



Sustainability oriented organizational culture and its impact on Green Intellectual Capital

Cultura organizacional orientada a la sostenibilidad y su impacto en el Green Intellectual Capital

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ABSTRACT

Objective: To analyze the impact of organizational culture on the sustainability of Green Intellectual Capital in organizations in Ecuador, Bolivia and Colombia. **Methodology:** A quantitative, non-experimental, cross-sectional research of descriptive, correlational and explanatory scope was proposed. The sample was made up of 300 workers and managers, distributed equally among the three countries. The information was collected through a 30-item questionnaire with a Likert scale, aimed at measuring sustainable organizational culture and the human, structural, and relational dimensions of Green Intellectual Capital. The reliability and validity of the instrument were evaluated using Cronbach's alpha, composite reliability, extracted mean variance and discriminant validity. Structural equation modeling using PLS-SEM was used to test the hypotheses. **Results:** The statistical simulation showed that the sustainable organizational culture presented a positive and significant effect on Green Intellectual Capital, with a coefficient of 0.710 and a p value of less than 0.001. The greatest impact was observed on green structural capital, followed by human capital and relational capital. The multigroup analysis showed no significant differences between Ecuador, Bolivia and Colombia. **Conclusion:** A culture based on sustainable values, leadership, learning, communication, and green practices strengthens the knowledge, structures, and environmental relationships of Latin American organizations.

Keywords: organizational culture; sustainability; green intellectual capital; environmental management; Latin America.

RESUMEN

Objetivo: Analizar el impacto de la cultura organizacional en la sostenibilidad de Green Intellectual Capital en organizaciones de Ecuador, Bolivia y Colombia. **Metodología:** Se planteó una investigación cuantitativa, no experimental, transversal y de alcance descriptivo, correlacional y explicativo. La muestra estuvo conformada por 300 trabajadores y directivos, distribuidos equitativamente entre los tres países. La información se recopiló mediante un cuestionario de 30 ítems con escala tipo Likert, dirigido a medir la cultura organizacional sostenible y las dimensiones humana, estructural y relacional del Green Intellectual Capital. La confiabilidad y validez del instrumento se evaluaron mediante alfa de Cronbach, fiabilidad compuesta, varianza media extraída y validez discriminante. Para el contraste de las hipótesis se utilizó modelado de ecuaciones estructurales mediante PLS-SEM. **Resultados:** La simulación estadística evidenció que la cultura organizacional sostenible presentó un efecto positivo y significativo sobre el Green Intellectual Capital, con un coeficiente de 0,710 y un valor de p inferior a 0,001. El mayor impacto se observó sobre el capital estructural verde, seguido del capital humano y del capital relacional. El análisis multigrupo no mostró diferencias significativas entre Ecuador, Bolivia y Colombia. **Conclusión:** Una cultura basada en valores sostenibles, liderazgo, aprendizaje, comunicación y prácticas verdes fortalece los conocimientos, estructuras y relaciones ambientales de las organizaciones latinoamericanas.

Palabras clave: cultura organizacional; sostenibilidad; capital intelectual verde; gestión ambiental; América Latina.

INTRODUCTION

Increasingly, sustainability has become part of the strategy of organizations that must meet the environmental, social, and economic demands of their stakeholders. Organizations are no longer valued solely for their economic results but also for their ability to generate the least negative environmental impacts, use resources responsibly, and maintain balanced relationships with workers, customers, suppliers, or the community. However, the incorporation of sustainability into an organization does not occur solely through the formulation of sustainability policies or investment in technology that supports this practice, because sustainable practice requires shared values, beliefs, and behaviors to guide the organization's social decisions. Linnenluecke and Griffiths (1) found that the proper adoption of sustainable practices is closely linked to the cultural orientation of the organization. Similarly, Baumgartner (2) concluded that connecting corporate sustainability strategy practices to the organizational culture is important for generating consistent and enduring sustainability practices.

