Volume 6 Issue 1 (202 6) Pages 360 - 372
Amkop Management Accounting Review (AMAR)
ISSN : 2828-2248 (On line)

Green Ambidextrous Leadership and Green Employee Innovative Behavior: Mediating Effects of Knowledge Sharing and Psychological Safety and the Moderating Role of Green IT Empowerment

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Abstract

Purpose – This study aims to investigate the influence of Green Ambidextrous Leadership (GAL) on Green Employee Innovative Behavior (GEIB). It further explores the mediating roles of psychological safety and knowledge sharing, while examining Green IT Empowerment as a critical moderating variable.

Design – A quantitative approach was employed, utilizing a comprehensive model to analyze the interplay between leadership, psychology, knowledge management, and technology. Data were collected from employees in the petrochemical industry and analyzed to test the structural relationships within the proposed framework.

Findings – The results demonstrate that Green Ambidextrous Leadership is a pivotal factor in driving GEIB. This influence is primarily channeled through psychological safety and knowledge sharing, with psychological safety emerging as the more potent mediator. This highlights the necessity of a safe psychological climate for fostering environmental innovation. Furthermore, Green IT Empowerment significantly moderates these relationships, acting as a strategic enabler that amplifies the impact of organizational factors on green innovation. The integrated model explains 85.6% of the variance in GEIB, confirming the relevance of combining leadership, knowledge management, and technology empowerment perspectives in an industrial context.

Practical implications – Organizations should prioritize leadership development programs focused on green ambidextrous competencies and invest in Green IT infrastructure. Most importantly, management must cultivate psychological safety by transitioning from a "blame culture" to a "learning culture." This can be achieved through no-retaliation policies for speak-up behavior and reward systems that recognize "intelligent failures" in green initiatives.

Keywords: *Green Ambidextrous Leadership, Green Employee Innovative Behavior, Psychological Safety, Knowledge Sharing, Green IT Empowerment, Petrochemical Industry.*

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DOI : 10.37531/amar.v6i1.3548

INTRODUCTION

In the era of globalization and intensive industrialization, environmental sustainability issues have become a top priority for the industrial world, driven by the increasingly extreme phenomenon of climate change and the energy crisis that threatens global economic stability. A report (United Nations Environment Programme, 2023) shows that carbon emissions from the industrial sector reach 25 percent of total global emissions, causing economic losses of up to trillions of dollars due to natural disasters and supply chain disruptions. This phenomenon encourages companies to adopt green business practices, such as energy efficiency and waste reduction, as part of their commitment to the *Sustainable Development Goals* . Globally, as many as 78 percent of multinational companies have integrated sustainability strategies into their operations, with a trend increasing by 15 percent in the last five years. This is not only a response to pressure from regulators and consumers, but also as a competitive strategy to increase efficiency and *green product innovation* .

The circular economy is an economic development paradigm oriented towards breaking the link between economic growth and increased exploitation of natural resources through waste reduction strategies, product life cycle extensions, and ecological system regeneration. In Indonesia, the circular economy has been mainstreamed in the 2020–2024 National Medium-Term Development Plan (RPJMN) through the Low Carbon Development framework, positioning it as a key instrument for achieving inclusive growth while reducing environmental pressures. Its implementation is focused on five priority sectors—food, textiles, construction, plastics, and electronics—which collectively contribute nearly one-third of national GDP and employ more than 43 million people, providing strong empirical justification that the transformation to a circular economy model is not only an ecological issue but also a strategic macroeconomic development agenda. Various studies have shown that the integration of circular economy principles in these sectors has significant potential to reduce waste generation, reduce greenhouse gas emissions, conserve primary material use, and create new investment and job opportunities, which in turn requires green-oriented organizational governance and leadership practices at the micro level.

