The Evaluation of the Agritourism Picking Garden in Jiaokou, China

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Introduction

Agritourism is developed under the background of high urbanization and people's high economic income (Gou H.C. 2010). The development of agritourism has a long history abroad, first in Europe, such as Germany, France, Britain, Italy, Spain, and other countries, and later from the European countries to the East Asian, such as Japan, South Korea, Singapore, China and other countries. At present, agritourism has become a new industry with the function of production, life and ecology in the rural villages of economically developed countries and is showing strong vitality and development prospect (Gou H.C. 2010).

The significance of agritourism is that it is conducive to adjusting and optimizing the rural industrial structure, extending the agricultural industrial chain which promotes the development of the second and third industries, and improving the comprehensive benefits of agriculture. It is also conducive to the transfer and employment of surplus rural labor force. Because agritourism is a labor-intensive industry, it not only needs production and management personnel, but also needs to be engaged in accommodation, catering, transportation, commerce, and other service personnel. Agritourism picking garden is one category of agritourism (Wang & Wu, 2010). It provides a unique experience for tourists through landscape and picking activities (Ren, 2013). Meanwhile, urban residents are not satisfied with the traditional leisure modes in cities and they are more interested in the picking activities (Wang & Wu, 2010). Nowadays, the number of agritourism picking garden is increasing fast for higher revenue and profit. For apples, the revenue from picking garden is usually higher than that from the traditional apple orchards (Ren, 2013).

A good agritourism picking garden should locate around cities, so that it is more convenient for the tourists to visit (Zheng, 2008). Also, the picking garden should plant appropriate fruits considering the local soil and weather (Ren, 2013). The facilities in the picking garden should provide the tourists with a good environment and convenience, like the parking lot, roads, greenhouse, and the entertainment areas (Zheng, 2008). The objective of the project is to increase the profit and revenue through the agritourism picking gardens. I planned to evaluate the project focusing on

the cost, revenue, and profit. I also will predict the profit in the future with different circumstances to test whether the picking garden is profitable.

Background

Agritourism in Lin'an

Jiaokou is a village in Lin'an prefecture that locates in eastern China (30'33'' N, 119'20'' E). Based on Google Map, the distance between Jiaokou and Hangzhou is around 63 km and there is a freeway connecting these two places. Hangzhou, the city that I was born in, is the capital of Zhejiang Province with 7,271,400 urban residents and the per capita disposable personal income was $8,275 in 2017(Feng, 2017). Most people in Hangzhou are wealthy and they are not only curious about life and work in the villages, but also have passionate in experiencing different environment from the urban. The agritourism and picking activities are attractive for these residents in Hangzhou and they are willing to spend both time and money on these activities. In 2015, more than 4.1 million people spent 0.49 billion RMB in agritainment in Lin'an and the number of tourists increased by 100% compared with that in 2014 (Deng, 2017). Nowadays, agritourism picking garden for fruits was developing fast recently in Lin'an and the agritourism market is enormous.

Geography in Lin'an

Lin'an has a subtropical humid monsoon climate with distinct four seasons and sufficient sunlight. It is warm and humid in Lin'an prefecture that is good for living and agriculture.

In Lin'an, the annual average precipitation is around 1,400 mm. It seldom rains from late fall to early spring, but early summer and early fall are two main rainy seasons in Lin'an. From March to September, monthly precipitation is over 1,000 mm. In late spring, the highest precipitation happens in the southwest, however, in early summer, it rains more heavily in the northeast. In general, precipitation is enough for agricultural products and the drought merely lasts for less one month every year.

In plain, the annual average temperature is 15-16 ℃. The Monthly average temperature varies from 8.6 ℃ to 17.4 ℃ in one year and the difference is 8.8 ℃. Extreme weather like the average temperature is over 40 ℃ only happens in July or August that only lasts for few days, therefore its effect is not severe for agriculture in Lin'an. Sunlight is greatly strong that adversely affect plants photosynthesis (Dai & Shi,2017). Moreover, strong sunlight could result in high-temperature damage and drought. Therefore, it is inappropriate to cultivate vegetables or fruits without any structure.

Yellow clay soil is the main type of soils in Jiaokou and it is one type of clay soils. Yellow clay soil is neutral or slightly acidic and the pH is usually around 6. Based on the properties of clay, it can be concluded that yellow clay soil material combines minerals with possible traces of quartz, metal oxides, and organic matter. Geologic clay deposits are mostly composed of phyllosilicate minerals that contains variable amounts of water trapped in the mineral structure. Clays are plastic due to particle size and geometry as well as water content, and become hard, brittle and non–plastic upon drying or firing. (Wu, 2017). Generally, it is appropriate to cultivate fruits in yellow clay with slight soil improvement. Therefore, there is no need to improve the quality of soil.

Li Qiu

Li Qiu obtained bachelor in agriculture from Zhejiang University where he accessed to various information about agriculture. At that time, he realized the importance of the agricultural innovation in both cultivation and sales. He had passionate and ambitions in increasing the benefit from the agricultural projects.

Methodology:

Original Plan: I contacted Li Qiu in July 2017, as I heard he was planning to cultivate popular and valuable fruits and try to sell them at a high price. I showed my interest in his idea and we came up a preliminary plan about cultivating off season fruits. Because of the low temperature, most watermelons did not ripen in Zhejiang in May

and October. The wholesalers had to purchase watermelons from other provinces with a higher price. Thus, I suggested to cultivate off watermelons in greenhouse during that period. From my previous experience, planting crops in greenhouse can protect fruit from disease or pests and the sale price in the off-season is much higher. I also recommended to organize a farming cooperative just like the other farmers did in China. Since I thought farming cooperative could take advantage of the combined resources, and Li Qiu would be able to cultivate more watermelons in a larger land. Then these fruits could be sold through middlemen, picking activities, and the other channels. Meanwhile, the project could benefit the whole farming cooperative through an advanced cultivation technology.

