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The Implementation and Implications of Sustainable Development Goals at City Scale and Sustainable Urban Development Path

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Abstract: Cities were products of human social development, but the environmental pollution problems brought by high-density buildings and high-density populations in cities had become increasingly serious. The 17 Sustainable Development Goals proposed by the United Nations in 2015 were closely related to urban sustainable development issues. Based on it, this article analyzed the impact of SDGs and related theories on urban sustainable development and possible development directions. Starting from the impact of SDGs on urban sustainable development, elaborated on their impact on already implemented urban sustainable projects and relevant theories. It concluded that the future development of sustainable cities should be based on existing cities, with different focuses on developed and developing countries, but both require the protection of historical value landscapes and the greening of existing facilities. By explaining the theories and practical cases related to SDGs and sustainable cities, hoping to provide a reference and guidance for the path of urban sustainable development.

Keywords: Sustainable Development Goals, City, Sustainable construction

1. Introduction

City is an important unit of living in the current human community. Since the first Industrial Revolution started in Britain in the 1760s, urbanization has begun its process. At present, more than 55% of the global population belongs to urban population, and more than 70% of global greenhouse gas emissions come from urban areas [1]. With the continuous expansion of urban population, urban pollution levels are also rising rapidly, and sustainable development has become a problem that must be solved. The concept of "Sustainable Development" can be traced back to the report "Our Common Future" issued by the United Nations World Commission on Environment and Development in 1987, which defined sustainable development as "Development that meets the needs of the present generation without jeopardizing the ability of future generations to meet their own needs". Based on this definition, the United Nations adopted 17 Sustainable Development Goals, or SDGs, in 2015. Among the 17 Sustainable Development Goals, up to 65% of the content depends on urban action [2], with Goal 11 explicitly identifying "Building sustainable cities and communities" as a key component of urban sustainable development that promotes social inclusion, economic well-being and environmental quality in cities without compromising their ability to grow in the future [3-6].

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This paper analyzes relevant theories and ongoing sustainability attempt cases, and explores how SDGs exert their influence on sustainable transformation at the local urban scale, demonstrate the development path of sustainable urban development or sustainable transformation in the future, and provide a theoretical model for realizing SDGs at the urban scale that can be referred to.

2. Sustainable urban form

The basic form of most modern cities generally presents the characteristics of high density, radial distribution, obvious functional zoning, developed road network, green space and public space. This has shaped the commonality of modern cities: long traffic distances and extremely high space crowding. This does not seem so "sustainable".

On the basis of such a city, "New Urbanism" is derived, and "New Urbanism" breaks the single in traditional urban planning a functional, low-density and car-dependent, while advocating compact, mixed-use and pedestrian-friendly urban design [7], putting more emphasis on humanity and sustainability, advocating urban compact and core diversification, encouraging public transport and walking, aiming to create more socially cohesive and sustainable communities [8].

Sustainable cities are cities that meet the needs of existing and future residents through efficient resource use and environmental protection [7]. The form of sustainable cities in the future can be summarized into four types. Compact cities, The eco-city, Neotraditional development and Urban containment [9]. They have their characteristics and have certain commonalities, corresponding to different sustainable urban forms that may appear in the future.

Under the current urban scale, "15-Minute City" and "Three-Dimensional Ground" are relatively widely used concepts to achieve preliminary sustainable cities.

The concept of “15-Minute City” was first proposed by French urban planner Carlos Moreno in 2016. Promote a sustainable city or community where people can walk, cycle or use public transport within 15 minutes to reach facilities and services that meet their daily needs [10].

Another idea is the “Three-Dimensional Ground”, an extension of the three-dimensional transport concept proposed by Professor Colin Buchanan in the UK in 1963, also includes the development of transportation elements such as cars, walking, and public transportation, which break through the two-dimensional space dominated by the surface and extend to the air and underground [11-12]. This is the beginning of the trivialization of urban transportation elements. The urban elements accommodated by the three-dimensional ground include traffic, social public activity and natural ecology. That is, taking the ground as the center to build a three-dimensional structure of ground, underground and air traffic, society and nature, which is especially suitable for the sustainable construction of large-scale developed cities with crowded space, such as Wujiaochang in Shanghai, China [13].

In the form of a sustainable city, people are willing to use sustainable transportation modes, which saves a lot of time, and the city can also reduce the horizontal ground occupation area, and turn to sustainable transformation and other planning, so that the urban ground system is diversified and sustainable.

