

RELACIÓN ENTRE PRÁCTICAS DE CONTABILIDAD AMBIENTAL Y RENTABILIDAD EN LAS COOPERATIVAS DE AHORRO Y CRÉDITO

RELATIONSHIP BETWEEN ENVIRONMENTAL ACCOUNTING PRACTICES AND PROFITABILITY IN SAVINGS AND CREDIT COOPERATIVES

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RESUMEN: El surgimiento por este estudio nació al identificar que, en muchas cooperativas del sector financiero popular, los temas ambientales suelen presentarse más como parte de la imagen institucional que como información integrada a los estados financieros. En respuesta a esta situación, la investigación tuvo como objetivo analizar la relación entre la contabilidad ambiental y la rentabilidad en las cooperativas de ahorro y crédito de los segmentos 1 y 2 de Ambato, Ecuador. Para ello, se desarrolló un estudio con enfoque mixto y diseño transversal, mediante un censo aplicado a directivos y contadores de las 17 cooperativas de la ciudad. La información recopilada se analizó con el coeficiente Rho de Spearman, lo que permitió examinar la relación entre las variables del estudio. Los resultados mostraron en un 53% el manejo adecuado de los recursos naturales y el registro de los impactos ambientales que contribuyen a mejorar la toma de decisiones internas y favorecen una mejor gestión de los costos operativos. No obstante, cuando se examinó los indicadores financieros de rendimiento sobre el patrimonio y de rendimiento sobre los activos, se encontró que no existe vínculo estadístico con la rentabilidad, por lo que fue rechazada la hipótesis inicial. En conclusión, en las cooperativas en un 67% se contribuye al manejo de la contabilidad ambiental mediante el control de gastos y a la eficiencia operativa, obteniendo beneficios en la gestión diaria. No obstante, su impacto en los resultados financieros finales no refleja resultados positivos. Esto implica el desafío de fortalecer la preparación del personal, acoger herramientas analógicas e integrar la sostenibilidad como parte esencial de la información financiera.

Palabras clave: Rentabilidad, cooperativas de ahorro y crédito, contabilidad ambiental, optimización de recursos

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ABSTRACT: This study originated from the observation that, in many cooperatives within the popular financial sector, environmental issues tend to be presented more as part of the institutional image than as information integrated into financial statements. In response to this situation, the research aimed to analyze the relationship between environmental accounting and profitability in savings and credit cooperatives classified as Segments 1 and 2 in Ambato, Ecuador. To this end, a study employing a mixed-methods approach and a cross-sectional design was conducted, utilizing a census of executives and accountants from the city's 17 cooperatives. The collected data were analyzed using Spearman's Rho coefficient, allowing for an examination of the relationship between the study variables. The results indicated that 53% of the cooperatives demonstrated proper management of natural resources and the recording of environmental impacts, factors that contribute to improved internal decision-making and better operational cost management. However, an examination of financial indicators—specifically return on equity and return on assets—revealed no statistical link to profitability, leading to the rejection of the initial hypothesis. In conclusion, while 67% of the cooperatives contribute to environmental accounting management through expense control and operational efficiency—thereby gaining benefits in day-to-day operations—this does not translate into a positive impact on final financial results. This highlights the challenge of strengthening staff training, adopting analytical tools, and integrating sustainability as an essential component of financial information.

Keywords: *Profitability, Savings and credit cooperatives, Environmental accounting, Resource optimization*

INTRODUCTION

Background of the study problem

Currently, environmental accounting goes beyond its informative function, as it is consolidated as an essential pillar of strategic competitiveness. In Spain, an example is mentioned related to green bonds, which shows a positive relationship between environmental performance and emissions reduction (1). In the Latin American context, it responds to an urgency to maintain the economy in the face of the growing demands of responsible capital (2).

The lack of environmental accounting information prevents us from knowing the real effect of the projects and their contribution to the ecosystem. The International Financial Reporting Standards (IFRS) offer a clear technical structure; they ignore the recording of social and ecological facts, which forces risks to be evaluated using financial data that are insufficient to measure environmental vulnerability (3).

This problem becomes critical, since the lack of sustainability indicators generates incomplete files and facilitates the delivery of resources to companies with poor ecological management. Only under this qualitative rigor will it be possible to promote



transparent management models that leave behind the use of environmental reports as mere corporate image tools.

In this context, the application of International Financial Reporting Standards (IFRS) presents inconsistencies in the measurement, recognition and disclosure of financial information, expenses and risks related to environmental accounting. This occurs in segment 1 and 2 cooperatives in the city of Ambato, since there are inherent limitations to the application of the standard. As a regulatory framework focused strictly on the reasonableness of traditional financial statements, IFRS lacks standardized metrics to quantify environmental impact, its current accounting systems fail to capture how its partners' ecological risks affect their long-term solvency, or how capital allocation is impacting the local environment. Consequently, the need arises to adopt a model that integrates environmental accounting to correct the technical gaps that traditional financial regulations omit.

