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Environmental Uncertainty and Sustainability: Does Innovation Efficiency Matter? Evidence from Sharia Rural Banking in Central Java Indonesia

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Abstract

This study examines the influence of environmental uncertainty on sustainable growth and the moderating effect of innovation efficiency in this relationship. The population of this study is Sharia rural banks in Central Java for the 2018–2022 period. The sample of this study obtained through the purposive sampling method has 25 Sharia rural banks that meet the criteria. The data analysis technique used is partial least squares structural equation modelling (PLS-SEM) using WarPPLS version 8.0 software. This study shows that environmental uncertainty negatively and significantly affects sustainable growth. The effects of environmental uncertainty can damage the company's sustainability. Furthermore, the moderating test shows that innovation efficiency weakens the influence of environmental uncertainty on sustainable growth. This study provides evidence of the importance of innovation efficiency in maintaining the Sharia rural bank's sustainable growth in an uncertain environment. The findings will be helpful for the Sharia rural bank managers to optimize IT strategy through research and development implementation in their strategic planning and continuously enhance their innovation efficiency to manage the adverse effects of environmental uncertainty.

Keywords:

sustainable operation; sharia rural bank; sustainability; environmental uncertainty; innovation efficiency
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1. Introduction

Sustainability growth in a company has become a public concern nowadays because its goals are to offer value for the stakeholders and gain maximum profit. Therefore, its sustainability has become a significant concern for the company's management. The most important indicator of a company's value is its sustainable power (Subramanyam., 2014). Sustainable growth is an important aspect related to a company's ability to carry out business activities, which describes optimal growth from a financial perspective, assuming specific strategies are within the conditions of a clear financial framework (Agustia et al., 2021). Sustainable growth can be a benchmark for companies when combining operational policies with financial policies (Amouzesh et al., 2011). Sustainable growth includes future-oriented insights for managers to balance the company's operational and financial strategies. Therefore, the sustainability aspect is vital to research.

Conceptually, sustainable growth represents a new set of values that are the basis for creating economic and social future progress models (Claudia-Larisa, 2023). So, it is essential to include sustainability in their strategic planning to facilitate long-term survival, growth, and profitability (Disli et al., 2022; Sanoran, 2023; Liu et al., 2023) to see the company's sustainability prospects in the future, consider several aspects. Furthermore, sustainability is currently related to science and technology and funding to innovate and maintain this technology (Mittal et al., 2023). The sustainability of banks has become necessary because of their role as drivers of economic activity that involves public money who are depositors, not investors, so the government is often involved in this situation (Rastogi & Kanoujiya, 2022), particularly in small-scale banks such as sharia rural banks. Rapid technological developments mean companies must optimize research and development to sustain their competitive advantage. The banking sector, including Sharia rural banks, must implement these strategies and optimize its processes to survive in the uncertain globalization era.

Unlike regular banks, Sharia rural banks do not provide payment services; they operate within operational frameworks based on Islamic or Sharia frameworks. Regulations adopted by the Financial Services Authority (OJK) give special consideration to Sharia rural banks. The existence of Sharia rural banks is designated to provide banking services readily and consistently while adhering to the principle of prudence. It is also intended to create Sharia rural banks that can apply Sharia principles consistently and offer the best possible service to the community, particularly to medium-sized and microentrepreneurs in rural and urban areas who have yet to be served by bank services in general. This information is stated in Financial Services Authority Number 03/POJK.03/2016. Islamic rural banks must continuously enhance cost efficiency to achieve optimal performance, particularly regarding information technology implementation (Firmansyah, 2018). Islamic rural banks must perform competently to increase the company's sustainable growth. Central Java is ranked third in total Sharia rural bank assets in Indonesia, with 17.33% of all Sharia rural bank assets in Indonesia. The NPF percentage level is 6.42%, which is slightly above the 5% threshold set by OJK regulation Number 20/POJK.03/2019 regarding the Health Level Assessment System for Sharia Rural Banks, which states that an NPF of less than 5% is required to be considered healthy. Therefore, investigating Central Java Sharia Rural Bank's capacity to sustain sustainable growth became interesting.

