

Exploring Sustainable Policies for Xidi, the World Heritage Village

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Abstract: *The preservation of the historical town xidi is under debates. There are many different perspectives on how to conserve the historical towns by using tourism as a policy tool, from strict conservation policy to remain authenticity, to tourism growth development policy and the community development orientated policy. This study attempts to develop a holistic a system dynamics model to analyze the interaction of the social – economic – heritage sectors to examine policies to achieve the goal of development and conservation. The study shows that conservation alone cannot lead to its own goal. Economic development strategies could be a better choice if the development is careful planned and effectively controlled to avoid over consuming resources.*

Key words: *world heritage town, system dynamics modeling, Xidi, heritage conservation, tourism development.*

1 Introduction

The preservation of historical village or towns is a challenging task worldwide. Tourism has served as the major driving force to rejuvenate the historical towns but is always considered as a damaging factor for the heritage, especially for the places with the world heritage titles. For community developers, neither the tourism development strategies nor conservation strategies has fully considered local residents' interests in development. These controversies have been discussed by various policy decision makers, stakeholders and researchers. Related policies and regulations have been developed accordingly. However, most of the policies are often based on one perspective and lack of a systematic analysis. The long term dynamics patterns are seldom examined. This paper presents a case study on exploration of effectiveness of the tourism development and community development at a world heritage site - Xidi village.

2 The case study

Xidi village is the only world heritage site for a rural settlement in China. It is located in the middle of China, Anhui Province. Although for a long time in its history, Xidi remained as a poor rural village depending on the farming, it managed to thrive in the later years. In the Qing Dynasty, most of the men in Xidi went out for living quite successfully either as business men or as high officers. Nevertheless, they never really left the home village since they still considered the rural village to be the real home and remitted money back to build the magnificent houses and paid the relevant costs. They settled down again in their big houses after retired. In the late Qing Dynasty, the community gradually declined because fewer and fewer people could obtain the official positions and business environments were difficult. The community again turned back to farming. Without financial sources from outside, the villagers could not sustain the formal cultural landscape and some of the houses began to collapse. The formerly glory village turned into a deserted one. But this deserted situation helps Xidi to avoid the destruction by various development movements. Up to now, there are still over 300 heritage buildings in the village with over 100 well preserved.

In 2000, Xidi and Hongcun were accepted as the World Heritage by UNESCO. On the UNESCO Website, Xidi is included as a world heritage site due to the following reasons¹:

- *Criterion (iii): The villages of Xidi and Hongcun are graphic illustrations of a type of human settlement created during a feudal period and based on a prosperous trading economy.*
- *Criterion (iv): In their buildings and their street patterns, the two villages of southern Anhui reflect the socio-economic structure of a long-lived settled period*

¹ <http://whc.unesco.org/en/list/1002>

of Chinese history.

- *Criterion (v): The traditional non-urban settlements of China, which have to a very large extent disappeared during the past century, are exceptionally well preserved in the villages of Xidi and Hongcun.*

The discovery of heritage value Xidi was due to the closeness to Huangshan Scenic Mountain which has been the most famous tourist site in Chinese history. In the early 80s, a few cultural tourists paid a short visit to Xidi while visiting Huangshan and “discovered” the value of Xidi. Gradually the word of mouth spread out among architecture academicians and led to the promotion and submission of the world heritage application. Meanwhile, the local community observed the tourism opportunity and started their tourism village company in 1986.

Tourism has been growth since 1990s and jumped to a high level when Xidi got the world heritage title (Figure 1). Since then, the former quite and poor village has turned into a busy and crowded tourism destination. With the increased income, the community and the households can also afford the restoration and preservation of the heritages.

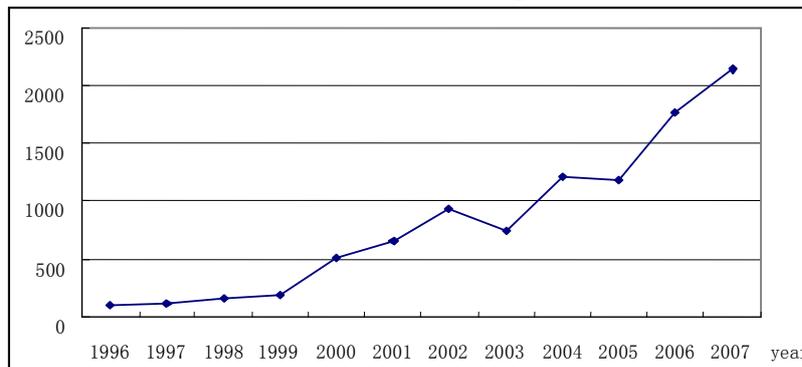


Figure 1 The tourism income of Xidi (unit: 10,000 MB)

However, compared with the other heritage towns, the local government has a strong control over the preservation, these measures include the reallocation of the local communities to reduce the pressures on the old houses and mitigate the risks of changing house structures for the need of modern life; the strict control of small shops and other business activities to avoid “over commercialization; and a controlled process of restoration of the houses by the owners. These measures have raised conflicts between administration and local residents. To certain extent, the strict control behavior is considered as a successful model of the world heritage preservation.

