National College of Ireland

Facilitating Business Transactions in the Digital Era: An Analysis of the Impact of FinTech Development in Indonesia's E-commerce

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Facilitating Business Transactions in the Digital Era: An Analysis of the Impact of FinTech Development in Indonesia's E-commerce

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Abstract

FinTech developments have shifted consumer behaviour in conducting digital transactions on Indonesian E-Commerce in payment transactions and adapting from traditional banking to digital transactions. The purpose of this study is to analyse what variables have an impact on consumer behaviour in adopting digital payment services in Indonesia by integrating the Technology Acceptance Model (TAM) to explain factors that significantly affect digital transactions. This research was conducted using factor analysis by applying the Confirmatory Factor Analysis (CFA) approach as a measurement model to measure the validity test as well as a structural model for analysis and determining the relationship between factors. The findings reveal that consumer intentions in conducting digital transactions are influenced by three factors accessibility, payment services, and security in adopting digital payments. This research can provide essential information for stakeholders in improving payment services and become a reference for policymakers in developing the right strategy for the development of digital payment services in the future.

1 Introduction

The digital revolution has become a significant global trend in various sectors including E-Commerce and Covid-19 has been the trigger that accelerated the sudden and drastic digital revolution. Abdalla et al., (2021) described that the Covid-19 pandemic has accelerated and changed consumer behaviour for the adoption of digital technology in everyday life, business, and education due to social restrictions, lockdowns, and changes in consumer behaviour due to the pandemic. However, the revolution process uncovered several problems such as inadequate digital infrastructure, cyber security which has a risk of fraud, data privacy theft, and digital inequality for disadvantaged groups, remote areas, and people who have limited access to technology.

The use of E-Commerce platforms has expanded quickly around the world because it is driven by several factors such as increasing internet use, smartphone penetration, and changes in consumer behaviour. Yusoff et al., (2020) conducted research on customer satisfaction in using the E-Commerce platform and found several influencing factors, namely service quality such as delivery duration, stock availability, and level of difficulty in the payment process. Security and efficiency are also a concern for E-Commerce platform users, thus affecting the level of user trust in the platform.

Effective fraud detection must be developed to maintain user security and trust in digital payment systems because digital fraud has become a fundamental problem resulting in

financial losses that affect customer satisfaction Para et al., (2023). Types of fraud such as identity theft, credit card fraud, and fraudulent transactions have become a problem faced in digital payments to identify legitimate and unauthorized transactions. Fraud often involves complex and variable complexity making fraud patterns challenging to detect and requiring an intelligent approach such as developing algorithms capable of learning fraud patterns.

Even though digital technology has revolutionized significantly and influenced customers in E-Commerce transactions, several challenges have been faced by users and E-Commerce business owners, so this study aims to determine to what extent the combination of FinTech technology factors has influenced digital transaction services in making digital payments with analyse: ***" How do users perceive the usefulness and the perceived convenience of the digital transactions provided by FinTech-enabled payment methods in Indonesia's E-Commerce, and how does this perception influence their transaction behaviour?"*** The Technology Acceptance Model (TAM) will be integrated to provide insight into the constructs of influencing factors, research methodology, design specifications, implementation, evaluation, and conclusions, as well as future work.

2 Related Work

2.1 Payment Services

FinTech technology in the field of online payments has a considerable influence on the business model of e-commerce businesses, Wierik (2019) argues that the adoption of FinTech technologies such as digital wallets, blockchain-based payments, and biometric technology in the context of online payments for e-commerce businesses in the payment process faster and more efficiently online to increase consumer confidence in e-commerce platforms. FinTech technology has provided benefits and changed the landscape of the online payment industry with various payment innovations such as Near Field Communication (NFC) technology, which makes transactions faster, safer and recorded in smart contracts.

Kim & Kim (2020) found the effect of blockchain technology on payments in the e-commerce business and compared it to traditional payments where there are several obstacles such as security, high transaction fees, and dependence on third parties so the process is longer and inefficient. Through blockchain technology, these obstacles can be overcome to enable e-commerce payment transactions that are safe, decentralized, transparent, and process faster because they do not require a third party and can reduce transaction costs.

Support Vector Machine (SVM) algorithm which is a machine learning technique for classifying and analysing data is often applied for complex mobile payment classification. Liu (2022) divides the classification of payments into two categories: successful transactions, and failed transactions. In the e-commerce industry, unintentional double payments by customers can lead to financial losses and customer dissatisfaction. Chahar et al., (2023) proposed a micropayment mechanism to overcome this risk by involving an efficient verification and validation process for each payment transaction and payment confirmation before the transaction is completed through secure encryption technology Poerjoto et al., (2021).

2.2 Security

Smart contract technology has been widely used in digital payment systems to increase payment security. Ahmadisheykhsarmast & Sonmez, (2020) propose to ensure payments are safe, transparent, and automatic using blockchain technology and smart contracts which can provide advantages in payment security. Smart contracts provide transparency, are immutable, and can be monitored by all parties involved so that payments become effective and efficient thereby increasing the trust of the parties involved. Mahmudnia et al., (2022) explained that digital payments need to pay attention to several aspects of threats such as identity theft, account hacking, and personal data theft which are serious problems because there is a possibility that user data can be accessed by unauthorized parties, so an understanding of security is needed. and privacy in making digital payments.

