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How Green Learning Orientation Cultivates Green Innovative Work Behavior: The Mediating Role of Environmental Commitment and the Moderating Effect of Proactive Personality

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ABSTRACT

Balancing economic growth and environmental sustainability is a critical challenge for emerging economies such as Indonesia, particularly in the manufacturing industry, which contributes substantially to both GDP and carbon emissions. While many firms have adopted sustainability policies, their effectiveness depends largely on employees' behavior. Drawing on Social Cognitive Theory (SCT), the Stimulus-Organism-Response (SOR) framework, and a person-environment (P-E) fit perspective, this study examines the roles of Green Learning Orientation (GLO), Environmental Commitment (EC), and Proactive Personality (PP) in shaping Green Innovative Work Behavior (GIWB). Survey data were collected using purposive sampling, yielding 201 valid responses. The results show that GLO positively influences EC and GIWB. EC partially mediates the relationship between GLO and GIWB. Moreover, PP strengthens both the direct effect of GLO on EC and the indirect effect of GLO on GIWB through EC. These findings highlight the importance of aligning company learning environments with proactive individual characteristics to promote EC and GIWB.

1. INTRODUCTION

The issue of national economic growth, which must be in harmony with environmental sustainability, is an unavoidable challenge today. Growing concern about environmental problems among customers, pressure from investors, and international agreements have forced many companies to implement Environmental and Social Governance (ESG) principles [1]. This issue is particularly significant for countries like Indonesia, one of the world's largest carbon emitters, which continues to face challenges in achieving sustainability [2, 3]. In particular, the manufacturing sector is a double-edged sword: it contributes 18% to Indonesia's GDP, yet is also responsible for 28% of the nation's emissions [4].

Although many manufacturing companies currently have sustainability policies, such as reducing energy consumption, reducing deforestation, and creating new innovations that support solutions to environmental problems, it still requires key driving forces within the company, namely employees, to realize sustainability [5, 6]. Because of that, Green Innovative Work Behavior (GIWB), or environmentally oriented innovative work behavior, is important for improving sustainability performance and waste reduction [7, 8]. This behavior includes environmentally friendly actions in daily work and creating more green products or services [6].

Previous research has provided new insights into the factors influencing GIWB, but Ma and Wang [9] noted that current GIWB research focuses too much on the results of relationships between variables, thus adopting a one-sided perspective. However, individual and situational/organizational factors are inseparable from each other in influencing GIWB [9]. As Dibattista et al. [10] noted, a key challenge in understanding pro-environmental behavior is the diversity of contexts in which it occurs, especially the interaction between workplace environments and personal factors, where distinct sets of norms may exert varying influences. Therefore, this study seeks to understand the factors that stimulate GIWB from two perspectives: the contextual influence that is organizational environment and personal factors.

In an organizational environment, shared values are a crucial element in employee behavior [11]. If the values embedded in an organizational culture support learning and knowledge sharing, employee innovation behavior also increases [12]. Therefore, this study uses Green Learning Orientation (GLO) as a shared value that guides companies in acquiring environmentally oriented knowledge (green knowledge) [13]. While the role of GLO in promoting green innovation has been established, the relationship between organizational GLO and employees' GIWB in the manufacturing sector remains underexplored. For example, prior research found that employee-level GLO, rather than organizational-level GLO, directly influences green service innovative behavior [14]. In the manufacturing context, Wang et al. [13] examined GLO primarily in relation to green innovation behavior at the organizational level, leaving its

influence on individual employees' GIWB insufficiently understood.

On the other hand, Environmental Commitment (EC) also represents an important individual factor, reflecting employees' identification with and dedication to sustainable values within their organization. As an affective state, EC is seen as more lasting and steadier than other emotions related to the environment, like environmental passion or empathy [15, 16]. Prior studies have shown that EC offers stronger predictive power for environmental work outcomes [16, 17]. This relevance also extends to GIWB, where EC has been identified as a mediating mechanism. Recent findings indicate that EC mediates the influence of green human resource management, corporate environmental ethics, and green work climate on GIWB [10, 18, 19]. However, its potential mediating role in the link between GLO and GIWB remains unexplored.