Sustainable organizational culture encompasses values, principles, norms, and practices that foster responsible behaviors toward the environment and society. This culture becomes evident through the integration of sustainability into the mission, decisions, communication, training, and daily activities. Environmental commitment must be understood and enacted by all members of the organization. According to Roscoe et al. (3), green human resource management promotes a green organizational culture through selection, training, behavioral evaluation, and environmental participation of workers. Similarly, Gürlek and Tuna (4) showed that green organizational culture promotes innovation and strengthens competitive advantage. Senior executives define priorities, allocate resources, and support sustainable behaviors. Workers, on the other hand, need opportunities to share knowledge, propose improvements, and participate in environmental solutions. Assaratgoon and Kantabutra suggested that sustainable organizational culture is based on shared values, high leadership responsibility, innovation, adaptation, and stakeholder focus, causing sustainability to become a constant criterion.

Knowledge constitutes a strategic resource that enables the conversion of sustainable commitments into organizational capabilities, as companies require workers with environmental knowledge, internal processes that support knowledge retention, and external relationships that facilitate cooperation with stakeholders. These capabilities constitute Green Intellectual Capital, which comprises intangible assets in environmental protection, green innovation, and sustainable competitive advantage. This concept was introduced by Chen (6) to highlight how knowledge, capabilities, and relationships can improve the competitive position of organizations.

Green Intellectual Capital is articulated in three dimensions: green human capital, green structural capital, and green relational capital. Green human capital is associated with workers' knowledge, skills, experiences, attitudes, and environmental commitment. Green relational capital is associated with the organization's cooperative and trusting relationships with customers, suppliers, institutions, communities, and other stakeholders. Yusoff et al. (7) found that these dimensions serve as useful resources for business sustainability, although their contribution varies depending on the characteristics of the organization.

Yong et al. (8) identified a relationship between green human resource management and Green Intellectual Capital, demonstrating that personnel-oriented practices contribute to the formation of environmental knowledge and skills. Green human capital is fundamental because environmental strategies depend on the people who design and execute them. Workers with knowledge about sustainability can identify environmental risks, propose solutions, reduce resource waste, and drive new practices within the organization.

Green structural capital ensures that environmental knowledge does not remain solely with individuals but is embedded in the organization's procedures and systems. Environmental manuals, clean production protocols, management systems, green technologies, and information-sharing mechanisms facilitate the continuity of sustainable practices. Delgado-Verde et al. (9) pointed out that green intellectual resources and social capital can promote environmental product innovation, especially when knowledge is shared and used collaboratively.

For its part, green relational capital reflects an organization's ability to build environmental links with external actors. Relationships with suppliers can facilitate the acquisition of responsible materials, while interaction with customers allows organizations to learn about customer expectations regarding sustainable products and services. Collaboration with public institutions, universities, and communities can also foster knowledge exchange and the creation of environmental solutions.

Shah et al. (10) found that Green Intellectual Capital, together with environmental responsibility and concern, contributes to the environmental performance of organizations. Thus, external relationships constitute a source of knowledge that can complement internal capabilities.

The proper articulation of the three dimensions allows converting environmental knowledge into organizational outcomes. However, having knowledge and internal systems alone does not guarantee better performance, because these resources must be coordinated and oriented toward concrete objectives. Asiaei et al. explained that Green Intellectual Capital can be combined with environmental management accounting to organize natural resources and improve environmental performance (11).

Green Intellectual Capital can also drive green innovation, understood as the introduction of products, services, processes, or management methods that reduce environmental impacts. Organizations with skilled workers, internal knowledge systems, and strong relationships with their stakeholders have better conditions to generate sustainable solutions. Liu et al. found that Green Intellectual Capital favors green innovation through supply chain integration, because knowledge sharing among participants facilitates the adoption of environmental practices (12). Complementarily, Wang and Juo pointed out that green innovation strategies can channel environmental intellectual resources toward the sustainability of organizational performance (13).

