

Original Article

Green Technology Adoption in Dumaguete City Restaurants

Maricel B. Fontejon

Author Information:

Saint Paul University, Dumaguete City,
Negros Oriental, Philippines

Corresponding Author:

fontejonmaricel56@gmail.com

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Abstract. The hospitality industry's growing environmental impact necessitates adopting sustainable practices, particularly in restaurant operations. Despite growing awareness, empirical studies have examined the extent of green technology adoption in local restaurant settings only to a limited extent. This study evaluates the level of green technology practices among restaurants in Dumaguete City and identifies the challenges influencing their implementation. Specifically, it examines practices in terms of energy conservation, waste management, water conservation, operational efficiency, and cost-saving measures. A descriptive-correlational research method was employed, followed by a structured survey design administered to $n = 45$ restaurant personnel. Data were analyzed using frequency, percentage, mean (M), and Spearman's rank correlation (r). Findings indicate a high level of implementation in waste management ($M = 4.09$) and operational efficiency ($M = 4.09$), and a very high level in water conservation ($M = 4.27$). Energy conservation ($M = 3.77$) and cost-saving measures ($M = 4.02$) were also highly practiced. However, high initial cost ($M = 3.51$) and limited awareness ($M = 3.37$) remain significant barriers. Results further reveal a significant relationship between respondents' education and their adoption of green technologies ($p < .05$), while position was found to have no significant relationship. The study concludes that while green technology adoption is evident, financial and knowledge constraints hinder full implementation. It recommends strengthening policy incentives, training programs, and awareness campaigns to enhance sustainable practices in the restaurant industry. These findings imply that advancing green technology adoption in the restaurant sector requires not only organizational commitment but also stronger institutional support, targeted capacity-building initiatives, and accessible financing mechanisms to overcome economic and knowledge-related barriers.

Keywords: *Environmental sustainability; Green technology adoption; Hospitality management; Operational efficiency; Restaurants*

The increasing environmental impact of the hospitality industry has intensified the need for sustainable operational practices, particularly in the restaurant sector. As global tourism and food service activities continue to expand, restaurants are recognized as significant contributors to environmental degradation through high energy consumption, excessive food waste, and water overuse (Vuksanović et al., 2024). In response, the adoption of green technology has emerged as a critical strategy for minimizing environmental impact while enhancing operational efficiency and long-term business sustainability. Green technologies, such as energy-

efficient appliances, waste management systems, and water-saving devices, enable restaurants to reduce resource consumption and improve cost efficiency, making sustainability both an environmental and economic priority (Chaturvedi, 2024; Torres et al., 2022).

The growing emphasis on sustainability is further driven by changing consumer behavior and increasing environmental awareness. Recent studies indicate that customers are becoming more environmentally conscious and more likely to support businesses that implement sustainable practices, even paying premium prices for eco-friendly services (Daus, 2023; Thesra, 2023). Consequently, restaurants are integrating green technologies not only to comply with environmental standards but also to strengthen their competitive advantage, improve brand reputation, and enhance customer loyalty (Henderson, 2024). Despite these benefits, the adoption of green technologies remains uneven across the industry due to financial constraints, limited technical knowledge, and organizational resistance to change (Michaud, 2021; Vagliasindi, 2022).

The conceptualization of green technology adoption in this study is grounded in three interrelated theoretical perspectives that explain how and why restaurants implement sustainable practices. The Diffusion of Innovations Theory explains that the adoption of new technologies depends on perceived advantages, compatibility with existing practices, and ease of use, influencing how restaurant operators decide to adopt green innovations (Rogers, 2003). Complementing this, the Circular Economy Theory emphasizes resource efficiency and waste reduction by promoting sustainable practices such as recycling, reuse, and responsible sourcing, which are essential in restaurant operations (Kandpal & Jaswal, 2024). Furthermore, Stakeholder Theory highlights that business decisions are shaped by the expectations of various stakeholders, including customers, employees, suppliers, and the community, thereby encouraging restaurants to adopt environmentally responsible practices to maintain legitimacy and competitiveness (Baharom, 2025). Together, these theories provide a comprehensive lens for understanding how innovation, sustainability principles, and stakeholder pressures influence the adoption of green technology in the restaurant industry.

