

Sustainable Urban Planning Models for New Smart Cities and Effective Management of Land Take Dynamics

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1. Introduction

The development and management models of land use—both natural and man-made—and infrastructures, in order to be considered sustainable, must guarantee the inhabitants of the area the satisfaction of their vital needs in a way that can also continue to be implemented in the future, without conflicting with the limited availability of natural resources on the planet. The need for the urban environment to satisfy its inhabitants' basic material needs in terms of housing and hygiene, among others, without causing environmental risks, is strongly underlined in the Brundtland Commission's report, published in 1987 [1]. However, despite that the growing awareness of the need to create new sustainable urban planning models has spread among both policy makers and inhabitants, the difficulties encountered in the processes of implementing and updating the strategies promoted by the 2030 Agenda, the New Green Deal and the Paris Agreement have slowed down the achievement of the environmental, social and economic sustainability targets that had been established, especially with the advent of the 2007 economic crisis, the spread of COVID-19 and the current context of geopolitical instability [2]. These events have complicated the assessment of sustainability, bringing out its complexity and the need to have adequate models capable of capturing the dynamism of varying conditions.

The awareness of the existence of a limit to the availability of natural resources has led to experimentation and the use of new technologies in order to reduce the consumption of natural resources (and its negative effects) caused by human activities. This is the process that led to the emergence of the concept of the "smart city", which defines a sustainable city where the use of information and communication technologies (ICT) is applied to support sustainable growth in all major urban areas, such as (but not limited to) mobility, energy use, education and urban governance. The term "smart city" therefore indicates a successor to the more widespread and broader concept of "sustainable city".

The development of a sustainable and smart urban environment requires the strategic, long-term vision of the policy makers in order to create inclusive systems. Technological progress is a fundamental requirement for the development of smart cities, but it must be supported by sustainable financial instruments, suitable land use management, adequate urban planning decisions and the efficient evaluation of their related impacts on the social, environmental and economic spheres of sustainability. In accordance with the recent recovery and resilience plan within the "Next Generation EU" financial dispositions, making cities more sustainable, resilient and livable is a complex issue which requires a strategic approach based on a holistic vision that provides the inclusion of infrastructure, mobility, buildings, roads, health care services, culture, blue and green networks, etc., to pursue the path towards the established future targets [3–5]. Although extremely useful in dealing with issues relating to smart and sustainable cities, such a holistic approach is characterized by obvious difficulties in managing the complex dynamics that concern these issues; therefore, the urban system is often broken down into several components,



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individually evaluated and analyzed in such a way that each research work contributes to the definition of a homogeneous picture [6–8].

The present Special Issue (SI) focuses on addressing the main critical issues relating to sustainable urban planning models for new smart cities and the effective management of land take dynamics by collecting innovative and original research articles and reviews. Here, particular attention is given to (i) indicators- and indices-based systems, (ii) real estate evaluation models, (iii) geographical information systems, (iv) urban planning compensation schemes and (v) financial operative tools that can support the decision processes that occur during public–private partnerships in the determination of the economic–financial, social and environmental risks related to land consumption reduction.

From the eleven papers received, a total of eight original research articles—which respect the themes and proposed innovative contributions of the Special Issue and are without conflicts of interest—successfully passed the peer review process and were published. The analyses carried out were based on different methodological approaches, including regression models (e.g., multinomial logistic regression) to recently developed multi-criteria techniques (e.g., SWARA), using the support of statistical examination and expert-based discussion. The achieved results are primarily intended for public and private decision-makers and policy-makers involved in the predisposition of suitable strategies and choices related to achieving the established sustainability targets.

2. Main Topics Addressed by the Papers

In the eight published papers, different topics relating to the main themes of the Special Issue are addressed. Examining their contents, two research streams can be identified: the first relates to the built environment, focusing on the infrastructure, housing and urban planning sub-systems; the second is mainly based on land dynamics, considering both industrial and rural sites. Table 1 shows the list of published articles and the main Special Issue topics to which they contributed.

In order to capture the main contributions provided by each work, a brief summary of each of them is illustrated below.

