The role of accounting as a driver of sustainability (SDG 12)

Alvarez, Santiago Camilo

UNCo, Neuquén, Argentina (santialvarez002@gmail.com)

Mansilla, Lucas Esteban

UNCo, Neuquén, Argentina (info.lucasmansilla@gmail.com)

Federico Julián Gas

UNCo, Neuquén, Argentina (federicogasu@gmail.com)

Flores, Francisco Daniel

UNCo, Neuquén, Argentina (fdanielfrancisco@hotmail.com)

Volpe, Richard Sebastian

UNCo, Neuquén, Argentina (volpesebastian92@gmail.com)

Abstract

This study analyzes the implementation of sustainable practices in five households over a five-month period, focusing on three axes: waste separation, use of reusable bags, and responsible consumption. Baseline and final surveys were administered, monthly follow-ups were conducted, and an economic exercise compared the cost of "non-responsible" purchasing options versus more sustainable alternatives. Results show that four out of five families reduced their use of single-use plastic bags to near zero, decreased weekly household waste, and increased waste separation. In addition, all families recorded economic savings associated with responsible consumption: the September analysis indicates an average saving of approximately 28–30% in the categories assessed. This suggests that consumption choices aligned with SDG 12 involve not only a lower environmental impact, but also household economic efficiency. Finally,

we propose that accounting can function as a pedagogical tool: quantifying waste avoided and money saved supports informed household decision-making and links day-to-day behavior with environmental and financial consequences.

Keywords: accounting; sustainability; consumption.

1. INTRODUCTION

Sustainable Development Goal 12 (SDG 12) proposes developing responsible patterns of consumption and production, reducing waste, promoting efficient resource use, and changing purchasing habits. This field is usually addressed through public policy, corporate responsibility, or environmental management frameworks, and increasingly relies on quantitative measurements of resource use to justify decisions (e.g., modeling consumption, forecasting demand, and assessing efficiency).

However, there is a specific gap: many of these strategies are designed for companies, municipalities, or large organizations, but are rarely measured with real data and systematic follow-up in the domestic sphere. Evidence is lacking on how a typical family's consumption and waste-management habits do—or do not—change when a direct and sustained intervention is made; and especially on translating those changes into economic terms that are understandable at the household level. In other words: we know we "should consume responsibly," but we do not always show how much environmental impact is reduced at home or how much money a family saves if they actually do so.

Our study addresses precisely this niche. Over five months we accompanied five families and tracked three practices: waste separation (WS), replacement of single-use plastic bags with reusable bags (RB), and responsible consumption (RC), understood as choosing alternatives with lower environmental impact and less discard. The objective is twofold: on the one hand, to show that SDG 12 can be operationalized at home with evidence, not only rhetoric; and on the other, to argue that the Public Accountant's perspective can serve as a bridge between sustainability and everyday decisions, transforming consumption and waste data into clear, usable economic information.

2. METHODOLOGY

General approach

The project adopts an applied, mixed-methods design (quantitative and qualitative), developed from the perspective of Place-Based Education (PBE) and Environmental Cost Accounting (ECA).

Its purpose is to promote and measure the progressive adoption of sustainable practices in the family environment, evaluating both behavioral changes and the economic impact derived from those practices.

The study is framed within Sustainable Development Goal (SDG) No. 12: Responsible Production and Consumption, and seeks to integrate accounting knowledge with applied environmental education.

Population and roles

The intervention was carried out with five convenience-sampled families representing real domestic contexts in which consumption habits are observed.

Group members (undergraduate Public Accounting students) performed two complementary roles:

- Awareness agents: design educational materials, guide the implementation of practices, and promote reflection on responsible consumption.
- Accounting analysts: systematize collected data, apply basic ECA criteria, and prepare the results reports.

Temporal and sequential design

The project spans five months, combining diagnostic, intervention, and final evaluation stages.

Each month focuses on a specific sustainable practice, allowing habits to be addressed gradually and cumulatively.

Table 1.

Temporary and sequential design, by month.

Month	Main focus	Main instruments	Data type

June	Diagnosis initial	Baseline survey (Google Forms)	Quantitative and qualitative
July	Waste separation (WS)	Educational video + weekly checklist	Quantitative, qualitative and perception
August	Reusable bags (RB)	Educational video + weekly checklist	Quantitative, qualitative and perception
September	Responsible consumption (RC)	Educational video + weekly checklist + uniform economic log	Quantitative, qualitative and economic
October	Final evaluation	Final survey (Google Forms)	Quantitative, qualitative and comparative synthesis

Justification of the progressive design

The methodological design is based on a sequence of gradual incorporation of sustainable practices rather than applying all of them simultaneously.

