The Influence of Developing Agritourism on Agricultural Production

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Abstract: The purpose of this study would like to investigate the impact of developing Agritourism on agricultural production in Taiwan. The empirical results indicated that the impact of developing agritourism on the total agricultural production are positive in Taiwan, especially in vegetables production. It is surprised that it is not significant on fruits production. We think it is because the development of agricultural tourism in Taiwan pays special attention to catering and processed agricultural products. The government even has a special plan to guide farmers to engage in flavor catering and produce and sell processed agricultural products, which may lead to increase the demand for vegetables.

Keywords: agritourism, agricultural production, panel data model

1. INTRODUCTION

Agritourism is a form of commercial enterprise that links agricultural production and tourism to attract visitors onto a farm, ranch, or other agricultural business for the purposes of entertaining or educating the visitors. Most studies believe that agricultural tourism can increase farm income. However, there is no unanimous conclusion on whether developing agritourism can improve agricultural production. Bwana et al. (2015) and Ghidouche et al. (2021) believe that agritourism can bring better income to rural areas. Farmers have incentives to continue farming. Therefore, agritourism can increase food production. However, Fleischer et al. (2018) indicated that Farmers may reduce agricultural production activities in pursuit of higher income by allocating resources to tourism. Montefrio and Sin (2021) also indicated that Agricultural tourism places too much emphasis on the creation of landscapes, thereby crowding out agricultural production in Philippines.

As far as agricultural tourism is concerned, agricultural tourism has been developed in Taiwan for a long time. The origin of agricultural tourism in Taiwan dates from the establishment of the first tourist orchard in 1965 (Duan Zhaolin, 2007). After nearly 60 years of development, agricultural tourism has become increasingly prosperous. The recreational agricultural area has also grown from Area 57 in 2007 to Area 102 in 2022. The purpose of this study would like to investigate the impact of developing Agritourism on agricultural production in Taiwan.

2. DATA and EMPIRICAL MODEL

Annual agricultural production data are collected in this study from 2012 to 2020. There are 19 prefectures (outer Islands not including) in Taiwan areas and totally 171 observations in this sample. The fixed effect model of panel data is applied in this study. The model is specified as

$$Y_{ijt} = \alpha + \gamma Agritourism_{jt} + \beta' X_{ijt} + t_{year} + \quad (1)$$

where Y_{ijt} is the total production of i agricultural product in year t for j prefecture. The Taiwan agricultural statistical annual report divides major crops into the following seven categories: rice, miscellaneous grain crops, special crops, fruits, vegetables, mushrooms and flowers. We add up the yields of all crops under each category to get the yield for that category. Since the unit problem, we can not add up the output of various crops under the flower category, so the flower category is discarded. In addition, the output of mushroom crops is very small. Therefore, this study incorporated mushrooms into vegetables with similar properties. In this empirical study, five agricultural production outputs are considered as the dependent variable. The five agricultural production outputs are rice, miscellaneous grain crops, Special Crops, Vegetables and Fruits. The data source is the Agricultural Statistics Annual Report from 2011 to 2020 issued by the Council of Agriculture.

The number of agritourism areas are considered as the index of developing agritourism. The data of weather such as temperature, rainfall, as well as the data of agricultural damage, the number of plant diseases and insect pests are also employed in this study. $Agritourism_{jt}$ is the number of agritourism areas in year t for prefecture j, which is considered as an index of agritourism development. Furthermore, there are other factors which affect agricultural production. Metclfe and Elkins(1980) attribute the factors affecting crop growth are summarized into three aspects: technology, biology and environment. Liliane and Charles (2020) indicate that environmental factors are also divided into abiotic and biotic factors. Abiotic factors include soil characteristics (soil composition, pH value, physical, chemical and biological characteristics) and climate stress (drought, cold, flood, heat stress, etc.). Biological factors are mainly plant diseases and insect pests. Based on the literature, the data of annual temperature, rainfall, agidamage, Insect and Pathogen are collected in this study. Those factors data are included in the X as the control variables.

