Investigation and Analysis of Dunhuang's Economic Issues

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Abstract. This paper provides a research of the housing prices and over depending on tourism in Dunhuang and ways to solve the problems. Overall, these results suggest that the government can control the housing prices by increasing the minimum down payment and solve the tourism problem by developing the cultural tourism further or make the city brand.

Keywords: Dunhuang; Price-to-income Ratio; Sustainable Economic Development.

1. Introduction

Dunhuang is a city with long history and culture--where Zhang Qian(-114BC), an explorer from Han dynasty in the 2nd century BC [1], went to the western regions and established the Silk Road in the place in 115B. C. E. Later, Silk Road has become the origin in Chinese history to connect China and foreign countries [2].

Surprisingly, Dunhuang's economy now has faced some challenges. Previous study has showed that the GDP growth in Dunhuang is the lowest compared to other cities in Jiuquan. Among all the compositions of the Gross Regional Products in Dunhuang, the tourism industry consists 34.33% of the total GDP in Dunhuang. Whilst Real Estate consists 4.39% of the total, which is the fourth highest among the tertiary industry. There is a positive relationship between the housing prices and tourism which shows that every 1% increase in the agglomeration of tourism industry will caused a 0.11% increase in the housing prices in Dunhuang [3].

The two issues have huge impacts on the economic development in Dunhuang. Thus, the paper offers a new model for understanding the affordability of Dunhuang's housing prices, over depending on tourism, what caused the two problems and ways to solve them since the two issues have received considerable critical attention when it comes to how to maintain the sustainable development of a certain city.

Up to now, there has been little definitive evidence about the housing prices and economic structure there as most previous study have suffered from low response rate of solving the problems. The aim of this paper is to understand the views and experiences of the two problems Dunhuang facing and find new methods to solve these problems, which has not been formally studied.

2. Methodology

Ting Xu's study [4] of the relationship between Interest Rates, Income, GDP Growth and House Prices assumed that the income of the residents and GDP growth are the main factors which influence house prices. There has been reliable evidence that tourism consists 60% of Dunhuang's GDP. Thus, quantitative research is needed to collect the information of over depending on tourism in Dunhuang.

The study used primary research and secondary research. It combined the quantitative and qualitative approaches in the investigating of the housing prices and tourism industry. The quantitative research is the secondary research including the GDP, income, housing price and PIR in Dunhuang. The qualitative research is primary research including interviews, which compare the opinions between citizens. Using mixed methods allows for a broader rich diversity of data in this discussion.

A quantitative approach was employed since it can quantify the changes in the housing prices these years and problem of the affordability of the housing price. Previous studies have based their criteria for selection of the affordability of housing prices on Price-to-income Ratio. The study uses

qualitative analysis in order to gain insights into what the citizens think of the housing prices and specific policies the government made in solving the problem of over depending on tourism.

The research data in this thesis is drawn from three main sources, the Gansu Statistics Bureau, the National Statistics Bureau and the Housing prices website. These data will be visible and provide information of the connection between housing prices and living standard.

2.1 Housing Price-to-income Ratio Model

To better understanding whether the housing prices in Dunhuang are affordable, the Housing-Price-to-income model was used. This is the formula of housing price-to-income ratio:

$$PIR = \frac{HP}{HI} = \frac{AR \cdot AF \cdot n}{AI \cdot n} = \frac{AR \cdot AF}{AI}$$

HP refers to the sales price of each house, which is the product of the average unit area price of housing (AR), urban per person housing building (AF), and the population of the urban household(n); HI refers to the income of the citizens there, which is income of urban residents (AI) multiply the average population in every household(n). Generally, the higher the PIR is, the lower the residents' affordability, and the higher the degree of speculation demand or the possibility of a real estate bubble in the real estate market [5]. Internationally, the reasonable range of PIR is between 3 and 6.

2.2 Interview

The participants of the research were comprised of three citizens who live in Dunhuang and a staff who work in Dunhuang's Tourism Administration. Two of them work in the tourism industry and the other work as a driver. In this research, the equipment was recording devices: one mobile phone. The interview questions such as 'Do you think that tourism is a very important part in Dunhuang's economy?' were designed to answer the two questions the dissertation focus on.

- Whether the income of the local people there can afford the housing prices?
- The situation of over depending on the tourism industry of the economy there.

3. Reporting Results

3.1 The High Housing Prices in Dunhuang

Economic growth has not kept pace with housing prices growth is the main problem Dunhuang facing now. Ting Xu's study [4] of the relationship between Interest Rates, Income, GDP Growth and House Prices assumed that the income of the residents and GDP growth are the main factors which influence the housing prices. The low increase in GDP causes the problem of not affordability in housing prices.

