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Behavioral Intention to Adopt Green Banking Technology: The Influence of UTAU and Environmental Concern Factors

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ABSTRACT

Objectives: This study examines the influence of UTAUT and environmental concern on behavioral intention and Green Banking Product adoption, focusing on gender differences.

Methodology: A survey was conducted using Google Forms with 129 respondents from BCA, BRI, BNI, and Mandiri bank customers in Banten, DKI Jakarta, West Java, Central Java, East Java, and Yogyakarta. The study employs a correlational design with cross-sectional data collection. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for analysis.

Findings: Results show that Facilitating Conditions and Social Influence do not significantly impact behavioral intention. However, gender moderates the relationship between Effort Expectancy and Behavioral Intention, indicating differences between male and female respondents.

Conclusion: Certain UTAUT factors may not directly influence behavioral intention, but gender plays a key role in Green Banking adoption. These findings can help banks develop targeted strategies to encourage adoption.

Keywords: Green Banking; Technology; Behavioral Intention; UTAUT Model; Enviromental Concern.

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INTRODUCTION

Sustainability has become one of the main focuses of global development, as reflected in the 17 Sustainable Development Goals (SDGs) initiated by the United Nations. One of the main priorities is to integrate sustainability principles in various sectors, including banking, to encourage environmentally friendly consumption and production patterns (Bouteraa et al., 2021). In the context of banking, green banking emerges as a strategic solution to reduce negative environmental impacts through technology-based service innovations that support environmental efficiency, such as reducing carbon emissions and paper waste (Bukhari et al., 2020; Park & Kim, 2020). The implementation of green banking, especially through internet banking and mobile banking services, has been introduced in Indonesia since the issuance of

Bank Indonesia Circular Letter No. 11/23/DPNP in 2009. However, the adoption rate of these services by customers at the four major banks-BCA, BRI, BNI, and Mandiri-is still below 50% of total active customers (BCA: 48%, BRI: 43%, BNI: 36%, Mandiri: 42%), suggesting further potential for improvement. In an effort to increase the adoption of green banking, this study utilizes the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. This theory identifies four main factors that influence consumers' behavioral intention to use technology, namely performance expectancy, effort expectancy, social influence, and facilitating conditions (Mensah et al., 2024).

Previous research shows that performance expectancy, which is the belief that technology can increase efficiency and productivity, has a significant effect on users' behavioral intention to adopt green banking (Shafique & Khan, 2020; Ahmad et al., 2023). The effort expectancy factor, which reflects the perceived ease of use of technology, has also proven significant in influencing adoption decisions (Bouteraa et al., 2022). However, results related to social influence, namely the influence of the social environment on user decisions, still show inconsistencies. Some studies report significant results (Ahmad et al., 2023), while others find inconsistent effects (Bouteraa et al., 2022; Abu-Taieh et al., 2022).

Apart from the factors from the UTAUT model, environmental concern or environmental awareness is one of the variables that is also relevant in this study. Environmental awareness describes the level of individual attention to the environmental impact of banking activities, which can affect their behavioral intention to use green banking services (Hwang & Choi, 2021; Ahmad et al., 2023). Studies show that customers with a high level of environmental awareness are more likely to adopt green banking products to support global sustainability goals.

Although there have been many studies on green banking, most of them focus on organizational and bank management perspectives, while the influence of individual factors, such as environmental awareness, has not been explored in depth (Aslam et al., 2022; Redwanuzzaman, 2021). Based on these research gaps, this study aims to identify the factors that influence consumer behavioral intentions in adopting green banking technology using the UTAUT framework, coupled with gender variables and moderation. This study will not only make a theoretical contribution to the UTAUT literature in the context of green banking, but also offer practical insights for banks to improve their marketing and green technology adoption strategies to support sustainability goals in Indonesia.