However there are also patterns which show some potential changes in the long run of the village such as:

2.1 The economic change

The importance of tourism for the villagers in terms of employment and income has been increasing. The community company allocates the tourism income to every person

who has the HUKOU (an official identity) in the village annually. In the early days of tourism development, this share was insignificant in the household income (Figure 2). Nowadays, the ratio tends to be high, reaching 37% at the average family income in 2007. For those families who do not operate the small business or off-farm business, the tourism income from the community company becomes a key source. In addition, with the development of tourism, more and more lands have been turned into the parking areas, resettlement lands and hotels etc. The cultivated lands for each person have been reducing. It is impossible to make a living on agriculture. More and more people are attempting to open a small tourism business, or to be employed in the service sectors (Figure 3).

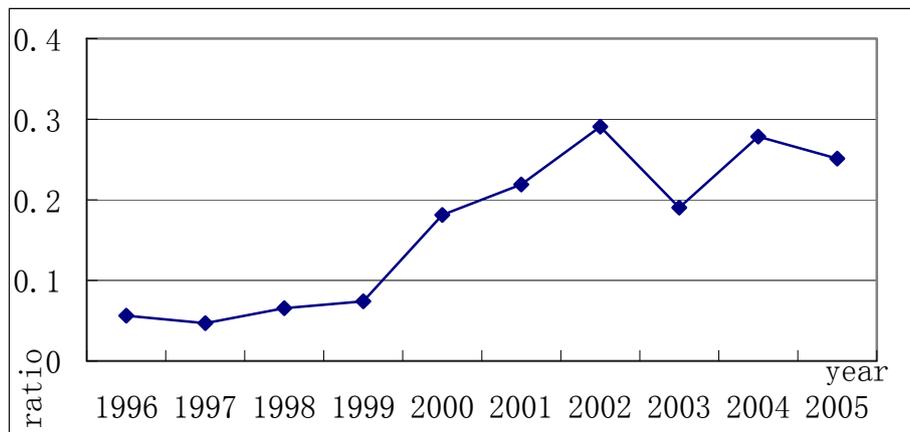


Figure 2 The historical pattern of tourism income out of total income per villager

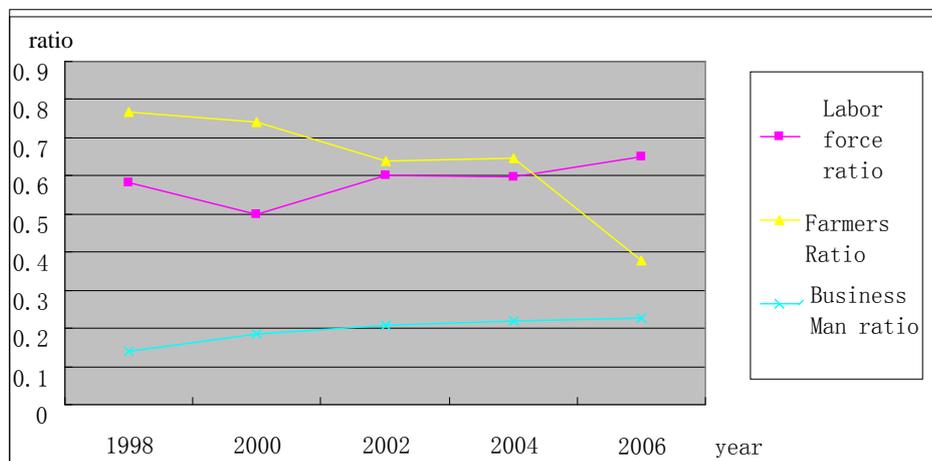


Figure 3 The historical pattern of employment pattern

2.2 Social changes

With the economic changes, social structure changes are also occurring which is reflected spatially in the village. There are three major streets from east to west and two streets from north to south. The initial tour routes were designed to go along the east to west streets and return through paddy fields. This route covers 22 major attractions and majority of the villages.

However, the real tour route led by the tour guides was very different from the designed one. The tour route was concentrated along the middle street only covering part of the community. As the result, the community was differentiated according to the distance to the tour route. Those who live in the tourist areas can have a chance to open a small shop, restaurants or other business; or rent out their rooms to the outsiders or even neighbors. For the non-tourist areas, the residents have to be employed by those who live in the tourist areas to earn a living as their lands are all turned into infrastructure. Table 1 shows the differentiation of the community.

Xu's study (in print) pointed out that the concentration of the tourist area followed a dependent path (Xu, et al, in press). Cultural, market structure, political and the community structure all contributed to this phenomenon. Among these, the differentiation of the community enables those who have already benefited from tourists to be powerful to protect their own business and avoid diverting the tourists to the other areas.