Digital payments have developed rapidly and with the increasing use of digital technologies security and privacy have become critical issues. Sahi et al., (2022) explained that digital payments need to pay attention to several aspects of threats such as identity theft, account hacking, and personal data theft which are serious problems because there is a possibility that user data can be accessed by unauthorized parties, so an understanding of security is needed. and privacy in making payments. Vijayan et al., (2020) also expressed concerns about security in electronic payments related to security and privacy issues when users make electronic transactions and researchers propose a blockchain technology system to maintain security. Abbas Helmi & Shang Ren, (2022) also stated that digital payments have become a rapidly growing trend, but security and privacy issues have become major concerns that need to be improved.

2.3 Accessibility

In the digital era, changes in payment from the use of cash and digital payments have impacted financial accessibility among the public. Kameswaran & Muralidhar, (2019) investigated the accessibility of payment transformation to demonetization to reduce typical crimes in India such as counterfeiting, and corruption. However, the problems that arise during this transition process are accessibility gaps that make some people experience difficulties and obstacles in making digital payments such as inadequate infrastructure, lack of understanding of digital literacy and disparities in the level of use of digital payments in various regions, thus affecting the distribution of accessibility.

Cognitive accessibility in digital payments which has become an integral part of daily life has experienced limitations for groups of individuals. Dai et al., (2023) stated that groups of individuals who experience cognitive limitations such as learning disorders for autism or people with Alzheimer's disease will experience difficulties when wanting to make complex digital payments due to unclear instructions, complicated interface processes have become obstacles for groups of individuals to make transactions which are safe and effective. Mohamed et al., (2021) also shared the same opinion regarding the difficult-to-understand and complex limitations of authentication accessibility which are an obstacle for users who have a level of ability and limitations in making online payments on applications.

Coffie et al., (2020) analysed an econometric panel regarding mobile payment transactions and traditional bank efforts towards financial accessibility in Sub-Saharan Africa where individuals or groups still experience difficulties accessing financial services such as ownership of bank accounts, credit applications, voicemail, and limited payment services due to several factors such as geographical distance from financial institutions, lack of adequate financial infrastructure, high transaction costs and lack of financial literacy among the public. In contrast to the Chinese market, E-Commerce has become an integral part of everyday life where many purchase transactions are carried out online Abdalla et al., (2021).

2.4 Cost-effectiveness

Mobile payment financial services have developed rapidly in developing countries allowing individuals to carry out transactions via their mobile phones such as money transfers, bill payments, and purchasing goods on E-Commerce platforms, and the ability to reach hard-to-reach populations Yao et al., (2022). However, transaction costs have become an obstacle for users and can reduce user incentives and benefits, transaction costs also affect market participation in accessing products available on the market thereby affecting business transactions, infrastructure, and digital literacy factors are also a problem for users who use cellular payment services Abooleet & Fang, (2021).

The complex economic challenges that have influenced consumers' payment choices in Zimbabwe include the effects of high inflation, limited access to formal finance, and changes in consumer payment preferences which are influenced by several factors such as payment choices, associated costs, and risks Simatele & Mbedzi, (2021). The rapid development of financial technology has affected payment options in Zimbabwe which include social and economic factors that influence the process of technology adoption, transaction costs, administrative fees, and currency conversion fees as well as transactional problems borne by consumers thus influencing the decision to make a transaction. In contrast to developed countries which are familiar with blockchain technology, there are transaction fees that are charged to users and need to ensure the security of the blockchain Mercan et al., (2020).

In Indonesia, the use of digital payment services has increased significantly among millennials such as digital wallets and digital money transfers which have gradually replaced the use of cash. Kamal et al., (2023). However, high transaction costs affect preferences for using digital payment services and some of the problems that arise are high transaction costs and become an obstacle in providing accessibility, especially for low-income people who find it difficult to access digital payment services.

2.5 Transparency

The development of digital technology and the adoption of digital payment services are increasingly popular in various countries and raises the question of whether digital payments can help reduce corruption which can harm economic growth through increased transparency. Setor et al., (2021). Problems related to corruption such as not recording cash transactions that allow manipulation and fraud in payments, as well as transparency of digital transactions in the flow of funds, can also help detect suspicious or illegal financial activities, and digital services

are expected to have a domino effect in eradicating corruption by increasing transparency in payment process because it can reduce the space for corruptors to move.

Online transaction of goods and services has developed rapidly so that smart contracts for digital payments appear that use blockchain technology to execute contracts automatically Shumyliak et al., (2023). Transparency is the key to implementing smart contracts for digital payments that are transparent so that the digital payment process is clear. Transparency and trust in the traditional or conventional financial industry is often a significant problem because market players often face challenges in verifying the authenticity of transactions Ravindran & Vamsi, (2021).

