Determinants of Eco-Budgeting and Control in Medical Waste Management: A Behavioral Approach

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Abstract
This study explores the determinants influencing the intention to adopt eco-budgeting and eco-controlling mechanisms in medical waste management. While existing research primarily addresses the technical aspects, there has been scant focus on the behavioral factors that influence hospital management's adoption of these environmentally conscious practices. Employing an associative quantitative methodology, this research gathered data from 125 managers across 15 private general hospitals in Denpasar City and Badung Regency, utilizing surveys and analyzing the results with partial least squares (PLS). The findings indicate that environmental concerns and stakeholder pressure significantly impact managers' intentions to implement eco-budgeting. To effectively translate these intentions into tangible practices, managers are found to deploy four types of eco-control mechanisms: belief, boundary, diagnostic, and interactive controls. These insights offer critical guidance for hospital administrators and policymakers, underscoring the importance of behavior-driven strategies in enhancing medical waste management. The study emphasizes the necessity of integrating behavioral factors into environmental management frameworks to foster the development of eco-efficient and environmentally sustainable practices within hospitals, ultimately contributing to the broader goal of green hospital initiatives.

Keywords: eco-budget; eco-control; eco-concern; stakeholder pressures; medical waste management.

INTRODUCTION

Bali is currently facing declining environmental quality, which poses a significant threat to regional development. Concerted efforts are required from both private and public organizations and society at large to adopt environmentally friendly operations. The hospital industry is particularly vulnerable to environmental issues. The health services provided by this industry generate medical waste, which can be hazardous to both society and the environment if not properly managed. Effective medical waste management is crucial for preventing the spread of dangerous infections and for maintaining a hospital's public image and legitimacy, especially during the COVID-19 pandemic when there was a significant increase in medical waste production, primarily from managing confirmed positive cases (Nie et al., 2018; Sarkodie & Owusu, 2020).

In Indonesia, the volume of medical waste increased by 30-50 percent during the pandemic (Ministry of Environment and Forestry – KLHK, 2020), driven by the use of chemicals and disposable medical devices such as masks, personal protective equipment (PPE), gloves, and vaccination and testing kits (rapid/swab/PCR). However, the number of facilities capable of managing hazardous and toxic materials remains limited. Only 15 percent of referral hospitals for COVID-19 patients have licensed incinerators (Soemiarno, 2020). Although Bali Province prioritized medical waste management during the pandemic (https://localisesdgs-indonesia.org), it faced significant budget and facility constraints, including a shortage of incinerators (Adiputra et al., 2019).

During the pandemic, there was a pressing need for stricter control over medical waste by standardizing its management to help prevent further spread of the virus (Peng et al., 2020). Such standardization and implementation could be effectively addressed by adopting eco-budgeting and eco-control mechanisms.

Eco-budgeting and controlling systems are essential due to the limited resources that must be optimally utilized. The eco-budgeting mechanism can help plan and allocate resources efficiently for various activities and programs; its effectiveness is ensured through the adoption of eco-controlling (Guenther et al., 2016; JF Henri et al., 2017).

The effectiveness of medical waste management requires strengthening the behavioral factors of the perpetrators, for example, individual attitudes towards

environmental preservation in the form of environmental concern (Hamilton & Saito, 2014), pressure from stakeholders (Abdel-maksoud et al., 2020; Ali et al., 2016; Seifert & Guenther, 2020) and environmental locus of control (Cleveland & Kalamas, 2015). These factors can trigger an intention to adopt eco-budgeting and eco-controlling, as explained by the theory of planned behavior (TPB) (Ajzen, 1991), which posits that individual behavior is influenced by attitudes, subjective norms, and perceived behavioral control.

Despite growing concerns over medical waste management, most studies have focused on technical aspects such as waste management systems and operating procedures (Lakbala & Lakbala, 2013; Tesfahun et al., 2014). There has been limited research on the behavioral factors influencing hospital management's adoption of eco-budgeting and eco-controlling practices (Ali et al., 2016). Additionally, the managerial aspect of controlling in medical waste management remains a significant weakness (Oroei et al., (2014). his creates a research gap in understanding how behavioral factors, guided by TPB, affect the intention to adopt these mechanisms in hospitals. Therefore, this study will investigate the behavior of hospital management

in adopting eco-budgeting and eco-controlling and their determinants to increase the effectiveness of medical waste management towards the realization of a green hospital. This novel approach integrates behavioral factors into medical waste management by extending TPB and focusing on environmental concern and stakeholder pressure as determinants of hospital managers' intentions to implement eco-budgeting. It also highlights the mediating role of intention between behavioral factors and eco-controlling mechanisms, which has been underexplored in the healthcare industry. Additionally, it addresses the lack of empirical research on eco-budgeting and eco-controlling in healthcare, particularly in developing countries.