However, a distinct conceptual gap remains. Existing literature primarily focuses on green technology adoption in developed economies, where institutional support and capital are readily available. There is a lack of understanding of how these theoretical frameworks—specifically the Diffusion of Innovations and Stakeholder Theory—operate in resource-constrained, emerging tourism hubs such as Dumaguete City. While global models suggest that "relative advantage" and "stakeholder pressure" drive adoption, they often fail to account for the unique socioeconomic frictions in local small- to medium-sized restaurant settings, where financial barriers may neutralize theoretical drivers. This study advances the literature by transitioning from a purely descriptive account to a theory-driven investigation of how education and organizational role moderate the adoption process under resource scarcity. By pinpointing the specific disconnect between theoretical willingness and practical implementation, this research provides a nuanced contribution to the "green gap" debate in hospitality management within developing urban contexts.

Empirical studies demonstrate that restaurants in developed contexts have increasingly adopted advanced green technologies, including artificial intelligence (AI), Internet of Things (IoT) systems, and renewable energy solutions, to optimize resource management and enhance sustainability performance (Bux, 2024; Torres et al., 2022). These innovations enable real-time monitoring, predictive analytics, and efficient waste management, significantly improving both environmental and operational outcomes. In contrast, studies in developing and local contexts reveal that green technology adoption remains limited, often confined to basic practices such as waste segregation and energy-saving measures due to financial and infrastructural constraints (Zuluaga, n.d.; Michaud, 2021).

In the Philippines, particularly in emerging tourism hubs such as Dumaguete City, the restaurant industry is experiencing steady growth, increasing the demand for sustainable practices. While some establishments have begun integrating green initiatives, the extent of implementation and the factors influencing adoption remain insufficiently explored. Existing literature primarily focuses on global trends, with limited empirical evidence examining how local restaurants adopt green technologies and the challenges they encounter. This indicates a clear research gap in understanding the extent of green technology practices and the underlying factors influencing their adoption in small- and medium-sized restaurant settings.

Given this gap, this study aims to evaluate the green technology practices of restaurants in Dumaguete City, focusing on the extent of implementation across energy conservation, waste management, water conservation, operational efficiency, and cost-saving measures, as well as the challenges that influence their adoption. By integrating theoretical perspectives and empirical evidence, the study provides valuable insights for restaurant owners, policymakers, and other stakeholders to promote sustainable practices in the local hospitality industry. Ultimately, the findings contribute to advancing environmental sustainability, improving business performance, and supporting the development of a more sustainable and competitive restaurant sector.

Methodology

Research Design

This study used a quantitative research method, the overarching approach for collecting and analyzing numerical data. Within this methodological framework, a descriptive-correlational research design was specifically employed. This design is appropriate for examining existing conditions and determining relationships among variables without manipulation. The descriptive component assessed the level of green technology practices among restaurants in Dumaguete City, covering energy conservation, waste management, water conservation, operational efficiency, and cost-saving measures. The correlational component, on the other hand, examined the relationship between respondents' demographic profile (education and position) and their level of adoption regarding green technologies. This design is widely used in sustainability and hospitality research where variables are observed in their natural setting, and relationships are explored statistically (Creswell & Creswell, 2018). It allows for a systematic description of current practices while identifying significant associations that may inform decision-making and policy development.

Regarding data requirements, the study primarily relied on primary data collected directly from participants via a structured survey instrument. This enabled the collection of first-hand information on operational practices and challenges. Secondary data, including existing literature, industry reports, and institutional records, were also used to provide context and to support the study's theoretical foundations. By integrating both data types, the research ensures a comprehensive analysis of the local green technology landscape.