Given this situation, this research asks the following question: How is environmental accounting related to the profitability of savings and credit cooperatives belonging to segments 1 and 2 in the city of Ambato, Ecuador? In order to test the hypothesis: H_1 , environmental accounting is positively related to the profitability of savings and credit cooperatives belonging to segments 1 and 2 of the city of Ambato, Ecuador.

Conceptual foundations of environmental accounting in savings and credit cooperatives

Environmental accounting refers to a management model within the sustainability accounting approach (4). From a broader perspective, environmental accounting has been gaining importance in the current business environment, since it has become a tool that allows integrating both financial and non-financial information into management and decision-making processes (5).

In this sense, environmental management is oriented towards the collection and analysis of information data that occurs with the use of natural resources and the impact generated by human activity, such as carbon dioxide emissions, water use, waste generation and renewable energy. The information facilitates the diagnosis of environmental impact through indicators, such as efficiency in energy use and emissions mitigation (2).

This study covers the use of natural resources, waste management and energy consumption, fundamental elements for responsible decision making (6). In this sense, it refers to the strategy aimed at preserving the environment and strengthening institutional sustainability. Likewise, the social dimension is related to the way in which the organization's activities influence people and the community that surrounds it (7). However, under the framework of the International Financial Reporting Standards (IFRS) with the recent incorporation of the S1 and S2 sustainability standards, which are incomplete, because it maintains a predominantly financial vision oriented to the investor. This technical and regulatory limitation means that essential operational and community activities, such as internal recycling processes and collective waste



management, are not tangibly reflected in the organizations' balance sheets, causing certain operational and community activities, such as internal recycling processes, collective waste management and social welfare initiatives, to not be tangibly manifested within the financial statements (3)(5).

Ethics and corporate responsibility go hand in hand, because they reflect a company's real commitment to acting with integrity and being aware of its role in society (8). Furthermore, business ethics is considered as a guide for management towards values such as honesty, transparency and objectivity (9). At the same time, profitability continues to be seen as a fundamental pillar in strategic planning, since it shows the ability of an organization to convert its resources into real profits. This metric helps measure how efficient the company is in managing everything it has, both tangible and intangible, and also allows us to see its potential to generate value (10). This is advantageous when evaluating financial performance and deciding where to direct the business.

This is essential, because it allows for a complete evaluation of both administrative performance and the way in which capital is strategically deployed (11). They are two key pillars to ensure that the entity is sustainable and that its assets are strengthened over time. From there, profitability is nothing more than a reflection of how the business is being managed (12). For example, when we look at the gross margin, we can clearly see how efficient operations are, it shows us whether we are taking care of costs and whether the value we assign to our products is adequate to sustain the structure of the company.

In relation to the above, operational efficiency is achieved when cost reduction and quality care merge as forces that drive production (13). Under this approach, raising quality standards makes it possible to stop the trickle of errors and the waste of inputs, which ensures full use of resources and strengthens the position of the business over time (14). The objective of the research is to analyze the relationship between environmental accounting and profitability in savings and credit cooperatives belonging to segments 1 and 2 in the city of Ambato, Ecuador.

MATERIALS AND METHODS

The research was supported by the positivist paradigm, the reality of the savings and credit cooperatives belonging to segments 1 and 2 of the city of Ambato, Ecuador was considered as the base context for the development of the research that was objective, measurable and susceptible to empirical analysis, and at the same time sought to explain the causal relationships between the study variables. In this framework, environmental accounting was considered as the independent variable and profitability as the dependent variable, both operationalized in quantifiable indicators that allowed their measurement and statistical analysis. In this way, the study not only allowed us to test the hypothesis raised about the positive relationship between both variables, but also explain how environmental accounting practices influenced the financial performance

of savings and credit cooperatives, providing empirical evidence that contributed to the understanding of the phenomenon investigated (15).

The present investigation was developed through a non-experimental design, since the phenomenon was developed in its natural environment without the deliberate manipulation of the independent variables, thus responding to the integrity of the observed data. A mixed approach was used that combines qualitative-quantitative methods, which led to a fusion of a strategy that allowed the psychometric precision of the numerical indicators and the interpretive depth of the qualitative information obtained in the field. The study was designed with a correlational-causal scope, with the purpose of not only identifying, but also explaining the degree of association and dependence between the study variables. The methodology was based on a hypothetical-deductive, analytical-synthetic approach; which allowed us to verify the hypothesis and organize the information. In this way, it was ensured that the findings are reliable, valid and the study can be replicated in other contexts.

The survey technique was used to collect data. Carried out to the management or direction staff, accounting or financial department and operations or administration area in the 17 savings and credit cooperatives, which validated the information to understand the phenomenon studied. The instrument was subjected to an approval process through the evaluation of specialists, who examined its relevance and relevance to evaluate the proposed topic (16).

