

Article

Rethinking Urban Decline in Post-COVID19: Bibliometric Analysis and Countermeasures

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Abstract: Urban decline refers to the sustained deterioration of cities in terms of their economy, population, and social aspects. The outbreak of the Coronavirus Disease 2019 (COVID-19) pandemic in 2019 objectively affected the trajectory of this phenomenon. A comprehensive analysis of scientific research on urban decline and its practical implications was conducted using bibliometric methods, data acquired from 2019 to 2023 and the Web of Science. Since COVID-19, research on urban decline has been predominantly led by traditional developed countries such as the United States and England, with a high degree of regional collaboration. Keyword clusters have focused on urban regeneration, growth, decay, family planning, resource dependency theory, public art, etc. Keyword co-occurrence has focused on shrinking cities, gentrification policy, land use, etc. Based on previous analyses and the contemporary context, the intrinsic logic behind the urban decline in recent years can be summarized as inadequate economic development, lagging infrastructure construction, the siphoning effect of core regional cities, and unique institutional factors leading to specific urban decline patterns. Comprehensive urban recovery plans have been proposed, including reshaping urban spatial layouts and planning and strengthening strategies for social and economic revival, with correspondence-specific samples. Studying the impact of COVID-19 on urban decline from the perspectives of city development and strategies can help us better understand the repercussions of global health crises on cities, providing a more scientific basis for urban planning and management to build resilient, sustainable, and equitable cities.

Keywords: COVID-19; bibliometric; urban decline; sustainable city; urban resilient; qualitative and quantitative analysis; Citespace; urban management; sustainability; cities development; cities strategies



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1. Introduction

1.1. Development Background

A city is densely inhabited with active economic activity, complex social structures, and a unique administrative and management structure [1]. Urban development constitutes a vital component of modern society. It offers abundant employment opportunities and access to education and healthcare resources and provides residents with diverse lifestyle choices and avenues for personal growth [2]. Cities also serve as hotspots for innovation and cultural exchange, fostering social progress and prosperity [3]. However, urbanization poses various challenges, such as environmental pollution, social inequality, and traffic congestion. Hence, it necessitates scientific planning and sustainable management practices [4,5].

The outbreak of the Coronavirus Disease 2019 (COVID-19) pandemic from late 2019 to early 2023 profoundly impacted global society, economy, and health systems [6,7]. It led to a significant increase in diseases and deaths, placed immense strain on healthcare resources, triggered economic recessions, disrupted education, and caused social and

mental health issues [8]. Various factors prompted individuals to leave cities, exacerbating signs or preexisting manifestations of urban decline. In general, COVID-19 mainly affects densely populated urban areas, and the degree of impact varies from region to region [9]. Common impacts include economic recession, urban population reduction, setbacks in the real estate market, difficulties in public finances, and damage to urban infrastructure and transportation.

1.2. Research Background

Urban decline refers to the deterioration or regression of cities in terms of their economic, population, social, and cultural aspects [10]. Various factors, including economic restructuring, population decline, rising unemployment rates, ageing infrastructure, environmental issues, and social problems, can cause urban decline [11]. Since the inception of cities, urban decline has been an inherent part of their dynamic spiral development, characterized by progress, setbacks, and cyclical patterns [12–14]. In recent years, global urban decline, further aggravated by the emergence of COVID-19, has presented distinct characteristics. The following factors have contributed to this phenomenon.

The COVID-19 pandemic has triggered a global economic recession. Imposed measures such as lockdowns, social distancing, and travel restrictions have led to temporary closures and bankruptcies of numerous businesses [15]. This has resulted in widespread unemployment and stagnation of economic activities, severely impacting urban economies. Faced with the severe impact of the pandemic on cities, individuals may opt to leave urban areas in search of safer places with better resources [16,17]. Consequently, urban areas experience population decline, affecting market demands, community services, and the labor market. Tourism and retail are vital economic pillars for many cities. However, the COVID-19 pandemic has imposed travel restrictions and reduced consumer spending, leading to significant setbacks in these sectors [18].

Consequently, the decline in tourism and retail industries has a ripple effect on the urban economy. During the pandemic, urban infrastructure faced immense pressure. Medical facilities, transportation systems, water supply, and sanitation systems may have been overwhelmed by the demands of a large-scale outbreak and population needs [19,20]. This has exacerbated the ageing and deterioration of urban infrastructure. The pandemic has intensified social issues within cities. Rising unemployment, increased poverty, and social unrest have heightened social tensions [21]. These social problems have adversely affected urban residents' social fabric and quality of life.

1.3. Research Review

Scientific research involves observing, experimenting, and reasoning based on scientific theories and methods to thoroughly investigate and explain phenomena in the natural world and society [22]. In contrast, the real world encompasses our tangible environment, encompassing various phenomena, issues, and challenges in the natural world and human society [23]. This study will utilize a bibliometric approach to dissect and analyze the scientific research on urban decline in the context of the pandemic from its onset until the present. The statistical evaluation of books, papers, or other publications is known as bibliometrics. Analyses are used to monitor the output and influence of authors and researchers. They are also used to determine journal impact factors as well [24]. To better understand publishing relationships, bibliometrics data can also be displayed and we can apply this method to urban decline. The objective is to gain insights into the current advancements in urban decline research, identify research focal points and emerging trends, evaluate research quality, identify existing gaps and limitations, and explore future research directions while encouraging interdisciplinary integration and knowledge sharing. A qualitative analysis was conducted to propose targeted solutions based on the quantitative analysis results. In academia, there are various published manuscripts related to the urban issues based on bibliometric analysis, but at present, there is not one based on the keyword of urban

decline, or accurate bibliometric analysis for urban decline, let alone a manuscript that focuses on the influence of COVID-19 [25–27].

