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**Research Article**

# Environmental Cost Accounting Practices of Restaurants

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**ABSTRACT**

Restaurants in Urdaneta City, Pangasinan encounter difficulty in sustainability because of their limited knowledge about and inconsistent application of Environmental Cost Accounting (ECA) methods on some of their main operations like waste disposal, utilities management, and emissions output. Anchored on Sustainable Development Goals (SDGs) 1 (No Poverty), 2 (Zero Hunger), and 3 (Good Health and Well-being), this study looked into the ECA practices of small and medium-sized restaurants situated in selected barangays such as, San Vicente, Nancayasan, Anonas, Cayambanan, Camantiles, and Santo Domingo. Using the descriptive quantitative research, the 30 registered restaurant establishments built the sample size. Restaurant owners or supervisors who have knowledge of daily operations and functional basis with regards to environmental responsibility or practices were the respondents of the study. Collected data were analysed to find out the level of implementation of ECA on waste disposal, utilities management, and emissions output. Statistical analysis was also used to determine the relationship between business profile and ECA factors. Results showed that most of the restaurants have only tried doing business for not more than six years and are generally employing not more than ten workers. ECA practices are generally implemented and among the three indicators, it is utilities management that showed the highest rating, followed by waste disposal and emissions output. There is no correlation between business profile variables and ECA. Suggesting greater awareness, commitment, and personal considerations rather than business capabilities pronounced ECA practices in Urdaneta city restaurants. An instructional brochure was developed based on the findings aimed to create awareness on ECA where general use would improve the long-term efficiency and competitiveness of the industry without compromising the environment.

***Keywords***: *Emissions Output, Environmental Cost Accounting (ECA), Utilities, Waste Disposal*

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## Background

The establishment of restaurants is rapidly growing both economically and environmentally, however, the speed of the restaurant industry's expansion has generated an increasing amount of pressure on the environment. The restaurant industry has contributed substantially to local economies and job creation, particularly near transport terminals, schools, and residential neighborhoods where many small and independently operated foodservice businesses exist. While these contributions to the economy and the creation of jobs are very positive, restaurants also have an adverse environmental impact due to their very high daily consumption of energy and water and their generation of a large amount of waste and emissions.

Small and medium-sized restaurants demonstrate a greater level of environmental impact due to a limited or non-existent formalized system for measuring or managing those impacts. Environmental Cost Accounting (ECA) provides a structured process to include environmental issues in business decision-making. It consists of all activities that identify, measure, and control the costs of waste disposal, utilities consumed, and emissions generated by a restaurant or foodservice operation. Through the implementation of ECA, restaurants will be able to improve the efficiency with which they utilize resources and decrease their operating costs, while at the same time developing sustainable business practices. However, very few small restaurants use formal ECA systems. Instead, the system in place for making business decisions is often based on past experiences or informal methods.

Due to the large number of restaurants currently located in Urdaneta City, Pangasinan, it is necessary to study how these restaurants are currently managing their environmental costs. The purpose of this research study is to identify the current environmental cost accounting practices of a sample of restaurants as they relate to waste disposal, the use of utilities, and emissions generated by the businesses. The researcher also intends to determine if the environmental cost accounting practices of the restaurants are related to certain variables associated with the business profile, and to recommend how the restaurants can improve their environmental cost accounting practices to operate in a more sustainable manner.

## Methods

### *Research Design*

This study utilized a descriptive quantitative research design to investigate Environmental Cost Accounting practices among restaurants in Urdaneta City, providing an opportunity to analyze the data and gain insight into actual practices.

### *Population and Sample*

The population was composed of registered small and medium sized restaurants in the Urdaneta City. Out of a formal list of 89 restaurants received from the Business Permits and Licensing Office (BPLO), a sample of 30 restaurants were selected by excluding themed restaurants as buffets, samgyeopsal, and restobars. The respondents were the owner or the supervisor of the restaurant that possessed a good understanding of the operations and the environmental concerns. For convenience purposes, the researchers used convenience sampling and, therefore, selected participants based on their willingness and ability to participate in the study. The data were collected on selected barangays, San Vicente, Nancayasan, Anonas, Cayambanan, Camantiles, and Santo Domingo, to ensure a manageable and focused study area.