In this framework, the Content Validity Index (CVI) applied using the formula, based on Lawshe's classic proposal:

$$IVC = \frac{N_e - \frac{N}{2}}{\frac{N}{2}}$$

The content validation of the 20-item instrument reaches a global Content Validity Index (CVI) of 0.87, a result that exceeds the minimum of 0.80 recommended for a panel of five judges $N = 5$ and confirms a strong theoretical alignment, since only three items received objections. This index is calculated from Lawshe's formula, which contrasts the variable N , the total number of participating experts, which is five in this case, with the variable that represents the number of judges who evaluated each item; This mathematical relationship is used to measure the degree of consensus and determine if the agreement exceeds that expected by chance, providing the validity of the instrument. Methodologically, although it is a small qualitative sample (5 experts), it is adequate and widely accepted in descriptive-causal instrument validation studies (22). N_e

The present investigation adopted a census approach covering all the entities of segments 1 and 2 located in the city of Ambato, Ecuador. This non-random selection includes 17 institutions, which facilitates a detailed analysis of the local reality without the need to apply random sampling methods. The evaluated group is mainly made up of the cooperatives: OSCUS, San Francisco, El Sagrario, Educadores de Tungurahua,

Mushuc Runa, Indígena SAC, Maquita Cushun, Ambato, Kullki Wasi, Chibuleo, Vencedores, Kisapincha, Acción Tungurahua, Sumak Samy, Credi Ya, Sisa and Interandina (17).

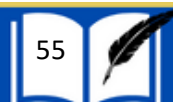
Table 1. Variable operationalization matrix.

Independent Variable Environmental Accounting		
Variable	Dimensions	Indicators
Environmental accounting	Dimension environmental	- Accounting record of environmental impacts - Measurement of CO2 emissions and energy consumption - Accounting management of natural resources
	Social dimension	- Register of social investments - Information on labor well-being - Inclusion of social criteria in accounting reports
	Environmental economic dimension	- Evaluation of long-term financial performance - Integration of sustainability criteria in profitability - Efficient allocation of resources
	Ethics and corporate responsibility	- Application of ethical principles in accounting information - Existence of codes of ethics - Compliance with financial and environmental regulations
Profitability Dependent Variable		
Variable	Dimensions	Indicators
Profitability	Financial profitability	- Return on assets (ROA) - Return on equity (ROE) - Financial margin
	Operational efficiency	- Reduction in operating costs - Optimization of resource use - Cost-income ratio
	Long-term profitability	- Sustained profit growth - Financial stability - Sustainability of economic performance

Note. Matrix for operationalization of variables, dimensions and indicators of the study.

RESULTS

Distribution of respondents according to age: the analysis of table 1 shows that 41.2% of respondents are between 25 and 35 years old, followed by the group over 45 years old with 29.4%, while the ranges from 36 to 45 years old and under 25 years old represent 17.6% and 11.8%. This distribution shows a greater participation of personnel



in the productive stage, which can favor the adoption of accounting practices linked to sustainability according to table 2.

Table 2. Frequencies for age.

Age	Frequency	Percentage	Valid Percentage	Cumulative Percentage
25-35 years	7	41.2	41.2	41.2
36-45 years	3	17.6	17.6	58.8
Less than 25 years	2	11.8	11.8	70.6
Over 45 years old	5	29.4	29.4	100.0
Absent	0	0.0		
Total	17	100.0		

Note. Frequency and percentage of responses obtained regarding the age of the respondents (n=17).

Labor well-being in accounting reports according to gender: the descriptive results show that 47.1% of respondents indicate that information on labor well-being is completely included in the accounting reports, followed by 29.4% who indicate that very little is incorporated, 17.6% who state that it is presented and 5.9% who indicate that it is not included. In the analysis by gender, the female group presents greater dispersion in the responses with 40% in complete inclusion, 30% in very little, 20% in partial inclusion and 10% in not included, while in the male group complete inclusion predominates with 57.1%, followed by 28.6% in very little and 14.3% in partial inclusion, with no records in the not included category. Regarding the Chi-square contrast, the value $p=0.792$ with 3 degrees of freedom indicates that there is no evidence to establish an association between gender and the inclusion of labor well-being information in the accounting reports in the cooperatives analyzed, as evidenced in table 3-4.

Table 3. Workplace well-being in accounting reports by gender.

Is information on workplace well-being included in accounting reports?					
Genre:	Very little	Not included	Yes, completely	Yes, partially	Total
Female	3	1	4	2	10
Male	2	0	4	1	7
Total	5	1	8	3	17

Note. Frequency and percentage of responses on the inclusion of workplace well-being information in accounting reports by gender

Table 4. Chi-square contrasts.

Value	Gl	p
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Table 3. Workplace well-being in accounting reports by gender.

Is information on workplace well-being included in accounting reports?					
Genre:	Very little	Not included	Yes, completely	Yes, partially	Total
X ²	1.036	3	.792		
N	17				

Note. Chi-square test to evaluate the relationship between gender and the inclusion of workplace well-being information in accounting reports.