This decision responds to pedagogical criteria:

- It allows families to understand and assimilate each habit separately, consolidating learning before moving on.
- It avoids variable confusion and facilitates identifying each practice's impact.
- It sustains active participation and reduces tracking burden.

Although this approach means the three practices are not applied in parallel, it does not affect the project's reliability, since the analysis is oriented toward assessing the cumulative evolution of sustainable habits.

Data collection instruments

a) Surveys (June and October)

The baseline and final surveys measure the evolution of habits, level of knowledge, and perceptions of sustainable practices. Key questions are maintained in both stages to ensure comparability:

- Waste separation.
- Use of reusable bags.
- Responsible consumption.
- Perceived difficulty and perceived economic savings.

b) Monthly checklists

Each family completes a weekly log with simple, homogeneous indicators. Three common indicators are maintained every month:

- Number of trash bags per week.
- Perceived difficulty (Very difficult / Difficult / Easy / Very easy).
- Perception of economic savings (Yes / No / Not sure).

Additional indicators are added depending on the month's practice:

Tabla 2.

Indicators and method of measurement, by month.

Month	Specific indicators	Measurement type
July (WS)	- Effective waste separation (Yes/No) - % recycled (0–25–50–+50%)	Quantitative / Qualitative
August (RB)	- Number of single-use bags accepted - Uses of reusable bags (times/week)	Quantitative / Qualitative
September (RC)	- Price comparison between responsible and non-responsible products - Estimated monthly spending	Quantitative / Economic

c) Educational materials

Each month a video and short explanation are delivered by each group member to their respective family, accompanying the practice:

- July: Why use reusable bags?
- August: Why should we separate waste?
- September: Why consume responsibly?

The videos function as applied environmental education tools, designed to foster practical understanding, awareness, and family commitment.

Economic methodology for responsible consumption

For September, a uniform methodology was applied to quantify the economic impact of responsible consumption comparably across families.

a) Selected products:

1. **Beverages:** returnable vs. non-returnable.
2. **Cleaning:** refillable product vs. disposable/hard-plastic packaging.
3. **Personal hygiene:** solid or refillable product vs. conventional.

b) Family log:

Each family completed a table with prices and purchase frequencies for both options, calculating estimated monthly spending.

Category	Non-responsible option	Price ($)	Responsible option	Price ($)	Frequency (times/month)

c) Group processing:

Data were consolidated in a master spreadsheet that automatically calculates:

- Economic difference per family (NR − R).
- Average savings or additional cost (%).
- Percentage of families perceiving actual savings.

Perceptions of quality and willingness to maintain the change were also recorded to integrate the economic and behavioral dimensions.

Data processing and analysis

Survey and checklist results were compiled in a group tracking sheet with the following fields:

Family	Month	% separation	Bags per week	Difficulty	Perceived savings	Specific indicator	Economic savings ($)

Applied analysis:

- Descriptive statistics (percentages, means, trends).

- Comparison between baseline (July) and final survey (November).
- Estimation of average economic savings and perceived impact.
- Graphical representations of evolution (reduction in waste, bags, and spending).

Expected results

A sustained increase was expected in the adoption of sustainable practices, accompanied by a progressive reduction in the amount of waste generated and in the use of plastic bags. Likewise, an increase in the use of responsible products with favorable economic impact was projected, together with a consolidation of environmental awareness and a sense of individual responsibility. Finally, simplified accounting evidence was sought to demonstrate the economic benefit associated with adopting sustainable habits.

3. RESULTS

This section records the main results obtained from the actions carried out. Results are contained in: English Surveys

Population and data sources

Results were produced from five participating families (F1–F5), who completed:

- A baseline survey (June),
- Monthly checklists (July to September),
- And a final survey (October).

Sources include exported Google Forms records and the September family economic calculations (uniform RC exercise).

Overview

Results reflect sustained changes in three areas:

1. Waste separation (WS)
2. Reusable bags (RB)
3. Responsible consumption (RC)

Each practice was measured through subjective behavioral indicators (frequency) and objective measures (bags per week or economic savings).

In October in particular, savings were calculated by comparing NR (non-responsible) vs. R (responsible) prices in three product categories.

Qualitative results

Responses were coded as Never=1, Sometimes=2, Always=3, averaging values per family:

Table 3.

Qualitative results, by practice.