Li Qiu thought greenhouse was a good tool and it was easier to seek investment as a farming cooperative from both companies and government. Then we contacted two families and they agreed on the project. Also, I contacted a professor from Zhejiang University, a specialist in horticulture, and she agreed to provide counselling and guide in cultivation. I contacted both local government and agribusiness companies to seek whether they were willing to provide the investment.   And I heard positive feedbacks from a government official that he was interested in the greenhouse and the picking activities plan. The government official believed our project could get the government investment successfully according to his previous working experience. After that Li Qiu was mainly responsible for the day to day work involved in setting up the farming cooperative and applying for subsidy from the government.

In August 2017, I worked as a coordinator including contacting and gathering information from the wholesalers, seedling companies, and other institutions which would provide assistance to the project. Then I came back to the U.S. in early September 2017. In July 2018, I forwarded Li Qiu's advertisements "Pick up your own watermelon" via WeChat, a free but popular social application in China, in order to help disseminate watermelons from Li Qiu's pick garden.

The Agritourism Picking Garden Plan: The sales price via picking activities was the highest comparing with the other channels. Therefore, Li Qiu wanted to focus on

building a pure agritourism picking garden without sales through middlemen. He expected to cultivate diverse fruits with different harvest time, in which the tourists can pick up different fruits all over the year. Li Qiu could increase the revenue by selling all fruits to tourists at a retail price. To attract tourism, Li Qiu preferred to rent a sloping fields that could provide a better view to tourisms. At the same time, slope fields could prevent fruit trees from ponding. However, the farming cooperative members did not agree on the plan for the extra land rental. In August 2017, Li Qiu was informed that his application was in the waiting list. As the result, the farming cooperative dissolved. Li Qiu decided to seek other investment from different resources to support the picking garden project. Finally, in September 2017, he persuaded his relatives to invest in the agritourism picking garden. Li Qiu decided to build a multi span greenhouse for oranges and cherries and more than 20 single span greenhouses for watermelons.

Meanwhile, he built the road and visiting center to provide a better environment to attract tourists. Local government provided the subsidy on the road for 90,000 RMB and told Li Qiu he could continue to apply for the subsidy on the greenhouse.

As a professional manager for the picking garden, Li Qiu was responsible for the daily management and business development. He disseminated his garden and fruits mainly through the WeChat and his friends. He also cooperated with local agritainments and they advertised the picking garden to the customers. Li Qiu hired five male and two female long-term workers to work on the cultivation. Li Qiu trained them on how to prune, pitch, and spraying the pesticides correctly until they could complete the tasks in the field independently.

The Land Use System Description

The total area for agritourism picking garden is 35 mu and it located in a sloped area. The multi span greenhouse was built in 20 mu and the other 20 single span greenhouses covered nearly 15 mu. There was a freeway nearby that connected the village with Lin'an and Hangzhou.

Figure 1 The Picking Garden in Jiaokou

In September, Li Qiu hired the land cleaning service and it took one month to clean the sloped area which costed 1,000 RMB per mu. Then, he hired 7 long-term labor to work for the picking garden including the preparation period and daily management. These workers and Li Qiu spend one week on digging furrows by tillage machine and applying the base fertilizer.   Since late October, Li Qiu hired the company service to build a multi span greenhouse and 25 single span greenhouses. At the same time, he worked with the long-term workers to dig a well and install tubes and the pump. The land preparation was completed by early December.

The greenhouse has 2.8m shoulder height, 4.5m arch height, 60m length and 8m width of the single span. Also, drip irrigation was installed in greenhouses that could also be used for cultivating the other fruits in the future.

Cherries & Oranges: In December, Li Qiu and 7 long term workers completed transplant the seeds of cherries and oranges into the multi span greenhouse which took 4-8 hours per mu. There are 10 mu cherries, with 33 plants per mu. The row spacing is 5m and the line spacing is 4m. Similarly, there are 10 mu oranges with 110 orange seedlings per mu where the row spacing is 3m and the line spacing is 2m. Then these workers spent 4 hours per mu on covering the greenhouse with more plastic films to prevent the oranges from chilling Then, these workers spend 2 hours per mu twice a month on spraying the pesticides in order to prevent potential disease and pests.

For the first three years, there is no requirement for flower thinning and fruits thinning. Workers were sent to weed monthly, but the working time depended on the weeds circumstance.

Because cherries flower phase is in February and March, workers will be required to spend 1 hour per on cherry flowers thinning and pollination since 2020. Meanwhile, these workers would spend one hour per mu on pitching. While there is no enough lighting, workers will remove the film to invite more lighting. In fruit period, worker will spend 1 hour per mu on fruits thinning. The cherries planted in greenhouse harvest in April and May, then the fruit should be picked up in one or two weeks, otherwise, the fruits will rot. In theory, the workers will be required to spend 5-8 hours per mu on applying fertilizer in postharvest period and flowering period (Fang & Sun, 2011). It takes these long-term workers 12 hours per mu to apply the base fertilizer again by tillage machines. Then they will spend more than 40 hours on thinning for a better plant growth.

For oranges, workers will apply the fertilizer three times a year, in winter, spring, and fall (Chen & Liu, 2016). And it could take more than 40 hours per mu to complete these tasks after 2020. Meanwhile, workers will prune the flowers in April and May. During this time, flower pruning will be very important, otherwise, it will negatively affect the quality of the fruits. In June and August, workers need to work more carefully in pruning all the inferior fruits, then the picking garden will harvest better oranges (Chen & Huang, 2014). later, workers will protect the oranges from pests and disease by fruit bagging. They will put transparent bags on the fruits instead of the other bags used in apple or pears, otherwise, the bags may affect the fruits rendering (Ke & Luo, 2014). The fruits begin to ripen in late November and the harvest period is in December. Then visitors can pick up the oranges until next early February (Chen & Liu, 2016). After all oranges are picked up, workers will spend more than 32 hours per mu on applying the solid fertilizer with tillage machines. After that, workers will prune the plants Estimated by Li Qiu, the working time on oranges is more than 120 hours per mu per year.