Figure 1. 1 Paradigm Shift from Linear Economy to Circular Economy

According to a 2023 report by Energy Solutions, which analyzed data from 1,000 companies across various sectors, this trend is also reflected in the global sustainability index, where green companies recorded 10-15 percent higher revenue growth than conventional competitors. Research by (Gupta et al., 2021) in *the Journal of Cleaner Production* added that companies adopting *green innovation* experienced energy cost reductions of up to 18 percent, with empirical data from case studies in India demonstrating increased productivity through *green innovation* . Global trends show that *green companies* score approximately 20 percent higher on *the Dow Jones Sustainability Index* (DJSI) than conventional competitors, indicating stronger sustainability and efficiency performance. Consequently, many of them are able to reduce operational costs by up to 12 percent through energy efficiency and the adoption of renewable resources.

DOI : 10.37531/amar.v6i1.3548

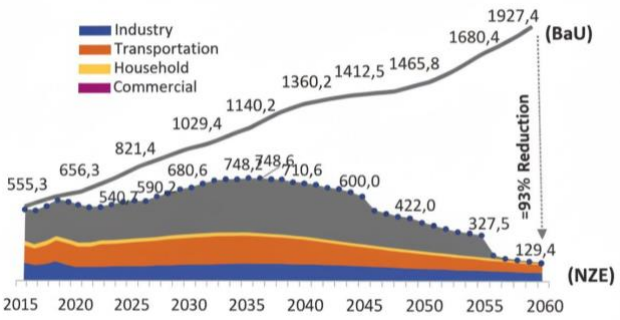

Figure 2 *Net Zero Emission* 2060 (Million Tons of CO2e)
Source: New & Renewable Energy Transition

In Indonesia, the Ministry of Energy and Mineral Resources targets a 93 percent reduction in carbon emissions from BaU or 1927.4 million tons of CO2 by 2060 through energy transition and industrial efficiency (Salim et al., 2024) . However, data from the Ministry of Industry in 2024 shows that only 62 percent of manufacturing companies have implemented *green industry* , and only 28 percent have integrated *green innovation* into leadership and human resources, indicating an implementation gap. For example, PT Pupuk Indonesia has initiated green practices but still faces obstacles on a national scale, because the manufacturing sector still contributes around 30 percent of national emissions according to the Central Statistics Agency (2023). Meanwhile, data from PwC Indonesia shows that only 0.15 percent of 29,000 medium and large industrial companies in Indonesia are *green certified* .

From an Islamic perspective, human responsibility towards the environment is a mandate that must be maintained with full moral and spiritual awareness. This is emphasized in the words of Allah SWT: "Corruption has appeared on land and sea because of what the hands of men have earned, that Allah may make them taste a part of what they have done, in order that they may return (to the right path)" (*QS. Ar-Rum: 41*). This verse contains a profound message that the environmental damage that occurs is a consequence of human behavior that is not wise in managing natural resources. Therefore, humans are required to reflect and improve their behavior by creating sustainable solutions oriented towards environmental sustainability as a form of responsibility towards the mandate of Allah SWT.

In the context of the modern industrial world, this verse serves as a moral basis for the development of *green innovation* , namely innovation that focuses on resource efficiency, waste reduction, and environmental protection. *Green innovation* not only reflects efforts to improve corporate performance, but also a manifestation of religious values such as ecological responsibility, environmental justice, and concern for Allah SWT's creation. Thus, *green innovation* can be interpreted as a form of ecological repentance, a moral and spiritual commitment to repair damage to the earth through environmentally friendly and sustainable ideas, technologies, and work practices in accordance with Islamic principles.

In the specific context of PT XX as a State-Owned Enterprise in the fertilizer and chemical sector, the company plays a strategic role in supporting national food security through fertilizer production, but its energy- and chemical-intensive operations often produce high emissions and hazardous waste. *Petrokimia Gresik on the Move: Towards a More Innovative & Sustainable Industry 2023 Sustainability Report* , (2023) recorded billions of rupiah in investments in waste processing technology and renewable energy, yet employee participation in green innovation reached only 45 percent, indicating a gap between managerial strategy and employee behavior. The main problem is that *green innovation* is often seen as an additional burden, rather than an integral part of the job, due to a lack of leadership support capable of balancing the exploration of new ideas and the utilization of existing

DOI : 10.37531/amar.v6i1.3548

resources in a sustainable context, known as *Green Ambidextrous Leadership* . For example, employees at PT XX may have an idea to develop a more efficient organic fertilizer, but without leadership that encourages exploration while maintaining daily operations, the idea goes unrealized, leaving the company dependent on high-emission fuels.

