

## PROMOTING ENVIRONMENTAL CITIZENSHIP FOR REGIONAL SUSTAINABLE DEVELOPMENT

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**Summary.** As environmental sustainability and regional development become increasingly interconnected, understanding the organizational factors that promote environmentally responsible behavior has become an important research priority. This study aims to examine the effects of sustainable production practices and digital environmental transparency on environmental citizenship behavior while investigating the moderating role of corporate environmental responsibility. Using survey data collected from 425 respondents involved in the production and consumption of environmentally sustainable products across Azerbaijan, Structural Equation Modeling was employed to test the proposed relationships. The results indicate that both sustainable production practices and digital environmental transparency have significant positive effects on environmental citizenship behavior. The findings further reveal that corporate environmental responsibility positively moderates the relationship between digital environmental transparency and environmental citizenship behavior, suggesting that transparent environmental communication is more effective when supported by genuine environmental responsibility. The study contributes to the sustainability literature by demonstrating that environmentally responsible production, transparent environmental disclosure, and corporate environmental responsibility jointly promote environmental citizenship behavior and support regional sustainable development. These findings provide practical implications for policymakers and business managers seeking to strengthen environmental governance, encourage stakeholder participation, and foster long-term regional sustainability through more effective corporate sustainability strategies and collaborative environmental initiatives across sectors.

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### Introduction

Environmental sustainability has become a global priority in response to climate change, environmental degradation, and the growing demand for sustainable regional development. Organizations are increasingly adopting sustainable production practices, improving environmental transparency through digital technologies, and strengthening corporate environmental responsibility to support sustainable development objectives. These initiatives are recognized not only as environmental management tools but also as strategic approaches that encourage environmentally responsible behavior among employees and stakeholders (Aguinis & Glavas, 2012; Lyon, & Montgomery, 2015; Zeynalova, 2019; Yusubov, 2024).

Environmental citizenship behavior (ECB) refers to voluntary environmental actions that contribute to environmental protection beyond formal organizational responsibilities (Boiral & Paillé, 2012). In this context, sustainable production practices and digital environmental transparency can promote ECB by increasing environmental awareness, stakeholder trust, and participation in sustainability initiatives. This issue is particularly important for regions pursuing sustainable development through responsible production systems, transparent environmental governance, and stronger collaboration between organizations and society (Paillé et al., 2013; Schnackenberg & Tomlinson, 2016).

Despite the growing body of research on environmental management and corporate sustainability, important research gaps remain. Existing studies have primarily examined sustainable production, environmental disclosure, and corporate social responsibility independently (Rosati & Faria, 2019; Rupp et al., 2016), while

limited attention has been given to environmental citizenship behavior and the moderating role of corporate environmental responsibility in the relationship between digital environmental transparency and environmental citizenship behavior.

Therefore, this study aims to examine the effects of sustainable production practices and digital environmental transparency on environmental citizenship behavior and investigate the moderating role of corporate environmental responsibility. The proposed framework contributes to explaining how responsible production, transparent environmental communication, and corporate environmental responsibility jointly promote environmental citizenship and support regional sustainable development.

## **2. Literature review and hypotheses development**

### **2.1. Sustainable production practices and environmental citizenship behavior**

Sustainable production practices (SPP) have become a fundamental component of corporate sustainability strategies, enabling organizations to reduce environmental impacts through efficient resource utilization, waste minimization, pollution prevention, and environmentally responsible production processes. Beyond improving environmental performance, these practices contribute to developing an organizational culture that encourages employees and stakeholders to engage in voluntary environmental activities (Fianko et al., 2021). As regions increasingly pursue sustainable development, environmentally responsible production systems are expected to promote environmental awareness and environmentally responsible behavior.

Environmental citizenship behavior (ECB) refers to voluntary actions that individuals undertake to support environmental protection beyond their formal job responsibilities (Zheng, 2025). Such behaviors include resource conservation, recycling, participation in environmental initiatives, and encouraging sustainable practices within organizations. Previous studies suggest that organizations implementing environmental management and sustainable production practices create favorable conditions for strengthening employees' environmental commitment and citizenship behavior (Daily et al., 2009). Similarly, Bissing-Olson et al. (2013) demonstrate that positive workplace conditions and pro-environmental attitudes significantly encourage employees' environmental behavior.

