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Article

Revisiting the relationship between university towns and urbanization based on bibliometric analysis

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Abstract: The scientific discourse on university towns (UT) has progressed for a long time, with a surge of interest in recent years. However, a global overview of the research conducted on this topic have yet to exist. This paper aims to re-examine the relationship between UT and urbanization in literature. Built environment and people are often the most talked aspects in UT literatures. The variety of definitions remains largely uncharted. Policies behind UT development are also rarely studied. This article used an R studio-based bibliometric literature review to synthesize findings from various scientific literature. Keywords related to university towns and urban were used in digital search engines to examine and analyse the literature. Results revealed a significant gap in scientific research on critical theoretical concepts that planners can use as a guide in creating, formulating, and evaluating UT, especially in developing countries. This study promotes simplification of existing literature by examining the impact of UT on the stakeholders involved.

Keywords: city planning; human; policy; sustainability; university sector

1. Introduction

Cities and universities have been actively engaged in creating new economic structures. However, their socio-spatial relationship, potential impact, and diversification of relationships on both sides have not been fully understood (Addie et al., 2015). Universities play an essential role in urban development by contributing to knowledge spaces, strengthening local community relations, and shaping city identity (Benneworth et al., 2010; Lazzeroni and Piccaluga, 2015). In addition, universities are recognized as 'creative industries', an indicator of socio-economically sustainable cities. (Kurtulus and Griffiths, 2017). Universities act as suppliers of educated human resources, drivers of urban growth, and creators of culture and character of the urban community (Gumprecht, 2003; Sagan and Vinokurova, 2021; Yalcintan and Thornley, 2007).

Urban universities are often considered as centers of knowledge and innovation. Many cities rely on their campuses to address environmental, socio-spatial, economic, social, and societal challenges (den Heijer et al., 2012; Mohammed and Ukai, 2023, 2022, 2021). The presence of universities significantly impacts urban development in medium-sized cities (Lazzeroni and Piccaluga, 2015). Strengthening university-city relationships is encouraged to benefit cities, as universities can maximize the capability of their respective cities for the local community and the entire nation (Mohammed et al., 2022a). As centers of 'enlightenment,' universities bear the burden

of initiating and sustaining dialogue between university representatives and local community stakeholders (Salim, 2008). However, the interrelationship between universities and cities (and their people) is complex, overlapping, interconnected, and diverse (Mohammed et al., 2022a). It is crucial to understand universities based on their contextual differences, as they exhibit different impacts on their respective cities in terms of their type, size, and location (Gumprecht, 2007; Mohammed et al., 2022a)

Easy campus access and proximity to urban communities can intentionally or unintentionally encourage or discourage urbanization (Mohammed and Ukai, 2021). The physical relationship between a university and the city extends beyond campus accessibility and significantly impacts the social lives of students (Mohammed et al., 2022a). Campuses located in easily accessible urban environments offers many benefits to students, such as diverse housing preferences transportation options (Mohammed and Ukai, 2023). The interconnectedness of on- and off-campus facilities requires an integrated concept for university towns (UT) planning.

The development of successful UTs is increasingly dependent on collaboration between city-regional authorities, knowledge institutions, and businesses (den Heijer et al., 2012; Kurtulus and Griffiths, 2017). Universities that prioritize property development can create creative and competitive new urban spaces and strengthen the position of universities and cities in the global economy (den Heijer et al., 2012; Kurtulus and Griffiths, 2017; Mohammed et al., 2022a, 2022b; Mohammed and Ukai, 2022). Establishing a campus as a hub of knowledge is a task for many stakeholders inside and outside the university—meaning that it requires strategic, financial, functional and physical integration (den Heijer et al., 2012).

The positive and negative impacts of urban development associated with the presence of campuses are increasingly evident in the region and surrounding communities. In the future, universities are expected to play an even greater role in regional dynamics. Studies on UT are still dominated in developed countries, particularly in Europe and America (Gumprecht, 2003; Rousmaniere, 2021; Shatilo, 2021), while research in developing countries are limited. Therefore, the implementation and management of UT policies in some countries can serve as valuable lessons for countries that have yet to adopt such policies.

This paper aims to explore the development of UT and its relationship with urbanization. The topic has been systematically simplified based on previous research. Furthermore, this review describes the characterization of UT in developing and developed countries and simplifies UT concept on urbanization, UT types, functions, and impacts. Comparative study on the relationship between UTs and urbanization will enrich studies on city planning. Increased association between UT and local communities and policies also amplifies the attention that policy makers should allocate to that region.

2. Theoretical background

2.1. The various definitions of university town

University, college, and campus town are interchangeable terms often used in various papers (**Table 1**). The presence of one or more universities is an important asset not only for the development and evolution of knowledge spaces but also for

urban development as a whole by leaving a tangible and intangible 'footprint,' strengthening the relationship between academia and local communities and contributing to the identity of knowledge cities (Lazzeroni and Piccaluga, 2015).

Table 1. Definition of university town, campus town, and college town.

No	Definition	Countries	Source
1	An area where a large proportion of the population is university students. In the United States, a city with more than 25% of its residents enrolled in a university is considered a university town. A city in China with a population between 250,000 and one million, where at least 10% of them are university students	United States, China	(Shao, 2015; Yong-qian, 2002)
2	A space where the university is central, featuring multi-scale divisions that impact social dynamics, resource distribution, travel challenges, seasonal variations, and land use. Fragmented lifes for those on low incomes.	China	(Shen, 2022; Ye et al., 2014; Ye and Zhuang, 2023)
3	Higher education cities play an essential role in attracting and retaining international students, which benefits both the city and the educational institution.	China	(Kim and Cocks, 2021)
4	A place where cities and universities work together, overcoming conflicts and debates arising from different visions of universities, positively impacting student populations, local communities, human capital, and land price appreciation.	China	(Rewers, 2016; Wang and Tang, 2020)
5	Sub-cities developed to accommodate the growth of higher education institutions, manage the growing population of students and scientific workers, and contribute to broader socio-economic development.	China, Germany	(Mei and Symaco, 2021; Shatilo, 2021)
6	A product of land-centered speculative urbanism, where local governments develop areas to profit from land use, housing, and the employment of students and teachers.	China	(Li et al., 2014)
7	Integrating universities into urban planning to foster cultural and creative industries, promoting collaboration between academia and the broader local cultural/community context for sustainable development.	China	(Hasdell, n.d.; Rousmaniere, 2021; Ruoppila and Zhao, 2017)
8	Spatially isolated areas where students generally live and study but often travel to the city center for various activities due to limited commercial facilities and public services, especially transport.	Portugal, China	(Ferreira and Batey, 2010; Qin et al., 2023; Zhao et al., 2023)
9	A metaphorical concept where the relationship between the university and the urban environment influences city policy and urban regeneration. Symbolizes the close relationship between the university and the urban environment, influencing the design of public spaces for an inclusive, sustainable, and resilient future city.	Italia	(Marta et al., 2022)
10	University city refers to the city where university graduates choose to settle after graduation, which has an impact on the geography-social, labor dynamics, city marketing strategy, and attracting human resources for development.	US	(Brańka, 2013; Lafer, 2003)
11	Cities where universities are essential in contributing to sustainable urban development through collaboration with local governments and businesses.	Poland	(Stanowicka, 2021)
12	A unique urban area characterized by the dominant presence of higher education institutions. College towns are unique urban places with a highly educated workforce, cosmopolitan populations, and dominant higher education institutions, often characterized by college campuses and college-oriented shopping districts. UT influences its youth population, local culture, demographics, socio-economic dynamics, and the symbiotic relationship between the university and the surrounding community.	US	(Gumprecht, 2007, 2003)