This study contributes to the body of knowledge by integrating behavioral factors into the medical waste management framework using the TPB model. It explores how environmental concern, stakeholder pressure, and environmental locus of control influence hospital management's intention to adopt eco-budgeting and eco-controlling. The research also provides practical insights for hospital administrators and policymakers on improving medical waste management through

behavior-driven strategies, ultimately supporting the development of environmentally sustainable green hospitals.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The main reference theory in this study is the Theory of Planned Behavior – TPB (Ajzen & Fishbein, 2010; Ajzen, 1991) which is a behavioral theory from the science of motivational psychology. TPB explains and predicts individual behavior based on its determinants, namely attitudes, subjective norms, and perceived behavioral control through behavioral intentions. As an established behavioral theory, TPB has been widely used in various fields, including information technology (Cai & Zheng, 2018); marketing (Brodowsky et al., 2018) ; social commitment (Zarzuela & Antón, 2015); health (Conner et al., 2017), and the environment (Poudel & Nyaupane, 2016).

The theory that is used as a reference for this research is stakeholder theory, in which companies are understood as a series of relationships that create value, between groups with an interest in business activities Epstein et al., 2017). Stakeholders include investors, customers, suppliers, employees,

creditors, communities and management. There are two stakeholder groups, namely primary and secondary stakeholders. Primary stakeholders are the most important stakeholder groups, whose absence will threaten the survival of the company (Burns & Collett, 2017). Secondary stakeholders are parties whose involvement in company transactions and whose existence is not essential for the survival of the company (Garcia-castro & Francoeur, 2014). The more important stakeholders are for the survival of the organization, then more and more efforts will be made by management to maintain good relations with these stakeholders. So, the organization will respond more to the interests or expectations of stronger stakeholders or primary stakeholders.

Previous studies that took the theme of eco-control still focused on manufacturing companies, while other companies were still limited (Lee, 2015). In fact, insights about the implementation of eco-control can also be obtained through research in the context of the service industry, especially service companies providing services tht are affected by the environment. The healthcare industry is an industry that is very vulnerable to environmental impacts, because it is

a producer of medical waste which is a critical problem for the environment of every health facility (Ali et al., 2016; Seifert & Guenther, 2020). In addition, most of the previous research with the theme of eco-budgeting and control was in the realm of literature review, for example Aziz et al., (2015);Crutzen et al., (2017); Gomez-Conde et al., (2019); Guenther et al., (2016). Therefore, empirical research on this theme is important.

Previous studies have not paid attention to behavioral factors (Arjaliès & Mundy, 2013; Journeault et al., 2016), even though behavioral factors are important to predict the effectiveness of the implementation of eco-budgeting and controlling mechanisms. This study will accommodate behavioral factors in the research model, as suggested by (Ali et al., 2016), namely that behavioral research is needed to determine the determinants of the effectiveness of medical waste management, especially in developing countries. This is due to the constraints in examining economic factors, particularly in terms of medical waste management costs, because they are considered a negative motivation/disincentive, making it difficult to realize.

The low level of compliance with waste management regulations, due to not being fully mandatory, is also a concern in this study. Only 42 percent of hospitals in Indonesia comply with government regulations (WHO, 2017). According to Caniato et al., (2015) also stated that compliance with regulations is a major weakness in medical waste management. The compliance aspect is closely related to behavior, so research on medical waste management that focuses on behavior is important to do.

The relationship between environmental concern and pro-environmental intentions and behavior has been studied in various contexts, such as green tourism, consumption of environmentally friendly products and services, and product recycling behavior (Chan et al., 2014; Chiang et al., 2019; Han & Yoon, 2015); The results of these studies indicate that the attitude of environmental concern has a positive effect on the intention to implement environmentally friendly behavior.

Several previous studies in the context of environment and social responsibility have used stakeholder pressure as a construct in their research models (Betts et al., 2015; Helmig et al., 2013; Meixell et al., 2015). These studies found that (1)

stakeholder pressure can lead to sustainability awareness, adoption of sustainable goals, and/or implementation of sustainable practices; (2) different stakeholder groups have different influences in the decision area; (3) the pressure of different stakeholder groups is influenced by the sustainable issues in question, whether environmental or social.

The empirical evidence provides support that stakeholder pressure is a determinant of green intentions and practices or behavior in various environment-based contexts, such as environmental management strategies, sustainable supply chain management, and social and environmental responsibility. In the context of adopting eco-budgeting and controlling, stakeholder pressure is related to stakeholders' opinions and views on this matter which is a pressure for management to make it happen.

Locus of control (control center) is an individual's belief in whether or not he can control his own destiny. Individuals with internal LOC will believe that they can control the occurrence of these events, and conversely individuals with external LOC will perceive that environmental quality is controlled more by factors outside of themselves. Previous studies on LOC and green behavior have shown that internal LOC has a positive effect on environmental performance (Chiang et al., 2019; Fielding & Head, 2012; Hwang et al., 2020; Kalamas et al., 2014).

