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Title	THE EFFECTS OF VERTICAL COOPERATION ON ECONOMIC EFFICIENCY OF PANGASius FARMS WITH A CASE STUDY IN VIETNAM [an abstract of dissertation and a summary of dissertation review]
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Degree Grantor	北海道大学
Degree Name	博士(水産科学)
Dissertation Number	甲第15100号
Issue Date	2022-06-30
Doc URL	https://hdl.handle.net/2115/86811
Rights(URL)	https://creativecommons.org/licenses/by/4.0/
Type	doctoral thesis
File Information	Huynh_Huu_Tho_abstract.pdf, 論文内容の要旨



学位論文内容の要旨

博士の専攻分野の名称：博士（水産科学） 氏名： HUYNH HUU THO

学 位 論 文 題 目

THE EFFECTS OF VERTICAL COOPERATION ON ECONOMIC EFFICIENCY OF PANGASIU FARM WITH A CASE STUDY IN VIETNAM

（パンガシウス属魚類の内水面養殖の経済効率性に対する

垂直統合の影響と効果：ベトナムでの事例研究から）

A variety of constraints in markets with commodities from aquaculture productions in developing countries, such as asymmetric information, output uncertainty, high transaction costs, and production risks lead to market failure and significant market entry barriers for farmers, have economically reduced efficiency of activities and profits to stakeholders (Eaton & Shepherd, 2001; Mounirou et al., 2020). Vertical cooperation is one of the rural development alternatives by linking farmers to the market, while the alternatives allow firms to secure their materials and then commodities to sell to the market, it is also expected to contribute to solving problems that producers face by reducing transaction costs. This study aimed to find optimum economic alternatives for pangasius farmers in the Mekong Delta, Vietnam and other countries with efficiency issues with market dynamics. Analyses were made on the influences of vertical cooperation and characteristics of farms on economic efficiency. The results and methodological approach are expected to optimize farm businesses in Vietnam and other countries facing similar market dynamics.

I choose Dong Thap, An Giang, and Soc Trang provinces in the Mekong Delta ($8^{\circ}20'-11^{\circ}00'N$; $103^{\circ}50'-106^{\circ}45'E$) as the site for the case study. After the key informant interviews, the study used a structured questionnaire to survey 127 commercial pangasius farmers located at study sites to collect their information on socioeconomic characteristics and the pangasius production and commercial activities. Besides, data on the status of pangasius production and trading were collected from the Vietnam Association of Seafood Exporters and Producers (VASEP), the Food and Agriculture Organization of the United Nations (FAO), and the United States International Trade Commission. Vietnam's macroeconomic indicators were gathered from The World Bank.

The effect of vertical cooperation and other determinants on pangasius farmers' economic efficiency was estimated using propensity score matching (PSM) and a single-stage stochastic frontier analysis (SFA) to control the potential sample selection bias. The likelihood ratio test is used to examine bias and consistency in the results. Moreover, the comparison between vertical cooperated and non-vertical cooperated farms was made in socioeconomic characteristics of farms, commercial efforts and farming activities using the Mann-Whitney U test (Mann & Whitney, 1947; Nachar, 2008). Besides, the one-way ANOVA test (Finstuen et al., 1994; Kim, 2017) is used to compare socioeconomic characteristics and pangasius commercial and farming activities among farms in the three strata in Mekong Delta.

The study found a statistically significant effect of vertical cooperation and other determinants on the economic efficiency of pangasius farmers in the Mekong Delta, Vietnam. Most pangasius farmers have faced challenges in access to the market and improving economic efficiency, especially maximizing benefits. There was no

significant difference in most demographic characteristics between pangasius farmers with and without vertical cooperation. However, the mean yield difference between farms with and without vertical cooperation was statistically significant. Profits and revenues are significantly higher in farms with vertical cooperation than without vertical cooperation. Besides, vertical cooperation positively affected the economic efficiency of pangasius in the Mekong Delta. Processing companies ensured pangasius market and sharing marketing risks for vertical cooperated farmers, thereby increasing pangasius farmers' efficiency. Moreover, market information and knowledge of the companies improved the production and marketing management capacities of farmers. The study also found a nonlinear relationship between farm size and the economic efficiency of pangasius farmers. Economic efficiency first increased due to economies of scale until the farm area reached a size threshold, then fell as farm size increased because of transaction and agency costs under asymmetric information. Decision-makers' farming experience negatively affected efficiency, while the influence of access to extension supports on this efficiency was positive. Like previous studies, feed and fingerling costs were essential input factors for farms with and without vertical cooperation.

Based on the results, the study recommendations for enhancing the economic efficiency of farms are: improving performance of vertical cooperation, providing and sharing timely market and farming technique information to farms, accessing extension support, determining the optimal farming scale depending upon farmers' available resources, and using quality of fingerlings and feed.

Keywords: Economic efficiency, vertical cooperation, pangasius farming, single-stage stochastic frontier analysis, propensity score matching