SCIENTIFIC CULTURE

www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 2.1, (2026), pp. 6400-6410
Open Access. Online & Print

DOI: 10.5281/zenodo.19483724

STRATEGIC COMMUNICATION AS A DRIVER OF ENVIRONMENTAL SUSTAINABILITY: A CASE STUDY OF ENVIROL'S FOG MODEL IN THE UNITED ARAB EMIRATES

Sameer Baniyassen[1*], Haitham Numan[2], Samar Abdulhalim[3], Mawada Mubarak[4], Ali Mohammed[4] and Ansa Manarkattu Joseph[5]

[1]City University Ajman (CUA), College of Media, United Arab Emirates. Email: s.baniyaseen@cu.ac.ae
Orcid ID: https://orcid.org/0000-0001-5161-7172
[2]Department of Social and Political Sciences, Philosophy & Anthropology (SPSPA)
University of Exeter. Email: H.Numan@Exeter.Ac.Uk
[3]City University Ajman (CUA), College of Media, United Arab Emirates. Email: s.abdulhalim@cu.ac.ae
[4]City University Ajman*(CUA), College of Media, United Arab Emirates. Email:* 20221021*@cu.ac.ae*
[5]Envirol Sustainability Organization, United Arab Emirates. Email: Ali.M@envirol.ae
[6]Envirol Sustainability Organization, United Arab Emirates. Email: Ansa. m@envirol.ae

Received: 21/01/2026
Accepted: 25/03/2026

Corresponding Author: Sameer Baniyassen (s.baniyaseen@cu.ac.ae)

ABSTRACT

It is a new sustainability priority that the UAE is pursuing, supported by government strategy and regulations, including the UAE Vision 2030, the Circular Economy Policy 2021, and the UAE Net Zero 2050 Strategy. Environmental awareness will be shaped, and public attitudes will be greatly influenced by strategic communication and digital monitoring tools. A survey of the fats, oils, and grease (FOG) waste sector and sustainable behavior is undertaken, and this is the first focus. Utilizing Envirol LLC, an integrated FOG treatment facility operating within the Gulf Cooperation Council (GCC), investigates the connection among communication, technology, and institutional collaboration, with the aim of achieving better environmental outcomes. Results: A mixed-methods research design was adopted; qualitative data were collected through semi-structured interviews; content analysis of communication was employed; and, finally, an analysis of Dubai Municipality policies was conducted. Quantitative analysis was performed using operating data from April to December 2023, along with operational performance data collected from environmental performance documents/records and operational documentation from January to December 2023. GovEVA dump data have been analysed from January through August 2023, as well as using Envirol digital monitoring tools, such as QR codes, RFID tracking, and the FOG Watch platform, to measure compliance and awareness. Food establishment results demonstrated a 78% increase in compliance and an 85% increase in awareness. Digital technologies provide improved accuracy, transparency, and real-time tracking of environmental outcomes, such as reductions in emissions and increased diversion of solid waste from landfills.. The Envirol case provides a locally grounded model demonstrating how communication and technology can effectively support environmental sustainability in the UAE.

KEYWORDS: Environmental Sustainability; Strategic Communication; Digital Transformation; Waste Management; Public Engagement.

1. INTRODUCTION

The key sustainability issue will be whether the nation maintains its economic position and its environmental future. This study illustrates how effective use of communication, combined with the latest technology, is a catalyst for responsible behaviours and compliance by individuals and businesses in the UAE. The Envirol case study provides evidence that, through the combination of three communication strategies, consistent measurement, and collaboration among all participants, real improvements can be achieved across all aspects of well-being. By improving community operations and delivering positive health impacts, performance towards achieving the Green Strategy targets nationwide can be enhanced. A wide range of benefits will accrue to the leaders of government, business, and society.

1.1. Background And Context

The UAE has made it a top priority to protect the environment, as seen within its national goals such as the UAE Vision 2030, the Circular Economy Policy (2021), and the Net Zero 2050 Strategy. These goals demand a collective strategy for regulatory issues, the introduction of new technologies, active communities, and the challenges of environmental protection. To facilitate achieving these, a clear and effective communication plan will raise awareness of the policies, instigate action, and enhance adherence to the rules by promoting the use of technology, including online tracking and reporting

1.2. Research Problem

Managing fats, oils, and grease (FOG) waste generated by food businesses is a continual challenge. Their excessive accumulation harms wastewater systems, raises the cost of doing business, and may threaten sustainability ambitions. Envirol has been actively involved in encouraging businesses to adopt good disposal processes. This study will explore how its communication campaigns can affect the levels of knowledge, behavior, and compliance among businesses and how these outcomes will lead to greater achievement of sustainability objectives in the UAE.

.

