ADOPTION OF GREEN BANKING TECHNOLOGY:
A PERSPECTIVE FROM ISLAMIC BANKING CUSTOMERS

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Abstract

This study examines the factors influencing customer adoption of Green Banking Technology through a descriptive-exploratory quantitative approach supported by qualitative data. The first phase of the research involves an exploratory stage to identify potential constructs, while the second phase involves quantitative testing of the TAM 3 model as the underlying framework. The study population consists of BSI customers in the Special Region of Yogyakarta, with a sample of 150 respondents. The data were analyzed using the PLS-SEM method with the WarpPLS 8.0 analytical tool. The results indicate that Output Quality, Result Demonstrability, and Perceived Ease of Use significantly affect Perceived Usefulness, while Computer Self-Efficacy and Perceived Enjoyment influence Perceived Ease of Use. Additionally, Perceived Usefulness and Perceived Ease of Use significantly impact Behavioral Intention. The implications of this research are expected to provide valuable insights for BSI and other Islamic banking institutions to enhance the quality of Green Banking Technology services, thus better meeting customers' needs for Islamic financial technology.

Keyword: *Green Banking Technology, Technology Acceptance Model, Bank Syariah Indonesia*

A. INTRODUCTION

Environmental challenges are becoming increasingly severe in the context of rapid globalization and technological developments, mainly due to business practices that often overlook environmental sustainability (Ria et al., 2023). Through the idea of Green Banking, the complexity of environmental issues like climate change and global warming has increased public awareness of the significance of sustainable practices, including in the banking industry. (Malik & Singh, 2022)

Green banking aims to integrate environmentally friendly practices into banking operations, including financing sustainable projects. This initiative is regulated in Indonesia through Law No. 32 of 2009 and Financial Services Authority Regulation (POJK) No. 51/POJK.03/2017, encouraging sustainable finance adoption. However, its implementation remains limited primarily to large banks such as BCA, BRI, BNI, and Bank Mandiri, as well as several Islamic banks, such as Bank Syariah Indonesia (BSI) and Bank Muamalat Indonesia (BMI).

BSI has initiated environmentally friendly financing and digital efficiency efforts but needs help optimizing resource consumption. Digital technology, through the Internet and mobile banking services, is crucial in reducing carbon footprints. However, public understanding of Green Banking Technology still needs to be improved, underscoring the need for further education and studies on its environmental benefits (Zhang et al., 2022).

The researcher uses the Technology Acceptance Model (TAM) 3, an extension of TAM 1 and TAM 2, which is used to understand the acceptance and use of information technology, to examine the factors influencing customers' adoption of Green Banking Technology. This model was selected due to its ability to accurately forecast the adoption and use of technology. Previous studies on green banking technology have primarily employed the TAM or UTAUT 2 models. In contrast, research using TAM 3 has typically focused on domains such as learning applications, investment and stock trading apps, and other computer-related technologies like cloud computing and OVO applications.

This study is unique in that it uses open-ended questions before closed-ended ones to test the TAM-3 model and investigate possible new variables based on customer perceptions. Additionally, this research focuses solely on BSI customers in the Special Region of Yogyakarta.

This study is expected to identify the factors influencing BSI customers' adoption of Green Banking

Technology. The findings are also expected to provide insights for Islamic banking institutions to enhance customer awareness and engagement in sustainable financial practices and support the achievement of the Sustainable Development Goals (SDGs) in Indonesia.

B. LITERATURE REVIEW

Green Banking Technology

Green banking refers to approaches aimed at reducing the negative environmental impacts of financial institutions (Afissunani, 2023). Green banking emphasizes that banks should pursue financial profits and fulfil social and environmental responsibilities. Thus, the focus extends beyond profit to encompass social welfare (people) and environmental sustainability (planet) as part of the commitment to sustainable development (Hanif et al., 2020).