From the low employee participation rate explained above, in an operational context under strict regulation, employee work activities are generally designed to follow established standard operating procedures to ensure process safety, consistent product quality, and compliance with industry requirements. This highly structured work structure is crucial for minimizing risk and ensuring operational stability, but it can also limit the space for spontaneity in generating new ideas, as employees focus more on executing tasks accurately and according to guidelines than on exploration or experimentation that could potentially lead to deviations from formal procedures. Chen and Farida (2020) explain that when work demands technical precision and compliance, the psychological space to express alternative ideas can be reduced if there is no support from the social work environment. This demonstrates the importance of psychological conditions that enable individuals to feel safe when proposing new approaches.

Furthermore, interaction and information exchange within the organization also significantly impact the environment. In operations at a large industry like PT XX, the dynamics of information exchange often present unique challenges. The complexity of production processes, from control to waste management, means each work unit requires highly specialized technical knowledge. This often creates fragmented work patterns, where critical information about a task circulates only within a small circle.

PT XX has not yet fully implemented IT integration. However, some initiatives, such as replacing a paperless system with the SERGIO innovation application, have made it easier for employees to gather creative ideas. According to Dwivedi et al.'s 2021 study in the Journal of Business Research, green IT integration can reduce energy consumption by up to 30 percent. Without this integration, companies like PT XX may continue to face challenges such as a 15 percent annual increase in energy costs, according to 2023 data from the Ministry of Energy and Mineral Resources, which could worsen operational efficiency.

Given the numerous issues outlined above, a theoretical approach is needed to explain the psychological and social mechanisms that shape *Green Employee Innovative Behavior . In this context, the theory of planned behavior* (TPB) developed by Ajzen (1991) serves as the most relevant theoretical foundation for explaining how intentions and *innovative behavior* are formed in an organizational environment.

A study by Birkinshaw et al. (2016) in *Bridging the Dynamic Capabilities and Ambidexterity Perspectives* explains that *ambidexterity* helps companies understand the strengths and weaknesses in management decision-making, especially when seeking and exploiting new opportunities. This approach also encourages companies to adjust and restructure internal activities to be more adaptive to change, where employees are reluctant to innovate due to the risk of failure. Further research is needed to integrate mediation such as *knowledge sharing* and *psychological safety* , as well as moderation of *Green IT empowerment* , to overcome this challenge and increase *Green Employee Innovative Behavior* , which includes new ideas for energy efficiency and waste management. For example, without *psychological safety* , employees may be afraid to propose the idea of replacing hazardous chemicals with environmentally friendly alternatives, even though it could reduce waste by up to 25 percent, as potential from the OECD study (Organization for Economic Co-operation and Development, 2023) . Research by Ahmad et al. (2024) in the Journal of Business Research added that in state-owned companies,

