Review article

A Systematic Review of Loyalty in Urban Green Spaces: Bibliometric Mapping and TCCM Analysis

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Abstract

Urban green spaces (UGS) play an essential role in environmental sustainability, public health and so-cial well-being. Understanding user loyalty to these spaces is increasingly important for their long-term governance and effective management. This study conducts a systematic review of 38 peer-reviewed articles on UGS loyalty published between 2010 and 2025 and indexed in the Web of Science and Scopus databases. Using VOSviewer and Scimago Graphica to map keyword co-occurrence and publi-cation trends, supported by content analysis guided by the theory–context–characteristics–methods framework, the review reveals fragmented theoretical foundations, uneven geographic distribution of studies and predominant reliance on quantitative methods. Core constructs such as place attachment, satisfaction and revisit intention are often analysed yet usually lack a stable conceptual foundation. The results give us valuable information about loyalty determinants and mechanisms, as well as help-ful insights for urban planning and environmental governance. This study also identifies future re-search demands, such as expanding contextual coverage, improving theoretical integration and imple-menting more diverse and longitudinal methodological approaches.

Keywords: Loyalty; Urban Green Spaces; TCCM Framework; Bibliometric Analysis; Systematic Literature Review; PRISMA Approach.

1. Introduction

Urban green spaces (UGS) have become an important part of urban life in recent years, especially considering the accelerating pace of urbanisation and associated environmental and health risks (Huang *et al.,* 2022). UGS, such as parks, forests and greenways, are vital parts of urban ecosys-tems because they provide important ecological employment. They enhance air quality, alleviate the urban heat island effect and promote biodiversity conservation and climate resilience (Lee *et al.,* 2023). In parallel, UGS have been acknowledged for their social and mental health benefits, serving as spaces for recreation, stress recovery and enhanced mental well-being while reinforcing social activities and collective cohesion (Godoi *et al.,* 2025; Gong *et al.,* 2023; Zhu *et al.,* 2022).

In this larger context, user loyalty has become a key idea for determining how individuals build long-term relationships with green areas. Loyalty is typically demonstrated through individuals' emotional attachment to a location and their continuous visitation behaviour (Kaklauskas *et al.,* 2021). Loyalty, originally derived from marketing and tourism studies (Quan *et al.,* 2025; Zhou *et al.,* 2026), has recently been proposed as relevant to the sustainable utilisation and management of UGS (Alreahi *et al.,* 2023; Sousa-Silva *et al.,* 2024). Loyal users are likely to visit frequently, provide word-of-mouth endorsement and support green area interventions geared towards conser-ving and managing green spaces, thus contributing to the ecological and social utility of these spaces (J. Li *et al.,* 2022; W. Li & Liu, 2025). Research on leisure has shown that leisure in-volvement and on-site experience affect satisfaction and post-visit behaviour, providing a useful perspective for understanding the formation of loyalty in UGS (Rahmafitria & Kaswanto, 2024).

The literature on UGS has grown significantly in recent decades, encompassing topics ranging from physiological improvements linked with green spaces, environmental quality perceptions, spatial variables and activity profiles to their broader positive impacts on urban well-being (e.g. Blessing Aibhamen Edeigba *et al.* 2024; Nursyamsiah & Setiawan, 2023; Tang *et al.,* 2021). At the same time, more researchers have started using bibliometric approaches to trace developments in UGS-related fields and to identify emerging themes and influential studies (Singh *et al.,* 2023). These methods provide a useful foundation for mapping the structure of research on loyalty within UGS—a topic that lacks consolidated review.

Despite growing interest in this topic, there are no reviews that specifically address the application of loyalty in UGS research. The lack of systematic reviews and in-depth bibliometric analyses of existing research results hinders a comprehensive understanding of progress, research frontiers

and theoretical evolution in the field. In addition, most studies rely on a single theoretical perspective or approach. For example, some studies have employed psychological theories to examine loyalty-related behaviours (Wu *et al.,* 2023), while others have used empirical designs that do not fully utilise theory as a guide. Therefore, an integrated approach that combines different theoretical perspectives—such as environmental psychology, urban planning theory and marketing theory—with different methodologies—such as qualitative research, quantitative analysis and bibliometrics techniques—can provide a comprehensive understanding of the relationship between UGS and loyalty. Such an approach can also help identify deeper mechanisms and influencing factors that can promote theoretical development and support the sustainable design and management of UGS systems.

Therefore, this study attempts to address the following overarching research questions:

RQ1: What are the overall trends in the study of loyalty in UGS?

RQ2: What advancements have occurred in the literature on loyalty in UGS regarding theories, research context, characteristics and methods?

RQ3: What are the future directions for research on loyalty in the context of UGS?

To answer these research questions, this review applies the theory–context–characteristics–methods (TCCM) framework (Paul & Benito, 2018; Paul & Rosado-Serrano, 2019).

Therefore, this study aims to comprehensively and systematically explain the application and research context of loyalty in UGS. By using bibliometric techniques and the TCCM framework to analyse peer-reviewed articles indexed in the Web of Science (WOS) and Scopus databases, this paper reveals the knowledge structure of the field and highlights key research gaps. Specifically, VOSviewer was used to conduct keyword co-occurrence analysis and topic clustering, and Scimago Graphica was used to visualise the publication patterns and international research networks. Through comprehensive content evaluation, this study integrates key theoretical foundations, research backgrounds, variable relationships and methodological systems. The paper provides an in-depth analysis of the historical evolution and current status of UGS loyalty research and reveals emerging trends and future research avenues. By connecting environmental psychology, urban studies and marketing, this study enriches the interdisciplinary literature and provides practical insights for the sustainable development and management of UGS.

In the remainder of the paper, Section 2 positions the study by reviewing the existing literature on loyalty in the fields of landscape, tourism, environment and related research; further, this section responds to unresolved issues in previous studies. Section 3 describes the methodological procedures adopted in this review. Section 4 outlines the overall situation of loyalty research in the field of UGS and discusses the research findings based on bibliometric analysis. Section 5 conducts an in-depth analysis of the existing theories, backgrounds, characteristics and methods based on the TCCM framework. Section 6 discusses the findings, and Section 7 presents the research conclusions.

2. Previous Literature Review on Loyalty

This section aims to assess previous contributions, identify research gaps and formulate future research goals by evaluating the literature in the past five years (as shown in Table 1). The four independent studies explore the core issues from unique perspectives, using diverse methods and goals. These studies focus on the following topics: the relationship between destination loyalty, place attachment and behavioural intention as well as the relationship between destination image and tourist behavioural intention.

From the previous systematic reviews, Cruz-Milán (2023) sought to provide a thorough and modern perspective on destination loyalty during the COVID-19 pandemic by integrating findings from 24 journal articles. The study emphasised research techniques, sample characteristics and loyalty participants. Zhang *et al.* (2023) used bibliometric analysis, investigating research on 'green loyalty' from the points of view of economics, management and marketing. However, certain limitations remain regarding the scope of data collection and the depth of variable analysis. Singh *et al.* (2022) sought to systematically integrate the conceptualisation, measurement and causes of destination loyalty. Dang and Weiss (2021) examined the correlation between location attachment and behavioural intentions via a qualitative synthesis of 66 empirical studies published from 2010 to 2021. Their methodology, utilising numerous databases, provided a comprehensive perspective on the subject, although the limited sample size may not adequately represent the breadth of previous research. Meanwhile, Afshardoost and Eshaghi (2020) used a meta-analytic method to explore the link between destination image and visitor behavioural intention based on

87 studies. The robustness of their conclusions may be affected by the quality and potential publication bias of the included research. Table 1 shows how the current literature reviews are different from each other in terms of topic, approach and sample size.

While several reviews have examined key constructs, none of the existing studies has provided a comprehensive synthesis integrating these constructs within the context of loyalty in the UGS research field. Prior studies have employed systematic review, meta-analysis and qualitative synthesis methods to examine various aspects of loyalty. In contrast, this review utilises a broader array of theoretical and empirical contributions to delineate the multidimensional aspects of UGS-related experiences.

Table 1. Summary of the Focus of Previous Literature Reviews Related to Loyalty.