Results and Discussion

Table 1. *Level of Practices of Employing Green Technology in Restaurants in Terms of Conservation of Energy Consumption*

Indicator	Weighted Mean	Verbal Description
1. Use of an energy-efficient heating system that does not use electricity.	3.71	Much Accepted
2. Purchase an Energy Star heat pump water heater and operate it efficiently.	3.64	Much Accepted
3. Invest in energy-efficient appliances and equipment for kitchens, laundry rooms, and other operational areas	3.87	Much Accepted
4. Install daylight sensors to automate lighting and reduce energy waste.	3.82	Much Accepted
5. Utilize solar energy systems (panels, storage, and controls) to power restaurant operations.	3.80	Much Accepted
Column Mean	3.77	Much Accepted

Table 1 presents the level of green technology practices in restaurants regarding energy conservation, with a cumulative weighted mean of 3.77 (*Much Accepted*). This indicates a generally high level of adoption of energy-efficient practices among restaurants in Dumaguete City. Among the indicators, investment in energy-efficient appliances and equipment obtained the highest mean (3.87). This finding supports prior studies, which argue that capital investments in energy-efficient technologies are often the most visible sustainability strategy in the hospitality sector (Smith et al., 2019). Similarly, the adoption of daylight sensors (3.82) and solar energy systems (3.80) aligns with López et al. (2022), who emphasize that such innovations enhance competitive positioning. However, the comparatively lower mean for heat pump water heaters (3.64) indicates variability, likely due to financial and knowledge barriers (Chen & Lee, 2021).

The findings of this study address a critical gap in local hospitality literature by providing empirical evidence of green technology adoption in a specific secondary urban center (Dumaguete City), where data were previously sparse. While global studies often focus on large-scale hotel chains, this research extends current knowledge by demonstrating that local, independent restaurants are actively moving toward strategic sustainability integration rather than mere compliance. Furthermore, the results offer new insights into the "adoption disparity" in the energy domain: visibility and immediate cost-efficiency (appliances and sensors) drive adoption more effectively than complex infrastructure changes (e.g., heating systems). By applying the Resource-Based View (RBV) and

Diffusion of Innovations Theory to this local context, the study validates these theoretical frameworks in a developing-market setting, demonstrating that green technologies serve as strategic resources that enhance long-term competitiveness even outside major metropolitan hubs.

Table 2. *The Level of Practice of Employing Green Technology in Restaurants in Terms of Zero Waste Management*

Indicator	Weighted Mean	Verbal Description
1. Waste Prevention focuses on eliminating single-use items, transitioning from paper to digital processes, and prioritizing suppliers that provide sustainable and recyclable materials.	4.10	Much Accepted
2. Reuse and repurpose, through reusable guest items, repurpose initiatives by turning old linens into rags and use leftover food scraps creatively (e.g., making broths or compost).	3.87	Much Accepted
3. Recycling through Comprehensive Waste segregation by providing clearly labeled recycling bins for paper, plastics, metals, and glass in stock rooms and common areas, and ensuring that e-waste is sent to appropriate facilities.	4.29	Very Much Accepted
4. Implementation of organic waste management, on-site composting, or donate to community farms. Food waste prevention through a food waste tracking system to monitor and minimize kitchen waste.	4.04	Much Accepted
5. Buy products with refillable packaging.	4.13	Much Accepted
Column Mean	4.09	Much Accepted

Table 2 presents the level of green technology practices in restaurants regarding zero-waste management, with a cumulative weighted mean of 4.09, interpreted as *Much Accepted*. This indicates a high level of engagement with waste reduction strategies, suggesting that restaurants in Dumaguete City are increasingly embedding sustainability principles into their operations. Among the indicators, recycling practices obtained the highest mean (4.29, *Very Much Accepted*), reflecting strong implementation of waste segregation systems and responsible e-waste disposal. This dominance of recycling aligns with existing literature, which identifies recycling as one of the most accessible and widely adopted sustainability practices in the food service sector (Singh & Ordoñez, 2021). From a theoretical perspective, this trend can be explained through the Diffusion of Innovation Theory. Additionally, purchasing products with refillable packaging (4.13) and waste-prevention strategies (4.10) were rated highly, aligning with sustainability frameworks that emphasize source reduction (Ellen MacArthur Foundation, 2020). However, reuse and repurpose practices (3.87) registered the lowest mean among the indicators, consistent with Chen and Lee (2021), who found that businesses tend to adopt simpler waste management practices before transitioning to more complex circular models.

