Proceedings of the 2nd International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/62/20231311

Using the PESTLE Method to Analyze the Relationship Between Sustainable Development and Economic Growth: A Comparison of Chengdu, China and Sheffield, UK

Yini Chen[1,a,*]

[1]*Pengzhou Jiaxiang Foreign Languages School, Chengdu, Sichuan, 610051, China*
a. tianfeifan@bfsu.edu.cn
**corresponding author*

Abstract: Sustainable development and economic growth have become increasingly important issues in modern society. Since the concept of sustainable development was proposed, countries have been exploring ways to achieve sustainable development under the premise of good economic development. This article takes two friendly cities, Chengdu in China and Sheffield in the UK, as examples and uses the PESTLE analysis method to comprehensively analyze the relationship between sustainable development and economic growth, and make a comparative analysis of the two cities. Based on this, the study found that economic growth and sustainable development have a mutually reinforcing role. Economic growth is beneficial to the realization of sustainable development, and sustainable development also promotes economic growth. Sustainable development and economic growth can be achieved simultaneously in a number of ways. Therefore, it is suggested that all regions should promote coordinated development of the economy, environment, society, and other aspects to promote high-quality sustainable development in the region.

Keywords: sustainable development, economic growth, Twin Cities, PESTLE

1. Introduction

Sustainable development means meeting the development needs of the present without compromising the development needs of the next generation [1]. Countries around the world have always attached great importance to the issue of Sustainable Development. The Millennium Development Goals set by the United Nations were unanimously adopted in 2000, and 17 Sustainable Development Goals have been adopted since 2015. These two goals cover many aspects of life, education, environment and so on, and are important carriers of sustainable development. The achievement of these sustainable development Goals is closely related to economic development [2]. Economic development can either harm or promote sustainable development, and sustainable development can also help regions achieve economic growth. If the connection cannot be drawn, it is easy to make the conflict between economic growth and sustainable development, causing irreparable losses to the environment, economy and society.

The PESTLE model is a widely used analytical tool for identifying and assessing the external factors that affect the strategic planning and decision-making of businesses and organizations. The acronym stands for Political, Economic, Sociocultural, Technological, Legal, and Environmental

© 2023 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2754-1169/62/20231311

factors [3]. This article will apply the PESTLE model to analyze and compare the sustainable development and economic growth of two cities: Sheffield, in the UK, and Chengdu, in China. The economic growth levels and their development status in terms of technology, law and policy, environment, and society in the two cities will be analyzed separately to determine the relationship between economic growth and sustainable development. At the same time, the development status of the two cities will be compared, the similarities and differences in the development of the two friendly cities will be analyzed, and some improvement suggestions will be given.

The research subjects of this article are Chengdu, China and Sheffield, UK. Chengdu and Sheffield became sister cities on March 23, 2010. Sister cities refer to two cities (or provinces, states, counties, and other local entities) in different countries that carry out all-round exchanges and cooperation in politics, economy, culture, and other fields to enhance friendly relations and promote bilateral economic and trade development [4]. Through the comparative analysis of these two cities, this study can explore the impact of sister cities on economic growth and sustainable development, fill the gap in such research, and compare the similarities and differences in the development paths of the two cities to provide more reasonable recommendations. At the same time, this article will use the PESTLE analysis method to comprehensively analyze the relationship between economic development and sustainable development based on multiple factors, rather than being limited to analyzing environmental or tourism factors like most articles.

2. Description of Chengdu

Chengdu is located in the southwestern region of China and is the provincial capital of Sichuan Province. It has a land area of 14,335 square kilometers and a resident population of 21.268 million. Chengdu is one of the fastest-growing cities in China. It is an important national high-tech industry base, commercial logistics center, and comprehensive transportation hub. It is also an important city in the western region and a significant electronic information industry base. As of the end of 2021, there were 130 national-level innovation platforms and 54 national-level enterprise technology centers in Chengdu. At the same time, Chengdu, as an important transportation hub, connects China with Asia and other parts of the world, which is of great strategic significance to attract foreign investment and international trade. Over the past few decades, Chengdu has attracted many multinational corporations to establish regional headquarters or research and development centers in the city, with 312 Fortune Global 500 companies settling in Chengdu. It was also the host city for the 31st World University Games.

