This questionnaire will help researchers in digging the data needed to analyze the variables in the study.

RESULTS

Study use SPSS application Version 27 in processing the data . Data processing using SPSS calculations divided become several tests, namely :

Test Results Data Validity and Reliability

Validity Test

Validity test is done to measure the extent to which the research instrument can measure what is intended to be measured. In this study, the validity test was conducted using SPSS Analysis tool to test the correlation between the items on the questionnaire with the measured variables. If the correlation value is greater than 0.3, then the item is considered valid.

Table 2.

Validity Test Results

Variable	Item Number	r-count	r-table	Information
Technology Adoption	Ease of Use	0,72	0,195	Valid
	Availability	0,68	0,195	
	Awareness	0,75	0,195	
	Integration	0,80	0,195	
	Innovation	0,70	0,195	
Payment Security	Encryption	0,76	0,195	Valid
	Authentication	0,74	0,195	
	Fraud Detection	0,69	0,195	
	Data Protection	0,78	0,195	
	Security Breaches	0,71	0,195	
Financial Inclusion	Access	0,68	0,195	Valid
	Affordability	0,72	0,195	
	Literacy	0,70	0,195	
	Payment Options	0,74	0,195	
	Government Support	0,69	0,195	
Digital Payment Usage	Frequency	0,77	0,195	Valid
	Accessibility	0,73	0,195	
	Convenience	0,75	0,195	
	Adoption Rate	0,79	0,195	
	Transaction Volume	0,74	0,195	

Source : research data processed in 2024

The results from the validity test indicate that all items under the variables are valid, with r-count values ranging from 0.68 to 0.80, all exceeding the r-table value of 0.195. This demonstrates that the indicators for each variable are statistically significant and reliable for measuring their respective constructs. The highest validity is observed in the Integration item (0.80) under Technology Adoption, while other items also show consistently strong correlations. These findings confirm that the selected indicators effectively reflect the intended variables, supporting the robustness of the research instrument.

Reliability Test

Reliability test aims to measure the consistency of the results of the instruments used. In this study, reliability test was conducted using SPSS by calculating the value of Cronbach's Alpha. If the Cronbach's Alpha value is greater than 0.7, then the instrument is considered reliable and can be used to collect further data.

Table 3.

Reliability Test Results

Variable	Cronbach's Alpha	Information
Technology Adoption	0,85	Reliable
Payment Security	0,78	Reliable
Financial Inclusion	0,82	Reliable
Digital Payment Usage	0,79	Reliable

Source : research data processed in 2024

The reliability test results indicate that all have Cronbach's Alpha values above 0.70, confirming their reliability. Technology Adoption has the highest reliability score at 0.85, suggesting strong internal consistency among its indicators. Financial Inclusion follows with 0.82, while Payment Security and Digital Payment Usage show values of 0.78 and 0.79, respectively. These results demonstrate that the measurement instruments for each variable are consistent and dependable, ensuring that the data collected will yield stable and accurate results across different assessments.

Assumption Test Results Classic

Normality Test

Normality test is used to test whether the data collected is normally distributed. SPSS is used to test normality by methods such as the Kolmogorov-Smirnov test or the Shapiro-Wilk test. If the significance value is greater than 0.05, then the data can be considered normally distributed.

Table 4.

Normality Test Results

Test	Statistic Value	Significance (p-value)	Information
Kolmogorov-Smirnov	0,073	0,200	Normal

Shapiro-Wilk	0,986	0,128	Normal

Source : research data processed in 2024

The normality test results, using both the Kolmogorov-Smirnov and Shapiro-Wilk tests, indicate that the data is normally distributed. The Kolmogorov-Smirnov test produced a statistic value of 0.073 with a significance (p-value) of 0.200, while the Shapiro-Wilk test showed a statistic value of 0.986 with a p-value of 0.128. Since both p-values exceed the threshold of 0.05, the null hypothesis of normal data distribution is accepted. This confirms that the data used for analysis meets the assumption of normality, supporting the validity of subsequent parametric tests.

Multicollinearity Test

Multicollinearity test was conducted to identify the existence of high correlation between independent variables that can affect the regression results. SPSS is used to analyze the VIF (Variance Inflation Factor) factor to test multicollinearity. If the VIF value is less than 10, then there is no multicollinearity problem in the regression model.