1.4. Research Aim

Although COVID-19 has posed significant challenges to cities, appropriate measures can be taken in the post-pandemic era to support economic recovery, improve infrastructure, foster innovation, and promote sustainable development, thereby mitigating the risks of urban decline [28]. Therefore, it is crucial to study the impact of COVID-19 on urbanization and propose solutions immediately after the pandemic to gain a deeper understanding of its impact on cities and its potential long-term effects. The research objectives are focused on the following aspects:

- Investigating the impact of COVID-19 on urban decline provides valuable insights into urban crisis management and urban planning. It helps to understand how city governments and relevant institutions should respond and implement measures to mitigate global pandemics' economic, social, and environmental impacts [29].
- Analyzing the impact of COVID-19 on urban decline helps identify factors that make cities more vulnerable and susceptible to global health crises [30]. This knowledge contributes to formulating preventive measures and preparedness plans to address similar events that may occur in the future.
- Research indicates significant inequalities in the impact of COVID-19 on cities among different social groups. The pandemic severely affects vulnerable populations and impoverished communities [31,32]. Understanding these effects allows the proposal of targeted policies and interventions to reduce social inequalities and protect vulnerable groups.
- Investigating the impact of COVID-19 on urban decline provides valuable insights into sustainable urban development. It helps to understand the vulnerability of urban infrastructure, methods to enhance urban resilience and adaptability, and integrate public health and environmental sustainability into urban planning and design [33,34].
- The COVID-19 pandemic is a global crisis that has affected countries and cities worldwide. Analyzing the impact of COVID-19 on urban decline promotes international cooperation and knowledge sharing, enabling countries and cities to learn from each other's experiences and collectively address similar challenges [35–37].

2. Methodology

This study first conducts a bibliometric analysis of research on the urban decline from the onset of COVID-19 until the present. The Citespace software is employed for this research. Based on the results generated by the software, qualitative descriptions are provided.

Bibliometric analysis is a quantitative research method used to evaluate and analyze indicators such as the quantity, quality, citation relationships, and impact of academic literature [38]. It is based on statistical and mathematical analysis of literature data and aims to reveal trends in academic research, researcher influence, and the development of research fields [39].

There are many softwares that can be used in bibliometric analysis, such as VOSviewer, Sci2, Gephi, etc. In this research, we choose Citespace (6.2.R2 Basic), a popular bibliometric analysis software tool. Compared with others, it combines data analysis with visual representation and possesses powerful features and flexibility [40]. It assists researchers in conducting in-depth analyses of citation relationships and academic collaboration networks, identifying trends and innovative points in research fields, and providing important references and guidance for further research [41].

The database selected is Web of Science (Core Collection), hereafter referred to as WoS. WoS is a globally renowned academic literature database and retrieval tool developed and maintained by Clarivate Analytics [42]. It indexes high-quality academic journals, confer-

ence papers, and patent literature across various disciplines and provides comprehensive literature search and analysis functions [43].

Usually, when conducting this kind of research, precise keywords that reflect the research object are required. In this research, based on the previous analysis, the keyword “urban decline” was selected, and the data retrieval period was from December 2019, when zero patients were reported in Wuhan, China, until 13 June 2023. In addition, 140 articles were obtained from WoS, and the raw data were imported into the Citespace software with default settings [44,45]. Duplicate and irrelevant data were manually removed, resulting in a final dataset of 117 articles for data analysis [46].

3. Results

This chapter presents and analyzes the findings obtained through methodological operations, specifically focusing on the publication regions, keyword co-occurrence, and keyword clusters. These results serve as a theoretical and factual basis for subsequent qualitative analysis [47].

3.1. Publication Regions

Urban decline is a challenge faced by numerous countries and regions, yet their specific circumstances differ [48]. Examining the publication regions sheds light on the disciplinary status, international cooperation, and exchange within the urban decline [49].

Through software analysis, this study identified that scientific research on urban decline since the onset of COVID-19 has predominantly emanated from the United States, China, England, and South Korea (Figure 1).

CiteSpace, v. 5.2.R2 (64-bit) Advanced
 June 21, 2023 at 12:44:05 AM CST
 WoS: C:\Users\jasu\Desktop\wos\data
 Timespan: 2019-2023 (Slice Length=1)
 Selection Criteria: g-index (k=25), LRF=3.0, L/N=10, LBY=5, e=1.0
 Network: N=37, E=44 (Density=0.0661)
 Largest CC: 24 (64%)
 Nodes Labeled: 1.0%
 Pruning: None

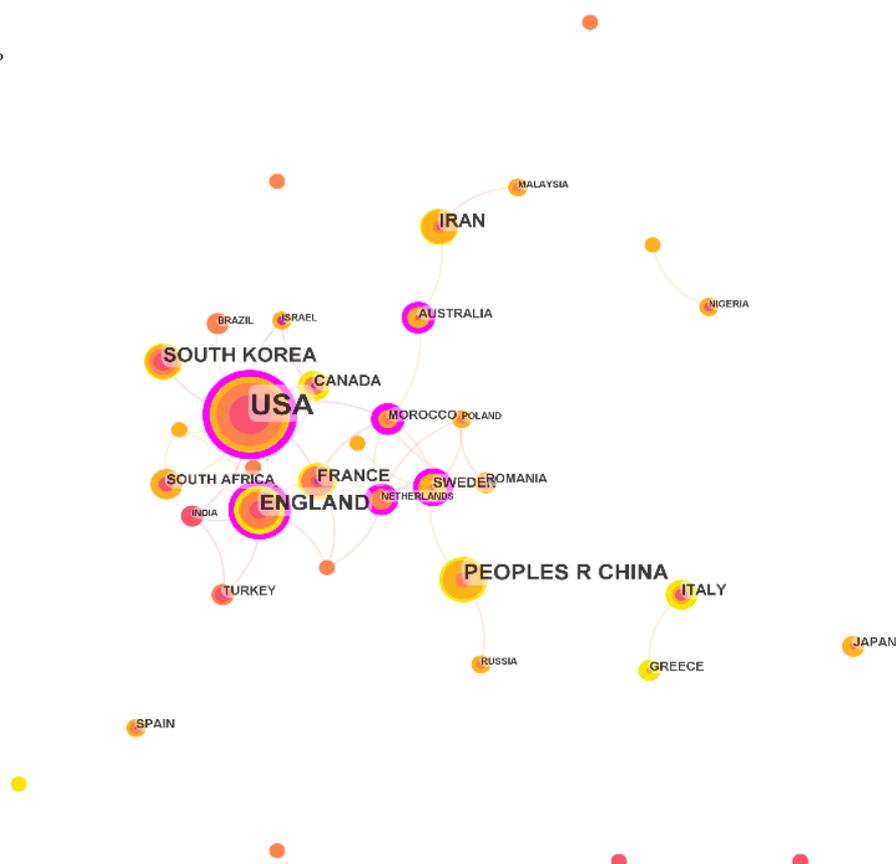


Figure 1. Distribution of source regions for urban decline research in the context of COVID-19.