In the context of pro-environmental behavior at the organizational level, strategies, programs and activities that have been planned beforehand should be realized effectively. For this reason, a system that can be used to ensure this needs to be built, namely an environment-based management control system (eco-control) (Cadez et al., 2012; Chenhall, 2008) Eco-control consists of four control mechanisms, namely beliefs, boundaries, diagnostics and interactive eco-control (Arjaliès & Mundy, 2013; Henri et al., 2016; Henri & Journeault, 2010). The results of the empirical research show that (1) different eco-control mechanisms will support different environmental capabilities; (2) the use of several eco-control practices simultaneously is important to support the implementation of a comprehensive environmental capability; (3) the eco-control mechanism allows management to identify and manage opportunities and threats, so as to be able to support the organization in achieving its goals; and (4) different strategies
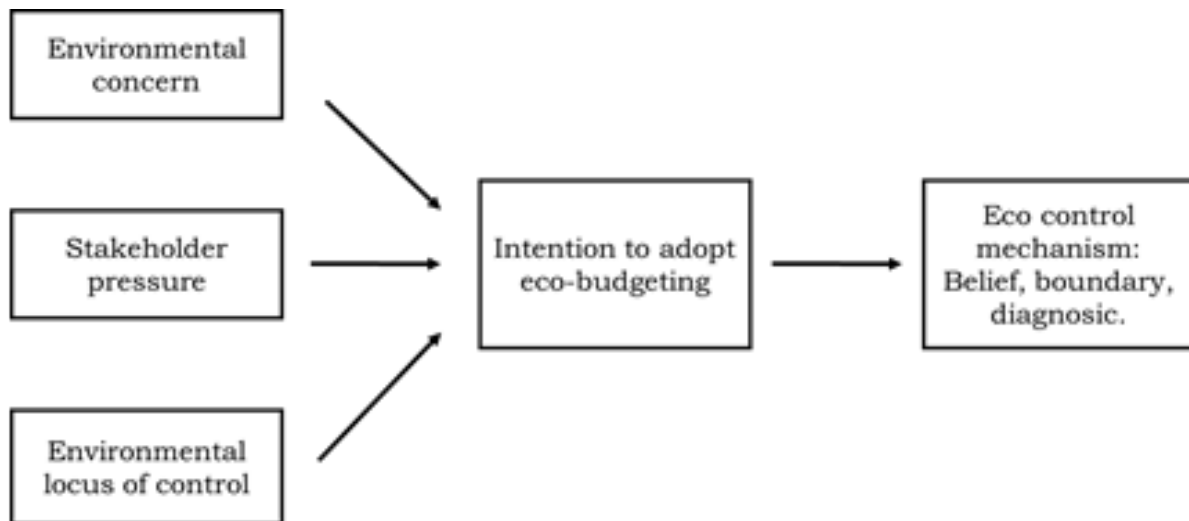
Figure 1: Conceptual Framework

lead to variations in the use of beliefs, boundaries, diagnostics and interactive eco-control. so as to be able to support the organization in achieving its goals; and (4) different strategies lead to variations in the use of beliefs, boundaries, diagnostics and interactive eco-control. so as to be able to support the organization in achieving its goals; and (4) different strategies lead to variations in the use of beliefs, boundaries, diagnostics and interactive eco-control.

Based on the results of previous research and the reference theory used, the conceptual framework of this study is presented in Figure 1.

The conceptual framework illustrates the relationships between behavioral factors and eco-management mechanisms in medical waste management. Environmental concern, reflecting awareness and commitment to environmental preservation, positively influences the intention to adopt eco-budgeting, as organizations with higher environmental concern are more likely to allocate resources for sustainable practices. Similarly, stakeholder pressure, driven by expectations from key stakeholders such as regulators, communities, and governments, encourages hospital management to develop an intention to adopt eco-budgeting to comply with external demands and maintain legitimacy. Additionally, environmental locus of control, representing management's belief in their ability to influence environmental outcomes, further strengthens the intention to adopt eco-budgeting. This intention serves as a critical intermediary that directly impacts the implementation of eco-control mechanisms—which include

belief systems, boundary systems, and diagnostic controls—ensuring that environmental plans are effectively monitored and executed. Moreover, environmental concern, stakeholder pressure, and environmental locus of control indirectly influence the adoption of eco-control mechanisms through the intention to adopt eco-budgeting, highlighting the role of behavioral factors in driving effective environmental management strategies.

Based on this conceptual framework, the formulation of the research hypothesis is as follows. Individuals or organizations with environmental concern tend to engage in environmentally friendly behaviors. In the context of medical waste management, environmental concern encourages hospital management to adopt sustainable practices like eco-budgeting. Previous studies have shown that environmental concern positively correlates with the intention to perform pro-environmental actions, such as using eco-friendly products and recycling waste (Chan et al., 2014; Han & Yoon, 2015). Therefore, it is assumed that the higher the environmental concern of hospital management, the greater their intention to adopt eco-budgeting

mechanisms. Thus, the hypothesis 1 is formulated as follows:

H1: Environmental concern has a positive effect on the intention to adopt eco-budgeting.

