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Changes in Consumer Behavior Through E-Payment in the Implementation of Green Economy

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Abstract

In recent years, there has been a growing awareness of the importance of adopting environmentally sustainable infrastructure. The shift towards a circular economy and the increased use of digital payment methods (e-payment) have emerged as key drivers of sustainable consumer behavior. This study examines the impact of con-sumer behavior changes through the adoption of e-payment systems within the framework of green economy practices. The research was conducted in Makassar, involving a sample of 150 respondents, and analyzed using Structural Equation Modeling (SEM). The results indicate a significant relationship between consumer behavior changes and the increased use of e-payment, which in turn supports the implementation of green economy practices. The findings highlight that e-payment adoption contributes to reduced carbon emissions and the use of non-renewable resources, promoting a more sustainable and efficient economy.

Kata Kunci: *Consumer Behavior, E-Paymnet, Green Economy, Sustainability*

Introduction

In recent years, awareness of the importance of environmentally friendly infrastructure and the circular economy has increased. Strategies like recycling and renewable energy are key to reducing waste and emissions, while plastic waste has become a global issue (Hari Kristianto, 2020). Governments and com-panies are implementing stricter policies and integrating sustainable practices. The green economy aims to create sustainable and inclusive growth, with consumers playing a crucial role in its success (Khoirunisa Wahida & Hoirul Uyun, 2023). The use of e-payment as a digital payment method facilitates consumer behavior change toward sustain-able practices, such as reducing paper and plastic usage. This trend is driven by technological advance-ments and rising environmental awareness (Press, 2023). However, challenges like data security and lim-ited access to technology in certain regions still exist. Therefore, studying the impact of e-payment on the green economy is essential to provide insights for policies and business practices in achieving sustainable economic growth (Srouji, 2020).

The implementation of e-payment is key to the economic transformation towards greater environmental awareness. Research shows that the adoption of e-payment significantly influences changes in consumer behavior, supporting the reduction of carbon footprints and emissions by decreasing reliance on cash. The development of environmentally friendly e-payment infrastructure and policies that support the integration of this technology are crucial for achieving green economic goals(Astadi et al., 2022). This re-search provides insights for policymakers, businesses, and academics in formulating effective strategies to achieve a sustainable green economy. Many studies have examined the impact of e-payment on consumer behavior and sustainability, but key gaps

remain, especially in Indonesia's green economy context. Most research focuses on the technical aspects of e-payment or environmental benefits, neglecting how consumer behavior shifts with e-payment adoption and its indirect impact on sustainability (Sari et al., 2022). Additionally, studies are often centered on developed countries, leaving gaps in understanding e-payment in regions like Indone-sia, with limited technological infrastructure (Zhao et al., 2022). This study addresses these gaps by exam-ining consumer behavior in Makassar, specifically how e-payment adoption can reduce resource use and promote sustainable practices in developing countries.

This research is important because consumer behavior shifting towards eco-friendly products and ser-vices through e-payment can drive the growth of a green economy. E-payment helps reduce the carbon footprint of physical transactions, is more efficient in resource use, and encourages technological innova-tion. In addition, e-payment allows consumers to play a role in raising environmental awareness. The strengths of this research lie in the evaluation of the effectiveness of e-payment in promoting environ-mentally friendly behavior, the influence of environmental awareness on the use of e-payment, and the role of institutions and the government in strengthening the green economy. The study will also employ observation and statistical analysis methods to compare the effectiveness of e-payment with convention-al payment methods. Several relevant studies explore the impact of e-payment adoption on consumer behavior and its role in supporting the green economy. One study highlights how digital payments positively influence consum-er demand and contribute to sustainable economic development by reducing the environmental footprint of traditional payment methods, such as paper and plastic use in cash transactions. These findings show that e-payment systems can drive household consumption while promoting environmentally conscious behaviors, which are essential for a green economy (Zhou, 2022). Another study focuses on how e-payment adoption is particularly effective in emerging economies, em-phasizing that shifting consumer behavior through digital payments can reduce carbon emissions and promote sustainable consumption habits. This approach supports pro-environmental choices by simplify-ing transactions and decreasing the reliance on physical resources (Dreyer & Sonnenberg, 2022).

Several studies have explored the relationship between e-payment adoption and changes in consumer behavior, particularly in the context of promoting sustainable practices and supporting the green econo-my. Research highlights that digital payment systems reduce the reliance on traditional cash transactions, thus lowering environmental impacts like carbon emissions associated with paper money production and transportation. For instance, studies from China and Nigeria have demonstrated that e-payment not only drives increased consumer demand but also fosters more environmentally conscious consumption habits, which is crucial for sustainable economic development (Oyelami et al., 2020). In addition, research from Taiwan and the Philippines explores the role of mobile payments in eco-friendly transactions, noting that digital payment systems promote a shift toward more sustainable con-sumption patterns by reducing the use of physical resources such as paper and plastic. This indicates that e-payment adoption can support green economy initiatives by encouraging responsible consumer choices and reducing the environmental footprint of financial transactions (Niu et al., 2023). These findings highlight the potential for e-payment technologies to serve as tools for advancing sustain-able practices and driving consumer behavior changes in favor of a greener economy. Further research, especially in developing countries like Indonesia, is crucial for understanding the full impact of e-payment on consumer behavior in the context of green economy implementation.