Transparency in trade has a significant role in building trust between businesspeople and consumers in the B2B E-Commerce platform to build strong business relationships Lahkani et al., (2020). Some of the problems faced in achieving transparency in B2B E-Commerce are the lack of detailed information about transactions which becomes an obstacle in making business decisions. Such as the findings of Taherdoost & Madanchian, (2023) regarding the convenience of E-Commerce, there are still several problems in realizing transparency such as payment systems that are not transparent and vulnerable to cyber-attacks, schemes related to the process of sending goods because they do not have transparent information.

3 Research Methodology

3.1 Data Collection

To fulfil the research objectives, a quantitative approach will be used using a Questionnaire Technique to collect respondent data to measure customer satisfaction with digital payment services Tiwari et al., (2022). This research was conducted on Indonesian society using a structured questionnaire through questions related to the five factors at issue, namely payment services, security, accessibility, cost-effectiveness, and transparency.

3.2 Data Analysis

After the dataset is obtained, the data will be processed by changing some of the variables measured into a Likert scale with a total of 5 points with a scale of strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5. After that, the data is processed using factor analysis, namely the statistical method used to identify patterns of relationships between variables into smaller factors to explain variations in data forms and understand the factors that influence continuance intention in using digital payment services. Factor analysis techniques will assist in reducing data complexity by identifying interrelated variables and will gain a better understanding of the underlying structure of the data Natasia et al., (2021).

3.2.1 Confirmatory Factor Analysis

The next step is to perform a Confirmatory Factor Analysis (CFA), which is a statistical technique used to validate the factor structure and check whether the proposed factors match the observed data by looking at the hypothesis of the relationship between the observed

variables and latent factors and statistically tested Marsh et al., (2014). CFA has several advantages in that it can provide higher control in designing and testing factor models to determine the relationship between variables and factors, CFA is also a powerful analytical tool for verifying factor structures that strengthen conceptual validity and provide in-depth estimation parameters about relationships between variables and factors to provide deeper insight into the factor model being tested so that research results are more accurate.

3.2.2 Statistical Method

The KMO statistical method (Kaiser-Meyer-Olkin) and the Bartlett Spherical Test were used to test the suitability of the sample and the suitability of the data used in the study H. Liu & Wang, (2021). KMO is used to test the factor analysis sample by measuring the suitability between the correlation matrices between variables using a metric > 0.6 so that the data is considered valid for factor analysis. The Bartlett Spherical Test is conducted to test the correlation metric hypothesis between variables in the data by using the null hypothesis (H0) on the identity metric (all values outside the diagonal are zero) or empty metric (all values are zero). If the null hypothesis is rejected, it means that there is a significant correlation between the variables in the data, so that the data is worthy of further analysis. Determination of feasibility depends on the P value resulting from the statistical test, which is 0.05, which means the null hypothesis is rejected and provides a clearer understanding of the suitability of the data in the analysis.

3.2.3 Statistical Hypothesis Test

After conducting CFA and validating the factor model, the Chi-square test of independence will be used to test the relationship between the categorical variables associated with the model factor so that it can support the interpretation and validity of the proposed model McHugh, (2012). Thus, the CFA and Chi-square test of independence work simultaneously in factor analysis to validate the factor model and evaluate the relationship between the variables in the model by testing whether there is a significant relationship between the variables so that it can determine the distribution of observation frequencies between categories of variables depending on other variables. or the frequency distribution is independent. The process is through the following steps, namely calculating the chi-square statistic by comparing frequencies and determining the P-value which represents the probability of significance is p <0.05, which means that the relationship between these variables is statistically significant.

3.2.4 Factor Analysis

Factor analysis aims to identify the factors that underlie the scale of questions in research papers to understand the internal structure and measuring instruments used and validation through the process of selecting relevant variables, evaluating data quality, factor extraction, factor assessment, and measuring instrument validity Andersen et al., (2017). The resulting factors will be evaluated and assessed to understand how well the factors explain the variation in the data by involving the assessment of the factor coefficients which indicate how strong the contribution of the variables to each factor and provide a deeper understanding of the factor structure of the questionnaire scale. Varimax factor rotation will be applied to facilitate factor

interpretation by identifying the factors that underlie the relationship between variables so that it can overcome the problem by rotating the factors in the factor space to get a high loading load.

3.2.5 The Goodness of Fit Tests

The goodness of fit is used to measure the extent to which a statistical or simulation model evaluates a simulation model to accurately predict strain based on the observed characteristics Theren et al., (2022). To measure the goodness of fit, several methods are commonly used, such as the Tucker-Lewis Index (TLI), Root means square error of approximation (RMSEA), and Bayesian information criterion (BIC) with a fit defined as TLI > 0.9, RMSEA <0.05, and BIC negative number. Statistical significance tests were conducted to ensure that the observed data and the model's predicted results were not purely coincidental so that statistical tests could be used to measure these differences.