In addition to the internal change of the community, the increase of the migration also contributes to the complexity of the community. By the end of 2007, there were over hundred immigrants who were attracted by the employment and business opportunities in Xidi². Those who were engaged in the business by renting from the local villagers are normally from the near towns and villages in the same county. There were 50 of them. They did not stay in the community and only used this place as a working place. There were also about 90 migrate employees inside the village, who normally lived in the community but only considered them as temporal migrants and would leave it once they had owned enough money or find another job.

Table 1 The differentiation of the community

Location	Housing condition	Job opportunity	Resident attitude towards Heritage architectures
located along the major lanes	house for tourism	tourism	Pay attentions on housing maintenance, and will to repair their house by themselves, not just waiting for government's report.
Near by the major lanes	house for maintain	farming or migrant	Pay attentions on housing maintenance, but would not spend much on it.
Far away from the major lanes	house idle	migrant or farming	Seldom repair their house

Source: field trip (2008, 2009)

2.2.1 Low tourism satisfaction level

Due to the over concentrated tourist areas, tourists are often frustrated, especially during

² Data resource: 2007 Rural cooperative statistical report of Xidi

the peak time when they can hardly move. The voices from different tour guides interact and it is difficult for the tourists to follow the tour guide into the heritage houses. As a result, the length of stay for each tourist also reduces from one to half an hour. The overall income from tourists is therefore reduced.

2.2.2 Selective preservation of the physical heritage

Local government has a strong sense of preservation of authenticity of the historical village. The authenticity and integrity are regarded as the important factors in evaluating world heritages. Since there are no operational guidelines of the authenticity, the authenticity is often interpreted as the preservation of the physical buildings in the original status when the world heritage is announced and the living style of the people also has to remain the “old style”. Still, the physical condition of the heritage is not satisfied. Two outstanding problems need special attention.

The first is the lack of maintenance of the heritage buildings. The restoration and the maintenance of the historical houses are the responsibility of the owners. In order to avoid the owner converting their houses into business places, the local government strictly controls the restoration process. Application has to be submitted for the approval which can only be carried out by accredited Restoration Company. For a substantial number of the owners, the restoration and maintenance are time and cost consuming if these houses are not in the tourist areas or not used for tourist business.

The second one is that much of the public space and paddy fields has been converted into tourist infrastructure or new residential areas. Since the World heritage Plan of Xidi emphasizes on the building parts of the village, the surrounding paddy fields are regarded as the buffer zone, most of the construction are developed in this area. Xidi is planned as a boat shape, indicating the possibility to move easily in case some disaster occurred. Now, as the paddy fields and nearby valleys are all heavily constructed, the boat is not a light one any more. The atmosphere as a rural surrounding is losing.

Observing the patterns of Xidi heritage village, calls for formulating new policies from various stakeholders are obvious. A dynamic system approach is selected to model the decision making process in this village regarding to quality of life and the tourism development in order to facilitate the exploration of policies to achieve a balanced path for sustainable development.

3 The model structure

The model is composed by four sectors: community, heritage architecture, tourists, and land.

3.1 Community

Community includes the local residents, immigrants and the second home owners.

3.1.1 Local residents

The local residents are changed by the natural birth and death rates and also by the migration rate. In order to differentiate the migrants from the other places, the local resident migration is described as the off-farm labors. The official registered local population in Xidi is almost leveled off in the last several decades due to the constraint of birth control policy. However, the actual local residents who stay in the community reduce due to the off-farm activities in the big cities by young people. The percentage of the young people in the community drops dramatically although their HOUKO is still with the village and the community structure becomes unhealthy.

The dominant motivation to emigrant of the local is the discrepancy of expected income between rural and city (Todaro, 1969). Studies (e.g. Zhao, 1999) shows that rural labors prefer to find a local nonfarm work than to migrant unless they would earn much higher incomes, as there are many deterrent factors involved whilst working away from home, such as the lack of safety, forced separation from families. Accordingly, migration is affected largely by the availability of rural non-farm employment opportunities. If the local income and local job opportunity rise, off farm labors would return. Otherwise, locals continuously go out.

Local expected income includes three parts: average local wage, local daily spending, and local tourism income which are becoming more important with the fast development of tourism. Local tourism income ratio is significantly affected by the Hukou (household registration) system. Only when a person owns this particular identity can he/ she get the tourism income allocation from the community company. This shared income attracted many off farm labors to return, especially when the annual allocation rose (Zhang, 2009). In the same time, the increase of average local wage is limited, especially when the increased rate is compared with the rising of local consumer price index due to tourism consumption.