According to stakeholder theory, organizations respond to the demands of stakeholders deemed critical to their survival. In the healthcare industry, hospitals face pressure from stakeholders such as governments, communities, and environmental regulators. This pressure motivates management to adopt sustainability practices such as eco-budgeting to meet stakeholder expectations and maintain organizational legitimacy (Betts et al., 2015; Meixell et al., 2015). Therefore, stakeholder pressure is assumed to have a positive effect on the intention to adopt eco-budgeting. In hypothesis formulation it will be stated as follows:

H2: Stakeholder pressure has a positive effect on the intention to adopt eco-budgeting.

Locus of control reflects individuals' beliefs about their ability to control outcomes. Hospital management with an internal environmental locus of control believes they can influence environmental quality through their

actions. Previous studies have shown that individuals with an internal locus of control are more likely to engage in pro-environmental behaviors, such as responsible waste management (Fielding & Head, 2012; Kalamas et al., 2014). Therefore, internal environmental locus of control is assumed to have a positive effect on the intention to adopt eco-budgeting. It can be stated as follows:

H3: Internal environmental locus of control has a positive effect on the intention to adopt eco-budgeting.

The intention to adopt eco-budgeting reflects management's commitment to planning and allocating resources for environmental management. However, this intention must be translated into concrete actions through the implementation of eco-controlling mechanisms, which involve monitoring and evaluating environmental performance. These mechanisms ensure that environmental plans are effectively executed (Cadez et al., 2012; Henri & Journeault, 2010). Therefore, it is assumed that the intention to adopt eco-budgeting has a positive effect on the implementation of the eco-controlling mechanism. This can be formulated as follows:

H4: The intention to adopt eco-budgeting has a positive effect on the eco-controlling mechanism.

Environmental concern, stakeholder pressure, and internal locus of control influence the intention to adopt eco-budgeting, which subsequently impacts the implementation of eco-controlling. Eco-controlling cannot function effectively without careful planning through eco-budgeting. Therefore, these behavioral factors are assumed to have an indirect effect on the adoption of eco-controlling mechanisms through eco-budgeting (Arjaliès & Mundy, 2013; Guenther et al., 2016). This is formulated as the last hypothesis as follows:

H5: Environmental concern, stakeholder pressure and environmental locus of control have a positive effect on the eco-controlling mechanism through eco-budgeting.

METHODS

The population in this study consists of management teams from private general hospitals located in Denpasar City (10 hospitals) and Badung Regency (5 hospitals). These areas were chosen due to being the most heavily impacted regions in Bali,

experiencing the highest number of COVID-19 cases. The involvement of these hospitals in managing confirmed COVID-19 cases has led to a significant increase in medical waste production, including hazardous and infectious materials such as personal protective equipment (PPE), masks, gloves, and testing kits. This surge in medical waste has placed an additional operational burden on hospitals, requiring more comprehensive waste management strategies to ensure proper disposal and prevent environmental contamination. Simultaneously, hospitals faced heightened accountability demands from regulatory bodies, the public, and other stakeholders, compelling them to adopt stricter waste management protocols and enhance their environmental responsibility practices. Consequently, hospital management teams have become key decision-makers in implementing environmentally sustainable measures, making them relevant respondents for this study.

This study used the primary data which were collected by the self-administered survey method, in which respondents filled out the questionnaire independently without supervision from the researcher. This might have the potential for bias associated with self-reported data, which may affect the accuracy and reliability of the findings. Respondents might provide socially desirable answers or overestimate their engagement in eco-budgeting and eco-controlling practices due to perceived expectations or concerns about confidentiality. Additionally, differences in personal interpretations of survey items could lead to variability in responses. To mitigate this risk, the study employed a validated questionnaire and ensured anonymity and confidentiality to encourage honest reporting

Before use, the questionnaire was tested for validity and reliability. The survey is carried out by coming directly to the hospital by mail-survey. The questionnaire was adapted from various sources in a variety of context, such as hospitality, manufacturing, and health sectors. The sources include Wu et al. (2013) for environmental awareness variables; Betts et al. (2015) for stakeholder pressure; Fielding & Head, (2012) for environmental locus of control; Abdulla et al., (2008); Akulume & Kiwanuka, (2016); Oroei et al., (2014); Paulraj, (2009) for the intention to adopt eco-budgeting; and (Henri et al., 2016; Naranjo-gil, 2016) for the construct of the eco-control

mechanism. Measurements were made using a Likert scale of 1 to 5.

Before the data were analyzed, a non-response bias test was carried out to avoid bias in the conclusions due to the existence of respondents who did not respond. Furthermore, the data were analyzed using Partial Least Square (PLS), because it can simultaneously test the measurement model as well as the structural model. The measurement model is used to test the data validity and reliability, while the structural model is used to test causality, namely testing the hypothesis with a predictive model.