This study also employs Proactive Personality (PP) as a moderator, given its recognized importance for both individual and organizational success [20]. PP describes an individual's disposition to identify opportunities, take initiative, act decisively, persist in overcoming obstacles, and drive meaningful change [21]. While PP has been examined extensively in relation to innovative work behavior (IWB), its relevance to environmentally oriented employee behaviors has received limited attention [22]. Recent studies have introduced PP as a moderator to strengthen the link between sustainable-oriented leadership and environmental awareness [23]. However, its mediating moderating effect on GIWB is still not explained, especially in between mechanism of Stimulus-Organism-Response (SOR). Rongbin et al. [6] suggest that individual differences, specifically PP, may be potential moderator of contextual factors on GIWB.

To address this mechanism, as also highlighted by Ma and Wang [9], GIWB research should analyze the interaction between individual and situational factors. Therefore, we apply Social Cognitive Theory (SCT) to explain the mutual influence of environmental, personal, and behavioral factors, and the SOR framework to clarify the process mechanisms. To capture the role of proactive individual differences, Person-Environment (P-E) fit theory is adopted as an additional theoretical lens. Ultimately, this research aims to offer in-depth theoretical insights into how situational and individual factors shape environmentally friendly innovative work behavior.

2. LITERATURE REVIEW

2.1 Theoretical underpinnings

This research model is grounded in SCT developed by Bandura [24], which explains human behavior through triadic reciprocal determinism, emphasizing the dynamic interaction among environmental, personal, and behavioral factors. Within the proposed framework, GLO functions as an environmental factor that provides learning cues, norms, and support related to environmental sustainability, thereby shaping employees' cognitive states and motivational orientations. To further clarify the internal process mechanism, this study also adopts the SOR framework [25]. From a SOR perspective, GLO serves as a stimulus that activates internal psychological states, conceptualized in this study as EC. EC represents the organism component, reflecting employees' psychological attachment to and sense of responsibility toward environmental sustainability [26], which subsequently drives the response in the form of GIWB. In line with both SCT and SOR, environmental inputs are expected to influence personal cognition, which then translates into behavioral outcomes.

Furthermore, to account for individual differences in how employees interpret and respond to these environmental cues, this study draws on P-E fit theory as an additional theoretical lens. P-E fit theory posits that attitudes and behaviors are shaped by the degree of congruence between individual characteristics and environmental attributes, with higher fit leading to stronger psychological attachment and more positive behavioral outcomes [27]. In this context, employees with a high PP are more likely to actively seek, interpret, and internalize green learning cues, thereby experiencing a stronger sense of fit between their personal values and the organizational environment. As a result, PP is expected to strengthen the effect of GLO on EC and amplify the indirect effect of GLO on GIWB through EC.

2.2 Green Learning Orientation and Environmental Commitment

GLO reflects an organization ongoing emphasis on acquiring, sharing, and applying knowledge related to environmental sustainability [28]. From the perspective of SCT, continuous environmental learning serves as a key environmental stimulus that shapes individuals' cognitive beliefs, values, and self-regulatory mechanisms toward pro-environmental action. As employees are repeatedly exposed to sustainability-related knowledge and practices, pro-environmental norms become internalized, strengthening personal responsibility for ecological well-being. This learning process fosters EC, whereby individuals not only feel psychologically connected to environmental goals but also perceive a moral obligation to support and maintain sustainable practices in the workplace [29].

Previous research agreed that organizations with a stronger learning climate, such as collective learning, systems thinking, an open culture, and informal knowledge sharing, can enhance individual green self-efficacy [30]. Ahmad et al. [31] also found that knowledge is a crucial strategic resource that maximizes employee EC and drives innovative performance. Furthermore, the measurement of GLO highlights the central role of leadership [28], where later studies found sustainable leadership has a significant positive influence on EC.