The registration of environmental impacts and control of natural resources: They show that 52.9% of respondents indicate that environmental impacts are recorded, and within this group, 66.7% also indicate that accounting control of natural resources is maintained, which reflects a more consistent application of these practices. In contrast, 35.3% state that these records are carried out sometimes, with a predominance of 66.7% in this group who rarely keep control of the resources, which shows certain limitations in the integration of both processes. The never and rarely categories present a reduced participation of 5.9% each. In relation to the statistical analysis, the value $p=0.228$ obtained in the Chi-square test indicates that a relationship is not identified between the record of environmental impacts and the accounting control of natural resources in the cooperatives evaluated as shown in table 5 and 6.

Table 5. Record of environmental impacts and control of natural resources.

Does your cooperative record the environmental impacts of its operations?	Is there accounting control of the natural resources used by the cooperative?			
	Sometimes	Rarely	Always	Total
Sometimes	1	4	1	6
Never	0	0	1	1
Rarely	0	1	0	1
Always	2	1	6	9
Total	3	6	8	17

Note. Frequency and percentage of responses about the recording of environmental impacts and the accounting control of natural resources ($n=17$).

Table 6. Record of environmental impacts and control of natural resources.

	Value	gl	p
X ²	8.146	6	.228
N	17		



Note. Relationship between combined variables evaluated with Chi-square ($p < 0.05$; $n = 17$)

Registration of social investments and incorporation of social criteria in financial reports: the results show that 52.9% of respondents indicate that social investments are always recorded, and within this group 77.8% also indicate that social criteria are always incorporated in financial reports, while 11.1% do so sometimes and 11.1% rarely, which reflects greater consistency in these practices. On the other hand, 47.1% state that social investments are sometimes recorded, where 50% also incorporate social criteria sometimes, followed by 25% who always do so and 25% rarely, which shows a less consistent application. In relation to the statistical analysis, the value $p = 0.088$ indicates that a relationship between both variables is not identified, despite the fact that a certain tendency of association is observed in the cooperatives as evident in table 7 and 8.

Table 7. Record of social investments and incorporation of social criteria in financial reports.

Are the social investments made by the cooperative recorded?	Does the cooperative incorporate social criteria in its financial reports?			Total
	Sometimes	Rarely	Always	
Sometimes	4	2	2	8
Always	1	1	7	9
Total	5	3	9	17

Note. Frequency and percentage of responses about the registration of social investments and the incorporation of social criteria in financial reports

Table 8. Relationship between social investments and social criteria in financial reports.

	Value	Gl	P
χ^2	4.869	2	.088
N	17		

Note. Relationship between the record of social investments and the incorporation of social criteria evaluated with Chi-square ($p < 0.05$; $n = 17$).

Measurement of CO₂ and energy consumption: the results show that the measurement of CO₂ emissions and energy consumption is already part of the management in several cooperatives, since 41.2% carry it out systematically and 35.3% occasionally, adding up to 76.5% that apply this type of practices at some level. This shows progress in the incorporation of the environmental approach within institutional management. However, there are still weaknesses, since 17.6% indicate that the measurement is carried out irregularly and 5.9% that it is not carried out, which reflects a lack of continuity and standardization. However, there is progress, the application is still not homogeneous, which can limit the quality of environmental accounting information and its usefulness for financial decision making (see figure 1)



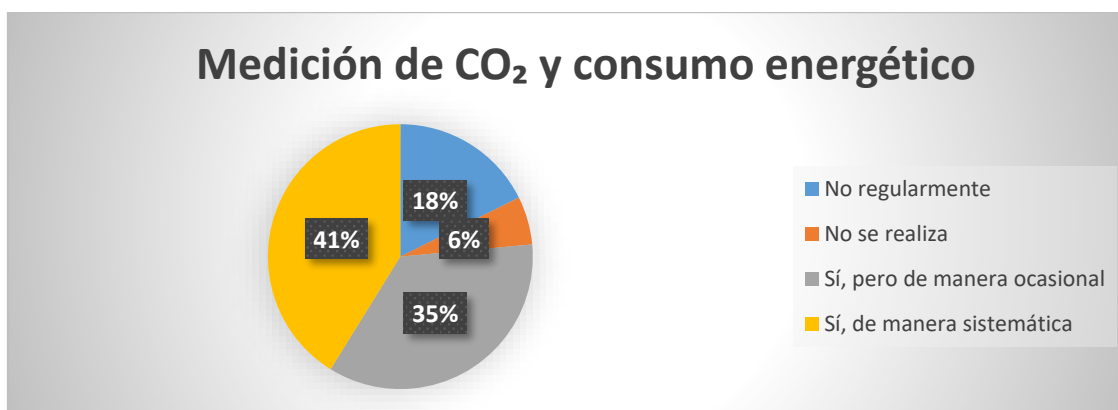


Figure 1. Measurement of CO₂ and energy consumption.