Although previous research has extensively examined the relationship between environmental management practices and organizational environmental performance, relatively limited attention has been given to the direct contribution of sustainable production practices to environmental citizenship behavior within the context of regional sustainable development. Sustainable production not only improves operational sustainability but also encourages environmentally responsible behavior that contributes to broader regional sustainability goals.

Accordingly, the following hypothesis is proposed:

**H1. Sustainable production practices have a positive effect on environmental citizenship behavior.**

### **2.2. Digital environmental transparency and environmental citizenship behavior**

Digital environmental transparency (DET) has become an essential component of corporate sustainability by enabling organizations to disclose environmental information through digital platforms, sustainability reports, and online communication channels. Greater transparency improves stakeholders' access to environmental information, enhances organizational accountability, and strengthens trust in corporate environmental initiatives (Schnackenberg & Tomlinson, 2016). As digital technologies continue to reshape sustainability communication, transparent environmental disclosure has become an important mechanism for promoting environmentally responsible behavior.

Environmental citizenship behavior (ECB) can be encouraged when employees and stakeholders perceive organizations as open and accountable regarding their environmental performance. Transparent environmental disclosure increases environmental awareness, reduces information asymmetry, and motivates individuals to participate in environmental protection activities (Hahn & Kühnen, 2013). Conversely, misleading or incomplete environmental information may reduce stakeholder confidence and weaken environmental engagement (Delmas & Burbano, 2011). Recent studies also indicate that digital transformation enhances environmental communication and stakeholder participation, thereby supporting corporate sustainability objectives (Li & Zhao, 2024; Huynh & Nguyen, 2025).

Although previous studies have investigated sustainability reporting and environmental disclosure, limited attention has been given to the direct influence of digital environmental transparency on environmental citizenship behavior. Improving digital transparency may strengthen environmentally responsible behavior by increasing trust, stakeholder engagement, and participation in organizational sustainability initiatives.

Accordingly, the following hypothesis is proposed:

**H2. Digital environmental transparency has a positive effect on environmental citizenship behavior.**

### 2.3. The moderating role of corporate environmental responsibility

Corporate environmental responsibility (CER) reflects an organization's commitment to integrating environmental protection into its business strategy, operational activities, and stakeholder relationships. Organizations with strong environmental responsibility not only implement sustainable environmental practices but also communicate their environmental commitments more credibly, thereby strengthening stakeholder trust and engagement (Aguinis & Glavas, 2012). Consequently, CER is considered an important organizational capability that enhances the effectiveness of sustainability initiatives.

Digital environmental transparency provides stakeholders with accessible and reliable environmental information, encouraging environmentally responsible attitudes and behaviors. However, the effectiveness of transparent environmental disclosure depends on whether stakeholders perceive the organization's environmental commitment as genuine. Previous studies indicate that corporate environmental responsibility increases the credibility of sustainability communication and positively influences employees' and stakeholders' responses to environmental initiatives (Du et al., 2010; Glavas & Kelley, 2014). Similarly, Farooq et al. (2014) argue that responsible corporate practices strengthen organizational commitment through greater stakeholder trust, while Koh et al. (2023) demonstrate that high-quality CSR disclosure enhances stakeholder engagement.

Despite growing research on environmental disclosure and corporate responsibility, limited studies have examined the moderating role of corporate environmental responsibility in the relationship between digital environmental transparency and environmental citizenship behavior. Organizations with stronger environmental responsibility are more likely to convert transparent environmental communication into greater environmental participation and voluntary environmental behavior.