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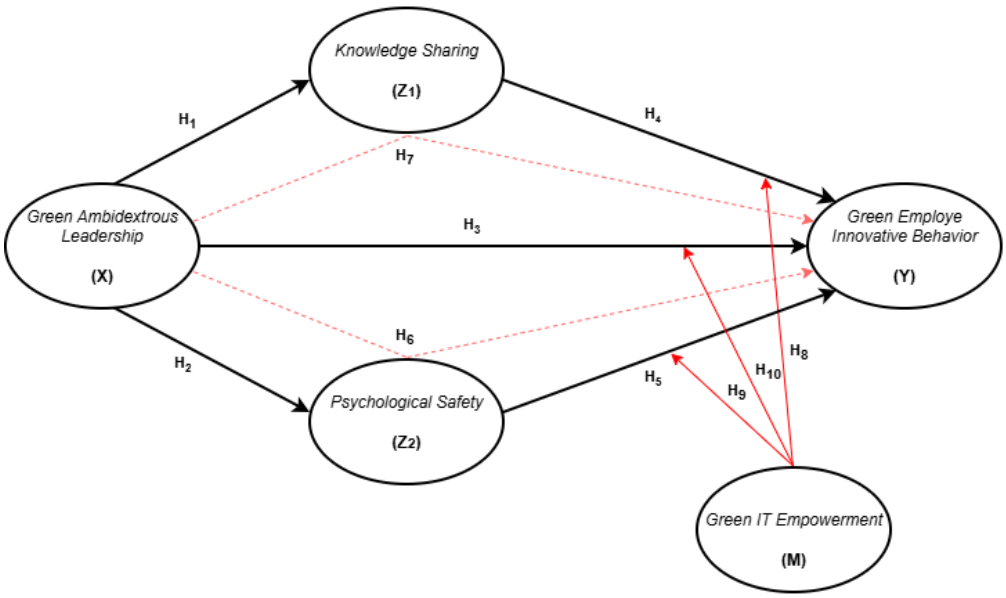
psychological safety can be strengthened through leadership training, with data from a study in Malaysia showing an increase in green innovation of up to 28 percent.

This study analyzes the influence of *Green Ambidextrous Leadership* on *Green Employee Innovative Behavior* through the mediation of *Knowledge sharing* and *psychological safety* , as well as the moderation of *Green IT empowerment* at PT XX, using quantitative methods with surveys and Structural Equation Modeling analysis. Theoretically, this study enriches the literature with an integrative model that addresses previous gaps, contributing to organizational behavior and sustainability theory by testing the complex interactions between leadership, mediation, and moderation variables in the specific context of Indonesia. Practically, the benefits for the manufacturing sector are increased energy efficiency, waste reduction, and digital transformation, which can be replicated by other state-owned enterprises to support Indonesia's Nationally Determined Contribution. For example, the results of the study can encourage PT XX to increase employee participation by up to 60 percent, as potential from the study of Newman et al. (2017). Research by Amabile (1996) in the Harvard Business Review adds that employee innovation is enhanced through a supportive environment, which is relevant for this practical benefit.

Thus, the research entitled "The Influence of *Green Ambidextrous Leadership* on *Green Employee Innovative Behavior* through the Mediating Role *of Knowledge Sharing* and *Psychological Safety* and Moderation of *Green IT Empowerment* at PT XX" is expected to provide significant theoretical and practical contributions to the development of management and sustainability science. Theoretically, this research strengthens the understanding of the mechanism of influence of ambidextrous leadership in the context of green organizations, while practically the results are expected to be a reference for PT XX and similar industries in designing leadership strategies and sustainable innovation policies oriented towards efficiency, productivity, and environmental responsibility .

Research Model



Gambar 1.Model Penelitian

Green Ambidextrous Leadership towards Knowledge Sharing

Green Ambidextrous Leadership encourages employees to share knowledge by balancing the exploration of new ideas with the utilization of existing knowledge.

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Supportive and open leaders create a collaborative climate and mutual trust, thus encouraging employees to share ideas and experiences related to green innovation.
H1.0: Green Ambidextrous Leadership has no effect on Knowledge Sharing.
H1.1: Green Ambidextrous Leadership influences Knowledge Sharing.

Green Ambidextrous Leadership towards Psychological Safety

Green Ambidextrous Leadership creates psychological safety by encouraging openness, support, and acceptance of new ideas. When employees feel psychologically safe, they are more confident in expressing their opinions without fear of negative consequences.
H2.0: Green Ambidextrous Leadership has no effect on Psychological Safety.
H2.1: Green Ambidextrous Leadership has an effect on Psychological Safety.

Green Ambidextrous Leadership on Green Employee Innovative Behavior

Green ambidextrous leadership can enhance green employee innovative behavior by providing space for innovation and clear implementation guidelines. This leadership fosters employee courage to develop and implement environmentally friendly ideas.
H3.0: Green Ambidextrous Leadership has no effect on Green Employee Innovative Behavior.
H3.1: Green Ambidextrous Leadership has an effect on Green Employee Innovative Behavior.