H_1: GLO positively influences EC.

2.3 Green Learning Orientation and Green Innovative Work Behavior

GLO refers to an organization commitment to learning environmental knowledge for sustainable development. Firms with a strong GLO encourage employees to acquire, share, create, and exploit green knowledge related to production and operations. This orientation helps build the firm's green knowledge base and promotes employee participation in green innovation activities. As a result, organizations are more likely to develop greener products, cleaner production methods, and practices that reduce waste and pollution [13]. Consistent with Organizational Learning Theory [32], continuous learning strengthens problem-solving capacity and fosters innovation. From SCT perspective, such an organization's learning-

oriented factor functions as a key environmental factor that shapes employees' behavior outcome. This notion has also been empirically demonstrated in previous research, showing that a learning-oriented culture positively impacts green and environmentally friendly innovation capabilities, thereby improving company performance [28, 33]. Similarly, previous research supports that GLO impacts green innovation behavior [13] and green service innovative behavior [14].

H_2: GLO positively influences GIWB.

2.4 The mediating role of Environmental Commitment

Individuals who are strongly committed to environmental values are more confident in their ability to address environmental challenges and are more likely to believe that their innovative ideas will meaningfully contribute to organizational sustainability. This psychological state encourages GIWB, which involves generating, promoting, and implementing new ideas that improve environmental performance [34]. EC provides intrinsic motivation that fosters creativity and persistence in developing environmentally friendly solutions. Research shows that employees who care strongly about the environment are more likely to take proactive and innovative environmental behavior [19, 35].

As a mediating factor, commitment serves as an internal personal factor that motivates GIWB. Drawing on the SOR framework [25], GLO acts as an environmental stimulus that shapes employees' internal psychological states (organism), particularly EC, which in turn drives behavioral outcomes (response) in the form of GIWB. A strong GLO provides sustainability-related knowledge and signals organizational priorities, fostering employees' commitment to environmental goals. Consistent with SCT [24], this learning environment strengthens environmental beliefs and motivation, encouraging employees to translate commitment into proactive behavior.

Empirical studies show that a culture that fosters knowledge sharing positively influences EC, thus impacting a company's sustainable performance [31]. At other organizational levels, EC serves as a mediator between green organizational identity and innovative performance [36]. Lastly, green commitment has also been found to mediate the relationship between green human resource management (Green HRM) and GIWB, suggesting that a company's sustainability drive is important for fostering EC and thus generating GIWB [37].

H_3: EC positively influences GIWB.

H_4: EC mediates the relationship between GLO and GIWB.

2.5 The moderating role of Proactive Personality

While explaining the internal psychological mechanisms underlying GIWB is important, Chen and Zhang [23] argue that the strength of these psychological states may differ across employees. Accordingly, PP is considered a critical individual factor from the perspective of P-E fit theory, which emphasizes the alignment between individual characteristics and environmental cues [27]. PP characterizes individuals who demonstrate initiative, adaptability, opportunism, perseverance, and resilience in the face of situational challenges [21]. Individuals with a PP tend to take initiative, seek opportunities, and actively shape their work environment [38], making them more receptive to green learning signals. When proactive employees perceive a supportive green environment, they are more likely to internalize environmental values and the meaningfulness of the firm's environmental goals [39]. This explains the contextual notion of GLO towards EC is more effective with proactive employees.

Extending this logic, PP also conditions the indirect effect of GLO on GIWB through EC. From a P–E Fit perspective, proactive individuals are better able to translate internalized EC into innovative green actions, as they actively seek ways to implement learned sustainability principles. Thus, the mediating role of EC becomes stronger when employees possess a high PP, resulting in a conditional indirect effect. Prior empirical studies support this argument where PP strengthens the impact of supportive contextual factors such as sustainable leadership on environmental awareness, which then turn into eco-friendly innovative behavior [40].