Green Banking Technology refers to the application of technology in banking to support environmental sustainability, including Internet banking, mobile banking, green project financing, and electronic outlets that reduce environmental impact (Bouteraa et al., 2022). This technology also incorporates ESG (Environmental et al.) principles as a framework that balances environmental, social, and governance aspects (Wu et al., 2024).

In the ESG framework, the environmental aspect encourages banks to reduce energy consumption and electronic waste while promoting the use of renewable energy (Delgado-Ceballos et al., 2023). From a social perspective, banks need to consider the impact of their technology on social equity and community welfare by ensuring inclusive financial services (Fauzan et al., 2024). From a governance standpoint, banks must maintain transparency and accountability in the use of technology and ensure compliance with regulations (Kontesa et al., 2023).

Theoretical Framework and Hypothesis Development

The Technology Acceptance Model (TAM) is used to understand user acceptance of information technology systems. Introduced by Davis in 1985 (Davis, 1985), TAM is grounded in the Theory of Reasoned Action (TRA) and focuses on the factors influencing technology use, namely perceived usefulness (PU) and perceived ease of use (PEOU). TAM posits that the level of technology use is influenced by perceptions of its benefits and ease of use.

TAM has evolved to adapt to technological changes. In 2000, TAM 2 added constructs such as intention to use, usage behaviour, and external factors like subjective norms, job relevance, and experience (Venkatesh & Davis, 2000). In 2008, TAM 3 introduced new dimensions focusing on perceived ease of use, such as Anchor and Adjustment constructs, including variables like computer self-efficacy, anxiety, and Enjoyment of using technology (Venkatesh & Bala, 2008).

In this study, the researcher selects constructs most relevant to the context of Green Banking Technology services, as follows:

Output quality relates to individuals' belief that an information system or technology they use will produce positive outcomes for their tasks. Previous studies, such as those by Nur Zaida et al (2022), have shown that output quality affects users' performance expectations of technology, with users being more likely to adopt technology that delivers high-quality output which meets their needs. Additionally, studies by Cengiz & Bakırtaş (2020) and Unal & Uzun, (2021) support the finding that output quality significantly influences perceived usefulness. Based on these results, it can be said that users are more likely to believe that a technology is useful for their tasks if its output quality is higher.

Result demonstrability refers to the measurable results of using information technology. In other words, it pertains to the extent to which individuals believe the outcomes of using a system are tangible, observable, and communicable (Moore & Benbasat, 1991; Venkatesh & Bala, 2008). Previous studies suggest that the ability to communicate the results of technology use enhances its perceived usefulness. Thus, if the outcomes of using Green Banking Technology (GBT) are observable and easily communicated, people will be more convinced that it can improve productivity in daily activities.

H1: Output Quality (OUT) positively affects Perceived Usefulness (PU).

H2: Result Demonstrability (RES) positively affects Perceived Usefulness (PU).

Computer Self-Efficacy refers to an individual's confidence in their ability to use technology, essential in influencing perceptions of ease of use (PEOU). Research has shown that individuals with high self-efficacy tend to view technology as more straightforward. However, inconsistencies in findings suggest that, despite high self-efficacy, its effect on ease of use is only sometimes significant. User experience, technical support, or the technology's context may influence this relationship. Therefore, further research is needed to explore factors that moderate or mediate the relationship between self-efficacy and ease of use and improve technology adoption.

Perceived Enjoyment refers to the degree to which individuals find satisfaction in using an information system, regardless of its performance outcomes. Previous research indicates that Perceived Enjoyment has a significant positive impact on Perceived Ease of Use. When users derive enjoyment from technology, they are more likely to perceive it as easy to use, thereby facilitating its adoption.

H3: Computer Self-Efficacy (CSE) has a positive effect on Perceived Ease of Use (PEOU).
H4: Perceived Enjoyment (ENJ) significantly and positively influences Perceived Ease of Use (PEOU).