Knowledge Sharing on Green Employee Innovative Behavior

Knowledge sharing plays a crucial role in driving green innovation because it enables the exchange of ideas and experiences among employees. The greater the intensity of knowledge sharing, the greater the opportunity for green innovation.

H4.0: Knowledge Sharing has no effect on Green Employee Innovative Behavior.
H4.1: Knowledge Sharing has an effect on Green Employee Innovative Behavior.

Psychological Safety on Green Employee Innovative Behavior

Psychological safety encourages employees to innovate without fear of blame or criticism. A psychologically safe work environment increases employee participation in the development of green innovation.

H5.0: Psychological Safety has no effect on Green Employee Innovative Behavior.
H5.1: Psychological Safety has an effect on Green Employee Innovative Behavior.

The Role of Knowledge Sharing Mediation

The influence of green ambidextrous leadership on green employee innovative behavior can occur through knowledge sharing. Leadership that encourages collaboration will increase knowledge sharing, which in turn strengthens employee green innovation.

H6.0: Knowledge Sharing does not mediate the effect of Green Ambidextrous Leadership on Green Employee Innovative Behavior.
H6.1: Knowledge Sharing mediates the effect of Green Ambidextrous Leadership on Green Employee Innovative Behavior.

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The Mediation Role of Psychological Safety

Psychological safety is a crucial mechanism that bridges the influence of green ambidextrous leadership on employee innovation. When employees feel safe, they are more active in conveying and developing innovative, environmentally conscious ideas.

H7.0: Psychological Safety does not mediate the effect of Green Ambidextrous Leadership on Green Employee Innovative Behavior.
H7.1: Psychological Safety mediates the effect of Green Ambidextrous Leadership on Green Employee Innovative Behavior.

Green IT Empowerment Moderation in Knowledge Sharing

Green IT Empowerment strengthens the relationship between Knowledge Sharing and Green Employee Innovative Behavior. Green technology support helps employees access, disseminate, and apply knowledge more effectively in environmental innovation.

H8.0: Green IT Empowerment does not moderate the influence of Knowledge Sharing on Green Employee Innovative Behavior.
H8.1: Green IT Empowerment moderates the influence of Knowledge Sharing on Green Employee Innovative Behavior.

Green IT Empowerment Moderation on Psychological Safety

Green IT Empowerment creates a digital work environment that supports psychological safety. Green technology increases transparency and collaboration, thereby strengthening the influence of psychological safety on green innovation.

H9.0: Green IT Empowerment does not moderate the relationship between Psychological Safety and Green Employee Innovative Behavior.
H9.1: Green IT Empowerment moderates the relationship between Psychological Safety and Green Employee Innovative Behavior.

Moderation of Green IT Empowerment in Green Ambidextrous Leadership

Green IT Empowerment strengthens the influence of Green Ambidextrous Leadership on Green Employee Innovative Behavior. The use of green technology supports collaboration, efficiency, and the optimal implementation of environmentally friendly innovations.

H10.0: Green IT Empowerment does not moderate the effect of Green Ambidextrous Leadership on Green Employee Innovative Behavior.
H10.1: Green IT Empowerment moderates the effect of Green Ambidextrous Leadership on Green Employee Innovative Behavior.

METHODOLOGY

This study adopts a quantitative approach with a causal research design to examine the causal relationships among variables. Green Ambidextrous Leadership is treated as the independent variable, Green Employee Innovative Behavior as the

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dependent variable, Knowledge Sharing and Psychological Safety as mediating variables, and Green IT Empowerment as a moderating variable.

The research was conducted at PT XX in December 2025. The population consists of 2,138 employees, with a sample of 337 respondents determined using the Slovin formula at a 5% error rate. The sampling technique applied was convenience sampling.

Primary data were collected through an online questionnaire using a five-point Likert scale. Data analysis was performed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) to assess the measurement model and structural relationships, including direct, mediating, and moderating effects.