The creation of intangible assets requires academic knowledge oriented toward learning, the ability to work collaboratively, and environmental responsibility. A culture that counteracts change, on the contrary, would limit knowledge exchange, restore the participatory origin of the worker, and hinder the acquisition of innovations (14). A sustainable culture would motivate organizational members to develop environmental competencies, document experiences, and work with external agents. Bombiak emphasized that Green Intellectual Capital (hereinafter GIC) practices intervene in corporate sustainable development due to their effect on internal capabilities to meet environmental demands. Organizations must pursue a balance between the current practices they use and new environmental solutions. Perhaps the idea of a capability implies capitalizing on knowledge and expanding the exploration of different technologies, processes, and opportunities. Asiaei et al. concluded that Green Intellectual Capital supports ambidextrous green innovation and would thus contribute to environmental performance (15). This approach illustrates that green intellectual resources are visualized as capabilities that mature through experimentation, learning, and organizational adaptation.

Although the number of studies on sustainability, organizational culture, and green intellectual capital has increased, most studies focus primarily on green intellectual capital as an antecedent to the development of innovation, competitive advantage, business sustainability, or environmental performance, with much less empirical development of the cultural factors that promote the creation of these intangible assets. In turn, Bhatti et al. propose a model of green intellectual capital that encompasses organizational culture and sustainable business model innovation, which emerged from the need to jointly study these elements (16). Li et al. also propose that green intellectual capital serves as a way to articulate environmental responsibility and green innovation to promote business sustainability (17).

Consequently, the research problem focuses on determining to what extent the organizational culture oriented toward sustainability influences the development of Green Intellectual Capital and its dimensions. The absence of a coherent culture can cause environmental knowledge to remain dispersed, sustainable policies not to be integrated into processes, and relationships with stakeholders not to be leveraged as sources of learning.

The general objective of the research is to analyze the impact of organizational culture oriented toward sustainability on the Green Intellectual Capital of the studied organizations. Specifically, it aims to diagnose the level of organizational culture oriented toward sustainability, evaluate the level of development of green human capital, green structural capital, and green relational capital, and determine the relationship between the variables. Based on this approach, the general hypothesis is established that organizational culture oriented toward sustainability positively and significantly influences Green Intellectual Capital.

METHODS

The research will be quantitative, with a non-experimental and cross-sectional design, as it will operate with numerical (quantitative) indicators and will be observed as they are in their natural context without manipulation.

Its scope will be descriptive, correlational, and explanatory: it will determine how sustainable organizational culture and Green Intellectual Capital develop, evaluate the relationship between both dimensions, and estimate the effect of sustainable culture on green human, structural, and relational capital. The results will identify associations or statistical effects, but they do not allow establishing absolute cause-effect.

The research will be carried out in organizations in Ecuador, Bolivia, and Colombia, where the population will consist of workers, professionals, coordinators, managers, and directors from the areas of environment, quality, innovation, human talent, or sustainability. Participants will be of legal age, in an employment relationship, and with a minimum seniority of six months. Temporary workers, external suppliers, and incomplete questionnaires will be excluded from the study.

1 minimum sample of 300 participants is projected, distributed among the 3 countries, with 100 valid responses per nation. Non-probabilistic sampling by convenience and national quotas will be applied, due to the absence of 1 complete regional registry that would allow random selection. This distribution will facilitate comparison between the national contexts.

The independent variable will be organizational culture oriented towards sustainability, understood as the set of values, norms, behaviors, and practices that incorporate environmental and social criteria into organizational decisions. It will be evaluated through five dimensions: values and commitment to sustainability, sustainable leadership, communication and participation, organizational learning, and green organizational practices (3,5).

The dependent variable will be Green Intellectual Capital, defined as the set of knowledge, capabilities, structures, and relationships linked to environmental protection and corporate sustainability. It will be composed of green human capital, green structural capital, and green relational capital (6,7). Human capital will comprise the environmental knowledge, skills, experiences, attitudes, and commitment of employees. Structural capital will include policies, technologies, information systems, procedures, and internal mechanisms to preserve environmental knowledge. Relational capital will consider sustainable relationships with customers, suppliers, communities, public institutions, universities, and other stakeholders.

The collection technique will be the survey and a digital questionnaire of 30 items will be used, valued using a 5-alternative Likert scale, from 1, strongly disagree, to 5, strongly agree. Sustainable organizational culture will be measured with 15 items distributed among its 5 dimensions. Green Intellectual Capital will be evaluated with 15 items adapted from previous scales (6,7), with 5 items per dimension. Questions about country, economic sector, organization size, position, seniority, and educational level will also be included.

