

The Relationship Between the Changes in Landscaping and Economic Development in Taiyuan

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Abstract. This study is based on the development process of Taiyuan in the past ten years, combined with the basic policy of the state on urban planning and development. The changes in Taiyuan's industrial structure are expounded to lead to the environmental pollution caused by Taiyuan's use of heavy industry as the core of economic development. Explain the benefits of landscaping on pollution control. It also explores the direct impact of landscaping on the environment of Taiyuan and the indirect impact on the economic development of Taiyuan. It is found that there is a positive influence between the two. In addition, this article introduces the world-renowned garden building 'Punggol Town', compares the climate, terrain and other conditions of the two places, and analyses the feasibility of Taiyuan's direct imitation. Although Taiyuan cannot use the development model of 'Punggol Town', landscaping still has a broad development prospect in the economic development of Taiyuan. This article aims to introduce the relationship between landscaping and the economic development of Taiyuan in an easy-to-understand way, and to study and discuss it.

Keywords: Landscaping, economic development, transformation.

1. Introduction

Taiyuan is a city of 5.4 million people and has seen economic growth of 11 percent since 2010. The main industries are 4 and the city benefits from close transport links to Beijing. This paper aims to investigate the relation between landscaping and economic development in Taiyuan. In recent years, Taiyuan has experienced rapid economic development and prominent issues of imbalanced industrial structure, resulting in increasingly severe ecological and environmental problems. Environmental issues are the core issues that Taiyuan has to face and solve in its subsequent development process. Many studies, including this research, focus on the relationship between economic development and the environment in Taiyuan. First of all, the reason of choosing the topic lies in supporting an environmentally friendly and low-carbon life. Second, it is based on the particularity of Taiyuan City, which was previously famous for coal, steel and other heavy industrial products in China. Under the guidance of the current policy, the development of landscaping and the study of the transformation and construction of Taiyuan can provide a better understanding of such areas for this city.

2. Literature Review

2.1. Profile of Taiyuan and Its Economy

Although Shanxi is an inland province, it connects Shaanxi, Henan and other provincial capitals from east to west. Since ancient times, it has been the intermediate hub of the interconnection of the economic belt on land Silk Road and a bridge through the whole Eurasian continent. And Taiyuan is the capital of Shanxi Province [1]. It is bordered by the Fen River and surrounded by mountains on three sides. It is an ancient capital with a history of more than 3000 years. It is the capital, political, economic and cultural center of Shanxi Province. Taiyuan is a famous military and cultural center in northern China. It is also a world-famous Jin business capital. From Taiyuan Municipal People's Government, it is also one of the most important energy and heavy industry bases in China.

The early days of the founding of New China, agriculture and heavy industry in Taiyuan occupied a dominant position in the national economy and belonged to a typical agricultural society. Over the past 70 years, the industrial structure of Taiyuan City has undergone a process of continuous

adjustment and optimization. Since the reform and opening up, the proportion of the tertiary industry has been increasing, and the proportion of the primary and secondary industries has been decreasing. For example, in 2010, As Taiyuan Municipal Bureau of Statistics said, the proportion of primary, secondary and tertiary sector is 1.8%, 44.9% and 53.3%. Compare with 2020, there were a significant altering in the industry structure. The they were 0.8%, 36.2% and 63.0% in sequence, those data are from Taiyuan Municipal Bureau of Statistics as well. Although Taiyuan's economic structure is relatively simple, it has great advantages in energy, steel, construction and other industries. In addition, Taiyuan tourism has also played a certain impact on promoting economic development due to its 3000 years history. Because the structure of sectors was adjusted and the other parts such as tourism were developed by government officers' effort, the GDP of Taiyuan grow rapidly. The numbers are shown in Figure 1 below.