### *Data Collection*

A structured questionnaire checklist was used to collect the data which consisted of two parts. The first section includes questions that relate to business profile, the second part require the respondents to rate the Environmental Cost Accounting practices on issues related to waste disposal, utilities and emissions output using a 4-point Likert scale. The questionnaires were distributed personally so that the researcher could ensure understanding by the respondents and provide assistance to them, when necessary.

Before data collection occurred, two internal experts in accounting, Ms. Yverine Vianessa O. Garcia, MBA, LPT; Mr. Claiver C. Soriano, MBA, LPT, and one external expert in sanitation and environmental health; Ms. Ann Fritzi B.

Nacis, Sanitation Inspector IV from the City Health Office of Urdaneta City, Pangasinan validated the instrument for content validity, clarity, and alignment to study objectives and provided recommendations to enhance the instrument.

To test the reliability of the instrument, a pilot test was conducted on restaurants who possessed similar characteristics to the sample population, resulting in a Cronbach's alpha of 0.801, above the acceptable level of internal consistency.

***Data Analysis***

The analysis of data was conducted through the compilation of counts of frequencies, and percentages for business profile of the respondents, and through average weighted means for assessing the level of Environmental Cost Accounting (ECA) practices with respect to waste disposal, utilities and emissions. Statistical computations of the variables relationships to each other were made using pearson correlation coefficient (r) to determine whether there were any significant relationships between the business profiles and the Environmental Cost Accounting (ECA) practices. All statistical computations utilized with respect to the evaluated sample of the research study were conducted by utilizing Jamovi software to ensure accurate processing of results.

## Result and Discussion

*Table 1. Business Profile of Restaurants*
*n = 30*

| Variables | Indicators | Counts | Percentage (%) |
|---|---|---|---|
| **Number of years in Business Operations** | 1-5 years | 19 | 63 |
| | 6-10 years | 5 | 17 |
| | 11-15 years | 1 | 3 |
| | 16-20 years | 3 | 10 |
| | Others please specify | 2 | 7 |
| **Number of Employees** | 1-10 employees | 24 | 80 |
| | 11-20 employees | 3 | 10 |
| | 21-30 employees | 2 | 7 |
| | Others please specify | 1 | 3 |
| **Average Monthly Revenue** | Less than 100,000 | 16 | 53 |
| | 100,001-200,000 | 4 | 13 |
| | 200,001-300,000 | 3 | 10 |
| | 300,001-400,000 | 2 | 7 |
| | More than 400,000 | 5 | 17 |
| **Estimated Monthly Expenses** | Less than 40,000 | 10 | 33 |
| | 40,001-60,000p | 9 | 30 |
| | 60,001-80,000 | 1 | 3 |
| | 80,001-100,000 | 7 | 23 |
| | Other please specify | 3 | 10 |

Table 1 indicates the profile of restaurants in Urdaneta City in terms of years of operation, number of employees, average monthly revenue, and estimated monthly expenses. The outcome is that most of the restaurants are relatively new, 63% of the restaurants were within the 1-5 years range and only 3% were in the 11-15 years bracket. The fact that most of the locally owned restaurants are comparatively new reveals that the restaurants of the Urdaneta City are dominated by small and new businesses. Some of the restaurants may experience operational issues at the early stage including limited capital, fluctuating demand and higher operating costs, as experienced by small and medium enterprises in the food service sector (Najib et al., 2021).

