The Role of Environmental Graphics in Informing Urban Waste Management (Case Study: Rasht City)

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Abstract

In recent decades, rapid developments in human societies have made urban spaces the central setting of citizens' daily lives. City dwellers spend a considerable amount of time in these environments, which has increased the influence of visual elements and environmental graphics on individuals' perceptions, experiences, and behavioral patterns. Beyond their aesthetic function, environmental graphics play a fundamental role in public information and education and can directly influence citizens' behavior. One area in which this potential is particularly evident is urban waste management. Growing human needs and the expansion of consumption, along with the widespread use of packaged goods, have led to the generation of large volumes of waste, making its management a critical environmental and social concern. This study seeks to answer the question: Why and how do environmental graphics play a role in informing waste management? The research adopts a descriptive–analytical approach, with data collected through library-based research and a review of successful international examples. For data analysis, the SWOT strategic model was employed to identify strengths, weaknesses, opportunities, and threats, with the city of Rasht selected as the case study. The findings indicate that environmental graphics, through the use of visual language and modern digital tools in public spaces, can significantly increase citizens' awareness of the importance of waste management. Moreover, these visual tools have the capacity to influence attitudes and encourage active public participation. Ultimately, environmental graphics not only contribute to improving the quality of the urban environment but also function as an effective instrument in promoting sustainable development, social responsibility, and citizens' sense of place attachment.

Keywords: Environmental graphics; waste management; visual communication; urban space.

1. Introduction

Waste management, particularly at the urban level, has become a major contemporary challenge. As human societies progress, increasing attention has been directed toward meeting the diverse needs of citizens, especially within urban environments. Consequently, the production of both essential and auxiliary goods has expanded, leading to a substantial rise in the volume of waste generated in cities. Under these circumstances, enhancing citizens' awareness of waste management practices has become critically important.

The use of informational elements within urban spaces can play a significant role in increasing public knowledge and awareness of waste management. Environmental graphics, as a key informational component at the urban scale, are therefore of considerable importance. The organization of urban spaces, along with the coordination and arrangement of buildings, constitutes a fundamental prerequisite for effective environmental graphic design, as these factors influence people's understanding of their surroundings and the ease with which they navigate urban spaces and facilities. Accordingly, successful environmental graphic design depends on the correct application of urban planning and architectural principles to provide appropriate standards for human–environment interaction. In essence, a portion of the responsibility for organizing the urban environment and conveying information and messages through symbolic language, signage, and typography lies with environmental graphics. Beyond aesthetic considerations, environmental graphics must align with the audience's cognitive and cultural experiences to facilitate meaningful interpretation, offering creative visual expressions that resonate with societal values and collective memory. Historically, cities have served as centers of population concentration and hubs of economic, cultural, and social activity. In the contemporary era, the pace of urbanization has accelerated rapidly. According to United Nations reports, more than half of the world's population now resides in urban areas. This population growth and urban expansion have introduced numerous challenges, among which urban waste management is one of the most critical. Improperly managed urban waste can result in severe environmental, health, and social consequences. Therefore, informing citizens and raising awareness about waste reduction, separation, and recycling constitutes a core pillar of sustainable urban management. One of the most effective tools in this domain is environmental graphics. Environmental graphics, as a branch of graphic design, are employed in public and urban spaces to communicate visual messages, establish spatial identity, and guide users. Through the use of symbols, colors, signage, and imagery, environmental graphics can convey waste management–related messages in a clear, engaging, and accessible manner. This function becomes increasingly important in the context of the information age and the development of smart cities, where digital environmental graphics offer interactive capabilities and rapid message updates.

The purpose of this study is to examine the role of environmental graphics in informing urban waste management and to explore how such graphics can encourage citizens' active participation in waste management practices. The city of Rasht serves as the case study. The research employs a descriptive–analytical methodology based on a review of library resources, with qualitative data analysis conducted using the SWOT strategic model to provide a comprehensive evaluation of the findings.

2. Literature Review

Previous studies have addressed environmental graphics and waste-related information as separate subjects; however, fewer studies have examined the integration of these two domains within a unified framework. The present research seeks to address this gap by analyzing environmental graphics as an effective informational tool in urban waste management. From a graphic design perspective, this study adopts an interdisciplinary and applied approach that can contribute to the development of practical solutions for urban planners and graphic designers. Khataei and Arefi (2017), in their study "Environmental Graphics and Urban Furniture Characteristics in Waste Separation in

Shiraz City," identify environmental graphics as a key factor in enhancing urban legibility. They argue that the design of pictograms, signage, and waste bins using specific colors and forms plays a significant role in educating citizens and encouraging waste separation at the source. Their findings also indicate that integrating environmental graphics with the characteristics of urban furniture contributes to both the visual identity and aesthetic quality of the city.

Similarly, Ghaemimanesh (2019), in "Environmental Graphics as a Medium for Environmental Protection," examines the role of environmental graphics in environmental communication at urban and public levels, emphasizing their importance as a powerful medium for increasing environmental awareness and fostering environmental culture.