The hypothesis of this research is

1. Consumer behavior changes significantly influence the use of e-payment.
2. Consumer behavior changes significantly influence sustainable green economy practices.

3. The use of e-payment significantly influences sustainable green economy practices.
4. Consumer behavior changes influence sustainable green economy practices through e-payment as a mediating variable.

Analysis Method

Research on Consumer Behavior Changes Through E-Payment in the Implementation of a Green Econo-my was conducted in the city of Makassar, with a population of 100-150 people. Subsequently, instru-ments were selected based on the research variables, and then samples were taken. Observation, inter-views, and questionnaires are used to collect data. The collected data is processed using quantitative and descriptive analysis tools. This research employs the SEM (Structural Equation Modeling) analysis meth-od as the primary approach to test and model the relationships between key variables, such as the use of e-payment, changes in consumer behavior, and sustainable practices in the green economy. This method allows researchers to identify and understand the causal relationships between these variables more comprehensively, as well as to measure both direct and indirect effects among them. Thus, SEM provides a robust analytical framework for understanding the complexities of the interactions between the factors influencing changes in consumer behavior in the context of implementing a green economy through the use of e-payment. Then the results are interpreted, the final step is concluded, and recommendations are provided. This research uses a Likert scale that allows for the ranking of data from the lowest to the high-est level. After that, an instrument test was conducted to assess the validity and reliability of the ques-tionnaire.

Results and Discussion

Research Results

The respondents in this study were e-payment users residing in Makassar City. Data collection was conducted by distributing questionnaires to respondents using Google Forms, with a total of 150 re-sponses collected. The data collection took place between July 2024 and August 2024. Respondents in this study were categorized into several characteristics, including Gender, Age, and Education Level. A summary of the respondents' characteristics is presented below.

Table 1. General Overview of Respondents

Gender	Frequency	Percentage
Male	65	43.33%
Female	85	56.67%
Total	**150**	**100%**

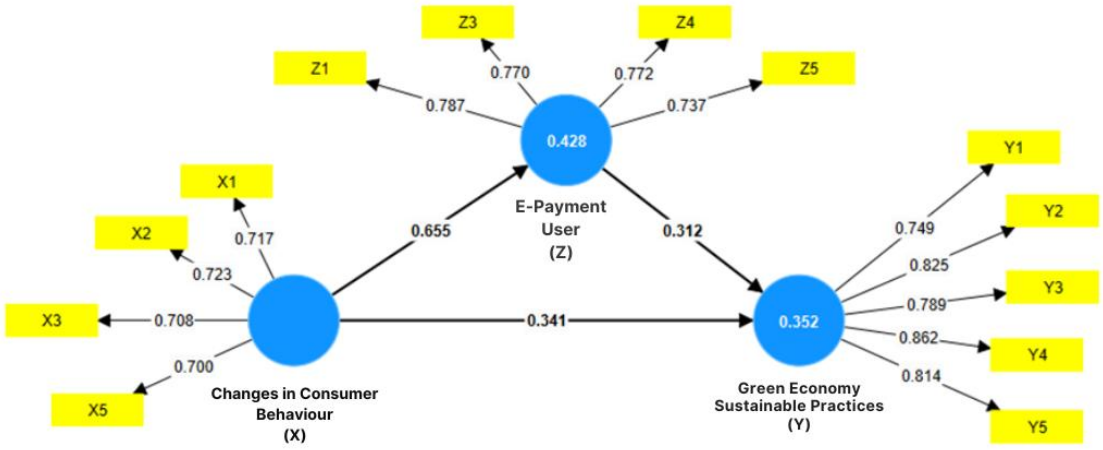

Figure 1. Measurement Model (Outer Model)

Based on Figure 1, the convergent validity test can be understood, which displays the input data model design and PLS Algorithm results, indicating several indicator eliminations. The Consumer Behavior Change variable (X) includes indicators X1, X2, X3, X5. The E-Payment Usage variable (Z) is represented by indicators Z1, Z3, Z4, Z5. The Sustainable Green Economy Practices variable (Y) includes indicators Y1, Y2, Y3, Y4, Y5.

Measurement Model Evaluation

The measurement model in this study consists of a reflective measurement model. The variables Consumer Behavior Change, E-Payment, and Green Economy are measured reflectively. According to Hair et al. (2021), reflective model evaluation includes loading factors ≥ 0.70, composite reliability ≥ 0.70, Cronbach's alpha ≥ 0.60, and AVE (Average Variance Extracted) ≥ 0.50. In addition, discriminant validity is evaluated using Fornell and Larcker criteria, as well as HTMT (Heterotrait-Monotrait Ratio) under 0.90.(Hair et al., 2021)

Variable	Measurement Item	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Consumer Behavior Change (X)	X1	Frequency of Use	0.717	0.680	0.805	0.507
	X2	Type of Transaction	0.723			
	X3	Preference	0.708			
	X5	Convenience	0.700			
E-Payment Usage (Z)	Z1	Adoption Rate	0.787	0.767	0.851	0.588
	Z3	Security	0.770			
	Z4	Transaction Speed	0.772			
	Z5	Benefits	0.737			
Sustainable Green Economy Practices (Y)	Y1	Reduction in Paper and Plastic Use	0.749	0.870	0.904	0.654
	Y2	Carbon Footprint Reduction	0.825			
	Y3	Consumer Awareness	0.789			
	Y4	Preference for Paperless	0.862			
	Y5	Consumer Support	0.814			

The Consumer Behavior Change variable (X) is measured by four valid measurement items with outer loadings ranging from 0.700 to 0.723, indicating that these four items validly reflect Consumer Behavior Change (X). The reliability level of the variable is acceptable, as indicated by Cronbach's alpha above 0.60 and composite reliability above 0.70 (reliable). The convergent validity level, indicated by an AVE value of 0.507 > 0.50, meets the criteria for good convergent validity. Overall, the measurement items explain 50.7% of the variable's variance. Among these items, X1 and X2 have the highest outer loadings (0.717 and 0.723), indicating that "Frequency of E-payment Use" and "Type of Transaction" are the most frequently used measurements.