LITERATURE REVIEW

Green Banking Technology

Green banking technology is a banking concept that integrates environmental sustainability principles into financial operations and services, utilizing technological innovations to reduce negative impacts on the environment. These technologies include services such as internet banking, mobile banking, e-statements, and other digital solutions that enable customers to conduct transactions without the need to use paper or visit branches, thereby reducing carbon footprint and print waste (Hossain et al., 2020; Gupta & Singhal, 2022). In addition to supporting global sustainability goals, green banking technology also provides additional benefits such as operational efficiency, better risk management, and improved corporate image

in the eyes of environmentally conscious customers (Ahmad et al., 2023). In this context, the adoption of green banking becomes a strategic solution for banks to not only meet sustainability demands, but also enhance their competitiveness in a banking market that is increasingly oriented towards digitalization and environmental responsibility.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT theory introduced by Venkatesh et al. (2003) is a development of various previous models such as the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Innovation Diffusion Theory (IDT). This theory aims to simplify the understanding of the factors that influence technology adoption by formulating four main constructs, namely performance expectancy, effort expectancy, social influence, and facilitating conditions.

Performance expectancy refers to the belief that technology enhances efficiency and performance. In green banking, it reflects customers' expectations that digital banking improves transaction speed while benefiting the environment. (Shafique & Khan, 2020; Ahmad et al., 2023).

Effort expectancy, denotes the perceived ease of use, where simpler and more user-friendly interfaces increase adoption likelihood. Customers who find green banking technology easy to navigate are more inclined to use it. (Bouteraa et al., 2022).

Social influence highlights the role of peers, family, and colleagues in shaping adoption decisions. Recommendations from social circles may encourage green banking use, though cultural differences affect its impact. (Ahmad et al., 2023).

Facilitating conditions, focus on the availability of infrastructure, such as mobile devices, internet access, and customer support. Reliable resources enhance user confidence and increase green banking adoption. (Ahmad et al., 2023; Mensah et al., 2024).

Environmental Concern

In addition to the main constructs of UTAUT, this study adds environmental concern variables that are relevant in the context of green banking. Environmental concern refers to the level of individual attention to the impact of human activities on the environment, such as pollution, climate change, and ecosystem degradation (Hwang & Choi, 2021). In research related to green banking, this variable serves as the main driving factor, where customers who have high environmental awareness tend to prefer environmentally friendly banking services. Research by Ahmad et al. (2023) shows that environmental awareness plays a significant role in influencing behavioral intentions to adopt green technology, because they consider this technology as a form of real contribution to environmental preservation.

Behavioral Intention Concept to Adopt

Behavioral intention refers to a person's willingness to perform an action, often predicting actual behavior. In the context of green banking, it reflects customers' readiness to use such services based on their perceptions of usefulness, ease of use, and alignment with personal values. Key factors influencing this intention include perceived benefits, ease of use, social influence, and infrastructure support. Studies show that positive attitudes toward sustainability, perceived benefits, and community or institutional support significantly increase the likelihood of adopting green banking services (Bouteraa et al., 2020; Ahmad et al., 2023; Abu-Taieh et

al., 2022; Mensah et al., 2024).

Conceptual Framework

The theoretical framework of this study centers on the UTAUT model which has been expanded with the addition of environmental concern variables as additional predictors. This framework describes the relationship between the main variables (performance expectancy, effort expectancy, social influence, facilitating conditions, and environmental concern) with behavioral intention, which then affects the level of green banking adoption, The framework of this study is as follows:

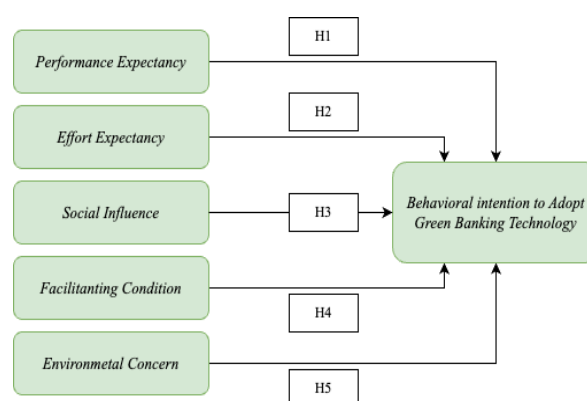


Figure 1. Conceptual Framework

This framework not only supports the theoretical objectives but also provides practical insights for banks in increasing the adoption of green banking in Indonesia.

