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Green building adoption: Emphasizing energy efficiency and water conservation

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Abstract: Acceleration of development in Indonesia requires the adoption of Green Building that prioritizes efficiency, energy and water conservation. Previous studies have shown that perception, policy, regulation, and knowledge influence the adoption of green buildings for energy efficiency and sustainability. This study offers a step to explore the implementation of Green Building in East Java, assessing the cost, perception, and government policy for the success of green buildings. This study analyzes the influence of individual attitudes, perceived ease, and social support on the intention to adopt green technology. This study uses an interactive questionnaire to collect valid data, analyze Green Building adoption factors, and provide strategic recommendations with a sample size of 111 that have contributed to green buildings in East Java. This study reveals that attitude (R^2 = 0.924) and intention (R^2 = 0.933) contribute significantly to the adoption of green buildings in East Java. Meanwhile, funding variables and government policies do not show a significant impact. Simultaneous tests show a significant influence of attitude with an F value of 13.938.

Keywords: *Adoption, Cost, Education, Green building, Social support.*

1. Introduction

East Java, as one of the provinces in Indonesia, holds beautiful architecture that reflects cultural heritage, modern innovation, and sustainability. In every corner, we can find buildings that are not only visually appealing, but also rich in meaning and function. Every building, both historical and modern, holds a story and provides an unforgettable experience for every visitor. With a combination of tradition and innovation, East Java continues to transform into a center of stunning and sustainable architecture. In implementing the concept of green buildings in East Java, several international certifications such as BREEAM, LEED, Green Star, and HQE can be important references. BREEAM certification, issued by BRE Global in the UK, assesses aspects such as energy, land use, and environmental quality (Dunne, 2022). LEED, issued by the US Green Building Council in the United States, emphasizes site sustainability, water efficiency, and indoor environmental quality. Meanwhile, Green Star certification from the Green Building Council of Australia takes a holistic approach, evaluating indoor environmental quality, energy, transportation, and emissions management (Mahdi, 2024). On the other hand, HQE from Alliance HQE-GBC in France assesses welfare, environment, economy, and project management. The implementation of this certification in East Java can encourage more sustainable commercial and residential development, increasing public awareness of the importance of being environmentally friendly (Roshaunda et al., 2019). By using this international standard, East Java can become a pioneer in implementing green buildings, creating a healthier environment and reducing negative impacts on the environment.

The implementation of green building concepts in East Java is urgently needed to address environmental challenges and sustainable development. With international certifications such as

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BREEAM, LEED, Green Star, and HQE, the region has the opportunity to lead green initiatives that support economic growth and community well-being. The UK's BREEAM certification emphasizes in-depth evaluation of energy, land use, and environmental quality, which are becoming important amidst increasing urbanization and the need for resource efficiency. The US Green Building Council's LEED highlights site sustainability and water efficiency, crucial aspects in addressing clean water challenges and the need for green open spaces in urban areas. Green Star, adopted from Australia, offers a holistic approach with a thorough evaluation of indoor environmental quality, transportation, and emissions, ensuring that buildings are not only efficient but also comfortable and healthy for their occupants. On the other hand, France's HQE integrates social, economic, and project management welfare, forming a strong foundation for sustainable development. By implementing these certifications, East Java can educate the public and industry players about the importance of green buildings, encouraging the adoption of best practices in the commercial and residential sectors. Through this step, East Java has the potential to not only become a pioneer in implementing green buildings, but also create a healthier, more sustainable and livable environment, as well as reduce negative impacts on the ecosystem. The urgency to act now is key to ensuring that future generations can enjoy a better quality of life and a protected environment.

Existing studies include (Micu et al., 2021), stating that the perception of technology as a target of energy efficiency and ease of use thus influences purchasing decisions (Zhang et al., 2018), stated that green development policies are designed to achieve energy efficiency targets and commitments to reduce carbon emissions (Darko, Chan, et al., 2018), revealed that there are obstacles to the realization of green buildings due to regulations that have not been optimized (Rajaee et al., 2019), stating that knowledge is sufficient to change perceptions about green building technologies (Darko, Chuen Chan, et al., 2018), that awareness of environmental benefits, government policies and the drive for sustainable development targets are driving the adoption of GBT (Darko et al., 2017), there has been no identification of the root of the problem from industry players who reject GBT.

(G. hancerliogullari Koksalmis & Pamuk, 2021), through attitudes, subjective norms and behavioral control are contributions from the implementation of green roofs (Ramshani et al., 2020), said the adoption of green technology in roof systems is a matter of public awareness (Goodwin Robbins et al., 2020), that green buildings are able to make energy consumption more efficient holistically (Junari et al., 2022), green buildings become a high opportunity for implementation to increase educational capacity.(MacNaughton et al., 2018), the comfort of green buildings is identified from air quality, thermal comfort and lighting which have standards (Li et al., 2020), the success rate of green building implementation dominates over traditional methodologies with simple estimation (Potbhare et al., 2009), the need for organizations that are able to provide technical knowledge of green buildings (Wu et al., 2019), improving industry regulations and guidelines as evidence of public and industry awareness parameters towards green buildings.(Wang et al., 2019), that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of GBTS have a positive and significant influence on the adoption of GBTS by developers (Tsaur & Lin, 2018), ease of use contributes to perceptions of usefulness and positive attitudes toward green building systems (Chan et al., 2017), indicating strong agreement on which strategies are most effective in promoting GBT adoption (GBCI, 2013a), with more detailed criteria, it is expected that new buildings that follow these standards will have better environmental quality and be more sustainable.