In terms of workforce size, 80% of the restaurants have 1–10 workers while, only 7%, have 21–30 employees. This reflects businesses with tightly-held concerns that seek to maintain labour cost efficiencies according to industry expectations, as many small restaurants naturally run with minimal staff to reduce overhead and become more flexible in schedule choices while also keeping efficiency in the day to day functions. With regard to business income, over half of the restaurants 53% generate a business income of less than ₱100,000 a month with only 7% generating between ₱300,001 and ₱400,000 a month. This states that most restaurants earn at the low end of the modest income scale with very few demonstrating they have the potential to compete at the highest level of the market. An increase in revenue rates can be seen as a sign of a strong brand, stable quality of products, and positive interaction with customers (Najib et al., 2021).

Regarding estimated monthly costs, 33 percent of restaurants report costs less than ₱40,000, with only 3 percent reporting costs within the ₱ 60,001-80,000 range. It is an indication that a large number of restaurant owners have reasonably low operating expenses relative to relatively low revenue levels. This can be blamed on the fact that cost-control measures like proper resource utilization, inventory control, and operational adjustments are in place and are currently practiced in the food service industry (Melchor et al., 2025). In general, the results indicate that small, comparatively new restaurants prevail in the local industry and are dependent on adaptive and cost-effective practices of management. Nevertheless, this also suggests that the operational performance is more likely to be influenced by the managerial decisions and practices rather than business size, which is also applicable when considering how sustainability-related practices, including Environmental Cost Accounting can be implemented.

*Table 2. Environmental Cost Accounting Practices of Restaurants in terms of Waste Disposal*

*n = 30*

| Indicators | Weighted Mean | Descriptive Equivalent |
|---|---|---|
| 1. Uses separate bins for paper, plastic, glass, and food waste to improve recycling and help monitor how much is spent on each type of waste. | 3.83 | Highly Practiced |
| 2. Monitors and records the amount of waste produce, such as leftover food and used packaging, on a daily or weekly basis. | 3.43 | Practiced |
| 3. Uses compostable or biodegradable containers, cups, and plates to reduce landfill waste while keeping track of packaging costs. | 3.50 | Highly Practiced |
| 4. Uses metal utensils for dine-in to reduce plastic waste and lower utensil expenses. | 3.90 | Highly Practiced |
| 5. Uses leftover ingredients to make stocks or reuses them instead of throwing them away, helping reduce food waste and save on ingredient and disposal costs. | 2.13 | Slightly Practiced |
| 6. Cleans and checks waste bins regularly to keep the area sanitary and manage cleaning and maintenance costs. | 3.93 | Highly Practiced |
| 7. Works with recycling or composting services to handle waste properly while comparing those service fees with landfill costs. | 3.23 | Practiced |
| **Overall Weighted Mean** | **3.42** | **Practiced** |

The results reflected in Table 2 indicate that with a focus on sanitation related ECA practices, the preparation and hygiene of restaurants in Urdaneta City, and the routine maintenance of waste bin checks obtained the highest information weighted mean of 3.93 and was interpreted as Highly Practiced, shows that visible daily sanitation practices are practiced since such activities are generally associated with hygienic practices, customer perception and control, and day-to-day operation.

The lowest scoring indicator was the reuse of leftover ingredients to create stocks or other food, which had a weighted mean of 2.13, which is interpreted as Slightly Practiced. This signals that the food waste reduction practices could be regarded as weak in comparison to other fundamental activities' waste management practices. In the Urdaneta City-specific context, this can be attributed to such features of operations as standardised serving, variability in the number of customers, less systems to recover food waste and staff not being trained on how to properly manage stock items and safely reuse them. In addition, the average restaurant might emphasise sanitation and ease of disposal over food waste monitoring practices which appear to require more frequent records and more robust operational planning.

In conclusion, with a weighted average of 3.42 that is interpreted as Practiced indicates the waste disposal practices tend slightly to be cleaner and compliant than proactive waste minimization. As mentioned, the apparent measures of hygiene and cleanliness compliance may not be yielding sustainable results in the end as can some food waste prevention activity for food service organisations (Filimonau et al., 2020). This begins to condense the food waste management system that will increase environmental value and efficiency by optimising resource use in restaurants (Olekanma et al., 2024).