These countries are represented by the largest circles, denoting the highest publication output. Notably, the circles representing the United States, England, and South Korea are closely positioned, indicating robust research collaboration in these regions. Conversely, China appears relatively distant, exhibiting a distinct research position. Based on these findings, the study suggests the following implications.

The COVID-19 pandemic has profoundly affected cities worldwide, with the United States, China, England, and South Korea among the most severely impacted countries [50]. As such, research on urban decline conducted within these nations holds significant practical and policy implications due to their cities' shared or similar challenges.

The United States, China, England, and South Korea possess ample research resources and expertise in urban studies. These countries boast exceptional research institutions and scholars specializing in urban planning, economics, sociology, geography, and related disciplines. Consequently, they offer substantial academic support and specialized knowledge for urban decline research.

Urban development and addressing decline issues resonate strongly in the United States, China, England, and South Korea—countries known for their influential cities and economic centers. These nations have accumulated extensive experience and accomplishments in urban planning, economic development, and management, leading to a concentrated research focus on urban decline.

The United States, China, England, and South Korea exhibit a high level of research collaboration and academic exchange on an international scale. Researchers from these countries actively participate in international conferences, collaborative projects, and knowledge exchange initiatives, fostering cross-border cooperation and disseminating research outcomes. Notably, closer regional cooperation is observed among traditionally developed countries such as the United States, South Korea, and England.

While these four countries demonstrate a significant concentration of research in urban decline, it is essential to recognize that urban decline is a global issue, and different countries and regions may face diverse challenges and research needs. Therefore, fostering cross-national cooperation and knowledge sharing remains pivotal for advancing urban decline research.

3.2. Keyword Co-Occurrence

Keyword Co-occurrence is a method for analyzing the co-occurrence relationships among keywords in academic literature [51]. It reveals the correlations and connections between keywords by calculating the frequency or patterns of keyword pairs or groups that appear together in the same document [52]. In this study, the analysis of keyword co-occurrence and the construction of a scientific may help researchers understand the relationships between different disciplines, identify important research directions, and explore potential collaboration opportunities in urban decline (Figure 2).

This study found that, since the onset of COVID-19, the keyword co-occurrence results in urban decline mainly focus on the following keywords: shrinking cities, gentrification policy, land use, etc. Based on this, the study suggests the following implications.

Keyword co-occurrence indicates the research scope and focuses on urban decline. "City" is the core concept, encompassing urban areas' development, transformation, and changes. Moreover, keyword co-occurrence includes important concepts related to urban development and decline, such as "urban decline", "growth", "shrinking cities", "gentrification", and "urban regeneration".

Keyword co-occurrence reflects the phenomena and challenges faced by cities in decline. "Urban decline" and "shrinking cities" in keyword co-occurrence suggest issues related to economic decline, population reduction, and deteriorating urban infrastructure.

Keywords such as "growth", "gentrification", and "urban regeneration" in the co-occurrence context demonstrate that researchers in the field of urban decline also focus on urban transformation and development strategies. These keywords encompass urban

growth, gentrification, and urban regeneration strategies, highlighting researchers' concerns for addressing urban decline and achieving sustainable urban development.

Keyword co-occurrence analysis helps researchers understand the core concepts, research focal points, and development directions within the field of urban decline. The co-occurrence relationships between these keywords reveal the associations and research hotspots among different concepts, providing guidance and references for further studies. Additionally, keyword co-occurrence analysis can uncover research gaps and areas requiring further investigation, offering insights and strategies for scholars and decision-makers to address the challenges of urban decline.

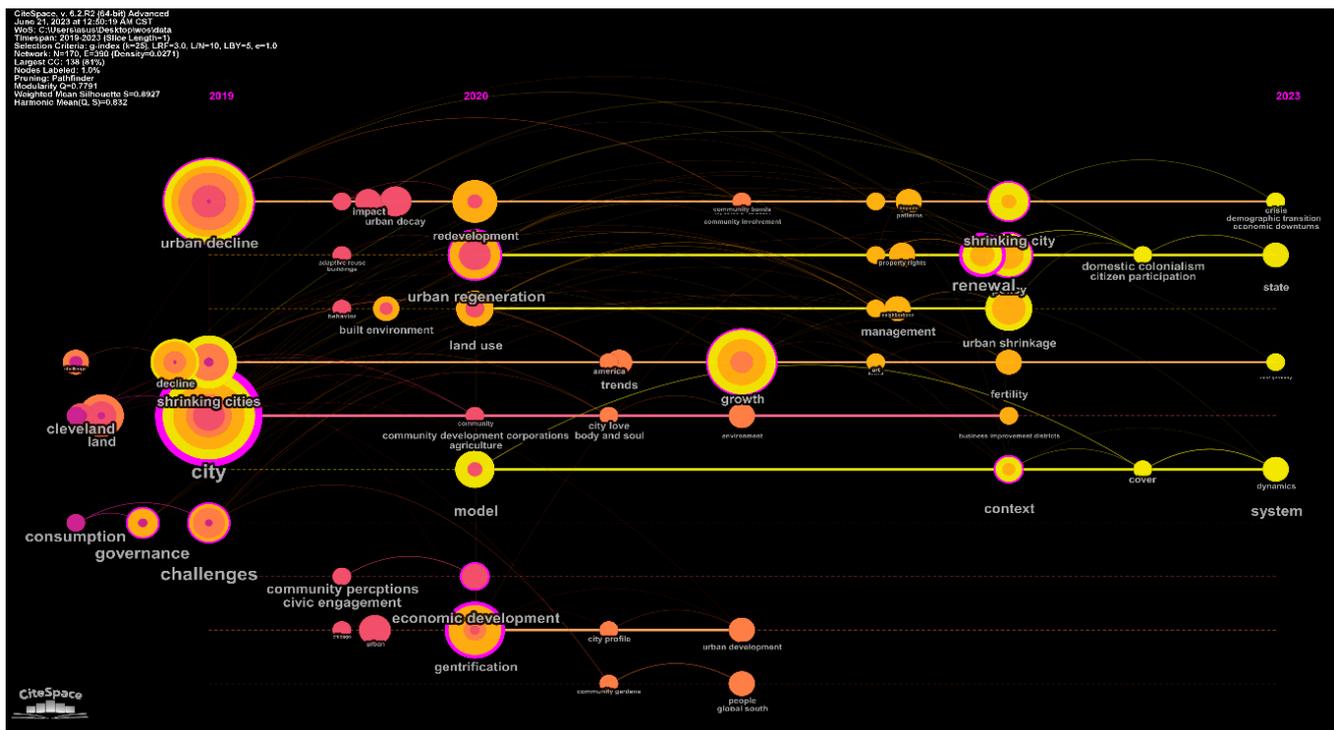


Figure 2. Keyword co-occurrence for urban decline research in the context of COVID-19.