Note. Most cooperatives measure CO₂ emissions and energy consumption with differences in their frequency and level of application.

Application of ethical accounting principles: the results show that the application of ethical principles in the preparation of accounting information is a fairly widespread practice in the cooperatives analyzed, because 58.8% indicate that they are always applied and 35.3% that they are used on some occasions, reaching a total of 94.1%. This reflects a clear trend towards the use of ethical criteria in accounting processes. However, 5.9% indicate that they are rarely applied, which shows that there are still certain gaps in their constant application. In general, accounting ethics is present in most cases, it is still necessary to reinforce its continuous use to achieve greater consistency and confidence in financial information (see figure 2)

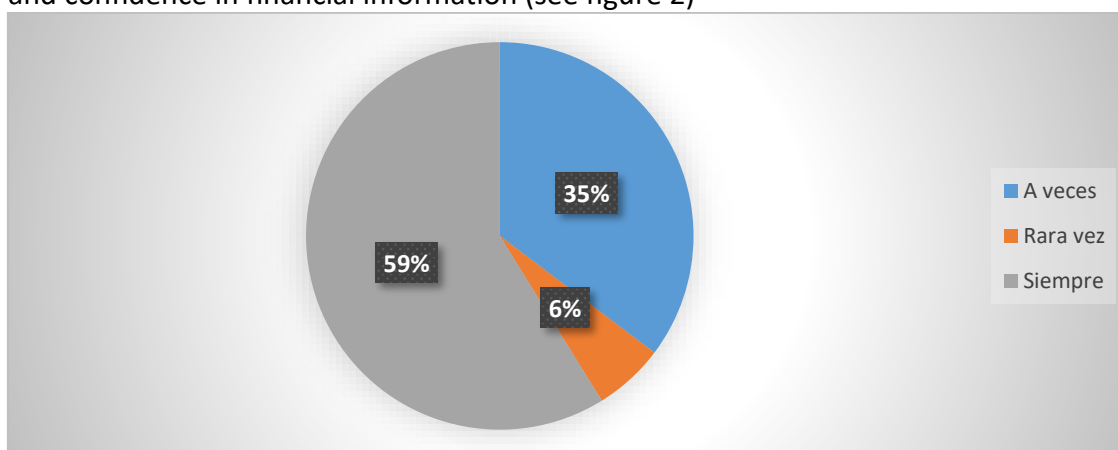


Figure 2. Application of ethical accounting principles.

Note. The application of ethical principles in accounting information predominates with variations in its frequency.

Variable normality analysis using the Shapiro-Wilk test

The normality analysis using the Shapiro-Wilk test shows that all the variables evaluated have p values lower than 0.05, ranging between <0.001 and 0.018, which leads, with statistical rigor, to the systematic rejection of the null hypothesis of normality in each of

the items analyzed. This behavior is consistent both in sociodemographic variables (age, gender, level of education, position and experience) and in those related to accounting, environmental and sustainability practices. The W statistics, which vary between 0.611 and 0.865, reinforce the evidence of deviations from a normal distribution, which can be attributed, in part, to the ordinal nature of the variables (Likert-type scales) and the small sample size ($n=17$) (see annex 1)

Relationship between variables using non-parametric statistics

This section examines the relationship between the study variables, environmental accounting and profitability, with the objective of determining both the intensity and the direction of their association. For this, Spearman's Rho correlation coefficient was used (see table 5)

The interpretation of the results of the Spearman's Rho coefficient (ρ) is based on two fundamental elements: the strength and direction of the relationship and its statistical significance. The value of ρ ranges between -1 and +1; values close to +1 indicate a positive relationship (both variables increase), values close to -1 reflect a negative relationship (one variable increases while the other decreases), and values close to 0 show no relationship. Regarding magnitude, coefficients between 0.00–0.29 are considered weak, 0.30–0.59 moderate, and ≥ 0.60 strong. However, to determine if this relationship is statistically valid, the p value is analyzed: if $p < 0.05$, the correlation is significant and can be generalized to the population; Otherwise, there is not enough evidence to affirm a real relationship as shown in Table 9.

Table 9. Relationship between environmental accounting, management and profitability.