Watermelons & Sweet melons: It took Li Qiu and these long-term workers four hours per mu to transplant the seedlings to the single span greenhouses in February. The total cultivation area for watermelon was 8 mu. And they planted 400 units per mu. They would spray the pesticides and fungicides twice a month in case of any disease and pests. It took 8 hours to spray pesticides in 6-7 mu via a spraying machine. The amount of fertilizer depended on the fruits growth circumstance.

Usually, there was no need for watering and fertilizer in March. Since that time, the long-term workers would frequently check the greenhouse to maintain the appropriate temperature. During the February and April, workers covered another film to increase the temperature that can enable the seedlings to grow better. Workers will open the window for cooling when the temperature was higher than necessary.

In March, Li Qiu instructed these long-term workers on pruning the tendrils. He decided to keep four tendrils for each plant. Pruning required an intense physical working and it took 8 hours per mu to complete the task. As the tendrils grew fast in March, workers had to prune the tendrils repeatedly and continuously in two weeks.

In April, the workers spent more than 4 hours per mu every day on manually pollinating the flowers. The pollination working ended in late April. Then, Li Qiu sprayed the liquid fertilizer only once through irrigation system in fruit period. By this method, it could facilitate the fruits growth to achieve a higher output. At the same time, the irrigation system also watered the fruits.

In May, the watermelons began to ripen in different rounds, so the visitors could continuously pick up the watermelons in next two months.

Li Qiu adopted the same method to plant sweet melons as they were greatly similar to watermelons. He planted sweet melons in 3 mu and they also ripened in May.

Strawberries: When all the watermelons were picked, it took these long-term workers less than one week to clean the land. As the average temperature in August was nearly 30℃, the workers prepared the steam sterilization by watering the soil directly and

keeping the single span greenhouse closed for at least one month. These workers spent nearly 8 hours per mu on that.

In early September, they spent 8 hours per mu on applying the base fertilizer and digging the furrows. Then, it took them more than 20 hours to cultivate the strawberries in three rounds by the middle of September. They planted 6000 units per mu. After successful transplanting, they covered a mulching film on the ground to protect the strawberries from potential low temperature in late September and October. It required 27 hours per mu to finish the work. Then the workers would check the temperature in the greenhouse in case the strawberries could be hurt from chilling. Meanwhile, long-term workers sprayed the pesticides every two weeks and pruned the strawberries that could ensure the quality of fruits. The pruning and spraying pesticides usually took less than three hours per mu in one month.

In November, Li Qiu placed a bottle of bees in each single greenhouse for pollination. At the same time, it required workers to fertilize the strawberries every 20 days that ensures the sufficient nutrition for the growth.

A small amount of strawberries began to ripen from late December, but most strawberries will ripen in January and February. Although, most strawberries will not ripen until April, Li Qiu can harvest the strawberries in advance and sell them to the tourists at a higher price.

When all the strawberries are picked, the workers will dig furrows and apply the base fertilizer again.

The Evaluation of the Leisure Agriculture Picking Orchard
Economic Performance

The total cost of the project is 2,221,075 RMB and the budget is attached in appendix. As the figure 2 shows, the fixed cost including infrastructure and greenhouse building is 1800,000 RMB and it accounts for 80% of total cost in 2018. The 9% of total cost is used to purchase seeds, fertilizer and pesticides, which costs 175,000 RMB. And the total labor cost in 2018 is 286,000 RMB. The revenue in 2018 is 328,880 RMB.
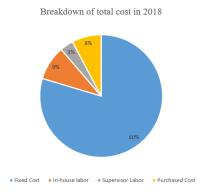
Breakdown of total cost in 2018

■ Fixed Cost   ■ In-house labor   ■ Supervisor Labor   ■ Purchased Cost

Figure 2 Breakdown of Total Cost in 2018

Input Prices and Output Prices Analysis: Except labor, all the other variable agricultural inputs are in four categories: fertilizer, pesticides, seeds, and the general agricultural inputs (National Bureau of Statistics, 2017). I obtained the price indexes for these four categories from 1998 through 2017. All these indexes indicated the change rate of the prices comparing to the previous year. Agricultural price is different from the other industries for the seasonality of production (Jha, G. K., & Sinha, K., 2013). Therefore, it is reasonable to treat indexes as time series data. In this section, I used Auto-Regressive Integrated Moving Average (ARIMA) model to predict all the prices that were included in the production. By R, all the fitted inputs price indexes are in Figure 3. It shows the fitted value follows the past trend, though, more work is required for this part like stationary test and residual test. Considering the complexity of the price prediction, I decided to use the predicted price from the fitted model directly without a further test on the stationarity.

Similarly, I predicted the output price based on historical fruits price index by ARIMA model from National Bureau of Statistics (NBS, 2018). However, the price always fluctuates dramatically in different seasons especially when the farmers harvest earlier than normal. For example, Li Qiu has harvested a limited amount of strawberries in December that could even be sold at 80 RMB/kg, but the normal price in January, February, and March is usually around 15 RMB/kg. The amount of harvested fruits in off-season could be negligible comparing with the total outputs, therefore, I estimated the price for each fruit with a normal price without any fluctuation in one year.