1.3. Research Gap

Sustainable development studies have primarily focused on waste management and consumption patterns rather than on individual industrial characteristics, such as fats, oils, and grease. Very little empirical evidence exists on how the use of strategic communications and digital technologies, such as QR Codes, RFID tags, and real-time dashboards, assists organizations in complying with regulations governing FOG management. There is still a significant gap in research on the application of these technologies in the UAE and the Gulf region.

1.4. Significance Of the Study

This study has importance for both development and implementation. This research explores one of the significant environmental concerns in the relatively neglected field of green communication. The analysis of relationships among communication strategies, digital management, and cooperation will help identify how communication can promote appropriate behavior and improve environmental outcomes. Envirol provides a case study of applying communication theory to environmental management in the UAE and to rule-based management. This research aims to bridge theory and practice in sustainable development.

1.5. Research Objectives.

The purpose of this study is to evaluate the impact of adopting digital technology on the practice of responsible management of food and beverage waste in the United Arab Emirates through integrated communication. This shall be achieved by investigating the effects of different types of messages on people and the effectiveness of communication in influencing behavior, conformity, and environmental outcomes, using both qualitative and quantitative methods.

1.6 .Research Questions

To what extent does strategic communication enhance environmental sustainability in the UAE, as demonstrated by Envirol FOG management practices?

Sub-Questions

1. How do Envirol's environmental communication messages shape food establishments' understanding, attitudes, and adoption of sustainable FOG management practices?
2. How do Envirol's communication and promotional strategies influence compliance with environmental regulations among food establishments?
3. How effective are Envirol's awareness initiatives in fostering long-term sustainable behaviors among businesses and the wider community?

2. LITERATURE REVIEW

2.1. Overview

This review of the literature is a systematic review of 200 international studies on environmental communication and waste management. 181 works are included, with all relevant older or unrelated studies having been filtered. There were several key thematic concerns that remained recurring: • the emphasis on public awareness campaigns to make people change their environmental behavior, • the increasing role of digital technologies in environmental monitoring and reporting, • and the role of psychological and behavioral factors in fostering public compliance with environmental regulations.

2.2. Comparison With Previous Studies

Most existing research focuses on sustainability in general and does not consider the management of sectors such as fats, oils, and grease (FOG). Very little research has investigated the use of cutting-edge technology – QR tracking, AI dashboards, or digital monitoring - for the enforcement of environmental laws. While the UAE is a pioneer of environmental innovation, research in the region remains scarce.

2.3. Research Contribution

This research contributes by linking theoretical ideas to the data used in Envirol operations. It is one of the first studies to describe how Envirol enhanced its waste management process through digital technologies and communication strategies to improve compliance in food outlets. The results emphasize the synergy between technology and government regulations in increasing public awareness and compliance.

2.4. Background Of Envirol LLC as a Sample:

Envirol LLC, which is a joint venture with Alserkal Group, is the only fully integrated FOG treatment plant in the GCC. It has been engaged in environmental protection, regulatory enforcement, and sustainable development since its initial public offering in 2002. With a portfolio of more than 13,818 food establishments, the company processes up to 165,000 gallons of grease-trap waste per day.

2.5. Historical Milestones

1992–2000: New FOG regulations with Dubai Municipality.2002: Introduction of grease trap installations and cleaning services at scale.2005: Initiatives to turn FOG waste into usable products were launched.2007: Signing of official FOG recycling agreements with Dubai Municipality.2009–2018: Additional treatment facilities were established with new technologies.

2.6. Understanding FOG Waste and Grease Traps

FOG is fat, oils, and grease generated in the cooking and food preparation process. If contaminated, FOG can obstruct sewage pipes, cause pollution, emit a foul odor that travels through homes, and ultimately impose maintenance costs on many municipalities. Globally, FOG-related problems can cost governments billions of dollars annually due to infrastructure damage.Grease traps – devices that are placed under sinks or drainage lines to prevent FOG from entering the system. To minimize environmental hazards, Dubai Municipality mandates all food chains to install and maintain these traps.

2.7. Facility Overview and Circular Economy Outputs

A sophisticated process run by Envirol, complete with filtration, chemical, and multi-stage separation technology on its treatment plant. Some of the numerous products of these operations include brown oil, soap base, recycled water, and organic matter, and they also contribute to the UAE's circular economy.

2.8. Envirol's Environmental and Social Impact

As a result of Envirol's daily work, there has been a clear increase in environmental and community benefits. Envirol's operations have prevented over 8 million kilograms of carbon dioxide from being emitted into the atmosphere, saved approximately 1.6 million cubic meters of landfill disposal capacity (equivalent to nearly 96,842 trees), and generated more than enough treated water for irrigation on about 7,120 football fields. Therefore, this is proof that Envirol is continually committed to taking action to improve the environment, promote better health in our communities, and support our nation's objectives to become greener.