RESULTS AND DISCUSSION

A pilot test was carried out with the aim of measuring the validity and reliability of the instrument. The pilot test was carried out on 30 respondents who were the master of management students as a proxy for the hospital managers.

Having targeted 150 respondents of hospital managers, 200 sets of questionnaires were sent, of these, 125 responses have been received, resulting in a response rate of 62.5 percent. The response rate of 62.5 percent can be said to be good/adequate, as stated by Mellahi and Harris (2016), that for the survey research targeting responses from the management level of respondents, a

response rate of 35-50 percent is considered sufficient. However, to ensure that the conclusions are not potentially biased, a non-response bias test was performed.

Based on their gender, out of a total of 125 respondents, there were 74 male respondents (59 percent) and 51 female respondents (41 percent). By position, the highest number of respondents were top management, which included directors and deputy directors, heads and deputy heads of hospitals, as well as heads and deputy heads of departments, namely 102 people (82 percent), of which 92 people (74 percent) had working period between 1 to 5 years. Eighteen percent of the respondents are middle level management, which consists of section heads and installation heads who lead sections or installations related to the environment, namely waste treatment and environmental sanitation installations.

The data then were tested using PLS technique, consisting of outer model and inner model tests. The outer model which is also called the measurement model is evaluated by measuring the convergent and discriminant validity and the composite reliability of the indicators. The data have successfully passed all these outer

Table 1. The Value of R Square of the Endogenous Variable

Endogenous Variable	R Square
Belief	0,112
Boundary	0,136
Diagnostic	0,161
Interactive	0,102
Intention to Adopt	0,208

model tests. The next test was the Inner model testing which was done by looking at the R-square value which is a goodness of fit model test. R-square measures how well the observed values produced by the model and also the parameter estimates.

The coefficient of determination (R^2) is used to assess how much the endogenous construct is affected by the exogenous construct. An R Square value of 0.75 indicates that the model is strong, an R Square value of 0.50 indicates that the model is moderate, and an R Square value of 0.25 indicates that the model is weak (Sarstedt et al., 2017). Based on the data shown in Table 1, it can be explained that the R Square value for the above variables has a value below 0.25, which means that this research model has a weak influence on adopting intentions and eco-control mechanisms.

The bootstrapping procedure produces t-statistical values for each path of the relationship used to test the hypothesis. The t-statistic value

obtained will then be compared with the t-table value, and for research that uses a 95% confidence level or an accepted error rate, namely α = 5%, it has a t-table value of 1.96. If the value of the t-statistic is smaller than the t-table (t-statistic <1.96) then H_0 is accepted and H_a is rejected, whereas if the value of the t-statistic is greater than the t-table (t-statistic > 1.96) then H_0 rejected and H_a accepted (Ghozali & Latan, 2015).

Based on Table 2, the p-value and t statistics obtained for each variable are explained as follows. The first hypothesis (H1) in this study states that environmental awareness has a positive effect on intention to adopt eco-budgeting. The p-value for testing the effect of environmental concern on the intention to adopt is 0.002 which is lower than 0.05. The statistical value shows 3.179 which is greater than 1.96 while the coefficient value is 0.272.

This shows that environmental concern has a positive and

Table 2. T Test Results: Direct Effects between Variables

	Original Sample (O)	Sample Means (M)	Std. Deviations (STDEV)	T Statistics (|O/STDEV|)	P Values
Environmental concern-> Intention to Adopt	0.272	0.283	0.086	3,179	0.002
Locus of Control-> Intention to Adopt	0.171	0.154	0.143	1,194	0.233
Intention to Adopt -> Belief	0.335	0.342	0.095	3,537	0.000
Intention to Adopt -> Boundary	0.368	0.387	0.084	4,367	0.000
Intention to Adopt -> Diagnostic	0.401	0.419	0.062	6,453	0.000
Intention to Adopt -> Interactive	0.319	0.338	0.076	4,177	0.000
Stakeholder Pressure -> Adoption Intention	0.270	0.275	0.068	3,975	0.000

Source: Processed Data 2020

significant effect on the intention to adopt eco-budgeting. The hypothesis testing results support the assertion that higher environmental concern among hospital management correlates with a greater intention to adopt eco-budgeting. This finding aligns with previous research by Chiang et al., (2019); Ricci et al., (2018), which demonstrated similar trends in the purchase of eco-friendly products and Sisdyani et al., (2020) in the context of medical waste management. These studies collectively confirm that environmental concern can significantly increase the intention to engage in environmentally friendly behaviors across various contexts, particularly in the consumption of eco-friendly products. Specifically, in this study's context of environmental budgeting and control, environmental awareness is a critical

determinant of the intention to implement eco-budgeting. The implication is clear: individuals with a heightened sense of environmental concern are more likely to pursue eco-budgeting strategies in medical waste management. Thus, it is crucial to foster positive attitudes towards environmentally friendly behaviors, as they have been shown to effectively enhance intentions to adopt such behaviors.

