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Keywords:
Bibliometric Analysis, Environmental Design, Thematic Analysis, Landscape Architecture, R Studio.

Anahtar Kelimeler:
Bibliyometrik Analiz, Çevresel Tasarım, Tematik Analiz, Peyzaj Mimarlığı, R Studio.

ABSTRACT

Today, artificial intelligence (AI) technologies are transforming numerous disciplines and creating new opportunities in the field of environmental design. The potential of AI tools in environmental design extends beyond technical processes, influencing human-environment interaction. However, existing studies on this topic have predominantly maintained a technical focus, with limited in-depth exploration of social dimensions such as human, society, and culture. This paper presents a bibliometric and thematic analysis of AI technologies in environmental design from a social sciences perspective. From an initial set of 170 works identified in Scopus as related to "artificial intelligence" and "environmental design," 39 articles classified under the "Social Sciences" category were selected for analysis. The bibliometric analysis quantitatively examines the temporal evolution, geographical distribution, collaborative network structures, and citation profiles of these publications. Subsequently, thematic analysis investigates the prominent research topics, data sources, and methodological approaches applied in these studies. Findings reveal a broad spectrum of AI applications from quantifying perception and experience to analyses of human well-being and safety, and from socio-ethical considerations to the integration of generative AI in design processes. By arguing that AI in environmental design should be regarded not merely as a technical tool but as a phenomenon influencing social structures and human experiences, this study aims to deepen understanding of the field's social dimensions and provides a foundation for future research.

ÖZ

Günümüzde yapay zekâ (YZ) teknolojileri birçok disiplini dönüştürmekte olup, çevre tasarımında da yeni olanaklar yaratmaktadır. YZ araçlarının çevre tasarımındaki potansiyeli teknik süreçlerin ötesinde insan-çevre etkileşimini de etkilemektedir. Ancak yapılan çalışmalarda YZ'nin bu alandaki rolü genellikle teknik odaklı kalmış, insan, toplum ve kültür gibi sosyal boyutlar yeterince derinlemesine incelenmemiştir. Bu çalışma, YZ teknolojilerinin çevre tasarımı alanındaki kullanımını sosyal bilimler perspektifinden ele alan bibliyometrik ve tematik bir analiz sunmaktadır. Scopus veri tabanında 'yapay zekâ' ve 'çevresel tasarım' kavramları ile ilişkili olduğu belirlenen 170 çalışma arasından konu kategorisi 'Sosyal Bilimler' olan 39 makale analiz için seçilmiştir. Bibliyometrik analiz, bu yayınların zaman içindeki değişimini, coğrafi dağılımını, iş birlikçi ağ yapısını ve atıf profillerini nicel verilerle ortaya koymuştur. Ardından tematik analiz ile bu makalelerde öne çıkan araştırma konuları, veri kaynakları ve uygulanan yöntemler incelenmiştir. Bulgular; YZ'nin algı ve deneyimin nicelleştirilmesinden insan refahı ve güvenlik analizlerine, toplumsal/etik boyutlardan üretken YZ'nin tasarım süreçlerine entegrasyonuna kadar geniş bir yelpazede kullanıldığını göstermektedir. Bu çalışma, YZ'nin çevre tasarımında sadece teknik bir araç olmanın ötesinde, toplumsal yapıları ve insan deneyimlerini etkileyen bir olgu olarak kabul görmesi gerektiğini savunarak, alanın sosyal boyutlarının daha iyi anlaşılmasına katkı sağlamayı ve gelecek araştırmalar için zemin oluşturmayı hedeflemektedir.

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INTRODUCTION

In today's world, artificial intelligence (AI) technologies are developing rapidly and transforming many disciplines. In the field of design, the use of AI tools and methods is becoming widespread, which also opens up new possibilities and challenges in environmental design. The potential of AI in environmental design, including landscape architecture, is not only limited to automating or optimizing technical processes, but is also influencing the way we understand and shape human-environment interaction, perception, well-being, and societal sustainability (Arango-Uribe et al., 2023; Choi et al., 2025; Nava & Melis, 2024; H. Wang et al., 2024; Zhang & Cantrell, 2021). However, most of the work on the role of AI and Machine Learning (ML) in environmental design often focuses on engineering or computer science-oriented topics, such as technical performance, optimization, or visual production. The effects of this powerful technological progress on social dimensions such as humanity, society, and culture, which are the basis of design, the potential it provides, and the challenges it poses, have not been examined in depth enough from the perspective of social sciences. Design is not only the act of creating a physical environment, but also a complex socio-spatial process that shapes social interaction, reflects cultural values, and affects human well-being. Therefore, it is of great importance to understand the social consequences of the integration of AI into these areas. In this context, in the age of AI, it is necessary to examine environmental design not only from the point of view of engineering or information sciences, but also through the prism of social sciences. People's perceptions of the environment (Ogawa et al., 2024; L. Su et al., 2023; Tang et al., 2025), their behavior (Ma&Qu, 2025), their health (Wang et al., 2024), their perception of safety (Choi et al., 2025; N. Su et al., 2023), and their cultural values (L. Su et al., 2023) are central to the ultimate success and societal acceptance of the design. This study aims to address the current literature on the use of AI in environmental design with a bibliometric and thematic analysis from a social science perspective. Nevertheless, through accumulating experience from the preceding to the present era, various design disciplines have been rapidly evolving sophisticated design techniques. These techniques are becoming more and more specialized, as they address issues and simultaneously forge their distinct identities (Sungur & Akçaova, 2024). The study focused on issues such as people's perception of the environment, well-being, participation, and the social/ethical dimensions of AI use within the framework of "Socio-Technical Systems Theory" and "Actor-Network Theory (ANT)". In this context, among the 170 articles obtained as a result of the search conducted with the keywords "artificial intelligence", "environmental design" and "landscape design" in the Scopus database, 39 articles determined to be related to the field of social sciences were examined and the main trends, research topics and methodologies in the field were revealed. By analyzing the content of these articles in depth, this study aims to reveal the general trends of the use of AI/ML in environmental design in the social sciences literature, the prominent application areas, the potential presented, and the challenges expressed. In this direction, answers to the following questions were sought within the scope of the study:

- How does the annual number of studies published in the field of artificial intelligence and environmental design change?
- What is the share of publications within the scope of social sciences in the relevant literature, and what is the ratio (%) or number represented?
- Which countries and researchers have contributed the most to publications in this field? Which countries and authors are the most cited?
- What are the main themes that stand out in the relevant literature, and what are the most common methodological approaches to these themes?
- What are the theoretical model proposals and practical application frameworks presented in the related articles?
- What strategies are being formulated for future research and applications?

In this context, it is aimed to contribute to a better understanding of the social dimensions of environmental design in the age of AI and to create a basis for future research.

LITERATURE REVIEW

Considering the artificial intelligence applications in the field of environmental design and landscape architecture from the perspective of social sciences, it is understood that various issues are focused on in the literature. One of the primary focuses is the understanding of people's perceptions and experiences of urban and natural environments (Ogawa et al., 2024; L. Su et al., 2023; Tang et al., 2025). Social media data was used to analyze people's perceptions of cultural services; Perception was evaluated on various indicators such as aesthetic value, historical and cultural value, learning value, recreational value, health value, economic value, and life support value. Semantic analysis software and word frequency analyses have been effective in determining these perceptions through high-frequency words. For example, in a study conducted on an old residence, it was determined that the value of learning was perceived as the main cultural service (L. Su et al., 2023). By using Street View Imagery (SVI) and Computer Vision (CV) techniques, it has been shown that subjective perceptions of street landscapes (e.g., safety, vitality, aesthetics) can be evaluated. These models are able to train individual types of perceptions as well as interactions between different perceptions and offer higher accuracy (Ogawa et al., 2024). In the evaluation of subjective perceptions of ecosystem services, the effects of objective and perceived green/blue areas were examined by using methods such as SVI and Hedonic Price Model (HPM) (Tang et al., 2025).