3. THEORETICAL FRAMEWORK

The study applies key theories in marketing and communications to describe how the means by which messages are conveyed and how management interacts with stakeholders can influence behavioral change and adherence to the messages. The integrated marketing communication theory, public relations campaign theory, and green marketing theory are part of a more comprehensive framework

for understanding how digital tools can be used to promote sustainable practices in communicating FOG management.

3.1. Integrated Marketing Communication (Imc)

IMC focuses on delivering consistent and coordinated messages across multiple channels to enhance clarity, credibility, and impact[2].

Rather than perceiving communication as a series of separate behaviors, IMC describes the coordinated, unified communication of messages, all consistent with the vision and shared strategic direction of the whole, thereby creating a shared goal and value proposition. IMC is crucial to environmental discourse given the complexity and multidimensionality of sustainability messages. Messages are typically expected to translate technical regulatory information into ethical and behavioral messages to a wide variety of audiences. IMC is here considered as a means to illustrate the manner in which Envirol synchronizes its communication activities among digital platforms, print materials, teaching material, and face-to-face relationships with food outlets. Consistently explaining regulatory expectations and environmental responsibilities helps reduce ambiguity and improve message retention, thereby enabling users to change behaviors in ways that comply with FOG waste-disposal regulations. Consequently, IMC functions as a theoretical foundation for exploring how well Envirol's communication activities integrate the overall sense in its awareness (and adherence to), with respect to governmental regulations

3.2. Public Relations Campaign Theory

PR Campaign Theory examines how various communication approaches shape people's understanding and actions over time. For campaigns to be effective, they must have clear goals, a credible message, and ongoing monitoring of outcomes. For this study, PR Theory will help explain how Envirol uses a structured approach to creating campaigns, thereby providing people with ongoing access to guidance, reminders, and feedback through various digital tools, which will help support long-term behavioral change through repetitive interaction.

3.3. Green Marketing Theory

Green marketing theory examines how a company communicates its commitment to the environment and sustainability. Successful communication is based on transparency, credibility, and evidence-based claims. Communications linking environmentally friendly practices with specific, measurable results bridge the gap between the practices an organization promotes and the ways it encourages customers to make choices with a positive environmental impact. This research utilizes green marketing theory to help Envirol demonstrate that proper disposal of fats, oils, and grease improves environmental performance by reducing emissions and decreasing landfill use, thereby encouraging customers to act responsibly.

3.4. Theoretical Concepts and Theoretical Perspectives Integration

Integrating IMC, PR campaign theory, and green marketing theory will provide a comprehensive framework for evaluating the growth of FOG's communications programs. IMC helps maintain uniformity in messaging (marketing communications); PR provides an objective, systematic approach to how an organization interacts with its stakeholders; and Green Marketing helps an organization align its message with environmental principles. All three factors constitute the overall impact of an organization's communications efforts on compliance, behavior change, and sustainable outcomes in FOG management.

Table 1: Environmental Strategic Communication Framework.

Component	Key Elements	Role in the Model
Communication Strategies	Integrated Marketing Communication (IMC); PR Campaigns; Green Communication	Provide the strategic communication foundation for sustainability messaging
Communication Channels	Digital platforms; Educational materials; Industry engagement	Deliver sustainability information and outreach to target audiences
Communication Mechanisms	Awareness building; Attitude formation; Behavioral guidance	Influence stakeholders' perceptions and motivations
Behavioral Outcomes	Regulatory compliance; Adoption of sustainable FOG practices	Reflect behavioral change among businesses and stakeholders
Environmental Outcomes	Reduced landfill waste; Lower carbon emissions; Improved waste governance	Demonstrate the sustainability impact of communication efforts

Table 1 shows the relationship between environmental strategy communication (ESC) and sustainable development. As it demonstrates, the

core of environmental sustainability messages lies in the channels through which people receive them. These routes, in turn, create awareness, shape opinions, and influence decisions to engage in pro-environmental behavior, thereby enhancing adherence to regulations and improving FOG management. Gradually, implementing these steps will lead to reduced landfill use, lower air pollution, and improved waste management systems.

4. METHODOLOGY

In this project, a mixed-methods design will be used to determine the impact of planned communication via digital technology on adherence to rules and positive environmental outcomes in managing FOG waste in the UAE. The single-case study methodology facilitated an intensive, contextually grounded study of Envirol's success in incorporating environmental messages and waste management practices.

4.1. Research Design

Enviroli was used as a representative case because it has a well-developed environmental management system and in-depth data on all its operations.
What makes such a study interesting is its ability to analyze complex, real phenomena in which the boundaries between communication strategies, organizational phenomena, and environmental outcomes become increasingly interwoven. Qualitative and statistical approaches illuminate how communication strategies are constructed and perceived, and how empirical measures of changes in behavior and environmental impacts are derived.