H_5: PP positively moderates the relationship between GLO and EC, such that the relationship is stronger at higher levels of PP.

H_6: PP positively moderates the indirect effect of GLO on GIWB through EC, such that the mediated relationship is stronger when PP is high.

3. RESEARCH METHODOLOGY

3.1 Sample and data collection

This research is conducted in Indonesia because of its serious challenges towards environmental performance. Indonesia ranks 43rd in the 2025 Climate Change Performance Index (CCPI) and remains the world's sixth-largest CO_2 emitter, releasing approximately 692 million tons in 2022 [2, 3]. To enhance the relevance to GIWB, this study focuses specifically on the manufacturing sector. Globally, manufacturing is the third-largest source of per-capita greenhouse gas emissions [41] and has recorded a 60% increase in total emissions over time [42]. In Indonesia, manufacturing is a dominant contributor to national carbon output, accounting for roughly 28% of total emissions [4].

Furthermore, this study employed a non-probability purposive sampling technique to ensure that the selected respondents were associated with innovative work behavior, given that the population of employees meeting this characteristic was unknown [43, 44]. This approach is widely used in behavioral science and has been shown to produce valid data [45, 46] and has been used in other GIWB studies [19, 34, 47]. Therefore, the targeted respondents were employees involved in planning, production, and quality control, as manufacturing innovation primarily emphasizes process improvements to enhance efficiency and reduce costs [36, 48].

Online sampling using Google Forms was conducted from September to December 2025. Data were collected from employees of a single manufacturing company in Indonesia, following formal approval from the company's HR Manager. Prior to the main survey, a pilot study with 30 respondents was conducted to assess the clarity and relevance of the measurement items. Once the instrument was validated, it was distributed to employees for the main survey. By the end of the data collection period, a total of 201 valid responses were retained after excluding incomplete and irrelevant entries.

To ensure that this sample size is sufficient for hypothesis testing, this study follows the guidelines of Memon et al. [49] regarding minimum sample size requirements for survey-

based research using G*Power. Among the variables examined, EC was treated as the most complex predictor, involving three terms (independent variable, moderator, and interaction). Applying the recommended parameters (three predictors, power = 0.80, $\alpha = 0.05$, $f^2 = 0.15$), the minimum required sample size was 77 respondents. Therefore, the final sample of 201 respondents exceeds the required threshold and is considered adequate for the analysis.

3.2 Measurements

To measure all the variables, GLO was measured using the scale developed by Fong and Chang [28], consisting of 4 items. For example, "Top managers encourage employees to share and create green knowledge." Second, EC was assessed using the scale developed by Raineri and Paillé [26] and further supported by Chen and Zhang [23], consisting of 7 items. For example, "I feel a sense of duty to support the environmental efforts of my company." Third, PP was measured using the 10-item scale developed by Seibert et al. [50]. For example, "I am always looking for better ways to do things." Lastly, GIWB was assessed using 4 items from Zhang et al. [51] and also used by Rongbin et al. [6] and Ma and Wang [9]. For example, "I conserve resources (e.g., water, electricity) in business activities." All measurement items were then translated using a two-way translation procedure to ensure contextual accuracy.

3.3 Data analysis

Following prior studies on GIWB, this study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS. PLS-SEM is well suited for research that seeks to examine relationships among variables and is particularly effective for testing mediation and evaluating multiple constructs within a single model [52]. The analysis proceeded in two stages, following Chin's [53] framework. First, the measurement model was assessed by examining item loadings, composite reliability (CR), and evidence of convergent and discriminant validity. Second, the structural model was evaluated using the coefficient of determination (R^2), effect size (f^2), path coefficients (β), and predictive relevance (Q^2) as recommended by Hair et al. [54]. To determine the significance of the hypothesized relationships, a bootstrapping procedure with 5,000 resamples was performed. Hypotheses were tested using one-tailed significance tests, as all proposed relationships were directional (i.e., positive effects) and grounded in prior theoretical and empirical literature. Therefore, the reported p-values reflect one-tailed statistical testing.