Variable	Baseline (JUNE)	Final (OCTOBER)	Change
WS	2.2	2.8	+0.6
RB	3.0	3.0	0.0
RC	2.2	2.8	+0.6

Interpretation:

- **WS** increased: several families moved from "Sometimes" to "Almost always."
- **RB** remained high and stable, suggesting previously consolidated adoption.
- **RC** grew, evidencing improved purchasing decisions, though not full adoption (3.0).

Waste generation (bags per week)

From weekly checklists, the number of trash bags each family put out was measured:

Table 4.

Average bags/week, per month.

Month	Average (bags/week)
July (WS)	4.4
August (RB)	3.6
September (RC)	3.8

Average reduction: 4.4 → 3.8 = −0.6 bags/week, equivalent to a 13.6% decrease.

Interpretation: after the WS intervention and subsequent months, the average weekly waste per family decreased slightly, showing an initial reduction with a slight later uptick (see Limitation 1).

Separation and recycling (WS month — July)

The percentage of recycled waste increased, especially in Family 4, which reached levels above 50%. Meanwhile, Family 1 maintained low levels of recycling, with intermittent progress. Family 2 showed intermittent advances in separation and recycling without sustained consolidation.

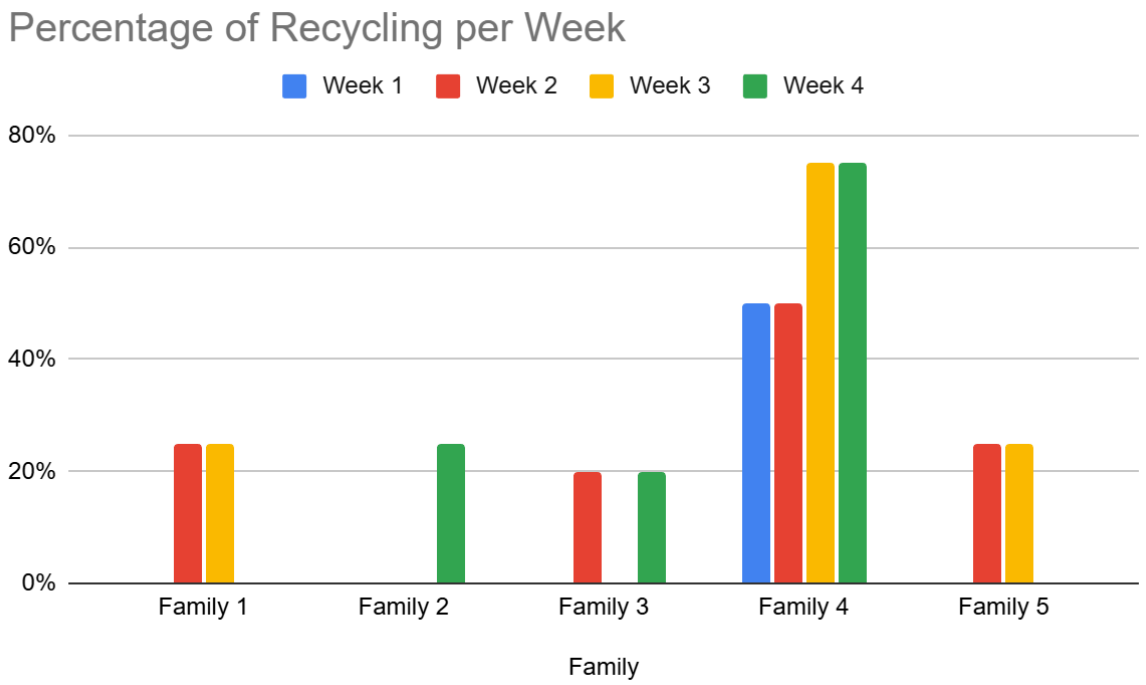

Figure 1: Percentage of recycled waste by family (July)

Separation and recycling (RB month — August)

During August, focused on the use of reusable bags, there was a significant reduction in single-use bags. Four out of five families used between 3 and 5 reusable bags per week, reflecting sustained adoption of more responsible practices.

Although the focus was RB, parallel improvements in waste separation were recorded. Families F3, F4, and F5 maintained or increased their recycling levels, while F1 and F2 showed more modest improvements. This suggests that the RB habit may be associated with greater environmental awareness, although no direct correlation between RB and WS was observed.