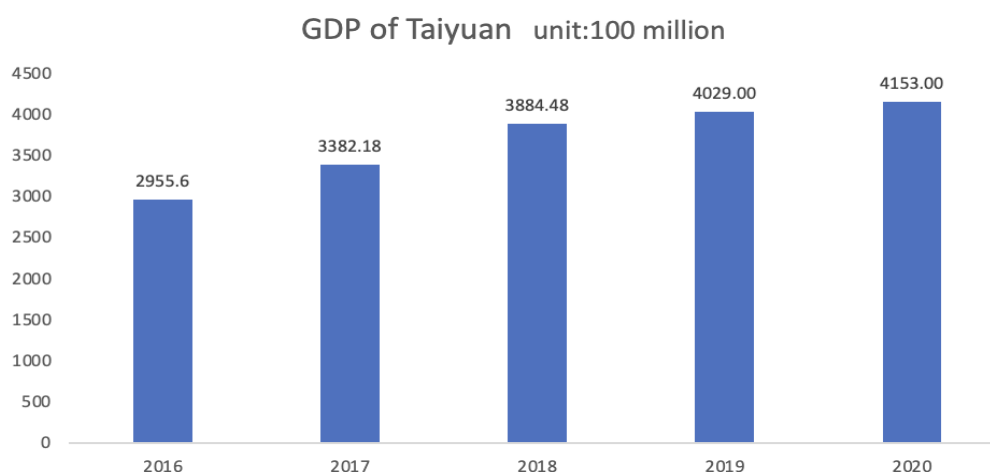


Figure 1. Gross domestic product of Taiyuan in 2016-2020 (Source: National Bureau of Statistics)
(Photo credit: Original)

2.2. Landscaping an Economic Development in Taiyuan

Landscaping is a public welfare urban infrastructure, so it cannot bring economic benefits directly to Taiyuan. But it is closely related to economic development and people's living standards. From the perspective of development, the construction of landscaping drives demolition, the construction industry can improve the tourism environment, improve the influence of Taiyuan, and then promote real estate, culture, service market, etc. And research shows that the green space rate of urban built-up areas and GDP growth per capita play a mutually reinforcing role. On the one hand, the construction of urban green space can promote the development of urban economy, from a national perspective, from China Environment News, the growth rate of green space in urban built-up areas by 1% can lead to a per capita GDP growth of 0.217%. On the other hand, economic development can also improve the level of urban greening. From the national scale, for every 1% increase in GDP per capita, the green space rate in urban built-up areas increases by 1.44%.

From the perspective of life, landscaping has a great impact on people's lives and internally affects everyone's feelings about the city. Research shows that green plants can promote the physical and mental health of office workers and improve the concentration and work efficiency of members. Moreover, more or less landscaping can have an impact on the happiness of people's lives [2].

2.3. Environmental Issues in Development

Taiyuan's heavy industry accounted for a large proportion in several decades and became the main secondary sector of the nation due to the ample mineral resources [3]. However, Long-term large-scale coal mining and steelmaking lead to the complex and serious environmental challenges of Taiyuan. Air pollution, water pollution and soil pollution are the hardest hit area of industrial pollution [4]. Among the air pollutants, PM10 and nitrogen oxides are the main pollutants, which mainly come from the exhaust emissions of large factories and enterprises. Taiyuan ranked 18th from the bottom

in the national urban air quality in the August 2014 report. In the subsequent September, October and November reports, the situation still did not improve [3]. Furthermore, the pollution sources in water and soil are the waste which is intentional discharge and unintentional leakage from chemical enterprises, 92.3% of the 26 major rivers in the province have been polluted to varying degrees, of which 84.6% have reached heavy pollution and serious pollution, and 73% of the river section does not meet the minimum water quality 5 standards which is the data from Taiyuan Ecological and Environmental Protection Bureau. The form on land desertification and forest coverage is also serious. 53.2% of the land area of Shanxi Province is covered by loose loess, drought and little rain, coupled with long-term over-reclamation, and serious vegetation damage, making it one of the areas with serious soil erosion in the country. In 2000, the total area of soil erosion in the province was 93,300 square kilometers, accounting for 59.8% of the total area of the province. Shanxi's forest resources are scarce, and the area of grassland degradation, soil desertification and desertification has expanded, exacerbating the imbalance of the ecosystem. The forest area is 3 million hectares, with a coverage rate of 11.72%, which is 2.2 percentage points lower than the national level. After adding shrubs, the forest coverage rate is only 20.1% [4].