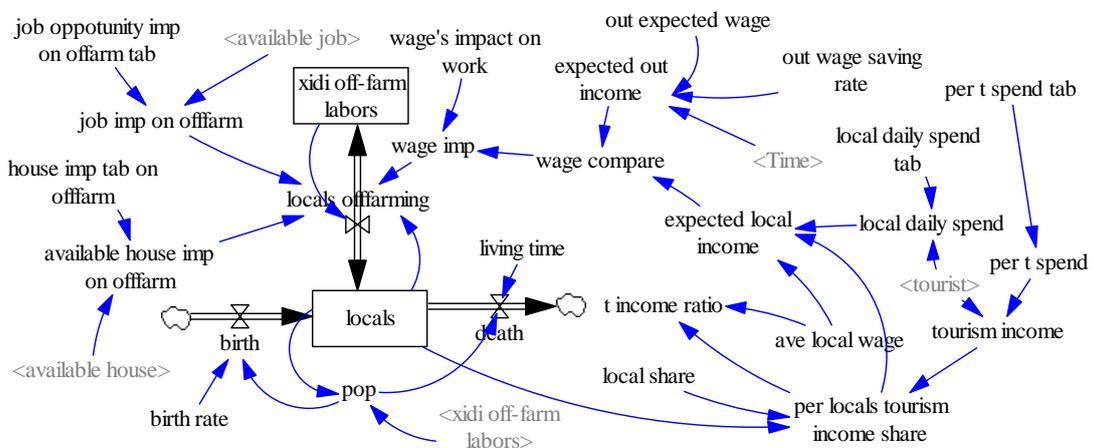


Fig. 4 dynamic model for local residents sector

Note: t represents tourism or tourist

3.1.2. immigrants

Immigrants are another issue for the heritage town. Most of the stakeholders have negative opinions on the immigrants because they are more competitive in small business operations and also in job obtainment compared to the local residents. The inflow of the immigrants is considered to impact the authenticity of the local community. As a result, the local government has placed some restriction on the migrants, still migrants keep on flowing. The drivers to make a decision to immigrate are complex. There are three factors affecting immigrants' decision, available house in Xidi which also reflecting the crowdedness of the local population, crowdedness of the tourists and job opportunity in Xidi. The impacts of these three factors are given by three table function as it is difficult to measure their real influence.

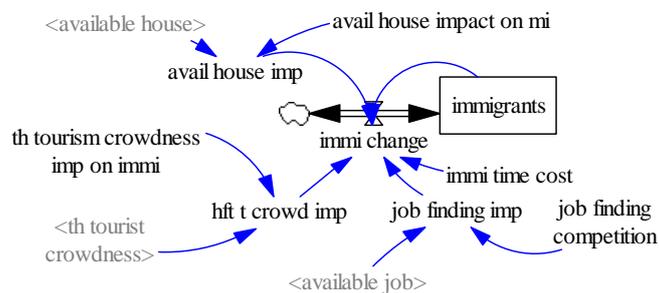


Fig. 5 dynamic model for immigrants sector

Note: th represents tourism house

3.1.3 Second home owners

Some idle houses have been sold to outer persons as second home. The expansion of tourism activity and the world heritage brand attract the migration of art and leisure entrepreneurs to buy the resident houses as their second home though it is illegal. The number of second home is impacted by policy, crowdedness and the price of the old houses (Hoogendoorn et al 2005).

3.2 heritage architecture

Heritage architectures are the main tourism attraction now. The houses are in different conditions. In the model, we construct four statuses: idle houses, residential houses, tourist houses and second home. Initially, almost all houses are residential houses and maintained by their owners. Due to lack of income and inconvenient living conditions of the old house, some of the houses turned into idle ones and their owners move to the cities for living, or to the new residential areas outside the old village. Without maintenance, the idle houses finally collapse. When tourism begins to develop, some of the idle houses and residential houses are turned into tourist houses. Some of the idle houses can be also converted into residential houses for new migrant labors. Recently, some artists from Shanghai show interests to buy some of the old houses as their second, still this transaction is illegal.

3.3 Tourists

Tourists are assumed to be the mass tourists organized by the tour groups. The number of tourist arrival at Xidi is modeled as the potential tourist number multiplied by crowdness effect and the authenticity effect which is the ratio of residential houses over the whole houses and the preservation effect of the agricultural lands. There is 2 year delay of these impacts on tourist arrival. The tourist arrivals number would decline down due to the over-crowdness, too many commercial activities and reduction of the agricultural land.

3.4. The land

Land is always a constraint for Xidi village throughout history because there is limited agricultural land per capita. Due to this reason, in Qing Dynasty, the local residents had to go out for business or take official positions to make a living and thus enable them to remit money back and build the magnificent houses. Since this is a heritage village, these agricultural lands are also designed as buffer area and under preservation. Yet, with the tourism development and the increasing demand from the local residents for better housing, the preservation of the agricultural land is considered as less important than the building heritage and therefore gradually is gradually turned into tourism infrastructure and residential lands. Government policy plays important role in determining whether the heritage houses should be redesigned and re-use or to encroach into the open lands.