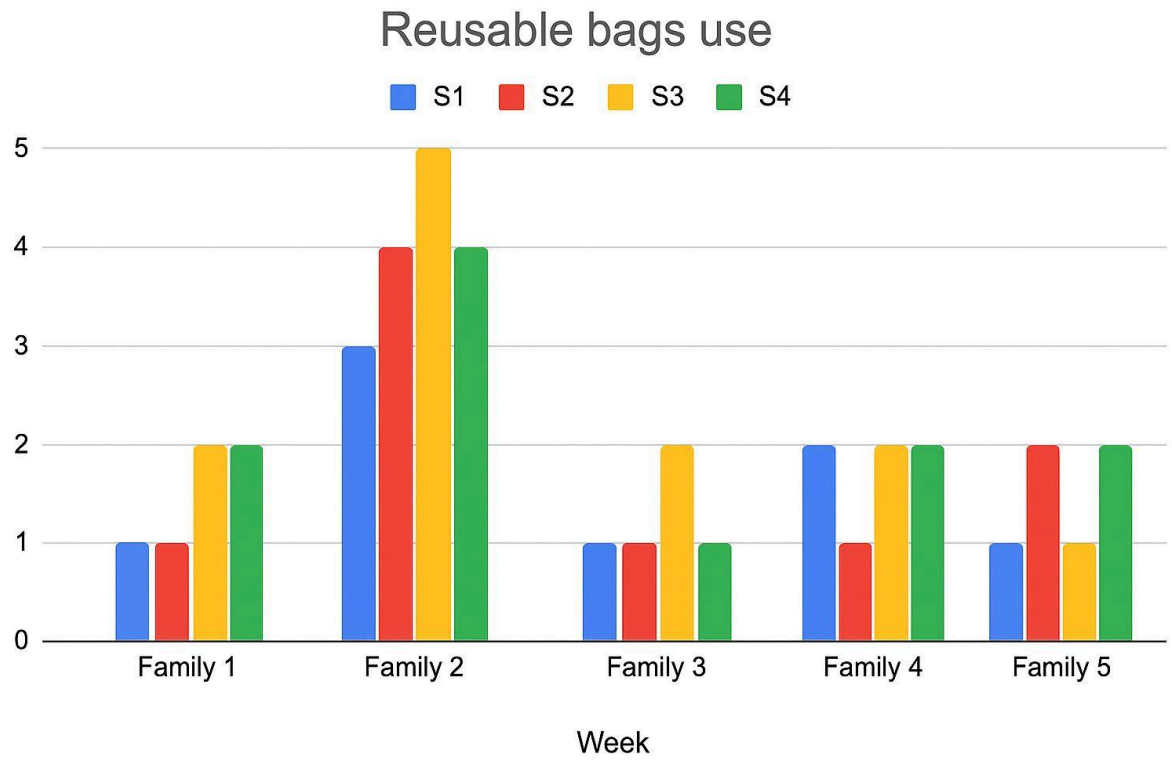

Figure 2: Use of Reusable Bags by family (August)

Economic impact (RC month — September)

In September, monthly spending with responsible (R) products was calculated versus non-responsible (NR) products in three categories: beverages, cleaning, and personal hygiene. Families accepted the challenge of acquiring responsible products during this month. The idea was that, while shopping, they would see the price difference between the NR product (usually purchased) and the R product (acquired during the month), recording these data to visualize the economic benefit (savings).

Table 5.

Monthly expenses, per family.

Family	Total NR spending	Total R spending	Monthly saving ($)	Monthly saving (%)
F1	$ 23.280	$ 16.750	$ 6.530	28.05%
F2	$ 45.300	$ 36.000	$ 9.300	20.53%
F3	$ 67.400	$ 51.900	$ 15.500	22.99%
F4	$ 38.840	$ 27.630	$ 11.210	28.86%
F5	$ 29.600	$ 16.920	$ 12.680	42.84%
Average			**$ 11.044**	**28.70%**