The E-Payment Usage variable (Z) is measured by four valid measurement items with outer loadings ranging from 0.737 to 0.787, indicating that these four items validly reflect E-Payment Usage (Z). The reliability level is acceptable, with Cronbach's alpha above 0.60 and composite reliability above 0.70 (reliable). The convergent validity level, indicated by an AVE value of 0.588 > 0.50, meets the criteria for good convergent validity. Overall, the items explain 58.8% of the variable's variance. Z1 and Z4 have the highest outer loadings

(0.787 and 0.772), showing that "Adoption Rate" and "Transaction Speed" are the most commonly used measurements.

The Sustainable Green Economy Practices variable (Y) is measured by five valid measurement items with outer loadings ranging from 0.749 to 0.862, indicating that these five items validly reflect Sustainable Green Economy Practices (Y). The reliability level is acceptable, with Cronbach's alpha above 0.60 and composite reliability above 0.70 (reliable). The convergent validity level, indicated by an AVE value of 0.654 > 0.50, meets the criteria for good convergent validity. Overall, the items explain 65.4% of the variable's variance. Y2 and Y4 have the highest outer loadings (0.825 and 0.862), indicating that "Carbon Footprint Reduction" and "Preference for Paperless" are the most frequently used measurements.

Table 2. Fornell-Larcker Criterion

	E-Payment Usage (Z)	Sustainable Green Economy Practices (Y)	Consumer Behavior Change (X)
E-Payment Usage (Z)	**0.767**		
Sustainable Green Economy Practices (Y)	0.535	**0.809**	
Consumer Behavior Change (X)	0.655	0.545	**0.712**

Discriminant validity evaluation is necessary by looking at the Fornell-Larcker criterion. This criterion states that the square root of AVE should be greater than the correlation between variables. The Consumer Behavior Change variable has a square root of AVE of 0.712, which is greater than its correlation with E-Payment and Green Economy. Next, the E-Payment variable, with a square root of AVE of 0.767, is also greater than its correlation with Green Economy and Consumer Behavior Change. Lastly, the Green Economy variable has a square root of AVE of 0.809, greater than its correlations with Consumer Behavior Change and E-Payment. These results show that the discriminant validity for the variables Consumer Behavior Change, E-Payment, and Green Economy is achieved.

Table 3. HTMT (Heterotrait-Monotrait Ratio)

Variables	HTMT
Sustainable Green Economy Practices (Y) <-> E-Payment Usage (Z)	0.629
Consumer Behavior Change (X) <-> E-Payment Usage (Z)	0.881
Consumer Behavior Change (X) <-> Sustainable Green Economy Practices (Y)	0.669

The HTMT test results show that for each pair of variables, the HTMT values are below 0.90, confirming that discriminant validity is achieved. The variables share more variance with their own measurement items than with items from other variables. This can be seen in the following table:

Table 4. Cross Loadings

	E-Payment Usage (Z)	Sustainable Green Economy Practices (Y)	Consumer Behavior Change (X)
X1	0.471	0.385	0.717
X2	0.554	0.399	0.723
X3	0.386	0.283	0.708
X5	0.428	0.460	0.700
Y1	0.339	0.749	0.263
Y2	0.341	0.825	0.394
Y3	0.559	0.789	0.526
Y4	0.442	0.862	0.465
Y5	0.410	0.814	0.475
Z1	0.787	0.427	0.449
Z3	0.770	0.391	0.433
Z4	0.772	0.428	0.585
Z5	0.737	0.390	0.520

Structural Model Evaluation

Evaluating the structural model is related to testing the hypotheses concerning the

effects between research variables. The structural model evaluation is carried out in three stages:

First, checking for multicollinearity between variables using the Inner VIF (Variance Inflation Factor) measure. An Inner VIF value below 5 indicates no multicollinearity between variables (Hair et al., 2021). Second, testing the hypotheses between variables by examining the t-statistic or p-value. If the p-value is less than 0.05, there is a significant effect between variables. Additionally, the results and 95% confidence intervals of the estimated path coefficients should be reported. Third, calculating the f^2 value, which represents the direct effect of a variable at the structural level, with the following criteria: $f^2 = 0.02$ (small effect), 0.15 (moderate effect), and 0.35 (large effect) (Hair et al., 2021). The f^2 mediation effect, called Upsilon (v), is obtained by squaring the mediation coefficient (Wetzels et al., 2019), which is interpreted as a small mediation effect (0.02), moderate mediation effect (0.075), and large mediation effect (0.175) (Ogbeibu et al., 2020).

