

## Bibliometric Analysis of the Concept of Walkability

Özlem Büyüktaş<sup>1\*</sup>, Hatice Günseli Demirkol<sup>2</sup>

<sup>1</sup>Faculty of Architecture and Design, Adana Alparslan Türkeş Science and Technology University, Adana, Turkey

<sup>2</sup>Faculty of Architecture and Design, Eskişehir Technical University, Eskişehir, Turkey

\*corresponding author email: obuyuktas@atu.edu.tr

**Abstract** – Walkability is a concept that enhances urban quality by promoting pedestrian-friendly environments and providing individuals with better living spaces. Recently, it has become a systematic and interdisciplinary research area that is extensively addressed within urban planning and design studies. A review of studies on walkability in national and international literature reveals that, on a national scale, systematic studies examining this concept are limited. This study aims to identify how the concept of walkability, examined through various bibliometric analyses on an international scale, is addressed at a national level. The bibliometric analysis method was chosen to quantitatively examine theses focused on the concept of walkability and to provide an overall view of the research topic. To this end, theses available in the National Thesis Center of the Council of Higher Education (YÖK) were searched using the keywords "walkability," "walkable," "walking," "pedestrian," and "pedestrian movement." This approach enabled the identification of studies directly addressing the concept of walkability, as well as those focusing on the subject even if these terms were not present in the title. The selected theses were then analyzed through bibliometric analysis to detail how the concept of walkability has evolved and been addressed over time on a national scale.

**Keywords** – Walkability, Perceived Walkability, Pedestrian, Bibliometric Analysis, Graduate Theses

### I. INTRODUCTION

In car-centric cities, originating in the United States and gradually spreading to other countries, the adoption of a sedentary lifestyle has led to an increase in physical and mental health issues, bringing discussions on walkability to the forefront. The rise in automobile use, functional transformations, segregation of urban residents, and various environmental degradations have exacerbated health problems. Consequently, the importance of walkability is emphasized as a means to create healthier, safer, and more livable cities [1-3]. With the Industrial Revolution, modernism, and urban theories tailored to accommodate personal vehicles, the significance of pedestrian spaces has diminished [4]. As pedestrian areas have declined, pedestrian networks have deteriorated, restricting free movement for pedestrians. The obstruction of pedestrian experiences on streets and avenues has led to a loss of human scale and transparency, resulting in spaces devoid of public life, functioning merely as service routes [5]. The spread of a sedentary lifestyle has exacerbated health issues and diseases, highlighting the importance of walking once again. Numerous studies are being conducted to enhance walkability and foster the emergence of more walkable cities.

Walking emerges as one of the most fundamental forms of movement in urban spaces. It also plays a significant and defining role in the design of urban environments. Through the act of walking, spaces are defined and shaped [6-7]. This activity enables city dwellers to integrate with their surroundings, become familiar with the environment, and interact with others [8].

The concept of walkability, regarded as an indicator of a pedestrian-friendly environment, enhances the quality of the city and offers individuals a better quality of life [9]. Addressed at various scales and for different purposes,

walkability is a concept in the literature that brings together numerous variables. As such, it is often described as an "umbrella term," understood more comprehensively as a discourse on built environments and urban life. A walkable city is one in which public spaces are designed to enable all individuals, including children, women, and people with disabilities, to move independently, comfortably, safely, and without interruption [3].

In summary, walkability is a highly significant concept for both individuals and cities, from both physical and psychological perspectives [10]. Despite its many critical roles for urban life and city dwellers, a systematic examination of the concept of walkability in the national literature remains limited. Building on this premise, the aim of this study is to conduct a bibliometric analysis of walkability-focused theses on a national scale. In line with this objective, the research questions and thesis evaluation criteria established for this study are presented below:

1. What is the distribution of publication years for graduate theses?
2. What are the types of research conducted in graduate theses?
3. What is the distribution of academic disciplines in which the graduate theses were published?
4. What is the distribution of institutions where the graduate theses were prepared?
5. What is the distribution of keywords used in graduate theses according to context?
6. What is the distribution of types of methods used in graduate theses?

Within the scope of the study, walkability-themed graduate theses registered in the National Thesis Center (YÖKTEZ) database were searched using the keywords "walkability," "walking," "walkable," "pedestrian," and "pedestrian

movement,” in line with the established evaluation criteria and research questions. This search was conducted between 15.10.2024 and 16.10.2024.