3.1.1 GDP

From figure 1, the differences in GDP between China, Lanzhou and Dunhuang are highlighted. The GDP in Dunhuang was once the highest among the three whilst after 2017, it suddenly decreased and the GDP is now below the national level. Two discrete reasons emerged from this. Firstly, Dunhuang's economic structure is not sustainable. The Statistics Bureau in Gansu illustrated that the revenue growth in tourism industry was around 5% in Dunhuang, which is higher than the GDP growth. As time went by, the over depending on tourism can lead to a low increase in the economic growth as the tourism industry is the main issue which helps the economy to grow [6]. Secondly, Dunhuang's lack of talents. One interview participant (the official) commented:

'Actually, Dunhuang don't have many talents since Dunhuang doesn't have many opportunities for those talents. Maybe if the government can offer some money for attracting the talents.'

Fig 1. The comparison between China, Dunhuang and Lanzhou's GDP per capital
(National Statistics Bureau)

Figure 2 represents the comparison of growth rate between Dunhuang and the nation. The results to emerge from the data is that Dunhuang's growth rate in GDP was around 20% during 2010 to 2013. No significant increase was found between 2014 and 2016. Changes in the growth rate in GDP in Dunhuang was compared with China and Lanzhou which shows that the economic growth level is below the nation and capital city. However, the housing prices is still increasing.

Fig 2. The growth rate of GDP between places
(National Statistics Bureau)

3.1.2 Income

Increasing in the income can cause the increase in housing prices [4]. It can be seen from figure 3 that the disposal income in Dunhuang has increased 41.5 % whilst in China, it increased 46.9%. The

significant difference between the national disposable income and the income in Dunhuang represents that the development in Dunhuang is lower than China. The evidence presented suggests that the income could not match the increase in the housing prices, which can be caused by the over depending on tourism.

Fig 3. The disposable income in Dunhuang and China
(National Statistics Bureau)

3.1.3 Housing Prices

The houses can be divided into two kinds, the new houses and second-hand houses. Second-hand houses refer to the houses that were purchased again in the market [7]. From the chart, the second-hand housing price in Dunhuang was once higher than the new houses. However, the prices of the new houses increasing constantly and exceeded the second-hand housing prices in 2014. In a study conducted by Li [8], it was shown that the China's excessive financial support for the real estate industry, for example the housing credit loan, is the cause of the increasing in the housing prices since people can borrow money from the bank to invest in the real estate.

Fig 4. The housing prices from 2011 to 2019 in Dunhuang
(Gansu Statistics Bureau 2019)

In 2019, Yin and Ma [5] provided an analysis of determining the affordability of the housing prices by using the Price-to-income ratio. As shown in Figure 5, Dunhuang's PIR first decreased and then increased. On average, PIR of Dunhuang is in the international reasonable range (4-6). However, comparing with other cities in China, the PIR in Dunhuang is low as shown in figure 6.

Fig 5. PIR of Dunhuang (Gansu Bureau of Statistics, 2019)

Fig 6. The comparison between PIR
(National Statistics Bureau 2020)

A number of issues were identified differently through the qualitative research. All the three citizens indicated that the houses they bought are new houses. Two of them bought their house during 2010 to 2015 whilst the other bought the house in 1997. In all cases, the informants reported that they bought their houses by getting a loan (mortgage) from the bank. One informant reported that:

“In Dunhuang, most families are very traditional and the parents will buy the first house for their children. Though compare to other cities, the housing prices in Dunhuang is not high, but Dunhuang's income is low as well. That's why I think the housing price is high for the youth to afford.”

Comparing the two results, it can be seen that the housing prices there are still not affordable for citizens and more policies should be made to control.

3.2 Over Depending on the Tourism Industry

3.2.1 Results of the Secondary Research

Previous studies of the economy there have shown the weakness of the economy system of the tourism city [6]. The weakness of the tourism city refers to the dependence of the city on the tourism industry as all the factors related to the tourism can affect the economy. Whilst Dunhuang's tourism industry was considered as the Resources-Based tourism, which depends heavily on the culture and natural resources [9]. Thus, Dunhuang's economy can be influenced if the culture or natural resources were over used. Figure 6 presents the proportion of different categories of the industries. Among all the industries, the tertiary industry consists 62.54% of the total GDP in Dunhuang with 34.33% of tourism industry [10]. Compared with China, around 11% GDP come from the tourism industry. That is why the industrial system in Dunhuang is supported by tourism, which can cause risks and sustainability problem to the economy [11].

