

学位論文の要旨 (論文の内容の要旨)
Summary of the Dissertation (Summary of Dissertation Contents)

論 文 題 目

Dissertation title

Agricultural Production, Irrigation and Interdependency through Transactions in Rural Village: Evidence from Developing Countries

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In developing country, over half of total workers get involved in agricultural sector and most poor people make money from agricultural production. Agricultural sector generates significant economic spillover effects in terms of employment and income generation to local people in remote areas. Inevitably, irrigation is the single most important component of sustainable agricultural production. It improves agricultural production and indirectly improves the diversity of household food consumption and food security leading to poverty reduction.

More specifically, rice is one of the most important agricultural products and its plantation needs more water than many types of agricultural products. Most cases are rainfed rice cultivation which is directly affected by climate change. In developing countries, approximately 60% of total rice production come from irrigated area. Therefore, the government in many countries try to introduce irrigation to ensure the growing of rice in both dry and raining seasons as well as to improve rice productivity and production.

In the case of Lao People's Democratic Republic (Lao PDR), rice is an important staple food crop which is planted over 75% of arable land. Especially, sticky rice has the share of approximately 80% of total rice production and over 80% of rice cultivation occurs via rainfed farming which changes year by year and results in fluctuating rice production. In 2018, only 20% of households accessed to irrigation. However, some existing irrigations cannot be regularly used due to insufficient water supply, lack of operational and maintenance costs. As a result, some farmers avoid to grow rice in dry reason.

Whether irrigation can improve agricultural production and productivity or not, we cannot measure the magnitude of its effect on poverty reduction. Interdependency among households could be another factor leading to poverty reduction, especially isolated villages, where the villagers become more specialized and economic interdependence by products' transaction. The level of economic interdependence can vary depending on type of products and village setting. The interdependency mainly occurs in households that cannot access regular market. So access to adequate consumption could lead to household livelihood improvement and poverty reduction in the long run. The interdependency among households in rural areas is a crucial factor to better understanding the rural households' characteristic,

pattern of their production and trade transactions. This issue is useful information for local government to formulate district or villages' poverty eradication strategy.

To address this problem, three main empirical studies of this dissertation focus on: (1) examining the impacts of irrigation systems on sales value, total production and productivity of sticky rice, as well as household consumption; (2) estimating the impact of households access irrigation in different period of times on sticky rice productivity; and (3) analyzing key characteristics of interdependency among households in the same community through agriculture transactions in order to capture village economy's performance pattern. The findings of this dissertation expect to contribute to a greater improvement of rice productivity, and a better understanding interdependency among households in village, as a result lead to poverty reduction.

To estimate the impacts of irrigation on household sticky rice production and productivity in Lao PDR of the first and second empirical chapters, this research utilizes panel data of the Lao Expenditure and Consumption Survey (LECS) 2002/2003, 2007/2008, and 2012/2013.

The first empirical study evaluates the impacts of irrigation on sticky rice production. Panel data are divided into two groups, in which the treatment group has 459 irrigated households in all three periods of the LECS. The second group is control group including 783 non-irrigated households in any of the three periods of the LECS. Since irrigation is not randomly selected, PSM can help researchers to reconstruct the counterfactuals to mitigate the endogeneity problem. The results show that with irrigation access, households can improve sales value, total production and productivity of sticky rice. However, no any evidences are found in the impact of irrigation on household consumption. In Lao PDR, households mainly grow sticky rice for self-consumption rather than sale, and household income is usually earned from various sources apart from sticky rice cultivation. In addition, majority of rural areas in developing countries including Lao PDR, where households cannot access regular markets. Therefore, when the production of households increases or the production surplus, they will be stocked them as wealth or capital accumulation. Furthermore, sticky rice product is considered to be necessary goods which has a small elasticity of demand when the production of household or income increases, they will have a minor change on the amount of stick rice consumption. This might, to some extent, be able to explain the reason why an increase in sticky rice productivity does not reflect in household consumption.

The second empirical study aims to further investigate whether the impacts of irrigation on sticky rice productivity (if any) is sustainable when households extend their irrigation access from one period to two periods applying the difference-in-differences (DID) method with a fixed-effect model to analyze the impact of irrigation access in different period of times on sticky rice productivity. The significant advantage of the DID method is that the observed and unobserved time-invariant confounding variables, which might be correlated with the treatment and outcomes of interest, are canceled out in the regression. Meanwhile, the fixed-effect model accounts for not only the unobserved time-invariant heterogeneity but also the heterogeneity in observed characteristics over multiple periods. Panel data are divided into two comparison groups to evaluate the impact of irrigation on sticky rice productivity when households access irrigation in one period and two periods of LECS. The first comparison group, in which the treatment group has 266 households with irrigation access in LECS 5 but no longer in LECS 4 and the control group includes 530 households without irrigation in any of the LECS. The second comparison group comprise of 98 households with irrigation in LECS 4 and 5, but without irrigation in LECS 3 and the control group has 783 households with no irrigation access in any of the LECS. The finding points out that irrigation has positive impact on sticky rice productivity when households access to irrigation in both one period and two periods of the LECS. Moreover, comparing with households access irrigation in one period of the LECS, households with access to irrigation

in two periods of the LECS have nearly double sticky rice productivity. We found that long-term access to irrigation leads to higher sticky rice productivity, since a longer access to irrigation made farmers have learnt more experience in using irrigation for supporting their sticky production such as good irrigation practice, intensive irrigation management and good water arrangement.

The third empirical study of this dissertation focuses on investigating household interdependency through their transactions. Two village surveys were conducted in two developing countries in March 2018. By focusing on agricultural transactions, 75 households are conducted in Dang village in Vietnam and 70 households in Houey Nambak village in Lao PDR. Using data from two household surveys, two expanded VIOTs are constructed. The expanded VIOT shows the amount or value of household transactions in each village. Therefore, to examine the number of transactions for each product for each consumer and producer, two expanded QVIOTs are transformed to binary information from two expanded VIOTs. The findings show that poultry is the subject of most transactions because it is cheap and widely consumed by households in the two villages. Specifically, in Houey Nambak village, nearly poor and middle-income households have stronger interdependency than poor and rich households in terms of poultry transactions with over 70% of total transactions conducted within the village, but no such evidence is found in Dang village.

Some policy implications that can be derived from this research are that farmers should be intensively promoted to make the most use of irrigation, development of irrigation system is highly needed, and to ensure effectiveness of irrigation utilization local farmer involvement in monitoring procedure of irrigation is necessary. To improve household livelihoods and to lead to sustainable development, adopting commercialization is necessary to raise transaction volume and poultry productivity.

備考

論文の要旨はA 4判用紙を使用し、4,000字以内とする。ただし、英文の場合は1,500語以内とする。

Remark: The summary of the dissertation should be written on A4-size pages and should not exceed 4,000 Japanese characters. When written in English, it should not exceed 1,500 words.