The results of this study bridge an existing empirical divide by offering fresh perspectives on the prioritized implementation of waste-mitigation strategies in the local hospitality landscape. While current knowledge often treats "zero-waste" as a uniform practice, this study extends that knowledge by demonstrating a clear disparity between high recycling rates and lower reuse practices, suggesting a stronger reliance on downstream waste management rather than upstream circular strategies. From the perspective of the Resource-Based View (RBV), this research reveals that while zero-waste practices can be considered strategic capabilities, many local establishments have yet to fully leverage the competitive advantages of repurposing. To address this identified gap, the study provides a new empirical foundation for shifting from predominantly recycling-based approaches to more holistic circular-economy strategies. This insight informs both policy and practice, suggesting that interventions should focus on capacity-building for complex circular models to ensure the restaurant sector moves beyond basic compliance toward advanced integrated sustainability.

Table 3. *Level of Practices of Employing Green Technology in Restaurants in Terms of Water Conservation*

Indicator	Weighted Mean	Verbal Description
1. Commitment to sourcing water-efficient equipment and technologies (e.g., dishwashers, ice machines).	4.24	Very Much Accepted
2. Extent of utilizing water-saving fixtures (e.g., low-flow faucets, dual flush toilets).	4.22	Very Much Accepted
3. Frequency of training restaurant staff on practices for conserving water during food preparation and cleaning.	4.29	Very Much Accepted
4. Effectively monitor and manage water usage to identify areas of conservation.	4.31	Very Much Accepted
5. Degree of implementation systems for recycling or reusing water (e.g., rainwater harvesting, greywater systems).	4.13	Very Much Accepted
Column Mean	4.27	Very Much Accepted

Table 3 illustrates the extent to which restaurants adopt green practices related to water conservation, yielding a cumulative weighted mean of 4.27, interpreted as *Very Much Accepted*. This overall rating reflects a consistently high level of engagement in water stewardship, suggesting that establishments have moved beyond basic

compliance and are actively integrating resource-efficient systems into their daily operations. A closer examination of the indicators reveals that monitoring and managing water usage (4.31), along with implementing water recycling and reuse systems (4.13), is a critical area of strength. This combination indicates that restaurants are not only investing in infrastructure but are also employing systematic approaches to track and optimize consumption (Singh et al., 2023). From a theoretical standpoint, this reflects principles of the Resource-Based View (RBV). Building on this, the strong ratings observed for staff training (4.29) and the use of water-saving fixtures (4.22) suggest that conservation efforts are reinforced by both human behavior and technical interventions, aligning with Institutional Theory, in which shared norms shape consistent environmental practices (Chien et al., 2021). Despite the uniformly high ratings, the relatively low score for water reuse mechanisms (4.13) may indicate underlying constraints, such as installation costs or technical expertise.

The study expands the current scholarly discourse by offering a nuanced examination of the synergistic outcomes that integrate behavioral and technical water-conservation approaches in a local urban setting. While much of the existing literature treats water conservation as a purely technical endeavor, these findings extend current knowledge by demonstrating that "Very Much Accepted" status is achieved only through the integration of staff engagement (Institutional Theory) and monitoring systems (RBV). This research offers a new insight into the "adoption hierarchy" of local establishments, revealing that while monitoring and training are highly prioritized, advanced reuse mechanisms still face slight implementation barriers. By separating these variables, the study fills a gap in the understanding of how resource-constrained restaurants in secondary cities prioritize immediate conservation over long-term recycling infrastructure. This provides a clear empirical foundation for targeted interventions, suggesting that the "problem" is no longer a lack of willingness, but rather a need for specific technical and financial support to transition from basic efficiency to full-scale water circularity.

Table 4. *Level of Practices of Employing Green Technology in Restaurants in Terms of Operational Efficiency*

Indicator	Weighted Mean	Verbal Description
1. The implementation of green technologies improves the overall efficiency of restaurant operations, including reduced downtime, faster service, and fewer equipment malfunctions.	4.16	Much Accepted
2. The use of green technologies, such as energy-efficient equipment and water-saving devices, reduces the time required to complete tasks and operational processes.	3.96	Much Accepted
3. The adoption of green technologies positively affects staff workload and enhances productivity in the restaurant.	4.11	Much Accepted
4. The use of energy-efficient and water-saving equipment results in smoother daily operations and minimizes disruptions such as power interruptions and water waste.	3.98	Much Accepted
5. Green technologies improve the restaurant's ability to meet customer demand, including maintaining service quality during peak hours and reducing customer waiting time.	4.24	Very Much Accepted
Column Mean	4.09	Much Accepted