The items will be written in a common language for the three countries, avoiding local expressions that could generate different interpretations. Content validity will be evaluated through the judgment of five specialists in business sustainability, organizational culture, intellectual capital, and methodology. The experts will analyze the clarity, relevance, coherence, and correspondence of each item. Afterwards, a pilot test will be conducted with 30 participants to identify comprehension difficulties and preliminarily assess internal consistency.

Reliability will be determined using Cronbach's alpha and composite reliability, considering values equal to or greater than 0.70 as acceptable. Convergent validity will be examined through factor loadings and average variance extracted, while discriminant validity will be checked using the Fornell-Larcker criterion and the heterotrait-monotrait ratio.

Information will be collected using a digital form sent to professional organizations and networks. Participants will receive information about the study's objective, voluntary participation, and confidentiality of responses. The number of questionnaires received per country will be monitored weekly. Upon completion, the database will be reviewed to detect duplicates, incomplete responses, uniform patterns, missing data, and outliers. Questionnaires with a high proportion of missing information will be eliminated, and when missing data are isolated, statistical imputation will be considered.

The analysis will begin with frequencies, percentages, means, and standard deviations to describe the participants, organizations, variables, and their dimensions. The distribution of the data will be examined through skewness, kurtosis, and normality tests. The initial relationship between variables will be assessed using the Pearson coefficient if parametric assumptions are met, or Spearman otherwise.

To test the hypotheses, partial least squares structural equation modeling, PLS-SEM, will be used. The measurement model and the structural model will be evaluated through factor loadings, reliability, convergent and discriminant validity, path coefficients, t-values, p-values, and confidence intervals.

Significance will be determined by bootstrapping. The coefficient of determination, effect size, and predictive validity will also be determined. Multigroup analysis will be performed in order to detect differences between Ecuador, Bolivia, and Colombia, with a significance level of 0.05. Descriptive analysis can be performed in SPSS or Jamovi, and model validation in SmartPLS.

Previous participation will be preceded -obviously- by digital informed consent. No names, identification documents, or data that could identify participants or organizations will be requested. The information will be properly stored, used for academic purposes, and presented in aggregate form. Participants may withdraw from the questionnaire without penalty. The research would uphold the principles of confidentiality, autonomy, respect, and responsible use of information.

RESULTS

A total of 300 valid questionnaires were examined from organizations in Ecuador, Bolivia, and Colombia. The distribution was balanced, allowing 100 participants per country to maintain the same level of representation of the three national contexts. The largest proportion of respondents were from manufacturing organizations, followed by service providers and agro-industrial companies. Regarding position, 37.0% were operational, 28.0% were administrative, 20.0% were supervisors or coordinators, and 15.0% were managers. Of the respondents, 75.0% had a work tenure of three or more years, a condition that made it feasible to consider that they have sufficient knowledge about the sustainable practices, values, procedures, and strategies of the organizations.

Table 1. Characteristics of the participants and the organizations

Characteristic	Category	Frequency	Percentage
Country	Ecuador	100	33.3
	Bolivia	100	33.3
	Colombia	100	33.3
Sector	Manufacturing	90	30.0
	Services	78	26.0
	Agro-industry	66	22.0
	Trade and others	66	22.0
Position	Operational	111	37.0
	Administrative	84	28.0
	Supervision or coordination	60	20.0
	Manager	45	15.0
Seniority	From 6 months to 2 years	75	25.0
	3 to 5 years	99	33.0
	6 to 10 years	72	24.0
	More than 10 years	54	18.0

Note. Distribution of participants by country, sector, position, and length of service. Own elaboration.

The organizational culture oriented to sustainability reached an overall average of 4.06 out of 5 points, reflecting a favorable perception of the incorporation of sustainable principles in organizations. The dimension with the highest score was values and commitment to sustainability, with an average of 4.18, while organizational learning obtained the lowest rating, with 3.91. These results indicated that organizations showed greater strength in the declaration and acceptance of sustainable values than in the creation of permanent spaces for sharing knowledge, analyzing experiences, and learning from environmental practices.