3.3. Keyword Cluster

A keyword cluster is a method of grouping keywords with similar topics or semantic associations [53]. By conducting keyword clustering, the concentration and relevance of different themes within a collection of literature can be revealed, aiding researchers in understanding the structure and content of the literature [54]. In this study, the visualization of keyword clustering results was employed to more intuitively observe the structure and relationships of urban decline-related literature, thereby uncovering the underlying logic behind the literature (Figure 3).

This study found that, since the onset of the COVID-19 pandemic, the keyword clusters in the field of urban decline research mainly revolve around the following keywords: urban regeneration, growth, urban decay, family planning, urban renewal, resource dependency theory, and public art. Based on this, the study suggests the following implications.

Keyword clusters such as urban regeneration, growth, and renewal indicate researchers' focus on urban development and regeneration. These keyword clusters reflect researchers' interest in utilizing urban regeneration to promote growth and improve the state of urban decline.

Urban decay is one of many keyword clusters that allude to problems with urban decay. Researchers are concerned with studying the causes, processes, and influencing factors of urban decline.

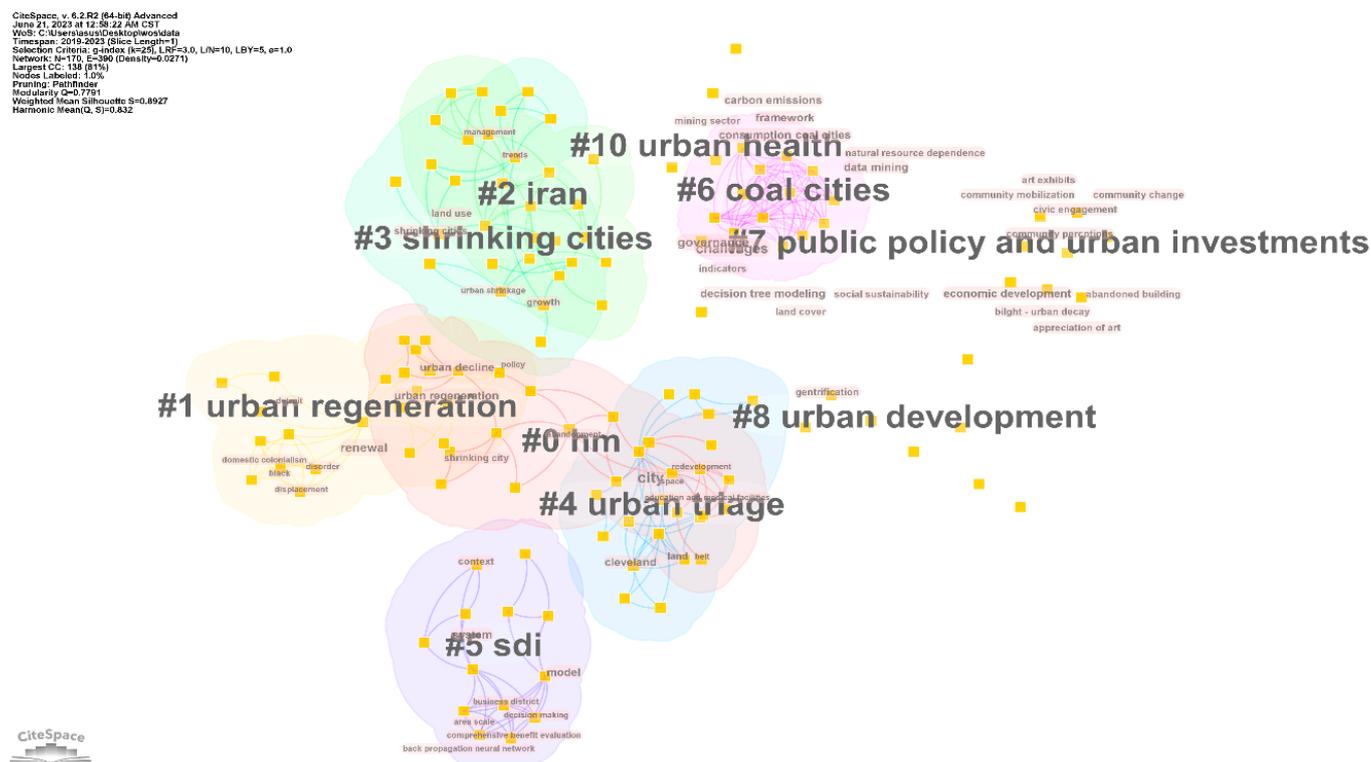


Figure 3. Keyword cluster for urban decline research in the context of COVID-19.

Keyword clusters containing family planning touch upon the influence of social and demographic factors for urban decline. Researchers may be interested in exploring the role of factors such as population structure changes and family planning policies in urban decline and regeneration.

Keyword clusters like resource dependency theory and public art suggest researchers' application of theoretical frameworks and methods in the field of urban decline. Researchers may employ resource dependency theory to analyze the relationship between urban development and decline or investigate the role of public art in urban regeneration.

These keyword clusters reflect the themes and research directions of interest within the field of urban decline. Researchers may focus on addressing urban decline issues through urban regeneration and growth while considering the impact of social, demographic, and economic factors. Applying theoretical frameworks and methods also provides guidance and methodological foundations for research. The results of these keyword clusters guide researchers, facilitate academic communication and collaboration, and encourage further in-depth research on related issues in urban decline.