RESULTS AND DISCUSSION

4.1 Descriptive Analysis of Research Variables

Descriptive analysis was used to provide an overview of respondents' perceptions of the research variables, including Green Ambidextrous Leadership, Knowledge Sharing, Psychological Safety, Green IT Empowerment, and Green Employee Innovative Behavior. This analysis used the mean, median, and standard deviation values of each indicator to identify trends in respondents' responses.

Table 4.5 Descriptive Statistics of Research Variables

Indicator	Mean	Median	Std. Dev
X1.1.1	3,487	3,000	0.859
X1.1.2	3,481	4,000	0.929
X1.1.3	3,531	4,000	0.873
X1.2.1	3,494	3,000	0.873
X1.2.2	3,462	3,000	0.851
X1.2.3	3,456	3,000	0.893
Z1.1.1-Z1.6.1	3,475-3,506	3,000-4,000	0.844-0.901
Z2.1.1-Z2.5.2	3,469-3,538	3,000-4,000	0.859-0.915
M1.1.1-M1.5.1	3,475-3,525	3,000-4,000	0.844-0.942
Y1.1.1-Y1.3.2	3,438-3,481	3,000	0.782-0.819

Based on Table 4.5, the mean values for all indicators range from 3.438 to 3.538, which is above the midpoint of the Likert scale (3.00) and close to 4, which represents the "agree" category. This finding indicates that respondents generally gave a positive assessment of all research variables. The standard deviation values ranging from 0.782 to 0.942 indicate that the

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variation in respondents' answers is relatively low, indicating the consistency of employee perceptions of the measured phenomena.

4.3.1 Description of Green Ambidextrous Leadership Variables

The Green Ambidextrous Leadership variable is measured through six indicators reflecting two leadership dimensions: opening leadership (exploration) and closing leadership (exploitation). The mean score for the exploration dimension ranged from 3.481 to 3.531, while the mean score for the exploitation dimension ranged from 3.456 to 3.494. This indicates that PT XX employees perceive that their leaders have implemented both leadership approaches in a balanced manner within the context of green innovation.

Indicator X1.1.3, which measures leader support for learning from mistakes during the exploration of environmentally friendly ideas, had the highest mean value (3.531), indicating that employees feel supported in taking risks and learning from failures in the innovation process. This finding aligns with Edmondson's (2018) research , which emphasized the importance of a mistake-tolerant environment in encouraging innovative behavior. Conversely, indicator X1.2.3, which measures the provision of feedback to ensure environmentally friendly activities are carried out according to regulations, had the lowest mean value (3.456), although it is still in the positive category.

The relatively consistent standard deviation values across all indicators (0.851-0.929) indicate that employee perceptions of green ambidextrous leadership are quite homogeneous. This indicates that leadership practices that encourage the exploration of new ideas while ensuring efficient implementation have been consistently implemented by leaders across departments. According to Rosing et al. (2011), consistency in the application of ambidextrous leadership is crucial for creating a culture of sustainable innovation within an organization.

4.3.2 Description of Knowledge Sharing Variable

The Knowledge Sharing variable is measured through ten indicators covering various aspects of knowledge sharing, including sharing discussion results, work documents, work transparency, solutions and contacts, expertise, and experience. The mean score for this variable ranged from 3.475 to 3.506, indicating that PT XX employees have a fairly good tendency to share knowledge related to green practices.

Indicator Z1.2.1, which measures the willingness to share relevant documents or materials with team members, had the highest mean score (3.506), indicating that employees have a positive attitude towards collaboration and helping each other complete tasks. According to Wang and Noe (2010), document sharing is the most tangible and easily implemented form of knowledge sharing, often serving as a starting point for building a knowledge-sharing culture. In contrast, several other indicators, such as Z1.1.1 and Z1.5.2, had relatively similar mean scores (3.475), indicating consistency in knowledge-sharing practices across various aspects.

The standard deviation values, ranging from 0.844 to 0.901, indicate relatively low variation in employee perceptions of knowledge sharing. This indicates that a culture of knowledge sharing is well-ingrained at PT XX, which is an important prerequisite for encouraging green innovative behavior. Research by Xu and Suntrayuth (2022) shows that knowledge sharing is a key mechanism in transferring best practices related to environmental sustainability from more experienced to more junior employees.