Fig 7. The share of the contribution of the industry in Dunhuang (Gansu statistics Bureau 2020)

From the chart below, it can be assumed that the expenditure on tourism is increasing every year. However, less money had been spent in the development of technology. Only one third of the expenditure in tourism industry has been spent in technology.

Fig 8. Tourism spending and expenditure in Dunhuang

3.2.2 Results of the Primary Research

All the four participants expressed the belief that Dunhuang's economy was depended heavily on the tourism industry. The number of tourists increased 700%. One participant (a woman works in the travel agency) commented:

"Dunhuang's economy is really depending on the tourism industry. There is a local saying that if those who work in the tourism industry can't make profits, then the whole industry in Dunhuang is facing the problem of bankruptcy".

4. Discuss the Findings

4.1 The Reasons behind the Increase of Housing Prices

4.1.1 Reasons Why the Housing Prices are not Affordable

The current study found that the PIR in Dunhuang was within the limits of international reasonable PIR (4-6). Surprisingly, all the interviewees there argued that the housing prices are too expensive to afford. This result may be explained by the fact that the increase in GDP and income could not match the increase in housing prices in Dunhuang. There are several reasons to explain why the development in Dunhuang's GDP could not match the high housing prices, though it is still increasing. The over depending on tourism may be a reason. The tertiary industry has consisted 62.54% of the total GDP. The insufficient diversity in industrial development would impose the economic development since the industrial structure leads to the failure to change rapidly when problems arise [12].

Another reason may be citizens' investment in real estate in order to gain asset wealth [13]. One informant reported that he would buy another house in Dunhuang since he considered the housing prices is still increasing. These results can be related to the increase in the total tourism revenue from 42.8 million RMB to 374.2 million RMB over the ten years. Since the number of tourists and revenue increased, the demand of the houses also increased as investors buy property in the hope of letting out housing for tourism. The two economic problems are related to each other.

4.1.2 Impacts

The high housing prices make citizens unable to afford new houses. Two out of three of the interviewees announced that they bought the houses by borrowing loans from the bank. There is an unambiguous relationship between the individuals risks and the loan [14]. The change in the exchange rate which leads to those foreign investors leaving the market could increase the individual investors' risks in the housing market. Besides, high housing prices could increase the gap between wealth [15]. In macroscopic view, the high housing prices may cause inflation in the society [16].

4.2 The Over Depending on Tourism Industry

4.2.1 Reasons of the Over Depending on Tourism

Firstly, Dunhuang is place with abundant tourism resources. It is reported that Dunhuang has cultural resources such as Grotto culture and Silk Road Culture. For natural resources, Zhou [9] attempts to show that Dunhuang has 7 scenic spots above the national A scenic level.

This rather intriguing result may be related to government policies. On October 17, 2015, more than 30 cities along the "One Belt, One Road" in China jointly established the "One Belt and One Road" Urban Tourism Alliance in the ancient capital Kaifeng. Li's study [16] found that "One Belt, One Road" helped to promote the regional cooperation and the global economic development. In the Belt and Road Cultural Exhibition, the government invested 30 billion in the tourism projects. Last year, 1.25 billion was spend in construction of the tourism industry. The government supports could deepen Dunhuang's over depending on problem.

4.2.2 Impacts of the Issue

This combination of findings provides evidence to the impacts of over depending on tourism in Dunhuang. For individuals, it may influence normal people's life. Since Dunhuang has low season

and peak season every year for the tourism industry. As one interviewee (a woman who works in the tourism agency) said: ‘Dunhuang attracts thousands of tourists around the world every year. And we are busy from May to October. And idle during winter.’ For citizens, they might face the problem of losing their jobs during the low season and the unemployment rate will increase as well. Another individual who is a driver stated that ‘Nowadays, due to the pandemic, Dunhuang’s Economy has been influenced badly. In early July, I could still earn 500 to 1,000 per day since there are many tourists whilst now, I can only earn 100-200.’

Previous studies have reported that the increase in the tourists has caused the limitation of the water resources. Liu [12] found that the water resources per square kilometers is 4.8% of the national average. The study indicated that the water uses per person deceased 60 m³ in the past 10 years, which has influences on local people.