As Professor Jarvis suggested that when the real values were maintained through time or the past trends could not be estimated accurately, current prices could be projected in the future. So, another analysis will be provided based on the current prices later.
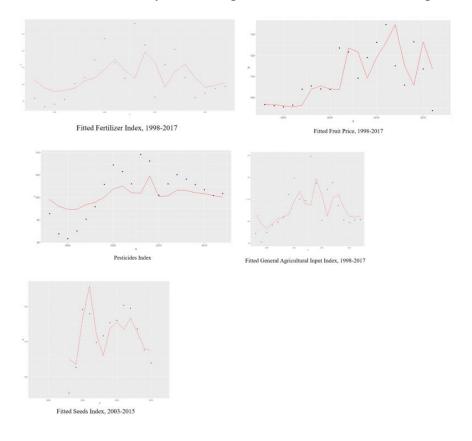

Fitted Fertilizer Index, 1998-2017

Fitted Fruit Price, 1998-2017

Pesticides Index

Fitted General Agricultural Input Index, 1998-2017

Fitted Seeds Index, 2003-2015

Figure 3 Fitted Values for Different Indexes

Input Analysis: Greenhouse is an efficient structure for planting fruits. Firstly, an artificial environment created by greenhouse could enable farmers to control the environment. Thus, the farmers can cultivate fruits more efficiently by adjusting the temperature and humidity, and preventing pests (Li, 2013). Earlier harvest is the most significant strength of greenhouse. Comparing with the plants in the open field, farmers usually can harvest in advance via greenhouse. For some fruits, it is necessary to protect them from low temperature. Red Beauty orange usually requires temperature protection from the greenhouse especially in November, otherwise, these oranges barely can suffer from the winter in Zhejiang (Chen &Jin, et al. 2013). Greenhouse is very important in an agritourism picking garden because it not only shows the special character of the agricultural facility, but also provides a great

opportunity for them to experience the harvest (Zheng, 2008). At the same time, greenhouse provides a comfortable place for tourists to enjoy their leisure time where they do not need to worry about rainfall and hot days.

By renovating the original muddy path of the picking garden, the newly built road and parking lot are not only convenient for tourists to enter the picking garden, but also can accommodate many tourists at the same time. Besides the fruits and greenhouse, other facilities are very important to attract more visitors (Zheng, 2008). The visiting center is not decorated elegantly, but it enables visitors to take a rest when they complete their pickings. In summer or winter, the weather could hinder the visitors from picking fruits in the field, however, a simple visiting center created an optional place for them to take a break. The visiting center provides fruit cutting service for the visitors. Meanwhile, Li Qiu can build a relationship with these visitors to develop them as regular customers.

The fixed cost in the picking garden accounts for a large part of the total cost in 2018. The cost of the production structure including all types of greenhouse, irrigation system, and the related machines is 1,505,700 RMB. All these inputs were invested in for creating a controlled environment that could facilitate the plants growth and increase the motivation for agritourism in the picking garden. The investment on the greenhouse and the other facilities might be tremendous and unaffordable for most family farms, but it is necessary for planting off-season fruits.

As for the other fixed costs like tillage machine, ditcher, and mower, I assumed all of them would work well in next 9 years and the repairment fee could be around 1,000 based on Li Qiu's prediction, though, there was no cost in repairment in 2017. Considering the plastic film of the greenhouse should be replaced every two years, the cost was classified as variable cost in 2020, 2023, and 2026.

Li Qiu was planning to cultivate more watermelons and sweet melons in 2019 as he did not have to spend time on infrastructure construction. Based on the current proportion, I assumed there would be 9 mu watermelons and 6 mu sweet melons for the next years. As the oranges and cherries will harvest since 2020, Li Qiu estimated that the amount of fertilizer would be 1.25 times as much as the current amount.

The variable costs are mainly composed of the land rent, fertilizer, pesticides, seeds, and the labor costs. The total cost in 2020 was estimated to be 508,000 RMB. The total purchased input including seeds, fertilizer, pesticides, and the other materials was 91,133 RMB. And the amount of these inputs per mu will not be changed unless Li Qiu decided to alter his planting methods. In figure 4, it shows that the cost of these items account for 18% of the total variable costs.

The land rent was charged for 1200 RMB per mu and it will increase by 100 RMB per year in the future.
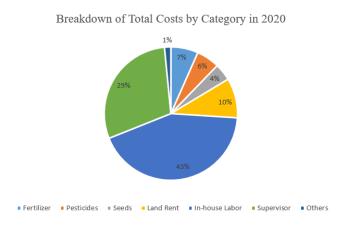
Breakdown of Total Costs by Category in 2020

Figure 4 Breakdown of the Variable Costs in 2020

Labor: The picking garden hired 5 male long-term workers and 2 female long-term workers. All of them are about 50 years old and accept primary or secondary education. They are all from Jiaokou, so the picking garden does not have to provide any accommodation. They used to work in cities like Shanghai and Guangzhou as short-term workers in different industries. For now, male workers are paid 30,000 RMB and female are paid 28,000 RMB every year. Considering the age and education, these workers are more willing to have a stable and comfortable working environment instead of seeking a intensive physical work that is far from their homes. Therefore, they might not be aggressive in salaries, though, the migrant working salary, based on National Bureau of Statistics (NBS, 2017), continuously increased by 5%-7% in different industries since 2015. Based on the manager's decision, the

salaries for these workers will not be increased next years unless the picking garden will require more work from them.

As for the manager's salary, it depended on the operation of the picking garden. But Li Qiu thought 80,000 RMB and 150, 000 RMB would be a reasonable salary range for a manager in next years if everything worked well without serious problems. As he described, he should have 150,000 RMB in 2020 when cherries and oranges ripen. Considering both the manager's decision and the growth rate of migrant workers' salaries, I assumed long-term workers' salaries would not be changed until 2020 when the garden could harvest cherries and oranges. At that time, these 7 workers' wages might be increased by 6%. Then, the salaries will not be adjusted unless Li Qiu needs to replace these middle-aged workers in the future. For Li Qiu, his salary was assumed to be 15,000 RMB in 2020 for the potential development of the picking garden. As for the manager's salary, it was assumed to be fixed since 2020.

In 2020, the total hired labor cost will account for 43% of the total variable cost and Li Qiu's salary will account for 29%. The agritourism picking garden is different from the other fruits farms that only focus on planting the fruits, Li Qiu has to spend more effort on business and management, so he should receive a higher return as a professional manager instead of a regular hired labor. If Li Qiu acted like the other workers and received the same salary, the labor cost would account for 64% of the total cost.