Table 5. Inner VIF

	VIF
E-Payment Usage (Z) -> Sustainable Green Economy Practices (Y)	1.750
Consumer Behavior Change (X) -> E-Payment Usage (Z)	1.000
Consumer Behavior Change (X) -> Sustainable Green Economy Practices (Y)	1.750

Before testing the structural model hypotheses, it is necessary to check for multicollinearity between variables using the Inner VIF statistic. The estimation results show that the inner VIF values are below 5, indicating low multicollinearity between the variables. These results support the robustness of the parameter estimates in the PLS-SEM model (Hair et al., 2021).

Table 6. Hypothesis Testing

Hypothesis	Path Coefficient	p-value	95% Confidence Interval of Path Coefficient		F^2 Square
			Upper Limit	Lower Limit	
Consumer Behavior Change (X) -> E-Payment Usage (Z)	0.312	0.000	0.545	0.726	0.750
Consumer Behavior Change (X) -> Sustainable Green Economy Practices (Y)	0.655	0.000	0.178	0.475	0.102
E-Payment Usage (Z) -> Sustainable Green Economy Practices (Y)	0.341	0.000	0.138	0.468	0.086

Hypothesis 1 (H1) is accepted, indicating that consumer behavior change significantly affects the increase in e-payment usage, with a path coefficient of 0.312 and a p-value of 0.000 ($p < 0.05$). Every change in consumer behavior will increase e-payment usage within the 95% confidence interval, where the effect size of consumer behavior change ranges between 0.545 and 0.726. The impact of consumer behavior change on increasing e-payment usage has a large structural level effect ($F^2 = 0.750$).

Hypothesis 2 (H2) is accepted, indicating that consumer behavior change significantly affects sustainable green economy practices, with a path coefficient of 0.655 and a p-value of 0.000 ($p < 0.05$). Every change in consumer behavior will enhance sustainable green economy practices within the 95% confidence interval, with an effect size ranging between 0.178 and 0.475. However, the impact of consumer behavior change on sustainable green economy practices has a small structural level effect ($F^2 = 0.102$).

Hypothesis 3 (H3) is accepted, indicating that e-payment usage significantly affects sustainable green economy practices, with a path coefficient of 0.341 and a p-value of 0.000 ($p < 0.05$). Every change in e-payment usage will improve sustainable green economy practices within the 95% confidence interval, with an effect size ranging between 0.138 and 0.468. However, the impact of e-payment usage on sustainable green economy practices

has a small structural level effect ($F^2 = 0.086$).

Table 7. Mediation Hypothesis Testing

Hypothesis	Path Coefficient	p-value	95% Confidence Interval of Path Coefficient	Upsilon (v)
Consumer Behavior Change (X) -> E-Payment Usage (Z) -> Sustainable Green Economy Practices (Y)	0.204	0.000	0.093 - 0.315	0.042

The mediation effect (F^2) is calculated using the Upsilon (v) formula as follows:

$$v = \beta^2_{YMX} - (R^2_{YMX} - p^2_{YX})$$

$$v = \beta^2_{YMX}\, \beta^2_{YM.X}$$

$$v = (0{,}655)^2 \times (0{,}312)^2$$

$$v = 0{,}429 \times 0{,}097$$

$$v = 0{,}042$$

1) **Hypothesis 4 (H4)** is accepted, indicating that e-payment usage plays a significant mediating role, mediating the indirect effect of consumer behavior change on sustainable green economy practices, with a mediation path coefficient of 0.204 and a p-value of 0.000 ($p < 0.05$). However, at the structural level, the mediation role of e-payment usage is categorized as having a low mediation effect (Upsilon v = 0.042) (Ogbeibu et al., 2020). Within the 95% confidence interval, increasing e-payment usage can enhance the mediation effect up to 0.315.

a. Model Fit Evaluation and Compatibility

1) R-Square

The R-square statistical measure can evaluate and describe the extent of the variation in the endogenous variable explained by other exogenous/endogenous variables in the model (Wetzels et al., 2019). According to (Hair et al., 2021), as cited in Yamin (2023), R-square values are categorized into three levels: below 0.25 (low impact), between 0.25 and 0.50 (moderate impact), and from 0.50 to 0.75 (substantial impact).

Table 8. R-Square

Variable	R-square	R-square adjusted
E-Payment Usage (Z)	0.428	0.425
Sustainable Green Economy Practices (Y)	0.352	0.343

Based on the above results, it can be said that the impact of consumer behavior change on e-payment usage is 42.5% (moderate impact). The impact of consumer behavior change on sustainable green economy practices, mediated by e-payment usage, is 34.3% (moderate impact).

Q-Square

Q-square measures predictive accuracy, evaluating how well changes in exogenous/endogenous variables can predict endogenous variables (Hair et al., 2021). This serves as a validation of predictive relevance in PLS models. A Q-square value greater than 0 indicates the model has predictive relevance. According to Hair et al. (2019) as cited in (Shwedeh et al., 2022), Q-square values are interpreted qualitatively as follows: 0 (low), 0.25 (moderate), and 0.50 (high).

Table 9. Q-Square

Variable	Q^2 Predict	RMSE	MAE
E-Payment Usage (Z)	0.414	0.773	0.621
Sustainable Green Economy Practices (Y)	0.274	0.863	0.665

The results show that the Q-square value for e-payment usage is 0.414, which indicates moderate to high predictive accuracy. The Q-square value for sustainable green economy practices is 0.274, indicating moderate predictive accuracy.