In the paper entitled “Increased Attention to Smart Development in Rural Areas: A Scientometric Analysis of Smart Village Research”, the authors aimed to analyze smart development in rural areas, centering on the concept of the smart village, carrying out a comprehensive scientometric review of the current academic literature to contribute to the debate on which is the most recognized concept in the existing literature and practices. The contribution of this study regards the overview of the current implementation and understanding of smart village initiatives by establishing the baseline data for future analysis and comparison. Moreover, the authors found that the current trend puts a relatively narrow focus on technology-driven approaches, and meanwhile, the dimensions of society, services and culture are currently largely neglected. Therefore, a dynamic conceptual model is proposed to call for more human-driven perspectives.

In the paper entitled “The Time-Varying Effect of Interest Rates on Housing Prices”, the authors analyze the time-varying effect of interest rates on house prices in response to the COVID-19 pandemic. By employing an autoregressive time-varying parameter vector model, the authors found that, given the recent substantial increases in interest rates due to inflation, an interest rate shock would likely cause a recession in the global housing market.

In the paper entitled “Mismatched Relationship between Urban Industrial Land Consumption and Growth of Manufacturing: Evidence from the Yangtze River Delta”, the authors conducted an empirical study on the Yangtze River Delta area to reveal the spatiotemporal evolution of the mismatch between urban industrial land changes and the growth of manufacturing. Using the Boston Consulting Group matrix, the spatial mismatch model, the decoupling index, the GIS and Geodetector tools, this study provides a basis for spatial planning and land management in the new era. In particular, their results highlight that goal orientation and the scale effect of economic growth play decisive roles in the

allocation of urban industrial land and that the influences of industrial structures and technological innovation are rapidly increasing.

Table 1. List of published papers and their main topics to which they contributed.

Paper's Title	SI Topics (Expressed through Keywords)	Main Contribution
"Increased Attention to Smart Development in Rural Areas: A Scientometric Analysis of Smart Village Research"	land use policy, land deal, land take, urban policy, decision support tools	A dynamic conceptual model to call for more human-driven perspectives
"The Time-Varying Effect of Interest Rates on Housing Prices"	real estate assessment models, risk assessment, urban policy, sustainable development, finance	An interest rate shock would likely cause a recession in the global housing market
"Mismatched Relationship between Urban Industrial Land Consumption and Growth of Manufacturing: Evidence from the Yangtze River Delta"	land use policy, land deal, land market, land take, decision support tools, index, indicator-based approaches	The goal orientation and scale effect of economic growth play decisive roles in the allocation of urban industrial land
"Unlocking Land for Urban Agriculture: Lessons from Marginalised Areas in Johannesburg, South Africa"	land use policy, land deal, land market, land take, decision support tools, index, indicator-based approaches	The identification of the agricultural sites where sustainable investment in urban agriculture infrastructure should be targeted
"A Comparative Analysis of Drivers Impacting Urban Densification for Cross Regional Scenarios in Brussels Metropolitan Area"	land use policy, land deal, land take, urban policy, decision support tools	The most influential factors of the urban densification are distance to highways, secondary roads, residential roads, parks, stations, income household, mean housing and zoning.
"The Economic Spatial Structure Evolution of Urban Agglomeration under the Impact of High-Speed Rail Construction: Is There a Difference between Developed and Developing Regions?"	land use policy, land deal, land take, urban policy, decision support tools	The network density and the average economic connection of urban agglomerations have a positive trend; the number of core areas in developed regions increased; the developed regions have benefited the most from the HSR construction, whereas in developing regions, the central city with difficult topography benefits the most, and the network structure of developed regions tends to be more balanced
"Localization of the Urban Planning Process with the Knowledge-Based Sustainable Development Approach"	land use policy, land deal, land market, land take, decision support tools, index, indicator-based approaches	The findings indicate that some aspects of the social and cultural development of Urmia, Iran, were more favorable than other aspects
'Greenery as an Element of Imageability in Window Views'	land use policy, land deal, land market, land take, decision support tools, index, indicator-based approaches	A window view on nature can strongly affect a person's wellbeing and comfort

In the paper entitled "Unlocking Land for Urban Agriculture: Lessons from Marginalised Areas in Johannesburg, South Africa", the authors propose an index which can be used to identify, quantify and visualize urban agricultural land in a marginalized area of Johannesburg. Using the Charrette visioning process, indigenous knowledge systems were incorporated in the formulation of criteria, weights and rule-sets. Their contribution pertains to the identification of an inseparable existential connection between indigenous knowledge systems and contemporary sustainability planning, which is critical to ensure sustainable development, due to the capacity of the developed index to reveal the sites where sustainable investment in urban agriculture infrastructure should be targeted.