Sustainable growth has become a global issue and received attention from various researchers around the world, such as Nasim & Irnama (2015), Fernandes & Solimun (2017), Junaidi et al. (2019), Mukherjee & Sen (2019), Priyanto & Robiyanto (2020), Chandradinangga & Rita (2020), Liu et al. (2020), Indarti et al. (2021), Ahsan et al. (2021),

Agustia et al. (2021), Andari et al. (2021), Qiao et al. (2021), Ahsan et al. (2021), Florensia et al. (2022), Asaolu et al. (2022), Ain et al. (2022), and Liu et al. (2023). A study by Fernandes and Solimun (2017) shows that environmental uncertainty can harm a company's strategic orientation regarding sustainable growth. A study by Liu et al. (2020) also shows that environmental uncertainty can harm economic and social responsibility related to sustainable growth. The globalization process brought various external consequences, including economic transformation, global competition, and a revolution in technology, and this effect forced managers to accept the role of environmental uncertainty in decision-making related to the company over time (Arianpoor & Asali, 2023). Thus, this effect can damage the company's sustainable growth. This research examines the role of innovation efficiency in reducing the impact of environmental uncertainty so that companies can sustain their businesses.

A study by Qiao et al. (2022) shows that innovation efficiency is a moderating factor between various market distortions and sustainable growth. Innovation efficiency is the capability to transform inputs into outputs (Atta Mills et al., 2021). The main principle of efficiency is the allocation of inputs to produce maximum output so that maximum profit with minimum costs can be achieved and the company's ability to be sustainable can be maintained (Petrone et al., 2007). In conditions of environmental uncertainty, it becomes difficult for companies to sustain themselves because of the uncertain volatility. Companies must be able to operate their business activities in a challenging and competitive business atmosphere, so it is essential to include innovation efficiency in their strategic planning. Innovation efficiency through optimization of research and development can increase the company's competitive advantage in uncertain conditions. Managers need to change their strategies in times of high environmental uncertainty to present a less risky image of the company (Arianpoor & Asali, 2023). Sharia Rural Bank has limited working areas. However, with the efficiency of sharia innovation, rural banks can reach a wider area. With Sharia innovation capabilities, rural banks become more dynamic and flexible entities—especially with the digitization of business processes in services, which speeds up the transaction process. For example, several rural Sharia banks have virtual accounts and internal banking cars.

Previous studies have yet to examine the importance of innovation efficiency in maintaining a company's sustainable growth in uncertain conditions. Based on these arguments, this study examines the effects of environmental uncertainty on sustainable growth and the role of innovation efficiency in moderating this relationship. This research explores and analyzes environmental impacts that influence sustainable growth. Moreover, analyzing innovation efficiency moderates the relationship between environmental protection and sustainable growth.

2. Literature Review

Stakeholder Theory

Stakeholder theory describes individuals, groups, or organizations that have the power to affect the achievement of an organization's objectives and can be affected by the organization (Freeman, 1994). Stakeholders include investors, creditors, suppliers, consumers, governments, and communities influenced by the company (Hadi, 2012). Stakeholder theory describes the relationship between a firm and the environment in which it operates (Schrobback & Meath, 2020) so that the company can operate and become a sustainable company. Sustainable growth is a concept where companies can achieve optimal

growth as sustainable companies (Higgins, 1981; Platt et al., 1995). Sustainable growth is essential and has become a significant interest for stakeholders and analysts (Mat Nor et al., 2020). The company's sustainable growth capabilities support sustainable national economic and long-term business development (Kaygusuz, 2018). Company managers must be able to manage all existing resources in the company, including employees, customers, and organizational capital. If all these resources can be managed and utilized well, they will create added value for the company.

Environmental Uncertainty and Sustainable Growth

Bank sustainable growth can be described as a bank's decision to provide products and services to customers that offer opportunities to create innovative products and services and have social and environmental benefits, including cleaner production processes and technology, resource efficiency, finance, and better services offered. In conditions of environmental uncertainty, it becomes difficult for companies to sustain themselves because of the uncertain volatility (Kafetzopoulos et al., 2020). Environmental uncertainty refers to a company's performance volatility, such as economic trends and globalization, caused by advanced technology (Arianpoor & Asali, 2023). Environmental uncertainty indicates the inability to predict the probability of future events. It can be a fundamental problem for managers because the changing external environment forces them to cope with the changes and develop different strategies so the company can maintain its survival. A study by Fernandes and Solimun (2017) shows that environmental uncertainty can harm the company's strategic orientation to maintain sustainable growth. A study by Liu et al. (2020) also shows that environmental uncertainty can harm the company's sustainability. The globalization process brought various external consequences, including economic transformation, global competition, and a revolution in technology, and this effect forced managers to accept the role of environmental uncertainty in decision-making related to the company over time (Arianpoor & Asali, 2023). Thus, this effect can damage the company's sustainable growth. Based on these arguments, the hypothesis 1 (H_1) is formulated as below:

H_1: Environmental uncertainty negatively influences sustainable growth.