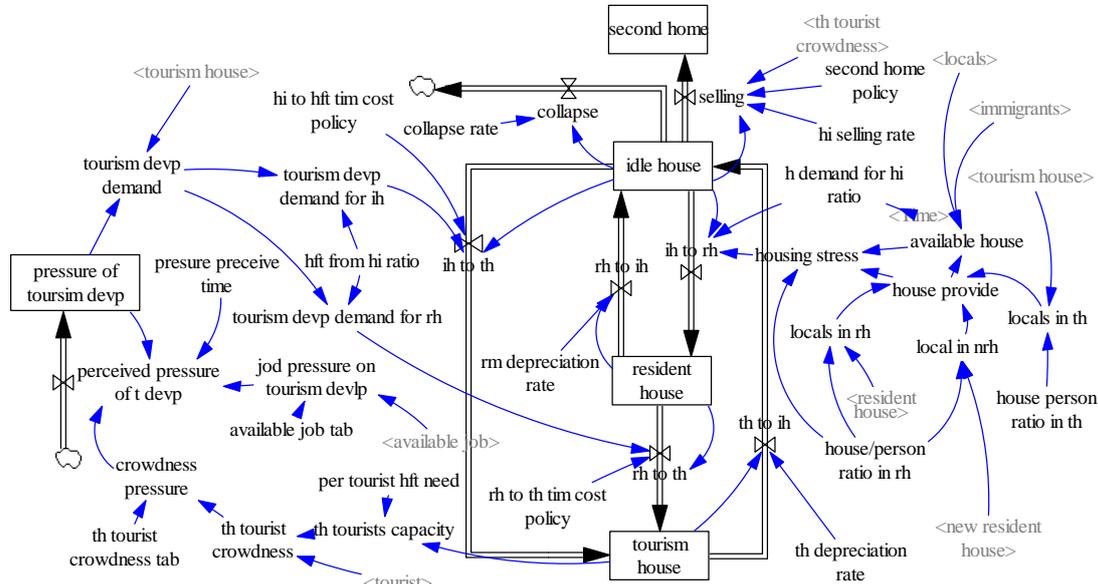


Fig. 6 dynamic model of the Heritage architectures sector

Note: rh represents resident house; ih represents idle house

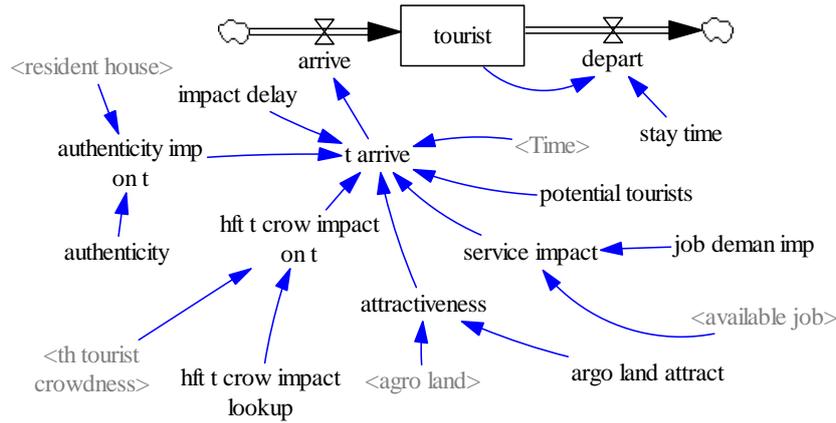


Fig. 7 dynamic model of the tourists sector

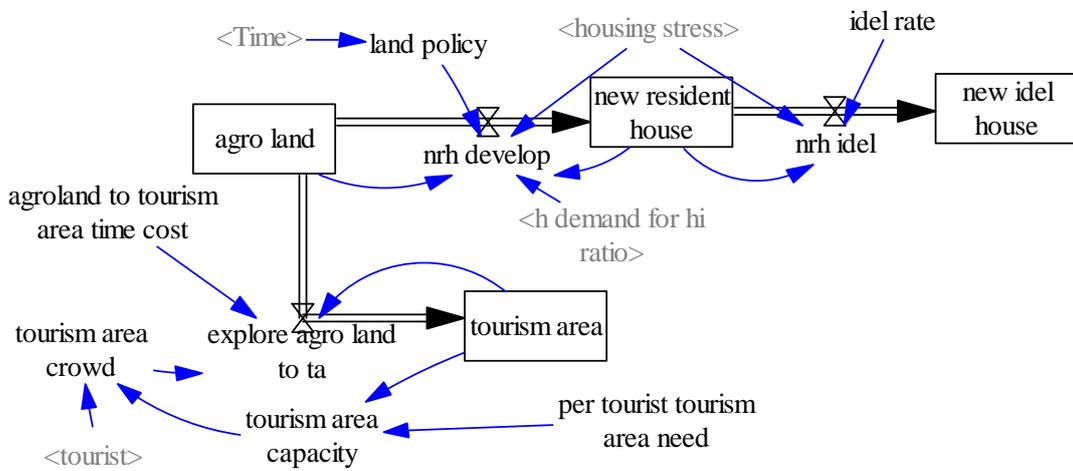


Fig. 8 Dynamic model of the land sector

4 Model simulation and validation

After developing the model structure, the equations and parameters are defined. Parameters are selected or estimated from statistical or historical data, then tested in the model, and adjusted until the model exhibits realistic outputs according to the reference behavior and historical data. Taking 1985 as the base year when the Xidi tourism company was built, a SD model was developed for 35 years to 2020. The forecast period is 2007-2020.