Another important area is the link between environmental design and human health and well-being. Assessment of the health effects of landscape morphology on non-communicable diseases was examined with models including demographic and socioeconomic factors (age, gender, race/ethnicity, income, education level, population density) (Wang et al., 2024). These studies highlight the impact of societal inequalities on health outcomes. Wearable sensors and machine learning algorithms were used to develop personal thermal comfort models, and physiological, meteorological, and survey data were integrated. This type of research (Liu et al., 2019) demonstrates the role of AI in understanding the impact of environmental conditions on individual comfort.

Urban security and crime prevention are also topics where AI contributes to social sciences. In the context of the principles of Crime Prevention by Environmental Design (CPTED), the effects of the built environment on psychological and social outcomes and crime rates were investigated (N. Su et al., 2023). Based on social theories such as the Broken Window Theory and the Defensible Space Theory, the relationship of urban visual features (street greenery, pedestrian density, lighting, etc.) with crime patterns has been examined using AI and computer vision (Choi et al., 2025; N. Su et al., 2023).

The effects of AI itself on societal sustainability and education have also been addressed in various studies. Statistical models (Beta Regression, Structural Equation Modeling) were used to measure the effects of online courses in higher education on sustainable development (SDG-4: Quality of Education) and validated by AI tools. The study found that online classes provide significant sustainability benefits in areas such as transportation, printing, paper, etc. (Arango-Uribe et al., 2023). However, it has been emphasized that the integration of AI into academia brings with it ethical, technological, regulatory, and societal concerns. These concerns include risk to academic integrity, biased outcomes, accessibility, digital literacy inequality, data privacy, cybersecurity, deepening of the digital divide, economic inequalities, dismissal, impacts on cognitive/emotional development, and cultural sensitivity (Gupta et al., 2024). Therefore, human and social factors need to be carefully evaluated in the integration of AI into any field.

The role of generative AI in the design process and human-AI interaction is also a new area of research. Karadağ and Ozar (2025) in their study, they examined the effects of Text-to-Image AI tools in the conceptual design phase, their role on creativity, and students' perceptions of AI. These tools are thought to help designers explore conceptual space and have the potential to promote new aesthetic concepts (Zhang & Cantrell, 2021). The human-centered AI approach stands out in regenerative digital design, and AI is expected to provide human-centered environments by understanding people's interests, preferences, and behaviors. Collective creativity is seen as a symbiotic partnership between man and machine, with AI being

able to function as an amplifier that reinforces these connections. Concepts such as "exaptation" are used to explore the potential of adaptation and multifunctionality in design through AI (Nava & Melis, 2024). However, it should be noted that the socio-ethical implications of the integration of AI into design processes also need to be checked.

In summary, social science-oriented studies on AI in environmental design; It covers a variety of critical topics such as quantification of perception and experience, associating welfare dimensions such as health and safety with environmental characteristics, analysis of the societal impacts and challenges of AI, and the role of AI on human-AI interaction and creativity in the design process. These studies show that AI is not only a technical tool but also a powerful societal factor influencing how we perceive, use, and shape our environment.

Theoretical Framework

In this study, two fundamental theoretical approaches have been adopted in order to understand the social sciences dimension of artificial intelligence applications in environmental/landscape design: Socio-Technical Systems Theory and Actor-Network Theory (ANT). The following section provides a concise overview of the fundamental conceptual elements underpinning each theory, along with a detailed exposition of their implications for the bibliometric and thematic analysis to be employed in the present study.

Socio-Technical Systems Theory:

Socio-Technical Systems Theory assumes a holistic perspective on the interaction between social elements (i.e. people, organizations, cultural norms) and technical elements (i.e. tools, technologies, infrastructure) in organizations and application areas. This approach, which was developed in the literature on industrial sociology and human-computer interaction, first emerged in the 1950s and was later developed in the contexts of organizational change, human-computer interaction, and systems engineering (Baxter & Sommerville, 2011). This theory posits that the evaluation of technological innovation should encompass not only technical performance criteria, but also social context, the transformation of actors' roles, organizational structures, and social values.

Environmental Design and AI Context

- *Technology and Human Interaction:* AI tools can assume functions such as data analysis, simulation, optimization, or participatory design platforms in environmental design processes. The socio-technical perspective allows to analyze the impact of these tools on design teams, user communities and stakeholders (Baxter & Sommerville, 2011). For instance, how does an AI-powered scenario generation tool modify the designer's decision-making processes and transform end-user or community participation procedures?
- *Organizational and Institutional Dynamics:* The way organizations adopt AI applications is closely related to knowledge infrastructure, level of specialization, decision processes and normative frameworks. Socio-technical analysis can be used to interpret publication patterns and interdisciplinary collaborations that are identified in bibliometric analysis from the perspective of a socio-technical systems (Trist & Bamforth, 1951; Ropohl, 1999). This analysis reveals which social science disciplines are at the forefront of interaction with technology fields.
- *Sustainability and Social Acceptance***:** Sustainability, participatory processes and social acceptance dimensions of AI applications in environmental design have an important role in socio-technical balance. This theory can serve as a reference for discussing which social and institutional conditions are emphasized in the adaptation of technology in articles focused on "sustainability," "participatory design," or "social impact" that emerged in the thematic analysis section of the study.

Actor-Network Theory (ANT):

Actor-Network Theory examines social phenomena as networks of interaction between human and non-human actors (technological devices, data sets, software, spatial elements, etc.). This approach, in which humans and non-human actants are analyzed symmetrically (Latour, 2005), positions artificial intelligence not as a passive tool but as an active actor in the design process.

Environmental Design and AI Context

- *Reciprocal Relationality:* In ANT perspective, AI applications are not just software that processes data; they are considered as actors that influence design decisions, play a role in shaping the space, and interact with stakeholders. For instance, an AI-driven simulation module generates a network comprising the designer, user groups, and spatial context.
- *Traceability and Documentation of Networks:* Research collaborations, author networks, and citation relationships identified using bibliometric methods can be compared using ANT's "network mapping" methodology; thus, deeper insights can be gained in the literature about the actors (tools, disciplines, research projects) and their relationships between AI and environmental design.
- *Emphasis on Actors in Thematic Analysis:* Elements such as "AI", "sensor data", "user involvement" in articles are considered as actors in terms of ANT. Thus, each theme is analyzed by positioning it within a network of relationships between actors.

The Combined Use of Theories

Socio-Technical Systems Theory and Actor-Network Theory provide theoretical foundations for bibliometric and thematic analysis studies conducted from a social sciences perspective in the field of AI-supported environmental design. By unveiling the conditions that facilitate the institutional and social adaptation of technology (socio-technical perspective) and the interaction networks of human and non-human actors (ANT), it enables a thorough examination of the dynamics underlying the collaborations and thematic focuses in the literature. These approaches will increase the depth and explanatory power of the study by interpreting the collaborative and citation networks in the literature, as well as the thematic focuses that emerge in the articles, within the framework of technology-society-document relationships.

METHOD

This study is descriptive research that uses bibliometric and thematic analysis methods to examine the intersection of artificial intelligence with environment and landscape design from a social science perspective. The flowchart showing the stages of the methodology of this research, which examines the publications in the field of artificial intelligence (AI) and Environmental Design, is given in Figure 1.