Author(s)	Journal	Objective / Sample size	Methodology	Type of review
Cruz-Milán (2023)	Frontiers in Psychology	To present a cohesive and current overview of the knowledge produced regarding destination loyalty since the onset of CO-VID-19. / Sample size: 24 scientific publications from WOS spanning 2019.11–2022.11.	Descriptive analysis of the reviewed articles, including research methods, sample characteristics and loyalty constructs; Identification of predictors of destination loyalty from the reviewed studies.	Literature review and synthesis of empirical results
Zhang et al. (2023)	Heliyon	To clarify the conceptual content, structure and measurement of green loyalty, conduct a bibliometric analysis to identify publication productivity, prominent topics, theoretical lenses, variables and future research directions. / Sample size: 236 articles from the WOS spanning 2002－2022.	Bibliometric analysis (using Cite Space software for performance analysis and science mapping) and content analysis.	Systematic literature review
Singh et al. (2022)	Journal of Quality Assurance in Hospitality & Tourism	To synthesise the literature on destination loyalty regarding its conceptualisation, measurement, antecedents, implications, methodology, research gaps and future recommendations. / Sample size: 179 articles from Scopus.	Systematic review following PRISMA checklist, searching Scopus database with specific filters on document type, language, time frame and journal ranking.	Systematic literature review
Dang & Weiss (2021)	Sustainability	To investigate the correlations between location attachment and behavioural intentions in studies from 2010 to 2021. / Sample size: 66 articles from WOS and Pro-Quest.	Qualitative analysis of selected peer-reviewed journal articles focusing on quantitative studies.	Systematic literature review with qualitative analysis
Afshardoost & Eshaghi (2020)	Tourism Management	To comprehend the correlation between destination image and tourist behavioural intention by synthesising effects from 87 studies.	Search various academic databases; perform a meta-analysis utilising Comprehensive Meta-analysis 2.0 software with defined inclusion criteria for papers.	Meta-analysis

3. Methods

3.1. Research Method

In this study, bibliometric and visualisation analyses are conducted using VOSviewer and Scimago Graphica. VOSviewer, an early tool for bibliometric and visualisation analyses, is preferred by many scholars (Bukar *et al.,* 2023) and employed in this study owing to its intuitive interface and clear results. Scimago Graphica is employed for the creation of geographic visualisations (Ren & Abdullah, 2024; Taneja & Bharti, 2022).

Moreover, the analysis follows the TCCM methodology involving a systematic review of the literature on loyalty in UGS (Figure 1). The TCCM approach exemplifies a framework-based review, offering a structured methodology for synthesising existing knowledge and formulating thorough suggestions for future study (Paul & Benito, 2018). The study starts with the 'Theory' part, which includes the primary theoretical foundations and paradigms employed to clarify the relationship between integration and growth. The 'Context' section outlines the core idea of the study. Paul *et al.* (2023) note that the concept is 'the domain of conditions influencing the research area'. The 'Characteristics' section talks about the parts of the object being looked at, especially

the different consequences of integration. The 'Methods' section explains the details of relevant study designs and ways to analyse data in the integrated growth literature.
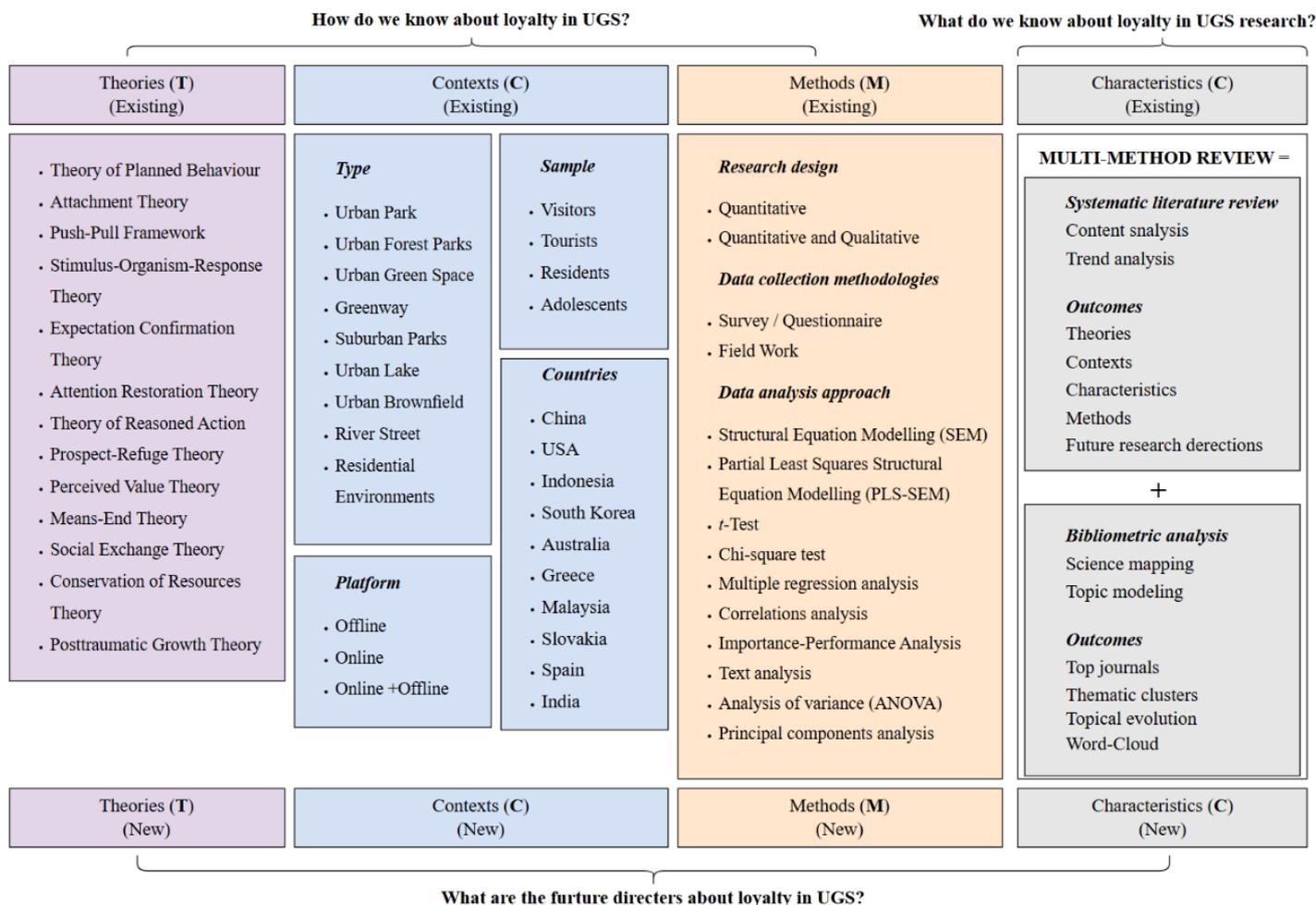
How do we know about loyalty in UGS? **What do we know about loyalty in UGS research?**

Theories (T) (Existing)	Contexts (C) (Existing)		Methods (M) (Existing)	Characteristics (C) (Existing)
• Theory of Planned Behaviour • Attachment Theory • Push-Pull Framework • Stimulus-Organism-Response Theory • Expectation Confirmation Theory • Attention Restoration Theory • Theory of Reasoned Action • Prospect-Refuge Theory • Perceived Value Theory • Means-End Theory • Social Exchange Theory • Conservation of Resources Theory • Posttraumatic Growth Theory	***Type*** • Urban Park • Urban Forest Parks • Urban Green Space • Greenway • Suburban Parks • Urban Lake • Urban Brownfield • River Street • Residential Environments ***Platform*** • Offline • Online • Online +Offline	***Sample*** • Visitors • Tourists • Residents • Adolescents ***Countries*** • China • USA • Indonesia • South Korea • Australia • Greece • Malaysia • Slovakia • Spain • India	***Research design*** • Quantitative • Quantitative and Qualitative ***Data collection methodologies*** • Survey / Questionnaire • Field Work ***Data analysis approach*** • Structural Equation Modelling (SEM) • Partial Least Squares Structural Equation Modelling (PLS-SEM) • *t*-Test • Chi-square test • Multiple regression analysis • Correlations analysis • Importance-Performance Analysis • Text analysis • Analysis of variance (ANOVA) • Principal components analysis	**MULTI-METHOD REVIEW =** ***Systematic literature review*** Content snalysis Trend analysis ***Outcomes*** Theories Contexts Characteristics Methods Future research derections + ***Bibliometric analysis*** Science mapping Topic modeling ***Outcomes*** Top journals Thematic clusters Topical evolution Word-Cloud
Theories (T) (New)	Contexts (C) (New)		Methods (M) (New)	Characteristics (C) (New)

What are the furture directers about loyalty in UGS?

