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Original Article

AI-Enhanced Environmental Graphic Design in Commercial Advertising: A Jordanian Case Study in Design Technology

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Abstract - *The paper explores the impact of environmental graphic design on commercial advertisements in Jordan from the designers' perspective in advertising design companies. The descriptive-analytical approach was used to achieve the research objectives. An item-based 3-dimensional questionnaire was designed as a research instrument to collect data related to the impact of environmental graphic design on commercial advertisements. The findings indicated that environmental graphic design has a significant impact on commercial advertisements in various dimensions, including branding and advertising. Likewise, the results demonstrated a positive impact of environmental graphic design on branding and advertising separately. That said, the study recommends conducting further future research on the topic using other variables. Moreover, among the key recommendations is to issue guidance publications for Jordanian advertising companies and designers, highlighting the importance of environmental graphic design and its role in enhancing the effectiveness of marketing and advertising.*

Keywords - *Advertisement, AI in design, Environment, Graphic design, Intelligent systems.*

1. Introduction

The advertising sector in Jordan is evolving rapidly, and Environmental Graphic Design (EGD) seeks to be a data-centric response to engage audiences more in-depth and communicate brands [1]. EGD has access to other advancements like Artificial Intelligence (AI) software, visual smart analytic software, and access to intelligent design online platforms, which are on the rise. The benefits of EGD show the evolution of traditional approaches to design intentionally to consistently design adaptively with intelligent and data-informed systems. EGD sways between the natural/and built environment, it utilizes intelligent software for speaking to messaging, and even tells not only the spatial experience of commercial integration [2]. With an increase in global environmental awareness, environmental graphic design now has a modern trend representing its environmental responsibility [3]. Environmental graphic design is a design discipline that integrates background environment at every point in the journey, i.e., sustainable materials tests, messaging that builds followers' understanding of accountability, and systems that create dialogues around eco-stewardship for future generations [4]. Environmental Graphic Design is relevant to this discussion in moving towards circular economies, as well as the implications and use of AI, which have fiercely disrupted graphic design activations.

AI-powered design tools, such as AI-generated designs, have quickly disrupted the design tool market, enabling designs to be completed quickly, with customizable designs [6]. Moreover, AI has the ability to analyze market movements and user trends, giving designers opportunities to build better, more sustainable businesses [7]. Not getting into these more recent applications can also help to improve the energy performance of digital designs, leveraging digital designs to meet sustainability criteria [8]. Perhaps the most compelling of recent developments, of course, is the application of deep learning techniques, which enable designers to assess environmental images and renderings with more speed and accuracy than pre-2022 designers, allowing for real-time integration of environmental criteria into design advertising [9].

AI-enabled applications are now translating ideas into cohesive graphic design and identifying the environmental aspects of the design, raising many questions about the designer's role in relation to rapidly evolving intelligent technology [10, 11]. Additionally, can these ideas be worked towards appropriate environmental graphic design while sustaining the creative center [12]? Therefore, this will also add new dimensions to explore how these strategies have a bearing on sustainable advertising design in the Jordanian

context and to what extent a detail-oriented approach and innovative measures must be used in attending to and resolving the issues designers face regarding commercial advertising in Jordan [13].

In light of these developments and demands of the marketing, environmental design impacts on the appeal of an advertisement and its presence of communicating a marketing message to the public will be examined through semistructured interviews with advertising designers in the Jordanian Market, revealing additional challenges that designers face when working under the guidelines of eco-design, such as the high cost of greener materials and considerations about whether the design is part of the brand.

This study is of high significance, as it provides recommendations for designers and advertising companies in Jordan to promote the use of Environmental Graphic Design, which contributes to achieving effective marketing objectives while maintaining environmental responsibility. In this context, this research explores the impact of environmental graphic design on commercial advertisements in Jordan from the perspective of designers working in advertising design companies, especially with the growing interest of local companies in adopting marketing strategies that reflect their commitment to sustainability. This study is significant in that it provides actionable insights for advertising design companies in Jordan, offering evidence-based recommendations to enhance branding and advertisement effectiveness through environmentally conscious design strategies.