4 Design Specification

Perceived ease of use has a significant role in payment system acceptance Chaveesuk et al., (2018) used the TAM (Technology Acceptance Model) theoretical framework developed to explain and predict user acceptance of modern technologies. The researcher adopts two main dimensions of TAM, namely perceived usefulness which reflects the view of how far the payment system can improve effectiveness, efficiency and perceived convenience which refers to the extent to which users perceive the payment system to be easy to use and understand. Researchers find challenges that need to be overcome such as awareness and understanding of digital payment systems, trust and security, and technical skill levels of users and propose solutions such as education and awareness campaigns to inform users about the benefits and how to use payment systems, building a robust security infrastructure to protect user privacy, and increase digital literacy.

Singh et al., (2022) explored the factors influencing customer acceptance of digital payment systems using the TAM framework and demonstrated that ease of use of technology has a significant role in customer acceptance of digital payment systems. Therefore, the TAM theory will be used in this study to understand the factors that can influence the impact of FinTech developments in conducting business transactions in Indonesian E-commerce by involving the five-factor construct represented by the TAM model in Figure 1 which represents the relationship between variables that are hypothesized. Researchers do not use the Unified Theory of Acceptance and Use of Technology (UTAUT) Model because it includes variables such as perceived ease of use, perceived usefulness, attitudes, and environmental factors Blut et al., (2022) but in this study, several other variables are quite important and are not included in UTAUT such as transaction security, transparency, accessibility, and the impact of FinTech developments on business relations. Therefore, choosing a TAM model that includes more of these variables would be more suitable for use in this study.

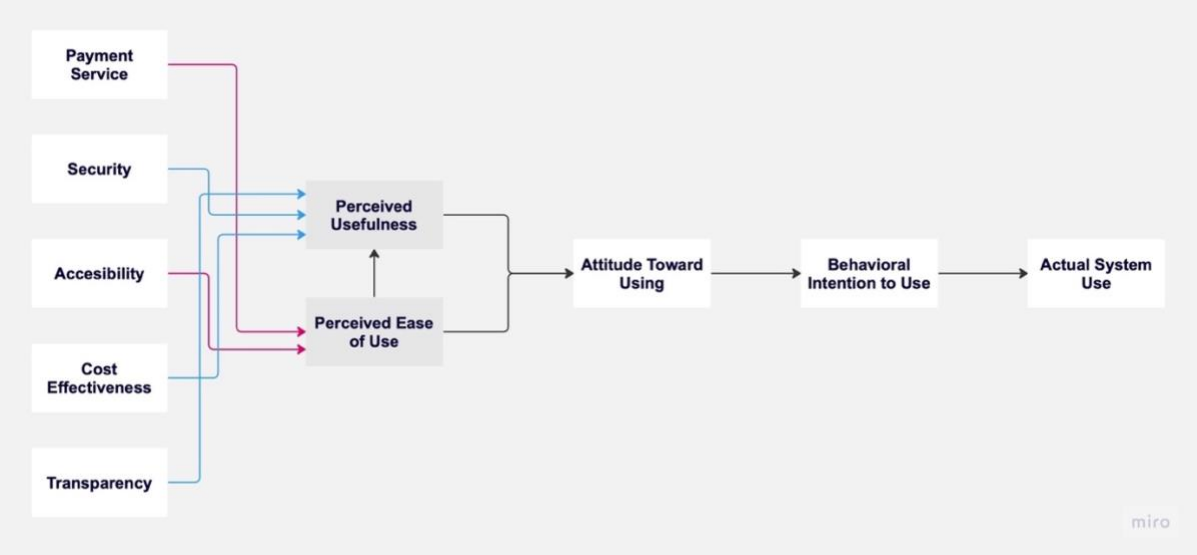

Figure 1: Proposed Research Model based on TAM (Technology Acceptance Model)

5 Implementation

In the implementation process, the survey data obtained is changed by involving data cleaning to achieve the expected standard and prepared for statistical analysis using the CFA (Confirmatory Factor Analysis) method as the main approach for assessing measurement models and determining the relationship of observed variables with latent constructs with uses R as the programming language and provides information about factor loadings, correlations between latent factors, and overall model fit measures. The purpose of CFA is to test and validate measurement models that have been designed previously based on research hypotheses to provide a better understanding of the suitability of the next measurement model, namely Factor Analysis. CFA produces various outputs that include several suitability indices, namely:

- Comparative Fit Index (CFI) is a measure used to assess the extent to which the proposed model fits the observed data compared to the null hypothesis, which states that there is no relationship between the observed variables. The CFI value ranges from 0 to 1, with a higher value indicating a better level of fit between the model and the observed data. The closer the value is to 1, the better the model's fit with the observed data.
- Tucker-Lewis Index (TLI) to measure the extent to which the proposed model fits the data compared with an average score of 0 and 1 with a high value indicating a better level of agreement.
- Root Mean Square Error of Approximation (RMSEA) is a measure of the average square root error indicating the extent to which the proposed model fits the research data.
- Standardized Root Mean Square Residual (SRMR) to measure the extent to which the proposed model matches the observed covariance between the observed variables and a lower value will be considered a good fit.