Research on the adoption of technologies such as the Internet of Things (IoT) and green building systems has developed using various theoretical models, such as the Technology Acceptance Model (TAM) and the PLS-SEM analysis method. However, there are limitations in capturing the complexity of external factors, such as funding, social dynamics, and the contribution of green building council institutions, which play an important role in influencing the adoption of these technologies. The varying social and cultural dynamics in each country also need to be considered in more depth to understand the adoption of Green Building Technology (GBT). In addition, previous studies often have not sufficiently explored these important factors, especially in the context of green technology implementation in the

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construction sector. Furthermore, many research findings are not accompanied by concrete practical recommendations or strategies for implementation, thus limiting their impact in the context of technology adoption by formal organizations. Future research needs to shed more light on how these external factors can influence technology adoption decisions, as well as offer practical solutions that can be applied according to social and cultural variations in different countries.

This study offers an overview of the implementation of Green Building in East Java, Indonesia, with a focus on environmentally friendly building construction that refers to the Green Building Council Indonesia (GBCI) standards. Uniquely, this study will examine key variables including building material costs, social perception, ease of use, government policies, and community intentions in using green buildings. In addition, this study explores the direct benefits of green buildings such as pollution reduction, energy efficiency, and water management, as well as the impacts on indoor comfort and health. By analyzing these factors in a local context, this study is a pioneer in exploring the relationship between community perception, government regulations, and green building implementation in East Java. This study not only identifies challenges to green building implementation, such as high material costs and operational risks, but also highlights social support and government policies as important factors influencing the success of green buildings.

This study aims to analyze the influence of individual attitudes toward green technology and how these attitudes affect their intention to adopt technology in green building construction. In addition, this study also aims to assess the role of perceived ease of use and perceived usefulness, and analyze the influence of funding factors and government policies on attitudes and intentions to adopt green technology. In addition, this study will investigate how social factors, such as community interaction and social support, contribute to attitudes and intentions to adopt green technology. This study will contribute to the development of policies that support the adoption of green buildings in East Java, increasing public awareness of the importance of green technology, and providing guidance for developers and contractors to understand the factors that influence the acceptance of green technology. In addition, this study can be a basis for further research in the field of green building and green technology and encourage more sustainable building practices, which in turn can improve environmental quality in the East Java region.

2. Research Methodology

2.1. Design

This research design uses the Structural Equation Modeling - Partial Least Squares (SEM-PLS) approach with a mediation model to analyze the factors that influence the adoption of Green Building in East Java. This approach allows the analysis of complex relationships between latent variables, and is able to handle models with non-normally distributed data and relatively small sample sizes. The main framework of the study is based on the Technology Acceptance Model (TAM), which was developed to understand technology adoption based on two main factors, namely perceived usefulness and perceived ease of use. TAM provides a strong basis for understanding how actors such as developers, contractors, architects, and government agencies view the benefits and ease of implementing green technology in buildings. The integration of the Green Building Council Indonesia (GBCI) into the TAM framework is very important, because GBCI acts as the national authority that sets green building certification standards in Indonesia. GBCI provides guidance and certification that encourages compliance with the principles of sustainable development. By integrating TAM and GBCI, this study not only measures the perception of green technology adoption, but also how these actors respond to the standards and policies set by GBCI. This integration is important because the adoption of Green Buildings does not only depend on technological advances, but also on regulatory factors, environmental awareness, and certification incentives provided by GBCI. Developers and other actors are expected to better understand the long-term benefits of green buildings, so that their decisions to adopt this technology become stronger and driven by alignment with national policies.

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2.2. Population and Sample

The sample determination in this study used the Lemeshow formula, with the population of actors related to the adoption of Green Building in East Java, covering developers, contractors, architects, and government agencies. The sample includesbuilding managers and understand green building governance asmanager, supervisor, academic, marketing, and developer positions for representative results, because the population size is not yet known, so that the right decision using the sample size methodology is calculated using a purposive sampling approach, where sample selection is carried out based on certain criteria that are relevant to the research objectives. Parameters for sampling size that meet a number of111 respondents who work as building managers and understand green building management include government buildings, hospitals, hotels, education and modern markets.

2.3. Operational Research Variables

The operational variables used to analyze the adoption of Green Buildings in East Java consist of two main constructs as follows (Table 1).

Table1.
Operational definition.