Accordingly, the following hypothesis is proposed:

**H3. Corporate environmental responsibility positively moderates the relationship between digital environmental transparency and environmental citizenship behavior.**

### 3. Materials and methods

Data were collected through a structured questionnaire based on validated measurement scales for sustainable production practices (SPP), digital environmental transparency (DET), corporate environmental responsibility (CER), and environmental citizenship behavior (ECB). Sustainable production practices refer to firms' implementation of environmentally responsible production processes, digital environmental transparency reflects the extent to which firms openly disclose environmental information through digital platforms, corporate environmental responsibility represents firms' commitment to integrating environmental responsibility into their business activities, and environmental citizenship behavior captures individuals' voluntary actions that contribute to environmental sustainability. The survey was conducted in Azerbaijan between June and October 2025 using a purposive sampling approach targeting individuals involved in the production and consumption of environmentally sustainable products.

All items were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). After data screening, 425 valid questionnaires were retained for analysis. As shown in Table 1, respondents aged 26–35 years constituted the largest age group (35.3%), followed by those aged 36–45 years (30.1%). Male respondents accounted for 56.0% of the sample, while females represented 44.0%. Among the occupational groups, organic food producers formed the largest category (25.6%). Regarding purchasing behavior, 50.8% of respondents reported that they frequently purchase eco-friendly products.

The data were analyzed using SPSS 26 and AMOS 26. Reliability was assessed using Cronbach's alpha ( $\alpha$ ) and composite reliability, while confirmatory factor analysis was employed to examine convergent and discriminant validity using standardized factor loadings, average variance extracted, the Fornell–Larcker criterion, and the heterotrait–monotrait ratio. The overall model fit was evaluated using  $\chi^2/df$ , CFI, TLI, RMSEA, and SRMR. Finally, structural equation modeling was performed to test the proposed hypotheses, and statistical significance was determined at  $p < 0.05$ .

### 4. Results

The results of the structural model examining the relationships among sustainable production practices (SPP), digital environmental transparency (DET), corporate environmental responsibility (CER), and environmental citizenship behavior (ECB) are presented in Figure 1. The structural model presents the estimated standardized path coefficients for the proposed direct relationships together with the moderating effect of corporate environmental responsibility.

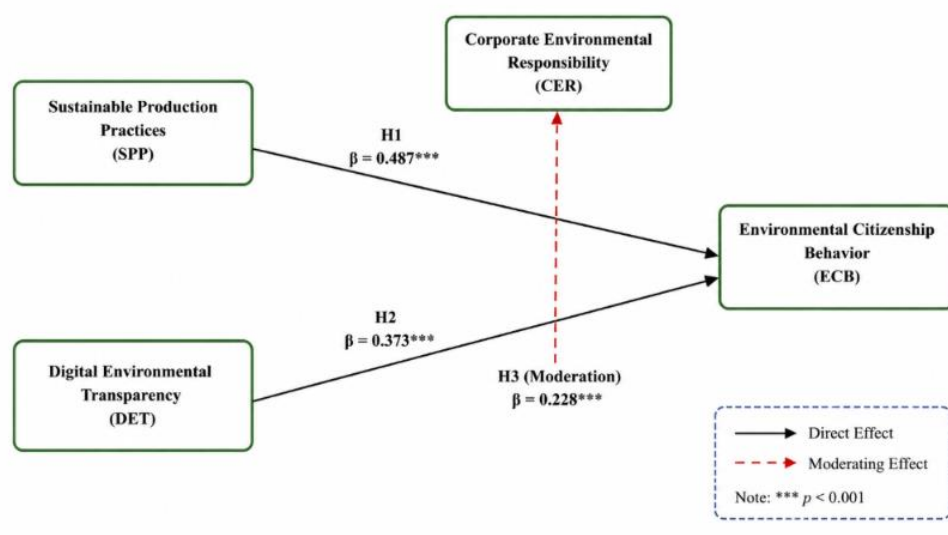


**Fig. 1.** Structural model results

The detailed results of the structural relationships are presented in Table 1. The findings indicate that all estimated structural paths are positive and statistically significant.

**Table 1**

Results of the structural relationships

| Path Relationship | Path Coefficient ( $\beta$ ) | S.E.  | C.R.  | Hypothesis Result |
|-------------------|------------------------------|-------|-------|-------------------|
| SPP → ECB         | 0.487                        | 0.075 | 6.493 | H1 Supported      |
| DET → ECB         | 0.373                        | 0.066 | 5.652 | H2 Supported      |
| DET × CER → ECB   | 0.250                        | 0.058 | 4.310 | H3 Supported      |

The results indicate that sustainable production practices have a significant positive effect on environmental citizenship behavior ( $\beta = 0.487$ ,  $p < 0.001$ ), supporting H1. This finding suggests that environmentally sustainable production systems encourage employees and stakeholders to engage in voluntary environmental activities beyond their formal responsibilities.