Figure 2. Application of the TCCM Framework.

3.2. Data Collection

This study collected relevant literature from the WOS and Scopus databases. The integration of Scopus and WOS databases is aimed at building a more comprehensive and balanced dataset to fit the decentralised and interdisciplinary nature of UGS loyalty research. This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which are recognised across disciplines for their standardised approach to identifying, screening and selecting literature in systematic reviews (Rethlefsen *et al.,* 2021). The detailed selection procedure is presented in Figure 2.

The search strategy was developed around two core themes: 'loyalty' and 'urban green space'. To ensure that no relevant studies were missed, the search string was expanded to include previous review studies and frequently used terms during the database literature search (Cruz-Milán, 2023; Jabbar *et al.,* 2022). The literature search was performed in the WOS Core Collection using the TOPIC field with the specified search string: (loyalty OR "revisit intention" OR "intention to revisit" OR "intention to recommend" OR "word-of-mouth" OR "recommendation intention") AND ("urban green space*" OR "green space*" OR "green area*" OR "urban park*" OR "city park*" OR "urban open space*" OR "urban forest*" OR "green infrastructure"). Articles published up to December 2025 were included, which resulted in 52 articles. The search in Scopus was conducted within the 'Article title, Abstract, Keywords' fields utilising an identical keyword combination, yielding an additional 35 publications. Thus, a total of 87 records were obtained from both databases. A modified dataset of 81 articles was obtained for further screening after restricting the results to those authored in English.

Through the utilisation of the Mendeley tool, same files present in both databases were merged and duplicate entries were removed, resulting in a dataset of 55 publications. After reviewing the abstracts of all 55 papers, 42 papers with a UGS loyalty background were selected for in-depth review. The accuracy and integrity of the final included studies were ensured through manual

review. In addition to database searches, authoritative journals in the fields of UGS, environmental behaviour and urban tourism (such as Urban Forestry & Urban Greening, Landscape and Urban Planning and Sustainability) were consulted to confirm whether there were any missing documents. No other studies that met the criteria were found. Subsequently, the content of the 38 articles finally determined was analysed according to the TCCM framework, and two researchers independently coded some of the literature to test the consistency. The differences were resolved through discussion. This process ensured the reliability of the included literature and laid the foundation for subsequent quantitative analysis and thematic induction.
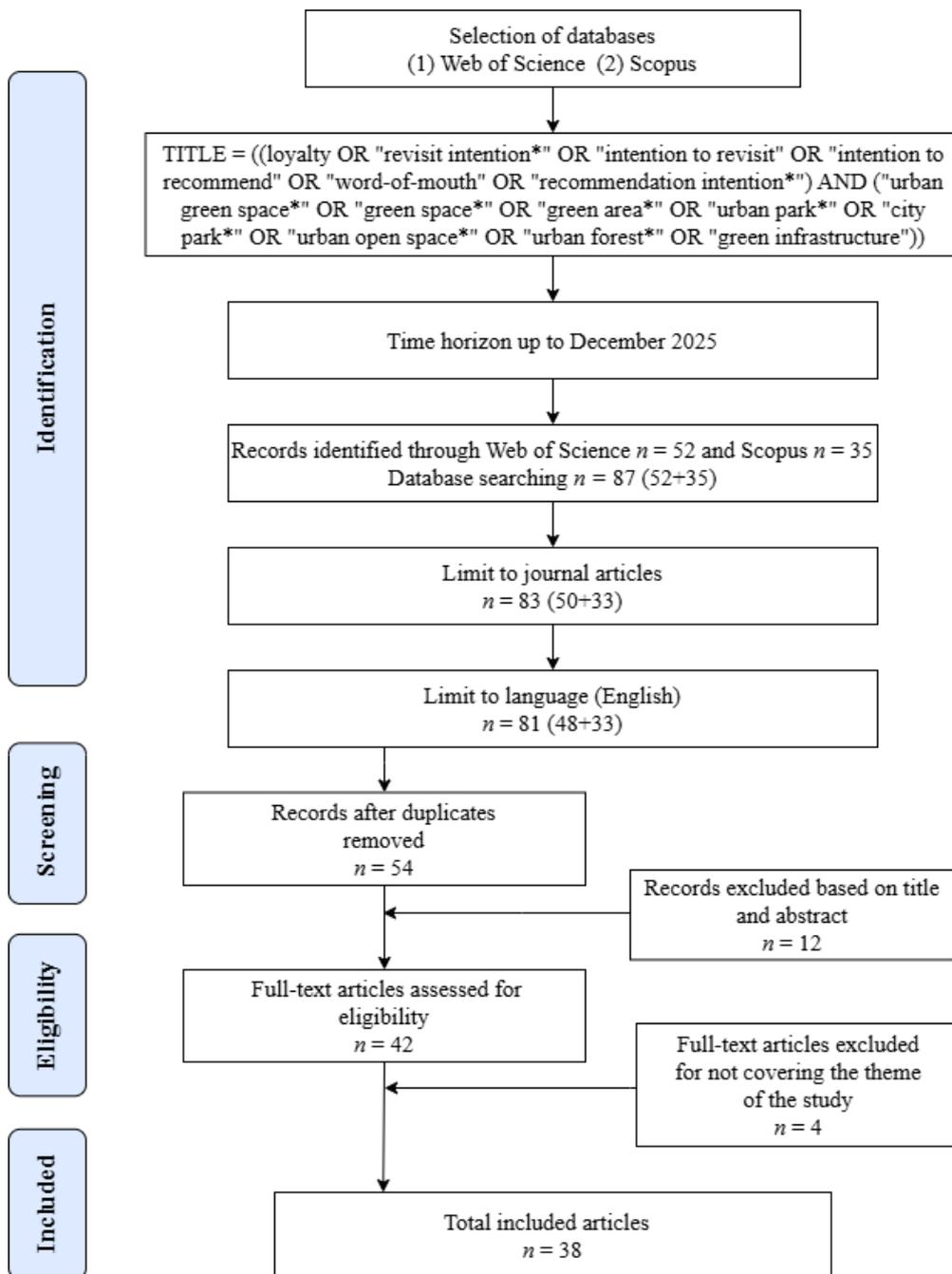
Figure 2. PRISMA Flowchart.

4. General Overview

All the literature collected for this study was systematically analysed and classified by publication year. As of December 2025, all identified literature related to loyalty in the context of UGS research was published after 2010. Figure 3 shows that the number of publications remained low and fluctuated between 2010 and 2019, with only 1–3 papers published each year. After 2022, there was a significant increase. In particular, 6 papers were published in 2022 and 2023, marking the peak of research in this field. Although there was a slight decline in 2024, it remained at a very high level in 2025. In addition, two articles for 2026 have been available online as early-

access publications. This trend indicates that attention to this topic has continued to increase in recent years, and the relevant research results have been continuously enriched.
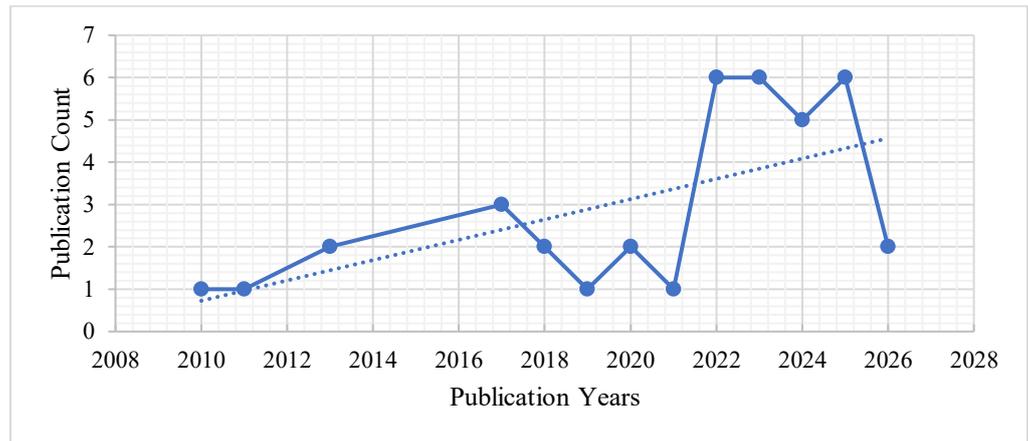

Figure 3. Publication Years.