4.2. Case Selection

Envirol LLC was selected to be the only fully integrated FOG treatment facility in the GCC region. In addition to the facility itself, Envirol operated a joint public-private partnership with Dubai Municipality to ensure compliance with regulatory standards, conduct environmental monitoring, treat, and recycle FOG waste received from food service providers. Its wide operational, high-end technological infrastructure, well-documented sustainable effects, and strong operation of the platform position it well to analyze the communication-digital monitoring-environmental nexus.

4.3. Data Collection Methods

4.3.1. Qualitative Data Collection

Qualitative data analysis was inductive, with themes emerging from the data. In this case, the data were coded, which helped the researcher identify recurring concepts in message planning, the effects of behavior, the importance of compliance, and perceptions about digital aids. The process helped the researcher identify interrelated trends that explained how communication enhances group activities. The researcher matched quantitative statistics on changes in compliance, environmental operations, and work efficiency. This would enable him to identify new trends. Qualitative and quantitative data analysis processes assisted the researcher in verifying the data, thereby enhancing the research's legitimacy.

4.3.2. Quantitative Data Collection

Quantitative data were collected on compliance and environmental performance using Environ's digital monitoring and communication interventions.

An operational review also included information such as FOG collection volumes, grease trap servicing frequency, and service coverage among food establishments. From emissions monitoring systems to track CO_2 and methane emissions. Environmental performance data were obtained from emissions-tracking systems that monitor CO_2 and methane reductions, as well as landfill-diversion volumes. Envirol's digital platform logs, generated by the Envirol system and by implemented systems (e.g., FOGwatch, RFID trackers, and QR-code reports), were recorded to provide objective indices of compliance, reporting accuracy, and user engagement. Datasets were obtained for different periods during which time behavioural trends were measured in response to communication or observation.

4.4. Data Analysis Procedures

Qualitative data analysis was inductive, with themes emerging from the data. In this case, the data were coded, which helped the researcher identify recurring concepts in message planning, the effects of behavior, the importance of compliance, and perceptions about digital aids. The process helped the researcher identify interrelated trends that explained how communication enhances group activities. The researcher matched quantitative statistics on changes in compliance, environmental operations, and work efficiency. This would enable him to identify new trends. Qualitative and quantitative data analysis processes assisted the researcher in verifying the data, thereby enhancing the research's legitimacy.

4.5. Ethical Considerations

Every ethical principle was observed. Participation was voluntary, and informed consent was obtained. The organizational data was also provided access, and privacy was ensured by using aggregated data that did not identify any personal information.

AI tools were used to support the analysis of tabular data and assist in interpreting patterns. However, all interpretations and conclusions are entirely the authors' original work.

5. RESULTS

The findings indicate that a larger proportion of the population has become more informed and compliant as a result of the implementation of a systematic communication system. Approximately 85 percent of businesses have reported increased awareness of FOG. Better disposal practices have also been enhanced by electronic systems that hold businesses accountable. The emission data showed lower environmental emissions and greater landfill diversion. The major source of emissions was electricity; however, overall emissions were lesser. The overall results support the correlation between communication, technology, and green business practices.

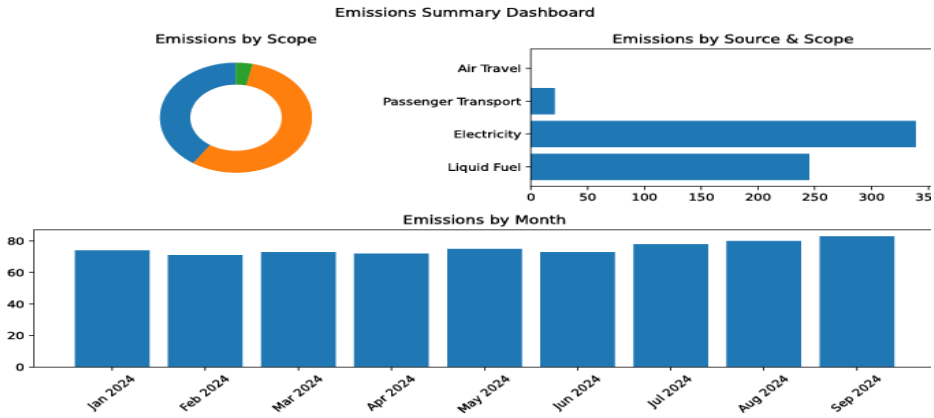

Figure 2: Goveva Dashboard Screenshot Showing Real-Time Emissions by Source (Scope 1–3 Contributions).