2.2. The role of universities in urban development

'City-University' ecosystems contribute to regional and urban development-enhancing the image and attractiveness of cities (Daneykin et al., 2021). University towns are often dominated by business and government institutions. Universities provide educational and entertainment services, while cities provide economic goods and political leadership (Miller, 1963). In China, university towns have contributed towards the reformation and development of higher education although it requires

harmonious development, program planning, system innovation, and scientific management principles for successful implementation (Gu and Wang, 2003). Effective economy and societal development can be achieved by uniting various resources, though university cities must address external and adverse effects to ensure sustainable development (Ting, 2004). Significant local growth in multiple sectors were observed in university towns in India. Although no prosperous university towns exist, they have positively impacted the population and the development of public facilities (Choyimanikandiyil, 2019).

New campus locations indicate the spread of urbanization across Japanese cities (Mohammed et al., 2022b; Mohammed and Ukai, 2021). New urban areas formation in suburbs surrounding university campuses provide an opportunity to attract new activities as campuses can influence, manage, and control urban growth (Alzouby and Talalqa, 2023; Haar, 2011; Yerli and Ozdede, 2017). Perry and Wiewel (2015) characterize universities as 'developers'.

Positive impacts of the university on the surrounding environment of the city will enhance the institutional image of the campus by foestering human-centered communities, attracting more students more research grants, contracts, research, and charitable donations (Bromley and Kent, 2006; Tiyarattanachai and Hollmann, 2016). As microcosms of the cityscape, campuses provide many social, cultural, economic (business), health, urban morphological, and institutional benefits to urban residents and their surroundings (Benneworth et al., 2010; Brunner et al., 2012; den Heijer et al., 2012; Marrone et al., 2018; Wei, 2012; Yerli and Ozdede, 2017; Zaki et al., 2020). Moreover, the city's image as an educational-cultural center is enhanced by the diverse ethnicities and backgrounds of the students who resides within (Bromley and Kent, 2006).

Specific impacts of campuses on cities is the formation of a learning communities, improved quality of life and mental health, enhanced security, campus sustainability, environmentally friendly (green aspects), and the preservation of fauna diversity (birds), native plants, and urban forests (Bacevice and Dunkley, 2018; Cannas da Silva and Heitor, 2017; Chen et al., 2019; Genta et al., 2022; Ha and Kim, 2021; Hajrasouliha, 2017; Hill and Woodward, 2013; Kiers et al., 2023; Lee and Shepley, 2020; Mohammed et al., 2022a; Reidy et al., 2015; Roman et al., 2017; Tiyarattanachai and Hollmann, 2016; Wang et al., 2021; Wells et al., 2018; Zhang et al., 2021). Various campus-city functional relationships include: residential, retail and leisure, academic, infrastructure, and business (Mohammed et al., 2022a; Mohammed and Ukai, 2022).

3. Research approach

This research uses an exploratory literature review approach (Asmussen and Møller, 2019). A systematic literature search was initially conducted to find papers relevant to the topic, followed by a thematic analysis of the data obtained. Other qualitative approaches were also utilized (explanatory, iterative, and hypothetical).

3.1. Selection and evaluation of studies

This review includes a systematic literature search through Scopus internet database, conducted on 10th August 2024 at 13.28 WIB using the web address

(https://www.scopus.com/search/form.uri?display=basic#basic). The first step was identifying keywords based on the topic, i.e., 'university town' OR 'college town' OR 'campus town' AND urban. After that, data was exported into Bib, RIS, and csv formats. 224 documents were obtained from the search. No time and country restrictions were imposed during the search to allow periodic observation of various locations. Additional sources were found by searching general literature on UT and urbanization relationship.

3.2. Analysis, synthesis, and presentation of findings

Thematic analysis (TA) is a common data analysis strategy used across all qualitative designs and is central to this methodological review (Braun and Clarke, 2023, 2022, 2021). TA is about what is said rather than how it is said by trying to reduce the amount of data to a few themes that summarise its content (Christodoulou, 2024). Additionally, TA provides a systematic element for data analysis and is considered the most appropriate tool for any research that seeks to find common threads using interpretation (Alhojailan and Ibrahim, 2012; Byrne, 2022). Thus, it is suitable for this research. TA is a process of active reflexivity in which the researcher's subjective experience is central to understanding the data. (Braun and Clarke, 2023; Kiger and Varpio, 2020). It emphasizes identifying, analyzing, and interpreting qualitative data patterns (Braun and Clarke, 2021). This qualitative analysis technique is often used in health, pharmaceutical, and medicinal research. Still, it has now been extended to other topics, such as science, which is the focus of this paper.

TA was used to categorize articles linking UT to urbanisation from different impacts and services viewpoints. The analysis used inductive coding, which extracted 'hidden' meanings and understood researchers' views on university town/campus town/college town. Increasing urbanization processes around the campus influences the social, economic, physical and institutional dynamics of UT. These themes were developed iteratively using Scopus and Google Scholar. Scopus was the primary reliable source, while Google Scholar provided enrichment from various perspectives. The iterative literature process strengthened or enriched the results and discussions. Complete data provision and data analysis stages are presented in **Figure 1.**

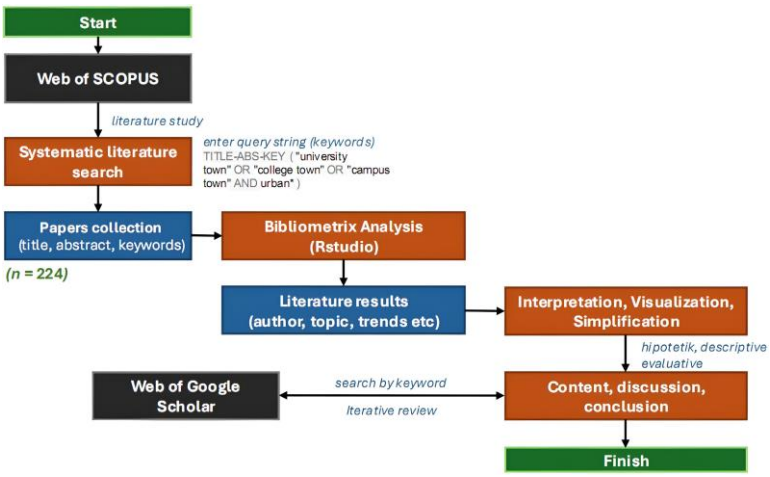

Figure 1. Research workflow.