In addition to the CFA index, Cronbach's Alpha is also used to measure internal reliability and indicates the extent to which items in a scale are correlated with a score between 0 to 1 where a high value indicates a satisfactory level of internal reliability which is above 0.70. rated good.

After the data is considered reliable, the data will be processed using the statistical factor analysis method to identify latent patterns and structures in the data studied with the main objective of seeing the relationship between the most representative variables and identifying latent factors to understand the underlying structure of simpler data. and structured by carrying out several stages, namely:

- Performing the Kaiser-Meyer-Olkin suitability index (KMO), which is an index to measure the fit and suitability of data for factor analysis with values ranging from 0 to 1 and high values indicating better suitability for factor analysis. Bartlett's Test is also used to test the basic assumption in factor analysis that the correlation of the variables is not a null hypothesis or does not have a correlation between tests.
- Extraction by measuring the eigenvalue in the scree plot which aims to determine the number of significant latent factors in the data. The aim is to assist researchers in determining the number of factors to be used in factor analysis.
- Rotation by using Varimax which is a factor rotation to obtain a clearer and interpretable factor structure. The main goal of Varimax is to maximize the separation between the factors, thus making the factors more independent from one another.
- Goodness of Fit aims to measure how well the estimated factor model matches the observed data whether the resulting factor model matches the empirical data, or the data being observed. Some of the methods used are the Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Bayesian Information Criterion (BIC) which if the CFI and TLI are close to 1 indicates a good goodness of fit. The factor model that has a high goodness of fit shows that the model is good enough to describe the relationship between variables in the data and accurately explain the relationship between variables or with each other, which means the factors can be trusted.

Factor analysis plays a significant role in revealing latent structures in complex data and helping to understand the relationships between variables to provide clear insight into the factors that significantly influence the adoption of digital payment services.

6 Evaluation

6.1 Measurement Model

The Confirmatory Factor Analysis (CFA) approach is carried out for the measurement analysis method by carrying out further testing and checking whether the observed variables have a relationship with measuring latent variables or variables that are not observed through several indicators, namely:

Table 2: Result of Latent Variable

	Estimate	**St. Err**	**z-value**	**P(>|z|)**
f =~				
Q1	1.000			
Q2	1.176	0.216	5.439	0.000
Q3	1.148	0.192	5.982	0.000
Q4	1.271	0.227	5.603	0.000
Q5	1.195	0.203	5.872	0.000

Q6	1.186	0.196	6.042	0.000
Q7	1.391	0.198	7.019	0.000
Q8	1.481	0.223	6.648	0.000
Q9	1.515	0.228	6.656	0.000
Q10	1.201	0.194	6.185	0.000
Q11	1.268	0.239	5.312	0.000
Q12	1.366	0.218	6.275	0.000
Q13	1.395	0.209	6.661	0.000
Q14	1.228	0.189	6.485	0.000
Q15	1.386	0.202	6.845	0.000

In Table 2, latent variables (f) which are not directly observed will be measured using CFA and there are 15 indicators used as proxies. The results of the parameter estimation of the measurement model show that all indicators have a significant factor loading ($P < 0.05$) de Blanes Sebastián et al., (2023) which shows that the indicator contributes positively and strongly to the measurement of the latent variable f because it rejects the null hypothesis (H0) so it concludes that the factor loading for this indicator is statistically significant. The estimation results show that the factor load varies between 1,148 (Q3) to 1,515 (Q9). The Q9 indicator has the highest factor load which means that it has a stronger relationship between the indicator and latent variables compared to other indicators. Thus, the results of this analysis provide confidence that the CFA measurement model used has succeeded in establishing a good relationship between the latent variables and the indicators used.

Table 3: Result of Fit indices derived from Confirmatory Factor Analysis (CFA)

Criteria	Result
Comparative Fit Index (CFI)	0.783
Tucker-Lewis Index (TLI)	0.747
Root Mean Square Error of Approximation (RMSEA)	0.124
Standardized Root Mean Square Residual (SRMR)	0.084

To test the fit of the model, the application of the fit index shows the measurement needed to determine whether the resulting data is suitable for confirmatory factor analysis through the results presented in Table 3. This finding illustrates that the metric results are within the threshold: CFI 0.783 and TLI 0.747 > 0.70 which indicates a good fit with the data but has not yet reached a very good level of fit so that model variations will be carried out to improve the model fit with the observed data because the recommended limit is CFI & TLI is > 0.95 Almaiah et al., (2022). RMSEA has a value of 0.124 which indicates a reasonable model error rate even though it is above the reasonable rate because the RMSEA is <0.08 Sarkar et al., (2020) and the SRMR value is 0.084 indicating a low model error rate and better quality of adjustment with a <0.08 Wang et al., (2019) thus indicating several aspects that need to be carried out to strengthen validity.