Table 2 lists the distribution of publication categories included in the study. Environmental Studies accounted for 36.84% of the total, followed by Hospitality Leisure Sport Tourism at 31.85%, Forestry (18.42%), Urban Studies (15.79%), Geography (13.16%) and Management (10.53%). Other related categories include Ecology, Psychology Multidisciplinary and Environmental Science, each accounting for about 7.89% of the total number of papers. In addition, the fields of Architecture, Engineering, Plant Sciences and Green Technology accounted for a relatively small proportion, highlighting the interdisciplinary nature of loyalty research.

Table 2. Disciplinary Distribution of Included Studies (n = 38).

Study Categories	Record Count	% of 38
Environmental Studies	14	36.84
Hospitality Leisure Sport Tourism	12	31.58
Forestry	7	18.42
Urban Studies	6	15.79
Geography	5	13.16
Management	4	10.53
Bossiness	3	7.89
Ecology	3	7.89
Psychology Multidisciplinary	3	7.89
Environmental Sciences	2	5.26
Construction Building Technology	2	5.26
Geography Physical	2	5.26
Plant Sciences	2	5.26
Regional Urban Planning	2	5.26
Public Environmental Occupational Health	2	5.26
Architecture	1	2.63
Computer Science Artificial Intelligence	1	2.63
Engineering Civil	1	2.63
Engineering Multidisciplinary	1	2.63
Green Sustainable Science Technology	1	2.63

Table 3 presents the top 5 publishers and their respective journals in the field. These prominent publi.shers published 3 papers or more than 84% of the overall releases. Elsevier emerges as the preeminent entity, publishing 14 publications in several specialised journals, including the Journal of Environmental Psychology, Landscape and Urban Planning and Urban Forestry & Urban Greening. This publisher is accountable for over 36% of the research output in this field. MDPI is a notable contributor, producing 10 articles (26.32%), primarily via its journals Forests and the International Journal of Environmental Research and Public Health. Following these two giants, Emerald Group Publishing and Taylor & Francis each account for a small but notable share (6% each), primarily through niche journals such as Management of Environmental Quality and Journal of Travel & Tourism Marketing. Furthermore, the Cognizant Communication Corporation publisher published 2 articles via Tourism Analysis.

Figure 4 illustrates the publication countries. A total of 16 countries were represented by scholars undertaking research on loyalty in UGS. China leads with 16 documents, representing nearly 50% of the total publications. The United States ranks second, contributing 10 documents, while South Korea follows with 5 documents. These three nations collectively account for the preponderance

of academic contributions in this domain. China has published the most research on this subject, showcasing its robust academic influence and sustained interest in urban environmental studies. However, the United States has the most extensive academic co-occurrence link with other nations.

Table 3. Top 5 Publishers and Publication Periodicals of the Study.

Publishers	Record Count	Publication Titles	Record Count
Elsevier	14	Journal of Environmental Psychology	2
		Landscape And Urban Planning	2
		Urban Forestry & Urban Greening	3
		Alexandria Engineering Journal	1
		Cities	1
		Ecological Informatics	1
		International Journal of Hospitality Management	1
		Journal of Outdoor Recreation and Tourism Research Planning and Management	1
		Acta Psychologica	1
		Applied Acoustics	1
MDPI	10	Forests	4
		International Journal of Environmental Research and Public Health	2
		Land	2
		Sustainability	1
		Buildings	1
Emerald Group Publishing	3	Management Of Environmental Quality	1
		International Journal of Tourism Cities	1
		Journal of Islamic Marketing	1
Taylor & Francis	3	Journal of Travel Tourism Marketing	1
		Landscape Research	1
		Journal of Asian Architecture and Building Engineering	1
Cognizant Communication Corp	2	Tourism Analysis	2

Top 5 regional publications

UK	2
AUSTRALIA	2
INDONESIA	4
SOUTH KOREA	5
USA	10
CHINA	16
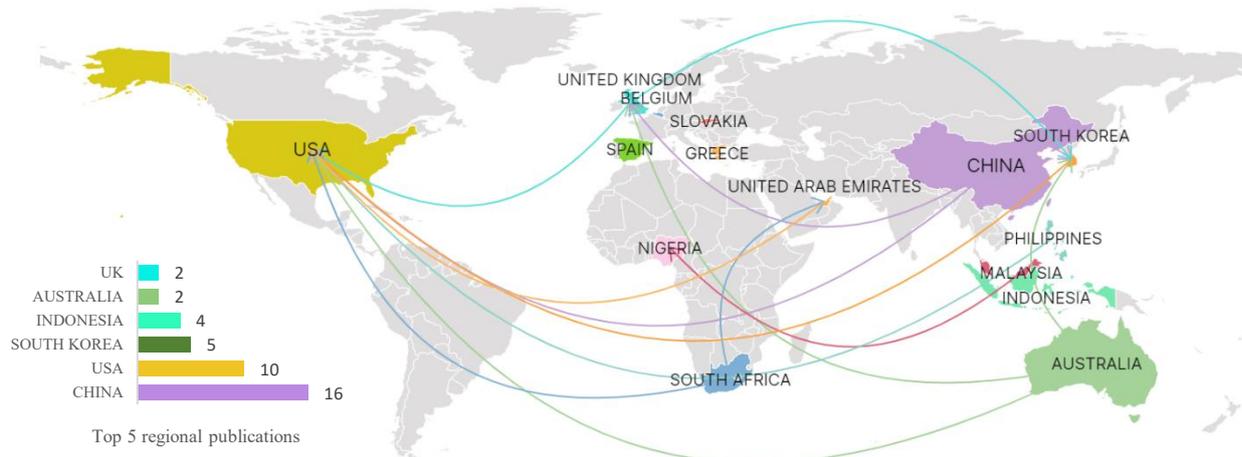
Figure 4. Publication Countries.

Figure 5 illustrates the co-occurrence network of keywords related to the research topic. Researchers established the minimum frequency of keyword occurrences at two; 51 keywords out of 274 meet the requirement. There are four clusters associated with the keywords co-occurrence network. Cluster 1 with the colour red specifies 14 nodes, with an emphasis on destination image and place attachment in destination loyalty as the study topic. Destination image is the major keyword (Total lines strength = 80, Occurrences = 10), followed by place attachment (Total lines strength = 69, Occurrences = 9). Cluster 2, represented by the colour green, comprises 14 nodes, focusing on satisfaction, behavioural intention and the perceived value in UGS. The most important term is satisfaction (Total lines count = 120, Occurrences = 18), followed by behavioural intention (Total line length = 39, Occurrences = 5) and perceived value. The study subject centred