4. Results: Literature review findings

4.1. Profile of article and source analysis

190 articles/reviews, 20 books/book chapters, 13 conference papers, and one editorial were found from Scopus. **Figure 2** shows the number of research articles published by each journal based on their relevance to UT and urban themes. The data lists the names of the most published journals, and the number of articles published with a bar chart. Darker color indicates high quantity and relevance of research themes and number of articles published by the journal. Sustainability (MDPI) is the most used journal, with ten articles published. This is caused by the relevancy of the theme discussed as well as the correlation between university town and sustainable regional development. The second most used journal is Environment and Planning, with four articles. This also shows that research on UT is widespread in various journals with diverse topics.

Journal calculation addresses aspects beyond quantity and relevance (Rusydiana et al., 2023). This study also focuses on the impact of journals that publish papers on UT and urban themes by referring to the journal's *h*-index, depicted in a bar graph. In addition to showing the *h*-index value obtained, the diagram below also illustrates the impact generated by the journal through the colors displayed. Darker color denotes a higher impact of the journal. The *h*-index of the journals in this study ranges from 0.0 to 4.0.

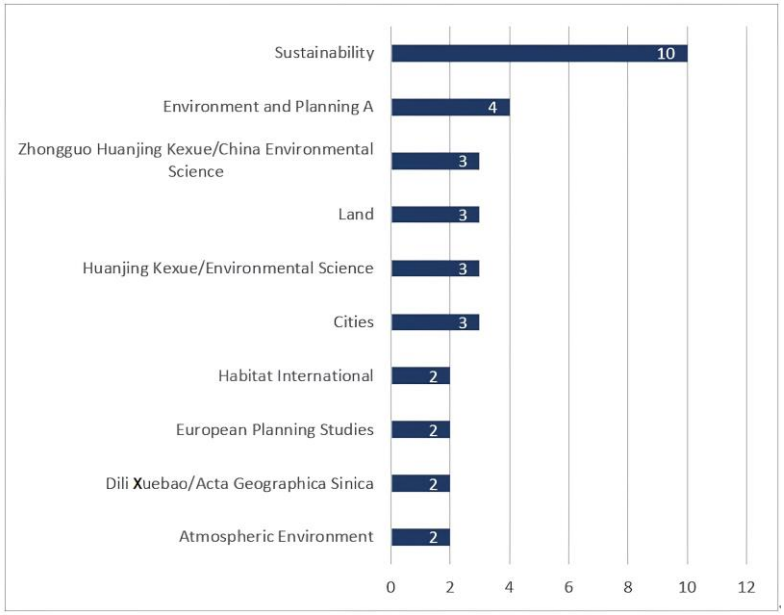

Figure 2. Most relevant sources.

Figure 3 shows that the journals Environment and Planning as well as Sustainability are in the top position with an *h*-index of 4.0, indicated by the dark color. Furthermore, Cities is in the third position with the same *h*-index of 3.0. There are five journals with an *h*-index of 2.0, marked with a lighter color in the diagram-indicating a lower impact of the journal.

Figure 3. Source impact.

This study also discusses the development of journals that address the topics UT and urban themes. The curve in **Figure 4** shows the annual occurrence of each journal from 1968 to 2022. This creates an understanding of the trends on UT and urban publications.

The curve illustrates that research on UT and urban themes tends to fluctuate. From the curve, it can also be seen that sustainability journals are at their highest publishing peak, starting around 2017 to 2022.

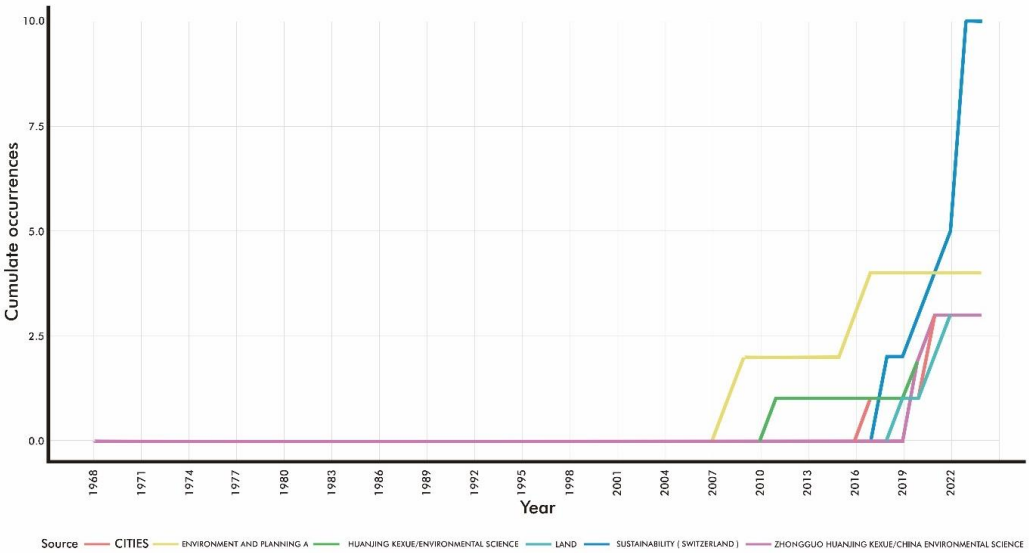

Figure 4. Source growth.

4.2. Authors analysis

Author level analysis shows, 1) the most relevant authors and some bibliometric indicators, 2) their publications over time, and 3) most cited authors and journals.

Author productivity is shown from individual and fractional production perspectives, indicating that a document is developed by several authors, each represented by a fraction of authorship (Rodríguez-Soler et al., 2020).

Figure 5 shows the number of research publications from each author or researcher related to university town, college town, or campus town. The list of authors named above are the ten highest-ranked authors with the most articles in international journals and are most relevant to the UT research theme. The graph shows the number of article documents published in international journals from 0 to 5 papers. The number of documents on UT that have been published the most and the most relevant is five documents. Some authors who have published 5 articles in international journals include Gumprecht B, Huang XF, and Wang Y. These three authors are the top 3 authors who produce the most documents and are most relevant to the UT research theme. In addition to these three authors, several others published 4 article documents with the same theme, including Cao LM, Chen Y, He LY, Hubbard P, Li X, Ren Y, and Snowden AJ.