The results from testing the second hypothesis (H2) provide empirical evidence supporting the assertion that stakeholder pressure positively affects the intention to adopt eco-budgeting. The p-value associated with the influence of stakeholder pressure on this intention is 0.000, which is significantly lower than the threshold of 0.05. The statistical value of 3.975 exceeds the critical value of 1.96,

and the coefficient value is 0.270, indicating that stakeholder pressure has a positive and significant effect on the intention to adopt eco-budgeting.

This suggests that the stronger the pressure exerted by stakeholders on hospital management, the more likely the management is to adopt eco-budgeting in medical waste management. Among the stakeholders, hospital management perceives the government as the most influential, followed by environmentalists, investors, the general public, and creditors. The findings from the H2 test align with those of Betts et al., (2015); Lee, (2015) and Meixell et al., (2015), which concluded that internal stakeholder pressure is a common driver of environmentally-based practices. These results confirm that stakeholder pressure is a significant determinant of management's intention toward green behavior.

The results of testing the third hypothesis (H3) indicate that internal locus of control does not significantly affect the intention to adopt eco-budgeting. The p-value for testing the effect of locus of control on this intention is 0.233, which exceeds the significance threshold of 0.05. Additionally, the statistical value of

1.194 is below the critical value of 1.96, and the coefficient value is 0.171, further demonstrating that locus of control does not significantly influence the intention to adopt eco-budgeting. This finding is contrary to the research hypothesis and diverges from several previous empirical studies that suggested a significant impact.

The non-significant relationship between locus of control (LOC) and the intention to adopt eco-budgeting may be attributed to several contextual and organizational factors. In Indonesia, especially in Bali, cultural beliefs emphasizing external control may lead individuals to attribute environmental outcomes to external forces such as government actions or divine will, reducing the influence of personal control beliefs. Indonesian people adhere to national culture with a relatively low index for the uncertainty avoidance dimension (Hofstede et al., 2010) which is closely related to the nature of the external locus of control which is surrender to what happens in the environment. They attribute environmental conditions to natural factors or destiny from God (Kalamas et al., 2014).

Additionally, environmental management in hospitals is often

perceived as a regulatory obligation, where compliance depends on external policies rather than individual initiative. The hierarchical decision-making structure in hospitals may further limit managers' perceived ability to control eco-budgeting decisions. Resource constraints such as budget limitations and inadequate facilities could also hinder individual managers' belief in their capacity to influence environmental outcomes. Moreover, the study found that stakeholder pressure played a significant role, suggesting that external demands may override personal control beliefs, rendering LOC less relevant in this context. Finally, potential measurement biases in the questionnaire could have affected how respondents interpreted LOC-related items, contributing to the non-significant result.

The testing of the fourth hypothesis (H4) explored the impact of the intention to adopt eco-budgeting on various eco-control mechanisms, revealing significant findings across all categories. Each mechanism showed positive and statistically significant results, demonstrating the strong influence of intention on effective eco-control implementation.

Firstly, the intention to adopt eco-budgeting significantly impacts the eco-belief control mechanism. This was evidenced by a p-value of 0.000 and a statistical value of 3.537, both of which underscore the strong correlation, reinforced by a coefficient of 0.335. These figures indicate that as hospital managers' intentions strengthen, so does their commitment to the eco-belief control mechanism, which focuses on fostering beliefs that support environmental initiatives.

Similarly, the eco-boundary control mechanism, which establishes limits on acceptable practices, was positively affected. The p-value remained at 0.000, with a statistical value of 4.367 and a coefficient of 0.368, reflecting a robust intention among hospital managers to enforce these boundaries rigorously.

The eco-diagnostic control mechanism also showed positive results, with a p-value of 0.000 and an impressively high statistical value of 6.453. The coefficient here was 0.401, the highest among the mechanisms tested, highlighting the strong effect of intention on monitoring and correcting deviations from eco-friendly practices.

Lastly, the intention to adopt significantly influenced the eco-

interactive control mechanism, as evidenced by a p-value of 0.000, a statistical value of 4.177, and a coefficient of 0.319. This mechanism, which involves ongoing dialogue and engagement around eco-practices, similarly benefits from strong managerial intentions to adopt eco-budgeting.

The tighter the formula *eco-budgeting*, the more important the application of the four levers of mechanisms *eco-control*, that is *belief, boundary, diagnostic*, and *interactive control*. General Hospital Management perceives the importance of implementing all mechanisms *eco-control* to ensure green behavior in medical waste management. This is consistent with the findings Arjaliès & Mundy, (2013); J. Henri et al., (2016) and Naranjo-gil, (2016). RSU management chooses to implement all control mechanisms, both reflecting controls on compliant behavior (*belief, boundaries* and *diagnostic control system*) and creative search efforts (*belief* and *interactive control system*).