## II. MATERIALS AND METHOD

The number of theses obtained from the National Thesis Center (YÖKTEZ) during the search conducted between 15.10.2024 and 16.10.2024 was clarified through the stages of searching, sorting, duplication removal, and finalization (Figure 1). The keywords “walkability,” “walkable,” “walking,” “pedestrian movement,” and “pedestrian” were used to search for theses with these terms appearing specifically in the “Thesis Title” within the National Thesis Center database.

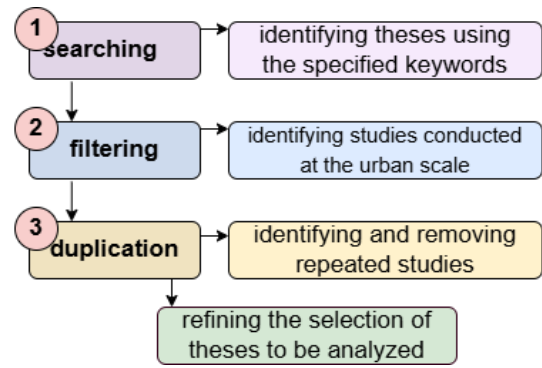


Figure 1. Finalization of Theses to be Analyzed

## III. FINDINGS

A total of 808 theses were obtained through the search conducted with the specified keywords. Theses related to walkability and conducted at the urban scale were filtered out (Table 1).

Table 1. Anahtar Kelimelere Göre Bulunan Tez Sayıları

Keywords	Searching	Filtering		Duplication	
	Total Number of Theses	Walkability and Urban-Focused Studies	Others	Total Number of Duplicate Theses	Final Number of Theses
Pedestrian	320	13	307	35	50
Pedestrian Movement	4	1	3		
Walkability	26	26	0		
Walking	414	2	412		
Walkable	44	43	1		

Theses excluded from the study encompass fields such as physical medicine and rehabilitation, pulmonary diseases, dermatology, physiology, and mechanical engineering. Additionally, topics such as walkability in shopping malls, pedestrian movement detection, pedestrian accessibility, and pedestrian density analysis were also excluded. This study specifically focuses on analyses of walkability at the urban

scale (e.g., streets, avenues). Accordingly, after conducting the keyword search, urban-focused studies on walkability were identified during the filtering stage. In this phase, a total of 86 studies were identified, and after removing duplicate theses, a final set of 50 theses was obtained. In the analysis phase, the types of these theses were first determined (Table 2).

Table 2. Types of Theses

Types of Theses	Number	Percentage
Master Of Thesis	38	%76
PhD	12	%24
Total	50	%100

It has been found that the majority of walkability-focused studies consist of master's theses. The first thesis on walkability was published as a master's thesis in 2006. Analyzing the distribution of graduate theses over the years, the highest number of walkability-focused theses (10) was published in 2022. In 2021, 6 theses were published, and in 2023, this number was 7. The increase in the number of

walkability-focused theses since 2021 can likely be attributed to the impact of the Covid-19 pandemic. During the pandemic, walking and walkability became significant topics of academic research in urban design. This trend highlights that the academic and societal focus on the concept of walkability intensified in 2021, 2022, and 2023 (Figure 2).

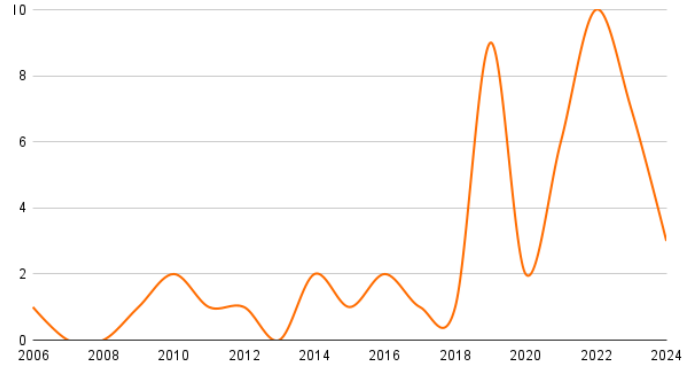


Fig. 2 Distribution of Theses by Year

When examining the relationship between types of theses, it has been observed that the number of master's theses has consistently exceeded that of doctoral theses over the years. However, in 2019 and 2020, there was an increase in doctoral theses, followed by a stabilization in numbers. In recent years,

particularly in 2023 and 2024, a decline has been observed in both doctoral and master's thesis numbers. This trend indicates a recent decrease in academic studies focused on walkability (Figure 3).