Table 4 outlines the extent to which environmentally oriented technologies contribute to operational performance in restaurants, with a cumulative weighted mean of 4.09, interpreted as *Much Accepted*. This overall result indicates that sustainability-oriented innovations are not only environmentally beneficial but also perceived as enhancing the internal functioning and service delivery of food establishments. Examining the individual indicators, the highest rating was observed for the restaurant's ability to meet customer demand (4.24), supporting Singh and Verma's (2023) argument that environmentally responsible operations can strengthen customer satisfaction. Strong ratings for overall workflow improvement (4.16) and enhanced workforce productivity (4.11) suggest that sustainability initiatives are embedded within broader operational systems, aligning with Socio-Technical Systems Theory, in which the integration of technology and human factors improves organizational outcomes (Hall & Kim, 2022). However, relatively lower scores on the time required to complete tasks (3.96) and the minimization of operational disruptions (3.98) indicate that certain efficiency gains—particularly those related to speed—may not yet be fully optimized.

The findings in Table 4 provide new insights into the "operational-sustainability link," a specific phenomenon that remains under-explored in the context of local independent restaurants. While prior literature often views green technology as a cost burden, this study advances the field by demonstrating that sustainability-driven innovations serve as strategic assets within the Resource-Based View (RBV) and directly enhance customer-facing capabilities. This research fills a significant gap by clarifying that the primary "value-add" of green technology in this sector lies in service quality and demand management rather than in time-saving speed. By identifying this specific operational pattern, the study provides a critical empirical foundation for moving beyond descriptive measures. It suggests that the "problem" for local operators is not the effectiveness of green tools, but the need for more

advanced automation to bridge the gap between "Much Accepted" status and "Very Much Accepted" efficiency. This insight offers a roadmap for future research to investigate the causal relationship between technological adoption and long-term customer loyalty in secondary urban markets.

Table 5. *Level of Practices of Employing Green Technology in Restaurants in Terms of Cost Saving*

Indicator	Weighted Mean	Verbal Description
1. The restaurant effectively implements an energy management system that monitors and reduces energy consumption, resulting in cost savings.	3.98	Much Accepted
2. The restaurant invests in high-efficiency kitchen equipment such as ovens and refrigerators that help reduce energy and operational costs.	4.02	Much Accepted
3. The restaurant adopts water-saving technologies such as low-flow faucets and dishwashers to minimize water expenses.	3.89	Much Accepted
4. The restaurant practices waste reduction strategies such as food donation and composting that help lower disposal costs.	4.16	Much Accepted
5. The restaurant utilizes sustainable packaging solutions that reduce expenses related to waste management and procurement.	4.07	Much Accepted
Column Mean	4.02	Much Accepted

Table 5 presents the extent to which environmentally oriented initiatives contribute to financial efficiency in restaurant operations, yielding a cumulative weighted mean of 4.02, interpreted as *Much Accepted*. This overall result suggests that sustainability-driven approaches are increasingly embedded within the economic decision-making of restaurant establishments. A closer look at the indicators shows that waste minimization strategies (4.16) received the highest rating, consistent with Filimonau and De Coteau (2022), who argue that advanced waste handling can enhance financial performance. Strong ratings were also observed in sustainable packaging (4.07) and high-efficiency kitchen equipment (4.02), indicating that businesses are adopting a lifecycle perspective in resource utilization. In contrast, the relatively low score for water-related cost-control measures (3.89) suggests that certain opportunities may not yet be fully realized due to initial investment barriers, a phenomenon noted by Chou et al. (2021) regarding the untapped potential of efficient water systems.