on the perceptions of green space, and the structural equation modelling (SEM) method is represented by 13 nodes in Cluster 3, shown by the colour blue. The most important term is SEM (Total lines strength = 77, Occurrences = 10). The research subject centred on loyalty and motivation is identified by 10 nodes in Cluster 4, which is shown in yellow colour. The main term is motivation (Total lines strength = 85, Occurrences = 10), followed by loyalty (Total lines strength = 76, Occurrences = 11) and quality (Total lines strength = 63, Occurrences = 10).
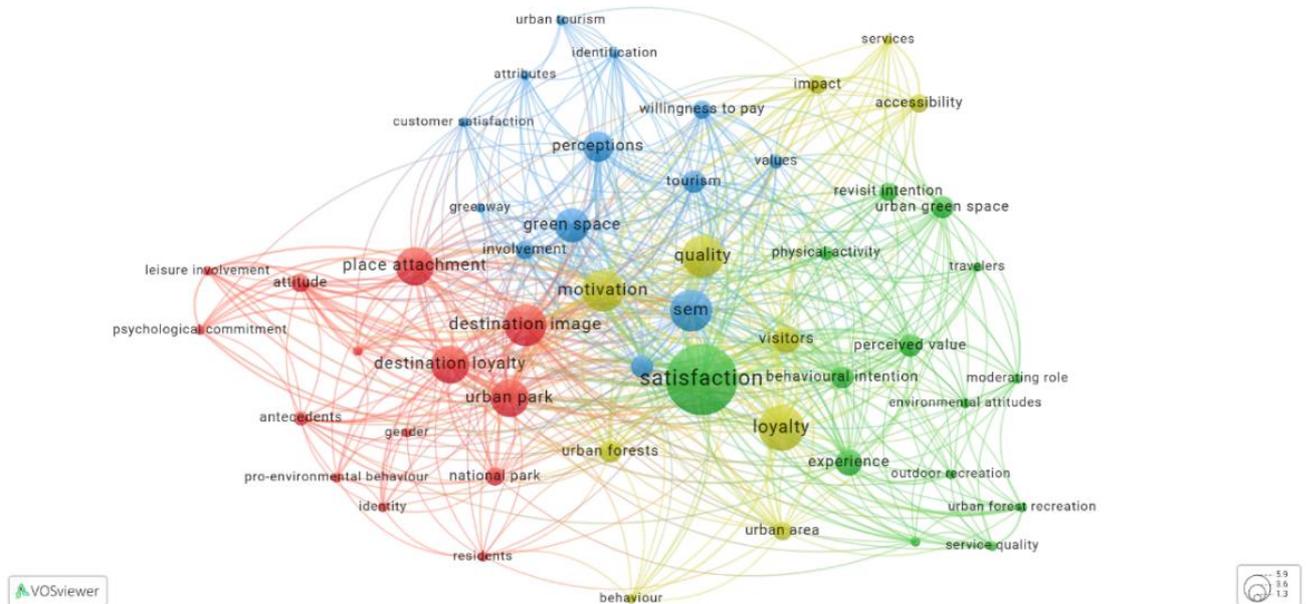
Figure 5. Keyword Co-Occurrence Network.

Figure 6 shows the keyword co-occurrence overlay. After 2022, the hot keywords are coloured purple. In these hot keywords, the noteworthy keywords include moderation role, gender, identity, revisit intention, wellness-to-pay, services, travellers, antecedents, environmental attitudes, pro-environmental behaviour and greenway, which indicates the trend of the moderating role of gender, age and origin in research on UGS loyalty as well as environmental attitude and behaviour.
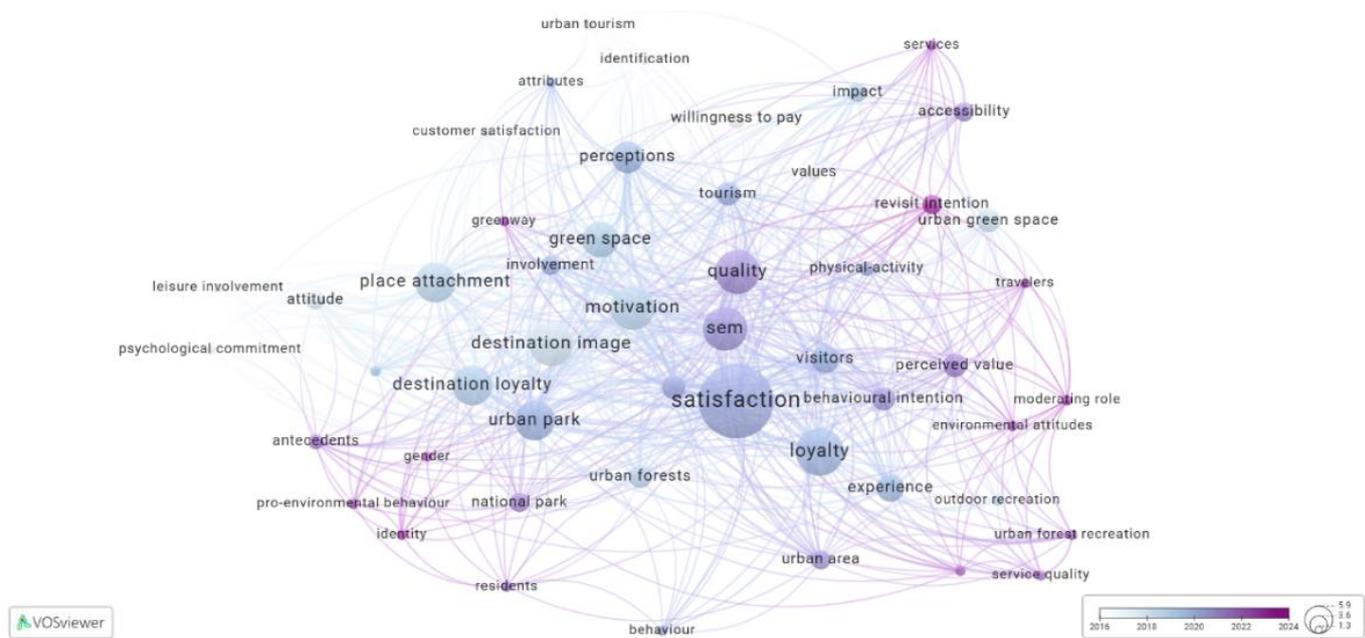
Figure 6. Keyword Co-occurrence Overlay.

Figure 7 shows the keyword cloud map, which visualises the main themes or topics (including keywords) frequently used in the dataset (McNaught & Lam, 2010). It offers a method to swiftly identify the predominant themes or subjects (including keywords) and their interrelations (Mowforth *et al.,* 2023). With the keyword cloud map, eight keywords¬such as satisfaction,

destination image, place attachment, loyalty, destination loyalty, SEM, motivation and green space—are highlighted, in addition to perception, perceived value, quality and visitors.
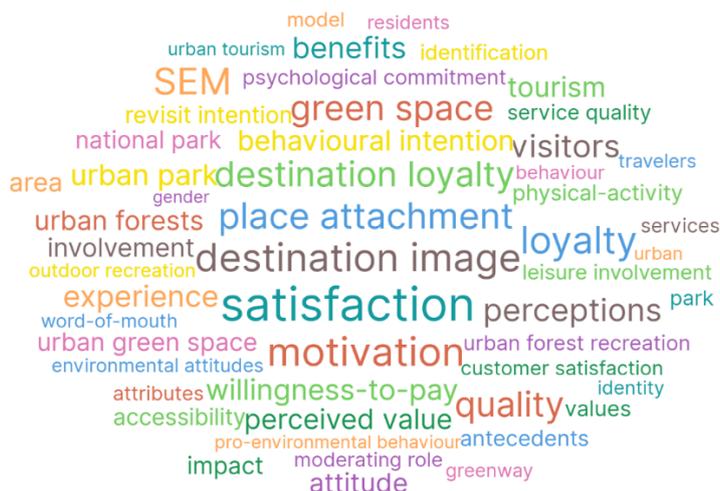

Figure 7. Keyword Cloud Map.

5 The Theory–Context–Characteristics–Methods Framework

5.1. Theory

Studies on loyalty in UGS have drawn upon a diverse range of theoretical perspectives (see Table 4). Although loyalty has been widely examined in tourism and marketing research, its theoretical application in the context of UGS remains relatively fragmented. Before reviewing the theories adopted in the literature, it is necessary to clarify several core constructs that frequently appear in UGS loyalty research. Loyalty typically refers to users' intention to revisit, willingness to recommend or continued engagement with a particular green space (S. Lee *et al.,* 2017; Tang *et al.,* 2021). Closely related concepts, such as place attachment and satisfaction, are often used as mediators to explain the psychological mechanisms underlying loyalty. Place attachment describes the emotional bond individuals develop with a specific environment (Nursyamsiah & Setiawan, 2023; Son *et al.,* 2023), whereas satisfaction reflects users' overall evaluation of their experience (Geng *et al.,* 2024). Although these constructs are conceptually distinct, they frequently interact and are commonly integrated into models predicting behavioural loyalty outcomes such as revisit intention or word-of-mouth behaviour.

Table 4. Theories Utilised in Loyalty Research in UGSs.