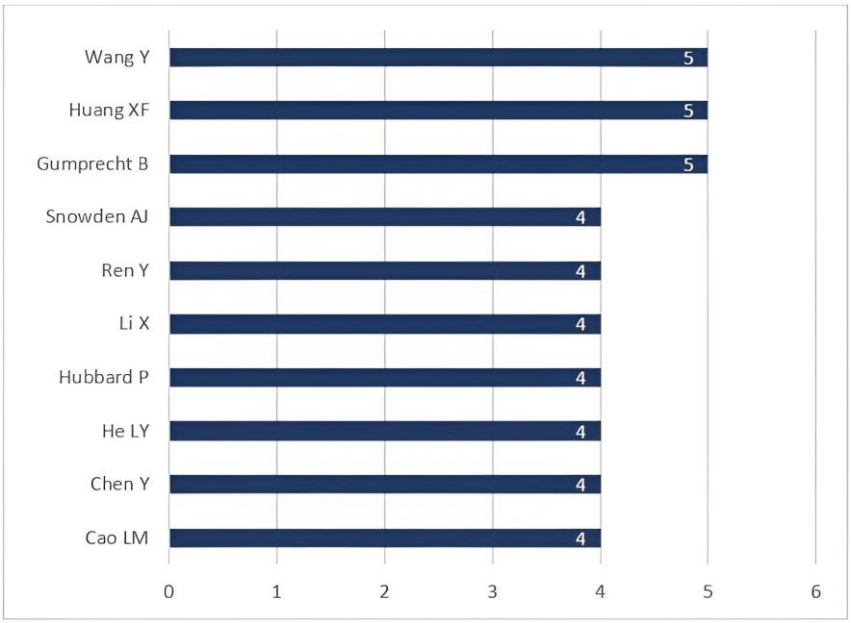

Figure 5. Most relevant authors.

Figure 6 shows the productivity of the top ten authors on UT from 2003 to 2024. The length of the research period reflects the productivity of each author in publishing their research publications, indicated by the size of the red line. The circle on the red line indicates the number of published articles yearly. The authors who have published the most extended research themes on UTs and have the longest track record are Wang Y from 2012 to 2024, Huang XF from 2014 to 2024, and He LY from 2014 to 2024. The longest track record on research relevant to university towns is 12 years by Wang Y. Wang Y's paper in 2020 discusses examining the local effects of university clusters by capitalizing on the university town (UT) development boom in China (Wang and Tang, 2020).

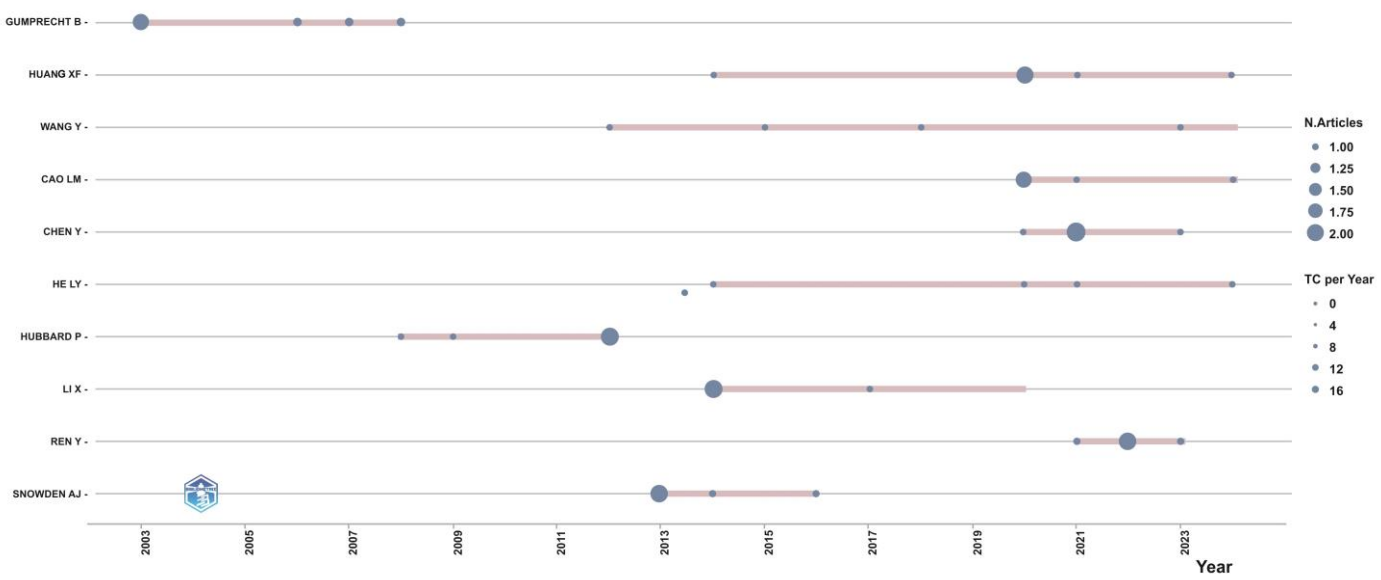

Figure 6. Top author's production over time.

Figure 7 shows the authors and articles in international journals that have been most cited by other researchers. The article written by Wu Y in 2006 and published in the Journal of Urban Development received the highest citation count at 241 citations in the UT urban-related research theme group. Wu Y has a research concentration on land use policy, construction management, urbanization and sustainable development.

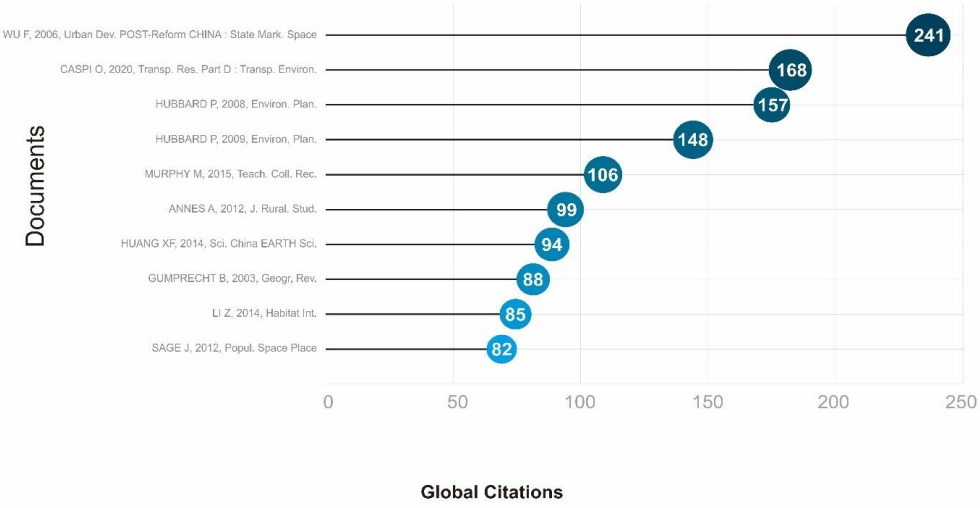

Figure 7. Most cited document.