*Table 3. Environmental Cost Accounting Practices of Restaurants in terms of Utilities*

*n = 30*

| Indicators | Weighted Mean | Descriptive Equivalent |
|---|---|---|
| 1. Uses LED lights, energy-efficient kitchen appliances, and air conditioners to lower electricity use while cutting down on energy costs. | 3.67 | Highly Practiced |
| 2. Adjusts temperature settings during busy and slow hours to save electricity and manage power expenses more effectively. | 3.77 | Highly Practiced |
| 3. Installs water-saving tools like low-flow faucets and checks for leaks regularly to reduce water bills and avoid costly repairs. | 3.43 | Practiced |
| 4. Uses induction cooktops and electric equipment to cut back on gas use, improve energy efficiency, and manage cost differences. | 2.97 | Practiced |
| 5. Trains staff to save energy and water as part of daily routines, helping reduce waste and lower utility expenses. | 3.97 | Highly Practiced |
| 6. Regularly checks monthly water and electricity bills and uses a logbook or computer to track consumption and reduce costs. | 3.90 | Highly Practiced |
| 7. Maintains appliances and fixtures regularly to keep them running efficiently and control energy and water-related repair costs. | 3.80 | Highly Practiced |
| **Overall Weighted Mean** | **3.64** | **Highly Practiced** |

Table 3 shows that the highest-ranking indicator was "Trains Staff to Save Energy and Water as Part of Daily Routines Helping to Reduce Waste and Utilities Expenses" with a weighted mean of 3.97 that was interpreted as Highly Practiced. This implies that the mode of training the staff members of restaurants in the Urdaneta City is through training their staff. It is felt that not only reducing unnecessary energy and water consumption but also accompanying the environmental responsibility and long-term cost savings is people getting involved in conservation.

In contrast, the lowest-scored indicator was "Uses induction cooktops and electric equipment to cut back on gas use, improve energy efficiency, and manage cost differences" which received a weighted mean of 2.97. This tells that restaurants may be aware of energy efficient technologies, but actual adoption remains limited likely due to financial constraint and incompatibility with current operating systems; this is the reality of small- and medium-sized enterprises aiming to integrate sophisticated sustainable technology into their daily operations.

With an overall weighted average of 3.64, the use of utility management methods by Urdaneta City restaurants was mostly centered on behaviour rather than technology; this correlates to previous studies showing that fate of small medium enterprises (SMEs) is affected by lack of both structural and economic support to adopt sustainable technologies (Olekanma et al., 2024; Privat & Guerrieri, 2024).

*Table 4. Environmental Cost Accounting Practices of Restaurants in terms of Emissions Output*

*n = 30*

| Indicators | Weighted Mean | Descriptive Equivalent |
|---|---|---|
| 1. Cooks with energy-saving appliances like air fryers and efficient ovens to reduce electricity use and lower emissions-related utility costs. | 3.30 | Practiced |
| 2. Uses kitchen ventilation systems such as range hoods, fans, and filters to maintain good air quality while managing emissions and maintenance expenses. | 3.77 | Highly Practiced |
| 3. Buys ingredients from local sources when possible to reduce transportation emissions and control delivery and sourcing costs. | 3.67 | Highly Practiced |
| 4. Switches to eco-friendly fuel options like biogas or coconut-shell briquettes to reduce harmful emissions and track fuel cost efficiency. | 2.60 | Practiced |
| 5. Trains staff on low-emission practices to lessen environmental impact and reduce day-to-day emissions-related costs. | 3.40 | Practiced |
| 6. Schedules bulk deliveries or works with eco-friendly couriers to reduce trips, lower emissions, and keep delivery costs in check. | 3.50 | Highly Practiced |
| 7. Works with local agencies or environmental groups to improve emissions practices while reviewing the costs of environmental programs and partnerships. | 3.17 | Practiced |

The findings on Table 4 shows how the restaurants of Urdaneta City control the emission using Environmental Cost Accounting (ECA) practices. The highest rated indicator is, "Uses kitchen ventilation systems like range hoods, fans, and filters to maintain good air quality and saves on emissions and maintenance costs", which has a weighted mean of 3.77 which translates into Highly Practiced capacity. It is an indication that restaurants are attending to duly disposed pollution or better circulation of

the air to ensure healthy working environment of workers and success of businesses.