Construct	Question items	Code	Reference
Funding	Green building materials cost too expensive	FUN1	(Liu et al., 2018)
	Operating costs are too high	FUN2	(Liu et al., 2018)
	Building operations are too risky	FUN3	(Liu et al., 2018)
Social	People who are important to me think that I should use GBT (Green Building)	SO1	(Rajaee et al., 2019)
	People in my neighborhood support environmentally friendly buildings.	SO2	(Rajaee et al., 2019)
	In general, my building project management supports environmentally friendly buildings.	SO3	(Rajaee et al., 2019)
PU	Eco-friendly buildings can provide protection for the surrounding environment, building materials and other resources.	PU1	(Micu et al., 2021)
	Eco-friendly buildings can be useful for protecting the environment and reducing pollution.	PU2	(Micu et al., 2021)
	Eco-friendly buildings can be useful for reducing household expenses such as water and electricity costs.	PU3	(Chatterjee & Bhattacharjee, 2020; Micu et al., 2021)
	environmentally friendly buildings can be useful for increasing comfort in a building space.	PU4	(Chatterjee & Bhattacharjee, 2020)
PEOU	The concept of environmentally friendly buildings is easy to understand	PEOU1	(GH Koksalmis & Pamuk, 2021)
	The concept of assessing environmentally friendly buildings is easy to do	PEOU2	(Rajaee et al., 2019)
	The interactions of environmentally friendly buildings are clear and understandable.	PEOU3	(GH Koksalmis & Pamuk, 2021)
GP	I believe that government policies on green buildings can provide additional benefits in protecting the surrounding environment.	GP1	(Rajaee et al., 2019)
	I understand that the current government policy provides sufficient information on the realization of green buildings.	GP2	(Khoshnava et al., 2020; Wei et al., 2015)

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Construct	Question items		Code	Reference	
	I can rely on the current government's policies to provide sufficient information in realizing green buildings.		GP3	(Chatterjee & Bhattacharjee, 2020)	
AT	I can quickly understand the concept of environmentally friendly buildings.		AT1	(Micu et al., 2021)	
	The concept of environmentally friendly buildings can be used in the teaching and learning process		AT2	(Micu et al., 2021)	
	Using environmentally friendly building concepts is a good idea		AT3	(Zhang et al., 2018)	
	Society should study environmentally friendly buildings for future educational needs.		AT4	(Zhang et al., 2018)	
IN	I want to buy environmentally friendly building materials		IN1	(Simcoe & Toffel, 2014)	
	I want to use the concept of environmentally friendly buildings.		IN2	(Shi & Liu, 2019)	
	I would like to recommend the eco-friendly building concept to my family and friends.		IN3	(Simcoe & Toffel, 2014)	
GBCI	The implementation of green buildings realizes optimal land use.	There is a Basic Green Area (Basic Green Area)	MPL1	A1 Average	(GBCI, 2013a, 2013b)
		There is a Site Selection Area	MPL2		(GBCI, 2013a, 2013b)
		There are Facilities for Community Accessibility	MPL3		(GBCI, 2013a, 2013b)
		There are facilities for public transportation	MPL4		(GBCI, 2013a, 2013b)
		There are Facilities for Bicycle Facilities	MPL5		(GBCI, 2013a, 2013b)
		The existence of land landscaping	MPL6		(GBCI, 2013a, 2013b)
		There are Facilities for Microclimate	MPL7		(GBCI, 2013a, 2013b)
		There are Facilities for Rainwater Runoff Management	MPL8		(GBCI, 2013a, 2013b)
	The implementation of green buildings realizes energy efficiency and conservation	There is an energy sub-meter installed	EKE1	A2	(GBCI, 2013a, 2013b)
		There are energy calculations according to SNI	EKE2		(GBCI, 2013a, 2013b)
		The implementation of energy efficiency and conservation	EKE3		(GBCI, 2013a, 2013b)
		The presence of natural lighting	EKE4		(GBCI, 2013a, 2013b)
		The presence of ventilation	EKE5		(GBCI, 2013a, 2013b)

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Construct	Question items		Code	Reference	
		The impact of climate change	EKE6		(GBCI, 2013a, 2013b)
		Renewable energy ownership in site	EKE7		(GBCI, 2013a, 2013b)
	The implementation of green buildings realizes the impact of saving and protecting water resources.	The presence of a water meter	PPSDA 1	A3 Average	(GBCI, 2013a, 2013b)
		There is a calculation of water usage	PPSDA 2		(GBCI, 2013a, 2013b)
		There is a reduction in water usage	PPSDA 3		(GBCI, 2013a, 2013b)
		The presence of water features	PPSDA 4		(GBCI, 2013a, 2013b)
		There is an implementation of water recycling	PPSDA 5		(GBCI, 2013a, 2013b)
		There is use of alternative water sources	PPSDA 6		(GBCI, 2013a, 2013b)
		The presence of rainwater reservoirs	PPSDA 7		(GBCI, 2013a, 2013b)
		The efficiency of landscape water use	PPSDA 8		(GBCI, 2013a, 2013b)

In this study, the main focus is on various constructs that influence the understanding and implementation of green buildings (GBT). Some of the constructs analyzed include Funding, Social, Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Government Policy (GP), Attitude (AT), and Intention (IN). Each construct is categorized through relevant question items, providing in-depth insights into public perception and support for green buildings. This data will help evaluate the challenges and opportunities in the implementation of GBT, so that it can provide effective recommendations to encourage sustainable development.

2.4. Observation and Interview

This study involved observations and interviews conducted from May 2024 to August 2024. Observations focused on the implementation of the green building concept in East Java, covering aspects of land use, energy efficiency, water resource conservation, and material management. Interviews were conducted with key factors such as developers, contractors, architects, and government officials, to understand their perceptions of factors influencing the adoption of Green Building. Interview questions covered issues of cost, ease of implementation, government policy support, and social influence on adoption decisions. Respondents were asked to provide an assessment using a Likert scale (1-5), where before conducting the scale model in GBCI, factor clustering was carried out first on various aspects, including perceptions of benefits, ease of use, and intention to implement green building technology in the future (Chan et al., 2017). The data obtained helps in analyzing the extent to which these factors influence the decision to adopt Green Building in this region.