Table 4: Result of Cronbach's Alpha Test

No of Items	Sample units	Cronbach's alpha
15	195	0.896

Cronbach's Alpha in Table 4 is a statistical measure used in this study to measure the level of reliability or internal consistency with measuring values ranging from 0 to one where the value closer to 1 means the higher the reliability and is considered good enough so that it can be accepted for use in research Y. Wang et al., (2023). From the study which consisted of 15 items tested on 195 samples, the Cronbach's alpha value reached 0.896 which means a satisfactory level of reliability and an important level of internal consistency because the items relate well to each other and can measure the same constructs consistently. Good reliability means that the analysis results can be relied upon and trusted to obtain accurate information about the variables being measured and support the research.

6.2 Statistical Analysis

Factor analysis is carried out to explore the basic structure of the variables in the dataset and before conducting factor analysis a Kaiser-Meyer-Olkin (KMO) measurement calculation is carried out which aims to assess the suitability of the data for factor analysis by measuring the proportion of variance in the observed variables with KMO values ranging from 0 to 1 and acceptable level > 0.60 (Kaiser, 1974). Bartlett's test is carried out to determine whether the correlation matrix is significantly different from the identity matrix with a significant acceptable level of $p < 0.05$ indicating that the variable is suitable for factor analysis (Bartlett, 1954).

Table 5: Result of KMO and Bartlett's Test

Kaiser-Meyer-Olkin	0.89
Bartlett's Test Chi-Square	1295.899
Bartlett's Test p-value	2.409055e-204
Bartlett's Test df.	105

In Table 5, KMO shows a value of 0.89 which indicates that each variable in the dataset has a good correlation with other variables and contributes adequately to factor analysis and the data is very suitable for factor analysis. The Bartlett test shows that the resulting chi-square value is 1295,899 with 105 degrees of freedom, and a very small p-value of 2.409055e-204 and less than 0.001 so these results indicate that the correlation matrix in the dataset differs significantly from the identity matrix because it is strong evidence to reject the null hypothesis so that there is a significant correlation between variables. The results of the KMO and Bartlett Test which support the factor analysis can be continued by exploring the fundamental structure of the variables in the dataset.

In the next, exploratory factor analysis is carried out to identify the fundamental structure of the variable by extracting factors that have an eigenvalue above one (1) because it illustrates how much variance that factor can explain so that it has a greater contribution in explaining the variability in the data.

Table 6: Result of Exploratory Factor Analysis

Number of Factors	Eigenvalue
Factor 1	6.3225599
Factor 2	1.4146688
Factor 3	1.3191814
Factor 4	0.9409785
Factor 5	0.7633658
Factor 6	0.6723394
Factor 7	0.5838196
Factor 8	0.5102240
Factor 9	0.4489606
Factor 10	0.4265583
Factor 11	0.3732507
Factor 12	0.3611699
Factor 13	0.3340611
Factor 14	0.2778281
Factor 15	0.2510338

Factor 1 has an eigenvalue of 6.3225599 which is the highest and shows that factor 1 can explain most of the variability in the data so that it has the possibility of reflecting the main concept or pattern of the variables in the dataset. Factors 2 and 3 also have high enough eigenvalues so they can explain the variability in the data in Table 6.

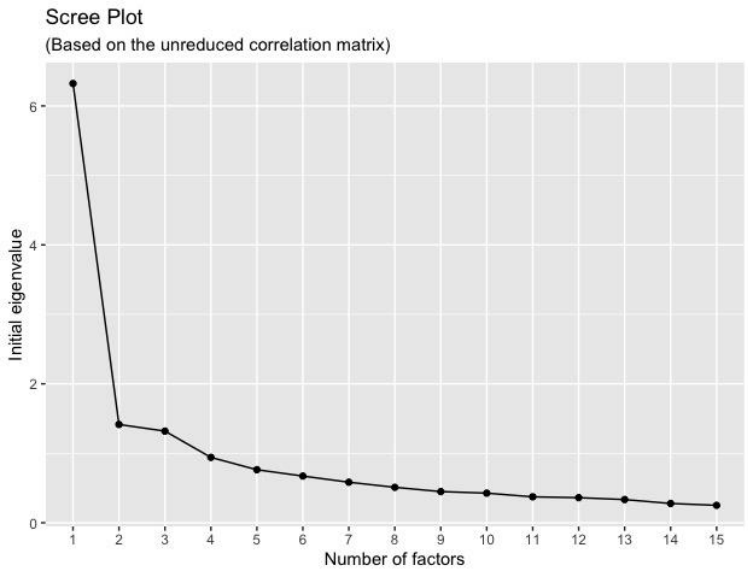

Figure 2: Scree plot Showing the Eigenvalues

The scree plot in Figure 2 displays the eigenvalue of each factor with the x-axis showing the factor number, while the y-axis shows the eigenvalue of each factor. Scree plots are used to help determine the number of significant factors to be extracted in factor analysis and this plot shows the elbow points on the curve which are the eigenvalue points that start to decline sharply

and indicate the most significant number of factors to be maintained in factor analysis, namely factors 1 to 3 while lower eigenvalues will be ignored because they do not have substantial interpretation in research.