4.3.3 Description of Psychological Safety Variables

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The Psychological Safety variable is measured through ten indicators, including comfort in raising issues, safety in taking risks, ease of seeking help, trust among colleagues, and team support and appreciation. The mean score for this variable ranged from 3.469 to 3.538, indicating that PT XX employees feel psychologically safe enough to engage in environmentally friendly innovation activities.

Indicator Z2.2.2, which measures the belief that leaders value new ideas even if they are not necessarily successful, had the highest mean score (3.538), indicating that employees feel supported in taking risks in innovation. This finding is very important because, according to Edmondson (1999), the perception that mistakes will not be punished is the foundation of psychological safety that allows employees to experiment with new ideas. Indicator Z2.4.3, which measures the feeling of safety in working together without suspicion among team members, had the lowest mean score (3.469), although it is still in the positive category.

The standard deviation values, ranging from 0.859 to 0.915, indicate a fairly good consistency in employee perceptions of psychological safety. This indicates that the work environment at PT XX has created an atmosphere that supports openness and collaboration. According to Zhu et al. (2022), psychological safety has a significant positive impact on innovation behavior at both the individual and team levels, thus providing a positive initial indication of the potential for green innovative behavior in the company.

4.3.4 Description of Green IT Empowerment Variables

The Green IT Empowerment variable is measured through ten indicators covering green IT policy, monitoring practices, sourcing practices, energy efficiency practices, and technical infrastructure. The mean value for this variable ranges from 3.475 to 3.525, indicating that PT XX employees perceive information technology empowerment that supports environmentally friendly practices.

Indicator M1.4.1, which measures knowledge regarding the role of green IT in energy efficiency and e-waste reduction, has the highest mean score (3.525), indicating that employees understand the contribution of green information technology to environmental sustainability. This finding aligns with research by Setyaningrum et al. (2023) which shows that understanding the benefits of green IT is an important predictor of the adoption of sustainable practices. Indicator M1.1.4, which measures support for the implementation of environmentally friendly policies in daily work activities, has a relatively high mean score (3.475), indicating employees' willingness to integrate green practices into their work routines.

The standard deviation values ranging from 0.844 to 0.942 indicate quite high variations in several indicators, especially in M1.1.4 which has the highest standard deviation (0.942). This indicates that although employees generally support green IT empowerment, there are still differences in the level of adoption and implementation at the individual level. According to Molla (2009), the adoption of green IT depends not only on the availability of technology but also on the readiness of organizations and individuals to change their work behavior in accordance with sustainability principles.

4.3.5 Description of Green Employee Innovative Behavior Variables

The Green Employee Innovative Behavior variable is measured through six indicators, including idea generation, idea promotion, and idea realization within the context of environmentally friendly innovation. The mean score for this variable ranges from 3.438 to 3.481, slightly lower than the other variables but still within the positive category.

Indicator Y1.2.2, which measures efforts to seek support from superiors or teams to implement new ideas, had the highest mean score (3.481), indicating that employees are active in promoting their innovative ideas. According to Janssen (2000), idea promotion is a critical

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stage in the innovation process because it requires persuasion and networking skills to gain support from stakeholders. Indicator Y1.2.1, which measures efforts to convince colleagues to support new ideas, had the lowest mean score (3.438), indicating that employees may face challenges in building consensus for their innovative ideas.

The standard deviation value, which ranged from 0.782 to 0.819, was the lowest among all variables, indicating very high consistency in employee perceptions of green innovative behavior. This indicates that environmentally friendly innovation behavior has become an integral part of the work culture at PT XX. Research by Hossain et al. (2024) shows that consistency in innovative behavior is an important indicator of the long-term sustainability of innovation programs.

H1: Green Ambidextrous Leadership → Knowledge Sharing

Green Ambidextrous Leadership has a positive and significant effect on Knowledge Sharing ($\beta = 0.853$; $p < 0.05$). This means that the higher the implementation of Green Ambidextrous Leadership, the higher the employee's knowledge sharing activity.