Standardized Root Mean Square Residual (SRMR)

SRMR is a measure of model fit, reflecting the difference between the observed data correlation matrix and the estimated model correlation matrix. According to (Hair et al., 2021) an SRMR value below 0.08 indicates a good fit, while values between 0.08 and 0.10 indicate an acceptable fit.

Table 10. SRMR

	Estimated Model
SRMR	0,108

Based on the table above, the estimated SRMR value is 0.108, indicating an acceptable model fit. The empirical data can explain the relationships between the variables in the model.

Goodness of Fit Index (GoF Index)

The GoF Index evaluates the overall model, combining both measurement and structural models. The GoF Index is calculated as the square root of the geometric mean of the communalities and the mean R-square. According to Wetzels et al. (2009) as cited in (Shwedeh et al., 2022), GoF Index interpretation is categorized as follows: 0.1 (low), 0.25 (medium), and 0.36 (high).

Table 11. GoF Index

Mean Communality	Mean R-Square	GoF Index
0.588	0.390	0.479

Based on the table above, the GoF Index value is 0.479, which falls into the high category, indicating that the model fits well with the data.

PLS Predict

Hair et al. (2019) state that PLS is a type of SEM analysis aimed at prediction. Therefore, it is necessary to develop a validity measure to assess the predictive strength of the proposed model. PLS predict functions as a validation tool for testing the predictive power of PLS. To demonstrate that PLS results have strong predictive power, they must be compared with a baseline model, such as a linear regression model (LM). A PLS model is said to have high predictive power if the RMSE (Root Mean Squared Error) or MAE (Mean Absolute Error) is lower than that of the linear regression model.

Table 12. PLS Predict

Indicator	PLS-SEM RMSE	PLS-SEM MAE	LM RMSE	LM MAE
Z1	**0.453**	**0.392**	0.457	0.404
Z3	0.469	0.404	0.446	0.376
Z4	**0.529**	**0.403**	0.535	0.405
Z5	**0.532**	0.394	0.541	0.394
Y1	**0.674**	**0.510**	0.678	0.513
Y2	**0.591**	**0.425**	0.600	0.432
Y3	0.514	0.409	0.493	0.371
Y4	**0.500**	**0.379**	0.510	0.384
Y5	0.473	**0.348**	0.464	0.351

The results show that out of 20 observations of RMSE and MAE values, 14 measurement items have higher values compared to the linear regression model, while 6 items have lower values. This indicates that the proposed PLS model has medium predictive power.

Table 13. Linearity Testing

Quadratic Effect	Path Coefficient	p-value	Interpretation
E-Payment Usage (Z) -> Sustainable Green Economy Practices (Y)	0.098	0.134	Linearity Achieved
Consumer Behavior Change (X) -> Sustainable Green Economy Practices (Y)	0.029	0.579	Linearity Achieved

Hair et al. (2019) suggests that checking the linearity of relationships between variables is essential. The assumption is that the influence between variables is linear. This check is part of the robustness of the model in SEM-PLS. The test involves examining the quadratic form of the variables (Quadratic Effect). The results show that the quadratic effect of Consumer Behavior Change and E-Payment Usage is not significant for Sustainable Green Economy Practices, confirming that the influence of Consumer Behavior Change and E-Payment Usage on Sustainable Green Economy Practices is linear, and the model's linearity is robust.

Discussion

Consumer behavior changes affect e-payment usage

The analysis results show that there is a significant effect between changes in consumer behavior and the usage of e-payment. This significance is indicated by a p-value of 0.000, which is far below the 0.05 threshold. Thus, it can be concluded that the relationship between these two variables is not coincidental. In other words, changes in consumer behavior indeed contribute to how often and in-tensively e-payment is used. The path coefficient value of 0.312 indicates that the influence of consumer behavior changes on e-payment usage is moderate. The higher the path coefficient value, the greater the impact the inde-pendent variable (in this case, consumer behavior changes) has on the dependent variable (e-payment usage). Additionally, the evaluation results show an f-square value of 0.750, indicating that the effect of consumer behavior changes on e-payment usage is large or high. The f-square value measures the contribution of one variable to another within the structural model. With this value, it can be con-cluded that consumer behavior changes have a substantial influence on increasing e-payment usage. Causally, consumer behavior changes here encompass various factors such as: 1) the frequency of digital financial service usage, measured by indicator X1; 2) the types of transactions frequently used by consumers, measured by indicator X2; 3) consumer preferences for e-payment-based services (X3); and 4) the comfort consumers feel when using e-payment technology (X5). These indicators have ad-equate outer loadings (above 0.7), indicating that all of these factors are valid in explaining consumer behavior related to e-payment usage. Therefore, when the frequency of digital service usage increas-es, or when consumers feel more comfortable using this technology, it directly contributes to the in-crease in e-payment usage. Furthermore, this effect lies within the 95% confidence interval, with a lower bound of 0.545 and an upper bound of 0.726. This means that we can state with 95% confidence that any change in con-sumer behavior will affect the increase in e-payment usage within that range. This wide range re-flects low uncertainty in the estimation of the effect. Changes in consumer behavior could include shifting preferences from cash to digital transactions, increasing trust in e-payment security, and more frequent use of e-payment for daily transactions such as online shopping, bill payments, or even transportation (Farahdiba, 2020). As these habits shift, overall e-payment adoption increases, driven by the convenience and efficiency offered by the technology (Aulia, 2020).