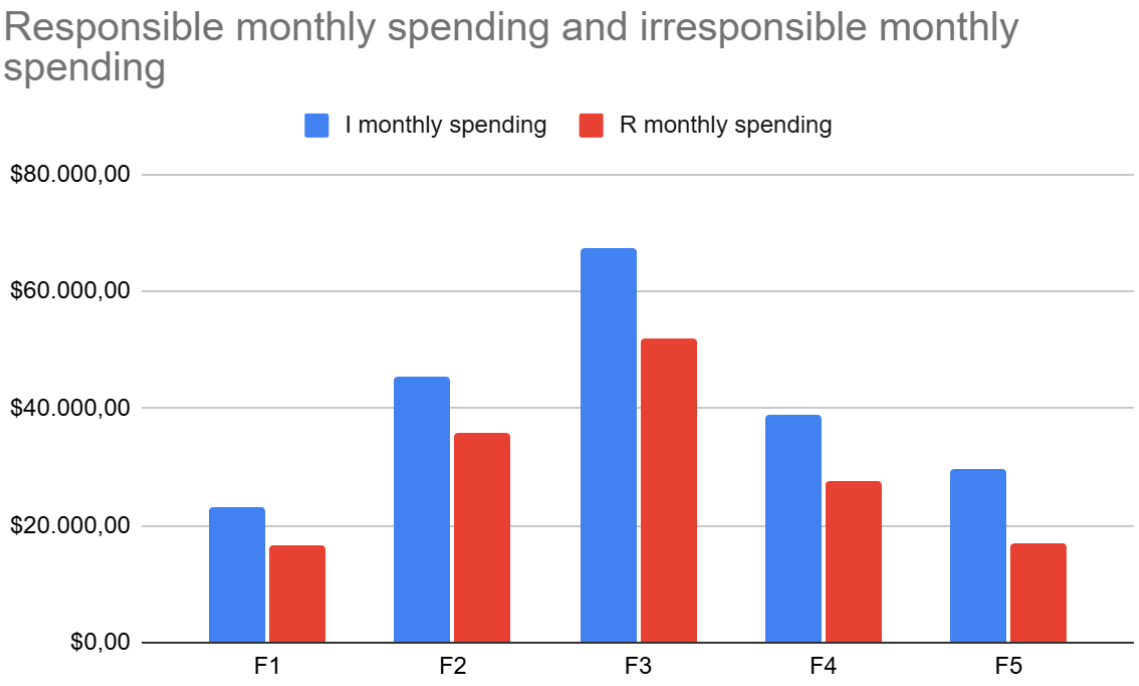

Figure 3. Percentage savings by family — Responsible Consumption (RC, September)

Interpretation:

The average saving was 28.7%, showing that responsible options not only reduce environmental impact, but also generate direct economic benefits.

Despite different consumption habits and spending levels, all families decreased their expenses when consuming responsibly.

The effect varies by consumption pattern, with F5 showing the highest savings (43%) and F2 the lowest (20%).

Relationships between variables

- Perceived ease → effective adoption: families who rated practices as "Easy" or "Very easy" showed higher WS and RC levels, in addition to concrete savings.
- WS and RB → waste reduction: improvements in separation and the use of reusable bags correlated with a decrease in total weekly trash bags.
- RC → savings: responsible consumption practices showed a direct relationship with reduced monthly family spending.
- RB and RC were not directly related, since reusable bag use was already consolidated prior to the intervention.

Survey comparison (June → October)

From June to October the following changes were observed:

- Trash bags/week: mean reduction from 4.4 to 3.8.
- Single-use bags: only one family virtually eliminated single-use bags; the others showed partial reductions.
- % recycled: F2, F3, F4, and F5 increased their recycling proportion.
- Responsible consumption: significant improvement in F2–F5, although not uniform or complete.

Limitations

1. Small sample size (n = 5 families) → limits generalization.
2. Some indicators were self-reported, potentially including perception biases (when feeling observed/measured, people may report the "socially correct" behavior rather than their usual one).

3. Monthly sequential design: each practice was addressed separately; cumulative effects may overlap.
4. Limited weekly measurements: some WS percentages used categorical approximations ("Few," "Most"), so they should be interpreted qualitatively.

Preliminary conclusions about the results obtained

The project revealed positive changes in the three dimensions analyzed:

- Reduction in trash bags and in single-use bags.
- Increase in effective recycling.
- Average economic savings of 28.7% from responsible products

Families F2–F5 adopted responsible practices in most items, albeit with variation in reuse frequency, while F1 requires greater reinforcement.

Taken together, the results suggest that applied environmental education at the domestic level can generate tangible environmental and economic impacts in the short term in similar contexts.

4. DISCUSSION

Comparison with previous studies

The results align with recent studies linking accounting education and environmental sustainability. In line with **Cho (2025)**, who argues that Place-Based Education enhances meaningful learning when students act in real contexts, our project confirmed that domestic application of sustainable practices enabled practical, transformative learning. This is consistent with the author's claim that everyday spaces can function as "living classrooms" capable of generating lasting changes in environmental behavior.