4.1. Base run

The base run is simulated with the following key assumptions:

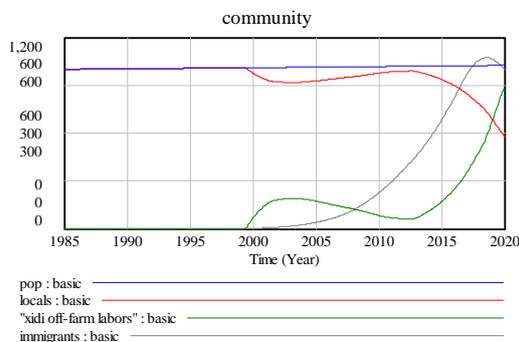
- 1) The residents and the migrants are allowed to construct the new residential houses on the agricultural lands if there is a demand for houses.
- 2) The houses which are turned into tourism areas can still used by residents. But the number of residents reduces per house.
- 3) The tourists are homogenous.

- 4) The change of the houses from the heritage house to the tourism house takes time due to government control.
- 5) The competitions from other destinations and marketing promotion are ignorable.
- 6) The tourism development process is just the resource exploitation process.
- 8) Potential tourisms and outsider expected wage grow steadily after 1999.

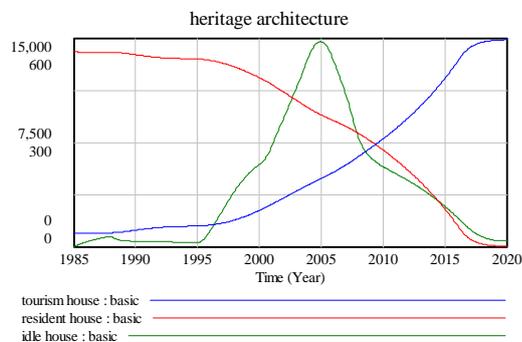
The simulation run shows that in 1985, all public space around the historical town was agriculture lands and all houses inside the ancient town were residential house. At that time, there were seldom tourists or immigrants, and all local labors worked in agriculture lands. Many rural surplus labor forces began to flock to the coastal economically developed areas to seek job opportunities similar as the other Chinese rural place.

Mainly due to the development of tourism, local residents shifted from agriculture to tourism. The ratio of Jobs provided by agriculture industry tends to be decline. Immigrant labors were attracted there to look for tourism jobs. Traditional houses were changed to tourism commercial use; a large number of agricultural lands were changed into tourism infrastructure, certain portion of residents moved out to new resident houses constructed on former agricultural lands. Some local houses were sold to be second homes. The limited capacity of the traditional house and the public place are the driving structure in this dynamic system.

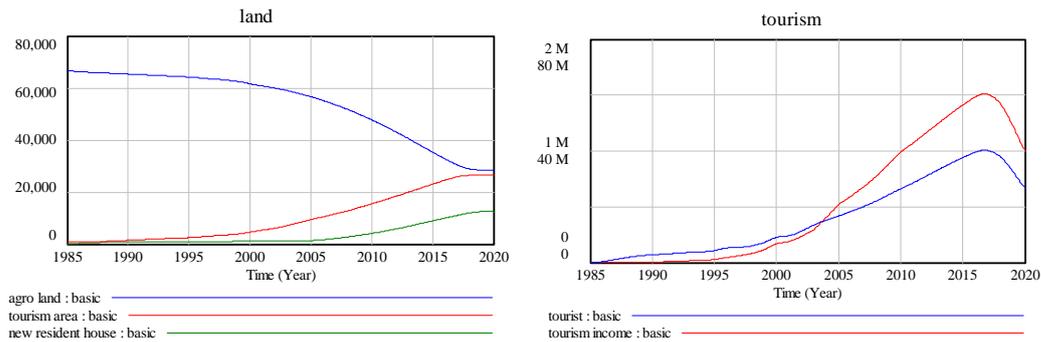
The simulation run shows that the tourists keep on rising and drops around the year 2018 due to the over-commercialization and the crowdedness. Off-farm labors continue to return when the number of tourists keep rising, and stop when tourism declines. Still, the community becomes healthier toward the end of the simulation. Initially, the idle houses rise because there is limited demand for tourism spaces. The locals tend to build their houses in the new residential areas. With the increase of the tourist arrival, more and more houses are turned into the tourism space and therefore are re-used. Fewer houses become idle and collapse. Yet, the agricultural lands are turned into residential lands. Urbanization process begins at the heritage site.



a) Community sector



b) heritage architecture sector



c) land sector

d) tourists sector

Fig. 9 Base run of the model

4.2 Model verification

In this study, we use the pattern verification and the structure verification measures to verify the model. Parameter verification which compares the model data to the real data is the first step to validate the model. But Parameter verification is not always the most efficient one, compared to pattern prediction test (Forrester 1980). Behavior reproduction is another way to verify model. Pattern prediction test examines whether a model generates qualitatively correct pattern of further behavior. In this study we attempt to understand the general patterns of the heritage protection. Therefore, pattern verification is adopted. The simulation results fit to the observed patterns described in the first sections.