2.4. The Challenges

Severe environmental problems not only affect the health of residents and the external image of Taiyuan, but also restrict the sustainable development of Taiyuan's economy. At the same time, the state has put forward the environmental protection concept of lucid waters and lush mountains are invaluable assets [5]. Facing the construction of garden cities across the country, the Taiyuan government said that it would take the creation of a national garden city as the overall goal, carefully create a convenient and comfortable living environment for the people. At this point, the landscaping project officially kicked off in Taiyuan.

In order to govern air pollution, the government has made adjustments to the industrial structure, the proportion of primary, secondary and tertiary sector were 0.8%, 36.2% and 63.0% in sequence.' In addition, the paper will carry out the control of key areas of air pollution such as the clearing project of loose coal and kerosene truck pollution. As of October 11, 2023, the average concentration of PM2.5 in Shanxi province has dropped to 35 micrograms per cubic meter, which is the first time since the monitoring record in 2013 has reached the national air quality secondary standard and the first phase target value of WHO, achieving a milestone breakthrough from Shanxi Provincial Department of Ecology and Environment.

For the control of water pollution, Taiyuan City fully launched the 'Jiuhe' Comprehensive Management Project [6]. They have carried out the investigation and rectification of black and odorous water bodies. In addition, the water flow of rivers and canals can be revitalized through the comprehensive improvement of pollution control, humidification, dredging, green banks and water transfer. The most significant change is the Xiaodongliu River. In addition, the government has carried out a wetland restoration project, which takes into account the ecological function on the basis of realizing the landscape and recreational functions [7].

The root cause of soil erosion lies in man-made destruction. As mentioned in 2.2, 'Taiyuan became the main secondary sector of the nation due to the ample mineral resources'. Therefore, long-term mining of coal mines and mining have caused a large area of underground mining areas, which are easy to form surface cracks, subsidence, collapses and landslides, etc., and from then on, it has caused damage to land resources [8]. Solve problems such as soil erosion and soil desertification, Taiyuan began large-scale afforestation. From the China Rule of Law Weekly, as of 2021, the area covered by garden greening in Taiyuan is 15,840 hectares, and the greening coverage rate has reached 44%; the garden green space area is 14,004 hectares, and the green space rate has reached 38.9%; the park green area is 4716.3 hectares, and the per capita park green space area has reached 12.25 square meters. Compare with 2011, there is a significant promoting on the landscaping Because the green coverage area ten years ago was only 38.01%, the green space rate was 33.16%, and the per capita

park green space was just 10.09 square meters which data from Taiyuan Municipal Bureau of Statistics.

2.5. Example of Landscaping in a Developing City

Nowadays, more and more place get benefit from landscaping. One of the famous examples is the Punggol Town in Singapore. Punggol Town is now a fully livable town with sustainable development and a good environment. However, the early Punggol was a remote fishing village in Singapore [9]. This quite prominent altering is because they have adopted a new design theory — Landscape Urbanism. Unlike traditional design, landscaping is always in a subordinate position. Landscape urbanism understands the city as an ecological system. It emphasizes that landscape is the carrier of all natural and human processes, aiming to use landscape to create a better living environment [10]. The construction of the artificial river Punggol Waterway is an important embodiment of its concept.

It connects two reservoirs with a total length of 4.2 kilometers, is the first artificial waterway built by the Singapore Reconstruction Authority. The government has designed three distinctive routes, namely, the 3-kilometer exploration route with the theme of understanding the ecological environment and history of the waterway, the 8.4-kilometer exploration route that can comprehensively explore the entire waterway, and the 3-kilometer rural route based on family leisure and cycling to watch the sunrise. Walking along the waterway, people can enjoy various natural forms such as forests, grasslands, lakes and wetlands. The fall of the Waterway has injected new vitality into the Punggol Town. It not only has greatly improved the landscape, but also promotes the development of land on both sides and promotes the common development of ecological, economic and social benefits. It has become a truly "most ecological landscaping. In Urban Design Alliance, they said, at present, the Punggol waterway and the Punggol Town construction have won many awards, such as the Singapore Design Index Gold Award, the International Livable Community Gold Award, and so forth.