2.5. Research Tools

The sophisticated research tools used in this study were essential to collect valid and relevant data from the respondents. The questionnaire developed through Google Forms allowed the researcher to design interactive and easily accessible questions for the participants. By using this platform, data

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collection could be done efficiently, where respondents could fill out the questionnaire from any location, thereby increasing the number of participation and reducing the possibility of data input errors. Respondents were asked to provide ratings using a Likert scale (1-5), which facilitated quantitative analysis of their perceptions on various important issues, such as cost, ease of implementation, and government policy support in adopting Green Buildings (Wu et al., 2019). Before applying the scale model in the Green Building Council Indonesia (GBCI), researchers conducted clustering of relevant factors (Roshaunda et al., 2019). This clustering is important to identify groups of interrelated variables, such as perceived benefits of green buildings, ease of use of technology, and respondents' intention to adopt green building practices in the future. The data obtained from the questionnaire were then analyzed using Microsoft Excel for initial processing, including the creation of graphs and frequency distribution tables. Furthermore, a more in-depth analysis was conducted using Smart PLS version 3, to evaluate the measurement model and structural model simultaneously. This process provides deep insight into the factors that influence the decision to adopt Green Building in this region. Through systematic analysis, this study will present strategic recommendations to support the development of green buildings, helping stakeholders understand the key factors that need to be considered in an effort to encourage the adoption of sustainable practices in the construction industry.

2.6. Research Procedures

In the mediation test conducted using Smart PLS version 3, crucial steps were taken to ensure the reliability and validity of the model, especially in the context of implementing Green Building principles. First, a convergence test was conducted to ensure that parameter changes were no longer significant, which was indicated by changes between iterations of less than 0.01 (Erdil, 2013). Achieving this optimal convergence rate is important to ensure that the model built can represent the relationship between variables with high accuracy. Furthermore, the significance of the path is tested through t-statistics, where a value greater than 1.96 indicates a significant effect at the 95% confidence level (Ganvir et al., 2020). The R-squared value of 0.60 indicates that 60% of the variability of the dependent variable, which will be explained by this model. In addition, the f^2 value is used to measure the magnitude of the influence, with a classification of 0.35, 0.15, and 0.02 indicating large, medium, and small influences. Mediation in this study is measured by p-value <0.05, indicating a significant mediation effect. Convergent validity is evaluated through Average Variance Extracted (AVE) and Composite Reliability (CR), with values of more than 0.5 and 0.7 respectively considered adequate (Yang et al., 2023). Discriminant validity was examined through the Fornell-Larcker Criterion, which ensures that the AVE is greater than the squared correlation with other constructs. Reliability was tested using Cronbach's Alpha and CR, where values greater than 0.7 indicate good internal consistency. The p-value generated from the analysis was also used to determine the statistical significance of the relationship between variables (Omondi, 2018). A P-value below 0.05 indicates that the results are significant, supporting the hypothesis that there is a meaningful relationship between the variables (Silva et al., 2022). Therefore, the inner model not only helps in testing the hypothesis, but also in understanding the dynamics between constructs that influence the decision to adopt Green Building, providing valuable insights for the development of sustainable policies and practices in the construction sector as a sustainable strategy using the basis of hypothesis rejection with the design of focus group discussion strategy.

3. Results and Discussion

3.1. Outer Loading

The indicators on the Adoption variable (A2: 0.973, A3: 0.769) show that A2 is stronger in representing the variable. On the Attitude variable (AT2: 0.981, AT3: 0.962, AT4: 0.975), all indicators have a very strong representation. The single indicator FUN2 on the Funding variable has a perfect outer loading value of 1,000. For the Government Policy variable (GP1: 0.846, GP2: 0.751, GP3: 0.800), the contribution of each indicator is quite moderate (Figure 1).

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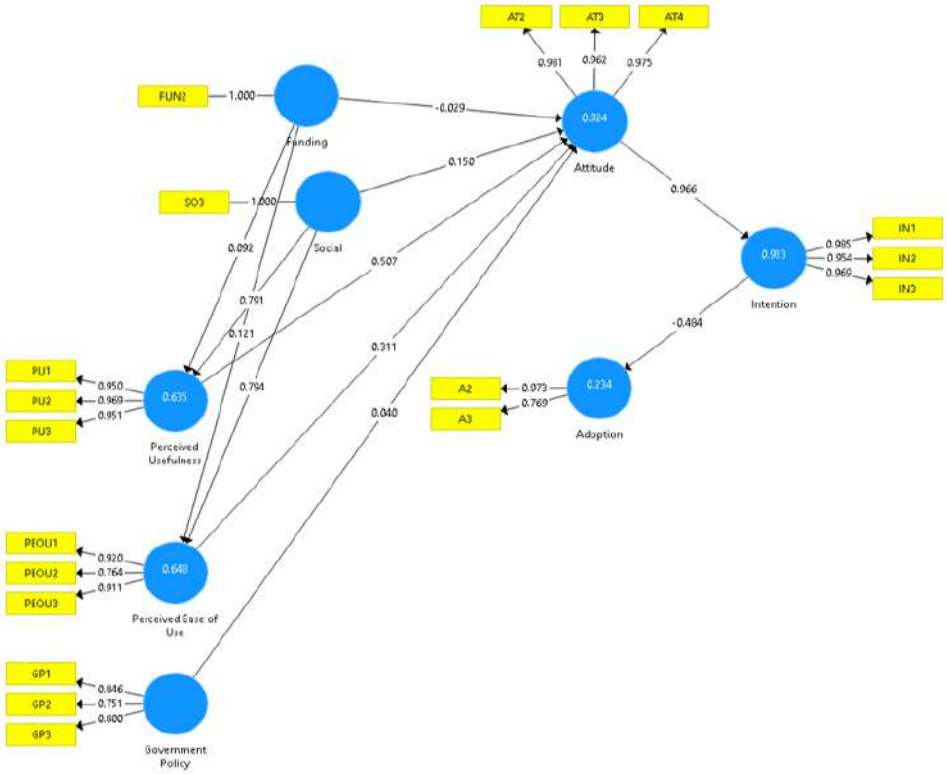