Envirol's 2024 greenhouse gas emissions can be summarized in Figure 1, which presents three elements: emissions by scope, emissions by source, and monthly emission trends. Moreover, for total emissions in 2024, there were total emissions of 606 tCO_2e, where electricity-related emissions from Scope 2 were the highest at 339 tCO_2e and Scope 1 direct emissions from liquid fuel at 245 tCO_2e, while the Scope 3 activities contributed a relatively smaller 21 tCO_2e, hence showing that electricity consumption is the most critical factor underlying Envirol's net carbon emissions. This pattern is even clearer in the "Emissions by Source" bar graph, demonstrating that electricity and liquid fuel, which are the dominant sources, as well as air travel, have no impact during the period. Monthly emissions show a constant chart with flat monthly emissions values, with an average monthly mean value of 71–74 tCO_2e between January and April, increasing through progressive values from June to August (78–83 tCO_2e), which may indicate seasonal needs, more service, and/or greater campaign oversight. All told, the data reflect the persistent consistency in baseline and intertemporal distributions of operational emissions, providing critical insights into how its energy use, transport, and seasonality affect Envirol's aggregate environmental performance.

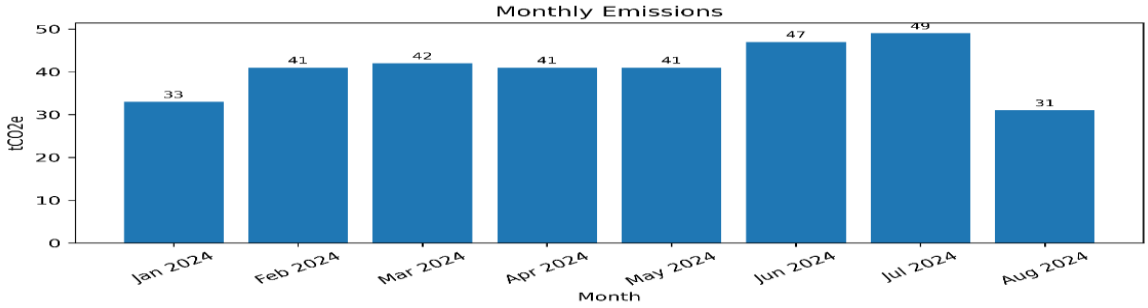

Figure 3: Monthly Emissions Line Graph Showing Emissions Trends for Envirol (January–August 2024).

Figure 3 illustrates the Monthly emissions trends for Envirol's operations from January to August

2024, showing stable and varying patterns in direct and indirect emissions. In the stacked bar chart, Scope 1 emissions for liquid fuel remain constant at approximately 31 tCO_2e per month, consistent with the data table, which confirms that monthly fuel consumption (30.662 tCO_2e) is constant over the given period. This is consistent with the more or less constant baseline of direct emissions from the firm's most essential business operations, like transit and production. On the other hand, in the upper parts of the bars, indirect emissions rise slowly—between 41–43 tCO_2e in early 2024 and 49–52 tCO_2e in midyear—due to increased electricity use, more frequent utilization of services, or heightened operational pressures. The gradual rise from May to August reflects increased activity, with some correlation with compliance and peak service seasons. Looking at that side, a parallel pattern reveals that high, continuous direct emissions occur with relatively regular fuel use, whereas highly variable indirect emissions arise from new operating needs. This differentiation is crucial for sustainability planning. It specifies where emissions reductions are most feasible and where communication or operational solutions may also be necessary to address seasonal peaks in emissions.

5.4. Environmental Savings and FOG Processing Performance

Table 2: Environmental Savings and FOG Processing Data (April 2024–December 2024).

Month	Gallons	Metric Tons	CO_2 Spared (ton)	Methane Spared (ton)	Landfill Area Diverted (km^2)
Apr-24	7,899.59	2	7.5046	0.0893	0.00008
May-24	9,041.60	2	8.5895	0.1022	0.00009
Jun-24	8,656.67	2	8.2238	0.0978	0.00009
Jul-24	9,084.81	2	8.6306	0.1027	0.00009
Aug-24	9,226.01	2	8.7647	0.1043	0.00009
Sep-24	8,931.65	2	8.4851	0.1009	0.00009
Oct-24	9,469.21	2	8.9957	0.1070	0.00009
Nov-24	9,368.35	2	8.8999	0.1059	0.00009
Dec-24	9,591.98	2	9.1124	0.1084	0.00010
Total	**81,269.87**	**21**	**77.21**	**0.9183**	**0.00081**