In Oxford, UK, sustainable development has a community-scale practice, which is called Low Traffic Neighborhoods. Its official website defines it as a “15-Minute City” attempt which was proposed in 2020 to set up barriers on some roads in the community, prohibit other vehicles except emergency vehicles, public vehicles, and bicycles from entering, create a 15-minute life circle environment in the community to promote sustainable transportation mode, and achieve local community ground diversity in the road environment. It is obvious that the sustainability of infrastructure is not limited to the transport sector, starting in April 2020, China began to set strict limits on the construction of high-rise buildings above 500 meters in cities, taking the first step to

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reduce the vertical height of the urban core, which is also the SDGs in the impact of infrastructure on cities.

In addition, resource recycling and clean energy in the SDGS are also important factors affecting the sustainable development of cities. Also in Oxford, there is another attempt to promote zero emissions, the Zero Emission Zone. The trial, which began in February 2022, will allow vehicles to enter the zone only if they meet emissions standards, while others will be denied access or will have to pay a fee - often high. In Amsterdam, the Netherlands, the city government proposed the "Amsterdam Energy Accord 2020", which aims to achieve 20% of the city's total electricity consumption from renewable energy sources, encourage the construction of sustainable buildings with renewable or recycled materials, and encourage waste separation and recycling. Promote water conservation and recycling, and encourage walking, cycling, and public transportation.

3. Implications

At present, people can see that the basic form of the city they live in is an urban form with a clear core, tall buildings and developed roads, which has a significant impact on the living habits of the urban population. The traffic time problem is one of the most widely discussed basic problems in large cities at present. Longer traffic distances and time will bring more pollutant discharge, which will pollute the atmospheric environment.

In both developing and developed countries. In recent years, the popularity of "New Urbanism" has made sustainable transformation begin to be carried out, but mostly by adding green space and other ways, and cannot produce enough effect.

In Oxford, UK, 50% of nitrogen oxide emissions come from transport. Under the LTN model, the community environment is improved, the health and safety of students, the elderly and children are taken care of, and the quality of life is partially improved. Within the ZEZ, the problems of emissions, noise and traffic are solved. This shows that the goal of sustainable cities and communities is achievable. It also demonstrates the effectiveness of the "15-Minute City" and the "Three-Dimensional Ground".

But for people who need to use cars, this increases their driving time and has a greater environmental impact. From the perspective of the city, increased sustainability within the community leads to environmental pollution outside the community, which does not actually have an effect, but instead produces "Pollution Transfer". "Pollution Transfer" means that a region moves its original pollution sources such as factories, industrial facilities, and high-density roads to surrounding areas through planning or policies, to reduce the pollution level in the local area to achieve sustainable standards. In simple terms, the sustainable transformation of a community, a region or a city is achieved by moving its pollution sources to surrounding areas, which does not meet the requirements of the SDGs, in which the SDG-17 explicitly mentions Partnerships for the Goals. The construction of a "Three-Dimensional Ground" should also prevent the misunderstanding of the expansion of transportation facilities, and ignore the natural and social parts of sustainable development.

Amsterdam in the Netherlands, one of the first cities in Europe to realize the importance of sustainable cities, has been exploring the path of sustainable transformation since the 1980s. In 2021, Amsterdam will already get more than 50% of its energy from renewable clean sources. By 2023, Amsterdam will have 100% public and green transport coverage, 40% green space coverage, and 400 kilometers of bicycle lanes, thus initially achieving the sustainable transformation of the city.

4. Development path

In view of the rapid development of global urban construction and the relatively high level of urbanization in most regions, the influence of SDGs on the urban scale does not mean to start from

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scratch and completely build new cities and urban agglomerations according to its standards, but in most cases, SDGs should be regarded as a theoretical guide. Sustainable transformation under the guidance of SDGs should be carried out according to the different situations and development levels of different cities in different regions, and sustainable development at the urban scale should be finally realized. The following will be elaborated from the two aspects of cities in developed countries and developing countries.

4.1. Developed countries

Developed countries usually have a higher level of urbanization, that is, a higher level of urban construction, more perfect urban facilities, and a larger urban population. The Urbanization Rate is the ratio of a country's urban population to its total population. In most developed countries, the urbanization rate is around 80%. This also includes the result of the special territorial factors of Monaco and Canada, but in general, the level of urbanization in developed countries is quite high.

From the perspective of history, cities in some developed countries began their urbanization process in the early days of the Industrial Revolution and the “Age of Discovery”, which also created their distinctive characteristics, that is, they have numerous historical buildings, such as London in the United Kingdom, Rome in Italy, Amsterdam in the Netherlands, and Paris in France. These cities all have modern urban areas, but their core areas are often filled with century-old buildings that have high historical value, but are often built without the space and content to support sustainable development.