Hypothesis Development

Performance expectancy is the belief that technology enhances efficiency. In green banking, customers view mobile and internet banking as convenient, time-saving solutions. Research by Shafique & Khan (2020) and Ahmad et al. (2023) confirms its significant influence on behavioral intention to adopt green banking. Therefore, the first hypothesis is:

H1: Performance expectancy has a positive influence on behavioral intention to adopt green banking technology.

Effort expectancy refers to the perceived ease of using technology. In green banking, user-friendly interfaces and mobile accessibility drive adoption. Studies by Bouteraa et al. (2022) and Ahmad et al. (2023) confirm its positive impact on behavioral intention. Thus, the second hypothesis is:

H2: Effort expectancy has a positive influence on behavioral intention to adopt green banking technology.

Social influence refers to how others' opinions impact technology adoption. In green banking, customers may adopt services if people around them use them. While Ahmad et al. (2023) found a significant effect, Bouteraa et al. (2022) noted its influence varies by context. Therefore, the third hypothesis is:

H3: Social influence has a positive influence on behavioral intention to adopt green banking technology.

Facilitating conditions refer to the availability of infrastructure and resources for technology

use. In green banking, access to smartphones, stable internet, and bank support encourages adoption. Studies by Ahmad et al. (2023) and Mensah et al. (2024) confirm its positive impact on behavioral intention. Therefore, the fourth hypothesis is:

H4: Facilitating conditions have a positive influence on behavioral intention to adopt green banking technology.

Environmental concern reflects awareness of ecological issues. Environmentally conscious customers prefer green banking for its eco-friendly benefits, such as reducing carbon emissions and paper waste. Research by Hwang & Choi (2021) and Ahmad et al. (2023) confirms its positive impact on behavioral intention. Thus, the fifth hypothesis is:

H5: Environmental concern has a positive influence on behavioral intention to adopt green banking technology.

METHOD

This study employs a quantitative correlational design to analyze UTAUT variables influencing green banking adoption. The population includes BCA, BRI, BNI, and Mandiri customers in Java and Banten, with 251 respondents selected via purposive sampling. Data were collected through an online questionnaire using a 7-point Likert scale. Analysis was conducted using PLS-SEM, assessing validity, reliability, and hypothesis testing, with gender moderation examined through Multi-Group Analysis (MGA). This approach offers strategic insights to enhance green banking adoption. This approach provides a comprehensive picture of the factors that influence green banking adoption.

By presenting a variable indicator table, this study displays detailed information related to the measurement of each construct and provides strategic insights for banks in encouraging the use of environmentally friendly services. The variable indicators of this study are as follows:

Table 1. Variable Indicators

Variabel	Code	Indikator Kuesioner
Performance Expectancy (Majeed et al, 2024) dan (Hilal & Neira, 2022)	PE1	1. I believe that using green banking technology will increase the efficiency of my financial transactions.
	PE2	2. Green banking technology helps me complete transactions faster.
	PE3	3. I believe that green banking technology will improve the quality of my banking services.
	PE4	4. Using green banking technology will make my financial management easier.
	PE5	5. I feel that green banking technology can help me reduce the environmental impact of banking activities.
Effort Expectancy (Majeed et al, 2024) dan (Hilal & Neira, 2022)	EE1	1. I find green banking technology easy to use.
	EE2	2. I have no difficulty in learning how to use green banking technology.