Digital environmental transparency also has a significant positive effect on environmental citizenship behavior ( $\beta = 0.373$ ,  $p < 0.001$ ), supporting H2. This result indicates that transparent digital disclosure of environmental information strengthens environmental awareness, stakeholder trust, and participation in sustainability initiatives.

The explanatory power of the structural model was evaluated using the coefficient of determination. Sustainable production practices, digital environmental transparency, and the interaction between digital environmental transparency and corporate environmental responsibility jointly explain 55% of the variance in environmental citizenship behavior ( $R^2 = 0.55$ ), indicating satisfactory explanatory power.

To further assess the moderating role of corporate environmental responsibility, a moderation analysis was conducted. The results are presented in Table 2.

**Table 2**

Moderation analysis results

| Effect Type        | Path            | Standardized Effect ( $\beta$ ) | S.E.  | 95% Bootstrap CI |
|--------------------|-----------------|---------------------------------|-------|------------------|
| Interaction effect | DET × CER → ECB | 0.228                           | 0.063 | [0.101, 0.329]   |

The moderation analysis confirms that corporate environmental responsibility significantly moderates the relationship between digital environmental transparency and environmental citizenship behavior. The interaction effect is positive and statistically significant ( $\beta = 0.228$ ,  $p < 0.001$ ), while the 95% bootstrap confidence interval [0.101, 0.329] does not include zero. This finding indicates that the positive effect of

digital environmental transparency on environmental citizenship behavior becomes stronger when corporate environmental responsibility is higher. Therefore, H3 is supported.

## **5. Discussion**

### **5.1. Advancing environmental citizenship through sustainable production practices**

The findings demonstrate that sustainable production practices have a significant positive effect on environmental citizenship behavior (H1), indicating that environmentally responsible production systems play an important role in encouraging voluntary environmental actions among employees and stakeholders. This suggests that sustainability-oriented production extends beyond improving operational efficiency and contributes to the development of an organizational culture that values environmental responsibility.

From a theoretical perspective, the results support the view that sustainable production practices create an environment in which individuals become more willing to engage in environmentally responsible behavior beyond their formal responsibilities. By integrating resource efficiency, waste reduction, and environmentally friendly production processes into daily operations, organizations foster stronger environmental awareness and commitment. Consequently, environmental citizenship behavior becomes a natural outcome of organizational sustainability efforts rather than merely an individual initiative.

These findings are consistent with previous studies emphasizing the importance of environmental management practices in promoting pro-environmental behavior. However, the present study extends the existing literature by demonstrating that sustainable production practices also contribute to broader regional sustainable development through their influence on environmental citizenship behavior. Therefore, organizations investing in sustainable production are likely to generate not only environmental and operational benefits but also stronger stakeholder engagement in sustainability initiatives.

### **5.2. The influence of digital environmental transparency on environmental citizenship behavior**

The findings reveal that digital environmental transparency has a significant positive effect on environmental citizenship behavior (H2). This indicates that transparent disclosure of environmental information through digital platforms enhances stakeholders' environmental awareness and encourages greater participation in environmental protection activities.

From a theoretical perspective, digital environmental transparency functions as a mechanism that strengthens organizational legitimacy and stakeholder trust. When organizations openly communicate their environmental performance, sustainability initiatives, and environmental objectives, employees and external stakeholders perceive these commitments as more credible and become more willing to support environmental initiatives. In this sense, digital transparency reduces information asymmetry while creating stronger relationships between organizations and their stakeholders.

The findings are consistent with previous research highlighting the importance of transparency and sustainability reporting in promoting stakeholder engagement. Nevertheless, this study contributes to the literature by demonstrating that digital environmental transparency influences not only organizational reputation but also environmentally responsible behavior. Consequently, digital disclosure should be viewed as a strategic sustainability tool capable of fostering environmental citizenship and supporting regional sustainable development.