This means that there is a very strong motivation from the RSU management to ensure the adoption of eco-budgeting in managing medical waste so that it can be realized into real behavior. Even

though intentions are strictly formulated based on regulations, hospital management still considers it important to implement controls that are creative pursuits, such as *interactive control*. Spontaneous behavior can arise without intention (Mirabeau & Maguire, 2013), but it is nearly impossible for a behavior to occur without any intention at all (Mintzberg & Waters, 1985). This causes the RSU management to keep trying to be involved and interact regularly with subordinates to come up with creative new ways of managing medical waste, as shown by their high perception of variable indicators. *Interactive control*, where is greater than 70 percent respondent agree and strongly agree on the application of these controls. Application *interactive control* by hospital management is appropriate because of the characteristics of the hospital as part of an innovative and creative industry (Altuntaş et al., 2013). Innovation in the healthcare industry is needed to provide optimal health services for patients and thereby improve performance. Therefore, it is important for hospital management to adopt all mechanisms *levers of eco-control*, including *interactive control*, even though the intention to conduct green behavior, namely to

Table 3. The Result of the Indirect Effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Environmental concern -> Intention to adopt -> Belief	0,091	0,099	0,045	2,006	0,045
Locus of Control -> Intention to adopt -> Belief	0,057	0,052	0,051	1,127	0,260
Stakeholders pressure -> Intention to adopt -> Belief	0,090	0,095	0,038	2,364	0,018
Environmental concern -> Intention to adopt -> Boundary	0,100	0,113	0,048	2,070	0,039
Locus of Control -> Intention to adopt -> Boundary	0,063	0,058	0,054	1,165	0,245
Stakeholders pressure -> Intention to adopt -> Boundary	0,099	0,106	0,036	2,736	0,006
Environmental concern -> Intention to adopt -> Diagnostic	0,109	0,120	0,045	2,399	0,017
Locus of Control -> Intention to adopt -> Diagnostic	0,068	0,064	0,060	1,149	0,251
Stakeholders pressure -> Intention to adopt -> Diagnostic	0,108	0,115	0,033	3,262	0,001
Environmental concern -> Intention to adopt -> Interactive	0,087	0,096	0,037	2,346	0,019
Locus of Control -> Intention to adopt -> Interactive	0,054	0,053	0,051	1,062	0,289
Stakeholders pressure -> Intention to adopt -> Interactive	0,086	0,093	0,033	2,618	0,009

Source: Processed Data

adopt eco-budgeting, is strictly formulated (*rigid*).

Based on Table 3, it can be said that the mediating role of the intention to adopt eco-budgeting is shown in the unbroken relationship between the variables of environmental awareness, the intention to adopt eco-budgeting, and the eco-control mechanism; as well as the path between stakeholder pressure variables, intention to adopt eco-budgeting, and eco-control mechanisms (H5).

Based on Table 3, the p-value and t statistics obtained for each variable are explained as follows: 1) The p-value for testing the effect of environmental concern on the eco-belief control mechanism mediated by the intention to adopt is 0.045, which is lower than 0.05. The statistical value shows 2.006 which is greater than 1.96 while the coefficient value is 0.091. This shows that the effect of environmental concern on the eco-belief control mechanism is mediated by the intention to adopt 2) The p-value for testing the effect of environmental concern on the eco-boundary control mechanism mediated by the intention to adopt is 0.039 which is lower than 0.05. The statistical value shows 2.070 which is greater than 1.96 while the coefficient value is

0.100. This shows that the effect of environmental concern on the eco-boundary control mechanism is mediated by the intention to adopt 3) The p-value to test the effect of environmental awareness on the eco-diagnostic control mechanism mediated by the intention to adopt is 0.017 which is lower than 0.05. The statistical value shows 2.399 which is greater than 1.96 while the coefficient value is 0.109. This shows that the effect of environmental concern on the eco-diagnostic control mechanism is mediated by the intention to adopt 4) The p-value for testing the effect of environmental concern on the eco-interactive control mechanism mediated by the intention to adopt is 0.019 which is lower than 0.05. The statistical value shows 2.346 which is greater than 1.96 while the coefficient value is 0.087. This shows that the effect of environmental concern on the eco-interactive control mechanism is mediated by the intention to adopt 5) The p-value for testing the influence of stakeholder pressure on the eco-belief control mechanism mediated by the intention to adopt is 0.018 which is lower than 0.05. The statistical value shows 2.364 which is greater than 1.96 while the coefficient value is 0.090. This shows that the effect of environmental