	EE3	3. Green banking technology does not require much effort to operate.
	EE4	4. The guidelines for using green banking technology are easy to understand.
	EE5	5. I feel comfortable using green banking technology in my daily banking activities.
Social Influence (Majeed et al, 2024) dan (Hilal & Neira, 2022)		
	SI1	1. My immediate family supports the use of green banking technology.
	SI2	2. My friends, support the use of green banking technology.
	SI3	3. My boss at work encourages me to use green banking technology.
	SI4	4. My coworker encourages me to use green banking technology.
	SI5	5. I feel that the people around me expect me to use green banking technology.
	SI6	6. I am influenced by social trends to use green banking technology.
	SI7	7. Green banking technology is widely used by people close to me.
Facilitating Conditions (Majeed et al, 2024) dan (Hilal & Neira, 2022)		
	FC1	1. My bank provides adequate technical support for the use of green banking technology.
	FC2	2. I have access to all the information needed to use green banking technology.
	FC3	3. The infrastructure provided by the bank supports the use of green banking technology.
	FC4	4. I can easily get help if I experience problems with green banking technology.
	FC5	5. My bank provides adequate resources to ensure green banking technology functions properly.
Behavioral Intention (Majeed et al, 2024)		
	BI1	1. I intend to continue using green banking technology in the future.
	BI2	2. I will recommend green banking technology to others.
	BI3	3. I plan to use green banking technology for all my banking transactions.
	BI4	4. I am eager to use green banking technology in my daily banking activities.
	BI5	5. I will use green banking technology as often as possible.
Environmental Concern (Majeed et al, 2024)		
	EC1	1. I am concerned about the negative impact of banking activities on the environment.
	EC2	2. I care about reducing my carbon footprint through the use of green banking technology.
	EC3	3. I feel responsible for supporting environmentally friendly banking practices.
	EC4	4. I will choose a bank that demonstrates a commitment to environmental sustainability.
	EC5	5. I prefer banking services that promote environmental sustainability.

RESULTS AND DISCUSSION

Measurement Model (Outer model)

Factor Loading, Cronbach Alpha, CR, AVE

Table 2. Factor Loading, Cronbach Alpha, CR, AVE

Indikator	Outer loadings	Cronbach's alpha	CR (rho_c)	AVE
BI.1 <- BI	0,914	0,963	0,971	0,871
BI.2 <- BI	0,934			
BI.3 <- BI	0,953			
BI.4 <- BI	0,943			
BI.5 <- BI	0,922			
EC.1 <- EC	0,923	0,974	0,979	0,905
EC.2 <- EC	0,949			
EC.3 <- EC	0,962			
EC.4 <- EC	0,968			
EC.5 <- EC	0,954			
EE.1 <- EE	0,885	0,927	0,945	0,773
EE.2 <- EE	0,889			
EE.3 <- EE	0,881			
EE.4 <- EE	0,869			
EE.5 <- EE	0,873			
FC.1 <- FC	0,931	0,949	0,961	0,831
FC.2 <- FC	0,955			
FC.3 <- FC	0,834			
FC.4 <- FC	0,908			
FC.5 <- FC	0,927			
PE.1 <- PE	0,882	0,918	0,938	0,753
PE.2 <- PE	0,867			
PE.3 <- PE	0,882			
PE.4 <- PE	0,867			
PE.5 <- PE	0,841			
SI.2 <- SI	0,883	0,891	0,932	0,821
SI.3 <- SI	0,924			
SI.4 <- SI	0,911			

This study tests Convergent Validity using factor loading, Average Variance Extracted (AVE), and Composite Reliability (CR), where the factor loading value > 0.5 , AVE > 0.5 , and CR > 0.7 indicate good validity and reliability. Of the 6 variables and 32 indicator items, 4 indicators from the Social Influence variable (SI.1, SI.5, SI.6, SI.7) were removed because they did not meet the criteria for outer loading, CR, and AVE values. After removal, the average outer loading, CR, and AVE values of the indicators above have met the requirements, with all indicators exceeding the minimum recommended value. This indicates that the instruments used are reliable and valid for measuring constructs in research. As for the path coefficients:

