

# The Decline and Revival of Traditional Heavy Industrial Cities: The Examples of Detroit in the United States and Shiyan in China

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**Abstract.** The global economic transformation has led to the gradual decline of many traditional heavy industrial cities, which makes how to revitalize these cities an important issue. This paper takes Shiyan and Detroit as case studies on the decline and revitalization of heavy industrial cities. The research in this paper concludes that the main reason for the decline of industrial cities is stagnant economic development. Both Detroit and Shiyan used to rely on the automobile industry as their mainstay, but this mono-industrial structure made the cities' economies excessively dependent on their industries. Economic stagnation has led Detroit and Shiyan to face declining incomes and lower tax revenues at different times, especially under the impact of the economic crisis. Promoting the economic revival of traditional heavy-industry cities can be done through industrial upgrading, innovation-driven and green transformation. At the same time, the city should also increase the cultivation and introduction of talent, build a talent highland and an innovation highland, and provide strong talent support for industrial transformation and development. In conclusion, the revitalization of traditional heavy industrial cities requires comprehensive economic, cultural, environmental, talent, and other considerations, the research in this paper can further explore the development paths and modes of industrial cities, and contribute to the revival and prosperity of industrial cities.

**Keywords:** Industrial Cities, Revival, Decline.

## 1. Introduction

Sustainable urban development refers to the ability of the city to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. The importance of sustainable urban development is mainly reflected in the following aspects. Firstly, sustainable urban development is conducive to improving the competitiveness and attractiveness of cities, promoting industrial transformation and upgrading, and enhancing the resilience and vitality of the economy. Secondly, cities are important carriers of human civilization and social progress and are the basis for inheriting history and culture and upgrading urban quality. Cities are the carriers of a nation's cultural and emotional memory, while history and culture are the keys to urban charm. Sustainable urban development is beneficial to the protection and utilization of the historical and cultural heritage of the city, reflecting the regional characteristics, national features, and contemporary style of the city, and upgrading the connotation and characteristics of the city. Thirdly, cities are important spaces for human survival and development and are the prerequisite for ensuring the quality of life and well-being of the people. Sustainable urban development is favorable to the construction of inclusive, safe, disaster-resistant, and sustainable cities, and meets the people's aspirations for a better life. Finally, cities are important consumers of ecosystems and resources and are key to combating climate change and preserving biodiversity. Cities are at the forefront of today's complex challenges, including the climate crisis, growing inequality, and political polarization. Sustainable urban development is conducive to building low-carbon and circular industrial systems and lifestyles, reducing the dependence of cities on natural resources and their impact on the environment, and improving the eco-efficiency and resilience of cities.

However, with the acceleration of globalization and economic transformation, many traditional industrial cities are facing serious challenges such as industrial decline, environmental degradation

and population exodus. Homogenization and a low-end industrial structure have resulted in slow economic growth and job shortages. The crude and aging urban space has led to outdated infrastructure and a low urban image; and the deterioration and pollution of the urban environment have led to the degradation of the ecosystem and damage to the health of residents. In the face of these challenges, some cities have begun the exploration and practice of industrial transformation and urban renewal, and have achieved a certain degree of economic recovery and urban transformation through the introduction of new industries, the optimization of industrial layout, the improvement of urban functions, the upgrading of urban quality and other measures; while other cities are still caught in the development dilemma, lacking effective transformation paths and innovative impetus, and are facing the risk of industrial recession and urban decline. Therefore, achieving sustainable development and revitalizations of heavy industrial cities has become an important issue.

Detroit in the United States and Shiyang in China are both traditional industrial cities mainly based on the automobile industry. However, in recent years, both cities have suffered from economic recession and become typical cases of the decline of traditional industrial cities. Currently, relevant studies have focused on analyzing the decline and revival of Detroit, a traditional industrial city in the United States, and the decline and revitalization of heavy industrial cities in China are more limited. However, the situation of China and the United States is different, which makes it impossible to solve the related problems by copying the American experience.

Therefore, this paper draws on international experience and takes Detroit and Shiyang as examples, focusing on analyzing the economic and social development status of the two cities and exploring the reasons for the decline of industrial cities and countermeasures, to provide references and inspirations for the transformation and upgrading of traditional industrial cities in China. Firstly, this paper analyses the common features and differences of the two cities by introducing the current development status of the two cities. Then, this paper analyses the main reasons for the decline of industrial cities from the perspectives of economy, environment, and population, as well as the negative impacts of these reasons on the cities, such as urban hollowing out and deterioration of the living environment. Finally, the paper proposes countermeasures and suggestions for the revitalizations of industrial cities, as well as the feasibility and effectiveness of these countermeasures. The research in this paper can provide a comprehensive perspective for understanding the development history and current situation of industrial cities, and reveal the challenges and opportunities facing industrial cities. At the same time, this paper can provide a useful reference for formulating development strategies and policies for industrial cities, and provide a guide and reference for the transformation, upgrading, and sustainable development of industrial cities.