Theory	Articles	References
Theory of Planned Behaviour	4	Rahmafitria & Kaswanto (2024), Rišová & Madajová (2023), Luo et al. (2022)
Attachment Theory	3	Nursyamsiah & Setiawan (2023), Son *et al.* (2023), Plunkett *et al.* (2019)
Push–Pull Framework	2	Zhan et al. (2024), Lee et al. (2017)
Stimulus–Organism–Response Theory	2	Yao et al. (2024), Quan et al. (2025)
Expectation Confirmation Theory	1	Du & Zhao (2022)
Attention Restoration Theory	1	Wu *et al.* (2023)
Theory of Reasoned Action	1	Tang *et al.* (2021)
Prospect–Refuge Theory	1	Li & Liu (2025)
Perceived Value Theory	1	Zhang *et al.* (2022)
Means–End Theory	1	Ma & Jiang (2023)
Social Exchange Theory	1	Son *et al.* (2023)
Conservation of Resources Theory	1	Son *et al.* (2023)
Posttraumatic Growth Theory	1	Luo *et al.* (2022)

Across the reviewed studies, not all articles explicitly stated a theoretical foundation. Among the studies that did incorporate theoretical foundations, the theory of planned behaviour (TPB) is the most frequently cited framework, appearing in four studies (e.g. Rahmafitria & Kaswanto, 2024; Rišová & Madajová, 2023). Attachment theory was applied in three articles to analyse emotional connections with place. The push–pull framework, commonly utilised in tourism research, was featured in two studies examining motivational dynamics. The stimulus–organism–response theory, expectation confirmation theory, attention restoration theory, theory of reasoned action (TRA) and prospect–refuge theory were also employed, each contributing unique perspectives on

psychological and perceptual processes in UGS use. In addition, several studies adopted value-based theories such as perceived value theory and means–end theory to explain cognitive evaluation processes leading to satisfaction and loyalty. The social exchange and conservation of resources theories were also applied in studies focusing on visitors' cost–benefit assessments and emotional resources. A small but growing number of studies combined multiple theories in a single conceptual model (e.g. Son *et al.* 2023; Luo *et al.* 2022), reflecting a growing trend towards integrative and interdisciplinary theoretical approaches in UGS loyalty research. Overall, the theoretical landscape of UGS loyalty research is diverse but non-uniform. While the range of applied theories demonstrates the interdisciplinary nature of the field, the lack of consistent theoretical grounding suggests opportunities for more systematic theory development and for models that better integrate emotional, cognitive and experiential processes in explaining loyalty within UGS.

5.2. Context

Context denotes the conditions in which research is conducted (Lim *et al.,* 2021). In previous systematic literature reviews (e.g. Jebarajakirthy *et al*., 2021; Lim et al., 2021), the type of UGS, sample, platform used for data collection and countries were considered as the context for the studies (see Table 5). In terms of type, the research mainly focuses on urban parks (39.47%), followed by urban forest parks (23.68%) and unlimited UGS (13.16%). In addition, 9 articles study urban greenways, suburban parks, urban lake, urban brownfield, street and residential environments. Consequently, the types of loyalty in the UGS study are varied.

Regarding the context of sample units, more than half of the studies (68.42%) included visitors and most were not restricted to factors such as origin, gender and age; an exception was the study by Sugiama *et al.* (2023), which examined the impact of recreational accessibility on the satisfaction, memories and loyalty of urban park visitors, especially the young generation (between 15 and 24 years old). Additionally, 18.42% of the studies focus on tourists and 7.89% on residents. Specifically, one study targets adolescents: Rišová and Madajová (2023) analyse adolescents' favourite place selection concerning environmentally responsible behaviour. Trongjitpituk and Suchao-in (2025) focused on older adults' behavioural intentions in urban parks in Bangkok. Moreover, Table 6 shows that in most studies (71.05%), researchers employ face-to-face procedures to engage the intended sample, as 26.32% of studies utilised online platforms for collecting data. One article was used online and on-site platform to collect the data (e.g. Wu *et al.,* 2023).

Regarding the country where the sample is drawn from, Table 6 shows that the empirical research on loyalty was carried out in 10 countries across the world. Most studies, as a unique nation, are derived from data obtained in China (14 studies), followed by the USA (7 studies), South Korea (5 studies) and Indonesia (4 studies).

Table 5. Contexts of Studies.

Context	Count	Percentage (%)	Context	Count	Percentage (%)
Type1			Platform		
Urban Park	15	39.47	Online	10	26.32
Urban Forest Parks	9	23.68	Offline	27	71.05
Urban Green Space2	5	13.16	Online + Offline	1	2.63
Greenway	2	5.26	Countries3		
Street	2	5.26	China	16	42.11
Suburban Parks	2	5.26	USA	10	26.32
Urban Lake	1	2.63	South Korea	5	13.16
Urban Brownfield	1	2.63	Indonesia	4	10.53
Residential Environment	1	2.63	Australia	1	2.63
Sample			Greece	1	2.63
Visitors	26	68.42	Malaysia	1	2.63
Tourists	7	18.42	Slovakia	1	2.63
Residents	3	7.89	Spain	1	2.63
Older Adults	1	2.63	Thailand	1	2.63
Adolescents	1	2.63	India	1	2.63

1 For some studies, there is not just one type of green space research.
2 For some studies, the type of urban green space was not specified.
3 For some studies, the data were collected from multiple countries.

5.3. Characteristics

This section discusses the key antecedents and mediating, moderating and outcome variables in UGS loyalty research, in addition to the relationships investigated, to elucidate a specific phenomenon related to these variables. Figure 8 classifies the various variables.
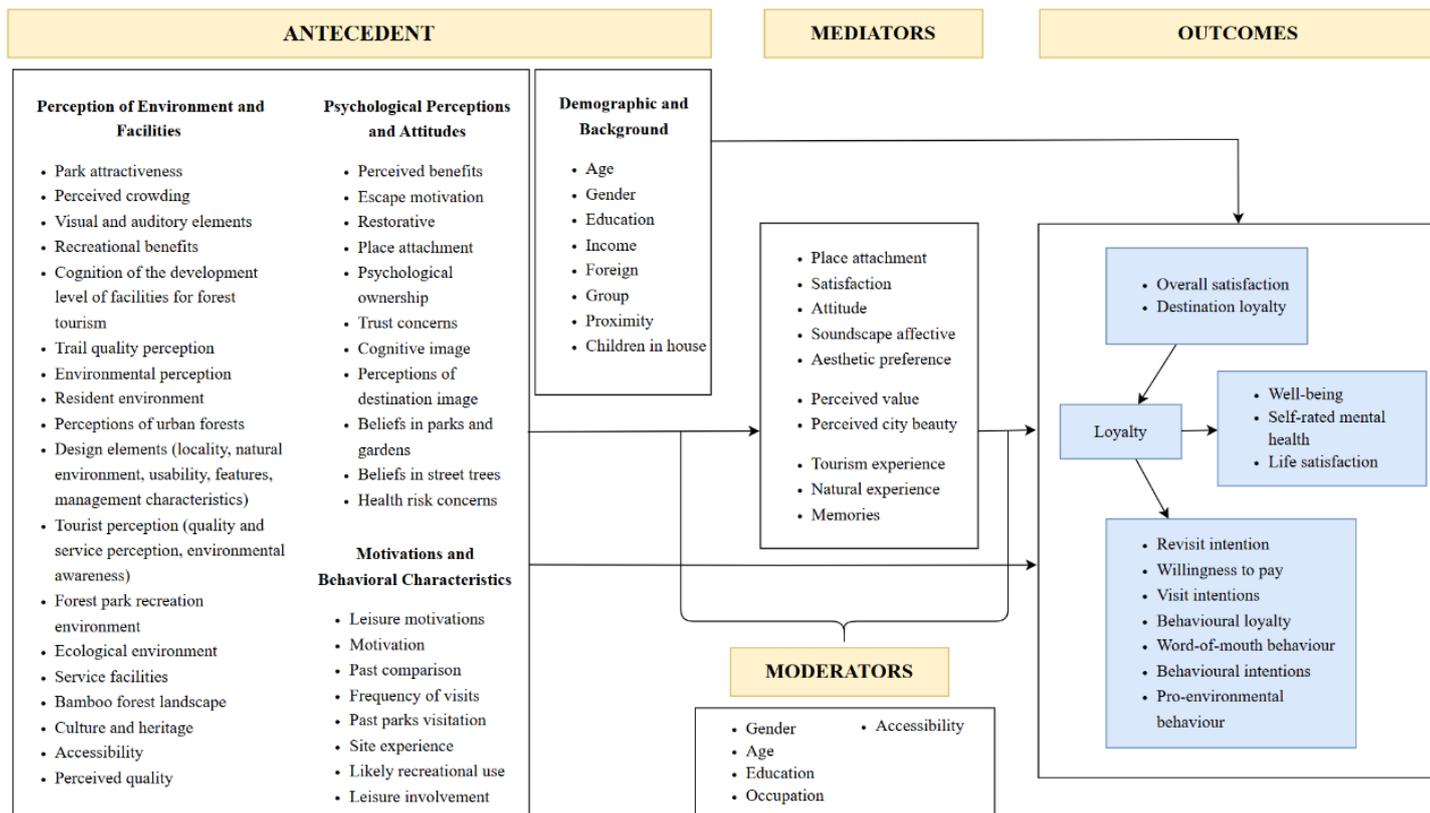

Figure 8. Variables Investigated in UGS Loyalty Research.