On the other hand, the lowest-rated indicator "Switches to eco-friendly fuel options such as biogas or coconut-shell briquettes to reduce harmful emissions and monitor fuel cost efficiency yielded a weighted mean of 2.60, which is interpreted as Practiced, which shows that though restaurants are aware of the need to reduce emissions, they have limited choices of alternative fuel due to cost, availability, and operational requirements.

An overall weighted mean of 3.34, interpreted as Practiced, suggests that ECA practices related to emissions in restaurants are moderately practiced. The activities of hospitality are generally based primarily on practical measures, which are taken to control the emissions through ventilation systems and simple working processes.

Although numerous restaurants possess some fundamental understanding regarding emissions reduction, many do not apply the newest or most sustainable fuel alternatives generally due to structural barriers and limited capital resources for small and medium size businesses. Prior research regarding sustainable transitions in SMEs identified many constraints preventing SMEs from using advanced low emission and/or environmentally sustainable energy systems, such as limited financial resources, lack of business focus, and limited access to low-emission and environmentally sustainable technologies (Olekanma et al., 2024; Privat & Guerrieri, 2024). Further, research on energy efficient practices suggests that although SMEs view energy efficiency measures as having value, they are dissuaded from using advanced energy saving practices because of their expense and difficulty of implementation (Privat & Guerrieri, 2024).

*Table 5. Summary of the Environmental Cost Accounting Practices of Restaurants in Urdaneta City*

*n = 30*

| Variables | Overall Weighted Mean | Descriptive Equivalent |
|---|---|---|
| 1. Waste Disposal | 3.42 | Practiced |
| 2. Utilities | 3.64 | Highly Practiced |
| 3. Emissions Output | 3.34 | Practiced |
| **Grand Overall Weighted Mean** | **3.32** | **Practiced** |

Table 5 shows the result of summarizing the extent of the restaurants in Urdaneta City's involvement in Environmental Cost Accounting (ECA) practice, specifically waste disposal, utilities, and emissions output. Of the three areas, the highest weighted mean score was given to waste disposal with 3.42, indicating that restaurants generally practice simple environmentally responsible actions like waste segregation, recycling a few items and using biodegradable materials. There are several factors that affect the degree of waste segregation such as raising public awareness, giving public attention through public notices on the issue of waste disposal; as most of the restaurants are in close proximity of schools, transportation hubs and shopping strips, these areas have high quantities of waste. Although waste disposal had the highest score of all three categories investigated, all of the ECA practices listed above were considered to be compliance versus an institutional commitment to sustainability as a restaurant business practice.

The emissions output follows waste disposal with a weighted mean score of 3.34, indicating that, although restaurants are moderately committed to reducing emissions to the environment or to indoor air emissions, their ability to successfully do so is limited. Some of the restaurants manage indoor air and/or fuel emissions by ensuring proper ventilation and keeping track of the amount of fuel used to cook their food; however, the implementation of air emission reduction measures is limited due to the costs related to using cleaner or more energy-efficient technologies, many restaurants still cook with traditional cooking equipment using traditional fuels because these technologies are more affordable and easier to find. This is a typical example of local companies prioritizing economic survival and cost efficiency

over improving their environmental performances.