Likewise, our economic and behavioral findings directly relate to **Thongpaeng (2024)**, who showed that Environmental Cost Accounting (ECA) promotes more responsible resource-use decisions and reduces long-term costs. Similarly, our study evidenced that families applying sustainable practices—especially responsible consumption—achieved an average saving of 28.7%, providing empirical validation for the hypothesis that environmentally responsible actions can also be economically advantageous. However, unlike Thongpaeng's corporate-focused research, our domestic application shows that these principles can be effectively transferred to non-corporate contexts.

With respect to the circular economy, the results align with **Khajuria (2025)**, who emphasizes integrating reduce, reuse, and recycle (3R) strategies as axes of SDG 12. The increase in waste separation and the reduction in the number of weekly trash bags among participant families support this perspective, demonstrating that the gradual incorporation of the 3Rs in households produces concrete, measurable environmental benefits.

Overall, these findings confirm that combining place-based environmental education and sustainable accounting is an effective way to foster behavioral change, as argued by the authors analyzed.

Interpretation of the results

Key findings emerge that clarify the intervention's real impact. First, behavioral data show that sustainable practices can be learned, measured, and maintained over time when applied under a situated educational approach. The increasing scores in WS and RC confirm that gradual, guided exposure promotes stronger internalization of environmental behaviors. This suggests that the method used (one practice per month) was appropriate to enable progressive assimilation and avoid participant overload.

The results demonstrate two things. **First**, that accounting education with an environmental orientation can generate measurable changes in non-business contexts. **Second**, that these changes can be evaluated using simple indicators, reinforcing the method's practical applicability. In short, the findings confirm the hypothesis that accounting can serve as an accessible language to represent, record, and evaluate sustainability. (SEE)

Another relevant finding was the 13.6% reduction in the number of trash bags per week, an indicator that suggests improved material efficiency in households. This provides concrete evidence that separation and reuse practices not only transform habits, but also reduce resource pressure, aligning with accounting's logic of cost and waste reduction.

The economic analysis adds an additional finding: substituting conventional products with sustainable options resulted in an average saving of 28.7%. This confirms that sustainability can be integrated into economic logic without loss of efficiency. Moreover, it provides evidence that responsible practices lead to financial results comparable to or better than those obtained under traditional consumption habits. In this sense, the data broaden understanding of the link

between sustainability and household economics, providing empirical support for Environmental Cost Accounting principles.

In summary, these results suggest that the method applied (a combination of environmental education, accounting records, and impact measurement) produces improvements in both family behavior and economic perception.

Limitations and recommendations

The study has limitations that should be considered when interpreting results. The most relevant is the small sample size—five convenience-sampled families—preventing broad generalizations.

Another limitation relates to the **self-reported nature** of some responses, such as perceived difficulty or perceived economic savings, which may be affected by personal biases or by the desire to report socially acceptable behaviors. Likewise, the **sequential design**—one different sustainable practice per month—makes it difficult to isolate the specific effect of each action, since behaviors may have reinforced one another.

Additionally, the use of simple instruments (surveys and domestic logs) limited the inclusion of objective measurements (e.g., actual waste weight or energy consumption) that would have allowed for more precise quantification of environmental impact.

Future research should expand the sample and combine qualitative and quantitative methods, incorporating more robust environmental and accounting indicators. This would strengthen validity and help consolidate a replicable model that integrates accounting education with sustainable resource management in diverse contexts.

5. CONCLUSION

Taken together, our data show that, within a few months, four of the five families managed to reduce single-use plastic bags nearly to zero, lower weekly trash generation, increase waste separation, and adopt more responsible purchases that produced concrete economic savings (on average close to 28–30% per month in the categories analyzed), while the only family that did not consolidate all changes is identified as a specific area for improvement rather than a “failure” of the model; this confirms that the intervention was not only formative, but also operational: it changed real habits and left numerical evidence of that change. These results close the report by showing that sustainability, when worked on in a domestic context with close follow-up, not only

contributes to SDG 12, but also opens a direct application space for the Public Accountant's profession: using basic accounting criteria (recording, comparison, percentage variation, projection) to translate environmental practices into clear economic information that helps families decide what to buy, how to manage their waste, and how much they are saving; that is, the accountant's professional role is not limited to certifying companies' financial statements, but can also include designing and communicating household-scale sustainability reports that link behavior, cost, and environmental impact reduction in a measurable, verifiable way.

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We express our gratitude to the participating families, whose commitment and collaboration were fundamental to the development of this project. Their willingness to adopt and maintain sustainable practices at home allowed us to transform theoretical concepts into concrete experiences, adding real value to the results obtained.

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