## **2. Economic and Social Development in Detroit and Shiyang**

### **2.1. Overview of Detroit**

Detroit is located in the southeastern part of the U.S. state of Michigan, bordering the Detroit River in the Great Lakes region and across the river from Windsor, Ontario, Canada. Detroit is the largest city in Michigan and was once the birthplace of the American automobile industry and one of the most important manufacturing centres in the United States. The history of Detroit dates back to 1701, when French explorer Antoine Lamoignon de Lamoignon established a military fort and trading post on the banks of the Detroit River. Detroit became the capital of Michigan Territory in the early 19th century and was officially founded as a city in 1815. Because of its location, Detroit gradually developed into an important port and transport hub in the Great Lakes region, attracting a large number of immigrants and merchants. With the process of industrialization, Detroit also established a number of industries such as shipbuilding, railways, manufacturing, etc., and provided munitions for the Northern Confederacy in the Civil War [1]. In 1896, Henry Ford built his first car in Detroit, which opened up the automotive era in Detroit. At the beginning of the 20th Century, automotive companies such as Ford, General Motors, and Chrysler set up their headquarters and factories in Detroit, which made Detroit become the world's largest automobile production centre, and also drove

the city's population and economic prosperity [2]. In the mid-to-late 20th century, Detroit suffered a series of recessions and crises. As automobile manufacturing declined and shifted, Detroit lost a significant number of jobs and tax revenues, leading to the deterioration of the city's infrastructure and public services [3]. At the same time, racial discrimination and violent conflict exacerbated the city's divisions and turmoil. The relocation of many middle-class whites and businesses to the suburbs or other areas has drastically reduced the population of the Detroit metropolitan area, leaving behind a large number of vacant homes and impoverished residents.

## 2.2. Overview of Shiyan

Shiyan is located in the northwestern part of Hubei Province, China, in the eastern part of the Qinba Mountain area and in the middle and upper reaches of the Han River. Shiyan is one of the famous automobile industry cities in China, with the title of "Detroit of the East". Shiyan has a long history, but for a long time, it was just an ordinary mountainous village or town. In 1963, the Chinese government began to implement the third-line construction policy, the Danjiangkou Water Conservancy Hub Project, China's second automobile factory, and other projects were launched in Shiyan one after another. The local industry developed rapidly, and Shiyan became a modern automobile city, with a per capita GDP at the forefront of the country. However, after entering the 21st century, as Shiyan's automobile enterprises gradually lost their market competitiveness, Shiyan's automobile industry began to decline, leading to the stagnation of local economic development. Currently, Shiyan is one of the fourth-tier cities in China, and its economic development level is in the middle to lower level of the whole of China.

## 3. Decline of Industrial Cities

### 3.1. Stagnant Economic Development

The most important reason for the decline of industrial cities is the stagnation of economic development. This problem consists of two aspects, the first is the decline of traditional industries as the pillar of the economy, and the second is the stagnation of the development of new industries. Both cities, Shiyan and Detroit, used to rely on the automobile industry as their pillar industry, and this single industry structure has great potential problems. The single pillar industry is the main tax source of the city, and the city residents are mainly engaged in this industry and its affiliated industries. When the pillar industry for various reasons after the decline in efficiency, the single industry dependent on the economic development of the city will inevitably be greatly affected. In its heyday, most of Detroit's revenue came from the automobile industry, and many Detroiters worked in automobile-related jobs. However, due to the impact of the oil crisis in the 1970s and the economic crisis in the 1980s, as well as the competitive pressure brought by the rapid development of related industries in Europe and Japan in the same period, the efficiency of the U.S. automobile industry has been declining continuously, which greatly affected Detroit's economic development and shook its position as a global automobile manufacturing centre [3]. The impact of the financial crisis in 2008 intensified the decline of the U.S. automobile industry and also intensified the decline of Detroit as well as its bankruptcy. Shiyan prospered in the 1960s due to the Second Automobile Manufacturing Plant and reached its heyday in the mid- to late-20th century. In the mid-1990s, when Dongfeng cars were selling well, Shiyan ranked among the top 10 in the country in per capita disposable income. However, affected by the financial crisis in 2008, coupled with Dongfeng Motor Company's (the former Second Automobile Manufacturing Plant) business strategy blunders, corporate efficiency has declined over the years, workers' incomes have declined, the city's tax revenue has decreased, and the economy has been greatly impacted. The stagnant development of new industries is also another important reason for the city's decline. Detroit in the second half of the last century has tried hard to promote the recovery of the city's economy through the development of a cultural economy represented by the tertiary industry, such as the construction of urban entertainment districts, the development of sports facilities, etc., but still ended in failure [4]. In recent years, Shiyan has also

made great efforts to develop the cultural tourism industry and specialty agriculture in the hope of promoting economic development. However, due to the downward pressure on the economy, these initiatives have not been as effective as expected.