Fig 9. Water use per person in Dunhuang and China
(National Statistics Bureau 2020)

It also influenced the economy there. One participant made comment of the over depending on tourism problem. ‘If tourism is paralyzed, Dunhuang’s economy will also be paralyzed.’ In a follow up study, protecting the environment of the scenic spot in Dunhuang is the key issue for the economy to sustain since it has many natural resources. It has been demonstrated that the maximum resource space carrying capacity is 9750 person per day [12]. However, the number of tourists per day have reached 28,000 people in 2019.

It has been observed in the Water level dynamic map of the Spring that in the 40 years, the water level decrease 9.98m, 0.24m every year. The situation could lead to the decrease of water resources in Dunhuang, which will cause the economic problem. There is a surprising outcome that in the past 18 years, the government has spent 4.1 billion RMB in the Crescent Spring to let water sustain. Although up to now, Crescent Spring still doesn’t reach the goal made in 2011, let the water level of crescent Spring return to 2 meters [17], it is continuing to rise. The participant (the official) commented:

“As the water level increase, (Cyprinus carpio var. specularis) a special kind of fish which once disappeared, appearing again due to the increasing of the water level.”

Further studies, which take these variables into account, assumed that Dunhuang’s government should spend around 1.1 billion to 1.5 billion in protecting the natural resources in Crescent Spring every year [2]. The investment in protecting the natural resources is the leading cause of the low development in the economy since the money is spending in those areas instead of other industries.

5. Suggestions

5.1 Lower the Ratio to Mitigate the High Housing Prices Issues

The observation of the housing prices supports the hypothesis that government should continue controlling and regulating the housing market. In 2010, the government first published the restriction in buying house in Beijing [18]. Later, the First-tier and second-tier cities have purchased this restriction to control the housing prices. This policy will be helpful since up to 2018, the new house sales in Beijing has decreased. One interview announced that: ‘We can buy houses when we want to buy. They are hardly any rules that forbid citizens to buy more than one house.’ It is also suggested that Dunhuang’s government can control the housing prices by decreasing the percentage that the housing market is allowed to increase as China’s housing market is monopolized by the government [16]. In recent years, the ratio has been controlled in 9%. To help in controlling the prices, the government can change the standard from 9% to 8% or even lower.

5.2 Developing on the Cultural Tourism and Technology

One of the suggestions towards over depending on tourism is that the government could invest more in the technology instead of the tourism industry. A study by Cao [19] reached that from 1996 to 2015, the average growth rate of technology development for the economy is 26.3%. Compared to the tourism industry which only have an average of 6.29% per year [20]. As one interviewee (the government official) put it: ‘Since Dunhuang doesn’t have many opportunities for those talents. Maybe if the government can offer some money for attracting the talents.’ Figure 9 represents the change in the expenditure in Dunhuang. It is assumed that more money should be spend in developing the technology and change the natural tourism into cultural tourism.

The expenditure in the different issues in Dunhuang

Annual	Total expenditure(million/RMB)	Government Expenditure in tourism (million/RMB)	Government Expenditure in technology (million RMB)	Expenditure for environment protection (million/RMB)
2010	146858	2978	1089	6831
2015	295831	6276	2985	9535
2018	377223	7252	2574	12782
2019	395159	8485	2939	10652

Fig 10. The expenditure in Dunhuang
(Gansu Statistics Bureau 2020)

Another way to sustain the economy is by developing cultural tourism and build the city’s brand. Since the tourism industry there is a Resource-based tourism [11], building image such as Mogao Grottoes and Crescent Spring can be helpful. A further study will be needed to use social media to spread the brands.

6. Conclusion

This paper has discussed a mixed of two economic problems Dunhuang facing and how can the government solve the problems.

This study indicated a link between the GDP, income and housing prices to establish a quantitative framework for detecting whether the housing prices are affordable and reasons why the economic growth could not match the growth in housing prices. Based on the quantitative and qualitative

research, it can be concluded that the housing prices there is not affordable to most citizens. There is, therefore, a definite need for publishing the restrictions or decrease allowable rate of increase in the market. Furthermore, controlling the over depending on tourism is important since it influenced Dunhuang's economic growth.

To solve the over depending on tourism problem, the government there can further develop its city brand or develop other industries such as technology. Also, the over depending on tourism problem have caused the decrease in the clean water resources and the decrease in the water level of the Crescent Spring. Therefore, more protective policies should be made in preventing the destroy of environment.

Overall, the research provides a new insight into how citizens considered the two economic problems. The findings of this study have several important implications for future practice. It suggests several courses of action for changing the use of the funds. Government should expenditure more in changing the tourism industry into cultural tourism, protecting the environment around Crescent Spring, and controlling the housing prices.

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