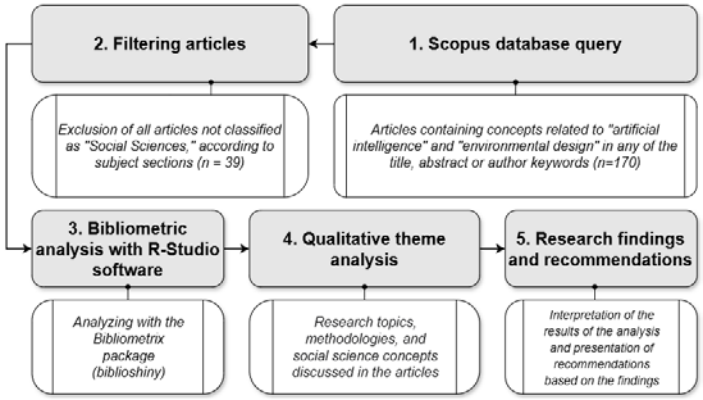

Figure 1. Flow Diagram on the Methodology of the Study

The process in the flowchart consists of five main steps:

i. *Scopus database query:* The starting point is to perform a search on the Scopus database. The search targeted articles that included concepts related to "artificial intelligence" and "environmental design" in any of the title, abstract, or author keywords sections. As a result of this query, 170 articles were found at the beginning, the oldest of which was in 1990 and the newest in 2025.

ii. *Filtering of articles:* A filtering application was made for 170 articles found. In this filtering step offered by Scopus, all articles except the "Social Sciences" section are excluded according to the subject sections in the database. After filtering, the number of articles to be examined within the scope of the study decreased to 39. With this step, it is aimed to focus the research especially on the perspective of social sciences.

iii. *Bibliometric analysis with R-Studio software:* Bibliometric analysis was performed on 39 filtered articles. For this analysis, R-Studio software and a special "bibliometrix package (biblioshiny)" were used. With bibliometric analysis, quantitative information about the structure of the relevant field was provided by examining the numerical characteristics of the publications (number of publications, authors,

institutions, countries, citations, etc.).

iv. *Qualitative theme analysis:* In addition to the bibliometric analysis, the content of the articles was analyzed qualitatively. In this analysis, the research topics of the articles, the methodologies used, and the social science concepts discussed were examined. With this step, it is aimed at understanding not only the quantitative trends of the study, but also the in-depth content of the field.

v. *Research findings and recommendations:* The final step is to interpret the results of the analysis and to make recommendations based on these findings. This stage is the stage where the findings of the research are summarized and the study outputs for the field or application are prepared.

In summary, the method followed in the study reveals step by step a systematic research process that examines publications at the intersection of artificial intelligence and environmental design with a focus on social sciences. The thematic classification used in the analyses was structured based on the concepts defined in the literature and the theoretical context.

Data Collection and Search Strategy

In this study, a special search strategy was created for the systematic collection of academic articles from the Scopus database. The search query *is designed to include articles that relate* concepts such as *artificial intelligence (AI), deep learning, machine learning, and natural language processing* to the concepts of environmental design and landscape design.

The search code is structured using the English equivalents of these concepts as follows:

(TITLE ("AI" OR "Artificial Intelligence" OR "Deep Learning" OR "machine learning" OR "natural language processing" OR "NLP") OR ABS ("AI" OR "Artificial Intelligence" OR "Deep Learning" OR "machine learning" OR "natural language processing" OR "NLP") OR AUTHKEY ("AI" OR "Artificial Intelligence" OR "Deep Learning" OR "machine learning" OR "natural language processing" OR "NLP")) AND (TITLE ("environmental design" OR "landscape design") OR ABS ("environmental design" OR "landscape design") OR AUTHKEY ("environmental design" OR "landscape design")) AND (LIMIT-TO (DOCTYPE , "ar"))

This query consists of three basic filtering stages:

- Artificial Intelligence-Related Content → Filtering that allows the presence of terms related to artificial intelligence and related techniques in the article title (TITLE), abstract (ABS), or keywords determined by the author (AUTHKEY).
- Environmental Design and Landscape Design → Similarly, the second stage enables the selection of articles that contain the concepts of "environmental design" or "landscape design" in their title, abstract, or keywords.
- Article Type Restriction → Limitation to peer-reviewed academic articles (LIMIT-TO (DOCTYPE, "ar"))).

This search strategy aims to comprehensively analyze academic literature on how AI is integrated into environmental design and landscape design. The results include the most up-to-date and scientifically validated studies on related topics.

Analysis Methods

During the analysis phase of the data, bibliometric analysis was first performed using the bibliometrix (Aria, M., & Cuccurullo, C., 2017) package of R-Studio software. Then, qualitative theme analyses of the sources in the dataset were completed to deepen the data obtained from the bibliometric analysis. Details of the analyses made at these stages are given below:

- Descriptive statistics (number of publications by year and country, most prolific authors, most frequently cited publication(s),
- Author Network Analysis (collaboration structures between authors and institutions)
- Conceptual Mapping (keyword co-determination analysis, thematic clusters)
- Citation Network Analysis (revealing scientific domains)
- Examining Time-Indexivity (evolution of themes and

emerging trends)

- Qualitative theme analysis (research topics, methods used, social sciences covered under discussion)

RESEARCH FINDINGS

The findings obtained in this study are presented under two headings: findings related to bibliometric analysis and findings related to qualitative theme analysis, in order to be compatible with the stages in the method part.

Findings on Bibliometric Analysis

As a result of the query made in the Scopus database with the search code given in the method section, 170 articles were reached. When the distribution of these publications by year is examined, it is seen that the number of publications increased from 1 in 2017 to 3 in 2019, 7 in 2020, 12 in 2021, 24 in 2022, 22 in 2023, and 59 in 2024 (Figure 2). It is understood that a significant part of the publications, approximately 94% (159 articles), were produced in 2021 and later. This shows that the relevant study topic has become more and more trendy in recent years, and there is a strong possibility that this trend will continue. Although there were 59 articles in 2024, the fact that 37 articles were reached in the first quarter of 2025 supports this view.

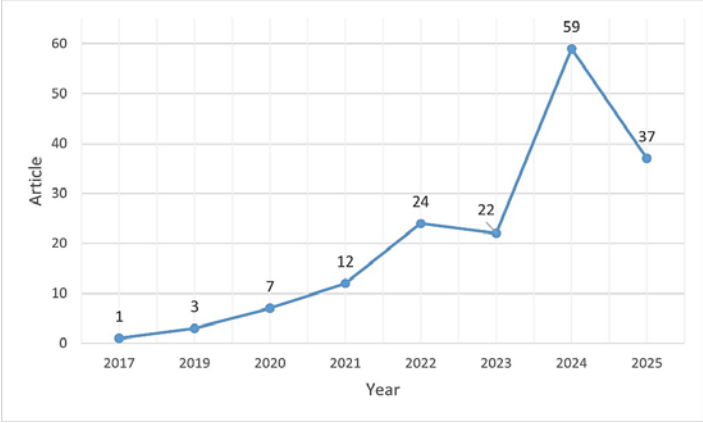

Figure 2. Distribution of Publications by Years

When the distribution by country (Figure 3) is examined, it is possible to say that the contribution of China, which produces 103 out of a total of 170 publications, to the relevant literature is quite significant compared to other countries. China is followed by the United States and South Korea with 25 and 16 articles, respectively. It is understood that these 3 countries, which have approximately 85% of the total amount of publications (144 articles), have made a significant contribution to the relevant literature. This graph, which shows the distribution of publications by country, shows that China plays a dominant role in global research in terms of publication output of the field.