4.3. Document analysis

In word analysis, the most relevant words are taken from the keywords in each document. The most relevant words related to UT, shown in **Figure 8**, are mentioned between 0 to 41 times. The analysis shows 25 most relevant words to university towns. Countries like China and the United States are the most mentioned in publications, 41 times and 31 times respectively. In addition, urban area is amongst the top 3 most relevant words that are mentioned. The word urban area appears 28 times.

This bibliometric analysis also presents a word cloud to describe some words relevant to research topic of university town. The resulting word cloud is a collection of words that often appear in the search of UT-related articles, with keywords from the titles of the articles searched and collected. Word clouds are displayed in various font sizes and colors with random placement (Maliha, 2024). Different font sizes in word cloud show the diversity of the words generated during the search (Patil et al., 2023). The larger font size is in the center of the word cloud, which illustrates the dominance and relevancy of the words to the research. Based on **Figure 9**, the six most dominant words related to the university town include China, United States, urban area, human, student, and urban population. This study shows that research on the university sector is dominantly studied in two countries, namely China and the United States. Issues related to the university sector that researchers most often discuss are issues related to urban areas, urban populations, humans, and students.

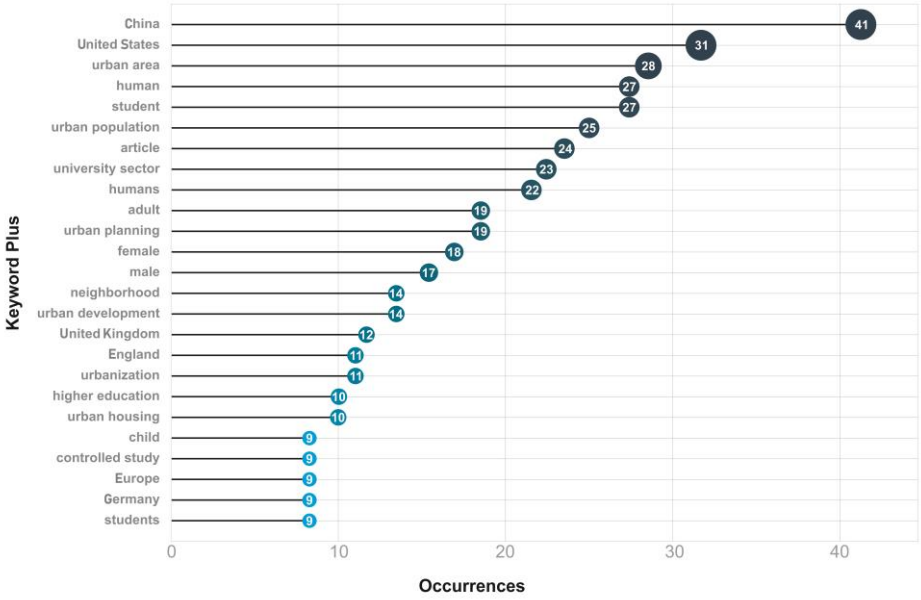

Figure 8. Most relevant words.

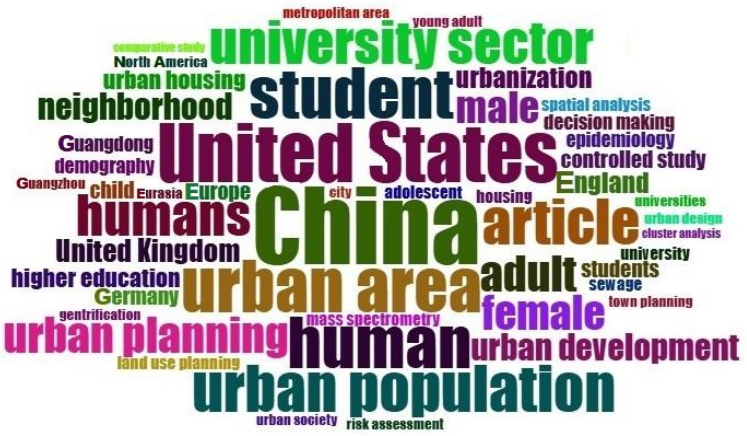

Figure 9. Word cloud.

Trending topics related to the university sector are also one of the essential outputs in this study. The resulting trending topics are analyzed based on the titles of articles related to the university related research. It presents how each terminology of university related research has evolved. The most and least used terminology in a particular year is also presented in this trending topic analysis, as indicated by the size of the circle presented. **Figure 10** illustrates that research on the university sector has been ongoing since 1983 or about 40 years ago. UT research continues to be a trending topic and remains an area of focus for researchers. Employment is the longest trending topic related to university sector, which started from 1983 to 2017. The influence and issues of university town development on employment became a vital topic studied by researchers during this period. In the last ten years, the most relevant topics to university towns are: urban, including urban areas, housing, urban planning, urban population, and urban development. Additionally, humans and students have also been trending topics in the last ten years. Existing topics relevant to the university town and currently trending include sewage, sanitation, and water treatment.

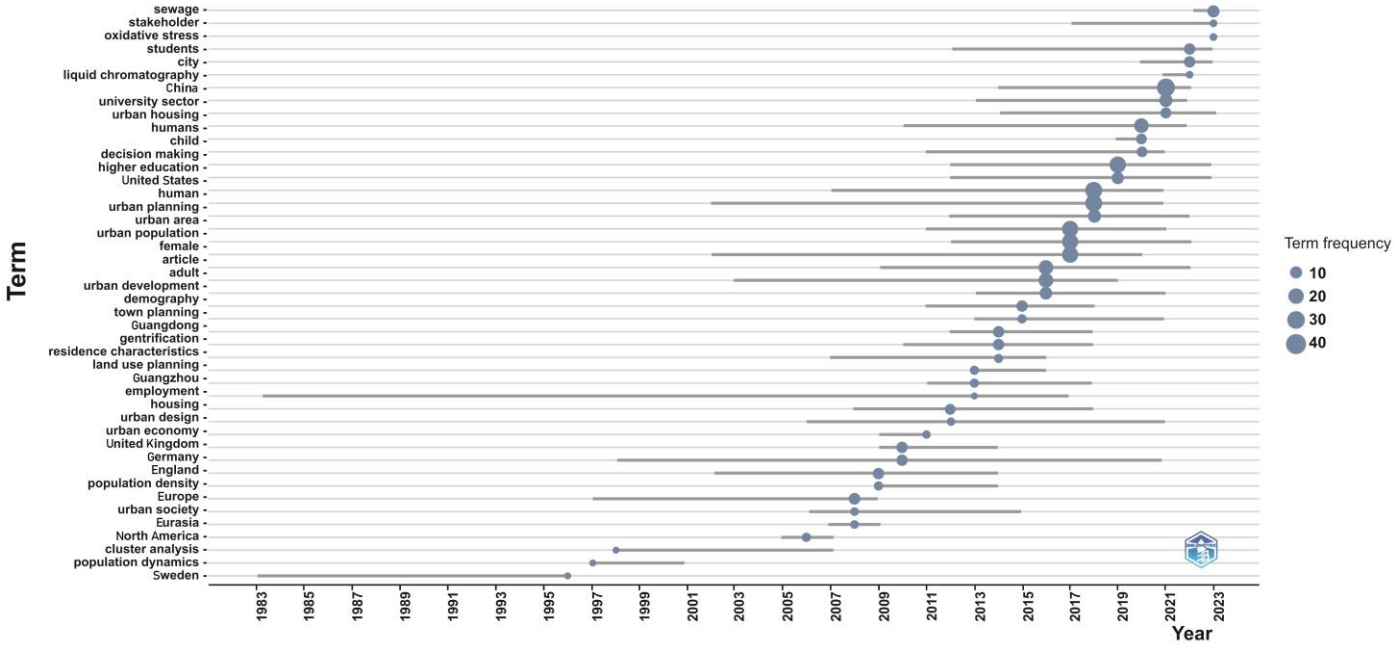

Figure 10. Trending topics.

