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ENVIRONMENTAL COMMUNICATION AND SUSTAINABLE TOURISM:

A study on the conscious disposal of micro-waste on the beaches of Santos

Comunicação ambiental e turismo sustentável: Um estudo sobre o descarte consciente de microlíxos nas praias de Santos

Comunicación Ambiental y Turismo Sostenible: Un Estudio sobre la Disposición Consciente de Microbasura en las Playas de Santos

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ABSTRACT:

The importance of environmental communication in raising awareness and educating tourists about the responsible disposal of micro-waste on the beaches of Santos is addressed. The role of media in shaping environmental perception is highlighted, emphasizing the need for effective strategies to tackle this often overlooked type of waste. The research, based on documentary analysis, content analysis, exploratory research, and a single-case study, identified a lack of information directed at tourists in the analyzed materials and the absence of a specific focus by public authorities on this issue. The use of innovative tools, such as Artificial Intelligence and Augmented Reality, is recommended to positively impact tourists during their stay. Despite its limitations, the study contributes by proposing strategies to reduce micro-waste, emphasizing the need for future research to assess the effectiveness of these approaches in the context of sustainable tourism.

Key words: Environmental Communication. Microwaste. Conscious Disposal. Beach Tourism

RESUMO

Aborda-se a importância da comunicação ambiental na sensibilização e educação de turistas sobre o descarte responsável de microlíxos nas praias de Santos. Destaca-se a influência dos meios de comunicação na percepção ambiental, sublinhando a necessidade de estratégias eficazes para lidar com esse resíduo frequentemente negligenciado. A pesquisa, baseada em análise documental, análise de conteúdo, pesquisa exploratória e estudo de caso único, identificou a carência de informações direcionadas aos turistas nos materiais analisados e a ausência de um enfoque específico por parte do poder público nessa problemática. Recomenda-se o uso de ferramentas inovadoras, como Inteligência Artificial e Realidade Aumentada, para impactar positivamente os turistas durante sua permanência. Apesar das limitações, o estudo contribui ao propor estratégias para a redução de microlíxos, ressaltando a necessidade de pesquisas futuras para avaliar a eficácia dessas abordagens no âmbito do turismo sustentável.

Palavras-chave: Comunicação Ambiental, Microlixo, Descarte Consciente, Turismo de Praia

RESUMEN

Se aborda la importancia de la comunicación ambiental en la sensibilización y educación de los turistas sobre la disposición responsable de microbasura en las playas de Santos. Se destaca el papel de los medios de comunicación en la formación de la percepción ambiental, subrayando la necesidad de estrategias eficaces para abordar este tipo de residuo, a menudo desatendido. La investigación, basada en análisis documental, análisis de contenido, investigación exploratoria y un estudio de caso único, identificó la carencia de información dirigida a los

turistas en los materiales analizados y la ausencia de un enfoque específico por parte de las autoridades públicas en esta problemática. Se recomienda el uso de herramientas innovadoras, como la Inteligencia Artificial y la Realidad Aumentada, para impactar positivamente a los turistas durante su estadía. A pesar de las limitaciones, el estudio contribuye al proponer estrategias para la reducción de microbasura, enfatizando la necesidad de investigaciones futuras que evalúen la eficacia de estos enfoques en el contexto del turismo sostenible.

Palabras clave: Comunicación Ambiental, Microbasura, Disposición Consciente, Turismo de Playa

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Introduction

Environmental communication is an essential tool for raising awareness in society about the importance of sustainable practices, particularly regarding the proper disposal of waste (Lima et al., 2015). The advancement of digital media has broadened the reach of environmental messages, enabling a more diverse audience to become sensitized to environmental preservation issues (Loose & Belmonte, 2017).

The improper disposal of micro-waste is a significant challenge, frequently observed in urban and marine environments. Micro-waste, such as cigarette butts, bottle caps, and plastic fragments, represents a type of waste widely discarded inappropriately, with significant cumulative impacts on the environment due to its widespread distribution (D'Antonio et al., 2012).

On the beaches of Santos, the presence of micro-waste is a noticeable issue, exacerbated during the summer season when the municipality receives a large number of tourists attracted by its infrastructure and natural beauty (Lescreck et al., 2016). The increased concentration of waste during these periods not only reduces the visual quality of the beaches but also harms coastal ecosystems, affecting marine species and their habitats.

In this context, environmental communication plays a fundamental role in promoting responsible practices, particularly among tourists visiting the municipality. Awareness initiatives, such as public campaigns and educational materials, have the potential to mitigate the negative impacts of tourism on Santos' beaches, encouraging more sustainable behaviors.