Perceived Ease of Use (PEOU) reflects users' perception that a technology can be operated effortlessly. Research shows that when users consider a technology easy to use, they are more likely to recognize its relevance. Studies have identified a positive correlation between perceived ease of use and perceived usefulness, indicating that ease of use amplifies the perception of its utility.

H5: Perceived Ease of Use (PEOU) has a positive impact on Perceived Usefulness (PU).

Behavioural Intention (BI) refers to willingness in adopting new technology (Chen et al., 2022). This construct strongly predicts individual technology acceptance. (Venkatesh et al., 2012). Perceived Usefulness (PU) is the belief that technology can enhance task performance. In the context of GBT, perceived benefits such as environmentally friendly transactions and easy access may increase the intention to adopt. Research has shown that perceived usefulness positively influences behavioural intention, supporting TAM. In other words, the greater the perceived benefits, the higher the likelihood of adoption.

Perceived ease of use represents the belief that a technology can be utilized with minimal effort. Studies have demonstrated that ease of use influences behavioral intention both directly and indirectly through perceived usefulness. The simpler a technology is to operate, the greater the intention to adopt it. In contrast, challenges in using the technology may diminish the willingness to adopt it.

H6: Perceived Usefulness (PU) positively affects Behavioral Intention (BI) to adopt green banking technology.
H7: Perceived Ease of Use (PEOU) positively affects Behavioral Intention (BI) to adopt green banking technology.

C. RESEARCH METHODOLOGY

This descriptive-exploratory study employs a quantitative approach supported by qualitative data. In the first stage, the researcher posed open-ended questions to explore factors that could influence GBT adoption beyond the TAM model. The second stage involves data analysis using the TAM 3 model to identify factors affecting the adoption of Green Banking Technology.

The target population for this study comprises BSI customers located in Yogyakarta. A non-probability sampling technique, specifically purposive sampling, was employed to identify respondents who met the predetermined research criteria. Data collection was conducted using an online questionnaire distributed via Google Forms within the Yogyakarta area.

In the first stage, open-ended questions were analyzed descriptively using SPSS 26 software. In the second stage, the variables in the TAM 3 model were measured using a modified instrument. Variables such as Output Quality, Perceived.

D. Discussion

Based on Table 1, this study involved 150 respondents. The respondents' characteristics in this study are diverse, with a demographic distribution reflecting varying Green Banking Technology usage durations. The research data shows a good sample, with respondents spread across different districts in Yogyakarta.

Table 1 Demographic Characteristics of Respondents

Characteristics	Description	N	Percentage (%)
Gender	Male	55	36,7%
	Female	95	63.3%
Age	≤ 20 years	10	6,7%
	21 – 30 years	123	82%
	31 – 40 years	16	10.7%
	> 50 years	1	0.7%
Educational Level	Elementary School/Equivalent	1	0.7%
	Junior High School/Equivalent	1	0.7%
	Senior High School/Equivalent	63	42%
	D3/S1	63	42%
	S2/S3	22	14.7%
Occupation	Student	84	56%
	Entrepreneur	10	6.7%
	Civil Servant/Military/Police	22	14.7%
	Business Owner	11	7.3%
	Private Employee	23	15.3%
	Others	0	0%
Monthly Income	< Rp 1.000.000	58	38.7%
	Rp 1.000.001 – 3.000.000	56	37.3%
	Rp 3.000.001 – 5.000.000	26	17.3%
	Rp 5.000.001 – 10.000.000	8	5.3%
	>Rp 10.000.000	2	1.3%
Current Domicile	City of Yogyakarta	38	25.3%
	Sleman Regency	36	24%
	Bantul Regency	33	22%
	Gunung Kidul Regency	24	16%
	Kulon Progo Regency	19	12.7%
GBT Used	BSI *Mobile*	120	80%
	Webform BSI	4	2.7%
	ATM	16	10.7%
	BSI *Mobile* dan ATM	10	6.7%
	Others	0	0%
Duration of Use GBT	< 6 Months	37	24.7%
	6 Months – 1 Years	65	43.3%
	1 Years – 2 Years	35	23.3%
	> 2 Years	13	8.7%