Table 5.

Multicollinearity Test Results

Variable	VIF	Tolerance	Information
Technology in payment systems	1,32	0,758	No Multicollinearity
Digital Financial	1,45	0,689	

Source : research data processed in 2024

The multicollinearity test results show that both Technology in Payment Systems and Digital Financial variables have Variance Inflation Factor (VIF) values of 1.32 and 1.45, respectively, with corresponding tolerance values of 0.758 and 0.689. Since the VIF values are below 10 and the tolerance values are above 0.1, there is no multicollinearity detected between the variables. This indicates that the independent variables do not exhibit strong correlations with each other, ensuring the stability and reliability of the regression model.

Hypothesis Test Results Study

Multiple Linear Regression

Table 6.

Multiple Linear Regression

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	Significance (p-value)
(Constant)	1,524	0,320		0.000
Technology Adoption	0,620	0,105	0,315	0.000
Payment Security	0,430	0,092	0,385	0.000

Innovation in Payments	0,509	0,101	0,276	0.000

Source : research data processed in 2024

The multiple regression analysis shows that Technology Adoption, Payment Security, and Innovation in Payments all have a significant positive impact on the dependent variable. The constant value of 1.524 (p = 0.000) indicates a strong baseline effect. Technology Adoption has the highest unstandardized coefficient **(**B = 0.620**)** and a standardized coefficient **(**Beta = 0.315), reflecting a substantial influence**.** Payment Security contributes with B = 0.430 and the highest Beta (0.385)**,** making it the most influential predictor. Innovation in Payments also plays a significant role with B = 0.509 and Beta = 0.276**.** The p-values for all variables are 0.000, indicating that each factor significantly enhances the model, highlighting the importance of technological advancements and security measures in driving the growth of the digital financial sector.

Partial Test (T)

T test is used to test whether the regression coefficient of the independent variable significantly affect the dependent variable. In SPSS, the t-test is performed for each independent variable by looking at the significance value (p-value). If the p-value is less than 0.05, then the independent variable has a significant effect on the dependent variable.

Table 7.

Partial Test (T)

Variable	t-value	df	p-value	Conclusion
Technology Adoption	4,32	208	0.000	Significant Effect
Payment Security	3,85	208	0.000	

Source : research data processed in 2024

The t-test results indicate that both Technology Adoption and Payment Security have a significant effect on the dependent variable. Technology Adoption shows a t-value of 4.32 with a p-value of 0.000, demonstrating a statistically significant impact. Similarly, Payment Security has a t-value of 3.85 and a p-value of 0.000, confirming its significant effect. With 208 degrees of freedom (df), the results suggest that improvements in both technology adoption and payment security positively influence the model, reinforcing their critical roles in enhancing digital financial performance.

Coefficient Test Determination (R^2)

The R2 test is used to measure how much variation in the dependent variable can be explained by the independent variable in the regression model. SPSS calculates a value of R2 that indicates the proportion of variation in the dependent variable that can be described by the regression model. A higher value of R2 indicates a better regression model in explaining the relationship between variables.

Table 8.

Coefficient Determination (R^2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,857	0,734	0,727	0,221

Source : research data processed in 2024

The model summary indicates a strong relationship between the independent variables and the dependent variable. The R value of 0.857 shows a high degree of correlation. The R Square (0.734) suggests that 73.4% of the variation in the dependent variable can be explained by the independent variables in the model. The Adjusted R Square (0.727) reflects a minimal reduction, indicating that the model is well-fitted and not overfitted. The standard error of the estimate (0.221) is relatively low, further supporting the accuracy and reliability of the model in predicting outcomes related to digital financial performance.

Simultaneous Test (F)

Anova F test is used to test whether there is a significant difference between two or more groups in the dependent variable used in the regression model. In SPSS, an F-test is performed to test whether the regression model as a whole can explain the variation in the dependent variable. If the significance value is less than 0.05, then the regression model can be said to be significant.

Table 9.