Table 7: Standardized Loadings (Pattern Matrix) from Factor Analysis

Variable	PA1	PA3	PA2	h2	u2	com
Q1	0.51	0.12	0.19	0.31	0.69	1.4
Q2	0.15	0.31	0.52	0.39	0.61	1.8
Q3	0.58	0.05	0.32	0.44	0.56	1.6
Q4	0.16	0.21	0.67	0.52	0.48	1.3
Q5	0.26	0.11	0.71	0.59	0.41	1.3
Q6	0.29	0.16	0.65	0.53	0.47	1.5
Q7	0.65	0.36	0.24	0.61	0.39	1.9
Q8	0.68	0.25	0.17	0.55	0.45	1.4
Q9	0.47	0.49	0.22	0.50	0.50	2.4
Q10	0.68	0.16	0.11	0.49	0.51	1.2
Q11	0.07	0.63	0.22	0.45	0.55	1.3
Q12	0.25	0.72	0.16	0.61	0.39	1.3
Q13	0.38	0.64	0.20	0.59	0.41	1.8
Q14	0.50	0.44	0.14	0.46	0.54	2.1
Q15	0.59	0.29	0.33	0.54	0.46	2.1

Factor analysis Table 7 was performed to identify the basic structure of the data as measured by the Principal Axis Factoring (PA) method to extract 3 factors that could explain the variability in the data. PA 1, PA2, and PA 3 are loads that show how strong the relationship is between variables and factors or the weight of each variable in the extracted factor with a higher value, the stronger the relationship between variables and factors. The results of the analysis show that the variables Q10, Q8, Q7, Q15, Q3, Q1, and Q14 have a high loading on factor 1; variables Q12, Q13, Q11, Q09 have a high loading with a factor of 3; variables Q5, Q4, Q6 and Q2 have high loading with factor 2. h2 (community) is the variance value of the variable explained by the extracted factor, the higher the occurrence means the more variance can be explained which means the variable is good and can be represented by the extracted factor, u2 (uniqueness) is the unique variance value of the variable after deducting the extracted factor and the higher the u2 value, the more variance that cannot be explained by the factor variable, com (community square) is the h2 value which indicates how large the proportion of the variance is can be explained by factors against the total variance in the variable.

Table 8: Result of SS loadings (Sum of Squared Loadings)

	PA1	PA3	PA2
SS loadings	3.15	2.26	2.18

The value of SS loadings Table 8 shows that PA1 (Factor 1) has the highest contributing factor in explaining the variability in the data, ss loadings of 3.15 and is dominated by factor loadings

on variables related to accessibility, PA3 (Factor 2) has ss loadings of 2.26 and is related to payment services, PA2 (Factor 3) has ss loadings of 2.18 and is related to the load factor on the variable that describes security. These factors have a significant role in shaping the data structure and contribute to explaining the variability in the observed variables.

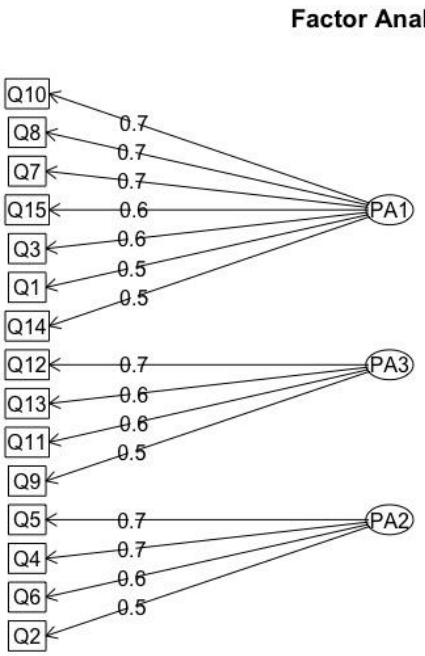

Figure 3: Rotated Factor Analysis using Varimax

The results of factor analysis with Varimax rotation show that the role of new digital technology in payments has identified three factor dimensions, namely accessibility (PA1), payment services (PA3), and security (PA2). These findings provide essential information about the factors that play a critical role in driving more service focus and driving further development of FinTech solutions to enhance user experience and business continuity in the digital age. Figure 3 explains that the loading on PA1 in the form of ease of payment services on smartphones and electronic devices, the level of effectiveness, the level of user-friendliness, efficiency, and ease of conducting online transactions can provide a deeper understanding of this role. digital technology in supporting the growth of E-Commerce in the digital era. The other main dimensions identified are payment services and security which provide a comprehensive view of the role of digital technology such as payment services in facilitating and increasing the efficiency of digital business transactions.

Table 9: Result of Fit indices derived from Exploratory Factor Analysis.