Consumer behavior changes affect sustainable green economy practices

Based on the SEM-PLS test results, consumer behavior changes also significantly affect sustaina-ble green economy practices, though the strength of this effect is lower compared to its influence on e-payment usage. The analysis results show that consumer behavior changes do have a significant effect on sus-tainable green economy practices. This is demonstrated by a p-value of 0.000, which is below the 0.05 threshold, indicating that there is a real relationship between the two variables. This means that changes in consumer behavior can significantly drive an increase in the implementation of sustaina-ble practices related to the green economy. The path coefficient value of 0.655 indicates that the relationship between consumer behavior changes and sustainable green economy practices is moderate to strong. This suggests that changes in consumer behavior have a significant impact on the implementation of the green economy, alt-hough not as strong as their influence on e-payment usage. The f-square value of 0.102 indicates that the effect of consumer behavior changes on sustainable green economy practices is low. This means that although there is a significant relationship, the influence of consumer behavior changes on the green economy is not as strong as their influence on e-payment usage. The impact remains relevant but does not dominate the structural context. The consumer behavior change variable is measured by several indicators, such as: 1) frequency of digital technology usage, 2) consumer preferences for digi-tal-based services, and 3) consumer comfort with modern services. Changes in frequency and consumer preferences for using e-payment technology or other plat-forms can contribute to the implementation of the green economy, such as shifting to paperless transactions, reducing fossil fuel consumption through digital services, and supporting environmen-tally friendly initiatives. Although these changes are not directly related to the green economy (e.g., not all consumers may be aware of the environmental implications of their actions), the cumulative impact remains. Consumers who prefer to use digital technology and platforms tend to reduce physi-cal resource consumption, such as paper or plastic use, which contributes to green economy goals. The 95% confidence interval for this effect is between 0.178 and 0.475. This means that with 95% confidence, any change in consumer behavior will affect sustainable green economy practices within that range. Although this effect is significant, the smaller range compared to its influence on e-payment usage suggests that there is more variation or uncertainty in the estimated impact on the green economy. Changes in consumer behavior that can influence the green economy include decisions to shift to cashless transactions, reduce the use of non-environmentally friendly materials, and choose services that support environmental sustainability. For example, consumers who shift from physical transac-tions using paper or plastic to digital transactions help reduce carbon footprints and waste, support-ing the principles of the green economy (Ürge-Vorsatz et al., 2016). However, this impact remains in-direct and is not as strong as its influence on e-payment usage because sustainable practices in the green economy often require additional awareness and initiative from consumers beyond simply switching to digital technology.

E-payment Usage Affects Sustainable Green Economy Practices

Based on the SEM-PLS test results, e-payment usage also has a significant effect on sustainable green economy practices, although the effect is relatively low compared to other relationships in the model. E-payment usage significantly influences the implementation of green economy practices, as shown by a p-value of 0.000, which is less than 0.05. This indicates that the use of e-payment truly af-fects the application of green economy principles. Therefore, when consumers use e-payment more frequently, it contributes to the enhancement of sustainable practices. The path coefficient value of 0.341 indicates that the relationship between e-payment usage and the green economy is moderate. This suggests that while the influence is not very strong, e-payment usage still

has a meaningful contribution to the implementation of green economy practices. The f-square value of 0.086 indicates that the effect of e-payment usage on sustainable green economy prac-tices is low. This means that while there is a significant relationship, the impact of e-payment usage on the green economy is not very substantial in the context of this model. The effect is noticeable but does not dominate or become the primary factor in the implementation of green economy practices. Based on causal interpretation, e-payment usage is measured by several indicators, including: 1) the rate of e-payment technology adoption by consumers, 2) the security and convenience of transac-tions using e-payment, and 3) the speed of transactions and the benefits experienced by consumers. As e-payment usage increases, consumers indirectly contribute to sustainable practices because digi-tal technology helps reduce the use of physical resources such as paper, plastic, and other non-environmentally friendly materials. Although this influence is mostly indirect, e-payment usage still plays a role in supporting the principles of the green economy. Electronic transactions reduce the need for physical documents, paper receipts, and even physical trips to transaction locations, which in turn helps reduce carbon emissions and waste (Carraro et al., 2012).

For the Confidence Interval, the 95% confidence interval for this effect ranges from 0.138 to 0.468. Thus, with 95% certainty, we can conclude that the impact of e-payment usage on sustainable green economy practices lies within this range. This relatively wide interval suggests that, although the ef-fect is significant, the level of certainty about its impact varies depending on the context or other in-fluencing factors.

In practical terms, the increased use of e-payment can be linked to various environmental bene-fits, such as:

- Reduction in paper usage. Every digital transaction eliminates the need for paper receipts and documents.
- Reduction in carbon footprint. E-payment reduces the necessity for physical transportation to carry out transactions, ultimately lowering vehicle emissions.
- Energy efficiency. Digital systems are often more energy-efficient compared to traditional, physically-based systems.

However, these impacts are not always immediately apparent to consumers or directly influence their decision to use e-payment. The effects tend to be more cumulative and indirect, which may ex-plain why the f-square value indicates a relatively low impact. Thus, e-payment usage has a significant effect on sustainable green economy practices, although the influence is relatively low. This means that the more consumers use e-payment, the more they contribute to reducing physical resources and waste, supporting sustainable practices (Niken Widowati & Khusaini, 2022). Although this influence exists, its impact is not as great as other factors, such as consumer behavior changes themselves. Nonetheless, e-payment usage remains relevant in supporting the green economy agenda, particularly in reducing paper usage and carbon emissions (Cao et al., 2021).