In the picking garden, the labor cost is much higher than the other agricultural inputs costs because it usually requires more working hours in fruits cultivation and the other tasks. Though, Li Qiu purchased the tillage machine and mower, it was hard to replace more workers with machines especially in some activities that required a skilled labor like thinning and pollination. Therefore, it is not easy to save the labor force for the picking garden.

The total working hour in the field for these long-term workers is estimated to be 5000 hours at least. However, as Li Qiu described, all these workers were also responsible for the other activities like serving the tourists, repairing the films, and checking the circumstance in the greenhouse. It is different from the other fruits

farmland that merely focus on the production or harvesting, these workers have to spend time on selling the fruits and serving the tourists. Meanwhile, they have to take care of the whole picking garden like necessary decoration and repairment. That explains why the percentage of the labor cost in the picking garden is higher than that in the other traditional orchards where the proportion of the labor cost is 47.73% in 2016 (National Development and Reform Commission, 2017).

However, it is difficult to count the accurate working hours and wage rate for these workers. In general, these workers are supposed to work for 8 hours in busy time like pruning the tendrils for melons. As for the other time, these workers could work around 5 hours every day or even less. Based on Li Qiu's observation, the average working hour could be around 5-6 hours, though, it was a rough estimate. Even more, the working time in the future will also be influenced by the amounts of the tourists. In this paper, I assumed the average working hour for each worker is 6 hours per day and the total labor hours in the picking garden is estimated to be 12,000 hours. Then, the wage rate for these long-term workers is 16.7 RMB per hour.

As for Li Qiu, he works for 8 hours every day. He is not only responsible for training these workers in the field management including thinning and pitching, but also scheduling the working time. He spends most of his working time in disseminating his picking garden and seeking for potential business partners like the agritainment. Meanwhile, he also works with the workers in pruning and thinning, but the working time in the field is less than 500 hours. His working hours is 2080 hours and the wage rate for now is 38.6 RMB per hour. However, his wage rate will be improved to be 72 RMB per hour based on his anticipation.

Based on the Migrant Workers Report in 2016, the average working hours for the migrant workers was 8.7 hours per day and the wage rate was 14.9 RMB per hour (National Bureau of Statistics, 2017). Comparing with the migrant workers in these cities, the long-term workers in the farmland do not have to leave their relatives anymore. Though, the wage rate for these long-term workers is between not higher than what they earned before, they have a more comfortable working environment with less physical work and overtime. Meanwhile, they do not have to face the

intensive competitive in the cities. Although males are paid more than females in total, females have less tasks and working hours. Li Qiu paid the workers with the same wage rate disregarding the gender.

Not like the other managers in the traditional orchards, Li Qiu has to focus on the related business activities to disseminate the picking garden and the and training these long-term workers for a better working. Comparing with the other orange orchards where the return to family labor was 32.68 RMB/hour in 2016 (National Development and Reform Commission, 2017), Li Qiu almost has more than twice as much as than that because of his effort on managing a picking garden instead of a traditional orchard.

Output Analysis: Li Qiu cultivated five different types of fruits in total to make sure the visitors could pick up various fruits in four seasons. Also, he chose the high-valued fruits to attract the visitors nearby like cherries and red beauty oranges that were expensive but popular currently. The estimated output for different fruits was shown in figure 5. As Li Qiu designed, he wanted to sell all the products at the retail price or even higher through the picking activities.
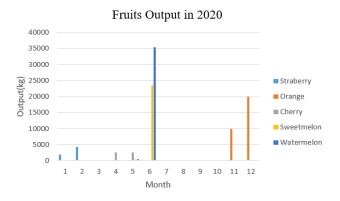

Figure 5 Fruits output in 2020

Orange: Red Beauty Orange is greatly popular for its special taste and the price. Li Qiu expected that he could harvest 3000 kg/mu in 2020. Usually, the oranges ripen since late November and they will not rot until more than one month later. Therefore, it is optimal for visitors to pick up the fruits in December and January. Otherwise, the quality of the oranges will not be guaranteed (Chen & Liu, 2016). As Li Qiu

predicted, all the oranges would be sold at 40 RMB/kg for visitors. Considering the predicted price, the oranges will be sold at 38.8 RMB/kg and the total revenue from the oranges in 10 mu should be 1,198,000 RMB in 2020.

Cherry: Cherry usually will ripen earlier in the greenhouse. Based on Li Qiu's estimation, the visitors could pick up the fresh cherries in April and May. However, the cherries will rot in two weeks since the harvest, moreover, it is tough to maintain the fresh and quality of the cherries. Therefore, it is better for visitors to pick up the fruits as soon as possible (Chen & Yu, et al., 2013). Li Qiu believed he could harvest 500 kg per mu and sell the products for 160 RMB/kg if visitors pick up these cherries. The predicted price for cherries in 2020 is 159.6 RMB/kg, and the total revenue from the cherries in 10 mu is 798,000 RMB.

Watermelon & Sweet melon: In 2018, all the watermelons and sweet melons were successfully picked by the visitors from May through August. The yield for both sweet melons and watermelons was 4000 kg/mu. Sweet melons were sold at 14 RMB/kg and the total revenue in 3 mu is 168,000 RMB. For watermelons, they were sold at 8 RMB/kg and total revenue in 5 mu is 160,000 RMB. In the future, Li Qiu decided to plant more melons and I assumed Li Qiu would expand the cultivation area for melons with the same proportion for the convenience of the prediction, though, it is inappropriate to plant watermelons continuously. Also, these melons are supposed to be sold by visitors directly. In 2020, the price for sweet melons and watermelons will be 13.9 RMB/kg and 7.9 RMB/kg respectively. The total revenue from watermelons in 9 mu will be 287,500 RMB and the total revenue from sweet melons in 6 mu will be 335,000 RMB.