Variable 1	Variable 2	ρ (Spearman)	p
P8: Control of natural resources	P6: Record of environmental impacts	0.429	0.086
P8: Control of natural resources	P18: Profitability (ROA/ROE)	0.115	0.660
P8: Control of natural resources	P9: Social investments	0.248	0.337
P8: Control of natural resources	P20: Environmental information in decisions	0.680	0.005
P8: Control of natural resources	P19: Optimization of resources	0.619	0.008
P6: Record of environmental impacts	P18: Profitability (ROA/ROE)	0.243	0.348
P6: Record of environmental impacts	P9: Social investments	0.441	0.076
P6: Record of environmental impacts	P20: Environmental information in decisions	0.612	0.015
P6: Record of environmental impacts	P19: Optimization of resources	0.234	0.367
P18: Profitability (ROA/ROE)	P9: Social investments	0.088	0.736
P18: Profitability (ROA/ROE)	P20: Environmental information in decisions	0.407	0.132
P18: Profitability (ROA/ROE)	P19: Optimization of resources	0.138	0.598
P9: Social investments	P20: Environmental information in decisions	0.377	0.165
P9: Social investments	P19: Optimization of resources	0.485	0.049

P20: Environmental information in decisions	P19: Optimization of resources	0.579	0.024
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Note. *Spearman's Rho coefficient (ρ); Relationships with $p < 0.05$ are considered significant.*

By carefully examining the results presented in Table 5, a fairly obvious pattern can be identified. On the one hand, there is a connection between the variables that are related to both environmental and operational management.

For example, when the cooperative carries out adequate management of its natural resources (P8), it also tends to use more environmental information when making decisions (P20) and to optimize its resources (P19). These connections are not only favorable, but also relevant, suggesting that they are not the result of chance, but reflect actual practices within organizations. In the same way, the environmental record (P6) is linked to the decision-making process, which shows that environmental accounting effectively adds value to internal management. However, when profitability is analyzed (P8), the situation transforms. However, some correlations are favorable, they are not of great relevance, which shows that it cannot be assured that environmental accounting is affecting economic results. In other words, cooperatives may be working with environmental and management aspects, but this still does not reflect a better level of profitability. Collectively, the findings indicate that environmental accounting improves and optimizes resources and helps cooperatives' administrative decision-making, although its impact on profit is not directly manifested in the economic parameters. The quantitative study, through the use of Spearman's Rho coefficient, validates the connection between ecological accounting and profitability, but does not present statistical significance, which results in the rejection of the proposed hypothesis. However, the connections of variables and the favorable trends between internal management show us that its contribution is located at the intermediate level of organizational performance, where it reinforces the processes to influence the final results.

Table 10. Technical approach.



Note. Logistic regression model ($p > 0.05$).

Qualitative Analysis

In order to strengthen the research and verify the proposed hypothesis, the qualitative study provided the understanding of this management through the actions in the cooperatives under study, who examine environmental accounting through the control of inputs and monitoring the use of resources such as paper, plastics and electricity. This

Independent Variable	Coefficient (β)	Standard Error	z value	p-value	Odds Ratio (OR)	95% CI (Bootstrapped)
P8: Control of natural resources	0.312	0.248	1.258	0.208	1.367	[0.812 - 2.014]
P6: Record of environmental impacts	0.187	0.221	0.846	0.398	1.206	[0.765 - 1.892]
P20: Environmental information in decisions	0.456	0.239	1.908	0.056	1.578	[0.987 - 2.451]
P19: Resource optimization	0.274	0.255	1.075	0.282	1.315	[0.793 - 2.087]
P9: Social investments	0.098	0.214	0.458	0.647	1.103	[0.712 - 1.689]
Constant (Threshold 1)	-1.872	0.612	-3.059	0.002	-	-
Constant (Threshold 2)	0.245	0.598	0.410	0.682	-	-

method promotes effectiveness and produces savings, which aligns with internal administration results. In a complementary manner, when applying the Ordinal Logistic Regression Model, several models were evaluated, the most relevant being the one that takes profitability as the dependent variable (P18) and the main dimensions of environmental accounting as explanatory variables (P8, P6, P20 and P19).

The results of the ordinal logistic regression model indicate that there is no statistically significant relationship between the majority of environmental accounting practices and the level of profitability of the companies analyzed. Specifically:

The coefficient of P8 (Control of natural resources) presented a positive value, but not significant ($p > 0.05$), suggesting that it cannot be stated that greater control of natural resources significantly increases the achievement of higher levels of profitability, although there is a positive trend.

The P20 variable of environmental information in decisions showed a strong coefficient close to significance, indicating that a better integration of environmental information in decision making could increase the probabilities of obtaining greater profitability, although this relationship does not reach the conventional principle of significance in the sample studied. The variables P6 recording of environmental impacts and P19

Resource optimization did not show significant effects on profitability. The bootstrapped confidence intervals confirmed the stability of the estimates, reinforcing the conclusion that the relationship between environmental accounting and profitability is weak in this context.

However, there is a disconnection with strategic processes and the lack of a broader evaluation of impacts that limit its scope, which helps to understand why its contribution does not translate into profitability. Jointly, a process is determined in which environmental accounting strengthens the operational base and opens possibilities for financial effects that need further evolution to be consolidated.

The analysis of the research reveals that the ecological requires importance when adding productivity. The deduction of costs becomes the main link between ecological actions and economic results, which relates this experience to eco-efficiency methods. Under this context, the focus is on immediate economic benefits, while a broader perspective of sustainability loses relevance. Environmental accounting is more often used as a resource for monitoring expenditures than as an aid in planning or formulating strategic decisions. Restrictions on the evaluation and measurement of information about the environment are observed within the inferential analysis. The overuse of paper shows established habits that have not yet been replaced by digital methods. This element shows obstacles related to culture in organizations and change management. The lack of advanced guides and guidelines prevents environmental information from playing a fundamental role in management, limiting its contribution to financial planning.