Figure 1.
Outer model.

Table 2.
Outer loading.

	Adoption	Attitude	Funding	Government policy	Intention	Perceived ease of use	Perceived usefulness	Social
A2	0.973							
A3	0.769							
AT2		0.981						
AT3		0.962						
AT4		0.975						
FUN2			1,000					
GP1				0.846				
GP2				0.751				
GP3				0.800				
IN1					0.985			
IN2					0.954			
IN3					0.969			
PEOU1						0.920		

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	Adoption	Attitude	Funding	Government policy	Intention	Perceived ease of use	Perceived usefulness	Social
PEOU2						0.764		
PEOU3						0.911		
PU1							0.950	
PU2							0.969	
PU3							0.951	
SO3								1,000

The Intention variable (IN1: 0.985, IN2: 0.954, IN3: 0.969) has a very strong representation. In the Perceived Ease of Use (PEOU1: 0.920, PEOU2: 0.764, PEOU3: 0.911) and Perceived Usefulness (PU1: 0.950, PU2: 0.969, PU3: 0.951) variables, all indicators show good contributions. Finally, the single indicator SO3 in the Social variable also has a perfect outer loading value of 1,000, indicating a perfect representation. Overall, most indicators have a strong contribution in explaining their variables (Table 2).

Table 3.
Reliability test.

	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted (AVE)
Adoption	0.751	1,364	0.868	0.769
Attitude	0.972	0.974	0.981	0.946
Funding	1,000	1,000	1,000	1,000
Government policy	0.772	0.906	0.842	0.640
Intention	0.968	0.970	0.979	0.940
Perceived ease of use	0.835	0.872	0.901	0.753
Perceived Usefulness	0.954	0.954	0.970	0.915
Social	1,000	1,000	1,000	1,000

The Cronbach's Alpha value, the Adoption variable has a value of 0.751, indicating sufficient reliability, while the Attitude variable has a very high value, namely 0.972. The Funding and Social variables have a perfect Cronbach's Alpha value of 1,000, indicating maximum reliability. For other variables, such as Government Policy, the Cronbach's Alpha value of 0.772 indicates adequate reliability. The rho_A value also shows similar results, with high values for variables such as Attitude (0.974) and Intention (0.970). The Composite Reliability value, which measures internal consistency, is also high for all variables, including the Adoption variable (0.868) and Perceived Usefulness (0.970), indicating that all indicators are quite reliable in measuring the constructs represented. The Average Variance Extracted (AVE) value, which reflects the amount of indicator variance that can be explained by the construct, also shows good results, where variables such as Attitude (0.946) and Perceived Usefulness (0.915) have high AVE values. The Government Policy variable has the lowest AVE value, which is 0.640, which is still considered to meet the reliability criteria in the study (Table 3).

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Table 4.
Discriminant test.

	Adoption	Attitude	Funding	Government Policy	Intention	Perceived ease of use	Perceived usefulness	Social
Adoption	0.877							
Attitude	-0.393	0.973						
Funding	0.042	0.076	1,000					
Government policy	-0.148	0.763	0.230	0.800				
Intention	-0.484	0.966	0.068	0.754	0.969			
Perceived ease of use	-0.442	0.938	0.132	0.801	0.944	0.868		
Perceived usefulness	-0.413	0.947	0.103	0.754	0.960	0.946	0.957	
Social	-0.352	0.825	0.014	0.655	0.837	0.796	0.792	1,000

Discriminant test shows the relationship between variables such as Adoption, Attitude, Funding, Government Policy, Intention, Perceived Ease of Use, Perceived Usefulness, and Social. The highest discriminant value was found in the Adoption variable with a value of 0.877, indicating that this variable has the most impact on technology adoption. Attitude has a strong correlation with other variables, especially with Perceived Usefulness (0.947) and Perceived Ease of Use (0.938), indicating that attitudes towards technology are greatly influenced by perceived ease and usefulness. On the other hand, the Funding variable does not contribute much to other variables, indicated by a relatively low correlation value. Government Policy is closely related to Attitude (0.763) and Intention (0.754), indicating that government policy plays an important role in shaping the intention to adopt technology. Perceived Ease of Use and Perceived Usefulness also have a strong relationship with Intention, indicating that perceived ease and usefulness have a major influence on the intention to use technology. Social factors have the highest correlation with Perceived Usefulness (0.837), indicating that social influence plays an important role in the perception of usefulness of technology. Overall, these results illustrate that technology adoption is influenced by attitudes, ease of use, and perceived usefulness, while government policies and social influence also contribute to strengthening user intentions (Table 4).