### **5.3. The boundary role of corporate environmental responsibility in environmental citizenship behavior**

The moderation analysis confirms that corporate environmental responsibility strengthens the positive relationship between digital environmental transparency and environmental citizenship behavior (H3). This finding suggests that transparent environmental communication alone may not be sufficient to maximize environmental citizenship unless it is supported by genuine corporate environmental responsibility.

From a theoretical perspective, corporate environmental responsibility enhances the credibility of environmental disclosure and reinforces stakeholders' confidence in organizational sustainability commitments. When environmental transparency is accompanied by responsible environmental practices, stakeholders are more likely to perceive sustainability communication as authentic rather than symbolic. As a result, they become more willing to engage in voluntary environmental activities and support organizational sustainability goals.

The findings support stakeholder theory and corporate environmental responsibility literature, which emphasize that responsible organizational behavior enhances stakeholder trust and engagement (Aguinis & Glavas, 2012; Glavas & Kelley, 2014; Farooq et al., 2014). Unlike previous studies that primarily examined the

direct effects of corporate environmental responsibility, this research demonstrates its role as a boundary condition that amplifies the effectiveness of digital environmental transparency. Therefore, organizations seeking to promote environmental citizenship behavior should complement transparent environmental communication with genuine environmental responsibility initiatives. Together, these practices create a stronger foundation for stakeholder participation and contribute to long-term regional sustainable development.

## 6. Conclusion

Promoting environmental citizenship has become an essential component of regional sustainable development as organizations increasingly integrate sustainability into their production systems and corporate strategies. This study developed and tested a structural framework examining the effects of sustainable production practices (SPP) and digital environmental transparency (DET) on environmental citizenship behavior (ECB), while investigating the moderating role of corporate environmental responsibility (CER). Using structural equation modeling, the study provides empirical evidence on the mechanisms through which organizational sustainability practices contribute to environmentally responsible behavior.

The findings demonstrate that both sustainable production practices and digital environmental transparency significantly enhance environmental citizenship behavior. Organizations adopting environmentally responsible production systems and transparent environmental communication are more likely to encourage employees and stakeholders to engage in voluntary environmental actions. Furthermore, the results reveal that corporate environmental responsibility strengthens the positive relationship between digital environmental transparency and environmental citizenship behavior, highlighting the importance of combining transparent environmental disclosure with genuine environmental commitment.

The findings offer several practical implications for policymakers, business managers, and regional development stakeholders. Policymakers should encourage sustainable production through supportive environmental policies and incentives while promoting greater transparency in corporate environmental reporting. Organizations should integrate sustainable production practices with effective digital communication strategies and strengthen their environmental responsibility to increase stakeholder trust and participation. By fostering environmental citizenship behavior, these efforts can contribute to stronger environmental governance, sustainable business practices, and long-term regional sustainable development.

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## ФОРМИРОВАНИЕ ЭКОЛОГИЧЕСКОЙ ГРАЖДАНСТВЕННОСТИ КАК ФАКТОРА УСТОЙЧИВОГО РАЗВИТИЯ РЕГИОНОВ

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**Резюме.** В условиях усиливающейся взаимосвязи между экологической устойчивостью и региональным развитием изучение организационных факторов, способствующих экологически ответственному поведению, становится важным направлением научных исследований. Цель исследования заключается в оценке влияния практик устойчивого производства и цифровой экологической прозрачности на экологическое гражданское поведение с одновременным изучением модулирующей роли корпоративной экологической ответственности. Для проверки предполагаемых взаимосвязей применён метод моделирования структурными уравнениями (Structural Equation Modeling – SEM) на основе данных опроса 425 респондентов, участвующих в производстве и потреблении экологически устойчивой продукции в Азербайджане. Результаты показывают, что как практики устойчивого производства, так и цифровая экологическая прозрачность оказывают статистически значимое положительное влияние на экологическое гражданское поведение. Полученные результаты также свидетельствуют о том, что корпоративная экологическая ответственность оказывает положительное модулирующее воздействие на взаимосвязь между цифровой экологической прозрачностью и экологическим гражданским поведением. Это указывает на то, что прозрачная экологическая коммуникация становится более эффективной, когда подкрепляется подлинной экологической ответственностью. Исследование вносит вклад в научную литературу по вопросам устойчивого развития, демонстрируя, что экологически ответственное производство, прозрачное раскрытие экологической информации и корпоративная экологическая ответственность совместно способствуют формированию экологического гражданского поведения и поддерживают устойчивое региональное развитие. Полученные результаты имеют практическое значение для разработчиков государственной политики и руководителей предприятий, стремящихся укреплять экологическое управление, стимулировать участие заинтересованных сторон и обеспечивать долгосрочную региональную устойчивость посредством более эффективных корпоративных стратегий устойчивого развития и совместных межотраслевых экологических инициатив.