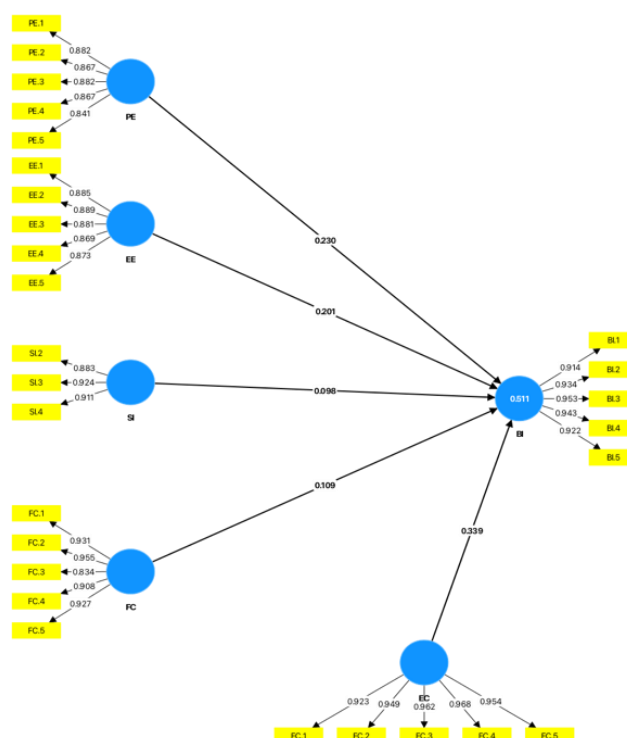


Figure 3. Path Coefficient

Discriminant Validity of HTMT and Fornell-Larcker

Table 3. HTMT Test

Complete	BI	EC	EE	FC	PE	SI
BI						
EC	0,537					
EE	0,583	0,296				
FC	0,495	0,459	0,407			
PE	0,566	0,228	0,780	0,357		
SI	0,508	0,295	0,559	0,671	0,528	

Table 4. Fornell-Larcker Test

	BI	EC	EE	FC	PE	SI
BI	0,933					
EC	0,523	0,951				
EE	0,560	0,291	0,879			
FC	0,476	0,444	0,393	0,912		
PE	0,534	0,218	0,728	0,334	0,868	
SI	0,475	0,280	0,516	0,621	0,482	0,906

Discriminant Validity testing ensures that each construct is significantly different from other constructs in the model. With the Fornell-Larcker Criterion method, the AVE value of each construct must be greater than the square of the correlation between constructs, while the HTMT method requires a value of <0.9 (or <0.85 for strict standards). The test results show that the square root of the AVE of each indicator is greater than the correlation between indicators, and

the HTMT value of all constructs is <0.9 . Thus, the constructs in the model meet the discriminant validity criteria and are valid in measuring the intended aspects.

VIF Value and Model Fit

Table 5. VIF Value

<u>Hubungan</u>	<i>(Complete)</i>
EC -> BI	1,275
EE -> BI	2,361
FC -> BI	1,874
PE -> BI	2,200
SI -> BI	1,956

Table 6. Model Fit

<u>Parameter</u>	<i>(Complete)</i>
SRMR	0,055
<u>d ULS</u>	1,244
<u>d G</u>	0,904
NFI	0,847

The Variance Inflation Factor (VIF) test results show that all VIF values are below 10 (preference <5), indicating that the model is free from multicollinearity problems and each independent variable (EC, EE, FC, PE, SI) makes a unique contribution to the dependent variable (BI). The model fit test shows an SRMR value of 0.055 (below 0.08), which indicates a good model fit, and an NFI value of 0.847, which falls into the moderate fit category. Overall, therefore, this model is declared feasible and can be used for further analysis.

Structural Model

Rsquare Test (R^2), Fsquare Test (f^2) and Predictive Relevance (Q^2)

Table 7. Test of Rsquare (R^2) and Predictive Relevance (Q^2)

R^2	0,511
Q^2	0,491

Table 8. Fsquare Test (f^2)

	<u>f-square</u>	<i>Effect Size</i>
EC -> BI	0,184	<u>Besar</u>
EE -> BI	0,035	<u>Besar</u>
FC -> BI	0,013	Kecil
PE -> BI	0,049	<u>Besar</u>
SI -> BI	0,010	Kecil

The R-square (R^2) test results show a value of 0.511, which is in the moderate category according to Hair et al. (2017), indicating that the model is able to explain 51.1% of the variability in the dependent variable (Behavioral Intention). Testing the effect size (f^2) shows that Environmental Concern has a moderate effect ($f^2 = 0.184$), while Effort Expectancy ($f^2 = 0.035$), Facilitating Conditions ($f^2 = 0.013$), Performance Expectancy ($f^2 = 0.049$), and Social Influence ($f^2 = 0.010$) have a small effect on Behavioral Intention. In addition, the model has good predictive relevance with a Q^2 value > 0 , indicating that this model is worth using for further analysis.