2.1. Economy

The economic environment of a city is determined by various factors, such as the level of economic growth, unemployment rate, inflation, currency exchange rates, and trade policies. In Chengdu, the economy is characterized by a combination of traditional industries, such as agriculture and tourism, and high-tech industries, such as ICT, biotech, and new materials. According to the Chengdu Statistics Bureau, since 2011, Chengdu's economy has steadily developed with a stable increase in gross domestic product. As of 2021, Chengdu's GDP was approximately 1.99 trillion yuan, and the disposable income of all residents has significantly increased. The direction of Chengdu's development has undergone significant changes. Compared with 2000, Chengdu has reduced the proportion of the primary industry (agriculture, forestry, animal husbandry, and fishing, but excluding professional and auxiliary activities in agriculture, forestry, animal husbandry, and fishing) from 10.7% to 2.9%, while the proportion of the secondary industry (including mining, but excluding professional and auxiliary activities in mining, manufacturing but excluding repair and installation of metal products, machinery and equipment, electric power, heat power, gas, and water production and supply,

DOI: 10.54254/2754-1169/62/20231311

and construction) has slightly decreased. Chengdu has emphasized the development of the tertiary industry (other industries besides the primary and secondary industries) with a proportion of 66.4% (Figure 1) [5].

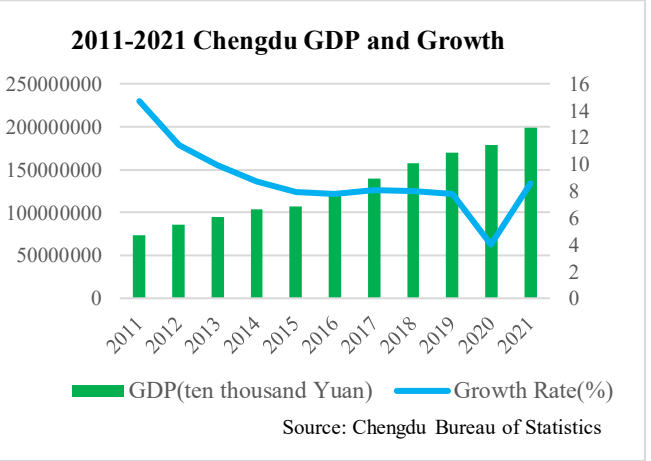

Figure 1:2011-- 2021 Chengdu GDP and Growth Rate

2.2. Politics

Political factors play a crucial role in shaping the business and investment environment of a city. In Chengdu, the government has implemented a series of policies and measures to encourage innovation and entrepreneurship, including the "Made in Chengdu 2025" plan and the "Mass Innovation and Entrepreneurship" campaign. The government has also designated Chengdu as a national innovation hub and established several incubators and accelerators to support startups and SMEs.

2.3. Technology

Over the past decade, with the stable growth of the economy, Chengdu's development in science and technology has been enhanced. The number of domestic and foreign enterprises settling in Chengdu has been increasing year by year, bringing a large number of employment opportunities and constantly increasing the number of employees. Chengdu has also been increasing its investment in scientific and technological innovation. In 2021, Chengdu invested a total of 67.275 billion yuan in research and development project funds, an increase of 16.789 billion yuan from the previous year, with a growth rate of 33.25%. The intensity of research and development (R&D) investment (the ratio of R&D funds to the regional gross domestic product) was 3.17%, an increase of 0.06 percentage points from the previous year and an increase of 1.08 percentage points from 2012. The per capita funding calculated based on the full-time working hours of R&D personnel was 600,000 yuan, an increase of 56,900 yuan from the previous year. While emphasizing the importance of technological innovation, Chengdu has also strengthened its infrastructure construction, including transportation, energy, information and communication technologies, to promote sustainable development. For example, Chengdu is an important transportation hub in southwest China where five railways converge. Since 2010, Chengdu has opened 12 subway lines with 540 stations connecting various districts and counties within the city. Chengdu has two airports that connect with many domestic and foreign regions. In 2022, both airports had a passenger throughput of over 10 million, greatly promoting economic development. Although Chengdu has made great investment in scientific and technological development, the city has also achieved an increase in net profits from technology from 1.82 million yuan in 2014 to 8.7 million yuan in 2021 through various means such as scientific and

DOI: 10.54254/2754-1169/62/20231311

technological consulting, technology development, and technology transfer, promoting economic growth.

2.4. Society

With the continuous development of Chengdu's economy, the city's social security, health, education, and other aspects have been improved. This article will take health and education as examples to demonstrate the construction of sustainable development under economic growth conditions in Chengdu. The number of medical institutions in Chengdu has grown from 4,293 in 2010 to 12,497 in 2021, and the number of hospital beds has increased from 69,500 in 2010 to 160,800 in 2021. The medical security system in Chengdu is also constantly being improved, enabling more people to have access to fair medical resources and timely treatment. At the same time, the education in Chengdu is also developing continuously with education expenditure increasing each year. As of 2021, the net enrollment rate for primary and junior high schools in Chengdu has reached 100%, ensuring the implementation of nine-year compulsory education and providing fair educational resources. In addition, Chengdu has 58 ordinary universities and colleges and 36 graduate schools, providing high-quality education resources. The construction of public libraries and adult higher education institutes also provides opportunities for lifetime learning for the public. The development of health and education improves people's lives and provides a foundation for achieving sustainable development. It is of great significance for future talent cultivation and economic development.