Table 2 displays Envirol's environmental savings and FOG (Fat, Oil, and Grease) processing performance for the period of April to December 2024, where the analysis of Envirol shows a trend of waste processing and measurable environmental results. During the nine months, Envirol processed a total of 81,269.87 gallons of FOG, equivalent to 21 metric tons, and the monthly FOG volumes ranged from 7,899.59 gallons in April to a total of 9,591.98 gallons in December. CO_2 saved increased from 7.50 tons in April to 9.11 tons in December, indicating a growing emphasis on waste diversion and operational efficiency throughout the period. Methane production increases from about 0.0893 to about 0.1084 tons as well, which suggests a decrease in anaerobic decomposition due to effective FOG recovery. The diversion from landfill is steady at approximately 0.00008–0.00010 km^2 per month, indicating a waste management system that relies on landfill and, consequently, relatively low land utilization. The big figures — 77.21 tons of CO_2 saved, 0.9183 tons of methane avoided, and 0.00081 km^2 of land cover saved — show the huge influence Envirol's land cover and the environment can have. In conclusion, the table provided by FOG demonstrates that the proper processing of FOG is highly advantageous for greenhouse gas reduction and landfill conservation, thereby highlighting the importance of communication-focused management & sustainable waste treatment.

5.5. Qualitative Impacts

One of the significant benefits (and the qualitative advantages that Envirol's sustainable projects have generated) is that we now have three benefits: environmental, social, and municipality. These outcomes underscore the importance of effective waste management and communication at scale in the UAE.First, it reduces waste, the most important value derived from waste management. Significant Reduction in Sewer Blockages and Odor Complaints. Under Envirol's proper FOG treatment and regular collection services, the number of sewer blockages, grease build-up, and odor complaints all decrease sharply–a problem already common amongst food enterprises and communities. Food service workers, as well as others responsible for conducting business with the company, have observed a significant reduction in blockages and odor complaints since the FOG treatment operation began. This makes Dubai's wastewater system a cleaner and more reliable one than ever before. Improved Public Health and Environmental Quality. Envirol specifically provides cleaner public environments by preventing FOG from entering drainage systems without treatment. This results in cleaner water systems, reduced

pollution, improved health and sanitation, and better overall health and well-being for the community. A Substantial Savings for Municipal Infrastructure. The efficient operation and management of FOG help alleviate pressure on sewerage networks and minimize the need for emergency repairs. Local governments save millions of dirhams by reducing maintenance needs, minimizing the need to maintain infrastructure, extending its service life, and reducing repair operations when required.

5.6. From Data to Decarbonization: Emissions Tracking Initiative

- Envirol applies GovEVA, an AI-driven technology platform for green technology by Envirol (Environmental, Social & Governance) that scrutinizes emissions in real time in search of environmental responsibility. GovEVA aligns with the Greenhouse Gas (GHG) Protocol for worldwide reporting, supporting reliable, internationally standardized emission measurement and reporting.

The platform classifies emissions into three internationally recognized scopes:

- Scope 1: Direct emissions originating from sources owned or controlled by Envirol, e.g., plant and onsite equipment and operational vehicles.
- Scope 2: Indirect emissions due to the consumption of purchased electricity consumed in total and through connection to Envirol's plants and networked systems.
- Scope 3: All remaining indirect emissions from broader operational activities, including those produced through staff commuting, outsourced transportation, and business-related air travel. Data Collection Period: This emissions estimation was performed from January to August 2024.

Table 2: Environmental Impacts of Improper Versus Proper FOG Disposal.

Environmental Impact Area	FOG Disposed Improperly	FOG Recycled / Managed Properly
Sewer System Performance	Causes sewer blockages, pipe obstructions, and wastewater overflows.	Significantly reduces blockages and maintains efficient flow across the sewer network.
Water Quality & Ecosystems	Leads to water contamination, harmful discharges, and damage to marine and freshwater ecosystems.	Results in cleaner waterways and provides greater protection for aquatic and terrestrial wildlife.
Greenhouse Gas Emissions	Releases methane and CO_2 due to decomposition and improper disposal.	Reduces overall greenhouse gas emissions, supporting climate mitigation efforts.
Infrastructure Costs	Causes infrastructure degradation, requiring costly municipal maintenance and emergency repairs.	Lowers long-term maintenance costs and extends the lifespan of sewer infrastructure.
Resource Recovery	No recovery of valuable byproducts; waste is lost entirely.	Enables the production of brown oil, biodiesel components, compost, and recycled water, thereby supporting circular economy practices.