The Moderating Role of Innovation Efficiency in the Relationship Between Environmental Uncertainty and Sustainable Growth

Sustainable growth is a concept where companies can achieve optimal growth as sustainable companies (Higgins, 1981; Platt et al., 1995). Sustainable growth becomes important because stakeholders need to see the company's sustainability prospects in the future by considering several aspects, including factors that can prevent a company from becoming sustainable. One of the factors that can decrease a company's ability to sustain itself is environmental uncertainty. In conditions of environmental uncertainty, it becomes difficult for companies to sustain themselves because of the uncertain volatility. Companies must be able to operate their business activities in a challenging and competitive business atmosphere, so it is essential to include innovation efficiency in their strategic planning. One of the most challenging aspects of the current economic condition has been the enormous increase in uncertainty in the financial sector, including for small-sized banks such as rural banks and Sharia rural banks to gain profit. In this condition, the role of bank managers in adapting their strategies becomes essential, including the innovation efficiency aspect of the bank's strategic plan. To mitigate the effect of environmental uncertainty, company managers must seek information through interactions with other departments to consider strategic management (Hatani, 2023).

Innovation efficiency through optimization of research and development can increase the company's competitive advantage in uncertain conditions. In a situation full of uncertainty or high volatility in some aspects, companies have to maintain their stability. Therefore, innovation efficiency is needed to reduce the adverse effects of environmental uncertainty. The central concept of efficiency is the allocation of inputs to produce maximum output so that maximum profit with minimum costs can be achieved and the company's ability to be sustainable can be maintained. In this perspective, the output used is loans and other earning assets, and the inputs are personal expenses, fixed assets, deposits, short-term funding, and research and development (R&D) expenses. The higher the efficiency score, the higher the innovation efficiency in the company (Qiao et al., 2022). Optimal innovation efficiency can improve the company's ability to maintain sustainable growth. Based on these arguments, the hypothesis 2 (H_2) is formulated as below: H_2: Innovation efficiency mitigates the influence of environmental uncertainty on sustainable growth.

Research Model

The model for this research can be described in the equation below:

Equation 1.

$SG = \rho_1 EU + \rho_2 IE*EU$

Explanation:

SG= Sustainable Growth

EU = Environmental Uncertainty

IE = Innovation Efficiency

3. Methods

Data Sample

This research is a causal study to examine factors causing a problem and test the effect of environmental uncertainty on sustainable growth and the role of innovation efficiency as the moderating variable in this relationship. The analytical technique used in this research was Structural Equation Modeling (SEM) - Partial Least Squares (PLS) using WarpPLS 8.0 software. The PLS-SEM is used as the technical analysis in this study because it can be performed even if the data is not standard. The sample of this study included 125 observations collected from Sharia rural banks in Central Java for the 2018–2022 period. Central Java is ranked third in total Sharia rural bank assets in Indonesia, with 17.33% of all Sharia rural bank assets in Indonesia. The NPF percentage level is 6.42%, which is slightly above the 5% threshold set by OJK regulation Number 20/POJK.03/2019 regarding the Health Level Assessment System for Sharia Rural Banks, which states that an NPF of less than 5% is required to be considered healthy. Therefore, investigating Central Java Sharia Rural Bank's capacity to sustain sustainable growth became exciting. The data in this study was secondary data collected from financial statements published on www.ojk.go.id and categorized as quantitative data. This study's sampling selection was purposive (see Table 1).

Table 1. Sampling selection

Number	Criteria	Total
1.	Sharia rural banks in Central Java are listed on www.ojk.go.id	25
2.	Sharia rural banks in Central Java that do not provide the indicator data required in this study during the 2018–2022 period	0
Number of samples that meet the criteria		25
Year of observation		5
Total sample in this study during the year of observation		125

Variable Measurement

Sustainable Growth

The dependent variable in this research is sustainable growth (SG). Sustainable growth is defined as the highest rate at which the company's sales can grow without depleting its financial resources. Sustainable growth rate measured as below (Sanoran, 2023):

SG = ROE x Retention Ratio
ROE = *(Net Income)/(Total Equity)*
Retention Ratio = (Retained Earnings)/(Net Income)

Environmental Uncertainty

Environmental uncertainty refers to a company's performance volatility, such as economic trends and globalization, caused by advanced technology (Arianpoor & Asali, 2023). Environmental uncertainty indicates the inability to predict the probability of future events. It can be a fundamental problem for managers because the changing external environment forces them to cope with the changes and develop different strategies so the company can maintain its survival. Environmental uncertainty is proxied by the total assets' coefficient of variation (CV) to capture sales volatility (Arianpoor & Asali, 2023). A higher CV indicates a higher level of environmental uncertainty.