3.2. Hypothesis

Attitude is proven to have a positive effect on Intention with a significance value (p-value 0.000), and Intention also has a negative effect on Adoption (p-value 0.000). Funding does not affect Attitude (p-value 0.299) but has a significant effect on Perceived Ease of Use and Perceived Usefulness. Social has a significant effect on Attitude, Perceived Ease of Use, and Perceived Usefulness, and these variables affect Intention and Adoption (Figure 1).

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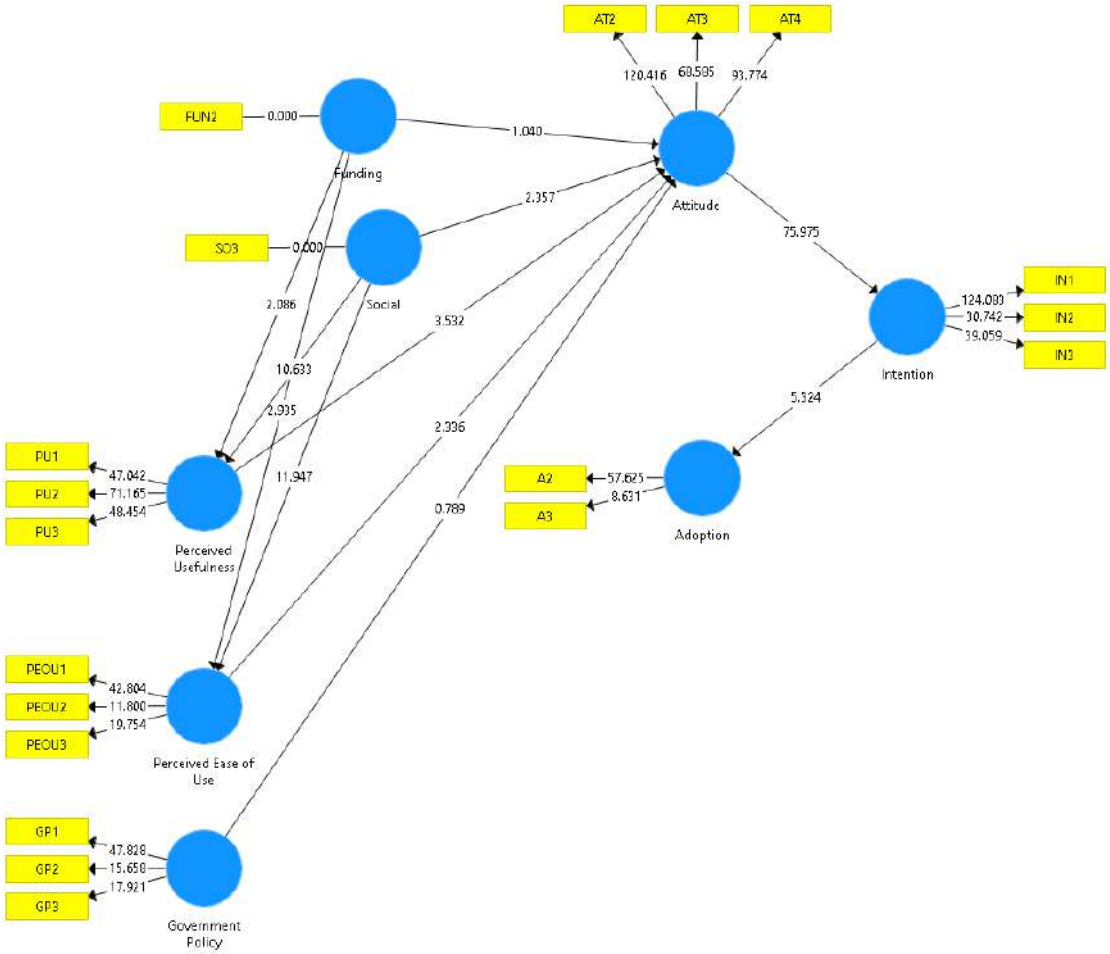

Figure 2.
Inner model.

In contrast, Government Policy has no significant effect on Attitude or the path from Attitude to Adoption. In the mediation path, Perceived Usefulness mediates the relationship between Attitude and Adoption with high significance (p-value 0.004), while other paths, such as Funding or Government Policy, fail to prove a significant influence in mediation. The relationship between Social, Perceived Ease of Use, and Perceived Usefulness also has a positive effect on Attitude and Intention, indicating that social factors play an important role in determining adoption. However, Funding does not show a significant effect through most of the mediation paths. Overall, these findings emphasize the importance of Attitude and perception variables in shaping adoption intention, while government policy and funding do not show a dominant role (Table 5).