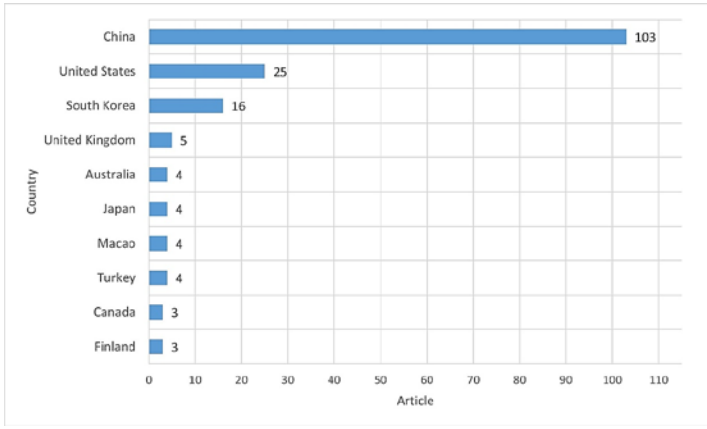

Figure 3. Distribution of Publications by Country

The graph showing the distribution of 170 articles determined without any filtering according to subject areas (disciplines) is presented in Figure 4. The graphic reflects the multidisciplinary nature of research at the intersection of AI and environmental design. The three subject areas with the largest share are: Computer Science (25.5%), Engineering (18.1%), and Environmental Science (12.7%). It is understood that these three fields are followed by the "Social Sciences" field with a share of 11%. Since a publication in the Scopus database can cover more than one topic at the same time, it has been determined that there are a total of 353 subject areas for 170 articles in the distribution by subjects. Therefore, it was determined that the share of 39 articles within the scope of "social sciences", which is the focus of the study, was 11% among all subjects.

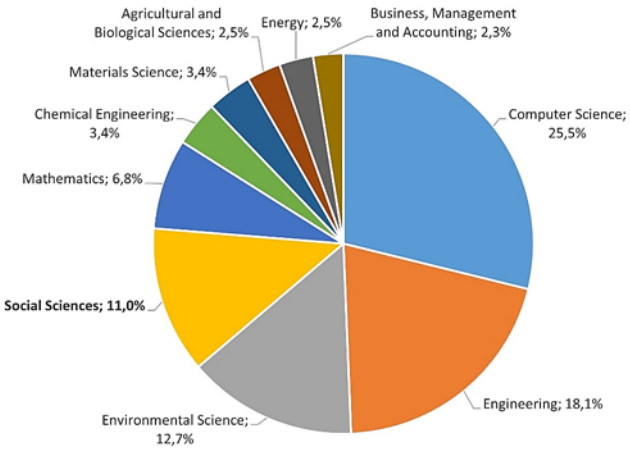

Figure 4. Distribution of Publications by Topics

Basic data such as the time interval of the publications and the number of journals in which they were published, are given in Table 1 for the 39 articles determined after the filtering. The average age of the articles published in 20 different scientific journals is 1.92, indicating that this field in literature is very new and up-to-date. The annual growth rate is 23.28%, which shows that research in the relevant field has gained significant momentum.

Table 1. Basic data on articles

MAIN INFORMATION ABOUT THE DATA		DOCUMENT CONTENT	
Timeframe	2014:2025	Keywords (Scopus)	235
References (Journals)	20	Author Keywords	137
Documents	39	**AUTHORS**	
Annual Growth Rate %	23,28	Authors	124
Average Age of the Document	1,92	Single-author document authors	1
Average citations per document	13.51	**AUTHORS' COLLABORATION**	
References	2078	Single-authored documents	1
DOCUMENT TYPES		Co-Authors Per Document	3,46
Article	39	% of international co-authorships	20,51

The fact that the average number of citations per article is 13.51 proves that the academic impact of the field is high, and the studies are actively used in the literature. A total of 2078 references are used, suggesting that the studies reviewed include a comprehensive literature review and have a strong academic foundation. The 137 keywords identified by the authors reveal a wide variety of concepts used in literature. A total of 124 authors contributed to 39 publications, indicating that the field is studied by a broad academic community. The fact that the number of articles with a single author is 1 reveals that studies in this field are mostly carried out in cooperation by more than one author. In parallel, the number of co-authors per article is 3.46, indicating that interdisciplinary or institutional collaboration is common. The international co-authorship rate is 20.51%, indicating that there is collaboration on a global scale, but the field is still focused on local academic production.

Data on the number of articles by year from 2014 to 2025 are given in Figure 5. It is seen that no publications were produced between 2015 and 2018. While the number of publications was 1 in 2014, it increased again in 2019 (2 articles in 2019, 2020, 2021, 3 in 2022, 6 in 2023, 13 in 2024, 10 in 2025). The trend in this chart is similar to that in the chart before filtering by subject. Especially after 2022, a significant increase is observed in the number of publications. While 13 articles were produced in 2024, 10 articles were published in the first 4 months of 2025, indicating that this trend in the field of social sciences will continue.

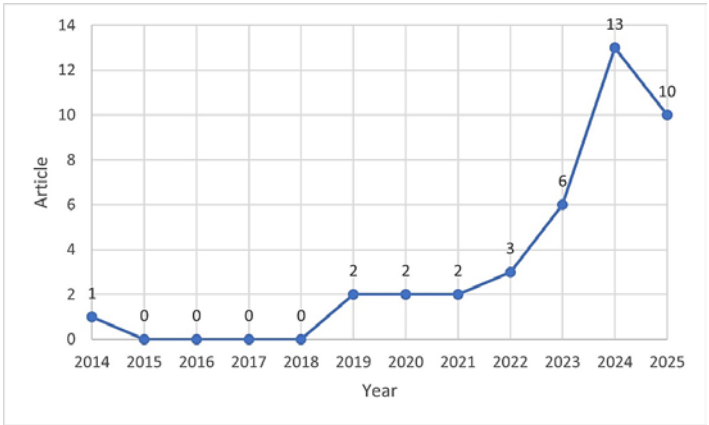

Figure 5. Distribution of Publications in the Field of Social Sciences by Years

When the distribution of articles in the field of social sciences by country (Figure 6) is examined, it is possible to say that the contribution of the USA, which produces 13 of the 39 publications, and China, which produces 11 of the total 39 publications, to the relevant literature is quite significant compared to other countries. It is seen that approximately 62% of the total number of publications (24 articles) were produced by these two countries. These two countries are followed by South Korea and Australia with 4 and 3 articles, respectively. Turkey and the United Kingdom contributed to this field with 2 articles each. This graph, which shows the distribution of publications by country, shows that the U.S. and China play a dominant role in global research in terms of publication output in the field.

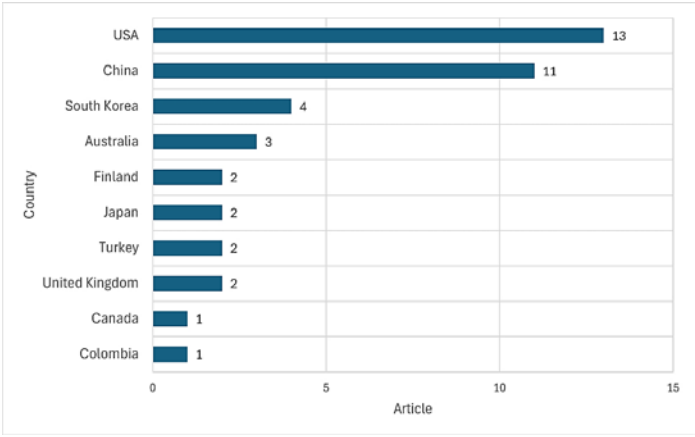

Figure 6. Distribution of Articles in the Field of Social Sciences by Countries

The most cited countries according to the number of citations are presented in Figure 7. In the number of citations, the U.S. is by far the leader with 314 citations. The USA is followed by China with 94 citations, Japan with 22 citations, and the United Kingdom with 19 citations. Compared to the number of articles in Figure 6, an interesting difference is striking: while China is quite close to the United States in the number of articles, it is well behind the United States (314) in the number of citations (94). This suggests that publications in the U.S. receive more citations on average, meaning that they are more influential or older and accumulate more citations over time.