Innovation Efficiency

The moderating variable in this study is innovation efficiency (IE). Innovation efficiency measurement uses the stochastic frontier analysis (SFA) method to measure the input-output combination

$$Max_{u,v}\vartheta = \frac{u1LN+u2EASS}{v1PEXP+v2FIAS+v3DEP+v4R\&D}$$

Following a study by Abdesslem et al. (2022), bank efficiency is formulated using output loans (LN) and other earning assets (EASS), as well as inputs, including personal expenses (PEXP), fixed assets (FIAS), and deposits and short-term funding (DEP). In this study, the input that reflects an indicator of innovation is R&D expense.

4. Result and Discussion

Model Fit

Table 2. Model Fit

Model Fit	Value	Sign.	Rule of Thumb	Notes
Average Path Coefficient (APC)	0.338	P < 0.001	P < 0.05	Satisfy
Average R-Square (ARS)	0.387	P < 0.001	P < 0.05	Satisfy
Average Adjusted R-Squared (AARS)	0.377	P < 0.001	P < 0.05	Satisfy
Average Variance Inflation Factor (AVIF)	1.796		≤5, ideally ≤ 3.3	Satisfy
Average Full Collinearity VIF (AFVIF)	1.221		≤5, ideally ≤ 3.3	Satisfy
Tenenhaus GoF (GoF)	0.622		*Small* ≥ 0.1 *Medium*≥ 0.25 *Large* ≥ 0.36	Large

The first stage is to evaluate whether this research model meets the goodness of fit criteria. Based on the model of fit indicators output that is summarized in Table 2, it can be seen that six indicators used in this study are satisfying, and it can be concluded that this model is fit based on the significant P value at the 0.05 level on the three indicators APC, ARS, and AARS; this model also has no vertical collinearity problem (collinearity between exogenous variables) or lateral collinearity problem (collinearity between exogenous and endogenous variables) based on the path coefficient of the two indicators AVIF and AFVIF. Another indicator is the criteria for GoF value = 0.622, which means that the predictive powers of the model are categorized as significant because the value is > 0.36..

Explanatory Power

Table 3. Explanatory Power

R-Squared = 0.387			
Q-Squared = 0.401			
Effect size			
Variables	Path Coefficients	Explanation	Rule of Thumb
EU	0.259	Medium	> 0.02 weak
IE*EU	0.128	Weak	> 0.15 medium
			> 0.35 large

The next stage is to evaluate the model's explanatory power. Based on the latent variable coefficients summarized in Table 3, the coefficient of R-squared determination is 0.387, which shows that 38.7% of the variation of the endogenous variable (sustainable growth) can be explained by the exogenous variables (environmental uncertainty) and moderating innovation efficiency. Other variables outside this model can explain the remaining 61.3%. Another explanatory power indicator is the value of Q-Squared as many as 0.401 > 0, which shows that this model has predictive relevance.

Another indicator of explanatory power is the effect size, which explains the individual contributions of each exogenous variable to the value of the R-Square endogenous variable. The effect size value of environmental uncertainty at 0.259 or 25.9% means that the absolute value of the individual contributions of the environmental uncertainty to the R-squared value of the sustainable growth variable is considered medium from a practical point of view. The effect size value of IE*EU at 0.128 or 12.8% means that the absolute value of the individual contributions of innovation efficiency moderation to the R-squared value of the sustainable growth variable is considered weak from a practical point of view.

Path Coefficients and P-Values

Table 4. Path Coefficients and P-Values

Variables	Path Coefficients	P-value	Rule of Thumb	Notes
EU	-0.435	<0.001	P < 0.05	Accepted
IE*EU	0.241	<0.001	P < 0.05	Accepted

The next stage evaluates the path coefficients and P-value values from the output summarized in Table 4. The path coefficient of the environmental uncertainty variable (EU) is -0.435 and significant with P < 0.001, and the path coefficient of the moderating variable, which is the interaction of innovation efficiency with environmental uncertainty (IE*EU), is 0.241 and significant with P < 0.001. Environmental uncertainty negatively affects sustainable growth. This significant effect can be explained by environmental uncertainty damaging the company's sustainable growth. Sharia Rural Bank has limited working areas. However, with the efficiency of sharia innovation, rural banks can reach a wider area. With Sharia innovation capabilities, rural banks have become more dynamic and flexible regarding uncertainty.