The co-occurrence network, shown in **Figure 11**, displays the words related to the keywords of UT and urban-based publications in clusters by considering the relationship between one word and another. Some keywords that frequently appear in research on UT can be divided into two clusters, namely:

Cluster 1 (region/country, university sector) consists of keywords: urban planning, China, United States, urban design, spatial analysis, urban development, higher education, land use planning, urban society, gentrification.

Cluster 2 (human) contains the following keywords: adult, female, male, young adult, demography, student, epidemiology, child, sewage, urban population, sewage.

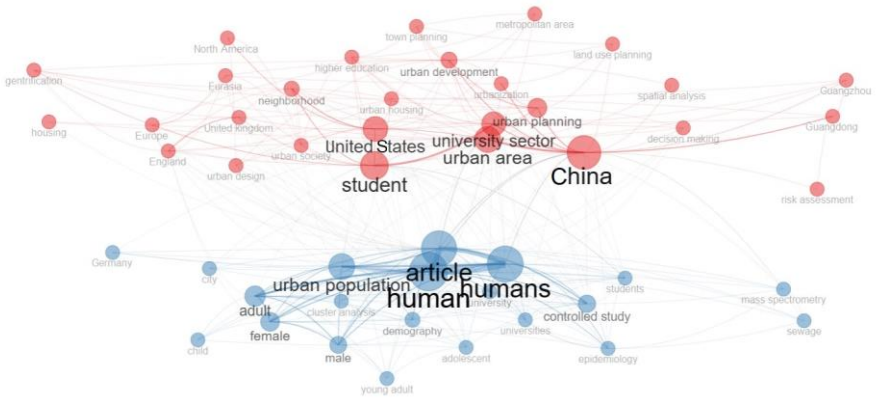

Figure 11. Co-occurrence network.

Thematic mapping, given in **Figure 12**, is analysed based on density and centrality. The figures show four quadrants. These results were obtained from a semi-automated algorithm by reviewing the titles of all the references that were the object of the study. The top left quadrant is a highly developed and isolated theme. The quadrant shows specific and rarely researched themes but has high development, indicated by high density but low centrality. The themes in this quadrant are behavior, approach, center, families, innovation, learning, and islandisation.

On the other hand, the bottom left quadrant represents emerging or declining themes, this quadrant shows themes that have been used for a long time but are experiencing an increasing or decreasing trend with low density and centrality. The themes in this quadrant are moving, geographies, households, birds, campus, covid. Looking at the development of UT sub-themes in recent years, the trend of words in this quadrant has increased. While the top right quadrant is the motor or driving theme characterized by high density and centrality. This theme needs to be developed and is essential for further research. The themes in this quadrant are characteristics, health, planning transit, atmosphere, and service. Finally, the primary and transverse themes in the lower right quadrant are characterized by high centrality but low density. These themes are essential to include in the research as they are commonly used topics. The themes in this quadrant are urban study, housing, studentification, design, evaluation, impact, neighborhood, sustainability, mobility, international, and education.

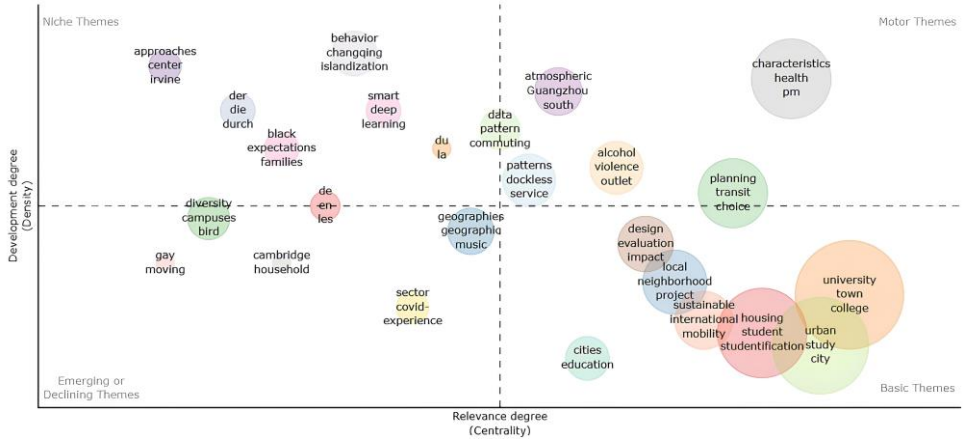

Figure 12. Thematic map.

The themes used in the papers, illustrated in **Figure 13**, are constantly changing, especially between recently published documents and long published papers. The figure shows the evolution, analyzed by themes related to UT. Themes are depicted as rectangles and large size indicate the usage frequency. Although the theme of this study was UT, the data obtained showed that several sub-themes were widely used.

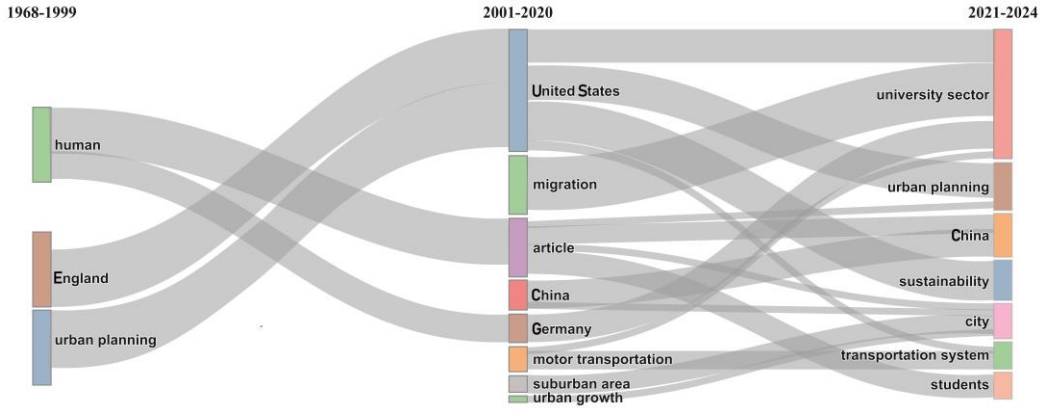

Figure 13. Thematic evolution.