This study aims to analyze how the public sectors of Santos utilize environmental communication to raise tourists' awareness about the proper disposal of micro-waste. The research seeks to identify the strategies employed, assess the existence of initiatives targeted at visiting audiences, and measure the effectiveness of these actions, providing a critical view of the challenges and opportunities related to environmental management in the city.

Based on an exploratory approach and methodologies such as documentary analysis, content analysis, and a case study, this research offers valuable insights for improving environmental communication practices. Deepening the understanding of the role of public authorities in this process aims to propose strategies that contribute to the environmental preservation of Santos' beaches and strengthen the integration between tourism and sustainability.

Method

The methodology of this study is based on qualitative research methods of a basic nature, appropriate for investigations involving humans and their social relationships. This approach allows for a comprehensive analysis of the people involved, their environment, and social context, contributing to the understanding of existing or emerging concepts that explain human behavior (Godoy, 1995; Yin, 2016).

To achieve the research objectives, a single-case study methodology was adopted, as proposed by Yin (2001). The municipality of Santos was selected as the unit of analysis, as the study seeks to understand the current situation and provide a general overview of the environmental communication work carried out by municipal public management to raise tourists' awareness about the conscious disposal of micro-waste on the beaches.

The single-case study was chosen for encompassing more variables of interest than data sources, relying on the prior development of theoretical propositions to guide data collection and analysis (Yin, 2001). A case study protocol was used for data collection, ensuring practical conditions to guarantee the reliability of the research.

In addition, exploratory research was adopted as a qualitative methodological procedure. This method proved suitable for the research purpose, as it aims to identify which environmental communication strategies are employed by public authorities to inform and educate tourists about the conscious disposal of micro-waste on the beaches of Santos. Exploratory research serves as the researcher's first contact with the theme, collecting data from secondary sources, experience surveys, case studies, and observations, providing flexibility during the research process (Santos, 1991).

According to Theodorson and Theodorson (1970), exploratory research is used to familiarize the researcher with the phenomenon under investigation, define the research problem, and formulate hypotheses with greater precision, choose the most appropriate techniques, and identify issues that require emphasis and detailed investigation. This approach is recommended in the initial stages of research when the researcher's knowledge about the subject is limited (Mattar, 1994).

Exploratory research relies on the researcher's perception and requires precise criteria for data collection, including structure and question models as well as sources used. This enables the researcher to identify other methodologies that segment or broaden the research object (Babbie, 1986).

Although specific articles on the researched themes were not found during the literature review, additional

searches were conducted in academic sources and specialized platforms such as Scopus, Scientific Electronic Library Online (SciELO), Education Resources Information Center (ERIC), Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Biblioteca Digital Brasileira de Teses e Dissertações (BDTD), LUME, ScienceDirect, Redalyc, Agência de Bibliotecas e Coleções Digitais (ABCD) da Universidade de São Paulo (USP), Scientific Periodicals Electronic Library (SPELL), EBSCO Essentials and Google Scholar, using keywords related to environmental communication, micro-waste, beach pollution, and conscious disposal.

It is expected that this research methodology contributes to advancing the understanding of environmental communication practices adopted by public authorities to raise tourists' awareness about the conscious disposal of micro-waste on the beaches of Santos.

Documentary analysis is a crucial approach in social science research, providing valuable insights for understanding society and its memory. As defined by Le Goff (2003), documents are sources containing relevant information about society, and this definition extends beyond written texts, encompassing films, videos, photos, and other forms of records (Sá-Silva et al., 2009).

The structure of documentary analysis, according to Cellard (2008), comprises several elements, including context, authors, interests, authenticity, reliability, nature of the text, and key concepts. This structure is essential for guiding the collection and analysis of documents in research.

To achieve the research objectives, it is fundamental to build a solid data foundation. Cellard (2008) warns against hasty document analysis, emphasizing the importance of conducting an exhaustive inventory and a rigorous selection of available information.

In this context, our methodology was employed to collect and analyze online and offline documents related to raising tourists' awareness about micro-waste disposal on the beaches of Santos. Online research sources included the Santos City Hall website, social media channels such as YouTube, Instagram, Facebook, and Twitter. Meanwhile, offline documents consisted of posters, banners, folders, brochures, and booklets.

In addition to documentary analysis, content analysis was also used, following the methodology proposed by Bardin (2016). This technique is particularly relevant in communication studies and aims to confirm hypotheses, identify unanticipated responses, and present inferences.

Content analysis is divided into three stages: pre-analysis, exploration of material, and treatment of results obtained and interpretation. These stages involve applying techniques such as categorical analysis, evaluative analysis, enunciation analysis, propositional discourse analysis, expression analysis, relational analysis, and thematic analysis.

In the research, categorical analysis was chosen, allowing the breakdown of texts into units and categories related to the themes of environmental communication, micro-waste, beach tourism, and conscious disposal. Additionally, the context unit was used to understand the respondents' interpretations of the micro-waste issue and the relevance of the theme.