### 3.2. Serious environmental problems

The development of industrial cities is usually accompanied by serious environmental problems, which become more and more prominent after the decline of the city, seriously affecting the quality of life of urban residents and the recovery of the city. Traditional industrial cities are dominated by heavy industries, such as the iron and steel industry, coal industry, petroleum industry, automobile industry, and so on. These industries inevitably pollute the surrounding environment during the production process. These pollution problems can cause population exodus, thus aggravating the decline of industrial cities. Detroit had very serious air pollution from the late 1800s to the early 1950s, which was closely related to the well-developed steel industry in the area [5]. This problem seriously affected the quality of life of Detroit's residents and was one of the major reasons why higher-income groups in the area moved out of the city. The trend of population exodus has led to fewer residents in Detroit, a rise in housing vacancies, and an increase in urban hollowing out, which has accelerated the decline of Detroit. Shiyang faces mainly problems in ecological protection. As the core water source area of the South-to-North Water Diversion Project, Shiyang is responsible for the drinking water safety of hundreds of millions of people in northern China, and shoulders the important responsibility of ecological protection. This means that Shiyang's economic development is given lower priority than ecological protection in its entirety. Under this premise, the development of heavy industry as well as part of light industry and agriculture in Shiyang has been severely restricted, which has made it more difficult to revitalise Shiyang's economy.

### 3.3. Significant population exodus

Population exodus is also an important cause of the decline of traditional industrial cities. Massive population loss will first lead to a reduction in business activities in cities, which will result in lower tax revenues and a decline in the quality and efficiency of infrastructure and public services, affecting the normal functioning of the city. The situation is further aggravated by the decline in residents' incomes that accompanies population loss [6]. Population loss means that the local settlement attraction is reduced, which will lead to a shortage of talent, affecting the development of local high-tech industries that have a high demand for high-end talent. Both Detroit and Shiyang have experienced population exodus. According to the U.S. Decennial Census, Detroit's population was 713,777 in 2010 and 639,111 in 2020, a decline of 10.5 per cent, resulting in a serious outflow of population. In addition, according to the bulletin of the sixth and seventh national population census of Hubei Province, the population with university (meaning college and above) education in Shiyang was 390,666 in 2020, accounting for 12.17 per cent of the total population, while the population with university (meaning college and above) education in Shiyang was 252,245 in 2010. Therefore, from 2010 to 2020, the percentage of the population with university education in Shiyang City has increased by 4.62 percentage points. In 2020, 15.50% of Hubei Province's population, or 8,952,500 people, had a university education, while in 2010, 5,456,340 people, constituting 15.50% of the total population, had a university education. Therefore, from 2010 to 2020, the percentage of the population with university education in Hubei Province increased by 5.97 percentage points. The proportion of population with a university education in Shiyang is much lower than the average level of the province, which reflects the phenomenon of brain drain from Shiyang.

## 4. Revitalisation of Traditional Industrial Cities

### 4.1. Economic development

To promote the economic renaissance of traditional heavy industry cities, it is necessary to give full play to their industrial advantages, achieve the transformation and upgrading of traditional

industries and optimise the industrial structure. Transformation and upgrading, optimising industrial structure. Traditional heavy industrial cities should accelerate the elimination of backward production capacity and low value-added products, implement the green, intelligent and service-oriented transformation of traditional industries, and improve industrial quality and efficiency [7]. At the same time, they should make use of their own resource endowment and location advantages to develop industries with special characteristics and potentials and create regional advanced manufacturing bases and industrial clusters. In the 14th Five-Year Plan, China pointed out that it would support the transformation and upgrading of industries in old industrial cities and resource cities to develop in a high-quality direction [8]. The report suggests supporting Tangshan, Baotou, Anshan, and other "steel cities" through technological innovation, extending and expanding advantageous industrial chains, and fostering the development of new industries. Detroit and Shiyuan, both of which have developed automotive industries, can make full use of their advantages in the automotive industry and combine them with today's economic development trends to launch products such as electric vehicles, realise industrial transformation and upgrading, and thus promote economic recovery.