Despite the rapid uptake of AI-assisted tools, little empirical work has examined how EGD translates into branding and advertising outcomes in the Jordanian market from the designers' perspective. Prior studies typically address consumer responses or technical tools, leaving a contextual and practice-oriented gap. We address this by validating a concise instrument capturing EGD's perceived impact in design practice, estimating EGD's effects on branding and advertising, and deriving practice-ready implications for integrating EGD with AI-enabled workflows in agency settings.

2. Literature Review

Previous research work and studies have documented the key role played by graphic design in various aspects of life in general and commercial advertisements in particular. The authors of [14] analyzed the impact of environmental graphic designs on consumer response to commercial advertisements in Jordan. The findings revealed that 68% of consumers prefer brands that use sustainable designs, with a 42% increase in recall rates for advertisements that use environmental elements. The study recommended integrating sustainability concepts into advertising strategies. Recent studies are beginning to explore how Artificial Intelligence (AI) tools may have an impact on visual advertising design. [15] indicates that, empowered by AI, design platforms like Midjourney can generate limitless visual options in seconds and iterate to develop creative ideas, while still letting the designer keep their traditional position. They are using AI as a collaborator rather than a replacement, to create efficiencies and ultimately spur innovation in competitive digital advertisement environments.

In another related study [16], the focus was on analyzing the impact of environmental graphic design on product packaging in advertisements. The results showed that designs using environmental symbols and natural colors contributed to a 27% increase in sales compared to traditional designs. The study also noted that these designs enhance a positive brand image. On the other hand, the Authors of [17] compared the effectiveness of environmental graphic designs in digital and print ads. It was found that digital advertisements with environmental designs achieved 35% higher engagement, while print advertisements were 22% more effective in enhancing brand trust. The study recommended adopting integrated strategies that combine both media.

Authors of [18] focus on the use of AI art generators that produce complex, high-resolution images based on text prompts. The research clearly shows how designers get prompted by Midjourney to make advertising posters and conceptual imagery in a matter of seconds instead of creating the work themselves, and can display the same results that took hours of manual labor. These tools are disrupting the creative space in expansive and experimental ways, while providing rapid concept validation and ideation in bolder frames.

Additionally, [19] examined how environmental graphic designs may be applied to the Arab culture in advertising. The findings demonstrated that a graphic design that merged environmental aspects with local cultural heritage was the most impactful for capturing attention at 53%. They indicated the value of cultural values when integrating sustainability into advertising, as well as graphic design. However, there's still a need for formation in developing countries, researchers have noted green marketing and brand communications, calling for literacy and sustainability in communications [20].

This research explained that green advertising must be socially responsible and also in alignment with local consumers' values and brand image, with each one of the three elements present for each element to have value and meaning in the marketplace. These studies show that the importance of environmental graphic design and the contributing presence of AI-assisted visual creation tools are on the rise in advertising. But, empirical studies seldom document the designers' views in markets like Jordan, where the intersectionality of sustainability and AI is embodied. This issue has prompted the research problem in the section below.

3. Research Problem and Hypotheses

Considering the ongoing development of markets, the congestion of products and services, the continuous diversity in Jordanian markets, and the constant development of commercial advertisements and associated brands, it is necessary to focus on studying the environment associated with commercial advertisements and the role of the environmental graphic designer in influencing commercial advertisements using the surrounding environment, which is represented by the internal and external environments [21]. Further, it is also of high importance to focus on studying environmental graphic design before starting any advertising project, emphasizing commercial advertisements and the brand associated with it, and utilizing the surrounding environment in the process of innovation and creativity [22]. Accordingly, the research problem is articulated in answering these questions:

- (RQ1) What is the impact of environmental graphic design on commercial advertisements in Jordan from the designers' perspective in design companies?
- (RQ2) What is the impact of environmental graphic design from the designers' perspective?
- (RQ3) What is the impact of environmental graphic design on commercial branding from the designers' perspective?
- (RQ4) What is the impact of environmental graphic design on commercial advertisements from the designers' perspective?