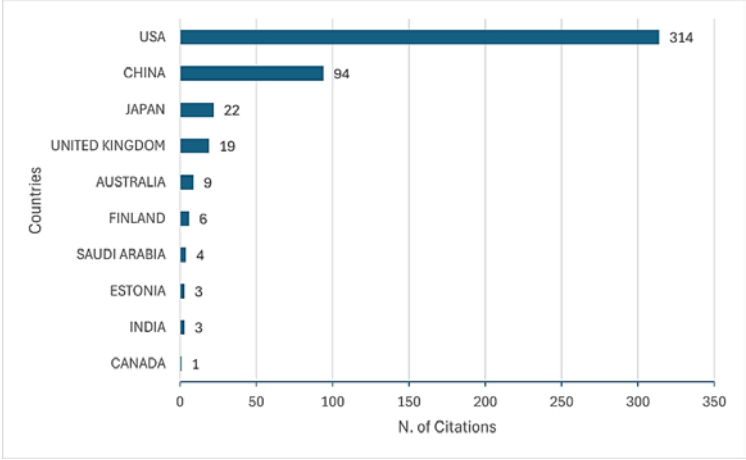

Figure 7. Top Cited Countries

The data on the most cited articles are given in Figure 8. The article at the top of the list was published in 2019 and received 231 citations. This article is followed by articles from 2022 that have received 64 citations and articles produced in 2023 that have received 47 citations. The fact that there are articles in the list that have received 22 citations despite being published in 2024 and 17 citations despite being published in 2023 indicates how strong the trend of producing publications on this subject has been in recent years.

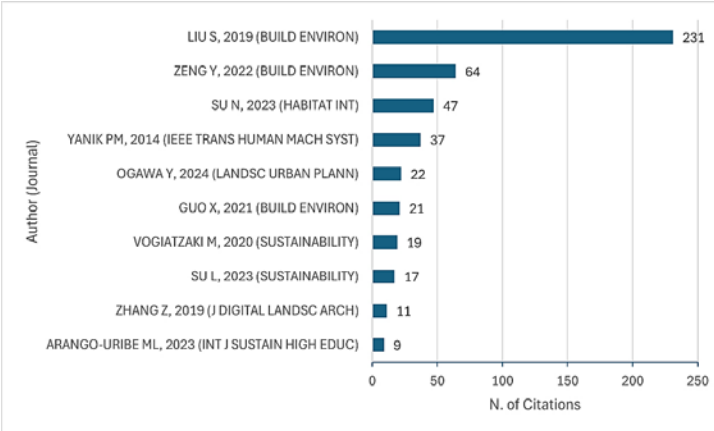

Figure 8. Most Cited Articles

The data regarding the repetition of the keywords (Turkish equivalents) determined by the authors in the articles are given in Figure 9. "Machine learning" is the most commonly used keyword with 13 repetitions. This concept is defined as "artificial intelligence" (10 times), "landscape design" (7 times), "deep learning" (6

times), "sustainability" (4 times), "big data" (3 times), "design tool" (3 times), "generative AI" (3 times), "street view imagery" (3 times) and "crime prevention through environmental design (CPTED)" (2 times), It follows concepts such as.

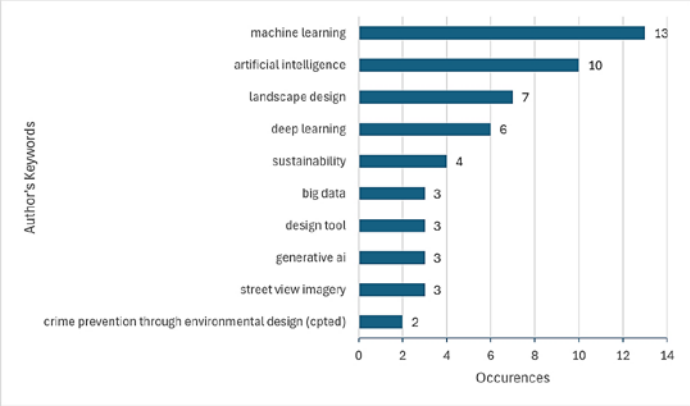

Figure 9. Number of Occurrences of the Author Keywords

Since the 10 most repetitive keywords are included in the graph, the word cloud is also presented in Figure 10 in order to see other concepts.

Figure 10. Word Cloud Image Generated from Author Keywords

Apart from the 10 most repetitive keywords, it is understood that concepts such as "landscape architecture", "urban planning", which are related to environmental design disciplines, and concepts such as "prompt engineering" and "text-to-image" related to artificial intelligence are also preferred as keywords in the articles.

Within the scope of bibliometric analysis techniques, network visualizations are used to show co-authorship or citation relationships between authors. The visual regarding the citation network between the authors prepared in this context is given in Figure 11. The nodes (colored dots) represent the authors, and the lines symbolize the citation links between them. The size of the nodes or the size of the tags symbolizes the number of citations received by the respective author. A larger, denser cluster is located in the center of the figure, indicating that there is a core group of authors who are actively collaborating in the field or referring to each other frequently.

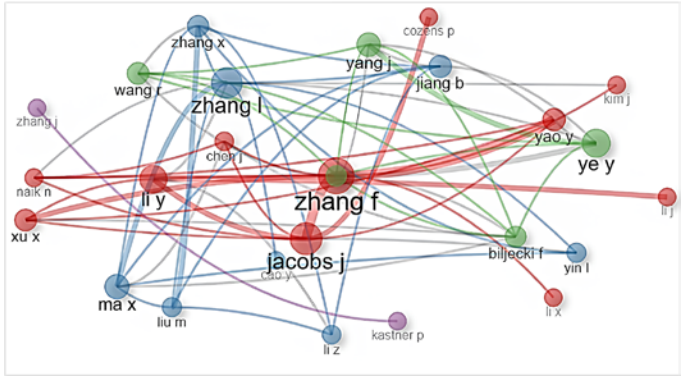

Figure 11. Citation Network Between Authors

Findings on Qualitative Theme Analysis

For each of the 39 articles evaluated within the scope of this research, the methods, data sources, and focal points used in the studies were examined in depth with the qualitative theme analysis technique. The data related to the findings obtained as a result of this analysis are presented in Table 2.

The data obtained as a result of the examination of 39 studies evaluated show that there is a significant and rapidly increasing trend in the use of Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) methods in the field of built environment and landscape studies. The most notable finding is that the vast majority of studies refer to or use AI, ML, or DL in general. Within this general trend, the use of specific ML and DL applications, as well as newer techniques such as generative AI from text to image, is also noteworthy. This reflects a growing interest in the potential for rapid visualization and conceptual discovery in design processes. More traditional methods, such as statistical analysis and survey studies, are still widely used and often take on complementary or validating roles in AI/ML techniques. Text-based data processing methods, such as semantic

analysis and natural language processing (NLP), and general image analysis techniques also have an important place in various perceptions and spatial quality analyses.