2.5. Environment

Environmental factors refer to the natural and ecological conditions that affect the sustainability and resilience of a city. With the rapid development of the economy, the environment often suffers serious impacts. Chengdu gradually began to pursue green development since 2017. By 2021, Chengdu has achieved remarkable results in green development. According to the "Chengdu Green Low-Carbon Development Report (2021)" released by the Chengdu Ecological Management Bureau, Chengdu has carried out green sustainable development in various aspects. In terms of industrial structure adjustment, Chengdu has implemented an action plan to strengthen the industry chain, integrating and building 12 ecological industrial circles and 20 key industrial chains. It has also created 34 national-level green factories, 4 green design products, 4 green industrial parks, and 2 green supply chain management companies. The city has cultivated key green and low-carbon industries such as photovoltaic and lithium-ion batteries, with a cluster of trillion-level industries taking shape. The overall revenue of the city's green and low-carbon enterprises reached approximately 190 billion yuan. In terms of green transportation development, Chengdu has accelerated the construction of a low-carbon, high-efficiency, three-dimensional and multi-level green transportation system. The total length of urban rail operation reached 558 kilometers, and rail transit accounted for more than 60% of the public transport share. To expand green travel methods, the coverage rate of bus stations 500 meters in urban built-up areas is 100%, the sharing rate of motorized public transport in the core areas of central urban areas is 60.5%, and the average number of shared bicycles is about 2.2 million. In terms of low-carbon energy transformation, Chengdu has implemented clean energy and realized the global zero of coal-fired boilers, with non-fossil energy consumption accounting for 45.9% and clean energy consumption accounting for 64.4%. Chengdu added 108,000 new energy vehicles in 2021, an increase of 163%, and the number of new energy vehicles is 266,000. 34,000 new charging piles and 711 charging stations were built, ranking first in the number of charging piles and charging stations in the central and western regions.

In terms of ecological environment improvement, Chengdu has introduced the country's first emergency response plan for severe ozone pollution weather, and the number of days with excellent

DOI: 10.54254/2754-1169/62/20231311

air quality throughout the year has reached the best level since the implementation of new air quality standards. Chengdu has implemented a pilot reform to integrate supply and discharge clean treatment, achieving full coverage of sewage treatment in 24 industrial parks at or above the provincial level, and building the first batch of Tianfu Blue Network demonstration projects covering 96.7 kilometers, with all national and provincial control sections meeting the annual water quality requirements. Chengdu has also deeply built an environmental governance system. The city has issued the country's first regulation for park-city construction, as well as local regulations such as regulations for prevention and control of atmospheric pollution, regulations for management of household waste, and measures for prevention and control of oil fume pollution in catering services [6].

3. Description of Sheffield

Sheffield, situated in the heart of the United Kingdom within South Yorkshire, England, ranks among the eight largest cities in the country. With a population of approximately 555,500 residents and covering an area of 368 square kilometers, Sheffield has evolved significantly from its 19th-century steel industry roots. Today, it stands as a diverse economic hub, celebrated for its contributions to sports and technology [7].

3.1. Economy

In Sheffield, the economy is heavily dependent on the advanced manufacturing sector, which includes aerospace, automotive, and medical devices. According to the Sheffield City Region Growth Hub, the manufacturing sector contributes £7 billion to the local economy and employs over 60,000 people. The local government has also been promoting the development of other industries, such as healthcare and creative industries.

3.2. Environment

In Sheffield, the city has been actively promoting sustainable development and environmental protection, with initiatives such as the "Green City Strategy", the "Clean Air Plan", and the "Zero Waste Sheffield". The city has set targets to reduce carbon emissions, promote renewable energy, and improve air and water quality. Sheffield is also a member of the "C40 Cities" network, which aims to tackle climate change and promote sustainable urban development. By promoting green and sustainable modes of transport, protecting green Spaces provides new jobs and quality regional services. Renowned as the most environmentally friendly city in the UK, Sheffield boasts an impressive natural landscape, featuring over 170 woodlands, 78 parks, and 10 public gardens. These abundant green spaces, interconnected through a comprehensive network of public trails, provide accessible recreational areas for the local community, all within a convenient 5-10 minute walk for most residents [8].