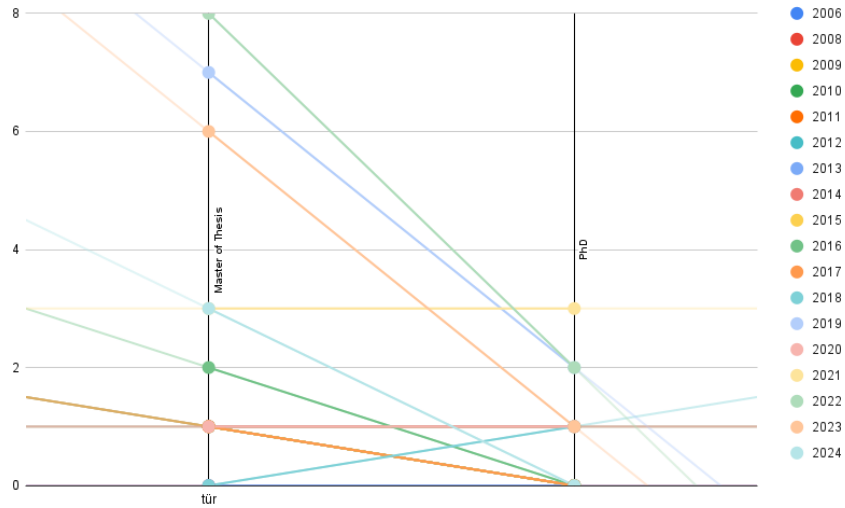


Fig. 3 Distribution of Theses by Type and Year

Examining the distribution of theses by academic disciplines reveals a concentration in city and regional planning, architecture, and urban design departments. However, walkability-focused studies have also been conducted in diverse disciplines such as civil engineering and

sociology. This indicates that walkability is an interdisciplinary topic, addressed as a research subject across various fields of study.

Table 2. Academic Disciplines of Theses

Academic Disciplines	Sayı	Yüzde
Architecture	14	%28
Urban Design	6	%12
City and Regional Planning	17	%34
Physical Education and Sports	3	%6
Interior Architecture	2	%4
Landscape Architecture	3	%6
Informatics	1	%2
Information Technology	1	%2
Geodesy and Geographic Information Technologies	1	%2
Civil Engineering	1	%2
Interdisciplinary	1	%2
Total	50	%100

An examination of the keywords in the published theses revealed that 11 thesis files lacked keywords. In the remaining 40 theses, a total of 192 keywords were identified. These keywords were grouped as “walkability,” “urban design,” “urban space,” “methods and tools,” “participant,” “pedestrian,” and “study area.” Under the walkability category, concepts such as perceived walkability, walkability criteria, and neighborhood walkability highlight the various dimensions through which the topic has been explored. In terms of urban space, it was observed that theses addressed the

concept of walkability across numerous spaces at the urban scale. Methodologically, walkability indices like “walkscore,” pedestrian surveys, and Geographic Information Systems (GIS) were used as tools and methods. Regarding study areas, there was regional diversity in the research, with most studies focusing on domestic sample areas, while some included international locations. Based on the grouping of keywords, it can be said that the concept of walkability encompasses not only physical aspects but also a broad perspective with social, spatial, and behavioral dimensions.