Before conducting hypothesis and model testing, instrument validity and reliability tests were performed to ensure the data's accuracy and consistency. The results confirmed that all variable items in this study met the criteria for validity and reliability, with a Loading Factor exceeding 0.7, Cronbach's Alpha (CA) above 0.7, Composite Reliability (CR) greater than 0.7, and Average Variance Extracted (AVE) over 0.5. A summary of these findings is presented in Table 2.

Table 2 Validity and Reliability Test

CODE	ITEM VARIABLE	LOADING	CA&CR	AVE
	Output Quality (OUT)		0.888 0.931	0.818
OUT1	The output from the Green Banking Technology (GBT) I use is of very high quality.	0.912		
OUT2	I do not encounter any issues with the output of GBT.	0.893		
OUT3	I assess the results produced by GBT as excellent.	0.907		
	Result Demonstrability (RES)		0.843 0.895	0.680
RES1	I do not find it difficult to explain the outcomes of using GBT.	0.849		
RES2	I can clearly communicate to others the consequences or effects of using GBT.	0.819		
RES3	The results of using GBT are clear.	0.867		
RES4	I do not find it difficult to explain whether the GBT I use is useful or not.	0.761		
	Computer Self-Efficacy (CSE)		0.846 0.897	0.686
	I am able to complete my tasks using GBT.			
CSE1	Even if no one tells me what to do.	0.886		
CSE2	Even if I receive helpful suggestions.	0.823		
CSE3	Even if someone tells me what I should do first.	0.747		
CSE4	Even if I use the same GBT to perform previous tasks.	0.852		
	Perceived Enjoyment (ENJ)		0.783 0.875	0.701
ENJ1	I enjoy using GBT.	0.887		
ENJ2	I feel comfortable using GBT.	0.739		
ENJ3	I am very happy when using GBT.	0.877		
	Perceived Usefulness (PU)		0.808 0.875	0.636
PU1	Using GBT enhances my job performance.	0.802		
PU2	Using GBT increases my productivity.	0.848		
PU3	Using GBT improves the effectiveness of my work.	0.773		
PU4	Using GBT is very useful for my job.	0.764		
	Perceived Ease of Use (PEOU)		0.927 0.948	0.820
PEOU1	My interaction with GBT is clear and understandable.	0.931		
PEOU2	Interacting with GBT does not require much effort.	0.892		
PEOU3	I find GBT easy to use.	0.889		
PEOU4	I find it easy to operate GBT, enabling me to do what I want.	0.909		
	Behavioral Intention (BI)		0.911 0.944	0.850
BI1	I have access to GBT, and I want to use it.	0.921		
BI2	I have accessed GBT, and I want to use it.	0.888		
BI3	In the future, I will use GBT.	0.956		

Study 1: Open-Ended Question Analysis

This study measured the factors influencing customers' adoption of Green Banking Technology using constructs from the TAM 3 model. While previous studies have demonstrated the model's ability to predict technology acceptance and usage, the researcher aimed to explore potential factors influencing the use of Green Banking Technology through open-ended questions. Analyzing these responses enriched the understanding of customer motivations for adopting Green Banking Technology and provided insights for future research development. The findings are summarized in Table 3.