The data collection process involved documents at the federal, state, and municipal levels, as well as semi-structured interviews with the Deputy Secretary of the Environment of Santos and the Communications Director of the Santos City Hall (CDSCH). These interviews provided detailed information about actions, target audiences, and measurements related to environmental communication, specifically regarding micro-waste.

This methodology of documentary and content analysis, combined with data collection through semi-structured interviews, provided a robust set of information for our research on raising tourists' awareness about micro-waste disposal on the beaches of Santos. The stages of pre-analysis, material exploration, and data treatment helped us understand the overall scenario and develop inferences from the messages and information obtained (Bardin, 2016).

Presentation and analysis of results

The results of this research were obtained through documentary analysis, content analysis, and semi-structured interviews, methods that enabled the understanding of how environmental communication is used to raise awareness about micro-waste disposal on the beaches of Santos. The following are the most relevant findings, organized according to the spheres of analysis.

Documentary analysis revealed that the Plano Nacional de Combate ao Lixo no Mar (PNCLM), developed by the Ministry of the Environment, establishes fundamental guidelines for reducing waste on Brazilian coasts and promoting environmental education aimed at social engagement. Among its objectives, the third and fifth directly address reducing waste on beaches and encouraging communication and environmental education:

- “1. Reduce the amount and impacts of marine litter originating from land-based sources;
2. Reduce the amount and impacts of waste from maritime sources, including solid waste, lost cargo, abandoned or discarded fishing gear, and abandoned vessels;
3. Reduce the amount and impacts of solid waste accumulated on the coast and in coastal and oceanic waters;
4. Promote research, development of technologies, and methodologies to combat marine litter;
5. Conduct environmental education activities, societal engagement, and communication about the impacts of marine litter and the need for better solid waste management”. (Ministério do Meio Ambiente, 2019, p. 19-20).

However, the study found that despite these guidelines, no specific actions were identified for the conscious disposal of micro-waste or those targeting tourists (Ministério do Meio Ambiente, 2019).

At the state level, the Plano de Resíduos Sólidos do Estado de São Paulo (2020) prioritizes educational actions but lacks specific communication strategies to raise public awareness about waste disposal (Governo do Estado de São Paulo, 2020). At the municipal level, the Plano de Gestão Integrada de Resíduos Sólidos do Município de Santos highlighted initiatives such as the “Nossa Praia” project, which used environmental monitors to distribute bags and informational brochures about beach cleanliness. However, it was found that the plan is outdated, and the described actions lack continuity, compromising their long-term effectiveness (Prefeitura de Santos, 2010).

Figure 1: Distribution of bags and brochures on the beaches of Santos



Source: *Plano de Gestão Integrada de Resíduos Sólidos do Município de Santos, 2010.*

The Plano Regional Gestão Integrada de Resíduos Sólidos da Baixada Santista also outlined relevant guidelines, such as continuous campaigns to reduce waste in high-traffic areas. However, these initiatives were not widely implemented by the Municipal Environment Secretariat (MES), according to information collected during the research (Interviewee 1, 2023). These results reinforce the gap between formulated policies and their practical application, particularly concerning tourist audiences and the issue of micro-waste.

Specific actions developed by the Santos City Hall have both positive aspects and challenges. Among the municipal initiatives, the Clean Sand Operation project stood out as an example of good practice, integrating communication tools such as brochures, videos, signage, and social media campaigns with the presence of inspectors and adapted equipment, such as cigarette butt receptacles and easily accessible trash bins. This initiative resulted in a 45% reduction in waste in monitored areas.

Figure 2: Brochure from the Clean Sand Operation



Source: Santos City Hall website, 2023.

Despite the initial success, the limited application and lack of expansion of these actions restrict their impact, particularly regarding tourist engagement (Prefeitura de Santos, 2023). Conversely, the Clean Beach Operation, conducted during summer and winter seasons, aims to raise awareness among beachgoers through direct guidance on conscious disposal and beach usage rules. However, the messages remain generalist and do not specifically address micro-waste, which represents a significant challenge to the sustainability of Santos’ beaches (Interviewee 2, 2023).

The analysis of Santos City Hall’s digital media revealed that topics such as environmental communication, conscious disposal, and micro-waste receive little attention. Of a total of 5,267 posts analyzed on the City Hall’s and Tourism Secretariat’s social media accounts, only 11 mentioned environmental communication, four addressed micro-waste, and 11 covered conscious disposal. On YouTube, only five videos mentioned conscious disposal, and one discussed beach tourism. These findings indicate that digital campaigns have prioritized other topics, while environmental issues, though relevant, remain underrepresented in the shared content (Prefeitura de Santos, 2023).