When examined in terms of data sources, the diversity of the field is striking. Survey data and Street View Imagery (SVI) are among the most commonly used data sources. Surveys are often used to capture subjective perceptions, preferences, and socio-demographic information, while SVIs analyze the visual characteristics of the urban environment and correlate them with issues such as perception and security/crime. Social media data is an increasingly used resource to collect users' experiences and perceptions on a large scale. Objective data, such as geographical/spatial data, environmental data, and building data, form the basis for spatial, environmental, and structural analysis. The fact that the data and images generated by AI are included as a data source in the studies themselves shows that AI has become a part of the research process or outputs, rather than just an analysis tool.

The focal points and objectives of the studies reveal how AI/ML/DL is applied to a variety of problems in this field. The various application areas of AI/ML/DL in environmental and landscape design are the broadest category and span specific sub-fields such as perception analysis, forecasting/modeling, optimization, and evaluation/measurement. Sustainability and health/well-being issues also stand out as important application areas. On the other hand, some of the studies focus directly on assessing the capabilities, future, potential, frameworks, and integration challenges of the AI tools themselves, or the accuracy and usefulness of the outputs of specific AI tools. This shows that the field is not only using AI as a tool, but also trying to understand and guide AI itself and the changes it will bring. Themes such as human-AI collaboration and the role of AI in teaching reflect the interest in the integration of technology into human beings and educational processes.

Overall, the trend in the literature shows that environmental and landscape studies are moving towards more data-driven, quantitative, and predictive approaches using AI/ML/DL techniques and various digital data sources. These technologies offer powerful tools for both understanding the complexity of environmental systems and improving design and planning processes. At the same time, the need to evaluate AI itself and address the ethical/practical challenges brought about by this rapid change is also on the agenda of researchers.

Table 2. Data on Qualitative Theme Analysis

	Author(s)	Method(s) Used	Data Sources	Focus/Purpose
1	Su, L. et al. 2023	Word frequency analysis, spatial interpolation, deep learning, and semantic segmentation	Social media big data (online text and image data): 7,745 comments and 17,654 images	Discovering the perception of city image with deep learning from social media big data and evaluating the perception of cultural services (aesthetic, historical/ cultural, learning, recreational, health, economic, life support values)
2	Ma, J., & Qu, B. 2025	Physical activity questionnaire, supervised learning techniques, and random forest classification models	Data on 14 physical activity and 23 parking form indicators (data from 10 urban parks)	Testing the predictability of physical activities in urban parks, analyzing the correlation between physical activities and landscape morphology indicators
3	Tebyanian, N., 2020	Application of machine learning (ML) in urban landscape design, literature review (71 studies), and bibliometric analysis	Data from literature and bibliometric analysis	To provide a foundation for landscape architects on how machine learning can be applied in urban landscape design and to position ML as a tool for landscape architects
4	De Luca et al. 2024	Literature review	Data from the literature	Discussion of computational tools and methods for environmental design, discussion of metrics and evaluation methods

	Author(s)	Method(s) Used	Data Sources	Focus/Purpose
5	Nava, C., & Melis, A. 2024	Natural Language Processing Model (NLP), machine learning (ML), deep learning (DL), generative AI (text-to-image), and parametric design/ modeling	Big data sets, geographic data, behavioral, cultural, and environmental factor data, AI algorithm data, and simulation scenarios	Exploring the potential of generative AI and complexity in generative digital design, proposing a new workflow that connects computational processes with human-centered design, and fostering collective creativity
6	Xu et al. 2025	Semantic analysis of online commentary, word frequency statistics, and aesthetic field transition analysis	Online tourism reviews of seven different Classical Chinese gardens and word banks for aesthetic areas	To explore the spaces of aesthetic experience in classical Chinese gardens, to examine the temporal structure and transitional process of aesthetic experience, to understand what aspects of the gardens visitors focus on (objects, perception, association, meaning)
7	Ahmed, H. T., & Aly, A. M. 2023	Designing a group of artworks using artificial intelligence (AI) systems and an observational study of parks	Data on waste management targets, estimated data on the daily waste generation rate per capita, and data obtained as a result of observations	Advocating the educational role of art, form, and color in landscape architecture in increasing social awareness of sustainability and changing culture, investigating the emotional and psychological effects of color and form in landscape design, and exploring the use of recycled waste materials in landscape design for sustainable development.
8	Yang et al. 2024	AI and virtual reality (VR) methods for developing an artificial intelligence (AI)-powered landscape design teaching platform	Dataset of relevant factors in landscape design teaching and data collected from the study area (layout, patterns, public preferences)	To increase the effectiveness of landscape design teaching using artificial intelligence, to build and implement a landscape design teaching platform, and to predict the key factors in landscape design (design preferences, landscape layout, landscape pattern, public satisfaction) with AI methods
9	Zang, Z., & Bowes, B. 2019	Literature review	Data from the literature	Discussion of the future of artificial intelligence and machine learning in landscape design and exploration of responsive technologies.
10	Wang et al. 2024	Random Forest decision tree algorithm and statistical analyses	Percentage of green area, morphology data, socio-demographic information, and geographical factors	Assessing the health impacts of the landscape and providing evidence-based forecasting before the implementation of landscape plans
11	Tan et al. 2024	AI-powered workflow, Deep Learning (DL) models, CycleGAN-based wind forecasting model, wind speed analysis, visual and quantitative analysis	Hypothetical urban models created with PCG, wind simulation data at 0-5m height, data sets produced with CFD	Introduction of AI-powered workflow for wind simulation in landscape design process, rapid design assistance with real-time AI simulations, pedestrian wind comfort optimization, AI, and designer collaboration

	Author(s)	Method(s) Used	Data Sources	Focus/Purpose
12	Guo et al. 2021	Topic modeling and sentiment analysis techniques	Social media data (star ratings and written reviews)	Evaluation of the satisfaction of those living in apartments with and without LEED (Leadership in Energy and Environmental Design) certification
13	Liu et al. 2019	Machine learning algorithms, surveys, use of wearable sensors	Demographic information, thermal experience/sensitivity, exercise hours, coffee consumption, and physiological data	Developing personal thermal comfort models from data collected through wearable sensors
14	Yang et al. 2022	Machine learning (ML) and semantic segmentation techniques	Street imagery, survey data, and data from pre-trained models	Transforming subjective perception into measurable and quantifiable information, analyzing the correlative qualities of walkability with ML, and organizing and evaluating urban design through street view
15	Dong et al. 2025	Comparative analysis of three field types with different green appearance index (GVI) and statistical tests	Data on thermal conditions (air temperature, relative humidity, wind speed, solar radiation, and green appearance index GVI)	To analyze the combined effects of the visual-thermal environment on restorative benefits, compare restorative benefits and thermal conditions, and study the relationship between green spaces and thermal conditions
16	Mansouri et. al. 2025	Machine learning, hyperparameter optimization	Qualifications of LEED-certified projects (USGBC) and climate data (USNCEI)	Development of an AI-based model to predict appropriate LEED credit targets using existing green building data
17	Arango-Uribe et al. 2023	Statistical modeling, structural equation modeling (sem), machine learning tools, surveys, analytic hierarchy process.	Survey data applied to higher education students and academicians, data on socio-economic dimensions.	Proposing a statistical model to measure the impact of online courses in higher education on sustainable development (SDG-4)
18	Ekici et al. 2021	Artificial Intelligence (AI), Machine Learning (ML), and Multi-Region Optimization (MUZO)	Building simulation data and parameter values in typical scenarios (floor height, zone rotation, shading, etc.)	Multi-site optimization of high-rise buildings using artificial intelligence for sustainable metropolises, focusing on optimization problems, algorithms, results, and method validation
19	Choi et al. 2025	Survey study, sequential logistic regression, conjoint analysis, and CPTED-CP service components	Data used for sequential logistic regression and conjoint analysis with survey data	Analyze residents' service preferences within the crime prevention system, provide implications for social reconciliation and localized service development, find clues to social reconciliation, and understand residents' priorities for crime prevention technologies