The dynamic behavior of model is dominated by the feedback loop structure (Forrester 1968). An integrated analysis of complex feedback relationships is helpful for a better understanding of the system. It is also an important test to verify the consistence of the model structure with relevant description knowledge of the system (Sterman 1984).

Fig. 10 illustrates the major feedback loop structures captured in the model explaining the simulation behaviors. There are four major feedbacks, two major positive feedbacks and two negative feedbacks. The positive feedbacks drive the tourism growth and therefore attract the migrants and make off-farm labors return. The growth of the population creates pressures on the local government to allow them to open new business to create more jobs from tourism. As a result, more heritage houses are turned into tourism spaces. Also, due to the tourism development, the heritage houses are either reused as residential houses or the tourism houses. The physical appearance of the houses looks better and can attract tourists.

However, with the tourism development, there are also other negative feedbacks which limit the effectiveness of this policy. The first is the re-allocation of the residents to the new residential houses. Since the local government has the fear that the use of heritage houses by local people may damage the authenticity and integrity of the heritage, there is a tendency to design agricultural land for them to build new houses. This new residential house can not be too far away from the heritage and soon the tourists find that the rural surroundings are already gone. The attractiveness of the rural heritage

reduces. Another negative feedback is due to the over-commercialization. Change of the heritage houses into tourism space also reduces the attractiveness of this place for some tourists.

Therefore, it can be seen that when tourism develops, idle houses begin to decline. Migrants are attracted to the heritage site along with the off-farm labors. However, the tourism can not sustain due to loss of the reduction of the attractiveness of the site for the tourists.

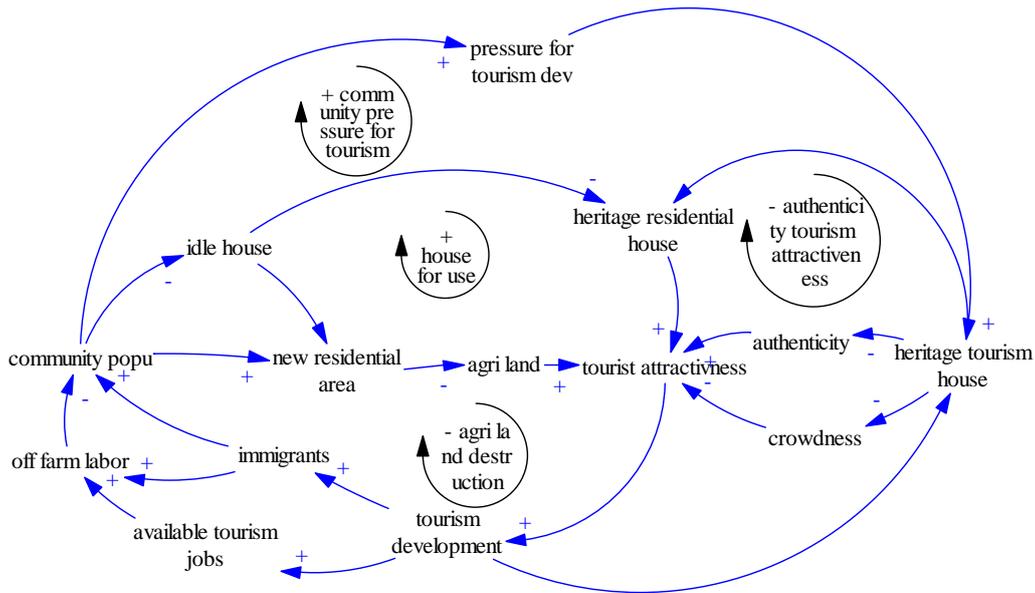


Fig. 10 the feedback loop structure of the model.

4 The understanding of the policies

Debates on how to protect the world heritage site and improve the living standards of the local communities are tested based on the model.

1) Policy on restriction of the construction of the new residential areas

In order to preserve the heritage, the local government places restricted regulations on the redesign and restoration of the old houses. The residents are therefore requested to build their new house in other places, which bring some damages to the agricultural lands. However, contrary to the existing policy, this policy suggests that instead of expanding into the agricultural lands, restrictions should be made on the construction of the new residential houses and emphases should be on how to redesign and reuse of the historical houses rather than the rigid preservation.

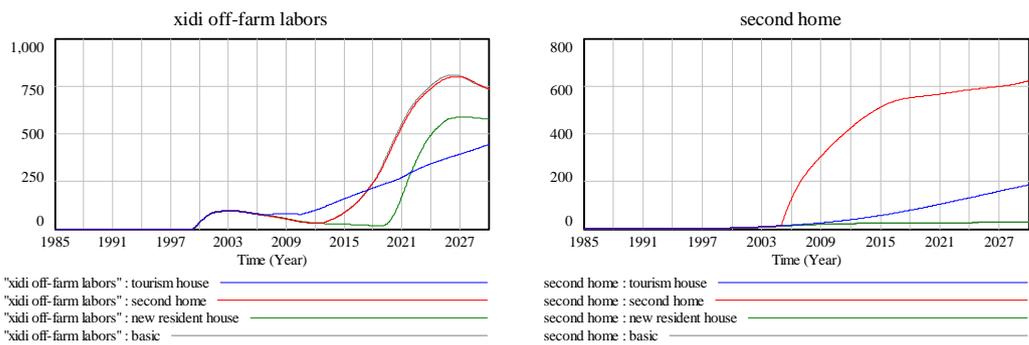
The simulation run shows that tourism development slows down due to the crowdedness. The limited tourism development pushes some of local labors to search for off-farm activities. Many young labors leave the village for living compared with the base run. Yet the idle houses also reduce and some agricultural lands remain.