In the paper entitled "A Comparative Analysis of Drivers Impacting Urban Densification for Cross Regional Scenarios in Brussels Metropolitan Area", the authors analyzed

the various drivers that can have an impact on the urban densification of a metropolitan area of Brussels. By adopting a multinomial logistic regression model, the authors show that the effects of driving factors varied across low-, medium-, and high-density areas. In particular, the distance to highways, distance to secondary roads, distance to residential roads, distance to parks, distance to stations, income household, mean amount of housing in the area and level of zoning are the most influential factors in urban densification.

In the paper entitled “The Economic Spatial Structure Evolution of Urban Agglomeration under the Impact of High-Speed Rail Construction: Is There a Difference between Developed and Developing Regions?”, the authors studied how the high-speed rail (HSR) development causes an impact on the economic spatial structure of urban agglomeration. Based on the modified gravity model, they employed a social network analysis method; their results show that the network density and the average economic connection of urban agglomerations have a positive trend: the number of core areas in developed regions increased and the developed regions benefited the most from the HSR construction, whereas in developing regions, the central city with a difficult topography benefits the most, and the network structure of developed regions tends to be more balanced.

In the paper entitled “Localization of the Urban Planning Process with the Knowledge-Based Sustainable Development Approach”, the authors evaluated the ability to localize urban planning indicators in the city of Urmia, Iran, and determine the desirability of knowledge-based city indicators to provide coherent policies and strategies to achieve sustainable development. Through the application of the Delphi method, one-sample statistical t-test, confirmatory factor analysis and SWARA multi-criteria technique, the desirability and knowledge-based city indicators’ priority levels were evaluated. The research findings show that urban planning indicators of economic, social, physical, environmental and managerial aspects could be implemented in the city of Urmia.

In the work entitled “Greenery as an Element of Imageability in Window Views”, the authors studied the effect of visual contact with nature. Through a survey carried out on two groups of students, they ranked the quality of window views using eight indicators to find the most common understandings of the role of greenery and an ambiguity in the perception of what is meant by the term ‘texture’.

3. Conclusions

The scientific and methodological rigor and the interesting contributions provided by each published paper successfully increase and broaden the current level of knowledge on the topics considered in the Special Issue, i.e., sustainable urban planning models for new smart cities and the effective management of land take dynamics. The focus themes related to (i) indicators- and indices-based systems, (ii) real estate evaluation models, (iii) geographical information systems, (iv) urban planning compensation schemes and (v) financial operative tools that can support the decision processes that occur during public–private partnerships in the determination of the economic–financial, social and environmental risks related to land consumption reduction have been extensively addressed by numerous authors from around the world. Perhaps thanks to their origins from different continents with geographical contexts characterized by specific environmental, social, economic and political conditions, the authors featured in this Special Issue were able to skillfully analyze the issues of sustainable urban development from multiple perspectives, providing a scientific panorama that highlights both the progress achieved towards and the efforts still necessary to achieve the sustainability targets established at an international level. Every paper featured in this Special Issue aimed to achieve robust and solid results starting from real case studies, with reliable and statistically verified data, in some cases also providing decision support models concerning sustainable urban planning. From a methodological point of view, the proposed works use the most recent multi-criteria evaluation (e.g., SWARA), regression and geospatial analysis techniques in a congruous way to provide integrated methodological systems. In particular, the relevant roles of the indicators-based approaches in the developed methodologies are presented. Furthermore,

the papers of this Special Issue present the ways in which the concepts of “sustainable development” and “smart city” can be broken down into several sub-systems of analysis, which in most cases covers the land use dynamics, subdivided into rural, industrial and urban sites. Moreover, housing dynamics are considered useful in understanding the effects of COVID-19 on urbanization and the perceived future economic trends that could derive from the consequences of the 2007 economic crisis.

The investigation of urban issues at different territorial scale of analysis, characterized by several levels of complexity and stakeholders’ involvement, have allowed us to identify new methodologies and techniques to fill the existing critical gaps in sustainable development models and the related land use dynamics.

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