4. Logic behind Urban Decline after COVID-19

The urban decline has been an ongoing process governed by its inherent patterns [55]. However, the occurrence of COVID-19 disrupted this progression. There exists a complex relationship and interaction between scientific research and practical reality. Issues and demands in practical reality can drive the direction and focus of scientific research [56]. In contrast, the outcomes and discoveries of scientific research can, in turn, impact practical reality, leading to social change and development [57]. Combining an analysis of scientific research in the field of urban decline since COVID-19, this study identifies the following main reasons contributing to the current urban decline.

4.1. Insufficient Economic Development

The academic institutions focusing on the urban decline are mainly in USA, England, China, etc. The economies of many countries, such as China, heavily rely on heavy

industries such as steel and cement, characterized by short industrial chains, low-value-added products, high energy consumption, and severe environmental pollution [58]. For a traditional industrial country, i.e., England, factors such as the depletion of energy resources, industrial upgrading, and increasing overcapacity have intensified market competition [59]. The previous price advantage of existing products is no longer sustainable. Additionally, the decreasing gap in labor costs between regions has diminished the advantages of cheap labor. The slow pace of economic development has resulted in job reductions, diminished prospects for growth, lowered attractiveness of cities for population influx, and the further impact of COVID-19, with many business closures and skyrocketing unemployment rates, accelerating urban decline, which has been reported in the USA.

4.2. Lagging Infrastructure Development

Due to fiscal constraints, most declining cities need more investments in infrastructure development [60]. This is reflected in the slow progress in transportation and communication, which reduces residents' willingness to reside and restricts the influx of migrants [61]. Therefore, keyword co-occurrence was noted for shrinking cities. Moreover, it increases transportation costs for businesses, gradually marginalizing economic development. Furthermore, the lag in infrastructure development is evident in the inadequate treatment of waste, sewage, emissions, etc. [62]. The low efficiency of pollutant treatment, inadequate environmental protection measures, and excessive discharge of wastewater and emissions have led to a deteriorating ecological environment, diminishing the quality of urban life and reducing people's willingness to settle [63]. As income levels rise, people have higher expectations for the political and social environment cities provide [64]. This led to the application of a leading gentrification policy. The outbreak of COVID-19 further exposed the lag in the development of public utilities such as healthcare, education, social security, elderly care, and cultural entertainment, which are unable to meet the needs of residents, thereby affecting the quality of life and weakening the attractiveness and competitiveness of cities.

4.3. Siphon Effect of Core Cities

The siphon effect of major cities has long been one of the main factors causing the decline in surrounding cities [65]. Regional core cities possess obvious comparative advantages regarding employment opportunities, infrastructure, and public services [66]. These factors continuously attract populations and capital, leading to a growing polarization trend and creating a siphon effect on the surrounding areas. The rapid development of transportation tools such as high-speed railways has improved transportation conditions and increased population mobility [67]. The continuous influx of people into mega-cities or provincial capital cities has left their surrounding areas needing more labor support for urban development and unable to attract factor accumulation, resulting in economic development difficulties. This is why urban regeneration holds a primary position in the keyword cluster.

4.4. Special System Leading to Unique Urban Decline

Unlike most democratic Western countries, China, as a populous nation under a centralized one-party system, has 668 cities, most of which have resource allocation constrained by the administrative system, requiring distribution from the central to local system and from higher to lower levels [68]. Cities at higher administrative levels possess more political capital, influencing the redistribution of resources [69]. They have advantages in infrastructure construction, talent attraction, and investment incentives. However, most small and medium-sized cities struggle to obtain corresponding financial support and development opportunities, resulting in significant disparities in public services, infrastructure construction, and employment opportunities across large cities [70]. These smaller cities face inherent deficiencies in urban development, leading to inevitable urban decline.

5. Countermeasures for Urban Decline after COVID-19

Based on the inherent logic of urban decline after COVID-19, this study proposes strategies and specific measures from the perspectives of recovery plans, spatial planning, and economic recovery to address the urban decline and help cities recover and reshape their development.

5.1. Developing a Comprehensive Urban Recovery Plan

Developing a comprehensive urban recovery plan is crucial in addressing the post-pandemic urban decline [71]. This plan needs to consider various aspects, including the economy, society, and the environment, to promote the recovery and development of cities comprehensively. Firstly, a thorough assessment and diagnosis are necessary to understand the main causes and influencing factors of urban decline. Key issues and challenges can be identified by analyzing the city's economic conditions, social dynamics, population movement, and environmental status.

5.1.1. Sustained Investment in Infrastructure Development

Increasing investment in transportation, water, electricity, telecommunications, and other infrastructure sectors will enhance the city's competitiveness and attractiveness [72]. Additionally, attention should be paid to the sustainable development of infrastructure by promoting new technologies such as clean energy and smart transportation, thereby creating a green and intelligent urban environment [73]. Since 2008, China has made significant efforts to develop its expressway infrastructure. As of 2021, the total length of expressways in China has exceeded 160,000 kilometers, making it the world's largest expressway network [74]. This substantial investment has improved transportation efficiency between cities and within urban areas, facilitated regional economic development, and enhanced the convenience of population mobility.

5.1.2. Promoting Innovation and Entrepreneurship

Support for innovative enterprises and emerging industries should be provided by establishing innovation parks and technology incubators, offering entrepreneurial support and financial assistance, and attracting and retaining high-tech talents [75]. At the same time, greater support should be given to transforming and upgrading traditional industries to cultivate new drivers of economic growth [76]. Silicon Valley, located in the United States, is one of the world's most renowned technology innovation hubs [77]. This region has numerous high-tech companies, startups, and research institutions, including Google, Apple, and Facebook. The success of Silicon Valley demonstrates the significance of establishing innovation clusters and technology incubators, providing collaborative opportunities, funding, and talent resources for innovative enterprises. Similarly, Israel has achieved remarkable accomplishments in entrepreneurship support and financial assistance [78]. Israel has nurtured numerous technology startups such as Waze and Mobileye through government backing and establishing venture capital funds. These companies have achieved commercial success on a global scale, driving economic growth and employment opportunities.