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Table 5.
Hypothesis decision.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDE)	P values	Decision
Attitude -> Intention	0.966	0.967	0.013	75.975	0.000	Alternative hypothesis is accepted
Funding -> Attitude	-0.029	-0.031	0.028	1,040	0.299	Alternative hypothesis is rejected
Funding -> Perceived ease of use	0.121	0.121	0.041	2.935	0.003	Alternative hypothesis is accepted
Funding -> Perceived usefulness	0.092	0.088	0.044	2,086	0.038	Alternative hypothesis is accepted
Government policy -> Attitude	0.040	0.041	0.050	0.789	0.430	Alternative hypothesis is rejected
Intention -> Adoption	-0.484	-0.500	0.091	5.324	0.000	Alternative hypothesis is accepted
Perceived ease of use -> Attitude	0.311	0.311	0.133	2.336	0.020	Alternative hypothesis is accepted
Perceived usefulness -> Attitude	0.507	0.494	0.144	3,532	0.000	Alternative hypothesis is accepted
Social -> Attitude	0.150	0.161	0.064	2.357	0.019	Alternative hypothesis is accepted
Social -> Perceived ease of use	0.794	0.792	0.066	11,947	0.000	Alternative hypothesis is accepted
Social -> Perceived usefulness	0.791	0.787	0.074	10,633	0.000	Alternative hypothesis is accepted
Funding -> Attitude -> Intention -> Adoption	0.014	0.015	0.014	0.989	0.323	Alternative hypothesis is rejected
Government policy -> Attitude -> Intention -> Adoption	-0.019	-0.018	0.023	0.799	0.425	Alternative hypothesis is rejected
Funding -> Perceived ease of use -> Attitude -> Intention -> Adoption	-0.018	-0.018	0.012	1,491	0.137	Alternative hypothesis is rejected
Perceived ease of use -> Attitude -> Intention -	-0.145	-0.153	0.077	1,881	0.061	Alternative hypothesis is

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	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDE)	P values	Decision
> Adoption						rejected
Social -> Perceived ease of use -> Attitude -> Intention -> Adoption	-0.115	-0.121	0.063	1,846	0.065	Alternative hypothesis is rejected
Funding -> Perceived usefulness -> Attitude -> Intention -> Adoption	-0.022	-0.021	0.013	1,657	0.098	Alternative hypothesis is rejected
Perceived Usefulness -> Attitude -> Intention -> Adoption	-0.237	-0.238	0.082	2,907	0.004	Alternative hypothesis is accepted
Social -> Perceived usefulness -> Attitude -> Intention -> Adoption	-0.187	-0.188	0.069	2,718	0.007	Alternative hypothesis is accepted
Attitude -> Intention -> Adoption	-0.467	-0.484	0.091	5.136	0.000	Alternative hypothesis is accepted
Social -> Attitude -> Intention -> Adoption	-0.070	-0.078	0.037	1,910	0.057	Alternative hypothesis is rejected
Funding -> Perceived ease of use -> Attitude	0.038	0.038	0.022	1,707	0.089	Alternative hypothesis is rejected
Social -> Perceived ease of use -> Attitude	0.247	0.245	0.105	2,348	0.019	Alternative hypothesis is accepted
Funding -> Perceived usefulness -> Attitude	0.047	0.045	0.027	1,695	0.091	Alternative hypothesis is rejected
Social -> Perceived usefulness -> Attitude	0.401	0.388	0.116	3.452	0.001	Alternative hypothesis is accepted
Funding -> Attitude -> Intention	-0.028	-0.030	0.027	1,042	0.298	Alternative hypothesis is rejected
Government Policy -> Attitude -> Intention	0.038	0.040	0.049	0.790	0.430	Alternative hypothesis is rejected
Funding -> Perceived ease of use -> Attitude -> Intention	0.036	0.036	0.021	1,722	0.086	Alternative hypothesis is rejected
Perceived ease of use -> Attitude -> Intention	0.301	0.300	0.128	2.357	0.019	Alternative hypothesis is accepted
Social -> Perceived ease	0.239	0.237	0.101	2,361	0.019	Alternative

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	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDE)	P values	Decision
of use -> Attitude -> Intention						hypothesis is accepted
Funding -> Perceived usefulness -> Attitude -> Intention	0.045	0.044	0.027	1,693	0.091	Alternative hypothesis is rejected
Perceived usefulness -> Attitude -> Intention	0.490	0.479	0.141	3,480	0.001	Alternative hypothesis is accepted
Social -> Perceived usefulness -> Attitude -> Intention	0.387	0.375	0.114	3.385	0.001	Alternative hypothesis is accepted
Social -> Attitude -> Intention	0.145	0.156	0.061	2,360	0.019	Alternative hypothesis is accepted

R Square and R Square Adjusted in research related to green building adoption in East Java, the results show that the Adoption variable has an R Square value of 0.234 and an R Square Adjusted of 0.227, which means that around 23.4% of the variability in green building adoption can be explained by the model used, while the rest is influenced by other factors outside the model. Attitude has a very high R Square, which is 0.924 and an R Square Adjusted of 0.921, indicating that this model is able to explain around 92.4% of the variability in attitudes towards green buildings. Intention also has a high R Square value, which is 0.933 and an R Square Adjusted of 0.932, indicating that this model explains 93.3% of the variability in the intention to adopt green buildings (Table 6).

Table 6.
R square.