	Author(s)	Method(s) Used	Data Sources	Focus/Purpose
20	Vogiatzaki et al. 2020	Descriptive model (data collection and data mining) and prediction model (descriptive analysis of real-time events, pattern recognition, and data fusion), and artificial intelligence (AI)-powered city lighting optimization	Geotagging, spatial information from GIS, satellite imagery, surveillance cameras, time-series analysis of past crimes, lighting characteristics, computer vision data, and artificial lighting standards	Improving city sustainability with smart technologies, discovering the relationship between lighting quality and crime prevention/fear of crime, and analyzing sensor data to deal with crime-prone scenarios before crimes happen
21	Tang et al. 2025	Hedonic Pricing Model (HPM), Geographically Weighted Regression (GWR) model analysis, distance to CBD analysis, and spatial heterogeneity analysis.	Street View View (SVI) data. Studies that refer to housing market data (house prices) and related contexts, such as water pollution or algal blooms	To estimate the value of Ecosystem Services (ES) in urban areas using an indirect method based on the housing market, to assess the impact of perceived and objective ES on house prices, and to analyze the contribution of ES to house prices and spatial heterogeneity
22	Su, N. et al. 2023	Machine Learning (ML) applications and the training of predictive models	Street View Imagery (SVI), Urban design quality data, street crime density data	Measuring the relationships between urban design quality and street crime density, and examining the relationships between visual features and crime patterns in urban areas
23	Kim, J., & Lee, Y. 2024	Assessing AI image accuracy, using Midjourney, creating image groups, qualitative elimination, expert survey, plant recognition application (PictureThis), real photo comparison	Tree images generated by AI, real trees/ environments, real tree photos used in expert survey, PictureThis database, search data used in tree species selection	Evaluate the accuracy of AI (Midjourney) in generating tree images for landscape design applications, evaluate AI's ability to replicate tree form, texture, color, and seasonal changes, identify the potential of AI as a rapid visualization tool, highlight the challenges in accurately reproducing detailed natural features
24	Zhang, Z., & Cantrell, B. 2023	Machine learning, literature review	Data from the literature review	Critical examination of the concepts of nature and wildness, and discussion of artificial intelligence strategies
25	AlTawil, T. N., & Rahhal, A. 2025	Source analysis, thematic analysis, systematic analysis, and coding of documents, and triangulation of findings	Government reports, laws (federal/ emiratical), academic sources, company/ industry reports	Examining their collective impact on fraud prevention and detection, promoting ethical corporate practices, increasing transparency and accountability, harmonization of legislation, whistleblower protection, and integration of AI
26	Ye et al. 2025	Text-to-image generative artificial intelligence (AI) model, qualitative, and three quantitative evaluation methods	18 photos obtained from web sources and images generated with a text-to-image generative AI model	Generating conceptual landscape designs using generative AI models such as text-to-image GANs and Diffusion Models

	Author(s)	Method(s) Used	Data Sources	Focus/Purpose
27	Yanık et al. 2014	Gesture recognition scheme (GNG algorithm), extraction of motion descriptors from sequential skeletal depth data, reinforcement learning, Q-Learning adaptation	Sequential skeletal depth data collected from human participants with the Kinect RGB-D sensor, "real data set" (750 gesture samples), motion models from the ASL dictionary	Gesture-based human-machine interface development for assistive robots, robots that learn arm-scale gestures from a human instructor, independent life support for aging individuals, interface without restrictions on the way the user gestures, real-time learning technique verification
28	Wang et al. 2024	Deep learning models, outdoor electrodermal activity (EDA) measurements, and a survey application	User-generated content (UGC) and physiological data collected from 36 students	Examination of landscape perception in cultural and creative industrial parks, use of user-generated content, and electrodermal activity data together
29	Lee, C., & Lee, Y. 2024	Comparative analysis of generative artificial intelligence (AI) tools from text to image and heuristic comparison	Review scores for design sketches, images generated by AI tools, and landscape elements	Analyzing and comparing text-to-image generative AI tools to convert design sketches into digital images, identifying the challenges of AI tools, and helping designers choose tools based on their specifications of AI tools
30	Karadağ, D., & Ozar, B. 2025	Generative artificial intelligence (AI) model from text to image, prompt attempts, surveys, thematic analysis	Student-generated prompts, survey data, and data from a design studio environment	Investigating the impact of artificial intelligence and human collaboration on conceptual design, evaluating students' perceptions of artificial intelligence and its integration into creative workflows
31	Gupta et al. 2024	Survey and Fuzzy AHP (Analytical Hierarchy Process)	Survey data collected from 149 academics. Data collected using a 5-point Likert scale and a 9-point comparison matrix	Developing a prioritization framework for academic challenges related to AI integration in academia. Identification and enumeration of ethical, technological, regulatory, social, human values, and psychological concerns
32	Fernberg et al. 2023	Comparative evaluation of different generative AI tools, measuring their ability to produce libraries of 2D assets	Images, text, and image-based prompts produced by Dall-E 2, Midjourney, Stable Diffusion	Evaluate the usefulness of generative AI tools in creating 2D asset libraries for landscape design visuals, reduce production time, and identify the strengths and weaknesses of different AI tools
33	Qi et al. 2025	Semantic segmentation, survey study, and regression analysis	Data on street view imagery (SVI), emotion detection, and color indication, as well as data from participants	To examine how street color affects the emotional experience of visitors, quantify the linear effect of color complexity and coordination on emotional perceptions, and propose implications for street planning/design
34	Qin et al. 2024	Deep learning (DL), image segmentation, and color clustering	Data collected from Open Street Map and street view imagery (SVI)	Quantitatively characterize and evaluate the spatial quality of the highway landscape based on deep learning and other methods, emphasizing the importance of the Beijing-Tibet highway as a landscape corridor

	Author(s)	Method(s) Used	Data Sources	Focus/Purpose
35	Ogawa et al. 2024	Machine learning models (ConvNeXt-B, VGG16) and accuracy evaluation	Street View Imagery (SVI) and data on 22 subjective perceptions	Effectively measuring and visualizing subjective perceptions using street view imagery, developing machine learning models that predict subjective perceptions from images, and analyzing factors influencing subjective perceptions
36	Kim, S., & Lee, Y. 2024	Comparative analysis of three generative AI tools, image evaluation by five design practitioners, and comparison of average scores	Images generated by various AI tools, three prompts created with ChatGPT 4, and evaluation scores from five design practitioners	Examining the use of text-to-image AI tools in the landscape design process, comparing the capabilities, strengths, and weaknesses of different AI tools in creating landscape elements, guiding designers in tool selection, and emphasizing the complementary role of AI.
37	Zeng et al. 2022	Hybrid AI Model (combination of LSTM - Long Short-Term Memory and ESWT - Extended Constant Wavelet Transform)	Time series data, such as air quality data. Examples of data used for comparison and performance evaluation results	Predict air quality, propose a hybrid AI model, and compare the performance and efficiency of the proposed model with existing ML and deep learning (DL) models
38	Senem et al. 2024	Generative adversarial networks (GANs), diffusion models, use of SDM with text prompts, evaluation of AI-generated plans	Input dataset for training GANs, raster data input for SDM, text prompts, and man-made landscape plans for comparison	Creating landscape layouts with generative AI models such as GANs and Diffusion Models, comparing AI-generated designs with human designs, and demonstrating an AI-based workflow that can help landscape architects with smaller-scale landscape design projects
39	Song et al. 2023	Natural Language Processing Model (NLP), sentiment analysis, BERT model, machine learning (ML) tools, and case study analysis	Pre-trained dataset for review texts, Street View Imagery (SVI), data from workspaces, and the BERT model	Measuring the impact of perceived landscape qualities on economic vitality and using sentiment analysis for commentary texts to understand perceptions