5.1.3. Development of Emerging Industries

Shifting the focus towards areas with growth potential and innovative drive, such as the digital economy, clean energy, and biotechnology, is essential [27]. By providing policy support and investment guidance, nurturing emerging industry clusters will inject new vitality into the city's economy [79]. For example, Shenzhen in China is a prime example of the country's digital economy development. The city has actively promoted technological innovation and embraced digital transformation, attracting numerous high-tech and innovative companies. Currently, Shenzhen's digital economy contributes over 70% to its GDP, establishing itself as one of the key centers for the digital economy in China [80].

Similarly, Freiburg in Germany has gained recognition for its clean energy industry, serving as a model for the country's clean energy development. The city has made remarkable advancements in renewable energy sources such as solar, wind, and geothermal. Data indicate that Freiburg has achieved an impressive milestone of sourcing nearly 100% of its electricity from renewable sources, solidifying its position as an innovative hub for clean technology and sustainable development [81].

5.1.4. Optimizing Urban Governance Mechanisms

Improving the urban governance system will enhance government efficiency and service quality [82]. Strengthening collaboration between the government, businesses, communities, and citizens, and establishing a multi-stakeholder urban governance model, will enhance the synergistic effect of urban development [83].

Singapore serves as a notable model of successful urban governance [84]. The country has achieved a highly effective government and improved service quality by establishing efficient administrative institutions and robust policy decision-making systems. Singapore's success underscores the significance of a well-developed urban governance framework for urban revitalization and sustainable development. Key initiatives include:

- Efficient administrative institutions

Convenient government services: Singapore's government agencies have embraced information technology and digital services to establish efficient administrative institutions. For instance, citizens can conveniently handle various transactions, such as applying for permits, paying taxes, and registering companies through online platforms, enhancing the accessibility and efficiency of government services [85,86].

- Enhanced service quality

Infrastructure development: The Singaporean government places great importance on infrastructure development, such as roads, transportation, water supply, and power [87]. The city's modern infrastructure provides residents with a high-quality living environment, enhancing the city's appeal and competitiveness [88].

- Urban planning and management

Effective urban planning: Through scientifically informed urban planning, the Singaporean government ensures rational land use and efficient urban spatial layouts. This approach contributes to the city's sustainable development and creates favorable conditions for urban revitalization [89].

Citizen participation: The Singaporean government encourages participation in urban planning and management. Residents have opportunities to engage in decision-making processes, offer suggestions, and collaborate with the government through initiatives like residents' committees and community engagement projects [90]. These efforts promote the democratization and participatory nature of urban governance.

5.2. Reshaping Urban Spatial Layout and Planning

Reshaping urban spatial layout and planning is crucial in addressing the challenges of urban decline [91]. By reassessing and updating city planning, cities can adapt to new demands and challenges, achieving sustainable development and prosperity.

5.2.1. Optimizing Land Use Layout

In the aftermath of urban decline, abandoned industrial areas and deteriorating commercial zones often occur [92]. These areas can be repurposed through re-planning and development, transforming into multifunctional residential, commercial, cultural, and entertainment spaces. By utilizing land resources effectively, cities can enhance functionality and their image, providing residents with better living environments and employment opportunities.

For example, once a center of the American automotive industry, Detroit faced economic decline, abandoning many factories and industrial areas. However, Detroit successfully revitalized these abandoned spaces through strategic planning and redevelopment, transforming them into creative industry parks, art districts, and entrepreneurial incubators [93]. This transformation has brought new economic vitality and employment opportunities to the city.

- Creative industry parks

Detroit's Eastern Market is one of the largest farmers' markets in the United States and a thriving center for creativity and innovation. According to the Detroit Economic Growth Corporation, the Eastern Market attracts over 1500 small businesses annually, creating more than 4000 local job opportunities [94].

- Art districts and cultural industries

Abandoned factories and warehouses in Detroit have been repurposed as art galleries, performance venues, and cultural centers, such as the Detroit Institute of Arts and The Whitney [95]. These cultural facilities attract many tourists and art enthusiasts, generating tourism revenue for the city and fostering the growth of related industries.

- Entrepreneurial incubators and technological innovation

Detroit's entrepreneurial incubators, such as TechTown and the Detroit Entrepreneurship Institute, provide training, support, and resources to entrepreneurs, driving the development of the technology and innovation sectors. According to TechTown's data, the incubator supports over 200 startup companies annually and creates hundreds of high-paying jobs locally [96].

5.2.2. Enhancing Urban Sustainability

The urban decline may be accompanied by environmental degradation and resource wastage [97]. Sustainable development principles should be integrated when reshaping urban spatial layout and planning. Measures such as constructing green infrastructure, promoting clean energy, advocating low-carbon transportation, and promoting a circular economy can achieve resource conservation and environmental protection [98].

Rotterdam has implemented various green infrastructure measures in the Netherlands, including green roofs, rainwater harvesting systems, urban parks, and ecological corridors, effectively reducing energy consumption and optimizing water resource utilization. Rotterdam boasts a green roof area exceeding 60,000 square meters, resulting in an annual reduction of approximately 700 tons of carbon dioxide emissions [99].

Denmark's capital, Copenhagen, has significantly promoted bicycle transportation by developing well-designed bicycle lanes and parking facilities. This initiative has greatly encouraged residents to opt for cycling as their preferred mode of transportation, leading to reduced car usage and carbon emissions. According to statistics, the proportion of bicycle trips in Copenhagen has surpassed 40%, making the city's transportation more environmentally friendly and sustainable [100].

In Japan, the city of Kobe has prioritized the development of a circular economy, particularly during the revitalization of abandoned industrial areas. The city has effectively reduced resource waste and environmental pollution by promoting reuse and resource recycling. Data show that the circular economy output in Kobe accounts for over 20% of its GDP [101].

5.2.3. Revitalizing the City Centre

The city center often serves as the core and façade of the city, playing a crucial role in its image and attractiveness [102]. Through improving building facades, enhancing the quality of public spaces, and increasing cultural facilities, crowds and vitality can be attracted back to reshape the prosperity and vibrancy of the city center [103].

Rio de Janeiro has revitalized its city center in Brazil, enhancing its image and attractiveness. One notable project was transforming the port area into a vibrant cultural, commercial, and entertainment center. This redevelopment has attracted substantial tourists and investments, injecting economic vitality into the city. Data reveal that the revitalized port area attracts over one million visitors annually, creating thousands of job opportunities [104].