Thematic evolution is divided into three sections. The left section shows some of the themes that were widely used from 1968 to 1999, and three themes are listed with different sizes depending on the quantity of use of these themes. The theme 'human' comes first, followed by 'England' and 'urban planning'. The second or middle section shows the most frequently used themes between 2001 and 2020. There are eight themes, of which three are evolutions of themes that appeared in the previous period, namely the themes 'United States', 'article,' and 'Germany'. Extensions of some of the themes are shown by this colorful plot. The last or right part shows the most used themes from 2021 to 2024. There are seven themes: university sector, urban planning, China, sustainability, city, transportation system, and student. UT description introduced by American and European (German) countries contribute to new themes. Meanwhile, sustainability at UT is developed by the United States.

5. Discussion

5.1. Gap substantial

The concept of university towns has become increasingly significant, particularly regarding urbanization. This concept is often found in America and China. These cities are designed to house and employ large numbers of students and faculty but also present unique challenges and opportunities in terms of spatial, social, and economic dynamics. This synthesis explores various aspects of the university city divide, focusing on spatial segregation, community engagement, and underlying motivations for developing these cities. Each element of the university city gap is hypothetically analyzed to illustrate the development goals of growth centers, sustainability, and resilience (**Table 2**).

University towns present a complex interplay of spatial, social, and economic factors (Mei and Symaco, 2021; Mohammed and Ukai, 2023). It requires adaptability

(resilience) in various interactions between these factors. While cities offer opportunities for community engagement and regional development, they highlight significant disparities in resource distribution and social integration. Addressing these gaps requires a comprehensive approach that considers the needs of all stakeholders, including students, faculty, low-income communities, and local communities.

Table 2. The substance gaps of UT from various literature and hypothetical target levels for each goal.

Gap	Description	Sources	Goal		
			GC	SU	RE
Spatial and Social Segregation	University towns often show significant spatial segregation, such as differences between old and new campuses and between the university and the city center. These separations lead to differentiation of social space and alienation among different classes, with resources and rights unevenly distributed.	(Ehlenz and Mawhorter, 2022; Foste, 2021; Mei and Symaco, 2021; Mohammed et al., 2022a; Ye et al., 2014)	High	Low	Medium
Community engagement and services	Effective community engagement can improve the relationship between cities and communities. Universities in these cities are essential to community engagement, providing sociocultural and intellectual community services and contributing to regional innovation and human capital development.	(Bruning et al., 2006; Gumprecht, 2007; Mei and Symaco, 2021; Miller, 1963)	Low	Medium	High
Economic and Political Motivations	The rapid development of university towns is primarily driven by land-centered speculative urbanism (China). Local governments use these projects to generate profits, often at the expense of university communities' social and spatial needs. Universities are usually the largest employers in university towns, providing significant economic benefits and employment opportunities to local communities.	(Li et al., 2014; Mei and Symaco, 2021; Miller, 1963; Ruoppila and Zhao, 2017)	Low	Medium	High
Environment and Biodiversity	The relationship between humans and the biosphere within the framework of UT. On new campuses, there is a decline in the quality of the biosphere and biodiversity in and around the campus. However, some universities are concerned about animal sustainability through wildlife-friendly campuses.	(Colding and Barthel, 2017; Simon et al., 2020; Zhang et al., 2021)	Low	High	Medium
Collaborative development and urban planning	The development of university towns is often driven by local governments and universities working together so they can function as public spaces. This collaboration can result in significant urban growth and expansion. Universities usually act as proactive stakeholders in the planning process.	(Gumprecht, 2007; Mohammed et al., 2022a; Ruoppila and Zhao, 2017; Shen, 2022)	High	Medium	Low

Sources: hypothesized and labeled by the authors.
Note: GC=Growth center, SU=sustainability, RE= resiliency.
Goal for each to growth center or sustainability or resiliency

Generally, the neighborhood around the campus is characterized by a busy and dense urban landscape (Freestone et al., 2021; Gu et al., 2019). This situation has led to different opinions about the atmosphere of the campus neighborhood. Some researchers consider the development of an increasingly crowded campus environment to be a natural process, and sometimes it is indeed a government strategy for the development of previously quiet areas (Coulson et al., 2014; O'Mara, 2012; Rérat, 2021; Rousmaniere, 2021; Yue et al., 2013). However, some researchers argue differently to maintain the isolated situation of the campus to have a calming and concentrating effect (Sun et al., 2021; Yaylali-Yildiz et al., 2014). The spirit of preserving natural conditions for sustainability fueled these conservatory-minded researchers.

The university's relationship with its city is considered strategic to achieve the ambitions and visions targeted by both (Mohammed et al., 2022a). Campuses can be regarded as indirect agents that contribute to physical and functional changes of the city (Mohammed and Ukai, 2022; Yue et al., 2013). Urban sprawl may also result from deliberate planning to encourage low-density industrial investment and large-scale projects such as university relocations (Yue et al., 2013).

In addition, UT strains the transport system on and around campus, which can be seen in the high demand for parking, traffic congestion, and accidents (Mohammed et al., 2022a). They pressure universities and transport planning agencies to develop transport-related programs, practices, and policies to address these issues. The growing concentration of students moving in and out of the campus area illustrates the dynamism of studentification that will continue to affect many areas of society.

Despite the centrality and implicity of students in studentification research, most current debates about universities and urban change often ignore student voices (Sotomayor et al., 2022). The public perceives university students as middle class, ignoring their diverse identities and experiences. So far, existing literature has only focused on sustainability in the higher education sector, and little of it considers the incorporation of universities with green issues (Fissi et al., 2021). Universities can play an essential role in building a more sustainable society. Societal problems stemming from economic, institutional, and environmental activities can also be reduced by universities. This is done by promoting sustainable practices in curricula and research programs. More precisely, a 'green university' applies sustainability in all its activities: institutional framework, campus operations, teaching, research, community engagement, accountability, and reporting.

5.2. Gaps by country type

A keyword search of documents related to UT and urban themes yielded 45 words. The words were then searched and mapped by country. Afterwards, the countries are classified into three categories: developed, developing, and China. China is separated because it is not only one of the centers of UT-related research, but different countries view China differently. Some literature mentions China as a developing country, but others believe that China is a developed country (Team, 2024). According to the World Bank (2024), China is an upper-middle-income country. In addition, the massive development of UT in China will provide a comprehensive picture of its development dynamics.

Developed countries include the United States, United Kingdom, Sweden, Germany, Poland, Portugal, and Estonia, while developing countries include Nigeria and India. In addition, there is China, which is not included in the former classifications as it provides an information gap that is different from other countries. Based on the distribution of these papers, research related to university towns is dominant in developed countries and China. In contrast, there is a lack of information on the dynamics of UT characteristics in developing countries.