Consumer Behavior Changes Affect Sustainable Green Economy Practices Through E-payment Usage

Based on the SEM-PLS test results, consumer behavior changes indeed affect sustainable green economy practices indirectly through e-payment usage. This mediation effect is significant, although the contribution is relatively low. The significant mediation effect means that consumer behavior changes significantly affect sustainable green economy practices through e-payment usage, with a p-value of 0.000, which is less than 0.05. This indicates that e-payment usage acts as a mediating varia-ble in the relationship between consumer behavior changes and green economy practices. This effect is not coincidental and has a clear causal relationship. The path coefficient for this indirect effect

is 0.204. Although the influence is not as strong as the direct effect of consumer behavior changes on e-payment usage or the green economy, it still shows that e-payment usage plays an important role in bridging the relationship between consumer behav-ior changes and sustainable green economy practices. The Upsilon v, which measures the strength of the mediation effect, has a value of 0.042, indicating that the mediation effect of e-payment usage is low. This means that while e-payment usage serves as a mediator, its overall impact on the green economy through consumer behavior changes is not very large. However, this mediation role is still important because it shows that e-payment usage strengthens the relationship between consumer behavior and the green economy, even though its contribution is limited. Based on the casual meditation interpretation, the mediation role shows that consumer behavior changes, in terms of 1) The frequency of digital service usage, 2) The types of transactions chosen, 3) Consumer preferences for technology, and 4) The comfort experienced by consumers, can first drive e-payment usage, which then facilitates contributions to sustainable green economy practices. Con-sumers who adopt more frequent and comfortable digital behavior tend to use e-payment more often, which ultimately helps reduce the use of physical resources such as paper or energy (Zahra et al., 2024). Although this influence is not primary, e-payment usage helps strengthen the impact of con-sumer behavior on the environment.

The confidence interval for this mediation effect is between 0.093 and 0.315. With 95% confidence, we can assert that the mediation effect lies within this range. This shows that while the influence is low, e-payment usage still helps strengthen the relationship between consumer behavior changes and the green economy. This mediation impact can be seen when consumers adopt e-payment usage as part of their daily habits. For example, when consumers prefer to use e-payment over cash or physical transactions, they indirectly contribute to reducing waste and emissions related to the use of physical materials such as paper, plastic, or energy used in traditional transaction processes (Liu et al., 2023). However, because the f-square and Upsilon v indicate that this mediation role is low, the contribution of e-payment usage to the green economy through consumer behavior changes tends not to be a major factor. This impact is more complementary, where e-payment usage provides addi-tional contributions to sustainability, but does not fully drive green economy practices (Geetha & Biju, 2024). Thus, consumer behavior changes do affect sustainable green economy practices through e-payment usage, but the influence is relatively low. E-payment usage serves as a mediator in this rela-tionship, strengthening the effect of consumer behavior changes on the green economy, although it is not the dominant factor. This indirect effect is significant, but its role is limited in driving overall green economy practices. Therefore, while e-payment usage helps link consumer behavior to sustain-ability practices, the primary contribution remains with the consumer behavior changes themselves.

Conclusion and Sugestion

The essence of this research lies in investigating the relationship between changes in consumer behavior, the adoption of electronic payments, and their impact on sustainable green economic practices. The main objective is to evaluate how shifts in consumer preferences and comfort with digital financial services can influence the use of electronic payment systems and, in turn, contribute to environmental sustainability (Dong et al., 2024). The primary reason for this research is the growth in digital payments. With increasing reliance on electronic payment systems, it is crucial to understand how this digital shift impacts broader sustainability goals. This study aims to uncover the relationship between consumer be-havior, electronic payments, and the reduction of resource consumption, such as paper and energy, align-ing with green economic objectives. The second reason is the environmental impact. This research emphasizes the role of e-payment in reducing environmental footprints, including the use of physical resources (such as paper) and the

reduction of carbon emissions through decreased physical transactions. Lastly, policy implications are considered, as the findings can offer valuable insights for busi-nesses and policymakers to encourage the broader adoption of digital payment technologies as part of their sustainability strategies. The government's role in supporting infrastructure for electronic pay-ments, particularly in promoting green economic practices, is highlighted as a key driver for future growth.

This study confirms that consumer behavior changes significantly influence e-payment usage, and both variables directly and indirectly contribute to sustainable green economy practices. The results show that as consumers increasingly adopt digital services and express comfort with e-payment technol-ogy, their usage of e-payment systems rises. This increase in e-payment usage facilitates reductions in physical resource consumption, such as paper and plastic, and lowers carbon emissions through less reli-ance on physical transactions. The findings also reveal a moderate relationship between e-payment usage and sustainable prac-tices, indicating that while e-payment usage contributes to green economy goals, it does so at a moderate level. The indirect mediation effect of e-payment usage further enhances the link between consumer be-havior and the green economy, though its contribution remains relatively low. The contribution of novelty in this research highlights the unique mediation role of e-payment in strengthening the relationship between consumer behavior changes and green economy practices. This mediation, though moderate, suggests that as consumers shift toward more frequent and comfortable digital behaviors, e-payment usage can act as a catalyst for promoting sustainability. However, the study also reveals that the impact of e-payment is more indirect and cumulative, pointing to the need for fur-ther exploration into maximizing its environmental benefits. This focus on digital financial services as a pathway to sustainability is an emerging area of interest, contributing new insights into how technology adoption can align with global sustainability goals.