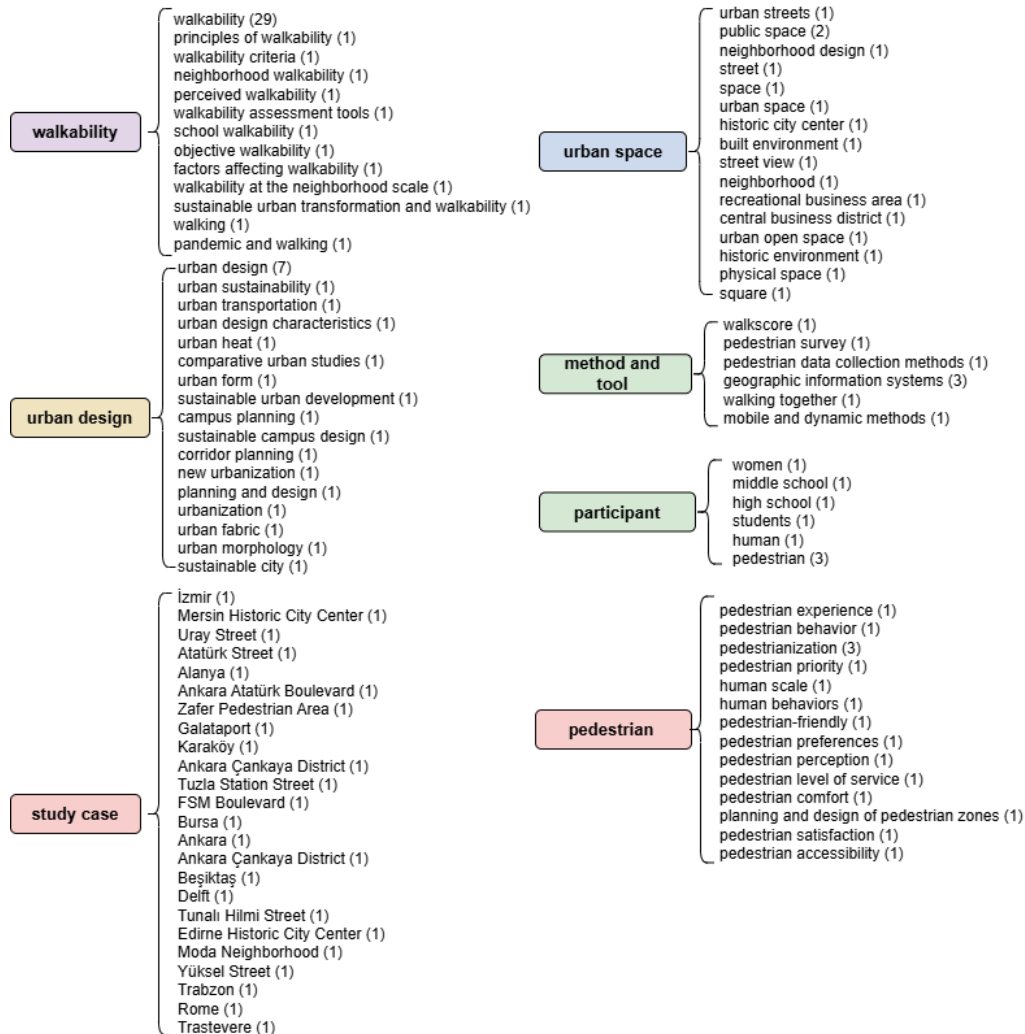


Fig. 4 Analysis of Keywords Used in Theses

In the keyword analysis stage, it was observed that authors also included keywords related to the methods they used in their thesis studies. Accordingly, a more detailed analysis of the methods used in the theses was deemed necessary. A total of 116 different methods were identified. While some theses employed only a single method, others used multiple methods, yielding both comparative and multifaceted results. Studies using multiple methods described their approaches as holistic, involving quantitative and qualitative assessments, as well as subjective and objective evaluations. The methods used in the

theses were grouped into survey, observation, interview, visual analysis, and spatial analysis methods (Figure 5). The combination of these methods provided a more in-depth perspective for the studies and allowed for a variety of evaluations to be conducted.

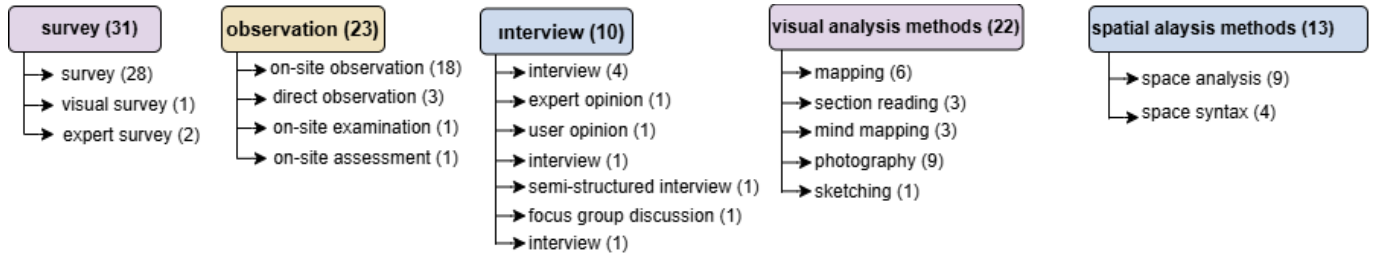


Fig. 5: Grouping of Methods Used in Theses

Among the most frequently used methods in the theses are survey and observation methods. These methods have been applied in various forms by breaking them down into subcategories. In the survey method, subtypes such as user survey, visual survey, and expert survey have been employed. For the observation method, approaches like on-site observation, direct observation, on-site examination, and on-site assessment were preferred. The survey method also included analyses based on walkability indices, such as "Walkscore." Studies utilizing observation methods conducted analyses like pedestrian counting and pedestrian movement observations. In addition to observation methods shown in Figure 5, other techniques, such as case studies, technical tours, walking together, machine learning, and archival research, were also employed. The diversity of these methods enabled multidimensional and in-depth analyses in the research.