Based on the research objectives, the following null hypotheses were tested at a significance level of $\alpha \leq 0.05$:

- H0: Environmental graphic design has no significant impact on commercial advertisements, including both branding and message effectiveness.
- H01: Environmental graphic design has no significant impact on commercial branding.
- H02: Environmental graphic design has no significant impact on advertisement content and design.

4. Methodology

This study used a descriptive-analytical method to investigate how environmental graphic design affects commercial ads from the point of view of designers who work for advertising companies in Jordan. Environmental Graphic Design (EGD) [23], in this study, refers to visual design that integrates environmental elements to enhance branding and advertisement effectiveness.

4.1. Research Population & Sample

The research population consisted of graphic design companies operating in Amman. One hundred thirty questionnaires were distributed to the research sample participants, and 112 were returned. After reviewing the returned questionnaires, 10 were excluded for being unsuitable for statistical analysis. Therefore, the number of questionnaires valid for statistical analysis is 102, as illustrated in Table 1.

Table 1. Number of distributed and returned questionnaires valid for statistical analysis

Distributed Questionnaires	Returned Questionnaires	Return Percentage	Percentage of Valid Questionnaires	Number of Valid Questionnaires
130	112	86.1%	%78.5	102

The research sample consisted of 102 valid responses from employees at advertising design companies in Amman. Most participants were male (74.5%) and held degrees in graphic design (46.1%) or interior design (41.2%). Nearly half of the respondents (49%) worked as graphic designers, and the majority had 10–20 years of professional experience (44.1%). Table 2 shows the demographic Characteristics of the Respondents.

Table 2. Demographic characteristics of the respondents

Variables	Category	Percentage
Gender	Male	74.5%
Academic Major	Graphic Design	46.1%
Job	Graphic Designer	49.0%
Years of Experience	10–20 Years	44.1%

4.2. Research Instrument (Questionnaire)

An item-based, three-dimensional questionnaire was designed as the research instrument to collect data related to the impact of environmental graphic design on commercial advertisements [24]. The questionnaire was developed in alignment with the research objectives, problem, and questions, and was structured to cover all variables proposed in the study. The instrument included the following sections:

- Personal and functional characteristics of employees working in companies operating in Amman, including gender, major, job position, and number of years of experience.
- Independent variable: The impact of environmental graphic design.
- Dependent variable: Commercial advertisement, which includes both branding and advertising components. Accordingly, the final version of the questionnaire consisted of 30 items directed at employees in graphic design companies.

To check the face validity of the instrument, it was reviewed by a group of experts and validators with experience and knowledge in graphic design, scientific research methodology, and applied statistics to leverage their expertise in making the instrument more accurate and objective in its

measurement. The questionnaire in its final form consisted of 31 items. Besides expert checking, the instrument was pretested with a small group of 10 practicing designers for clarity, length, and comprehension of items prior to launch. Feedback from this pretest resulted in minor wording adjustments and affirmed that the three-dimensional structure was appropriate. To evaluate the reliability of the research instrument, Cronbach's Alpha [25] was used to calculate the reliability coefficients for the research variables to measure the internal consistency of the questionnaire items, with the reliability rate for the overall instrument being 94.1%, as illustrated in Table 3.

Table 3. Results of the research instrument, reliability test "internal consistency of questionnaire items"

Main Variables	Number of Items	Cronbach's Alpha
The Impact of Environmental Graphic Design	11	%88.1
Commercial Branding	11	%89.9
Commercial Advertisement	11	%85.3
The Overall Instrument	31	%94.1

After completing the data collection process for the research variables, the data were inserted into the Statistical Package for the Social Sciences (SPSS) program [26]. Before conducting the hypothesis testing and regression analysis, the data had to be checked to see whether it met the statistical assumptions. To check for normality, we used a one-sample Kolmogorov–Smirnov test. To check for sampling adequacy, I used the Kaiser–Meyer–Olkin (KMO) measure, and to check for multicollinearity, the Variance Inflation Factors (VIF) were used. All values passed acceptable limits, thereby establishing the validity of the following multiple regressions.