The results show that environmental accounting needs to be improved within the framework of the accounting system. The placement of indicators and the use of digital technologies would increase their effectiveness. The training of personnel, carrying out team training and the inclusion of these aspects in organizational planning would facilitate progress towards a more harmonious management where the economic and ecological are connected, have a broader focus and are assisted with decisions.

DISCUSSION

By synthesizing findings between the general business environment and cooperative management, it is established that the use of environmental accounting is no longer just an administrative burden, but rather comes from economic success. This positive synergy indicates that being able to detect the costs of ecology will allow optimizing the use of resources and correcting operating expenses. Environmental accounting has ceased to be a purely ethical issue and has become a direct driver of profitability and efficiency in production processes, where sustainability and economic benefit act as complementary dimensions (19). The ecology of financial statements not only strengthens the theoretical accounting framework, but also offers guidance so that these decisions are appropriate to ensure the value of the entity in the long term (20).

However, the empirical results of the research in the 17 savings and credit cooperatives of Ambato openly refute this theoretical position, by statistically demonstrating the absence of a significant relationship between environmental management and traditional financial profitability indicators (ROA and ROE).

This contrast with previous literature finds its explanation in the regulatory conditions and the market structure of the Ecuadorian cooperative sector. In Ecuador, the Superintendency of Popular and Solidarity Economy (SEPS) and current legislation impose fixed cost structures and rate regulations that curb the direct short-term benefit of operational efficiency on profitability. Thus, although the Ambato cooperatives manage to optimize operating expenses through resource management, this cost savings does not have a proportional effect on the ROA or ROE.

Internal efficiency manages to establish the basis of the operation, but its final financial impact is neutralized by regulatory rigidity, the lack of direct fiscal incentives for green accounting and a fragile strategic articulation that connects environmental savings with the generation of financial value (21).

Added to this market limitation is the structural problem of the "profile" of the traditional accountant. Under the framework of the International Financial Reporting Standards (IFRS) applied in the national context, socio-environmental facts continue to be neither standardized nor formally made visible in the balance sheets.

In this context, a phenomenon of neutralization of operational savings is evident, although companies manage to optimize internal resources through environmental accounting practices such as: better control of natural resources or optimization of consumption, this saving does not translate into a significant increase in Return on Assets (ROA). This occurs mainly because active and passive interest rates are strongly regulated by the Central Bank of Ecuador (BCE).

These regulations establish reduced and inflexible margins between the rates of raising and placing resources, which limits the ability of companies to financially capitalize on their operational efficiencies. In other words, although operating costs are reduced through more efficient environmental management, the low interest rate differential prevents these savings from being converted into greater financial profitability, neutralizing the expected positive impact on asset performance.

The explanatory distance for the effective implementation of environmental accounting in Ambato is not the disinterest of management, but the lack of cutting-edge internal policies and the lack of specific technical training in sustainable finance. Even so, the problem persists of transforming the usual "profile" of the accountant, which traditionally, due to many standards towards which the reports revolve, among them, the International Financial Reporting Standards (IFRS), still does not have standardized social and environmental facts or events. In fact, it seems that the explanatory distance for the implementation of environmental accounting is not disinterest, but rather the lack of types of internal policies or specific technical training on the environmental issue.

Consequently, information on social and environmental impacts, although it contributes to transparency, institutional reputation and long-term viability in an increasingly demanding and competitive environment, cannot be fully materialized in traditional financial indicators due to these structural restrictions of the Ecuadorian financial system (23).

The coincidence of these works indicates that environmental accounting has left aside what is expressed as a technical record to become a space for strategic and political dispute: in the cooperative field it is recognized as a generator of profitability and operational efficiency and in the social field it constitutes a tool of resistance known as counter-accounts, put into practice with respect to what social movements would be with regard to the questioning of official information and the inability of territorial damages.

The sample including environmental metrics not only responds to parameters for improving financial results, but also responds to an ethical request for transparency (18).

The integration of results shows that environmental accounting is no longer subject to being a purely technical record, but rather becomes the core of the political legitimacy and efficiency of the operation. But a key alignment is generated: although cooperatives and medium-sized companies optimize operating expenses through resource management, cost savings do not have a proportional effect on ROA or ROE, suggesting that progress in internal efficiency contributes to the foundation of the operation, but its financial impact is diluted due to the lack of strategic articulation and the rigidity of regulations (21).

The drive to use "counter-accounts" and thus give visibility to territorial impacts also shows that sustainability should not be considered dead weight, but rather an administrative benefit that protects reputation in critical markets. The challenge is to change environmental accounting from a basic input control tool to a value generation tool. Only through technical training is there the possibility of converting operational resilience into measurable financial resilience, in accordance with the democratic responsibility of the organization.