The data in the comparative table provide a stark juxtaposition between the repercussions of improper disposal of fats, oils, and grease (FOG) and the advantages of efficient treatment and recycling methods made accessible through Envirol. The differences across five key domains of environmental impacts—public infrastructure, aquatic ecosystems, emissions, cost efficiency, and resource recovery—demonstrate that FOG management is not merely an operational problem but a fundamental environmental and economic concern. Improper FOG disposal directly places operational strain on the sewer system, causing blockages and impeding wastewater flow. Some of those system bottlenecks result in sewer overflows and environmental contamination. In contrast, when FOG is handled through controlled recycling systems, much of this pressure is alleviated. This not only maintains systemic continuity but also increases overall efficiency and mitigates the threat of infrastructure failure. The ecological consequences are no less dire. The unregulated influx of FOG into water systems endangers both marine and freshwater ecosystems, threatening biodiversity and disrupting ecological balance. Recycling effectively protects aquatic organisms from all these dangers, providing crucial support for aquatic life and ecosystem health. From a climate-impact perspective, mismanagement of FOG leads to greenhouse gas emissions, primarily methane and carbon dioxide, which are major contributors to climate change. In contrast, recycling processes substantially reduce these emissions, aligning with global and national climate mitigation goals and serving as a primary metric of sustainability performance.

6. DISCUSSION

These findings indicate that a combined

communication and digital monitoring approach enhances conscious awareness, compliance, and engagement with sustainable practices. The discussion of the results also contributes to communication theories that focus on the positions of consistency, engagement, and credibility in achieving desired behavior change.

6.1. Integrated Communication and Regulatory Alignment

Envirol has developed a comprehensive communication approach that combines digital tools, printed materials, reminders, and human contact. Approximately 85% of respondents reported increased understanding of FOG practice following the implementation of all communication methods. Aligning with regulatory criteria provided clarity and understanding of FOG, allowing individuals to make informed choices. In Integrated Marketing Communications, consistent messages drive both engagement and behavioral change.

6.2. Digital Systems for Accuracy, Transparency, And Compliance

Digital solutions, such as QR code reporting, RFID-enabled tracking, and the FOGwatch Smart System, enhanced operational transparency and data integrity. These technologies enabled real-time verification of grease trap servicing, automated data collection, and seamless interaction among Envirol, food outlets, and regulatory authorities. The 78% improvement in compliance rates demonstrates the potential of user-friendly digital systems to expedite reporting, reduce manual errors, and promote accountability. These results also support the view that digital communication platforms offer superior features in automation, clarity, and real-time responsiveness—key tools for achieving greater comprehension and long-term behavioral alignment.

6.3. Behavioral Change Driven by Technology

There were noticeable behavioral changes resulting from improved maintenance and repair, and reporting systems enabled by interoperable networks between two or more communication systems. These changes are supported by the PR campaign theory and the green marketing theory, which state that responsible consumer behavior increases when there are consistent messages and credible information about the environment.

6.4. Trust On Public–Private Partnerships

Envirol entered into a partnership with Dubai Municipality to enhance its communications efforts and strengthen relationships. Improving communication between the two organizations increased the credibility of their messages, reduced barriers to acceptance, and facilitated greater compliance. This achievement justifies the need for multi-stakeholder participation for effective environmental interaction.

6.5. Communication As the Vehicle for Environmental Performance

This environmental performance data also supports Envirol's approach to communication in these areas. Key areas, such as reductions in CO_2 emissions, methane generation, and landfill-directed waste, have shown clear improvement. This is also reflected in a change in practice regarding compliance with waste management regulations and operational reporting. The results of this study confirm that information sharing raised awareness and provided a financial incentive for environmental improvement by generating incentives to develop environmentally sustainable practices. It is similar to the theoretical model underlying the study. Recommendations

7. RECOMMENDATIONS

1. Enhance its digital engagements. Envirol would also extend its digital touchpoints to even more apps, active dashboards, social

media awareness programs, real-time notifications, and tools. Developing its digital presence enables the firm to reach a larger audience, enhance transparency, and encourage more frequent engagement with food venues.

2 Embed sustainability education in schools and in community programs.

To foster long-term sustainability awareness, such concepts should be integrated into basic education and community education sessions, as well as general seminars on the proper disposal of FOG. Early education helps develop a sense of duty, promoting future generations to cherish the environment.

3. Use artificial intelligence and smart gadgets to enhance national surveillance: predictive analytics, automated alerts, and reporting. Use predictive analytics, automated alerts, and reporting to build systems, such as GovEVA, that enable officials to make accurate, real-time decisions.
4. Increasingly integrate activities across all levels of public sector agencies and groups through Envirol, Dubai Municipality, food vendors, and industry groups to develop

more effective public awareness, education, or compliance campaigns.

5. Use Incentives to encourage sustainable practices through long-term sustainable compliance. By establishing systems that reward businesses through recognition, certificates, lower fees, or other incentives, companies will be encouraged to compete in establishing a sustainable business model.