Table 1 - Number of materials related to the research found on Santos City Hall’s digital media

Digital Media	Environmental Communication (EC)	Micro-Waste (MW)	Conscious Disposal (CD)	Beach Tourism (BT)
Instagram (City Hall and Tourism)	11	4	11	2
YouTube (City Hall)	0	0	5	1
City Hall website	0	1	7	0
Facebook (City Hall and Tourism Secretariat)	11	4	11	2

Source: Prepared by the authors (2023).

Interviews conducted with MES representatives (referred to as Interviewee 1) and the Communication Directorate representatives (referred to as Interviewee 2) underscored the need for greater integration between communication and environmental departments. Interviewee 1 (2023) highlighted initiatives such as the Clean Alley project, which seeks to engage local communities in waste management. However, they noted the absence of actions specifically aimed at tourists, a critical gap considering the high influx of visitors to the beaches during peak seasons. Interviewee 2 (2023) emphasized that the Communication Directorate uses media outlets and social networks to disseminate environmental projects but acknowledged that campaigns targeting micro-waste are sparse and often reactive, addressing specific demands rather than proactive communication strategies.

These results demonstrate that although promising initiatives exist, there is a lack of strategic and continuous approaches to environmental awareness. The disconnect between communication methods and the specific demands

of tourist audiences limits the reach and impact of the actions undertaken. Furthermore, the low representation of the micro-waste theme on digital media reflects a missed opportunity to engage a broader audience, especially seasonal visitors.

Given these findings, a series of measures are proposed to improve environmental communication in Santos. Initially, it is recommended to increase the frequency and specificity of digital campaigns, prioritizing interactive and dynamic content on platforms like Instagram and TikTok, aimed at young and diverse audiences. Partnering with tourism sector agents, such as hotels and tour operators, could also strengthen the dissemination of information about conscious disposal. Additionally, it is suggested to develop clear indicators to measure the impact of actions and foster greater integration between MES and the Communication Directorate for planning and executing broader-reaching campaigns.

Finally, expanding in-person actions, such as those conducted in the Clean Sand Operation, would be fundamental to engage tourists and residents throughout the year, not only during summer seasons. These actions, combined with the continuous updating of municipal waste management plans, can significantly contribute to the sustainability of Santos' beaches, promoting more conscious tourism aligned with environmental preservation practices.

Final considerations

This study aimed to identify the types of environmental communication employed by the public sector to inform and raise tourists' awareness about the proper disposal of micro-waste on the beaches of Santos. In this context, the specific objectives guided the analysis toward understanding the communication strategies adopted, identifying the existence of communication directed at tourists, and verifying whether actions and their results were measured. To achieve these objectives, a methodological approach involving a bibliographic survey, documentary analysis, content analysis, and semi-structured interviews was adopted.

The initial bibliographic survey expanded the understanding of the topic and explored how environmental communication related to micro-waste has been addressed by researchers. However, the lack of specific research on the subject highlighted the need to fill this knowledge gap.

The documentary analysis, divided between printed and digital materials, revealed a scarcity of specific information aimed at tourists regarding the conscious disposal of micro-waste on the beaches of Santos. Only one printed material, part of the pilot project Clean Sand Operation, contained information about conscious disposal, although it was not focused on tourists. Materials from social networks and the official website of the City Hall lacked informative content on the subject.

The content analysis, based on keywords such as Environmental Communication, Micro-Waste, Conscious Disposal, and Beach Tourism, showed that these terms were present in the analyzed content but not directly related to the research project. Most of the content was intended for residents and served as an informative tool, communicating actions carried out by the City Hall.

The interviews conducted with representatives from the Environment Secretariat and the Communications Directorate revealed that the micro-waste theme is not treated specifically, lacking targeted actions for this objective. Instead, micro-waste is addressed indirectly or as a consequence, without a specific focus on tourists.

One of the main contributions of this study lies in the recommendation for municipal public authorities to adopt communication tools to engage tourists during their stay in the city. The use of tools such as Artificial Intelligence and Augmented Reality can provide impactful and enjoyable experiences, demonstrating the positive impact of conscious waste disposal on beaches. Ongoing awareness campaigns targeting street vendors and digital marketing actions aimed at tourists during their visit are suggested strategies to reach this audience.

However, this study presents some limitations, such as the scarcity of recent research on Environmental Communication and its impact on human behavior. Additionally, during the interviews, respondents faced difficulties answering questions on the addressed themes, which may impact the quality of the collected information.

For future research, qualitative and quantitative studies are recommended to explore how communication tools and user experiences can contribute to reducing micro-waste on beaches. These studies could provide valuable insights for developing effective environmental communication strategies targeting tourists, helping to preserve Santos' beaches and, consequently, the marine environment.

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