The words 'human', 'male', and 'female' are topics discussed in all countries when discussing UT (**Figure 14**). It was found that the human aspect is more consistently discussed in UT papers than the building aspect of the campus itself. This

situation shows that the campus (university) is just a building or, like any other facility object, not always discussed in UT studies. Human and gender aspects are essential aspects that need to be addressed, both when and where it is located.

Figure 14. The UT gap by country.

Source: Illustrated by the author.

Topics covered in UT papers in developed countries and China are more related to health issues, urban development, and student dynamics-making it more diverse. Meanwhile, UT papers in developing countries discuss middle age and socio-economic factors that are rarely addressed in other papers.

The university towns in the US were established from land grant projects located far away from the city. In most countries, most universities are in major cities/capitals. Most major universities in the US were founded more than 75 years ago. Hence, the location of their main campuses is closely related to the distribution and concentration of population in the past compared to the current population distribution (Bromley and Kent, 2006). Therefore, relocating or adding campuses is often done because of overloaded neighborhoods. Universities need cities to fulfill the capacity students and staff needed for services and facilities (Mohammed and Ukai, 2022).

5.3. Theoretical implications

This paper presents bibliometric results on UT and visualizes the mapping of trends in published scientific literature. In the context of UT, urban development is essential in ensuring the continuity of the campus's existence and the surrounding area's development (**Figure 15**). Planning and implementation of UT on new and old campuses require a different approach to minimize negative impacts. Various academic, infrastructure, business, housing/dormitory, retail, and recreational functions must be prepared by the relevant stakeholders (city government and university). It is hoped that the favorable land, health, economic, built environment, social-culture, service, and transport impacts of UT's presence can be felt by students and the local community.

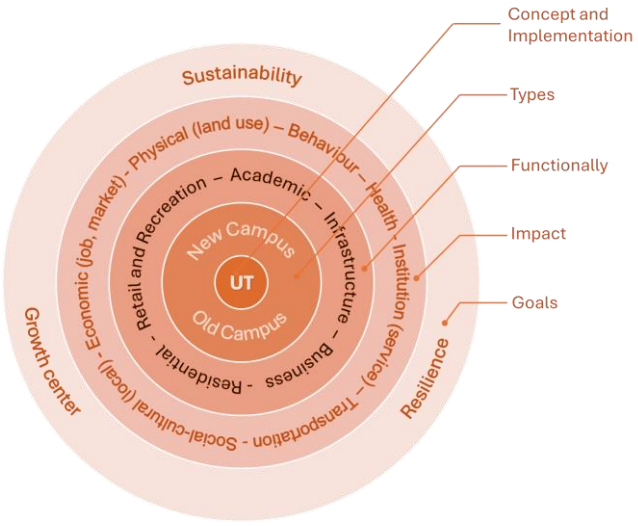

Figure 15. UT concept, types, functions, and goal.
Source: Illustrated by authors.

According to the research findings, humans and employment are among UT paper's most frequently mentioned topics. Sustainability, studentification, and the university sector have also been widely discussed in the last five years. Although this research shows gaps in these subjects, it also identifies areas that researchers need further development and investigation, such as characteristics, health, planning transit, atmospheric, and service. This paper has contributed to simplifying the concept of UTs and the characterization of UTs by country type.

5.4. Practical implications and recommendations

The development of university towns has become an essential strategy in supporting economic and social growth in various regions. University towns serve not only as centers of education but also as catalysts for innovation, community development, and industry collaboration. The application of UT to urban development still possesses both positive and negative impacts on the environment and neighborhoods. Policymakers and business strategists recognize the interconnectedness of the objectives of different economic actors and their roles within the same network. They also identify that physical environment is essential in achieving common goals (den Heijer et al., 2012). Planning spaces within and around the campus should be integral, so coordination between the two is a must.

The alignment of urban, corporate, and university development strategies is necessary to develop internationally competitive knowledge and innovation cities (den Heijer et al., 2012; Mohammed et al., 2022b; Rustiadi et al., 2021). In fact, in some places in China, 'College Districts' have been established to optimize the role of universities in urban development (Wei, 2012).

The coordination and synchronization of internal campus and regional policies is complex because it involves two different institutions and broad dimensions ranging from the increasing number of student intakes, traffic and motor vehicle arrangements, security issues, health issues, social issues, and student support facilities. If coordination is not carried out properly, problems and challenges will continue and further exacerbate the issues. In this case, local government policies are expected to

consider and predict dynamic campus policies. Short- and long-term policies can be adjusted to anticipate environmental problems, so they do not occur.

The discussion of UT is not only internal to the campus but broader, even regional in scale, as it is closely linked to urban growth that continues to increase as students and university intake policies continue to grow. UT has proven to impact the physical changes around the campus significantly. Therefore, the harmonization of internal campus planning and the region around the campus must take place. Leaders or interested parties from campus and local governments should meet to discuss synchronizing their planning policies.

6. Conclusion and limitations of the study

The relationship between UT and urban development has been explored in various studies from different perspectives. Previous research has shown that aspects of spatial and social segregation, community engagement and services, economic and political motivations, development collaboration, and urban planning affect university-city relationships in various ways. The impact of these aspects depends on the facilities, services, organizations, and stakeholders available in the city that can benefit the university or vice versa. The extent to which universities and cities can mutually benefit each other depends on their location and the physical relationship. Therefore, the functional and physical relationship between the campus and the city can be used to define the university and city relationship, helping to realize their interconnected vision and roles. Previous research has also shown that university and city engagement can help cities gain more potential to achieve their goals and face local and global challenges. However, this engagement should be based on placing students at the center for better decision-making.

The UT development principles of sustainability, resilience, and urban growth must serve as the basis for campus stakeholders and local government to align their programs. Implementing program sustainability between the two parties should not be limited to an agreement on paper; it can have a far-reaching benefits for society. Not only students and the community around the campus, but also the public who visit or pass through the campus can benefit from these programs. One simple example is the neglect of transportation. If not arranged together, it can lead to severe congestion. In addition, health problems are also often a source of problems that originate from around the campus.

In terms of regions, there have been many studies on UT in developed countries. Various aspects influence the characteristics of each area. Therefore, the characterization of UT in developing countries also needs to be done to enrich UT planning, implementation, and impact on people and regions/cities.

The research is still limited to the period in which scientific literature will continue to develop, and new trends may emerge in the future. The data used in this study is also restricted to Scopus and Google Scholar databases, so future research could be expanded to include indexing databases and newspaper articles, professional magazines, and other media. The articles analysed were predominantly published in English, so more exploration of academic research published in local languages is needed.

Research on the relationship between UT and urban development continues to grow. Some topics still require further study. Among these topics are new themes that researchers can further explore and discuss including transportation systems, students, and sustainability in UT development.

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