concern on the eco-belief control mechanism is mediated by the intention to adopt 6) The p-value to test the influence of stakeholder pressure on the eco-boundary control mechanism mediated by the intention to adopt is 0.006 which is lower than 0.05. The statistical value shows 2.736 which is greater than 1.96 while the coefficient value is 0.099. This shows that the effect of stakeholder pressure on the eco-boundary control mechanism is mediated by the intention to adopt 7) The p-value to test the effect of stakeholder pressure on the eco-diagnostic control mechanism mediated by the intention to adopt is 0.001 which is lower than 0.05. The statistical value shows 3.262 which is greater than 1.96 while the coefficient value is 0.108. This shows that the effect of stakeholder pressure on the eco-diagnostic control mechanism is mediated by the intention to adopt 8) The p-value for testing the influence of stakeholder pressure on the eco-interactive control mechanism mediated by the intention to adopt is 0.009 which is lower than 0.05. The statistical value shows 2.618 which is greater than 1.96 while the coefficient value is 0.086. This shows that the influence of stakeholder pressure on the eco-interactive

control mechanism is mediated by the intention to adopt

However, this mediating role cannot be proven for locus of control. This means that the higher the level of environmental concern and the stronger the pressure from stakeholders, the higher the management's intention to adopt eco-budgeting. A stronger intention will result in the implementation of an increasingly stringent control mechanism, to ensure that the adoption of eco-budgeting can be realized effectively.

Environmental concern and *stakeholders'* pressure indirectly and positively affect the implementation of the eco-control mechanism through the intention to adopt eco-budgeting. The findings of this study enrich *Theory of Planned Behavior (TPB)* in the following two ways. First, this research provides a unique and specific construct for individual behavior in the context of organizations facing environmental problems, that is the Environmental Concern, which is used as an alternative of the attitude construct (Wu, Huang, & Teng, 2013) and stakeholders' pressures as the alternative to the subjective norm construct (Harms et al., 2014). Attitudes and subjective norms are the original constructs within the TPB framework which are determinants of intentions. Second, this research proposed a way to strengthen the stability of intentions, as the main construct in the TPB, by integrating eco-control into the original model. The purpose is to ensure individual intentions to be aligned with organizational intentions, thereby increasing the realization of intentions into behavior.

Support for Stakeholder Theory (ST) is provided by giving recognition to the role of ST in enriching TPB, namely by accommodating interests of the stakeholder, particularly their role in managing environmental impacts for organizations. So, to increase intention and ensure it to become an eco-friendly behavior by adopting eco-budgeting, efforts are also needed to increase environmental awareness and concern of hospital managers. One way to increase environmental awareness is through continuous education and learning to gain environmental knowledge (Pagiaslis, A., and Krontalis, 2014); as well as the internalization of the environmental management system (Todaro et al., 2019) in the hospital operations.

Based on the findings and discussions presented earlier, all research questions have been

thoroughly answered. The results demonstrate that the proposed relationships among variables, including the influence of environmental concern, stakeholder pressure, and environmental locus of control on the intention to adopt eco-budgeting, as well as the subsequent impact of eco-budgeting intention on eco-control mechanisms, have been confirmed. Furthermore, the mediating role of the intention to adopt eco-budgeting in linking behavioral factors to eco-control mechanisms has also been validated. These findings provide a comprehensive understanding of the factors driving effective medical waste management through eco-budgeting and eco-control adoption, thereby addressing all the research objectives set forth in this study.

CONCLUSION, IMPLICATION AND LIMITATION

Based on the data analysis and discussions presented previously, we can draw several conclusions that address the research objectives. Firstly, the higher the level of environmental awareness among hospital managers, the stronger their intention to implement eco-budgeting. Secondly, increased pressure from stakeholders—

including investors, environmentalists, creditors, and society at large—encourages hospital managers to adopt eco-budgeting more robustly. Thirdly, a stronger intention to adopt eco-budgeting leads to more stringent control mechanisms. Fourthly, the intention to adopt eco-budgeting mediates the impact of environmental concern among hospital managers and stakeholder pressure on the implementation of eco-control mechanisms.

The research implications are significant both theoretically and practically. The Theory of Planned Behavior could be expanded to include constructs specifically tailored to environmental contexts. The Stakeholder Theory is supported when applied within the framework of green behavior. Practically, the implications center on medical waste management practices, particularly budgeting and control mechanisms.

This research is novel in its integration of behavioral factors into the medical waste management framework, focusing particularly on the adoption of eco-budgeting and eco-controlling mechanisms in hospitals. It extends the Theory of Planned Behavior by incorporating environmental concern and stakeholder pressure as specific

determinants of intentions to adopt eco-budgeting, a topic previously underexplored in healthcare. Furthermore, the study highlights the mediating role of intention between these behavioral factors and the implementation of eco-controlling mechanisms. This introduces a new perspective by linking hospital managers' intentions to the effective use of eco-control systems, often discussed in manufacturing but less so in service sectors like healthcare. Additionally, it addresses the empirical gap concerning the practical application of eco-budgeting and eco-controlling in managing medical waste, particularly in the context of a developing country like Indonesia.

Despite these insights, the research has limitations. The R Square values for the variables are relatively low, below 0.25, indicating that the model has limited explanatory power regarding the intentions to adopt eco-budgeting and eco-control mechanisms. Future research should consider additional variables that might enhance the model, such as personality traits and self-control factors.

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