In addition, the economic recovery of traditional heavy industrial cities requires adherence to an innovation-driven strategy, the search for emerging growth points and the cultivation of new economic dynamics. Traditional heavy-industry cities should increase investment in science and technology innovation, build innovation platforms and bases, promote the deep integration of industry, academia, research and application, and cultivate and develop high-technology industries, strategic emerging industries and modern service industries, to form new competitive advantages and growth points. For example, Pittsburgh, driven by innovation, has transformed itself from a "steel city" to a "high-tech city", and has become a global innovation centre in the fields of artificial intelligence, biomedicine and robotics. Detroit and Shiyuan can, like other cities such as Hong Kong, make full use of their local cultural heritage to develop their cultural and tourism industries and explore new growth points in their economies [9]. Detroit's aggressive use of its industrial heritage to develop tourism might be a good example [10].

#### **4.2. Improvement of the human environment**

Promoting the economic revival of traditional industrial cities should also focus on updating urban public services and facilities and improving the quality of life of urban residents. Traditional heavy industrial cities should organically combine industrial transformation and upgrading with upgrading the quality of urban public services and facilities, optimize the spatial layout and functional configuration of cities, improve urban infrastructure and public services, and enhance the comprehensive carrying capacity and attractiveness of cities [10]. In addition, green transformation is also one of the priorities for the development of traditional heavy industrial cities. Traditional heavy industrial cities should accelerate the realisation of low-carbon development, strengthen ecological environmental protection and governance, promote green manufacturing and clean production, build a clean, low-carbon, safe, and efficient energy system, and gradually realise safe carbon reduction. At the same time, they should actively develop the circular economy and green finance, promote resource conservation and use efficiency, and achieve coordination and unity between economic and social development and ecological environmental protection.

#### **4.3. Talent and Scientific Support**

Traditional industrial cities should open up and cooperate to expand their development space. Traditional heavy industrial cities should actively integrate into national and regional development strategies, strengthen collaboration and linkages with neighbouring cities and regions, and create cross-regional economic regions and innovation centres for mutual benefit and win-win results. At the same time, traditional industrial cities should actively participate in international exchanges and co-operation, introduce foreign advanced technology, management experience and human resources, expand international markets and partners, and enhance international influence. For example, the Ruhr area in Germany has transformed itself from the "Coal and Iron Capital" to the "European

Capital of Culture" through openness and cooperation and has become one of the largest metropolitan areas in Europe. Shiyian and Detroit should find their own positioning as regional centres, strengthen exchanges, cooperation and communication with neighboring cities, and form a perfect city network, so as to promote their own renaissance.

Talent support to enhance development momentum. Shiyian Detroit and other traditional heavy industrial cities should increase the cultivation and introduction of talent, build talent highland and innovation highland, and support the urgent need for talents for industrial transformation and development. At the same time, it should improve the talent incentive mechanism and service system, create a favourable environment conducive to talent growth and innovation and entrepreneurship, and stimulate the creativity and vitality of talents.

## 5. Conclusion

In this paper, the causes of urban decline and the path of revival of Detroit in the United States and Shiyian in China are investigated by using the case study method. Both Detroit and Shiyian are traditional industrial cities mainly in the automobile industry, but they have suffered from economic recession in recent years, which has become a typical case of the decline of industrial cities. This paper first introduces the geographic location, historical background, and development status of the two cities, and finds that both Detroit and Shiyian belong to the traditional industrial cities dominated by the automobile industry, but the main social contradiction of Detroit is the urban class division, and the main dilemma of Shiyian is the backwardness caused by the weak economic development. Then, this paper analyses the main reasons for the decline of industrial cities. Stagnant economic development affects the income of city residents as well as city tax revenue, which has a negative impact on city development; environmental problems limit the process of city development, which has a negative impact on the recovery of traditional industrial cities; and population exodus leads to the reduction of normal activities in the city, and increased hollowing out, which is not conducive to the development of the city. Finally, the paper proposes countermeasures and recommendations for the revitalization of industrial cities, including the combination of taking advantage of their own industrial base and finding new industrial growth points to promote economic development, upgrading the quality of urban infrastructure and public services to promote the improvement of the human environment, and launching relevant policies to promote regional cooperation and the cultivation of human resources, as well as the feasibility and effectiveness of these countermeasures.

This paper focuses on the qualitative research of automobile industry cities, and in the future, a variety of quantitative methods can be used to measure the effects of the implementation of various revitalization measures, so as to provide more precise opinions on the development of the relevant cities.

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