5.3.1. Antecedents

This study classifies antecedents into four distinct groups. These groups are based on perception of environment and facilities, psychological perceptions and attitudes, motivations and behavioural characteristics, and demographic factors and background of the samples. The category 'perception of environment and facilities' primarily refers to individuals' perceptions of various environmental and infrastructural features within different study areas. These include elements such as landscape (Ma & Jiang, 2023), trail (Wu et al., 2023), accessibility (Du & Zhao, 2022; Sugiama et al., 2023), design features (Deng & Pierskalla, 2018; Wang et al., 2023) and cultural attributes (Ma & Jiang, 2023). In the reviewed studies, such perceptual factors are commonly integrated into conceptual models to examine their influence on loyalty-related outcomes. For example, Son et al. (2023) considered seven residential environment elements and examined their effect on residents' place attachment, satisfaction, word-of-mouth behaviour and pro-environmental behaviour. Li and Liu (2025) demonstrated that in addition to ground vegetation, which only augmented aesthetic preference, additional natural landscape elements and types of sound sources substantially elevated visitors' aesthetic preferences and intent to return.

The category of 'psychological perceptions and attitudes' primarily encompasses internal cognitive and emotional responses, such as perceived benefits (Lopez-Mosquera & Sanchez, 2013), restorative environmental perception (Wu et al., 2023), place attachment (Plunkett et al., 2019), psychological ownership (Noël & Dardenne, 2024) and cognitive appraisals (Yang et al., 2023). For example, Wu et al. (2023) investigated the components of perceived restorative environment features among greenway recreationists and their impact on behavioural intentions.

Moreover, the category of 'motivation and behavioural characteristics' includes variables such as recreation motivation (Wu et al., 2023), usage experience (Li et al., 2022) and visitation behaviour, reflecting individuals' underlying drivers and patterns of engagement with UGS. For example, Li et al. (2022) performed a preliminary analysis of the similarities and differences between residents and tourists about their previous experiences, motivations, attitudes, satisfaction and loyalty. Furthermore, some scholars focus on more than one aspect of the antecedent. For example, Yang et al. (2023) analysed the correlation among tourists' perceived quality, cognitive

image and loyalty to the cultural representation of the greenway environment, with perceived value and satisfaction serving as mediators.

In addition, some scholars have examined demographic variables and visitor background characteristics to explore their relationships with loyalty-related constructs. For example, Klenosky *et al.* (2017) conceded that proximity and children in the house were factors that may influence visit intention. However, these variables have been mostly used as moderating variables in research published in recent years.

5.3.2. Moderators

Moderators refer to the elements influencing the relationship between two variables (Paul *et al.,* 2021). Moderators affect the intensity among the antecedents, mediators and outcomes (Lim *et al.,* 2022). Demographic variables are the most common moderating variables in these studies (Li & Liu, 2025; Lu *et al.,* 2023), such as gender, age, education, occupation and country, with gender being the most frequently studied as a moderating variable; for example, Li & Liu (2025) demonstrate that visitors' socio-demographic attributes, such as age, gender and occupation, influenced the mechanisms generating return intentions in the audio-visual context. Moreover, as shown in Figure 4, research on the moderating effect of demographic characteristics and other factors been common in recent years. Research has also used accessibility as a moderating variable; for instance, Zhan *et al.* (2024) found that enhanced park accessibility decreases the adverse correlation between perceived crowding and the decision to revisit.

5.3.3. Mediators

Previous research has used diverse variables as mediators to explain the relationship between two variables. The mediating variables identified in the reviewed studies can be classified into three categories: affective and attitudinal variables, cognitive and evaluative variables, and experiential variables. Affective and attitudinal variables encompass constructs such as place attachment (Nursyamsiah & Setiawan, 2023; Wu *et al.,* 2023), satisfaction (Son *et al.,* 2023; Yao *et al.,* 2024), attitude (Li *et al.,* 2022), soundscape affective response and aesthetic preference (Li & Liu, 2025), which indicate individuals' emotional and attitudinal reactions to UGS. Cognitive and evaluative variables, including perceived value (Lu *et al.,* 2023; Zhang *et al.*, 2022) and perceived city beauty (Deng *et al.,* 2010), reflect users' assessments and perceived advantages. Experiential variables, such as tourism experience (Deng *et al.,* 2010), natural experience (Rahmafitria & Kaswanto, 2024) and memories (Sugiama *et al.,* 2023), highlight the significance of personal and sensory engagement with green environments in influencing loyalty-related outcomes.

Place attachment and satisfaction are the most frequently used mediators in this context. Place attachment denotes the emotional bond humans form with a specific site (Son *et al.,* 2023). For example, Nursyamsiah and Setiawan (2023) assessed the influence of park revitalisation on the intention to revisit, employing place attachment as a mediating variable. Satisfaction represents the assessment of a user's overall experience (Geng *et al.,* 2024). Satisfaction functions as a mediating variable, relating environmental perceptions to loyalty; for instance, Zhan *et al.* (2024) examined how perceived congestion significantly reduces the prospect of revisiting and has an indirect influence on this desire via the mediating variable of satisfaction levels. Notably, satisfaction also operates as a dependent variable, examined in conjunction with loyalty to evaluate post-visit responses; for example, Deng and Pierskalla (2018) used importance–performance analysis analysis in the assumption of attribute performance impact on satisfaction and loyalty. The two constructs are fundamental to numerous conceptual models investigating the psychological pathways to loyalty within UGS contexts.

5.3.4. Outcomes

Outcomes are the resultant factors influenced by antecedents, moderators and mediators. In existing research on loyalty within UGS contexts, outcome variables have been conceptualised across three major domains: behavioural expressions of loyalty, evaluative satisfaction-related outcomes and well-being indicators. The primary outcomes often analysed are revisit intention (Nursyamsiah & Setiawan, 2023), willingness to pay (Lopez-Mosquera & Sanchez, 2013), visit intention (Klenosky et al., 2017), word-of-mouth behaviour (Son *et al.,* 2023) and pro-environmental behaviour (Rahmafitria & Kaswanto, 2024).

These variables denote behavioural loyalty, encapsulating users' intents or actions to return, approve of or recommend for UGS. In addition, overall satisfaction and destination loyalty are frequently regarded as either results of mediating factors like perceived value or place attachment or as parallel constructs to loyalty (Danjaji *et al.,* 2018; Deng & Pierskalla, 2018; Lee *et al.,* 2017; Li *et al.,* 2022). Moreover, when loyalty is treated as a dependent variable, it is often measured

using the second-order dimensions of revisit intention and recommendation intention (Lee *et al.,* 2017; Nursyamsiah & Setiawan, 2023; Tang *et al.,* 2021; Wang *et al.,* 2023); sometimes, the dimensions of positively sharing via media (Li *et al.,* 2022) and revisit at a lower price are also included (Du & Zhao, 2022).

5.4. Methods

This section assesses the research methodologies and analytical tools utilised in the analysed publications to investigate fundamental connections in the loyalty study. Upon reviewing all studies, only one publication employed a mixed-methods approach; the remaining were quantitative in design. Simultaneously, all researchers employed a questionnaire survey method for data collection, whereas Rišová and Madajová (2023) integrated field research with mapping activities for subsequent data analysis. We also found that most researchers employ convenience sampling for data collection, while numerous sampling methodologies exist for primary research. Table 6 demonstrates the data analysis techniques adopted in loyalty research. SEM was the major methodology, utilised in half of the studies (19 publications). The partial least squares SEM (PLS-SEM) method was utilised in six studies (18.42%) to analyse intricate interactions among latent variables. Conventional statistical techniques, such as t-tests (10.53%), chi-square tests (7.89%), text analysis (7.89%) and multiple regression analysis (7.89%), were commonly utilised to investigate group differences and prediction associations. The findings demonstrate a pronounced preference for multivariate modelling tools, especially SEM and PLS-SEM, which have been popularly used in recent research (e.g. W. Li & Liu, 2025; Yao *et al.,* 2024).