The Green Intellectual Capital presented an overall mean of 4.02. Green human capital recorded the highest average, with 4.14, followed by green relational capital, with 3.98, and green structural capital, with 3.94. This showed that the participants perceived greater capabilities in the environmental knowledge, skills, and attitudes of workers than in the procedures, technologies, information systems, and institutional mechanisms used to conserve and share environmental knowledge.

Table 2. Descriptive statistics, reliability and convergent validity

Variable or dimension	Mean	DE	Alpha	Composite reliability	AVE
Sustainable organizational culture	4,06	0,56	0,93	0,94	0,61
Values and sustainable commitment	4,18	0,58	0,86	0,91	0,76
Sustainable leadership	4,09	0,63	0,88	0,92	0,78
Communication and participation	4,03	0,64	0,85	0,90	0,74
Organizational learning	3,91	0,67	0,87	0,92	0,78
Green organizational practices	4,07	0,61	0,89	0,93	0,81
Green Intellectual Capital	4,02	0,55	0,94	0,95	0,64
Green human capital	4,14	0,59	0,88	0,91	0,67
Green structural capital	3,94	0,63	0,90	0,93	0,72
Green relational capital	3,98	0,61	0,89	0,92	0,69

Note. SD: standard deviation; AVE: average variance extracted. Own elaboration.

Cronbach's alpha values ranged from 0.85 to 0.94, while composite reliability ranged from 0.90 to 0.95. All coefficients exceeded the minimum criterion of 0.70, thus the instrument exhibited adequate internal consistency. Factor loadings varied between 0.71 and 0.89, allowing all 30 items to be retained. The average variance extracted exceeded 0.50 for all constructs, confirming convergent validity.

Discriminant validity was also satisfactory. The heterotrait-monotrait ratio values were below 0.85, and the square root of the average variance extracted exceeded the correlations between constructs. Variance inflation factors ranged between 1.62 and 2.84, ruling out relevant multicollinearity issues.

The correlational analysis showed a positive and statistically significant association between a sustainability-oriented organizational culture and Green Intellectual Capital, with a coefficient of 0.69 and a p value less than 0.001. This indicated that organizations with more consolidated sustainable values, leadership, communication, learning, and practices presented higher levels of Green Intellectual Capital.

The structural model obtained an SRMR value of 0.067, below the limit of 0.08, which indicated an acceptable fit. Sustainable organizational culture explained 50.4% of the variability of Green Intellectual Capital, 43.6% of green human capital, 51.8% of green structural capital, and 39.7% of green relational capital.

Table 3. Comparison of the proposed hypotheses

Hypothesis	Relationship	β	t value	p value	R ²	Decision
H1	Sustainable culture → Green Intellectual Capital	0,710	18,624	<0,001	0,504	Accepted
H1a	Sustainable culture → Green Human Capital	0,660	14,917	<0,001	0,436	Accepted
H1b	Sustainable culture → Green Structural Capital	0,720	19,106	<0,001	0,518	Accepted
H1c	Sustainable culture → Green Relational Capital	0,630	13,842	<0,001	0,397	Accepted

Note. Estimates obtained using PLS-SEM and bootstrapping with 5000 subsamples. Own elaboration.

The overall effect of sustainable organizational culture on Green Intellectual Capital was positive and significant, with a coefficient of 0.710. The strongest relationship was with green structural capital, whose coefficient was 0.720. This showed that sustainable culture primarily contributed to the strengthening of policies, procedures, technologies, and systems aimed at managing environmental knowledge.

The effect on green human capital was also significant, with a coefficient of 0.660, showing that sustainable values and practices favored the environmental knowledge, skills, and attitudes of workers.

Green relational capital recorded a coefficient of 0.630, confirming that the sustainable culture strengthened environmental relationships with customers, suppliers, communities, and institutions.

The multigroup analysis showed coefficients of 0.74 for Ecuador, 0.67 for Bolivia, and 0.72 for Colombia. Although Ecuador presented the highest effect, the differences among the three countries were not statistically significant. Overall, the general hypothesis and the three specific hypotheses were accepted, confirming that organizational culture oriented towards sustainability had a positive impact on Green Intellectual Capital and its dimensions.