3. Research Methodology

This study employs a descriptive–analytical research methodology. Data and information were collected through a comprehensive review of library resources, complemented by an examination of successful international examples relevant to the research topic. Data analysis was conducted qualitatively, using conceptual and comparative analysis of the selected sources. The analyzed examples were organized and evaluated in tabular form. The primary objective of the research is to investigate the role and impact of environmental graphics in informing and enhancing collective awareness of waste management in urban spaces, as well as to identify optimal strategies for improving public culture in this field. The city of Rasht was selected as the research sample. To achieve a more systematic analysis of the qualitative data, the SWOT strategic model was applied.

4. Findings

An examination of environmental graphic measures related to waste management in Rasht reveals several notable aspects of visual design and message communication. One key strength is the use of internationally standardized colors in the design of waste separation bins. Assigning green to recyclable waste, yellow to plastic, blue to paper, and red to hazardous waste has improved operational clarity and facilitated citizens' understanding of the waste separation process. This color-based system has contributed positively to public comprehension of source separation principles. However, accompanying banners and informational boards exhibit several graphic shortcomings. Many lack visual coherence, a clear hierarchy of readability, and meaningful graphic symbols. The use of non-standard fonts and weak compositional structures reduces visual appeal and diminishes message effectiveness, resulting in environmental messages that are not always clearly conveyed. Furthermore, insufficient attention to local cultural and indigenous elements in graphic design has weakened citizens' emotional connection to these messages and reduced their sense of belonging. From a spatial perspective, environmental graphic elements such as separation bins and informational signage are predominantly concentrated in central and high-traffic areas of the city. This uneven distribution limits access to environmental education and waste separation infrastructure in underprivileged neighborhoods, undermining spatial equity and potentially reducing long-term citizen participation. In addition, evidence suggests that environmental promotion related to smart waste management tools, such as mobile applications, remains limited and lacks sufficient effectiveness. Given the growing importance of digital solutions in urban management, it is essential to enhance environmental graphic design in alignment with these technologies to better educate, motivate, and facilitate citizen engagement.

SWOT Strategies for Improving Environmental Graphics in Waste Management in Rasht

To assess the waste management information system in Rasht, SWOT analysis was employed as a strategic evaluation tool. By identifying strengths, weaknesses, opportunities, and threats associated with the design and implementation of environmental graphics, this framework enables the formulation of strategies across four categories: SO, WO, ST, and WT.

SO Strategies (Strengths + Opportunities)

Leveraging NGO participation to produce graphic content inspired by the indigenous

culture and art of Guilan. Developing a waste management application with a localized, graphic-based user interface tailored to different age groups. Utilizing the capacities of universities and local designers to create an integrated, citywide information system.

WO Strategies (Weaknesses + Opportunities)

Redesigning urban messages and signage using motion graphics and digital billboards. Creating locally symbolic characters for visual education on waste separation at the city level and in schools. Collaborating with universities to redesign color systems and environmental information symbols.

ST Strategies (Strengths + Threats)

Redesigning separation stations using durable materials and visually appealing graphic forms to reduce damage and wear. Incorporating gamification and scoring systems into waste management applications to counter declining public participation. Integrating existing environmental graphics to avoid redundancy and audience confusion.

WT Strategies (Weaknesses + Threats)

Developing comprehensive municipal policies for the maintenance of informational equipment in collaboration with relevant institutions. Implementing short-term, targeted informational campaigns to test graphic design effectiveness. Establishing a visual database to continuously evaluate graphic messages and prevent the repetition of ineffective designs.

5. Conclusion

Environmental graphics represent a powerful visual tool in urban spaces, with significant potential to raise awareness and influence citizens' behavior regarding waste management. By employing symbols, colors, and imagery, environmental graphics communicate key messages—both directly and indirectly—and support public understanding of waste separation, reduction, and recycling. The findings of this study demonstrate that well-designed environmental graphics can generate positive behavioral incentives, contributing to reduced environmental pollution and enhanced urban quality of life.

Another critical factor highlighted in this research is the alignment of environmental graphics with local culture. Messages that reflect regional values, symbols, and cultural characteristics are more effective in fostering place attachment and strengthening citizens' sense of environmental responsibility. Consequently, environmental graphic design must be tailored to the cultural and social context of each region to achieve optimal impact. Urban waste management remains a major challenge in urban and environmental planning, particularly in cities such as Rasht, which possess distinctive cultural, climatic, and ecological characteristics. In this context, environmental graphics function as an interdisciplinary tool capable of informing, educating, and engaging citizens. This study examined the current status of environmental graphics related to waste information in Rasht using a qualitative, descriptive–analytical approach. Data were collected through field observations, visual analysis of existing samples, review of official documents, and analysis of visual content used in urban information tools. SWOT analysis revealed that although initial measures—such as multi-compartment bins, educational signage, and mobile applications—have been implemented, their effectiveness is limited due to a lack of graphic coherence, insufficient incorporation of local identity, restricted spatial distribution, and weak interactive design. Overall, the findings suggest that environmental graphics in Rasht require comprehensive revision at the levels of policy-making, design, and implementation. Emphasizing local visual identity, creating inclusive and accessible visual messages, expanding digital and interactive media, and integrating education with public participation can foster more responsible environmental behaviors. Achieving these goals necessitates coordinated collaboration among municipal authorities, graphic designers, cultural institutions, and citizens.

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Author's Contribution

The research was conducted solely by the author.

Conflict of Interest

The author declares no conflict of interest.

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