#### IV. CONCLUSION

Walkability, a highly significant concept for cities and urban residents, was examined on a national scale in this study, with a total of 50 theses analyzed. During the evaluation, the distribution by year, thesis types, academic disciplines, and analysis of keywords were conducted. The analysis revealed that the majority of theses were master's theses. It is highly valuable for this concept, essential for cities and their residents, to be addressed in doctoral research to contribute to urban development. The distribution of theses over the years showed a notable increase, particularly between 2019 and 2020, indicating that the importance of walkability grew under the extreme conditions brought by the pandemic. However, the recent decline in studies on walkability is a noteworthy trend and warrants consideration. Given the increasing importance of walkable cities, it is crucial to keep research in this field vibrant and active. Examining the sample areas used in these studies, the majority focused on domestic locations; however, there were also comparative and diverse site studies conducted in cities such as Rome and Delft. Studies with international samples at the national level are valuable for understanding how walkability develops in different cities and for setting an example for our country. The discipline-based analysis revealed that the concept of walkability is studied not only in architecture and city and regional planning but also in various fields such as civil engineering, highlighting its wide research scope.

From a methodological perspective, surveys and interviews were the most commonly used methods in the theses. Additionally, some studies employed innovative methods such as machine learning, walking together, and computational urban analysis. This study, which examines the concept of walkability through bibliometric analysis, can serve as a guide for future research in areas such as method selection and study area choice. In conclusion, this concept, which is important for

both the literature and urban development, should be addressed more frequently and diversified, particularly in doctoral research.

#### REFERENCES

- [1] A. Tekel, and N.G. Tamer, *Yürünebilirlik kavramı ve yürünebilirliği etkileyen temel faktörler*. A. Alpan, A. H. Öztürk, & A. Ceylan Kızıltaş Ed. Seksen Sonrası Mekan ve Planlama,, 2016.
- [2] E. Akçam, and E. K. Kutay, "Sosyo-demografik yapı ve fiziksel çevre özelliklerinin yürünebilirlik algısı üzerine etkisi" *Düzce Üniversitesi Bilim ve Teknoloji Dergisi*, 6(4), 1364-1376. 2018.
- [3] H. Gerçek, "Yürümek ve yürünebilir kent." *Türkiye Sağlıklı Kentler Birliği, Kentli Dergisi*, 10 (34), 49-51. 2019.
- [4] R. Ghorbani, and M. Jam Kasra. "Sidewalk development Movement, A New Approach to the Revival of Urban Centers, case Study: Tarbiat sidewalk Tabriz" *Journal of Urban and Regional Studies and Research*, 2 (6), 59 -62. 2010.
- [5] M. Southworth, "Designing the walkable city." *Journal of Urban Planning and Development*, 131 (4), 246-257. 2005.
- [6] L. A. Cemali, "Kentsel kamusal mekanda yaya hareketi: Bağdat Caddesi örneği," Master Of Thesis. Istanbul Technical University, Institute of Science. 2011.
- [7] S. Karımı, "Yürünebilirlik Düzeyini Etkileyen Fiziksel Özelliklerin Bulvar Ölçeğinde İncelenmesi: Bursa Fsm Bulvarı Örneği," Master Of Thesis. Bursa Technical University, Graduate Education Institute. 2022.
- [8] Z. Y. Halu,. "Kentsel Mekan Olarak Caddelerin Mekansal Karakterinin Yürünebilirlik Bağlamında İrdelenmesi Bağdat Caddesi Örneği." Doctoral dissertation, İstanbul Technical University. Institute of Science. 2010.
- [9] H. Wang, and Y. Yang, "Neighbourhood walkability: A review and bibliometric analysis," *Cities*. 93. 43–61.2019.
- [10] Ö. Büyüktaş, S. Oran, H. G. Demirkol. (2024). "Yürünebilirlik Algısının Derin Öğrenme ve Mekân Dizimi Yöntemleri ile Değerlendirilmesi: Adana Merkez Park Örneği." *MSTAS2024*. 712-738.