Tucker Lewis Index (TLI)	0.881
Root Mean Square Error of Approximation (RMSEA)	0.083
Bayesian Information Criterion (BIC)	-184.9

In factor analysis Table 9, the Goodness of Fit model is evaluated to measure how well the factor model is generated through several evaluation indicators, namely the TLI which is an index to measure the reliability of the factors extracted in factor analysis and has a value of

0.881 which indicates that the factors produced have a high level of reliability. high in explaining the data and a high level of model fit because the value is close to 1; RMSEA which shows the extent to which the model fits the data with a lower value indicates a better model and a factor analysis value of 0.083 indicates that the model has a low prediction error rate; BIC is used to compare various models and shows a value of -184.9 which indicates that the model with 3 factors is better in describing the relationship between variables in factor analysis.

6.3 Discussion

Confirmatory Factor Analysis (CFA) was carried out for the measurement model of the analysed data and showed that each variable in the dataset had a good correlation with other variables at KMO 0.89 so that it could make an appropriate contribution to the analysis. Bartlett's test shows that the correlation matrix in the dataset is significantly different because convincing evidence rejects the null hypothesis (Chi-square 1295.899 and p-value 2.409055e-204 <0.001). The results of the varimax rotation on factor analysis show that it can extract 3 factors (accessibility, payment services which affect perceived ease of use and security which affect perceived usefulness) which can explain the variability in the data and has a high weight so that it shows a strong relationship between variables and factors.

Three of the five confirmed TAM factors predict the fit between the reproduced and observed covariance matrices. The first factor regarding accessibility in digital payment systems is important to understand and pay attention to because it is a crucial matter that aims to ensure that consumers can interact with digital payments efficiently and effectively Dai et al., (2023). Researchers propose to divide consumers into several variations based on age groups, namely the elderly, children, or individuals who experience cognitive impairment and develop a payment system according to user needs.

The second factor regarding payment services underlines the importance of efficient payment services in increasing business transactions on the E-Commerce platform, admin fees that are not comparable to services have made consumers feel disadvantaged. Chiu & Wong, (2022) revealed that efficient and cost-effective payment services can benefit consumers by reducing transaction costs, speeding up the payment process, and increasing access globally. However, in critical analysis, the researcher realized that it was necessary to carry out an experimental design that could overcome the potential for bias by recommending the use of an experimental design with a better control group and using mixed methods to gain a deeper understanding of the role of payment services in E-Commerce transactions because transaction costs can also contribute to the welfare of businesspeople.

The last factor is security which has increased the trust and protection of consumer data in conducting digital transactions in Indonesian E-Commerce, and this discovery has comfort with the findings of Saqib & AL-Talla, (2023) regarding the effectiveness of security solutions on a large scale using the blockchain system to increase security and efficiency. The researcher also explained that cyber-attacks are a risk that needs to be anticipated because they can be a threat to leakage of user data and data processing. From this experiment, researchers are aware of the limitations in the aspect of feedback with participants so qualitative methods are

considered more suitable for understanding user perspectives related to security factors in Indonesian E-Commerce.

Finally, the goodness of fit results shows that the TLI has a value capable of showing the factors produced have high reliability, but the RMSEA has an indication of 0.083 which shows the quality of the model is still acceptable but not particularly good. The results of the BIC show a model with 3 factors are a good model. This is helpful evidence in answering the research hypothesis that TAM is confirmed as a non-factor model used in consistent research models.

7 Conclusion and Future Work

The purpose of this study is to analyse the impact of FinTech development on business transactions in E-Commerce in the digital era in Indonesia and this research uses factor analysis methods and measurement models using Confirmatory Factor Analysis (CFA) and design specification Technology Acceptance Model (TAM) to answer research questions and achieve the goals that have been set. The results of the study reveal that there are 3 of 5 essential factors that significantly affect E-Commerce business transactions in Indonesia in the digital era, namely accessibility, payment services, security, and transparency.

The finding of the accessibility factor indicates that the ease of access to digital payments has a significant effect on the adoption of digital payment methods in Indonesian E-Commerce. The admin fee payment service factor offered for digital payment access must also be comparable to the services provided which will have a positive impact on consumers, although, from the results of this study, consumers still hope that services still need to be maximized. On the other hand, security features in conducting digital transactions have influenced consumer interest in adopting digital payment services if consumers feel confident about this. From these findings it can be concluded that to improve the digital payment system in Indonesia, stakeholders must consider several factors that have been described such as increased accessibility, better and more diverse payment services, increased security, and consumer privacy. The implications of this research can be a reference for policymakers in developing the right strategy for developing digital payment services in the future.

These findings would theoretically contribute to digital payments research by strengthening the current literature on FinTech adoption through the TAM model. For further research, several recommendations can be considered such as the use of a more representative sampling method and the use of qualitative data through in-depth interviews to provide deeper insights regarding perceptions and experiences of using FinTech technology in E-Commerce. Testing alternative models of the Unified Theory of Acceptance and Use of Technology (UTAUT) or the Technology Readiness Index (TRI) can also help compare the effectiveness of models in predicting technology adoption behaviour, more in-depth analysis of factors such as external factors that can influence FinTech adoption, namely government regulations, the extent of digital literacy in Indonesia.

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