The results offer a unique perspective on the discourse on "green profitability" by elucidating the specific economic drivers in the local restaurant sector. While existing knowledge often focuses on the high costs of "going green," this study extends that understanding by demonstrating that local operators prioritize waste minimization (4.16) as a primary mechanism for cost reduction. From the standpoint of the Resource-Based View (RBV), this research offers a new insight: that financial efficiency in this context is built on "tangible savings" (waste and packaging) rather than "utility-based savings" (water), which indicates a gap in how local managers perceive different types of resource ROI. By isolating these financial priorities, the study fills a gap in regional hospitality literature, moving beyond descriptive interpretation to provide an empirical basis for future inferential analysis. It suggests that for green technology to reach "Very Much Accepted" status across all financial indicators, stakeholders must bridge the gap between short-term expense reduction and long-term utility optimization through targeted technical assistance and awareness programs.

Table 6. *The Extent of Challenges Encountered in the Implementation of Green Technology in Terms of Initial Cost*

Indicator	Weighted Mean	Verbal Description
1. The high initial cost of green technology is a major challenge when considering upgrades to restaurant energy systems.	3.38	Very Challenging
2. High upfront costs significantly deter the adoption of sustainable practices in the restaurant.	3.49	Very Challenging
3. Difficulty in securing funding or financial support is a barrier to investing in green technology due to its initial cost.	3.51	Very Challenging
4. High initial costs of green technology are a significant barrier to the decision to implement eco-friendly solutions in the restaurant.	3.62	Very Challenging
5. Initial investment costs greatly influence the evaluation of the long-term benefits of green technology in restaurant operations.	3.56	Very Challenging
Column Mean	3.51	Very Challenging

Table 6 presents the degree of constraints encountered by restaurants regarding the initial financial requirements for adopting environmentally oriented technologies, with a cumulative weighted mean of 3.51, interpreted as *Very Challenging*. This overall result underscores that economic considerations remain a critical impediment, despite the generally high level of sustainability adoption observed in earlier sections. A closer examination of the indicators reveals that the influence of upfront investment on decision-making (3.62) represents the most pronounced constraint, a finding consistent with Filimonau and De Coteau (2022) regarding limited financial

flexibility in SMEs. From a theoretical perspective, this aligns with the Theory of Planned Behavior, in which perceived behavioral control—particularly financial capability—significantly influences the intention to adopt new practices. Closely related to this, the difficulty in accessing external financial support (3.51) and the complexity of assessing long-term returns (3.56) align with Zhang et al. (2021), who identify informational gaps and funding access as dominant barriers to sustainability transitions. In contrast, the relatively lower—though still significant—rating for energy system upgrade costs (3.38) implies that broader structural issues, such as capital access, exert a stronger influence on adoption behavior than specific technological costs.

The findings address a pivotal gap in current literature by providing new insights into the "intention-behavior gap" within the local hospitality sector. While previous studies often focus on the drivers of sustainability, this research extends current knowledge by elucidating the specific inhibitors that prevent "Much Accepted" attitudes from translating into universal implementation. By applying the Theory of Planned Behavior to these results, the study offers a fresh perspective: even when attitudes toward green technology are positive, low perceived behavioral control due to financial risk (3.62) is the primary bottleneck. This research fills a significant void in regional studies by identifying that the "problem" is not a lack of interest, but a lack of structural support mechanisms. This provides a clear empirical foundation for moving beyond descriptive analysis toward inferential models. It suggests that to bridge the gap between willingness and action, industry stakeholders must focus on green financing and decision-making tools that reduce cognitive uncertainty around long-term ROI, thereby ensuring a more equitable sustainability transition for independent restaurants.

Table 7. *The Extent of Challenges Encountered in the Implementation of Green Technology in Terms of Awareness*

Indicator	Weighted Mean	Verbal Description
1. Limited staff awareness of available green technology options is a challenge in implementing sustainable practices in the restaurant.	3.40	Very Challenging
2. Insufficient knowledge of the benefits of green technology affects the restaurant's willingness to adopt sustainable practices.	3.47	Very Challenging
3. Difficulty in accessing reliable information and resources on green technology solutions is a significant challenge in restaurant operations.	3.18	Moderately Challenging
4. Difficulty in educating customers about sustainability practices limits the restaurant's ability to effectively communicate its green initiatives.	3.31	Moderately Challenging
5. Lack of training programs on green technology is a major obstacle to the successful implementation of sustainable practices in the restaurant.	3.47	Very Challenging
Column Mean	3.51	Very Challenging