Table 6. Data Analysis Tools Adopted in Loyalty Research.

Data analysis tools	Count	Percentage (%)	References
SEM	19	50.00	Zhou *et al.* (2026), Chen *et al.* (2025), Trongjitpituk & Suchao-in (2025), Quan *et al.* (2025), Zhan *et al.* (2024), Ma & Jiang (2023), Wu *et al.* (2023), Zhang *et al.* (2022), Lu *et al.* (2023), Luo *et al.* (2022), Singh *et al.* (2023), Li *et al.* (2022), Du & Zhao (2022), Tang *et al.* (2021), Plunkett *et al.* (2019), Lee & Shen (2013), Lopez-Mosquera & Sanchez (2013), Deng *et al.* (2010)
PLS-SEM	7	18.42	Suhartanto *et al.* (2025), Li & Liu (2025), Yao *et al.* (2024), Rahmafitria & Kaswanto (2024), Nursyamsiah & Setiawan (2023), Son *et al.* (2023), Sugiama *et al.* (2023)
t-Test	4	10.53	Wang *et al.* (2023), Luo *et al.* (2022), Li *et al.* (2022), Lee *et al.* (2017)
Chi-square test	3	7.89	Rišová & Madajová (2023), Luo *et al.* (2022), Lee *et al.* (2017)
Multiple regression analysis	3	7.89	Wang *et al.* (2023), Noël & Dardenne (2024), Danjaji *et al.* (2018)
Text analysis	3	7.89	Li *et al.* (2022), Ma & Jiang (2023), Quan *et al.* (2025)
Correlations analysis	2	5.26	Klenosky *et al.* (2017), Majumdar *et al.* (2011)
Importance–Performance Analysis	2	5.26	Wang *et al.* (2023), Deng & Pierskalla (2018)
Analysis of variance	2	5.26	Wang *et al.* (2023), Deng *et al.* (2017)
Principal components analysis	2	5.26	Halkos *et al.* (2022), Luo *et al.* (2022)

6. Discussion

In recent years, research on UGS loyalty has developed rapidly, especially experiencing explosive growth after 2022 (Zhang *et al.,* 2023). However, there remains significant differences in conceptual frameworks and research methods within this field. Although loyalty is typically empirically measured through indicators such as revisit intention, recommendation intention or pro-environmental behaviour (Cossío-Silva *et al.,* 2019; Wei & Zhang, 2023), its conceptual boundaries often overlap with related constructs such as satisfaction and place attachment (Chen & Phou, 2013; Yuksel *et al.,* 2010). This conceptual proximity has generated empirical richness and theoretical ambiguity, as many studies do not clearly distinguish between attitudinal and behavioural loyalty or explicitly articulate their theoretical grounding.

From a theoretical perspective, TCCM analysis reveals the diversity of theoretical frameworks but lacks integration. Although frameworks such as the theory of planned behaviour and attachment theory appear frequently, a significant amount of research still relies on single-theory applications or implicit assumptions (Huang *et al.,* 2021; Plunkett *et al.,* 2019). Meanwhile, studies adapting attention restoration, prospect–refuge and means–end theories have not fully explained how environmental perception translates into sustained engagement. The formation of loyalty in

UGS seems to stem from the interaction of cognitive evaluations (such as perceived value, environmental quality), emotional responses (such as attachment, satisfaction) and experiential processes (such as restorative experiences and memories; Li *et al.,* 2023; Rahmafitria & Kaswanto, 2024; Wu *et al.,* 2023). Future theoretical development needs to construct integrated models that connect environmental psychology with behavioural decision-making mechanisms, thereby providing a more coherent explanation for the long-term relationship between humans and the environment.

From a geographical distribution perspective, empirical research is mainly concentrated in China, the United States and South Korea, with studies in other regions still being insufficient (Zhang *et al.,* 2023). Most research focuses on the general tourist population, with limited attention given to specific social groups such as adolescents, older residents, immigrants or marginalised communities. Given that loyalty is shaped by cultural norms, accessibility and social space conditions, expanding cross-cultural and cross-type comparative studies is crucial for enhancing the external validity and inclusiveness of the research.

From a methodological perspective, the dominance of cross-sectional survey design and SEM reflects researchers' strong preference for examining complex mediation and moderation structures (Yang *et al.,* 2022). Although these methods can clarify structural relationships, they may not fully capture the dynamic evolution of loyalty. Longitudinal design, experimental methods, behavioural tracking and digital means can better reveal the mechanisms of loyalty development over time and responses to environmental interventions (Ma *et al.,* 2024). The diversification of methodologies also helps uncover the subjective meanings underlying statistical associations.

From a governance perspective, loyalty should not merely be regarded as a marketing concept but should be considered a strategic dimension of sustainable urban management. Continuous improvements in environmental quality, accessibility and experiential attributes can effectively enhance user satisfaction and emotional attachment (Zhang *et al.,* 2023), thereby promoting repeat visits and positive word-of-mouth endorsement (Nursyamsiah & Setiawan, 2023). Moreover, users with emotional attachment are more likely to support conservation initiatives and participate in community environmental actions (Wei & Zhang, 2023), contributing to the construction of a green space system with social resilience and ecological sustainability.

Overall, although the research on UGS loyalty has expanded rapidly, it is still in a transitional period from exploratory growth to theoretical integration. To deepen the comprehensive understanding of sustained engagement with urban green environments, it is essential to enhance conceptual clarity, broaden the scope of contextual representation and enrich methodological pathways. Table 7 summarises the key directions for future research based on the TCCM framework (Paul & Benito, 2018; Paul & Rosado-Serrano, 2019).

Table 7. Future Research Directions in UGS Loyalty Research Based on the TCCM Framework.

Dimension	Key Research Questions	Future Research Directions
Theory (T)	What theoretical frameworks can be used to distinguish between attitudinal and behavioural loyalty in UGS? How can existing environmental behaviour and psychology theories be integrated into UGS loyalty models?	Use environmental psychology for psychological mechanisms and TPB/TRA for behavioural mechanisms; Develop multi-theoretical integrative models.
Context (C)	How does loyalty vary across different countries, cultures and socio-ecological contexts? What differences exist in loyalty formation across types of green space and among different user groups?	Expand research to underrepresented regions (e.g. Africa, Latin America); Compare different green space types (e.g. greenways, brownfields); Focus on specific populations (e.g. youth, older adults, families, vulnerable groups).
Characteristics (C)	What are the distinct roles of cognitive, affective and behavioural antecedents of loyalty in UGS? How can loyalty-related variables be theoretically structured and integrated into a comprehensive model?	Categorise antecedents into cognitive, affective and behavioural domains; Develop structured theoretical models; Include complex moderators such as trust, personal values or emotion; Investigate the evolution of loyalty over time (e.g. via longitudinal pathways).
Methods (M)	Which research designs can better capture the dynamic and context-dependent nature of loyalty? How can digital or qualitative methods be used to uncover user experience and loyalty behaviour in UGS?	Employ longitudinal, experimental or scenario-based designs; Adopt qualitative or mixed methods. Use digital ethnography, social media text mining and mobile sensing to explore new engagement patterns.

7. Conclusion

This review systematically synthesises UGS loyalty research using bibliometric and TCCM approaches. By analysing 38 peer-reviewed articles published between 2010 and 2025, it maps the intellectual structure of the field and identifies major themes, theoretical foundations and methodological trends. The findings reveal inconsistencies in theoretical progress, the concentration of research space and the dominance of affective and cognitive variables, including place interaction, satisfaction and perceived value.

This paper explores the core constructs common in loyalty models and suggests integrating psychological, environmental and behavioural frameworks. The study provides practical solutions for urban planners, designers and policymakers to enhance the public's continued participation in UGS systems: improving environmental quality, accessibility and experiential attributes can enhance satisfaction and attachment, while loyalty-oriented design can promote conservation behaviour and sustainable park management. Nevertheless, this review is limited by language barriers and database selection. Future studies should integrate a wider range of datasets, adopt diverse methodologies and explore in depth the relevant social, cultural and ecological factors in specific contexts. Overall, this review lays the foundation for advancing interdisciplinary research on UGS system loyalty and provides important guidance for academic exploration and evidence-based urban planning.

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