Table 3 The Factor of Using GBT

No	Factor	Percentage	No	Factor	Percentage
1	Eeasy	34%	6	Recommendation from others	4%
2	Simple	8%	7	Needs	4%
3	Efective & Efficient	8%	8	Ceap	2%
4	Eco Friendly	19%	9	Others	13%
5	Quick Access	8%			
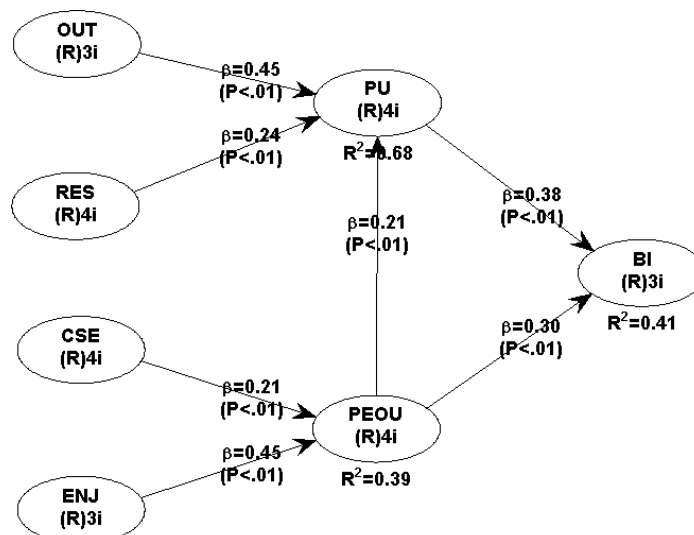
Gambar 1 Hasil Model structural tes

Based on the data obtained, several TAM 3 constructs emerged as crucial factors for the adoption of GBT by BSI customers. First, 34% of respondents felt the technology was easy to use, including in transactions, navigation, and other features (PEOU). Second, 8% of respondents described GBT as practical, effective, efficient, and easily accessible (P.U., OUT). Third, 2% mentioned that the technology was cost-effective (ENJ). Other factors, such as recommendations from others (4%), reflected positive experiences from other users (RES). However, some factors were not included in the TAM 3 model, such as environmental friendliness (19%), need (4%), and other factors such as interest, security, comfort, or simply the desire to try the technology.

Figure 1 illustrates the empirical findings of this research. The hypotheses were tested by analyzing the Path Coefficients (β) values and p-values (p-value < 0.05). The statistical results show that: OUT significantly and positively influences PU (β = 0.455; P < 0.001), RES significantly and positively influences PU (β = 0.238; P = 0.001), CSE significantly and positively influences PEOU (β = 0.209; P = 0.004), ENJ significantly and positively influences PEOU (β = 0.405; P < 0.001), PEOU significantly and positively influences PU (β = 0.208; P = 0.004), PU significantly and positively influences BI (β = 0.384; P < 0.001), PEOU significantly and positively influences B.I. (β = 0.302; P < 0.001). Therefore, H1, H2, H3, H4, H5, H6, and H7 were empirically supported.

Based on the above data analysis, it was found that the Output Quality of GBT usage is the most substantial factor driving customers to adopt GBT. This is evidenced by the respondents' assessment, which shows that the output quality of GBT positively contributes to its perceived usefulness. Therefore, financial institutions need to enhance the quality of their technology to encourage adoption, satisfaction, and user loyalty and increase the use of this technology in everyday life.

This research builds upon prior studies, highlighting that TAM 3 constructs, including Perceived Usefulness and Perceived Ease of Use, play a pivotal role in shaping Behavioral Intention to adopt GBT. Additionally, it strengthens the evidence that the TAM 3 model provides a solid framework for explaining technology adoption.

E. CONCLUSION

The acceptance of Green Banking Technology (GBT) by Bank Syariah Indonesia (BSI) customers in D.I. Yogyakarta is relatively high, with all research variables showing positive results. This study reveals that factors such as perceived usefulness, perceived ease of use, output quality, result demonstrability, computer self-efficacy, and enjoyment of using the technology significantly impact customers' behavioural intentions.

This study has some limitations, such as an uneven sample, being limited to BSI customers in D.I. Yogyakarta, and using the TAM 3 model, which only covers a few constructs. For future research, increasing the sample size and ensuring more evenly distributed questionnaire dissemination is recommended, as expanding the sample and population coverage and further developing the TAM 3 model by adding additional constructs to provide new perspectives.

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