3.3. Politics

In Sheffield, the politicians and policymakers have been actively supporting the growth of innovation and technology-based industries, such as advanced manufacturing, biotech, and digital technologies. The local government has established various initiatives and funding schemes to attract high-tech companies and research institutions, including the creation of the Advanced Manufacturing Research Centre (AMRC) and the establishment of the Sheffield Innovation Programme.

DOI: 10.54254/2754-1169/62/20231311

3.4. Technology

The technology industry in Sheffield is very diverse, with prominent areas including advanced manufacturing, industrial automation, biotechnology, medical devices, and digital technology. Sheffield has many high-tech companies, such as Ericsson, Boeing, and General Electric, which have invested and established factories in the region, contributing to the local economic development. At the same time, the emerging manufacturing sector in Sheffield is rising, such as the development of advanced titanium materials and the application of 3D printing technology, which will also bring new development opportunities to the city's technology industry. Sheffield has multiple technology industrial parks, such as the Advanced Manufacturing Research Centre and Innovation Center, which have attracted a large number of high-tech enterprises to settle in, providing them with modern office environments and technology facilities, allowing them to be more focused on scientific research and technological innovation. In addition, technology industrial parks have also attracted a lot of venture capital and angel investment, providing financial support for the local technology industry.

3.5. Society

In Sheffield, the city's multicultural and diverse community is a vital asset that contributes to the creativity and innovation of local businesses. The city has a vibrant arts and culture scene, with various festivals, events, and venues that attract both locals and tourists. Sheffield has also been actively promoting sustainable living and environmental education, with initiatives such as the "Green City Strategy" and the "Walkley Vision". Sheffield is a university town and sports capital. Famous universities in Sheffield include the University of Sheffield and Sheffield Hallam University. The two universities bring many students to the city each year, many of them from other countries. Due to the large number of secondary school students in its population, Sheffield has many bars, cafes, clubs and shops, as well as many residential housing for students, contributing to the local economy. At the same time, Sheffield is also a sports capital, is the world's oldest football club home, sports history has a long history, once hosted the World University Games. The city has many high-level sports and leisure facilities, which has promoted the upgrading and transformation of the industrial form of the whole city, and 2.5% of the city's citizens are employed in the direct sports industry. Because of sport, Sheffield has achieved good economic, social and environmental benefits.

4. Comparison of Chengdu and Sheffield

In March 2010, Chengdu and Sheffield officially became sister cities, deepening cooperation in science and technology, trade, transportation, sports, education and other aspects [9]. This article will discuss the similarities and differences between the UK city of Sheffield and the Chinese city of Chengdu in their economic and sustainability practices.

Overall, both Sheffield and Chengdu are striving to achieve sustainable development and economic growth, albeit with different priorities and challenges. Sheffield is focusing on the advanced manufacturing sector and promoting innovation and creativity, while Chengdu is diversifying its economy and promoting high-tech industries. Sheffield has a well-developed legal and business environment, while Chengdu is facing challenges in protecting intellectual property and ensuring regulatory compliance. Both cities have initiatives to promote sustainable development and environmental protection, but Chengdu faces more urgent environmental challenges than Sheffield [10].

However, they still have something in common. First of all, both cities attach great importance to the development of education and carry out in-depth cooperation in the field of education. The two cities not only establish cooperative relations between higher education institutions (such as Sheffield

DOI: 10.54254/2754-1169/62/20231311

Hallam University and Sheffield College establish inter-school cooperative relations with Chengdu University and Chengdu Vocational and Technical College respectively) and exchange visits to participate in education promotion meetings and project docking, but also cooperate in the field of preschool education and basic education (such as the establishment of Sheffield Primary School in Chengdu). Secondly, the two cities, as the former host of the World University Games, also have similar development paths in the field of sports. Both cities have built many high-quality stadiums and actively hosted various sports events to achieve economic development. In addition, the two cities also have similarities and close cooperation in green construction. Chengdu attaches great importance to green and sustainable development and constantly improves and improves, while Sheffield, as a famous green city in Europe, has a lot of experience in environmentally sustainable development, so Chengdu also actively carries out in-depth cooperation with Sheffield in environmental greening. In October 2010, the Chengdu Foreign Affairs Office and the British Consulate signed the "Chengdu - UK World Modern Garden City Sustainable Development Cooperation Memorandum" to cooperate in sustainable urban planning and architectural design, low-carbon development, energy conservation and new energy [8]. To sum up, Chengdu and Sheffield share many similarities in sustainable development and economic construction.