Therefore, for cities in developed countries, to realize sustainable urban transformation and sustainable development under the guidance of SDGs, the focus should not be on issues such as urban hardware facilities, but should be based on the consideration of historical and cultural protection. The demolition and construction of large-scale buildings should not be carried out, and more attention should be paid to education equality and gender equality mentioned in SDGs. The "software" of climate action, animal and plant protection, the integration of industrial resources, the establishment of uniform standards and regulations, the avoidance of "Pollution Transfer" from an economic and political perspective, the consideration of clean energy and other aspects, and the construction of appropriate, restricted infrastructure where necessary, to achieve sustainable development based on the SDGs and existing developed urban systems, while avoiding further urban sprawl, resulting in waste of resources and environmental pollution damage.

4.2. Developing countries

The United Nations does not have a clear data standard line for developing countries to judge, but from the perspective of urbanization, the urbanization level of developing countries is generally lower than that of developed countries, but the urbanization level of developing countries in different regions is also different. In the process of sustainable development, cities in developing countries need to consider the basic demands of infrastructure construction and economic construction, so the relevant application content of SDGs is not quite the same.

For developing countries, urban construction and expansion as well as economic development is one of their goals. Under the influence of urban scale and SDGs, developing countries need to encourage and popularize the use of affordable and clean energy while furthering urban construction and economic development. This will help developing countries achieve initial sustainable development in the field of transport in the process of urban expansion. When considering investments in public transportation in medium-sized developing cities, a key priority should be to improve existing bus systems [14]. Therefore, in urban infrastructure construction, it is also necessary to consider the factors of sustainable development, through the construction of a three-dimensional

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transportation network, and planning "Three-Dimensional Ground" to achieve the unit land in the environment, society and traffic three factors. Similarly, for buildings or areas of high historical value, a relatively modest conservation strategy needs to be considered.

In addition, in terms of industrial facilities, developing more sustainable industries and innovating production methods should be considered, rather than simply further expanding the original environmentally polluting industries, such as using photovoltaic power generation, wind power generation, hydroelectric power generation and other ways to gradually replace the original unsustainable industrial power generation mode of thermal power generation according to their regional characteristics.

In the field of economic development, responsible consumption and production must be primarily ensured, and prevent the waste of resources caused by excessive consumerism and the environmental harm and waste caused by excessive production. At the same time, partnerships can also be carried out in the field of sustainable development according to the scale of cities, which can be in infrastructure, education, health care, resources and economy, to realize functional division of labor and cooperation between regions, and avoid waste and pollution caused by excessive development of different cities and industries.

5. Conclusion

The current urban core construction has been basically formed, and it has a profound impact on the development of the city itself and the lives of the urban population, which states that the impact of SDGs at the local scale is to carry out sustainable construction on the existing basis, that is, different forms of sustainable transformation attempt to achieve resource recycling and energy clean, which is a long-term and complex process. It must be acknowledged that the basic form of modern cities is still far from achieving sustainable development, in both developed and developing countries.

“New Urbanism” is a first step towards sustainable urban development, but more needs to be done. Although there are some practical problems at present, the “15-Minute City” is undoubtedly feasible. The ideal sustainable urban form according to the design concepts of sustainable urban form is that which has a high density and adequate diversity [9], it is an overview of the commonalities of the different types of sustainable cities that may exist, including the contents and concepts of “15-Minute City” and “New Urbanism”.

The construction of sustainable cities and the sustainable transformation of existing cities will be a highly flexible process, which requires specific sustainable development planning based on different natural environments, economic levels and infrastructure levels. The sustainable development of urban scale under the guidance of SDGs needs to be selected according to the actual conditions of different cities in different countries. More attention can be focused on non-physical conditions, pay attention to social factors such as equality issues, environmental protection responsibilities, and limit the expansion of disorderly urban infrastructure to achieve sustainable development. For cities in developing countries, it is necessary to take into account the content of sustainable development, innovate the structure and content of industries, and bring their industries closer to the requirements of SDGs while building infrastructure and economic level. At the same time, inter-regional cooperation should be carried out to maximize benefits and sustainable development levels. It is important to note that while the SDGs affect the construction of sustainable development at the city scale. It is also necessary to ensure the needs of different groups, and pay attention to avoid the misunderstanding of “Pollution Transfer” and “Three-Dimensional Traffic Expansion”. While challenges remain, the Sustainable Development Goal concept of urban communities provides a strong foundation for people to build a more livable, prosperous and environmentally friendly future [7].

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