REFERENCES

Alserkal Group. (2024). *Business lines – Envirol*. Retrieved December 10, 2024, fromhttps://alserkalgroup.com/business-lines/

Belch, G. E., & Belch, M. A. (2023). *Advertising and promotion: An integrated marketing communications perspective* (13th ed.). New York, NY: McGraw-Hill Education.https://www.mheducation.com/

Correia, E., Sousa, S., Viseu, C., & Larguinho, M. (2023). Analysing the influence of green marketing communication on consumers' green purchase behaviour. *International Journal of Environmental Research and Public Health, 20*, 1356.https://doi.org/10.3390/ijerph20021356

Cox, R., & Pezzullo, P. C. (2018). *Environmental communication and the public sphere* (5th ed.). Thousand Oaks, CA: SAGE Publications.https://us.sagepub.com/

Dubai Municipality. (2021). *Dubai Municipality to implement measures to raise Emirates' profile as a global model for sustainable development*. Retrieved December 10, 2024, fromhttps://www.dm.gov.ae/2021/08/04/dubai-municipality-to-implement-measures-to-raise-emirates-profile-as-a-global-model-for-sustainable-development/

Dubai Municipality. (2024a). *Environment and sustainability*. Retrieved December 10, 2024, fromhttps://www.dubai.ae/environment-sustainability

Dubai Municipality. (2024b). *Waste department – technical guidelines*. Retrieved December 10, 2024, fromhttps://www.dm.gov.ae/municipality-business/environment-sustainability-technical-guidelines/

Envirol LLC. (2024a). *About us*. Retrieved December 10, 2024, fromhttps://envirol.ae/about-us/

Envirol LLC. (2024b). *Objectives and aims*. Retrieved December 10, 2024, fromhttps://envirol.ae/objectives/

Federal Government of the United Arab Emirates. (2024). *Waste management*. Retrieved December 10, 2024, fromhttps://u.ae/en/information-and-services/environment-and-energy/waste-management

Grunig, J. E. (1992). *Excellence in public relations and communication management*. Hillsdale, NJ: Lawrence Erlbaum Associates.https://www.taylorfrancis.com/

Jain, P., Kaur, N., & Saihjpal, A. (2023). Integrated marketing communication: A developing theory. *International Journal of Creative Research Thoughts, 11*(1), 1–12.https://ijcrt.org/

Keller, K. L. (2016). *Marketing management* (15th ed.). Harlow, UK: Pearson Education.https://www.pearson.com/

Leonidou, C. N., & Leonidou, L. C. (2011). Research into environmental marketing/management: A bibliographic analysis. *European Journal of Marketing, 45*(1/2), 68–103.https://doi.org/10.1108/03090561111095603

Lewandowska, A. (2017). Green marketing today: A mix of trust, consumer participation and digital communication. *Management and Production Engineering Review, 8*(1), 3–10.https://journals.pan.pl/

Moser, S. C., & Dilling, L. (Eds.). (2007). *Creating a climate for change: Communicating climate change and facilitating social change*. Cambridge, UK: Cambridge University Press.https://doi.org/10.1017/CBO9780511535871

Nisbet, M. C. (2009). Communicating climate change: Why frames matter. *Environment: Science and Policy for Sustainable Development, 51*(2), 12–23.https://doi.org/10.3200/ENVT.51.2.12-23

Ottman, J. A. (2011). *The new rules of green marketing*. San Francisco, CA: Berrett-Koehler Publishers.https://www.bkconnection.com/

Peattie, K., & Crane, A. (2005). Green marketing: Legend, myth, farce or prophecy? *Qualitative Market Research, 8*(4), 357–370.https://doi.org/10.1108/13522750510619733

Percy, L. (2018). *Strategic integrated marketing communications*. London, UK: Routledge.https://doi.org/10.4324/9781315620038

Rehman, S. (2022). Developing the integrated marketing communication (IMC) concept: Evolution and current status. *SAGE Open, 12*(2), 1–14.https://doi.org/10.1177/21582440221099936

Smith, R. D. (2020). *Strategic planning for public relations* (5th ed.). New York, NY:

Routledge.https://www.routledge.com/
Stoica, M. (2021). Green marketing communication strategies: An integrative literature review. *Annals of the University of Oradea, Economic Sciences, 30*, 388–396.https://steconomiceuoradea.ro/
U.S. Environmental Protection Agency. (2024). *Fats, oils, and grease (FOG) management guidelines*. Retrieved December 10, 2024, fromhttps://www.epa.gov/
United Nations Environment Programme. (2024). *Global waste management outlook 2*. Retrieved December 10, 2024, fromhttps://www.unep.org/resources/report/global-waste-management-outlook-2
World Bank. (2018). *What a waste 2.0: A global snapshot of solid waste management to 2050*. Retrieved December 10, 2024, fromhttps://openknowledge.worldbank.org/handle/10986/30317