CONCLUSIONS

The promotion of operational management and internal decision making through environmental accounting does not translate into a direct improvement in financial profitability in the cooperatives studied. The positive connections between the control of natural resources and the use of environmental data for strategic decisions for resource optimization are not carried over to asset and equity performance indicators. This finding shows and refutes the initial hypothesis and shows that the internal efficiency formed by environmental practices is not yet shown in measurable financial results. From this perspective, sustainability tends to be a set of independent works that, as a global approach, since labor well-being and social investment are indicated in the reports without a real connection with financial management. This lack of articulation is

common in the environmental area, where energy and CO₂ emissions measurements are carried out without clear criteria and in an irregular manner, making it difficult for accounting records to show true control over natural resources. In short, as long as this information remains fragmented and lacks continuity, it cannot be incorporated into decision-making in the environmental or social area, limiting sustainability to specific actions that lose trustworthy and strategic notability.

Ethics in accounting, which is manifested in the creation of financial data, does not become an ecological metric which supports strategic planning. Currently, the ecological approach allows reducing the use of basic inputs through their supervision, without relating it to long-term financial decision processes. This lack of coherence between the ethical principle and daily operations highlights an opportunity for improvement in the consistency of the methods used.

Environmental accounting in Ecuadorian cooperatives is used as a means to promote short-term efficiency and expenses, not as a driver of profitability. In order for this practice to have a financial impact, it is necessary to train staff in sustainable management, develop environmental indicators linked to financial statements and replace manual processes with digital systems. This change would allow environmental accounting to become a great support for strategic decision making.

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Anexo 1

	Edad	Género:	Nivel de estudios:	Cargo que desempeña en la cooperativa:	Años de experiencia en la cooperativa:	¿Su cooperativa registra contablemente los impactos ambientales de sus operaciones?	¿Se realiza la medición de emisiones de CO ₂ y consumo energético?	¿Se lleva un control contable de los recursos naturales utilizados por la cooperativa?
Válido	17	17	17	17	17	17	17	17
Ausente	0	0	0	0	0	0	0	0
Media (Aritmética)	2.647	1.588	3.353	1.941	2.176	1.647	1.882	1.882
Desviación típica	1.057	0.507	0.493	0.556	1.131	0.862	0.928	0.928
Shapiro-Wilk	0.852	0.632	0.611	0.732	0.845	0.742	0.833	0.739
Valor P de Shapiro-Wilk	.011	< .001	< .001	< .001	.009	< .001	.006	< .001
Mínimo	1.000	1.000	3.000	1.000	1.000	1.000	1.000	1.000
Máximo	4.000	2.000	4.000	3.000	4.000	4.000	4.000	3.000

	¿Se registran las inversiones sociales realizadas por la cooperativa?	¿Se incluye información sobre bienestar laboral en los informes contables?	¿La cooperativa incorpora criterios sociales en sus reportes financieros?	¿Se evalúa el desempeño financiero considerando criterios de sostenibilidad?	¿Se integran criterios de sostenibilidad en la rentabilidad y planificación financiera?	¿La cooperativa realiza una asignación eficiente de recursos considerando impactos ambientales?
Válido	17	17	17	17	17	17
Ausente	0	0	0	0	0	0
Media (Aritmética)	1.471	1.941	1.647	1.412	1.412	1.765
Desviación típica	0.514	1.029	0.786	0.618	0.618	0.664
Shapiro-Wilk	0.642	0.802	0.752	0.678	0.678	0.792
Valor P de Shapiro-Wilk	< .001	.002	< .001	< .001	< .001	.002
Mínimo	1.000	1.000	1.000	1.000	1.000	1.000
Máximo	2.000	4.000	3.000	3.000	3.000	3.000

	¿Se aplican principios éticos en la elaboración de la información contable?	¿Existe un código de ética que guíe las prácticas contables y ambientales de la cooperativa?	¿La cooperativa cumple con normativas financieras y ambientales vigentes?	¿Cómo evalúa la rentabilidad de la cooperativa sobre activos (ROA) y patrimonio (ROE)?	¿La cooperativa optimiza sus recursos y costos considerando criterios ambientales?	¿La información ambiental influye en las decisiones estratégicas y en la planificación financiera?
Válido	17	17	17	17	17	15
Ausente	0	0	0	0	0	2
Media (Aritmética)	1.471	1.588	1.471	2.176	1.765	1.933
Desviación típica	0.624	1.004	0.624	0.951	0.752	0.799
Shapiro-Wilk	0.714	0.631	0.714	0.865	0.709	0.782
Valor P de Shapiro-Wilk	< .001	< .001	< .001	.018	< .001	.002
Mínimo	1.000	1.000	1.000	1.000	1.000	1.000
Máximo	3.000	4.000	3.000	4.000	4.000	4.000