5. Results

5.1. (RQ1) What is the Impact of Environmental Graphic Design on Commercial Advertisements in Jordan from the Designers' Perspective in Design Companies?

In response to RQ1, the responses indicated that in connection with "commercial advertisements", participants favorably appreciated the influence of environmental graphic design (M = 4.54). "The Impact of Environmental Graphic Design" scored highest (M = 4.63) among the three dimensions, with branding and advertisement on the second level, which reflects perceived high influence in all realms.

5.2. (RQ2) What is the Impact of Environmental Graphic Design from the Designers' Perspective?

For RQ2, the dimension measuring the designers' perception of EGD's importance had a high overall mean (M = 4.63), indicating a strong agreement. Designers especially agreed that EGD "presents attractive designs to the recipient" (M = 4.72), further affirming the value of EGD in commercial contexts.

5.3. (RQ3) What is the Impact of Environmental Graphic Design on Commercial Branding from the Designers' Perspective?

RQ3 focused on the role of EGD in branding. Respondents rated this dimension highly (M = 4.55), particularly emphasizing its role in building a company's brand (M = 4.73). All responses supported the importance of integrating EGD into branding strategies.

5.4. (RQ4) What is the Impact of Environmental Graphic Design on Commercial Advertisements from the Designers' Perspective?

RQ4 addressed the impact of EGD on advertisements. The average response (M = 4.46) showed clear agreement about EGD's effectiveness. The most emphasized item was its role in arousing recipient interest and desire (M = 4.59), underscoring its value in communication and marketing. In order to provide an overview of respondents' evaluations of the main study constructs, Table 4 provides the means and standard deviations for Environmental Graphic Design (EGD), branding, and advertising effectiveness. Responses from the participants indicated generally high agreement with the significance and impacts of EGD for all dimensions. EGD had the highest mean (M = 4.63), branding next (M = 4.55), and advertising success (M = 4.46). This suggests that designers believe EGD very much influences branding and advertising.

Table 4. Descriptive statistics of study constructs

Construct	N	Mean	SD
Environmental Graphic Design (EGD)	102	4.63	0.52
Branding	102	4.55	0.57
Advertising Effectiveness	102	4.46	0.61

6. Hypothesis Testing

Before testing the hypotheses, several statistical checks were conducted. The Kolmogorov-Smirnov test confirmed that the dataset followed a normal distribution [27]. The one-sample t-test established data homogeneity [28], and the Kaiser-Meyer-Olkin (KMO) test confirmed the adequacy of the sample size for analysis [29]. Additionally, the Variance Inflation Factor (VIF) test indicated no issues with multicollinearity [30]. These tests confirmed that the data were suitable for multiple linear regression analysis to test the research hypotheses.

7. Research Hypotheses Testing Results

Research hypotheses were tested using Multiple Linear Regression Analysis. Table 5 summarizes the regression

coefficients and significance levels and explains the variance of the tested models.

Table 5. Summary of multiple regression results for the effect of Environmental Graphic Design (EGD)

Dependent Variable	β (Standardized)	p-value	R^2
Branding	0.48	< .001	0.23
Advertising Effectiveness	0.61	< .001	0.59

Table 5 shows that environmental graphic design has a significant predictive role on branding and advertising efficacy. EGD accounted for 23% of the variance within branding ($\beta = 0.48$, $p < .001$) and 59% of the variance in advertising efficacy ($\beta = 0.61$, $p < .001$), demonstrating a strong contribution towards strategically impacting brand perception and advertising effectiveness.