Hypothesis Test

Table 9. Hypothesis Confirmation

Hipotesis	Hubungan	Path Coefficient	Sample mean (M)	T statistics	P values	Supported
H1	PE -> BI	0,230	0,229	3,116	0,001	Yes
H2	EE -> BI	0,201	0,196	3,150	0,001	Yes
H3	FC -> BI	0,109	0,111	1,891	0,029	No
H4	SI -> BI	0,098	0,098	1,712	0,043	No
H5	EC -> BI	0,339	0,338	6,094	0,000	Yes

The results of testing the direct relationship hypothesis show that Performance Expectancy (H1) with T-statistic 3.116 and path coefficient 0.230, and Effort Expectancy (H2) with T-statistic 3.150 and path coefficient 0.201, have a positive and significant influence on Behavioral Intention. In contrast, Facilitating Condition (H3) with T-statistic 1.712 and path coefficient 0.109, and Social Influence (H4) with T-statistic 1.891 and path coefficient 0.098, have a positive but insignificant influence. Meanwhile, Environmental Concern (H5) shows a positive and significant effect with a T-statistic of 6.094 and a path coefficient of 0.339. These results indicate that the variables Environmental Concern, Performance Expectancy, and Effort Expectancy are significant predictors of Behavioral Intention in adopting green banking.

The study's direct relationship testing revealed varying impacts of independent variables on Behavioral Intention (BI) to adopt green banking. Performance Expectancy (H1) was accepted ($T = 3.116$, path = 0.230), indicating that perceived efficiency benefits significantly drive adoption, supporting Shafique & Khan (2020). Effort Expectancy (H2) was also accepted ($T = 3.150$, path = 0.201), confirming that ease of use enhances behavioral intention, consistent with Bouteraa et al. (2022). Conversely, Facilitating Conditions (H3) was not significant ($T = 1.712$, path = 0.109), suggesting that infrastructure availability does not directly influence adoption, aligning with Ahmad et al. (2023). Social Influence (H4) was also not significant ($T = 1.891$, path = 0.098), indicating that peer recommendations do not strongly impact adoption, in line with Bouteraa et al. (2022). Environmental Concern (H5) had the strongest effect ($T = 6.094$, path = 0.339), showing that eco-conscious users are highly motivated to adopt green banking, supporting Hwang & Choi (2021). These findings highlight efficiency, ease of use, and environmental awareness as key drivers, while infrastructure and social influence play lesser roles.

CONCLUSION

This study examines the low behavioral intention to adopt green banking technology in Indonesia, despite its environmental benefits. Social Influence and Facilitating Conditions have shown inconsistent effects, while Environmental Concern remains underexplored as a key driver. The findings reveal that Performance Expectancy (H1) and Effort Expectancy

(H2) significantly influence behavioral intention (T-statistics: 3.116 and 3.150), highlighting the importance of perceived benefits and ease of use. Environmental Concern (H5) is the strongest predictor (T-statistic: 6.094), indicating that environmental awareness drives adoption.

However, Facilitating Conditions (H3) and Social Influence (H4) do not have a significant impact, suggesting that infrastructure and peer influence are less critical in this context. The study underscores the need for banks to enhance digital services, improve user experience, and implement educational campaigns to boost green banking adoption. It also extends the UTAUT framework by emphasizing Environmental Concern as a key factor. Future research should explore trust in new technologies and consumer behavior trends through longitudinal studies to develop effective adoption strategies.

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