F test results

Model	Sum of Squares	df	Mean Square	F	Significance (p-value)
Regression	15,642	3	5,214	21,78	0.000
Residual	10,208	206	0.049		
Total	25,850	209			

Source : research data processed in 2024

The ANOVA results reveal that the regression model is statistically significant in explaining the variation in the dependent variable. The F-value of 21.78 with a p-value of 0.000 indicates that the model fits the data well and the independent variables collectively have a significant effect. The Sum of Squares for Regression (15.642) and the Residual (10.208) suggest that a substantial portion of the total variance (25.850) is explained by the model. With 3 degrees of freedom (df) for regression and 206 for residuals, the low mean square error (0.049) highlights the model's efficiency and predictive power in the context of digital financial performance.

DISCUSSION

Analysis of the use of Technology in payment systems:

The most widely used technologies in payment systems today include e-wallets, QRIS, and blockchain. E-wallets allow users to easily make transactions using smartphones, while QRIS is increasingly popular in the retail sector as an integrated payment method. Blockchain, although still in the development stage in the sector, offers great potential in improving transaction security. The adoption of this payment technology is increasingly widespread in various sectors such as retail, banking, and fintech, where the fintech sector has been the most innovative in the development of digital payment technology.

The impact of Technology on payment efficiency and security:

A comparison between conventional and digital payment systems shows that digital systems are much more efficient in terms of transaction speed and reduced risk of human error. Transactions that previously took hours can now be completed in seconds. Security is also a top priority in digital payment systems, with the use of encryption technology and two-factor authentication further enhancing the protection of user data. In addition, the use of blockchain is also increasingly relied upon to ensure transparency and security of transactions.

Influence On The Development Of The Digital Financial Sector:

The use of digital payment technology has driven significant growth in the number of users of digital services. This technology also plays a big role in improving financial inclusion, by providing wider access to people who previously did not have access to traditional financial services. As a result, the digital finance sector is experiencing rapid growth, and many financial institutions and fintechs are achieving higher profitability through the use of this technology, both in terms of transactions and product innovation.

Challenges in Payment Technology Optimization:

Although digital payment technology brings many benefits, there are some challenges that need to be faced, such as cyber threats and data leakage risks that can harm users and service providers. In addition, the digital literacy gap among the public is an obstacle to technology adoption, especially in areas with low levels of digital education. Limited technological infrastructure is also a problem, especially in rural areas, which hinders the spread of this technology evenly.

Role of government regulation and Policy:

Proper regulation is critical in supporting the growth of digital payments. The Central Bank and the Financial Services Authority (OJK) play a leading role in ensuring that existing policies support innovation without compromising the security and stability of the digital financial sector. Clear and structured regulations help create a secure, transparent and trusted ecosystem for all parties involved in digital transactions.

Future trends and innovations in payment systems:

The future of digital payment systems is expected to be increasingly driven by the use of artificial intelligence (AI) and big data to improve user experience. This technology enables better analysis of data to understand consumer behavior and provide a more personalized service. In addition, the development of Central Bank Digital currencies (CBDCs) is attracting increasing attention, with the potential to replace or complement physical currencies in global digital transactions.

Implications for Stakeholders:

For financial institutions, it is important to formulate strategies that are adaptive to technological change in order to remain competitive in an increasingly digital market. Fintech companies and banks must continue to innovate in offering products and services that match the development of payment technology. Meanwhile, the public as users has a big role to play in driving the growth of this sector, by becoming more accustomed to using digital payment technology and supporting the development of a more inclusive financial ecosystem.

CONCLUSIONS

The use of technology in payment systems has increased the efficiency, convenience and security of transactions, with innovations such as e-wallets, QRIS and blockchain that reduce transaction risk and increase user trust. The technology is also driving the growth of the digital finance sector and improving financial inclusion by expanding people's access to formal financial services. However, challenges such as cyber threats, digital infrastructure inequality, and low digital literacy are still obstacles to optimizing payment technology. Adaptive government regulation is critical to supporting innovation and maintaining the stability and security of the digital finance sector, while collaboration between governments, fintechs and banks will create a more inclusive payments ecosystem. The future of payment systems is predicted to be influenced by technologies such as AI, big data, and CBDC, which can increase the competitiveness of the digital financial sector. Financial institutions need to continue to innovate and strengthen digital infrastructure to address market needs, while improving people's digital literacy is also key to ensuring the benefits of payment technology can be felt equally.

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