2) Policy on restriction of reuse of residential house for tourism

In order to prevent the town to be over commercialized and to maintain the authenticity atmosphere, strict policy on the change of residential houses for the tourism use has been implemented. The simulation run shows that tourism development develop even slower that the policy 1. This is due to the limited space for tourism expansion. More houses tend to be idle and then collapsed due to lack of maintenance and usage.

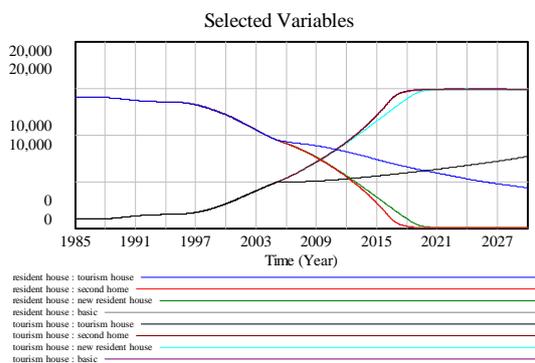
3) Control on second home

Second home development is also under debate; for the time being it is illegal for the residents to sell their houses (even the idle own) to outsiders as a second home. The rationality is that the contribution from leisure related buyers to local development is relatively small because these second home owners can only contribute to the restoration of the houses but do little to help the rejuvenate the local economy and also change the structure of the local community. It can be seen that when the control of the second home development is released, second homes will be boosted up, and tourism development is limited. For the preservation of the built buildings, the second home development is a good strategy. Yet, the community would lose its young people and the structure of the population.



a) The results prediction on Xidi off-farming

b) the results prediction on second home selling



c) The results prediction on tourism house

d) the results prediction on idle house

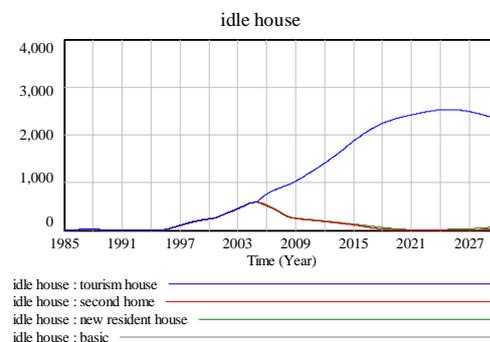


Fig. 11 The results prediction of policy implementation

Overall, the policy runs show there are many trade-offs along no matter which

individual place is implemented. It can be seen clearly that a strict preservation policy alone, especially when the conservation is only limited to the preservation of the built heritage buildings, would lead to the collapse of the buildings and the encroachment of the agricultural lands. With a very strict preservation policy, the villagers do not have motivation or resources to restore the houses. Young people are leaving the village leaving an aging and decaying community.

The best policy option is the one which attempt to redesign and reuse the heritage houses although this policy can not generate enough tourism to retain all the young people. This policy is contrary to the existing policies which attempt to improve the local residential housing through re-allocation. The policy run shows that restriction on the development of new residential area and focusing on the restoration of the old house can get the best scenario both in the old house restoration, community mix and the preservation of the agricultural lands.

5 Conclusions

Conservation of the heritage is a new concept in China which was introduced half century ago. The heritage system was implemented only 30 years ago. Apart from a very general principles set up by the UNESCO, there are no operational guidelines from the Chinese national institutions or provincial institutions. As the result, the understanding of the authenticity at the local level becomes very confusing. In the end, the conservation tends to remain as it was. The local development need from the community is ignored.

This model-based case study shows that heritage conservation, tourism development and the community development are interacting with each. Policy only focusing on the tourism development or on the preservation often leads to the counter-intuitive behaviors. Preservation focused policy leads to the decline of the young labors inside the community and then increased idle and collapse of heritage houses.

The model shows that with a restriction of the expansion of the new land development but a loose control on tourism development inside the village can generate the best scenario in terms of the houses and agricultural preservation and the improvement of the economic viability of the village. However, this policy has to be implemented the technical supports from the outsiders on how to redesign the houses to meet the residential need and tourist needs while conserving the value of the heritage.

There are also some limitations of the model. Many graph functions are obtained in the model; most of them are subjectively set just according to field trip and needed to be tested further. Secondly, the two economic activities - agriculture and tourism - are not linked. The tourism should enhance the added value in agriculture. The model assumes that unlimited potential tourists in the world heritage tourist market.

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