London has successfully reshaped its city center in the United Kingdom by improving its architectural aesthetics and public spaces. The opening of the Tate Modern art gallery and the development of the Southbank Centre have added cultural and artistic appeal to London's city center [105]. Data show that the Tate Modern welcomes over six million visitors annually, contributing hundreds of millions of pounds to the local economy [106].

In the United States, Chicago has reinvigorated its city center by renovating public spaces and adding cultural amenities, restoring its vibrancy. A notable example is Millennium Park, an iconic landmark and a popular destination for residents and tourists. According to data, Millennium Park attracts over 15 million visitors annually, generating significant economic benefits for the local tourism industry [107].

5.2.4. Community Development and Transformation

Communities are the fundamental units of cities, playing a significant role in residents' quality of life and social connections [108]. When reshaping urban spatial layout and planning, attention should be given to community construction and transformation, providing convenient community facilities and services, encouraging resident participation and autonomy, and enhancing community cohesion and vitality [109].

Amsterdam has successfully enhanced community cohesion and vitality in the Netherlands by focusing on community development and revitalization [110]. One notable example is the transformation of the De Pijp district from an abandoned industrial area into a vibrant residential neighborhood. Following the renovation, the community witnessed increased resident engagement and social interactions, along with the development of commercial activities and cultural venues. According to data, the revitalization project in De Pijp created over 100 job opportunities and attracted a significant influx of tourists and investments [111].

Portland prioritizes community development and revitalization in the United States, emphasizing community participation and self-governance. The city has established various community gardens, shared spaces, and activity centers, encouraging resident involvement in community planning and decision-making. These initiatives have strengthened community cohesion and vitality, promoting interactions and cooperation among residents [112].

5.2.5. Advocating for Creative Industries and Cultural Development

Creative industries and cultural activities are vital urban development drivers, injecting new vitality and economic growth potential into cities [113]. Establishing creative industry parks, organizing cultural and artistic events, and providing artist studios can attract artists, designers, and creative talents, promoting the development of the city's cultural and creative industries.

Germany's Berlin actively promotes creative industries and cultural development, attracting many artists, designers, and creative talents. For example, the Kreuzberg district is an art district in Berlin that houses many artist studios, galleries, and creative enterprises. The development of this area has brought new vitality and economic growth to the city [114].

Manchester has transformed itself into a cultural hub and creative center in the United Kingdom by establishing creative industry parks and hosting cultural activities. The Northern Quarter, for instance, is an area in Manchester known for its artistic atmosphere and creative activities. The development of this area has attracted a significant number of

artists, designers, and creative enterprises, contributing to the growth of the cultural and creative industries and generating employment opportunities in the city [115].

South Korea's Seoul strongly emphasizes cultural development by organizing cultural and artistic events and creating art villages, among other measures. For example, Hongdae is an art district in Seoul that attracts numerous young artists and creative talents. This area's vibrancy and creative atmosphere have become a driving force for new economic growth in the city [116].

5.3. Strengthening Social and Economic Recovery

Strengthening social and economic recovery is a key measure to address urban decline [117]. In the aftermath of the pandemic, cities face numerous challenges, such as business closures, rising unemployment rates, and social instability. Therefore, measures must be taken to strengthen social and economic recovery to restore urban vitality and drive sustainable development.

5.3.1. Supporting Business Recovery and Innovation

Governments should assist small and medium-sized enterprises in overcoming difficulties by providing loans, tax relief, and implementing incentive measures [118]. Furthermore, encouraging businesses to innovate, transform, and upgrade can enhance market competitiveness. Governments can also increase support for emerging industries, cultivate an environment for innovation and entrepreneurship, and provide resources and financial support to entrepreneurs. For example, New York City introduced multiple measures to support small and medium-sized enterprises during the COVID-19 pandemic. The Small Business Emergency Loan Program was launched to provide low-interest loans to affected enterprises and a grace period for loan repayment [119].

5.3.2. Promoting Employment and Human Resource Development

By conducting training programs and enhancing skills, the employability and competitiveness of workers can be increased [120]. Governments, educational institutions, and businesses should strengthen cooperation and establish a talent cultivation mechanism that integrates production, education, research, and application to provide the job market with talent that meets its demands.

- Germany's vocational education system

Germany's vocational education system is renowned for its successful model, which combines academic education with practical skills, providing students with extensive vocational training and apprenticeship programs [121]. According to data from the German Economic Institute, vocational education graduates have an employment rate of over 80%, which remains relatively stable even during economic downturns [122]. This successful model enables Germany to adapt to market demands quickly and produce highly skilled professionals that meet practical employment needs.

- Canada's skills training programs

Canada's skills training programs ensure that the workforce possesses the skills the market requires through a collaborative approach involving the government, educational institutions, and businesses [123]. For instance, Canada's provincial polytechnic institutes and colleges collaborate with industries to offer targeted training programs that equip students with practical skills. According to data from Statistics Canada, individuals participating in vocational training have significantly higher employment rates after economic downturns than those without [124].

5.3.3. Expanding the Tourism and Cultural Industries

Expanding the tourism and cultural industries is also crucial to promoting urban economic recovery [125]. Cities can attract visitors and investments by improving the quality of tourist attractions and cultural facilities. Governments can formulate supportive

policies to promote the development of the tourism and cultural industries, creating employment opportunities, driving economic growth, and enhancing the city's reputation and attractiveness [126].

Barcelona, Spain, is a successful tourism and cultural hub that has achieved economic recovery and an enhanced city image by developing cultural industries and improving tourist attractions [127]. According to data from the Barcelona City Council, the tourism sector contributes to nearly 15% of the city's GDP and generates significant employment opportunities. Furthermore, as a city of cultural creativity, Barcelona attracts a large influx of creative talent and businesses, providing impetus for innovation and economic growth [128].

Seoul, South Korea, has successfully transformed into an internationally renowned tourist destination by developing its tourism and cultural industries [129]. According to data from the Seoul Metropolitan Government, the tourism sector contributes to approximately 6% of Seoul's GDP and attracted over 10 million international tourists in 2019 [130]. This has created numerous job opportunities and stimulated the growth of related industries, such as hospitality, food and beverage, and retail.