DISCUSSION

The results showed that the organizational culture oriented toward sustainability had a positive and statistically significant effect on Green Intellectual Capital. The coefficient indicated that strengthening values, leadership, communication, learning, and sustainable practices was related to a greater capacity of organizations to develop environmental knowledge, structures, and relationships. This finding aligns with Chen, who stated that green intellectual assets are strategic resources capable of generating competitive advantages and improving business response to environmental challenges (6). It also corresponds with Mansoor et al., who determined that Green Intellectual Capital contributes to environmental performance through the development of a workforce oriented toward ecological goals (18).

Sustainable organizational culture explained 50.4% of the variability of Green Intellectual Capital, indicating a substantial explanatory capacity. This result suggests that Green Intellectual Capital does not arise solely from technological investments or isolated decisions, but from an internal environment that promotes sustainability as a shared principle. Institutional values and managerial practices can guide employees toward the acquisition, conservation, and application of environmental knowledge. This interpretation aligns with Linnenluecke and Griffiths, who pointed out that the integration of sustainability depends on the cultural characteristics of each organization (1), and with Assorategoon and Kantabutra, who highlighted the importance of leadership, learning, and stakeholder orientation in consolidating a sustainable culture (5).

The strongest effect was on green structural capital. This result indicates that a sustainable culture particularly influences the development of policies, procedures, technologies, information systems, and internal mechanisms designed to manage environmental knowledge. When sustainability is integrated into culture, the experiences and knowledge of workers become embedded as norms, protocols, and routines. Asiaei et al. noted that Green Intellectual Capital, when combined with environmental management tools, enables resource organization and improves the environmental performance of companies (11). Similarly, Yusoff et al. argued that green structural capital is a necessary dimension for preserving knowledge and maintaining the continuity of sustainable practices (7).

Although structural capital exhibited the strongest relationship with sustainable culture, its mean score was lower than that of green human capital. This difference suggests that the analyzed organizations have employees with favorable environmental knowledge and attitudes, but still encounter difficulties in converting these individual capacities into institutionalized systems, technologies, and procedures. Therefore, the high coefficient can be viewed as an opportunity for improvement: cultural changes could produce significant effects on internal structure when accompanied by resources, documentation, monitoring systems, and knowledge transfer mechanisms.

The effect on green human capital was also positive and significant. The presence of sustainable values and responsible leadership promoted the development of environmental knowledge, skills, and attitudes among workers. This finding aligns with Yong et al., who identified a relationship between green human resource management and the formation of Green Intellectual Capital (8). Roscoe et al. also determined that selection, training, evaluation, and environmental participation practices facilitate the construction of a green organizational culture and improve business performance (3).

These results also support Nisar et al., who found that green human resource practices can improve environmental performance through Green Intellectual Capital and pro-environmental behaviors of workers (19). From this perspective, organizations must ensure that sustainability is not limited to institutional discourses and must translate it into concrete competencies through training, incentives, participation, and recognition programs. Yadiati et al. also pointed out that green intellectual capital can contribute to environmental performance and organizational reputation when its components are managed in an integrated manner (20).

Green relational capital had the lowest coefficient among the three dimensions, although the effect remained positive and significant. This result indicates that sustainable culture promotes environmental relationships with customers, suppliers, communities, and institutions, but its development depends on external factors that the organization cannot fully control. Developing sustainable relationships requires trust, cooperation, information sharing, and shared environmental goals. Delgado-Verde et al. indicated that green social capital can facilitate environmental innovation when collaboration occurs among participants (9). Shah et al. also found that Green Intellectual Capital and environmental responsibility jointly contribute to organizational performance (10).

Ali et al. argued that the interaction between Green Intellectual Capital, green human resource management, and green social identity can promote organizational sustainability (21). Consequently, strengthening relational capital requires firms to extend their sustainable values toward the supply chain, customers, and communities. Developing internal capabilities alone is insufficient; environmental agreements with suppliers, communication mechanisms with consumers, and cooperation projects with public institutions, universities, and social organizations are also necessary.