4. RESULT

4.1 Measurement model

The results of the confirmatory factor analysis (Table 1) show that nearly all item loadings exceeded the recommended threshold of 0.70 [54]. But there are several items (EC6, PP1, and PP8) which had a loading slightly below 0.70. Following Hair et al. [55], items with loadings between 0.40 and 0.70 may still be retained when the construct demonstrates satisfactory internal consistency and convergent validity. Building on this, we proceeded to evaluate the reliability and validity of each construct. Reliability was assessed using CR and coefficient alpha (α), both of which exceeded the 0.70 threshold [56]. Convergent validity was also supported, as all average variance extracted (AVE) values were above 0.50 [57]. To further assess discriminant validity, we applied the heterotrait–monotrait ratio (HTMT). Table 2 shows that all HTMT values fell below the 0.85 benchmark [58], collectively indicating that discriminant validity was well established.

Table 1. Confirmatory factor analysis results

Variables Items	Factors Loadings	CA	CR	AVE
GLO				
GLO1	0.743			
GLO2	0.849	0.841	0.847	0.679
GLO3	0.843			
GLO4	0.856			
EC				
EC1	0.795			
EC2	0.787			
EC3	0.772			
EC4	0.800	0.888	0.892	0.599
EC5	0.797			
EC6	0.680			
EC7	0.778			
GIWB				
GIWB1	0.828			
GIWB2	0.813	0.842	0.842	0.679
GIWB3	0.833			
GIWB4	0.821			
PP				
PP1	0.658			
PP2	0.732			
PP3	0.762			
PP4	0.722			
PP5	0.816	0.906	0.907	0.543
PP6	0.755			
PP7	0.723			
PP8	0.694			
PP9	0.780			
PP10	0.715			

Note: CA = Cronbach Alpha; AVE = Average Variance Extracted; CR = Composite Reliability (rho_a); GLO = Green Learning Orientation; EC = Environmental Commitment; GIWB = Green Innovative Work Behavior; PP = Proactive Personality.

Table 2. Heterotrait-monotrait ratio

	GLO	EC	GIWB	PP
GLO				
EC	0.680			
GIWB	0.504	0.609		
PP	0.515	0.661	0.807	

Note: GLO = Green Learning Orientation; EC = Environmental Commitment; GIWB = Green Innovative Work Behavior; PP = Proactive Personality.

4.2 Common method variance

To reduce the potential influence of common method variance, we applied both procedural and statistical remedies as recommended by Podsakoff et al. [59]. Procedurally, respondents were assured of confidentiality and anonymity, which helps minimize evaluation apprehension and response bias. Statistically, we conducted a collinearity test using the variance inflation factor (VIF) following Kock's [60] guidelines. The highest VIF value observed was 2.601, well below the 3.3 threshold, indicating that common method variance was not a serious concern.

4.3 Structural model

Before testing the hypotheses, we assessed the structural model using R^2, f^2, and Q^2 as recommended by Hair et al. [54]. The R^2 values show how much variance in each endogenous construct is explained by its predictors. The analysis (Table 3) revealed R^2 values of 0.514 for EC and 0.301 for GIWB. We also checked predictive relevance by calculating Q^2 with PLSpredict. If the value is greater than zero, such as in Table 3, it means the model can make predictions. In PLSpredict, we also compared the Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) values between the PLS-SEM and linear models (LM) and found that most indicators show lower prediction errors in the PLS-SEM analysis. This result suggests that the model demonstrates medium predictive power [61]. Next, we assessed the effect sizes (f^2) and found that they ranged from 0.030 to 0.290, all exceeding the 0.02 threshold for a small effect as suggested by Cohen [62].