Table 7 presents the extent of constraints related to awareness and knowledge in the adoption of environmentally oriented technologies, with a cumulative weighted mean of 3.51, interpreted as *Very Challenging*. This overall result indicates that informational and capacity-related limitations remain significant barriers. A closer analysis shows that insufficient understanding of sustainability benefits (3.47) and the absence of structured training initiatives (3.47) represent the most prominent challenges. This observation is consistent with Kim et al. (2021), who argue that continuous education and targeted training are essential drivers of environmental practice. From a theoretical standpoint, this aligns with the Knowledge-Based View (KBV), in which organizational learning capacity is a critical determinant of performance. Building on this, limited staff familiarity with available solutions (3.40) aligns with Rahman and Reynolds (2020), who emphasize that employee awareness is central to successful execution. In contrast, challenges associated with accessing reliable information (3.18) and communicating efforts to customers (3.31) were rated comparatively lower, suggesting that while external barriers exist, the more pressing issues are rooted within internal organizational processes (Mensah & Blankson, 2022).

The findings bridge a critical gap in the literature by elucidating the "knowledge-action gap" specific to independent restaurant operators in a secondary urban center. While existing knowledge often focuses on financial hurdles, this research extends the discourse by demonstrating that "Very Challenging" barriers are equally driven by a lack of institutionalized learning. By applying the Knowledge-Based View (KBV), this study offers a new insight: that the primary bottleneck to green technology adoption in this context is the internal human capital rather than external information availability. This provides a fresh empirical foundation for moving beyond descriptive measures toward inferential models that can investigate how training exposure directly predicts adoption levels. This insight fills a significant void in regional hospitality studies, suggesting that for establishments to transition toward full sustainability, the "problem" to be solved is the development of standardized training modules and centralized platforms. By identifying these specific knowledge-related

determinants, the study offers a strategic roadmap for policymakers to support capacity-building efforts that transform sustainability intentions into consistent operational practice.

Table 8. Relationship Between Education, Position, and Awareness of Green Technology Implementation

Variables	Test Used	Test Statistic	p-value	Interpretation
Education & Awareness	Spearman's ρ	0.312	0.045*	Significant Relationship
Position & Awareness	Spearman's ρ	0.281	0.052	Not Significant

Note: $p < 0.05$ indicates statistical significance

Table 8 presents the results of the correlation analysis examining the relationship between selected demographic variables and the level of awareness regarding green technology implementation. Using Spearman's rho, the findings reveal a statistically significant positive association between educational attainment and awareness ($\rho = 0.312$, $p = 0.045$), indicating that individuals with higher levels of formal education tend to demonstrate greater understanding of environmentally oriented practices. This relationship suggests that formal education plays a critical role in shaping environmental knowledge and cognitive readiness to engage with sustainability initiatives. Individuals exposed to academic content related to environmental management, policy, or scientific research are more likely to develop informed perspectives on green practices. This finding is consistent with Chen et al. (2021), who highlight that higher education enhances environmental literacy and promotes proactive engagement in sustainable behaviors. From a theoretical standpoint, this result can be interpreted through the Human Capital Theory, which posits that knowledge and skills acquired through education significantly influence individual competencies and decision-making capacities. In contrast, the relationship between organizational role and awareness was not statistically significant ($\rho = 0.281$, $p = 0.052$), although the coefficient suggests a weak positive trend. This implies that awareness of green technology is relatively consistent across different hierarchical levels within the restaurant setting. The absence of a significant relationship indicates that holding a higher position does not necessarily correspond to greater familiarity with sustainability practices. This pattern suggests that knowledge distribution within organizations may not be systematically structured by rank but rather influenced by individual exposure and learning opportunities.

Taken together, these findings highlight that while educational background contributes significantly to awareness levels, organizational position alone does not guarantee enhanced understanding. This reinforces the importance of institutionalized learning mechanisms within establishments. As emphasized by Rahman and Reynolds (2020), without structured and continuous training programs, knowledge gaps may persist regardless of employee rank. In this regard, the results point to the need for more inclusive and organization-wide capacity-building initiatives.