Strawberries: The yield of the strawberries is estimated to be 1250 kg/mu. The picking garden harvested around 10 kg in December and they were sold at 80 RMB/kg. However, Li Qiu described that most strawberries would harvest in January and February when the price could fall to be 15 RMB/kg. Therefore, the total revenue from the strawberries in 5 mu should be 149, 800 RMB. Comparing with the other strawberries cultivated in the open field, visitors are able to pick up the strawberries

one month in advance due to the greenhouse. Usually, visitors could continuously pick up the strawberries from December through March.

The other fruits: Li Qiu also planted some other crops including the sweet potatoes and cherry tomatoes but with both limited input and output, therefore, the cost and revenue for these crops are not evaluated in the whole project.

Benefit and Cost Analysis:

Net Present Value: $1.8 million US.
The average return to the land: $5,058 US per mu per year.
Ratio of the average annual returns to land to the rental rate on land: 24.57.
Profit Margin: 204.4%

In 2018, the total revenue is estimated to be 328,800 RMB. All the revenues are from watermelons and sweet melons that were sold via agritourism picking. The total cost is around 2,221,075 RMB. Therefore, the net revenue for the first year of the picking garden is negative.

I assumed the output of all the fruits will not be affected by any other factors like the weather and labor. Also, the fruits should be picked up in time by tourists without any loss or sales through the other channels. Based on CEIC Data, the discount rate in China is 2.25% (CEIC, 2018). The predictions in figure 6 shows the discounted revenue will increase dramatically when the cherries and oranges harvest in 2020. Moreover, the annual revenue is always higher than the annual cost since from 2019 through fruit-picking. Meanwhile, the increment of the cumulative net value in figure 7 reveals that the picking garden is profitable in long term and the net value will be positive since 2020. Therefore, the harvest of cherries and oranges are very important as it determines whether the picking garden could expand the net revenue fast. Furthermore, Li Qiu has to ensure that garden could attract sufficient tourists to pick up the fruits in different seasons, otherwise, the revenue can be less than anticipated.
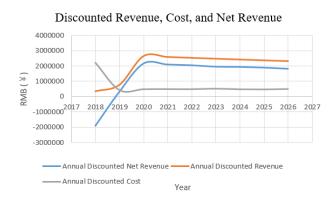
Figure 6 The Prediction of the Discounted Revenue, Cost, and Net Revenue
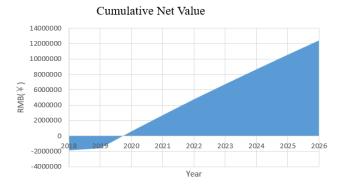

Figure 7 The Prediction of the Cumulative Net Value

The net present value for 2018-2026 is 12.3 million RMB or $1.8 million US. The average return to the land is 34, 400 RMB or $5, 058 US per mu per year. And the ratio of the average annual returns to land to the rental rate on land is 24.57. The profit margin is 204.4%. These values are exceptionally higher than the other normal fruits farmlands. In 2016, National Development and Reform Commission reported that average annual return to the land for the oranges farmland in 7 provinces was 2,233 RMB, or $328 per mu per year. The ratio of the average annual returns to land to the rental rate on land for the other orange farmlands was 17.1. Also, the average profit margin was 65.81% (National Development and Reform Commission, 2017) Based on the comparison above, the net revenue from the picking garden is enormously higher than that from the other traditional fruits gardens. Though, it is expected that the return from the picking garden should be higher, there are some potential problems in the assumptions.

Firstly, the cost of the advertisement for the picking garden cannot be predicted. For now, Li Qiu mainly disseminates the picking garden through WeChat and the

cooperation with local agritainment. He successfully sold all the melons in two months and the cost of dissemination via these methods is almost zero. However, it was not sustainable nor efficient to attract more tourists to pick the fruits in the future, because expanding the tourist market through personal relationships will be limited by the networking. Also, it is difficult to ensure that the tourists are willing to visit the same picking garden again. Though, Li Qiu has successfully built more than 20 regular customers who are interested in his fruits, the amount of these customers are negligible comparing with the output in the picking garden. It is a challenge for him to build a reliable tourists source. From Li Qiu's perspective, it is the key whether he could attract sufficient tourists to pick up the fruits.

Therefore, it is unclear about the amount of the fruits that can be sold via picking activities. Meanwhile, the cost behind the picking activities could be tremendous. If considering the potential cost related to the picking activities, the net revenue from the picking garden should be lower than the value was calculated.

Net Present Value: $0.46 million US.

The average return to the land: $1,292 US per mu per year.

Ratio of the average annual returns to land to the rental rate on land: 6.
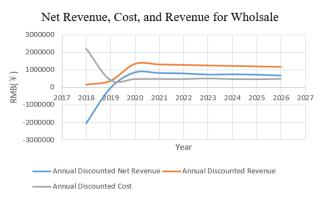
Profit Margin: 52.23%

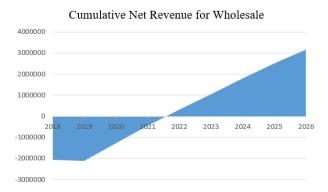Figure 8 The Prediction of the Discounted Revenue and Cost via Wholesales

Figure 9 The Prediction of the Cumulative Net Value for Wholesales

If the picking garden fails to sell the products via the picking activities or the other retail methods, then the picking garden has to sell the products through middlemen. All the costs and the outputs are the same except the sales price could fall to less than half of the targeted price. I assumed the new price through wholesales was half of that in picking activities. Then the new net present value for 2018-2026 will be 3.2 million RMB, or $465,000 US. The average return to the land is 8,786 RMB or $ 1,292 US per mu per year. The ratio of the average annual returns to land to the rental rate on land is 6. And the new profit margin is 52.23%.