5. Conclusion

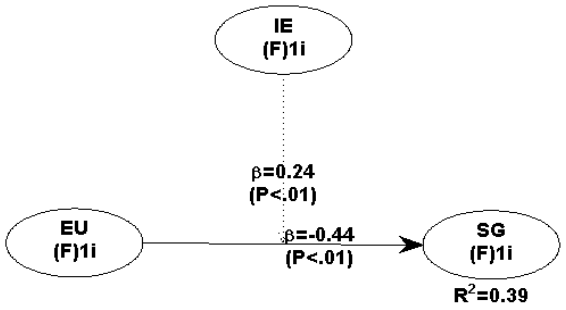

Figure 1. Path Diagram

Based on the path diagram, environmental uncertainty negatively and significantly affects sustainable growth. It can be seen from the path coefficient of the board of environmental uncertainty, which is -0.435 negative with P < 0.001, that hypothesis 1 (H1) is accepted. Environmental uncertainty negatively affects sustainable growth. This significant effect can be explained by environmental uncertainty damaging the company's sustainable growth. The innovation efficiency will determine the company's sustainability, as seen in Figure 1, where the interaction of innovation efficiency with the environmental uncertainty (IE*EU) score is 0.241 and significant with P < 0.001. Thus, hypothesis 2 (H2) is accepted. Innovation

efficiency mitigates the effect of environmental uncertainty on sustainable growth. Optimal innovation efficiency can improve the company's ability to maintain sustainable growth. Companies must be able to operate their business activities under environmental uncertainty, so it is essential to include innovation efficiency in their strategic planning.

This study shows that environmental uncertainty negatively and significantly affects sustainable growth. In conditions of environmental uncertainty, it becomes difficult for companies to sustain themselves because of the uncertain volatility. Furthermore, the moderating test shows that innovation efficiency weakens the influence of environmental uncertainty on sustainable growth. This study provides evidence of the importance of innovation efficiency in maintaining the Sharia rural bank's sustainable growth in an uncertain environment.

The company should include innovation at all decision-making levels. Efficiency in the company is needed to ensure the implementation of strategic plans. Optimal innovation efficiency can improve the company's ability to maintain sustainable growth. This study's input and output formulation assesses the research and development expenses used to implement innovation strategies such as IT implementation. When this factor is efficiently managed, contributing to the company's revenue, it maintains its sustainability. This aspect can be part of managing the flow of the company's business activities. Companies must be able to operate their business activities in a challenging and competitive business atmosphere, so it is essential to include innovation efficiency in their strategic planning. Innovation efficiency through optimization of research and development can increase the company's competitive advantage in uncertain conditions.

The sustainability of banks has become necessary because of their role as drivers of economic activity that involves public money who are depositors, not investors, so the government is often involved in this situation (Rastogi & Kanoujiya, 2022), particularly in small-scale banks such as sharia rural banks. The findings will be helpful for the Sharia rural bank managers to improve their innovation efficiency in managing the adverse effects of environmental uncertainty. The innovation aspect of implementing an IT strategy can be one of the alternatives to promoting a company's sustainable business performance and growth; in this context, it is in the Sharia rural bank. Sharia Rural Bank may face environmental uncertainties in its operations. This effect can threaten its sustainable growth. However, the adverse effects of environmental uncertainty can be reduced by considering optimal innovation efficiency, such as the use of IT implementation based on a research and development strategic plan to maintain its business activities as an intermediary function, especially the digitization of business processes in services, which speeds up the transaction process. For example, several rural Sharia banks have virtual accounts and internal banking cars.

The limitation of this study is that the year of observation only consisted of 5 years from the 2018–2022 period, so further research can expand the number of observations. Further research can examine the impact of environmental uncertainty on other aspects related to Sharia rural bank operations. This exciting research topic opens a direction for future research about the ongoing debate on sustainable growth. The role of innovation efficiency in the banking industry, both commercial and rural banks, can be studied more in maintaining sustainable growth. The efficiency approach in this study only uses SFA; future research can consider using Data Envelopment Analysis (DEA). From the point of view of theory implication, this research contributes to a research field related to sustainable operations. In practice, company management should optimize innovation efficiency's role

in their business strategy function to maintain sustainable growth in an uncertain environment. In conditions of environmental uncertainty, it becomes difficult for companies to sustain themselves because of the uncertain condition.

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