Table 3. Results of Q^2, R^2, and f^2

Variables	R^2	Q^2	
EC	0.514	0.474	
GIWB	0.301	0.322	
f^2			
Variables	**GLO**	**EC**	**GIWB**
GLO		0.290	0.030
EC			0.167
PP		0.202	

Note: GLO = Green Learning Orientation; EC = Environmental Commitment; GIWB = Green Innovative Work Behavior; PP = Proactive Personality.

The path analysis (Table 4) demonstrates that GLO is significantly associated with both EC and GIWB. Employees who perceive their organizations as strongly supportive of environmental learning tend to show higher levels of EC ($\beta = 0.423$, $t = 7.028$, $p < 0.001$), and this learning orientation is also linked to greater engagement in green innovative behavior ($\beta = 0.178$, $t = 1.887$, $p = 0.030$). These findings confirm Hypotheses 1 and 2. EC itself emerges as a key factor. The relationship between EC and GIWB is positive and statistically significant ($\beta = 0.424$, $t = 4.995$, $p < 0.001$), offering support for Hypothesis 3. The mediation analysis further clarifies that EC plays a meaningful role in explaining how GLO contributes to GIWB. The indirect effect is significant ($\beta = 0.179$, $p < 0.001$), with the confidence interval ranging from 0.122 to 0.259, which provides empirical support for Hypothesis 4.

Table 4. Direct effect and mediating effect

Relationship	β	t-Values	p-Values	LLCI	ULCI
Direct effect					
GLO → EC	0.423	7.028	0.000	0.341	0.540
GLO→ GIWB	0.178	1.887	0.030	0.017	0.325
EC → GIWB	0.424	4.995	0.000	0.285	0.564
Indirect effect					
GLO → EC → GIWB	0.179	4.296	0.000	0.122	0.259

Note: GLO = Green Learning Orientation; EC = Environmental Commitment; GIWB = Green Innovative Work Behavior; PP = Proactive Personality; LLCI = lower Level Confidence Interval (5%); ULCI= Upper Level Confidence Interval (95%).

Table 5 indicates that PP strengthens the relationship between GLO and EC. The positive and significant interaction ($\beta = 0.140$, $t = 2.352$, $p = 0.009$) suggests that employees with higher proactive tendencies are more likely to translate GLO into stronger EC. In addition, Figure 1 illustrates that the effect of GLO on EC increases from low PP (−1 SD) to high PP (+1 SD), confirming that this relationship is stronger for more proactive employees. This result supports Hypothesis 5.

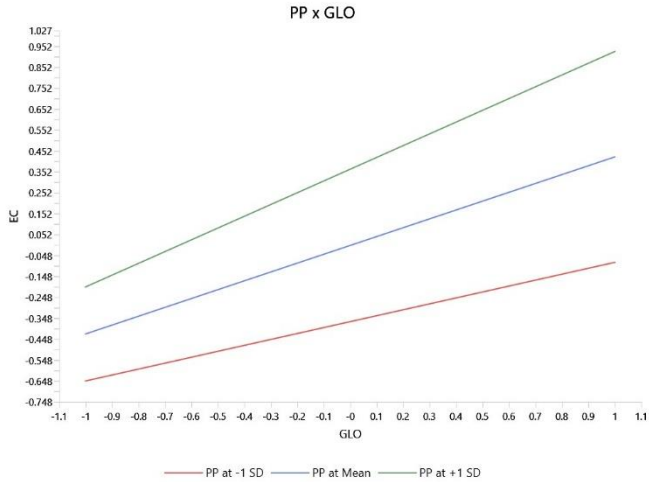

Figure 1. Simple slope analysis of Proactive Personality (PP) on Green Learning Orientation (GLO) and Environmental Commitment (EC)

Table 5. Moderation and moderated mediation effects

Relationship	β	t-Values	p-Values	LLCI	ULCI
PP × GLO → EC	0.140	2.352	0.009	0.043	0.237
PP × GLO → EC → GIWB	0.059	2.098	0.018	0.016	0.107

Note: GLO = Green Learning Orientation; EC = Environmental Commitment; GIWB = Green Innovative Work Behavior; PP = Proactive Personality; LLCI = lower Level Confidence Interval (5%); ULCI= Upper Level Confidence Interval (95%).