5. Conclusion and Suggestions

In conclusion, the PESTLE model provides a useful framework for analyzing the external factors that influence the sustainable development and economic growth of cities. By applying this model to Sheffield and Chengdu, we can see that both cities have strengths and weaknesses in different areas and are facing different challenges. However, both cities are committed to achieving sustainable development and are making significant efforts to promote economic growth, innovation, and environmental protection. By learning from each other's experiences and best practices, these cities can accelerate their development and contribute to a more sustainable and prosperous future.

Through the research, there are still some recommendations for them to help them achieve the sustainable development and economic growth better. Firstly, encourage cross-Industry collaboration: Sheffield and Chengdu should encourage cross-industry collaboration between businesses, universities, and research institutions. This collaboration fosters innovation, promotes technological advancements, and maximizes the potential of the cities' leading industries. Such collaborations can also address environmental concerns, improving sustainability and resilience. Secondly, encourage government policies that foster growth: Local authorities in both cities need to encourage the implementation of policies that enable innovative and resilient economic growth. Creating environments for investment and networking opportunities will enable the growth of SMEs and startups and enhance the growth of high-tech industries. Thirdly, increase emphasis on sustainable development: The cities should prioritize sustainable development to address environmental concerns, attain long-term, inclusive growth. Sheffield and Chengdu must continue developing their green initiatives, incentivizing sustainable investment, and encouraging sustainable production. Lastly, foster a sustainable public transport system: Sheffield and Chengdu ought to invest more in sustainable mobility solutions, encouraging mass transit, biking and walking which reduces congestion, and ultimately lowers pollution levels. The development of smart transportation systems, including traffic management systems, will also reduce carbon emissions and enhance the environmental sustainability of the cities.

However,there are still some shortcomings in this study. Because the author collected little data on Sheffield, the analysis may be incomplete and incomplete. At the same time, as sister cities, there are few cooperation materials between the two cities, and it is impossible to clearly analyze the impact of cooperation between the two cities on the economic and sustainable development of both sides. Based on this, researchers are expected to collect more comprehensive and complete data in future

DOI: 10.54254/2754-1169/62/20231311

studies to improve the impact of sister city cooperation on their economic growth and sustainable development.

References

[1] *Giddings, B., Hopwood, B., & O'Brien, G. (2002). Environment, economy and society: fitting them together into sustainable development. Sustainable Development, 10(4), 187–196. https://doi.org/10.1002/sd.199*

[2] *Lior, N., Radovanović, M., & Filipović, S. (2018, April 3). Comparing sustainable development measurement based on different priorities: sustainable development goals, economics, and human well-being—Southeast Europe case. Sustainability Science, 13(4), 973–1000. https://doi.org/10.1007/s11625-018-0557-2*

[3] *Wang Jinghui.(2015). External risk analysis of Shandong local refining enterprises under the framework of PESTLE. Chemical Engineering Management (19),114-115.*

[4] *Zhou Jianjun. (2022). International friendship cities relations research on the influence of the export trade of Chinese cities (Ph.D. Dissertation, central university of finance and economics). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDTEMP&filenam e=1022589810.nh*

[5] *Chengdu Bureau of Statistics. (2023, March 10). [Chengdu Statistical Yearbook 2022]. Retrieved September 10, 2023, from https://cdstats.chengdu.gov.cn/cdstjj/c155009/2023-03/10/content_55e834f929054755931293fde 6d64cba.shtml*

[6] *Chengdu Bureau of Ecological Environment. (2022, November 23). [Chengdu Green and Low-carbon Develo pment Report (2021)]. Retrieved September 10, 2023, from https://www.sc.gov.cn/10462/10464/10465/10595/2 022/11/23/abe81d2fd14e4008ad22167569295fdf.shtml*

[7] *Liu Dongfeng.(2011). The strategy and inspiration of building the image of Sheffield City through large-scale sports events. Journal of Shanghai sports institute (01), 30 to 33. Doi: 10.16099 / j.carol carroll nki jsus. 2011.01.009.*

[8] *Lili Ni & Qinghua Zhang.(2021). Sheffield, UK: Design Strategy for Improving pedestrian environment and Promoting urban renewal. Beijing Planning and Construction (01),54-56.*

[9] *Ding Tian Tian. (2017). Global view the next national actors in its role in foreign affairs (master's degree thesis, Beijing foreign studies university). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201702&file name=1017173157.nh*

[10] *Aldieri, L., & Vinci, C. (2018, October 2). Green Economy and Sustainable Development: The Economic Impact of Innovation on Employment. Sustainability, 10(10), 3541. https://doi.org/10.3390/su10103541*