Temperature is annual average temperature. It has been conducted on the effect of temperature on rice growth. In this study, the monthly average temperatures for 12 months of the year were added up and divided by 12 to determine the annual average temperature. Furthermore, the effect of temperature on crop yields is not linear. Therefore, in addition to using the annual average temperature as a control variable, this study will also use the square of the annual average temperature to characterize the impact of temperature on crop production. The data source is the Government Information Open Platform: Taiwan's 1960-2017 Temperature grid monthly average data for each county and city.

Rainfall is the annual cumulative rainfalls in each prefecture. Rainfall is also an important factor affecting crop growth. Both drought and floods are not conducive to crop growth (Zhang et al., 2006). We also believe that the impact of rainfall on crop yields is not linear. Although more rainfall is more beneficial to crop growth, if too much rain causes floods, it will also cause production losses. Therefore, in addition to using the annual cumulative rainfall as a control variable, this study will also use the square of the annual cumulative rainfall to characterize the impact of rainfall on crop production. The data source is the Disaster Prevention Data Service Platform: 1960-2020 Grid monthly average data of rainfall across Taiwan.

In recent years, climate change caused by climate warming has had a significant impact on agricultural production (Lachaud et al., 2022). Before 2016, Taiwan often suffered huge losses in agricultural products due to typhoons. Although the number of typhoons gradually decreased after 2016, droughts occurred frequently, leaving many rice fields fallow. Therefore, this study uses the amount of agricultural losses from natural disasters announced by the Committee of Agriculture every year as one of the control variables. The higher the amount of losses, the greater the impact of natural disasters on crop production. The unit of measurement is thousands of New Taiwan dollars. The data source is the annual crop disaster losses in Taiwan and Fujian from 2011 to 2020 published by the Agriculture and Food Administration of the Council of Agriculture.

In Taiwan, if farmers find that their crops are suffering from diseases, they can report to the government and ask them to diagnose the disease and provide treatment suggestions. Therefore, government will announce the disease diagnosis cases of various crops in various counties and cities in that year every year. We believe that if there are more disease diagnosis cases in that year, it means the disease is more serious. Same as disease. In Taiwan, if farmers find that their crops are infested by pests, they can also ask civil servants from the Bureau of Animal and Plant Health Inspection and Quarantine to diagnose the problem and provide treatment recommendations. Therefore, the Prevention and Inspection Bureau will announce the pest diagnosis cases of various crops in various counties and cities in that year every year. We believe that if there are more pest diagnosis cases in that year, it means the pests are more serious.

3. RESULTS and DISCUSSIONS

In terms of total output, the estimated coefficient of Agritourism is positive at the 10% significance level, indicating that the development of leisure agriculture has a positive contribution to agricultural production. In addition, the estimated coefficient of natural disaster loss (Agidamage) is significantly negative below the 1% level, indicating that natural disasters have a negative impact on crop production. In addition, looking at other types of crops, only the estimated coefficient of Agritourism for vegetables is significantly positive below the 1% level, indicating that the development of agricultural tourism will help increase vegetable production. We believe that this phenomenon is because Taiwan’s agricultural tourism development attaches great importance to catering and processed agricultural products. The government even has a special program (Tian Mama) to guide farmers in engaging in flavor catering and producing and selling processed agricultural products. This in turn leads to an increase in demand for vegetables. According to the survey results of Chen et al. (2021), the output value of processed agricultural specialty products accounted for 33.1% of the overall agricultural tourism output value in 2020, and the catering output value accounted for 26.4%. It is the main source of income from agricultural tourism. Both businesses require vegetables as materials. Even if a farmer completely transforms into a restaurant or a producer of processed products and no longer engages in farming, he still needs to purchase vegetables from neighboring farmers. Agricultural tourism does not have a significant impact on fruit production, which is quite surprising.

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