PP also makes the indirect effect of GLO on GIWB through EC stronger. Table 5 demonstrates the moderated mediation effect is significant ($\beta = 0.059$, $t = 2.098$, $p = 0.018$), which supports Hypothesis 6. To provide more details, Table 6 shows that when PP is low (- 1 SD), the indirect effect of GLO on GIWB through EC is significant but small ($\beta = 0.120$, $p = 0.003$). This means that even employees who are less proactive can turn environmental learning into green behavior. When PP is high (+1 SD), the indirect effect is much stronger ($\beta = 0.238$, $p < 0.001$), showing that highly proactive employees benefit more from GLO and are more likely to turn their EC into green innovative behavior. Figure 2 shows the structural model results and the corresponding hypothesis testing outcomes for the direct relationships.

Table 6. Conditional indirect effects of Proactive Personality (PP)

Relationship	PP Level	β	t-Values	p-Values
PP × GLO → EC → GIWB	Low (-1SD)	0.120	2.698	0.003
	High (+1SD)	0.238	4.289	0.000

Note: GLO = Green Learning Orientation; EC = Environmental Commitment; GIWB = Green Innovative Work Behavior; PP = Proactive Personality; SD = Standard Deviation.

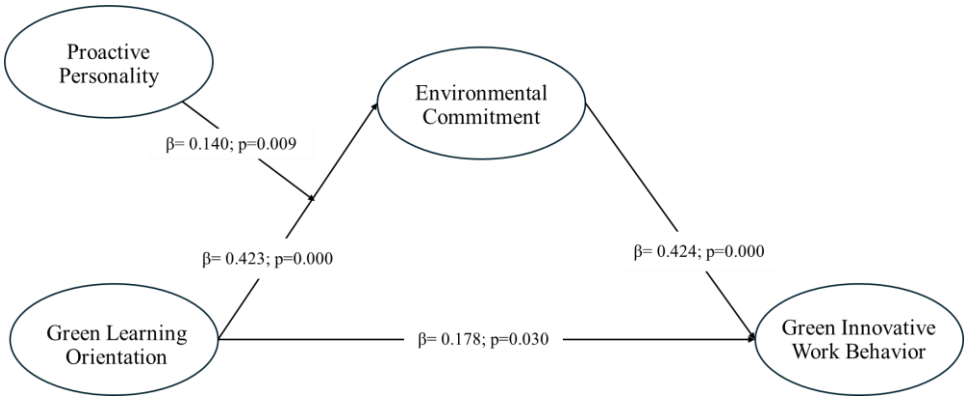

Figure 2. Structural equation model results

5. DISCUSSION

This study indicates that GLO is key in shaping employees' EC and GIWB. GLO positively affects EC, supporting SCT, which states that attitudes and behaviors develop through ongoing interaction between personal thinking and environmental cues [63]. When employees have opportunities to learn about environmental issues, they often take on these values and feel more responsible for environmental goals. In practice, organizations that focus on sustainability-oriented learning help build employees' commitment to protecting the environment. This matches earlier research showing that learning orientation leads to stronger pro-environmental attitudes [30, 31].

Our findings also show that GLO directly influences GIWB. In this context, GLO acts as a signal that shows the organization's focus on sustainability. When employees perceive that environmental learning is valued and supported, they are more likely to engage in behaviors consistent with these expectations, such as participating in GIWB. A learning-rich environment not only increases knowledge but also shapes employee behavior, which explains why a strong learning orientation encourages both innovation and environmental responsibility [13, 28, 33]. This relation can also be explained with Organizational Learning Theory [32], as continuous learning enhances problem-solving and drives innovation.