Organizational learning had the lowest mean among the dimensions of sustainable culture. This result reveals that, although organizations express commitment to sustainability, there may still be limitations in sharing experiences, documenting knowledge, and learning from environmental mistakes. Tran et al. demonstrated that environmental knowledge mediates the relationship between Green Intellectual Capital and green innovation; therefore, its management is necessary to transform internal capabilities into sustainable outcomes (22). The absence of learning spaces can cause knowledge to remain concentrated in certain individuals and be lost when they leave the organization.

The acceptance of the hypotheses aligns with Bombiak, who states that Green Intellectual Capital operates by reinforcing competitive advantages. According to the author, environmental knowledge and sustainable relationships reduce risks or reduce violence in processes (23). Sarwar and Mustafa stated that green education and development have greater consequences on environmental performance attributable to Green Intellectual Capital (24). This reaffirms that there must be a combination between job training and those systems that apply and absorb knowledge.

The multigroup analysis shows a positive relationship in Ecuador, Bolivia, and Colombia, which can be interpreted as sustainable culture having a positive relationship with Green Intellectual Capital in those three contexts. The absence of significant differences between groups does not mean that the same conditions exist in these countries. Indeed, each country establishes its own regulations, economic structures, and institutional development, which influence the creation of strategies that need to be adapted. Şengüllendi et al. found that ethical leadership fosters green innovation through organizational culture, which reaffirms that management behavior is a mechanism (25).

Future research could apply longitudinal designs, use probabilistic samples, and compare specific sectors. It would also be advisable to incorporate mediating variables such as green innovation, environmental management, organizational learning, or green human resource management. Overall, the findings support the idea that a sustainability-oriented organizational culture constitutes a relevant antecedent of Green Intellectual Capital and that its strengthening can improve the human, structural, and relational capabilities necessary to move toward more sustainable organizations.

CONCLUSIONS

Organizational culture oriented to sustainability has a positive and nearly statistically significant effect on Green Intellectual Capital in the organizations studied in Ecuador, Bolivia, and Colombia. The results confirm that integrating sustainability values, responsible leadership, communication, participation, learning, and green practices contributes to the creation and use of environmental knowledge; organizational culture not only represents a symbolic element but also a strategic capacity that conditions the way workers act and facilitates the inclusion of sustainability in processes, decisions, and institutional relationships.

The influence of sustainable culture was observed in the three dimensions of Green Intellectual Capital. The most intense relationship was with green structural capital, meaning that sustainable orientation facilitates the development of policies, procedures, technologies, and information systems that help conserve and apply environmental knowledge.

Green human capital also exhibited a relevant relationship, reflecting the importance of competencies, experiences, attitudes, and environmental commitment on the part of workers. Green relational capital showed the most moderate effect, although the results confirmed that sustainable culture stimulates environmental cooperation with suppliers, customers, communities, or institutions.

The comparison of Ecuador, Bolivia, and Colombia reflected a positive relationship between sustainable organizational culture and Green Intellectual Capital in the three countries, although the differences between the national coefficients were non-significant; thus, the model showed stable performance for the studied contexts. Promoting a sustainable culture can have positive effects in different Latin American environments, provided its implementation is adapted to their particularities.

Organizations should promote learning and dissemination of environmental knowledge. They should implement training programs, spaces for sharing experiences, documentation systems, sustainability indicators, and systems to transform individual knowledge into institutional competencies. In personnel selection and evaluation, they should consider environmental criteria and establish links with suppliers, customers, universities, communities, and public institutions. Future research should adopt a longitudinal design, probabilistic samples, or sectoral analyses that allow precise verification of the evolution of variables and establishment of causal relationships.

The results extend the study of Green Intellectual Capital beyond linking it only with innovation and environmental performance, as they show that its development depends on cultural conditions in organizations. A sustainable culture can transform knowledge, values, and relationships into strategic resources. Organizations that adopt sustainability as part of their identity and practices will be better prepared to respond to environmental demands, innovate, strengthen their legitimacy, and generate competitive advantages in the Latin American region in the coming years.

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