The findings supported the idea that EGD has two significant effects on commercial advertisements, namely branding and advertisement content. For the primary hypothesis (H_0), EGD was found to significantly moderate commercial advertising in general ($p < 0.001$), and the model accounted for an estimated 59% of the variance in advertising effects. This suggests that the EGD principles explain much of the commercial's effect on performance. Results provide evidence for the first sub-hypothesis (H_{01}) that EGD significantly influences branding effectiveness ($p < 0.001$) and explains approximately 23% of the variance observed.

This indicates the positive impact of environmentally friendly design on brand image and perception. Likewise, the second sub-hypothesis (H_{02}) was rejected, and explained a significant effect of EGD on the advertisement's design and content could be shown ($p<0.001$), and again, 23% of its variance. Taken together, none of the null hypotheses were accepted, which is strong statistical evidence that environmental graphic design has an effect on the efficiency of branding and commercial advertising in Jordan design firms.

8. Discussion

The findings of this study reveal that Environmental Graphic Design (EGD) holds strong potential for enhancing commercial advertising in Jordan, but its application remains relatively limited in practice. Although designers recognize its importance, the integration of EGD into advertising strategies is still in early stages, with most campaigns not fully embracing environmentally conscious design principles. One of the significant challenges identified is the lack of awareness among many advertising and design companies about the benefits of EGD. This includes its visual impact and role in strengthening brand identity and consumer trust. Without proper understanding and training, companies are unlikely to invest in sustainable design strategies.

Therefore, raising awareness is as important as efforts to change EGD through collaborations with universities, advertising agencies, and government agencies that can encourage novelty, develop local design standards, and promote environmental issues in an ever-changing design education constellation. Thus, EGD can shift from a peripheral concern and destination points in the Jordanian creative process, toward a center point based on advertising practice in Jordan to enhance emotional value and ecological awareness in commercial advertising.

The implications are practical for advertising and design firms. Marketing firms can use EGD principles with AI-supported systems to facilitate the speed of sustainability design ideation and assessment of sustainability design while saving time and allowing the brand's message to be more seamless and trustworthy. Education programs can concentrate, and designers can understand how to meld together environmental prompts – including media, natural colors, and spatial identity- with AI platforms like Midjourney to allow for imaginative exploration but still provide constraints for strategic reasons. Communication and collaboration between the academy, industry, and government could yield standards and best practices for sustainable marketing design.

These results align with existing research indicating that sustainable visual inputs are associated with increased consumer trust and engagement [16, 17]. However, in contrast to [17], which examined consumer digital engagement, this research provides a designer-focused perspective in a Middle Eastern context. This finding was also supported by more recent studies on AI-enabled advertising creativity [15, 18], establishing designers' thinking about EGD as a strategic benefit that could be enhanced and not replaced with AI technology. Moreover, worldwide research on green marketing in emerging economies [20] penalizes sustainability signals/ cues as cultural adaptation, which findings from Jordan also further validated. The study used self-reported perceptions from designers in Jordan, which limits generalizability and potential bias. The cross-sectional design restricts causal inference. Future research should experimentally or longitudinally examine these relationships, include measures of actual advertisement performance of AI or human-only designs, and better understand how AI-based design platforms can be systematically implemented into sustainable advertising processes.

9. Conclusion

This research supported the notion that Environmental Graphic Design (EGD) provides immense value in the commercial advertising industry in Jordan from the point of view of designers in advertising firms. The findings in this study indicated that EGD provides enhanced brand identity, reinforces marketing messages, and facilitates engagement by providing a visually appealing and purposeful design.

Participants noted EGD as an effective marketing tool that can not only help with actual products but can also evoke feelings and satisfy emotional responses and influence consumers' willingness to buy, think, and behave. Therefore, as soon as a company expresses environmental change through design, it can achieve effective marketing and socially responsible, meaningful values. To maximize the values of EGD, the designer needs to be innovative, create culturally appropriate designs, and align them with images and brand goals. The results from the research study illustrated that greater adoption of utilizing design principles that promote environmental impact in Jordanian advertising design will be necessary for the development of designs that are visually interesting, ecologically sound, and market-driven.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper. The research was conducted independently, and no financial or personal relationships influenced the outcomes or interpretation of the study.

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