H2: Green Ambidextrous Leadership → Psychological Safety

Green Ambidextrous Leadership has a positive and significant effect on Psychological Safety ($\beta = 0.874$; $p < 0.05$). This indicates that leadership that balances exploration and exploitation can create a sense of psychological safety for employees.

H3: Green Ambidextrous Leadership → Green Employee Innovative Behavior

Green Ambidextrous Leadership has a positive and significant effect on Green Employee Innovative Behavior ($\beta = 0.177$; $p < 0.05$). Although its direct effect is relatively small, this leadership still plays a role in encouraging environmentally friendly innovative behavior.

H4: Knowledge Sharing → Green Employee Innovative Behavior

Knowledge sharing has a positive and significant effect on green employee innovative behavior ($\beta = 0.183$; $p < 0.05$). The more intense employee knowledge sharing, the higher the resulting green innovative behavior.

H5: Psychological Safety → Green Employee Innovative Behavior

Psychological safety has a positive and significant effect on green employee innovative behavior ($\beta = 0.322$; $p < 0.05$). These results indicate that psychological safety is an important factor in encouraging environmentally friendly innovation.

The research results show that **psychological safety** needs to be prioritized as a primary strategy to encourage **green employee innovative behavior** . PT XX needs to shift its organizational culture from *a culture of blame* to *a culture of learning* by strengthening *the speak-up mechanism* , training supportive leaders, evaluating learning-based innovations, and appreciating *intelligent failures* .

Testing the Indirect Effect Hypothesis (Mediation)

Testing was conducted using **bootstrapping with 5,000 resamplings** . The results showed that all mediation hypotheses **were accepted** .

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- **H6:** Green Ambidextrous Leadership → Knowledge Sharing → Green Employee Innovative Behavior
  ($\beta = 0.156$; $p < 0.05$)

- **H7:** Green Ambidextrous Leadership → Psychological Safety → Green Employee Innovative Behavior
  ($\beta = 0.282$; $p < 0.05$)

Conclusion: Knowledge Sharing and Psychological Safety mediate the influence of Green Ambidextrous Leadership on Green Employee Innovative Behavior, with **Psychological Safety as the strongest mediator** .

Testing the Moderation Effect Hypothesis

The test results show that **Green IT Empowerment** acts as a significant moderator and **strengthens all tested relationships** .

- **H8:** Green IT Empowerment × Knowledge Sharing → Green Employee Innovative Behavior
  ($\beta = 0.184$; $p < 0.05$)

- **H9:** Green IT Empowerment × Psychological Safety → Green Employee Innovative Behavior
  ($\beta = 0.163$; $p < 0.05$)

- **H10:** Green IT Empowerment × Green Ambidextrous Leadership → Green Employee Innovative Behavior
  ($\beta = 0.210$; $p < 0.05$)

Green Employee Innovative Behavior is most effectively enhanced through psychological safety, reinforced by knowledge sharing and green IT support. Green leadership will have maximum impact when supported by a psychologically safe environment and the use of environmentally friendly technology.

CONCLUSION

This study successfully demonstrated that green ambidextrous leadership is a key factor in encouraging green employee innovative behavior at PT XX, with influence largely operating through psychological safety and knowledge sharing mechanisms. Psychological safety proved to be a stronger mediator than knowledge sharing, indicating the importance of creating a psychologically safe environment for employees to innovate within the context of environmental sustainability.

Green IT empowerment significantly moderates the relationship between green ambidextrous leadership, knowledge sharing, and psychological safety with green employee innovative behavior, indicating that green information technology functions as a strategic enabler that strengthens the impact of organizational factors on green innovation. This comprehensive research model is able to explain 85.6 percent of the variance in green employee innovative behavior, confirming the relevance of an integrative approach that combines the perspectives of leadership, knowledge management, psychological safety, and technology empowerment in understanding the phenomenon of green innovation in the petrochemical industry.

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