The net revenue will be much lower than that from picking activities if they fail in the sales channels. The profit from the picking garden is higher than that from the other orange orchards, because the average sale price in Li Qiu's garden is 20 RMB/kg that is still much higher than the other oranges. However, the profit margin is lower than that in the other orchards because of the higher labor cost and tremendous investment in greenhouse.

Also, it is impossible to predict the actual output of the fruits in the future. Red Beauty is sensitive to the disease, and dehiscent is another issue in harvesting period, therefore, both the output and the quality of the oranges cannot be guaranteed (Qing, 2017). Although, greenhouse could efficiently protect the oranges from rainfall or disease, and Li Qiu was confident that he could successfully avoid the reduction of the output by his knowledge, the uncertainty of the oranges output could result in lower profit in the future. Moreover, an increasing number of orchards begin to cultivate red beauty recently, the popularity and the price of the red beauty could decline fast (Qing, 2017). The risk of the declined price could also result in less profit.

If I assumed the yield of the red beauty was 1000 kg/mu because of the disease or the other potential problems, but they were still sold out through picking activities (Qing, 2017), then the net present value would decline to $1.08 million US and the average return to the land was $3,014 per mu per year. If the picking garden has to sell through wholesales with a reduced output of the oranges, then the net present value was $97,186 US, and the average return to the land was $270 per mu per year. The net revenue per mu was even lower than the average net revenue from the other regular orange orchards.

Based on the analysis above, the sales methods and the prevention from the reduced output are very important for the picking garden. The failure in attracting abundant tourists and oranges cultivation would make it impossible to increase the profit via agritourism picking garden. However, extra cost, especially in advertisements, could be required to achieve the expected revenue.

Conclusion

It is a good method to chase a higher revenue via the picking garden where the products could be sold at a retail price. Moreover, the greenhouse could help to ensure the output by protecting the crops from chilling, disease, pests, and other circumstances. The success of Li Qiu's melons reveals the feasibility of the picking garden and it implies that the direct sale via picking activities is more profitable than the regular orchards that focuses on wholesale. In the long term, Elegant facilities and decorations in the picking garden are also necessary in agritourism (Zheng, 2008). Therefore, more investment in the business and the decoration of the picking garden will be required to attract tourists.   Additionally, the guarantee of the successful cultivation is also important for the picking garden. Reduced output of the red beauty will cause a sharp decline in the net revenue and profit margin. However, the tremendous investment can still benefit the picking garden with a higher return than the traditional orchards.

Based on this project, it is possible and feasible to achieve a higher profit through agritourism picking gardens, but it also requires a large amount of investment in both

facilitates, human capital, and business activities to support a sustainable development. In long term, I believe the agritourism picking gardens can increase the profit for the fruits with a successful management and enough investment.

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Appendix:

The Benefit & Cost in 2018

Picking Garden in Jiaokou , China																			
Total Cost in 2017-2018 by month																			
							Month												
	Unit	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	Sum
Fixed Cost																			
Vehicle	RMB																		50000
Tillage machine	RMB																		4000
Small Car Pull Carts	RMB																		200
Sicssor	RMB																		560
Ditcher	RMB																		4000
Shoulder carrying mower	RMB																		2000
Pesticides Sprayer	RMB																		1700
Single Span Greenhouse	RMB																		200010
Multi Span Greenhouse	RMB																		1200060
Land Preparation	RMB																		35000
Well & Tube	RMB																		55000
Drip Irrigation System Construction	RMB																		3000
Sprink Irrigation System Construction	RMB																		40000
Office	RMB																		60000
Road	RMB																		90000
Sickle	RMB																		70
Planting(Cherry)																			3960
Planting(Orange)																			13200

Fixed Cost																			
Fixed Cost																			1762760
Cash Overhead																			
Land Rent	RMB	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	56000
Office Expense	RMB	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	625
Gasoline for agricultural machinery	RMB																		500
Land Preparation																			
Services																			
Fertilizer	RMB																		28000
Irrigation System																			
Management																			
Energy-Electricity	RMB	200	200	200	200	200	200	200	200	200	200	300	300	300	200	200	200	3600

Picking Garden in Jiaokou , China																			
Total Cost in 2017-2018 by month																			
							Month												
	Unit	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	Sum
Planting																			
Inputs																			
Planting(Watermelon)																			2000
Planting(Orange)																			13200
Planting(Cherry)																			3960
Planting(Sweetmelon)																			1200
Planting(Strawberry)																			15000
Crop management（Watermelon																			
Services																			
Liquid Fertilizer																			500
Spreading Pesticides & Fungicides																			2500
Crop management(Sweetmelon)																			
Services																			
Liquid Fertilizer																			300
Spreading Pesticides & Fungicides																			1500
Crop management(Cherry)																			
Inputs																			
Pesticides, Fertilizer & Fugisides																			15000

Crop management(Orange)																			
Inputs																			
Pesticides, Fertilizer & Fugisides																			15000
Crop management(Strawberry)																			
Services																			
Solid Fertilizer																			5000
Mulching Film																			1000
Liquid Fertilizer																			900
Spreading Pesticides & Fungicides																			5000
Reproductive(Watermelon)																			
Services																			
Artificial Pollination(授粉)																			15
Reproductive(Sweetmelon)																			
Services																			
Artificial Pollination(授粉)																			15
Reproductive(Strawberry)																			
Services																			
Bees																			1500

Labor Cost																
In-house labor																206000
Supervisor Labor																80000
Total Cost																
Total Cost																2221075
Purchased Cost																172315