The implications of the thus analysis regarding the influence of consumer behavior changes, e-payment usage, and sustainable green economy practices have significant impacts on business decisions, public policies, and consumer behavior. Businesses must recognize the role of digital transformation in driving sustainability, particularly in payment methods, as shifting to digital transactions can significant-ly reduce the consumption of physical resources like paper and plastic. The moderate contribution of e-payment usage to green economy practices suggests that companies embracing digitalization will en-hance their sustainability efforts. To strengthen their market position, businesses can adopt green tech-nology-based marketing strategies, promoting eco-friendly e-payment as part of their brand identity, which can increase loyalty among environmentally conscious consumers. Furthermore, to encourage more frequent e-payment usage, companies need to develop secure, fast, and convenient digital infra-structure, integrating eco-friendly payment solutions to further align their operations with sustainability goals (Mikhno et al., 2021). Governments and public policy play a crucial role in supporting the green economy by promoting the use of digital technology through supportive policies. Since consumer behavior changes impact the green economy via e-payment, policies that incentivize businesses to reduce paper-based or physical transactions and initiatives aimed at lowering carbon emissions are essential (Amin et al., 2022). Addi-tionally, regulations mandating the use of e-payment in sectors with high waste generation, such as pub-lic administration or transportation, can accelerate the shift towards a greener economy. To further pro-mote e-payment adoption, governments must strengthen technological infrastructure, particularly in regions where access to digital services is limited, ensuring broader adoption and integration of eco-friendly digital solutions Consumers play a vital role in advancing sustainability through behavioral changes that encour-age the use of e-payment and contribute to the green economy. The more frequently and consciously con-sumers use digital technology, the greater their impact on sustainable practices (Oyelami et al., 2020). By increasing their awareness of the environmental impact of daily habits,

consumers can make greener choices, such as opting for digital services for routine transactions, which reduces waste and emissions. For these behavioral changes to persist, trust in the security and convenience of e-payment technology must be strengthened, as consumer comfort with these systems directly correlates with their broader adoption and, consequently, their contribution to sustainability efforts.

The technology and fintech sectors have a significant opportunity to drive sustainability through the development of greener e-payment solutions. The finding that e-payment usage mediates the rela-tionship between consumer behavior changes and the green economy suggests that fintech companies can innovate by creating energy-efficient payment systems and integrating these with green economy initiatives, such as offering rewards for eco-friendly transactions. Moreover, fintech firms can invest in technological innovations that more directly support sustainability, including reducing server energy consumption, backing carbon reduction projects, and adopting renewable energy sources for their opera-tions. This shift towards sustainable technology not only strengthens the sector's role in the green econ-omy but also aligns with growing consumer demand for eco-friendly financial services. The environmental implications of e-payment usage are significant, particularly in contributing to waste and emission reduction. The broader adoption of digital transactions, coupled with shifts in con-sumer behavior toward using e-payment, can greatly reduce the need for paper and plastic-based transac-tions, as well as the physical travel required to complete them, leading to lower carbon emissions and waste (Mahat et al., 2019). Moreover, e-payment plays a crucial role in the green economy, not only by offering transaction convenience but by acting as a catalyst for global efforts to minimize environmental impacts. If e-payment technology continues to be encouraged and integrated with sustainable practices, it has the potential to become a key driver in the transformation toward a more environmentally friendly global economy. E-payment plays a crucial role in sustainable economic development by bridging the digital and green economies. As the digital economy grows, countries can reduce their dependence on physical re-sources, thereby contributing to more sustainable economic growth. Businesses that adopt e-payment early and integrate into the green economy gain a competitive edge in an increasingly environmentally-conscious market, creating additional economic incentives for sustainability initiatives. Furthermore, the moderate to low impact of e-payment on the green economy opens up opportunities for further research. In-depth studies could explore how payment technology and consumer behavior can be optimized to achieve greater sustainability, particularly in reducing environmental impact through digital innovations

The analysis results have important implications for businesses, consumers, governments, fintech companies, and the environment. To fully realize the benefits of consumer behavior changes and e-payment usage in supporting sustainable green economy practices, cross-sector collaboration is needed. Businesses must adopt eco-friendly digital payment solutions, governments need to support infrastruc-ture and policies that promote sustainability, and consumers must continue to be encouraged to become more aware of the environmental impact of their choices. If all of these are implemented, the transfor-mation towards a green economy will accelerate, and the impact on the environment will be more signifi-cant. The limitations of this study include its limited generalizability, as it may focus on a specific geo-graphic area or demographic, making it difficult to apply the findings universally. The moderate impact of e-payment on green economy practices also indicates that more research is needed to fully understand its potential in driving sustainability. The emphasis on indirect effects may overlook other direct factors that influence environmental sustainability. Additionally, the study may not address technological infra-structure gaps in regions with limited access to digital services, and without longitudinal data, the long-term effects of consumer behavior changes remain unclear. Finally, focusing on specific consumer behav-ior metrics, such as transaction frequency, without considering other factors like income or environmen-tal awareness,

may limit the comprehensiveness of the findings. These limitations highlight areas for further research to better understand e-payment's role in promoting sustainability.

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