Moreover, EC then emerges as an important mechanism linking learning to GIWB. Employees who are personally committed to environmental values are more likely to turn that commitment into real action. This aligns with previous research, where employees with strong EC are more active in sustainability efforts and green innovation [19, 35]. In the SOR framework, the mediation model shows that GLO acts as the stimulus, creating a psychological state of EC, which then leads to GIWB as the response. This pathway shows that learning orientation influences behavior not just directly, but also by encouraging deeper psychological engagement based on employees' internal values. This finding aligns with AlNaqbi et al. [37], who show that organizational sustainability initiatives play a crucial role in fostering EC, which in turn promotes GIWB.

The role of PP adds further nuance to these relationships. Individuals high in proactivity typically engage more readily with developmental opportunities and respond strongly to organizational signals emphasizing improvement and change [64]. In sustainability-oriented contexts, this means proactive employees are more likely to take environmental learning seriously and convert it into stronger EC. Prior studies also suggest that proactive employees tend to take greater ownership of environmental issues and are more active in advancing green initiatives [39, 40], which helps clarify why GLO has a greater overall impact for this relation.

Moreover, the conditional indirect effects also add new insight into the role of PP. The full pathway from GLO to EC and then to GIWB is substantially stronger for employees with higher levels of proactivity. This suggests that proactive individuals internalize environmental learning more effectively and translate their commitment into innovative action with greater intensity. From a Person–Environment Fit perspective, proactive employees experience better alignment between their personal tendencies and a work environment that emphasizes learning and sustainability, enabling the entire cognitive and behavioral chain to operate more effectively. When the fit is strong, proactive employees are more likely to absorb environmental cues, strengthen their commitment, and ultimately engage in GIWB.

6. CONCLUSIONS

This study draws on SCT and the SOR framework to provide a structured account of how GLO relates to GIWB. The study contextualizes established theoretical relationships by positioning GLO as an environmental stimulus that shapes employees' internal psychological state that is EC, which in turn is associated with GIWB. In doing so, the study contributes by extending prior research on GLO to the individual level within a single-manufacturing context, offering empirical support for the applicability of these established frameworks in this setting. Additionally, EC is examined as an intervening mechanism consistent with prior theory, helping to clarify how learning-oriented organizational values translate into employee green innovative behavior. Finally, by incorporating PP through a P-E fit perspective, this study extends prior research by identifying a boundary condition in which the strength of these relationships depends on how employees interpret and respond to green learning environments.

Practically, the findings suggest that organizations may benefit from embedding GLO as a core organizational value, rather than treating sustainability training as isolated initiatives. In the context of the participating manufacturing company, continuous environmental learning encourages employees to internalize sustainability goals and translate them into innovative practices. Managers can strengthen EC

by clearly communicating environmental goals, linking daily tasks to sustainability outcomes, and recognizing employee contributions to green initiatives. Additionally, organizations can enhance the effectiveness of green learning initiatives by providing greater autonomy and development opportunities for proactive employees and considering proactivity in recruitment and talent development.

This study is subject to several limitations. First, the use of a quantitative cross-sectional design limits the ability to draw causal conclusions; future research could adopt longitudinal or qualitative approaches to better capture changes in learning and behavior over time. Second, as the data are self-reported, there is a potential risk of common method bias, which future studies may address by collecting data from multiple sources or incorporating objective measures. Third, the data were collected from a single manufacturing company in Indonesia, which may limit the generalizability of the findings. Organizational practices and sustainability orientations may vary across firms and industries. Future research is therefore encouraged to include multiple organizations across different sectors and countries to validate and extend these findings. Finally, future studies could expand the model by incorporating additional organizational factors (e.g., green organizational climate or innovative culture), individual traits such as creativity, and behavioral mechanisms including green knowledge sharing.

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