The success of Punggol Waterway is no accident. It is not only because of landscape urbanism, but also because of the unique geographical location and climatic conditions of the Punggol. In terms of terrain, Punggol Town is located in the northeast of Singapore. The terrain is low and flat, facing the river from east to west, and coastal to the north [9]. As a waterfront town in Singapore's new town, the biggest feature of the Punggol is to stand by the water and live by the water. From the perspective of climate, like other parts of Singapore, the Town has a tropical marine climate. Due to the control of the equatorial low-pressure zone for many years, the climate is hot and rainy [9]. Those natural conditions create perfect factors to build the high achievement waterway.

Can Taiyuan imitate the successful example of Punggol Town to develop itself? The answer is no. Regardless of policies and other acquired factors, from the location and climatic conditions of Taiyuan, it is obvious that Taiyuan cannot imitate the famous goose town. Taiyuan is located in the northern part of the basin. From Taiyuan Municipal People's Government 's sentence, the whole terrain is high in the north and low in the south. And only one Fen River runs through the whole city from north to south. Contrary to the water on three sides of Punggol, the mountains are surrounded in the east, west and north in Taiyuan City. Even if the government officers want to imitate the Punggol Waterway, how to cross the mountains and introduce rivers is also an unsolvable issue. Another innate disadvantage is the climate. Taiyuan City is located inside the mainland. It belongs to the warm temperate continental monsoon climate, with cold winters and hot summers, and less and concentrated precipitation. Therefore, even if Taiyuan can build a waterway, it will face dryness in summer and freezing in winter.

3. Methodology

3.1. Summary of Secondary Research

So far, the use of secondary information has provided materials to discuss the following key points. Taiyuan is a thriving economic city with strong economic development. Traditional industries such

as coal and steelmaking have led to environmental challenges. The way to control pollution in Taiyuan. Taiyuan practices the urban garden policy. Landscaping has a positive impact on Taiyuan's urban development. The development level of the city and the degree of optimization of landscaping affect each other. Punggol Town is a small town that has developed on landscaping. The reason why Taiyuan cannot copy Punggol Town 's success.

3.2. The Research Gap

However, secondary sources are always out of date. Given the fast pace of development in Taiyuan, even studies written as recently as 2021 might be considered to be limited in their reliability. As such, more up to date information is needed. This is particularly the case when considering which strategies or policies might be used in future planning of landscaping in the city.

In addition, studies that consider alternative approaches to landscaping for big cities are not specific to Taiyuan – they discuss other cities – Singapore being a good example. As such, primary research conducted in Taiyuan and among a sample of respondents from Taiyuan will give a far better viewpoint of possible paths for future development.

4. Limitation and Outlook

The finding of this study has some limitation. First, this review paper is based on the author's own analysis and summary of the literature. Although it tries to be objective in the analysis process, it still has a strong subjectivity, so all findings are based on personal views. Other limitation is the limitation on the method. Moreover, because the whole article only applies the research method of secondary research, it has defects in information timeliness and information search. The data sets used for secondary analysis may be outdated, which makes them unsuitable for current research projects. Or the initial research may not be rigorous, and there may be uncontrolled biases. In terms of information search, it is impossible to find 100% of all the literature related to the research topic of this study.

This paper studies the connection between landscaping and economic development while ignoring other external factors. In the subsequent research, some first-hand research can be carried out appropriately, such as questionnaires, and interview relevant people in the industry, such as the staff of Taiyuan Economic Development Bureau and Ecology Administration, so as to understand the relationship between the two.

5. Conclusion

The purpose of this research is to explore the relationship between the degree of landscaping and economic development in Taiyuan City. Based on the existing industrial structure, this study ignores other irresistible factors affecting Taiyuan's economic development, such as the promulgation of policies, the increase or collapse of the industrial chain, etc., and confirms that there is a positive interaction between the two. This research will help to understand the impact between the two, thus adding another multi-faceted perspective to the future development of Taiyuan City.

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