	R square	R square adjusted
Adoption	0.234	0.227
Attitude	0.924	0.921
Intention	0.933	0.932
Perceived ease of use	0.648	0.641
Perceived usefulness	0.635	0.629

For the Perceived Ease of Use variable, the R Square value is 0.648 and the Adjusted R Square is 0.641, so that around 64.8% of the variation in the perception of ease of use of green buildings can be explained by the model. Meanwhile, Perceived Usefulness has an R Square of 0.635 and an Adjusted R Square of 0.629, which means that 63.5% of the variation in the perception of usefulness can be explained. These results indicate that attitudes and intentions have a very strong influence in influencing the adoption of green buildings in East Java, while perceived ease of use and usefulness also play an important role, but not as big as the influence of attitudes and intentions (Table 6).

In a simultaneous test involving the variables of adoption, attitude, funding, government policy, intention, perceived ease of use, and perceived usefulness on the adoption of green buildings in East Java, it was found that attitude has a significant influence with an F value of 13,938. Funding also has an influence with a significance of 0.010, as well as government policy with a significance value of 0.007, indicating an important role in influencing the adoption of green buildings (Table 7).

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Table 7.
Simultaneous test.

	Adoption	Attitude	Funding	Government policy	Intention	Perceived ease of use	Perceived usefulness
Adoption							
Attitude					13,938		
Funding		0.010				0.042	0.023
Government policy		0.007					
Intention	0.305						
Perceived ease of use		0.106					
Perceived usefulness		0.340					
Social		0.102				1,788	1,714

Intention contributes with a coefficient value of 0.305, indicating a relationship between intention and adoption of green buildings (Table 7). Perceived ease of use and usefulness have values of 0.106 and 0.340, respectively, indicating that perceived ease and usefulness also influence adoption. Social aspects also play a role with a value of 0.102, followed by funding variables that show a significant relationship with attitude (1.788) and intention (1.714). In conclusion, funding factors, government policies, perceived ease of use, usefulness, and intention contribute significantly to the adoption of green buildings in East Java, with individual attitudes towards adoption being a key factor influencing the decision to implement the green building concept.

The relationship between Funding and Attitude and Government Policy and Attitude, shows a P-value greater than 0.05, which indicates that the alternative hypothesis is rejected. This means that funding and government policies do not have a significant effect on attitudes towards green buildings. Based on this, it is necessary to evaluate the related funding and government policies, to understand why these factors do not affect people's attitudes in adopting green buildings. Social variables show a significant influence on both Perceived Ease of Use and Perceived Usefulness. With a high T-statistic value and a P-value below 0.05, it is proven that social factors have a significant influence in shaping public perceptions about the ease and usefulness of adopting green buildings. Therefore, the right implementation step is to increase social and educational campaigns that highlight the practical benefits and ease of implementing green buildings. The involvement of communities, media, and community leaders can be used to strengthen this perception among the people of East Java. This means that individual intention to adopt green building plays a significant role in the final decision to adopt. Therefore, implementation strategies should focus on increasing this intention through incentives, ease of process, and provision of clear and accurate information on the benefits of green building. Mentoring programs for communities and companies to start adopting green building can be initiated by local governments. R Square of 0.924, attitude shows very high variability in explaining the adoption of green buildings. This shows that changes in public attitudes towards green buildings will significantly increase the adoption rate. The right implementation is to direct public policies and campaigns to change the views of people who were initially skeptical or did not understand green buildings to be more positive. This can be done through continuous education about environmental impacts, energy savings, and the long-term benefits of green buildings. Although government funding and policies are not significant to attitudes, the results of simultaneous tests show that both still have an influence on the adoption of green buildings with significance values of 0.010 and 0.007, respectively. This indicates that the role of the government in providing supportive regulations, as well as easier access to funding for green building development, remains relevant. The right implementation is that local governments need to update regulations that facilitate access to funding sources for developers and communities who

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want to adopt the green building concept. The R Square value of Perceived Ease of Use and Perceived Usefulness of 0.648 and 0.635 respectively indicates that perceived ease of use and usefulness also affect the adoption of green buildings. Therefore, the implementation steps that can be taken are to improve the infrastructure and supporting systems for green buildings, such as the provision of environmentally friendly building materials, trained experts, and regulations that facilitate the green building certification process.

4. Conclusion and Suggestions

This study shows that the adoption of green building in East Java, attitude (R^2 = 0.924) and intention (R^2 = 0.933) have a significant influence on adoption. The funding and government policy variables do not show a significant influence. The results of the simultaneous test show that attitude has an effect with F = 13.938.

This study is important for policy makers and practitioners in the field of green development. To increase the adoption of environmentally friendly technologies, efforts are needed to improve positive attitudes through good social interactions and increased understanding of the usefulness and ease of use of these technologies. Policies that facilitate collaboration between individuals and communities can support the creation of a more conducive environment for the adoption of green technologies.

This study is to explore other factors that may contribute to the adoption of green technologies, such as individual intrinsic motivation, cultural influences, and the long-term impact of government policies and funding. In addition, research could include longitudinal analysis to assess changes in attitudes and intentions over time, as well as conducting case studies in different locations to understand the local context that influences the adoption of green technologies.

This study contributes to the significance of social factors in influencing attitudes and intentions and adds to the literature on technology adoption. From a practical perspective, these findings can be used as a guide for policy makers in formulating policies that support technology adoption, while companies can design marketing strategies that emphasize the benefits and ease of use of technology. In addition, the results of the study indicate the need for training and education programs to improve user understanding, as well as encourage organizations to improve technology facilities and provide social support to encourage wider adoption.

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