**Ключевые слова:** практики устойчивого производства, цифровая прозрачность экологической информации, корпоративная экологическая ответственность, экологическое гражданское поведение, устойчивое региональное развитие

## REGIONLARIN DAYANIQLI İNKİŞAFININ AMİLİ KİMİ EKOLOJİ VƏTƏNDAŞLIĞIN FORMALAŞDIRILMASI

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**Xülasə.** Ekoloji dayanıqlılıq və regional inkişaf arasında qarşılıqlı əlaqələrin getdikcə gücləndiyi şəraitdə ekoloji məsuliyyətli davranışı təşviq edən təşkilati amillərin öyrənilməsi mühüm tədqiqat istiqamətinə çevrilmişdir. Tədqiqatın məqsədi korporativ ekoloji məsuliyyətin moderator rolunu araşdırmaqla dayanıqlı istehsal təcrübələrinin və rəqəmsal ekoloji şəffaflığın ekoloji vətəndaşlıq davranışına təsirlərini qiymətləndirməkdir. Azərbaycanda ekoloji cəhətdən dayanıqlı məhsulların istehsalı və istehlakında iştirak edən 425 respondentdən toplanmış sorğu məlumatları əsasında irəli sürülən əlaqələrin yoxlanılması üçün struktur tənliklərin modelləşdirilməsi (Structural Equation Modeling – SEM) metodundan istifadə edilmişdir. Nəticələr göstərir ki, həm dayanıqlı istehsal təcrübələri, həm də rəqəmsal ekoloji şəffaflıq ekoloji vətəndaşlıq davranışına statistik baxımdan əhəmiyyətli müsbət təsir göstərir. Əldə edilən nəticələr, həmçinin korporativ ekoloji məsuliyyətin rəqəmsal ekoloji şəffaflıqla ekoloji vətəndaşlıq davranışı arasındakı əlaqəyə müsbət moderator təsir göstərdiyini aşkar edir. Bu isə şəffaf ekoloji kommunikasiyanın həqiqi ekoloji məsuliyyətlə dəstəkləndiyi hallarda daha səmərəli olduğunu göstərir. Tədqiqat ekoloji məsuliyyətli istehsalın, ekoloji məlumatların şəffaf şəkildə açıqlanmasının və korporativ ekoloji məsuliyyətin birlikdə ekoloji vətəndaşlıq davranışını təşviq etdiyini və dayanıqlı regional inkişafı dəstəklədiyini nümayiş etdirməklə dayanıqlı inkişaf sahəsində elmi ədəbiyyata töhfə verir. Əldə edilən nəticələr ekoloji idarəetməni gücləndirməyə, maraqlı tərəflərin iştirakını təşviq etməyə və daha səmərəli korporativ dayanıqlılıq strategiyaları və sektorlararası birgə ekoloji təşəbbüslər vasitəsilə uzunmüddətli regional dayanıqlılığı təmin etməyə çalışan siyasətçilər və biznes rəhbərləri üçün praktiki əhəmiyyət daşıyır.

**Açar sözlər:** dayanıqlı istehsal təcrübələri, ekoloji məlumatların rəqəmsal şəffaflığı, korporativ ekoloji məsuliyyət, ekoloji vətəndaşlıq davranışı, regionların dayanıqlı inkişafı.