The Predictive Benefit & Cost

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026
Fixed Cost										
Vehicle	RMB	50000	0	0	0	0	0	0	0	0
Tillage machine	RMB	4000	0	0	0	0	0	0	0	0
Small Car Pull Carts	RMB	200	0	0	0	0	0	0	0	0
Sicssor	RMB	560	0	0	0	0	0	0	0	0
Shoulder carrying mower	RMB	2000								
Ditcher	RMB	4000	0	0	0	0	0	0	0	0
Pesticides Sprayer	RMB	1700	0	0	0	0	0	0	0	0
Single Span Greenhouse	RMB	200010	0	0	0	0	0	0	0	0
Multi Span Greenhouse	RMB	1200060	0	0	0	0	0	0	0	0
Land Preparation	RMB	35000								
Well & Tube	RMB	55000	0	0	0	0	0	0	0	0
Drip Irrigation System Construction	RMB	3000	0	0	0	0	0	0	0	0
Sprink Irrigation System Construction	RMB	40000	0	0	0	0	0	0	0	0
Office	RMB	60000	0	0	0	0	0	0	0	0
Road	RMB	90000	0	0	0	0	0	0	0	0
Sickle	RMB	70	0	0	0	0	0	0	0	0
Planting(Cherry)	RMB	3960	0	0	0	0	0	0	0	0
Planting(Orange)	RMB	13200	0	0	0	0	0	0	0	0

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026
Cash Overhead										
Land Rent	RMB	42000	45500	49000	52500	56000	59500	63000	66500	70000
Office Expense	RMB	500	550	1000	1000	1000	1000	1000	1000	1000
Machine Repairment	RMB	1000	1016	1032	1048	1064	1080	1097	1113	1129
Greenhouse Repairment	RMB			36120			37811			39503
Gasoline for agricultural machinery	RMB	500	493	501	503	508	502	494	490	494
Land Preparation										
Services										
Fertilizer	RMB	28000	12132	12193	12217	12229	12237	12240	12240	12240
Irrigation System										
Management										
Energy-Electricity	RMB	3000	3200	3700	3712	3719	3724	3726	3727	3728
Planting										
Inputs										
Planting(Watermelon)		2000	3600	3665	3764	3801	3760	3696	3670	3697
Planting(Sweetmelon)		1200	2400	2443	2509	2534	2506	2464	2447	2465
Planting(Orange)		13200								
Planting(Cherry)		3960								
Planting(Strawberry)		15000	14769	15034	15440	15595	15423	15161	15056	15168

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026
Crop management （Watermelon										
Services										
Liquid Fertilizer		500	910	914	916	917	918	918	918	918
Spreading Pesticides & Fungicides		2500	4492	4487	4485	4483	4482	4482	4482	4482
Crop management(Sweetmelon)										
Services										
Liquid Fertilizer		300	607	610	611	611	612	612	612	612
Spreading Pesticides & Fungicides		1500	2995	2992	2990	2989	2988	2988	2988	2988
Crop management(Cherry)										
Inputs										
Pesticides, Fertilizer & Fugisides	RMB	15000	15149	19044	19106	19143	19165	19178	19185	19189
Crop management(Orange)										
Inputs										
Pesticides, Fertilizer & Fugisides	RMB	15000	15149	19044	19106	19143	19165	19178	19185	19189

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026
							Month			
Crop management(Strawberry)										
Services										
Solid Fertilizer		5000	5055	5080	5090	5096	5099	5100	5100	5100
Liquid Fertilizer		900	910	914	916	917	918	918	918	918
Mulching Film		1000	1010	1016	1019	1021	1022	1023	1023	1023
Spreading Pesticides & Fungicides		5000	4991	4986	4983	4981	4980	4980	4980	4980
Reproductive(Watermelon)										
Services										
Artificial Pollination(授粉)		15	27	27	28	28	28	28	28	28
Reproductive(Sweetmelon)										
Services										
Artificial Pollination(授粉)		15	30	30	31	31	31	31	31	31
Reproductive(Strawberry)										
Services										
Bees		1500	1515	1523	1529	1531	1533	1534	1535	1535

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026
							Month			
LUS Outputs										
Self-Pick										
Watermelon	RMB	160000	287700	287525	287421	287361	287327	287327	287327	287327
Sweetmelon	RMB	168000	335651	335446	335325	335255	335214	335214	335214	335214
Cherry	RMB			798681	798393	798225	798130	798130	798130	798130
Orange	RMB			1198021	1197589	1197338	1197194	1197194	1197194	1197194
Straberry	RMB	800	149844	149753	149699	149667	149649	149649	149649	149649

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026
							Month			
Labor Cost										
Hired Long-term Labor		206000	206000	218360	218360	218360	231462	231462	231462	231462
Supervisor Labor		80000	90000	100000	150000	150000	150000	150000	150000	150000
Fixed Cost										
Fixed Cost		1762760	0	0	0	0	0	0	0	0
Total Annual Cost										
Total Cost		2221075	432497	503717	521864	525703	579944	545307	548690	591879
Total Annual Revenue										
Total Revenue from Pick-up		328800	773195	2769425	2768428	2767846	2767514	2767514	2767514	2767514
Net Annual Revenue										
Net Annual Revenue		-1892275	340698	2265708	2246564	2242143	2187570	2222207	2218824	2175635

Picking Garden in Jiaokou , China
Benefit & Cost in the Future

	Unit	2018	2019	2020	2021	2022	2023	2024	2025	2026	Average
							Month				
Annual Discounted Net Revenue		-1892275	333201	2167092	2101497	2051210	1957246	1944485	1898802	1820872	
Annual Discounted Revenue		328800	756181	2648884	2589663	2532146	2476129	2421642	2368354	2316239	
Annual Discounted Cost		2221075	422980	481792	488165	480936	518883	477157	469552	495366	467758
Cumulative Discounted Net Value		-1892275	-1559074	608017	2709515	4760725	6717970	8662455	10561258	12382130	
Discount Rate in China		2.25%									
Net Present Value (2018 USD)		1820901									
Average Annual Returns to Land (2018 USD)		5058									
Ratio of the Average Annual Returns to Land to the Rental		0.61									
Returns to Family Labor		0.65									
Labor Hour		7800									
https://www.ceicdata.com/zh-hans/china/rediscount-and-lending-rate/cn-rediscount-rate											