5.3.4. Optimizing the Social Security System

Optimizing the social security system is key to strengthening social recovery [131]. Governments should strengthen social security and welfare systems to meet residents' basic living needs. By improving social assistance and healthcare mechanisms, residents can be provided with a healthy and secure social environment, enhancing social stability and cohesion.

- The Nordic welfare state model

The Nordic countries, such as Denmark, Sweden, and Norway, are renowned for their comprehensive social security systems. These countries ensure that the basic living needs of their residents are met by providing extensive social welfare and protection measures [132]. For instance, in Denmark, every resident has access to free healthcare, education, and unemployment benefits. Such social security systems help alleviate economic pressures for individuals, provide a sense of security, and promote social stability and development.

- Canada's healthcare system

Canada's healthcare system is a publicly funded, universal healthcare system that provides comprehensive medical coverage to residents [133]. According to data from Statistics Canada, over 90% of Canadians have access to healthcare insurance [134]. This system ensures that residents receive appropriate care and treatment for illnesses and medical issues, improving society's overall health.

- Japan's social assistance system

Japan has established a comprehensive social assistance system to support residents experiencing economic hardship [135]. According to the Ministry of Health, Labour and Welfare data, social assistance encompasses various support measures, including housing assistance, livelihood protection benefits, and employment support [136]. These measures aim to ensure that every resident can access basic living support, enhancing social fairness and cohesion.

5.3.5. Enhancing the City's Brand Image and Promotional Efforts

Governments and relevant institutions should conduct marketing and promotional activities to shape the city's brand image, highlighting its strengths and unique features [137]. The city's further development and economic recovery can be propelled by attracting external resources and investments.

As a historically rich and culturally vibrant city, Berlin, Germany, has successfully shaped its brand image through marketing and promotional activities [138]. The Berlin government and tourism organizations have launched iconic events and campaigns, such

as the Berlin International Film Festival and the Berlin Wall Art Festival, attracting many tourists and investments [139]. According to data from the Federal Statistical Office of Germany, Berlin received approximately 33.7 million international visitors in 2019, generating significant economic benefits and global recognition [140].

Dubai, United Arab Emirates, as a global business hub and tourist destination, has crafted a unique brand image through promotional and marketing activities [141]. The Dubai government has invested substantial funds in the city's promotion and marketing efforts, including developing iconic structures, hosting international events, and launching global advertising campaigns [142]. According to Dubai Tourism and Commerce Marketing data, Dubai received approximately 16.7 million international visitors in 2019, resulting in significant economic revenue and global recognition [143].

6. Discussion and Conclusions

This study provides an in-depth discussion of urban decline during the COVID-19 pandemic. The introduction chapter reviews existing literature and viewpoints in the research field to explore the impact of COVID-19 on urban decline. Then, it analyzes the key factors and mechanisms of urban decline to uncover the challenges posed by COVID-19 to urban planning and governance. The countermeasures chapter proposes strategies and measures to address the urban decline and discusses their implementation pathways and perspectives on sustainable development. The COVID-19 pandemic has had extensive and profound effects on cities worldwide. Furthermore, through a comprehensive analysis of relevant studies using bibliometric methods, we found that the pandemic has resulted in economic decline, labor market instability, industrial recession, and other issues. Further analysis of the impacts on the urban economy, society, environment, and other aspects reveals the underlying logic of COVID-19's influence on urban decline.

Under the backdrop of COVID-19, the key factors and mechanisms of urban decline have changed. This research discusses the impact of changes in urban development, industrial structure, the labor market, and urban decline. Factors such as economic shutdown, supply chain disruptions, and social distancing measures triggered by the pandemic have profoundly impacted the urban economy and society, leading to a declining situation [144]. At the same time, urban planning and governance face unprecedented challenges, such as balancing economic development with public health safety [145]. Based on the bibliometric logic behind analysis, we propose specific measures to address the urban decline, including supporting business recovery and innovation, promoting employment and human resource development, expanding the tourism and cultural industries, optimizing the social security system, and enhancing the city's brand image and promotional efforts. These measures aim to restore urban economic vitality, improve social stability, and lay a solid foundation for sustainable urban development. Governments should increase investment and provide fiscal support and policy incentives to drive urban economic and social recovery. Businesses should strengthen innovation capabilities and explore new development opportunities. Communities should actively participate in urban development, promoting social cooperation and co-construction. Additionally, we discuss these measures' implementation pathways and potential challenges and emphasize the importance of multi-stakeholder collaboration and cooperative platforms.

In terms of limitations and future research directions, we analyze the constraints and possible biases of the study. Due to the evolving nature of the COVID-19 pandemic, the research findings may be subject to temporal and spatial limitations. Furthermore, some mysteries surrounding urban decline still need further exploration. Therefore, we propose future research directions, for instance, an in-depth investigation of innovative urban planning and governance models and exploring sustainable urban economic and social development pathways. Meanwhile, there are many literature databases and bibliometric analysis softwares, such as Scopus and VOSviewer. This research only used Citespace and WOS and difference databases and softwares may cause different analysis results. The

data demonstrate timeliness, and over time, research on urban decline in the database is constantly being updated.

This study represents a pioneering integration of bibliometric research with the topic of urban decline, offering insights into the academic community's understanding of the impact of COVID-19 on urban decline. By examining the current state of scientific research on the global urban decline and analyzing the underlying logic of urban decline in the context of COVID-19, we have developed targeted strategies to assist regions in addressing urban decline and promoting sustainable development.

The research findings reveal that, following COVID-19, the countries primarily focused on urban decline are the United States, China, England, and South Korea. Among them, traditional developed countries, led by the United States, have formed close research collaborations in this field, while China has developed its unique approach. The main causes of current urban decline are insufficient economic development, lagging infrastructure construction, the suction effect of core cities in regional areas, and the influence of specific systems leading to unique forms of urban decline. Building upon these findings and considering the backdrop of COVID-19, comprehensive urban recovery plans can be devised, encompassing the reshaping of spatial layouts and urban planning and strengthening strategies for social and economic recovery. These efforts aim to mitigate or even reverse the phenomenon of urban decline.

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