DISCUSSION

A thorough review of the extant literature reveals a paucity of studies that directly address similar topics, especially within the theoretical framework of this study. Dwyer (2011) argues for the relevance and utility of Socio-Technical Systems Theory for environmental sustainability, as in this study. In particular, the study focuses on the role of system goals (sustainability over consumption) and feedback loops in behavior change. The article is a conceptual study, discussing the importance of the theory and explaining the concepts with case examples. However, it has not conducted a systematic literature review or bibliometric/thematic analysis focusing on AI applications. In this research, Socio-Technical Systems Theory is used as a lens to interpret the existing social science literature and to reveal trends quantitatively and qualitatively in the field. This work represents a significant advancement in the field by demonstrating, through the analysis of empirical data, the practical application of the proposed theory to the domain of AI-supported environmental design research. Moreover, Dwyer's study is from 2011, before the intensive development of AI in the field of environmental sustainability. In contrast, Bakour & Chougui (2024) incorporated Actor-Network Theory (ANT) within the theoretical framework of this

study. In addition, the aforementioned study demonstrates methodological similarities with this study, as it employs data visualization techniques, including text mining (VOSviewer) and mapping. ANT was used to examine the agency of technological objects in interactive spaces through a single case study ("Spatially Intelligent Art Center") in an architectural context. The focus is on analyzing the socio-technical network of a specific project in detail. In contrast, in this study, ANT was used as a framework for interpreting the thematic analysis of a larger body of literature (39 articles). This aims to reveal general research trends, prominent applications, and challenges in the field. Rather than focusing on a specific case study, this approach seeks to establish a comprehensive framework within a given scientific domain. Furthermore, while Bakour and Chougui (2024) study focuses primarily on architectural design and interactive spaces, this research considers environmental design and landscape architecture from a broader social science perspective. On the other hand, Lohani's (2024) study does not specifically address Socio-Technical Systems Theory or Actor-Network Theory in relation to AI applications or environmental design processes but focuses on how AI enhances sustainability efforts through resource management, climate change mitigation and ethical considerations. Despite the potential influence of these theories on AI applications, the article's primary focus lies in the discussion of AI's role in pollution prevention, resource conservation, and decision-making processes, without direct engagement with these theoretical frameworks. Similarly, Santos and Carvalho (2025) do not specifically address how Socio-Technical Systems Theory and Actor-Network Theory influence AI practices or improve environmental design processes. The study focuses on the role of AI in participatory environmental management and stakeholder engagement.

This research synthesizes Socio-Technical Systems Theory and Actor-Network Theory (ANT) to establish a distinctive and holistic theoretical framework for examining the social dimensions of AI-assisted environmental design. This integration provides a strong basis for understanding the complex interactions between technology and society at both the macro (system goals, societal acceptance) and micro (roles of actors, agency of technological objects) levels. In contrast to other studies that employ a single theoretical framework, this study integrates both of these theories, thereby facilitating a more comprehensive evaluation. The prevailing literature on AI in environmental design has historically been centered on technical and engineering aspects. Conversely, this study draws from publications in social sciences, exploring themes such as human perception, well-being, participation, and the sociological and ethical dimensions of AI implementation. This fills a critical gap in understanding the social implications of AI and its alignment with human values, beyond technical performance. This hybrid methodology integrates bibliometric analysis with qualitative thematic analysis, offering a comprehensive assessment of quantitative trends in the field, including the number of publications, geographical distribution, collaborations, and citation profiles. It also incorporates qualitative insights such as the application areas of AI, the methods employed, and the social science concepts discussed. This comprehensive assessment encompasses a broad range of topics, from introductory overviews of the field to in-depth discussions of specific subjects. Several other related studies have focused either solely on conceptual discussions or on detailed technical analysis based on a single case. As a result, a review of the literature revealed no studies directly similar to this research. This indicates the originality of this research and that it is one of the first studies to apply these theoretical approaches in this field.

CONCLUSION

In this study, the social sciences dimension of the use of artificial intelligence in environmental design is addressed from various perspectives by adopting two main theoretical approaches, namely Socio-Technical Systems Theory and Actor-Network Theory (ANT). The literature related to artificial intelligence and environmental/landscape design was reviewed, and a bibliometric analysis was carried out from the perspective of social sciences for these studies. In addition, with the qualitative theme analysis application, the research topics, methodologies used, and focal points of the articles were examined.

A comprehensive evaluation of the extant literature reveals that it can be grouped under the following four headings.

This categorization is based on a detailed assessment of the general trends and focus areas of the studies evaluated in this research.

- *Quantification of Perception and Experience:* Many studies focus on the use of AI to quantify or model subjective human perceptions and experiences that were previously difficult to measure. This is especially important for extracting information from large and unstructured datasets, such as social media texts or street view imagery (SVI). The aim is to bridge the gap between objective environmental data and subjective human experiences.
- *Impact of the Environment on Human Well-Being:* Studies use AI to examine the impact of environmental characteristics (green space, built environment morphology, thermal conditions) on different dimensions of human well-being (health, safety, comfort). These studies often strengthen the social context by including demographic and socioeconomic factors in the model.
- *Social and Ethical Dimensions of AI:* Various studies address the social, ethical, and technological challenges posed by AI technologies themselves (especially when integrated into human systems such as education). These sources point to far-reaching concerns such as digital inequality, bias, privacy, potential for job loss, and cognitive/emotional impacts that AI applications in environmental design must also consider. The following specific examples illustrate how these ethical and social concerns may be reflected in AI applications in the field of environmental design:
  - *Biased Results:* Biases in the training data of AI models (e.g., models that predict crime with street view imagery) may lead to inequalities in urban design decisions or perceptions of safety.
  - *Data Privacy:* The use of personal data collected from social media data or wearable sensors has the potential for privacy violations.
  - *Digital Inequality:* A comprehensive analysis is imperative to examine the impact of inequalities arising from access to AI-supported design tools or the ability to use them on participation and social acceptance in design processes.
  - *Potential Job Loss:* The potential impact of generative AI's role in the design process on employment in landscape architecture or environmental design professions should be thoroughly evaluated.
- *Human-AI Interaction in the Design Process:* Some sources explore how generative AI (text-to-image) affects designers' creativity and conceptual thought processes, the potential of human-AI collaboration, and new design paradigms (human-centricity, adaptation, exaptation). This positions AI not only as a tool of analysis, but also as a partner in the creative process.

Literature tends to use AI as a tool to analyze human perception and behavior, assess the effects of environmental designs on tangible social outcomes such as health and safety, and even measure the social dimension in achieving sustainability goals. While the studies emphasize the importance of human-centered design approaches, they also have an important consensus on the ethical and societal challenges brought about by the proliferation of AI. Although the types of data (text, images, sensors, surveys) and the specific ML/statistical methods applied vary, the main trend is to understand and improve environment-human interaction by leveraging AI's capacity to process complex social data. Although there are no direct contradictions, the fact that different studies focus on different subfields and methodological approaches of the subject reflects the diversity and development potential of this research area. These studies reveal both the powerful potential of AI for social sciences in environmental design and important social and ethical dimensions that need to be carefully addressed. As a result, the acceptance of AI not only as a tool but also as a phenomenon that affects social structures, human experiences, and ethical responsibilities is very important for the dissemination of the relevant literature in the field of social sciences.

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