Utilities (including energy and water conservation practices) had the lowest weighted mean score of 3.19, but are still classified as being "practiced." Specifically, restaurants employed staff to remind their employees about conserving resources, had performed basic maintenance on their appliances, and used informal methods of monitoring utility consumption; however, the utility conservation procedures were not always consistent with each other across the restaurants that employ the procedures. Many of the conservation measures that the restaurants implement often rely on the initiative of the owners rather than through standardized systems of implementation. Such inconsistency could suggest a lack of awareness of ECA principles as well as a lack of access to energy-efficient technologies and formal sustainability training for small restaurant operators in Urdaneta City.

The grand weighted mean of 3.32 for all three ECA practice categories indicates that firms exhibit ECA practices but have engaged with them as a matter of daily operations rather than a strategic integration of the practices into their operating strategies as a means of being responsible capitalists. Additionally, the lack of statistically significant relationships between the ECA practice category scores and business profile variables of size, age, and revenue, suggests that the barriers to adopting sustainable business practices are more reflective of an owner's or manager's mindset and developmental orientation towards sustainability. The findings suggest, therefore, that even small-sized restaurants will adopt environmentally responsible methods of conducting business if they prioritize sustainability as a decision-making activity.

*Table 6. Relationship Between the Business Profile of Respondents and Their Level of Environmental Cost Accounting Practices*

*n = 30*

| Profile Variable | $X^2$ Value | Df | p-value | Decision on $H_0$ |
|---|---|---|---|---|
| 1. Years in Business Operation | 4.31 | 4 | 0.366 | Accepted |
| 2. Number of Employees | 2.73 | 3 | 0.436 | Accepted |
| 3. Average Monthly Revenue | 3.32 | 4 | 0.505 | Accepted |
| 4. Estimated Monthly Expenses | 3.15 | 4 | 0.533 | Accepted |

Table 6 suggests that the business profile of restaurants in Urdaneta City do not significantly explain levels of ECA practices since all p-values were not significant at 0.05 significance level. Years in business operation (p = 0.366), number of employees (p = 0.436), average monthly revenue (p = 0.505), and estimated monthly expenses (p = 0.533) are not significantly associated with the level of ECA practices. In other words, the age, size, revenue, and expense level of the sampled restaurants do not significantly give account to the differences seen in the ECA implementation.

This result also supports the leadership argument in this study. Because ECA practices are independent of business profile, the adoption of sustainability cannot simply be just about budget capacity, size of restaurant, or length of operation. Managerial determination is the leading driver of sustainability, a restaurant with minimal revenue or few employees can certainly practice waste segregation and monitor utilities, or train employees in this area, or mitigate emissions, when owners or supervisors deliberately know and choose to implement them. On the contrary, a larger restaurant or one that earns higher revenues could still exhibit inadequate ECA practices if sustainability implementation is not a conscious factor in its everyday decisions. Environmental responsibility is a leadership decision that is conditioned by awareness, commitment, and operational disciplines rather than merely by the business profile.

## Conclusion

The results of this study indicate that Environmental Cost Accounting are already being

conducted in restaurant in Urdaneta City, although mostly in an informal matter. Aspects of sustainability, more so in the areas of waste management and utility usage being sustainably done, are applied to varying extent without previously being defined to be ECA.

One of the significant points of this study is that sustainability is self-determined not by the wealth of a business nor by its size, but instead, by how its owners and managers decide to operate. Restaurants with more active and concerned management tend to apply them in a more standardized way.

There is still a lot of room for improvement however since food waste reduction and exploring renewable energy sources are still challenges by realities like, consumer demand, pests, food safety threats and local supply limitations and infrastructures.

The overriding issue that will help improve Environmental Cost Accounting of local restaurants seems to be more awareness and practical direction and, most of all, strong managerial leadership. The data suggest sustainability practices are embraced best when owners and managers are proactive in orchestrating daily activities and decisions regarding the priority of environmental stewardship. With leadership in mind small to medium size restaurants can begin to factor in more and more sustainable practices into their full operation slowly and consistently until they become a part of normal day operations.

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