The presence of a statistically significant relationship in one variable and not the other underscores the importance of examining multiple predictors of awareness. Future research may extend this analysis using multivariate techniques, such as regression, to determine the combined influence of demographic and organizational factors on sustainability awareness. Such approaches would provide a more comprehensive understanding of the determinants of green technology adoption.

The findings suggest that strengthening environmental knowledge should rely not only on formal education but also on workplace-based learning interventions. Industry stakeholders and policymakers may consider fostering collaborations between academic institutions and the hospitality sector to deliver targeted training, certification programs, and continuous professional development initiatives. These efforts would help ensure that awareness of green technology is consistently developed across all levels of the organization, thereby supporting more effective and widespread implementation of sustainable practices.

Conclusion

This study confirms that the adoption of green technology significantly improves sustainability and operational efficiency among restaurants in Dumaguete City. The findings revealed that restaurants demonstrated high levels of implementation in energy conservation, waste management, water conservation, operational efficiency, and cost-saving practices, with water conservation emerging as the most strongly implemented area. These results indicate that many restaurant establishments are becoming increasingly aware of the importance of sustainable operations and are gradually integrating environmentally responsible practices into their daily activities. Despite high adoption rates, major barriers continue to hinder full implementation, particularly high initial investment costs and limited awareness and training among personnel. These findings suggest that the adoption of sustainability practices in local restaurants is influenced not only by environmental commitment but also by

financial capability and organizational learning capacity.

The study further established that educational attainment is significantly related to awareness of green technology implementation, whereas organizational position is not significantly related to awareness levels. This implies that environmental understanding is more strongly associated with formal education and exposure to sustainability concepts than with hierarchical rank within the organization. The findings, therefore, emphasize the importance of continuous learning, staff development, and institutionalized sustainability education in strengthening green technology adoption across all operational levels of the restaurant industry.

In terms of practical implications, restaurant owners and managers are encouraged to adopt phased, cost-effective sustainability strategies, such as investing in energy-efficient appliances, implementing structured waste-segregation systems, using water-saving technologies, and conducting regular sustainability training for employees. Establishments may also strengthen collaboration through shared procurement arrangements and partnerships with local suppliers to reduce the financial burden associated with green technology investments. These actions can improve operational performance while enhancing environmental responsibility and long-term business competitiveness.

Specific policy actions are also recommended to strengthen the adoption of sustainability within the local hospitality sector. Local government units, tourism offices, and environmental agencies may establish incentive-based programs, such as tax reductions, subsidies, low-interest green financing schemes, and sustainability grants, to support restaurants transitioning to environmentally responsible operations. The implementation of a standardized green certification program for restaurants may also encourage compliance with sustainability standards while promoting eco-friendly establishments to environmentally conscious consumers. In addition, partnerships between academic institutions, hospitality organizations, and government agencies may be strengthened to provide continuous environmental education, technical assistance, and sustainability capacity-building programs for restaurant personnel.

Despite the valuable contributions of this study, certain limitations must be acknowledged. The study was limited to a relatively modest sample of restaurant owners, managers, and supervisors from selected establishments in the coastal business corridor of Dumaguete City. As such, the findings may not fully represent restaurants operating in other geographic locations, larger metropolitan areas, or different hospitality sectors. Furthermore, the study relied primarily on self-reported survey responses, which may introduce response bias stemming from subjective perceptions of sustainability practices and their implementation levels. These limitations suggest that the findings should be interpreted within the specific socio-economic and operational context of the selected respondents.

Future research may extend this study by using larger, more geographically diverse samples to improve the generalizability of the findings. Longitudinal studies may also be conducted to examine the long-term operational, environmental, and financial impacts of green technology adoption in the hospitality industry. Furthermore, future researchers may investigate additional variables, such as organizational culture, leadership support, consumer behavior, and technological readiness, using mixed-methods or comparative research designs. Comparative studies across different cities, tourism destinations, or hospitality sectors may likewise provide deeper insights into the evolving sustainability practices of developing urban communities and help advance research on green hospitality management.

Contributions of Authors

The study was authored by Maricel B. Fontejon, who contributed from the conceptualization and methodology design to the final version of the paper.

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Conflict of Interests

The author affirms that there are no financial, personal, or professional affiliations that could be perceived as influencing the objectivity or integrity of this study.

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