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SUMMARY OF DOCTORAL THESIS

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Title: ECONOMIC ANALYSIS OF INCOME EFFECTS, RESOURCE-USE
EFFICIENCY AND INSTITUTIONAL ARRANGEMENTS IN THE HORTICULTURE
SECTOR IN GUINEA

(ギニアにおける園芸作部門の所得効果、資源利用効率と生産者組織に関する経済分析)

In developing countries such as Guinea, smallholder agriculture remains important for development and poverty reduction. The country boasts significant agricultural assets, for accelerating growth and creating lasting jobs. There is a relatively long rainy season, with annual rainfall ranging from 1,200 mm to 4,000 mm, and providing about 400 billion m³ of water. Moreover, with 6.7 million hectares of arable land and an estimated 367,000 hectares of developable areas for irrigation, the agricultural sector accounting for nearly 25% of the country's GDP, plays a significant role by providing a broad-based income and employment to about 80% of the workforce. However, growth in the sector is inextricably bound to the macroeconomic progress in the country. Most of the smallholder farmers are engaged in subsistence and semi-commercial farming, producing food staples such as rice, potato, maize and horticultural crops, for own consumption and commercialization. Several initiatives by governmental as well as non-state actors are in place to promote intensification and commercialization of smallholder farming. The problems with the Guinean smallholder agriculture dwell on the use of traditional technology which is associated with low productivity, the large majority of the crop area being cultivated by hand. Cash crops farming is dominated by spot markets, with an increase of some movements towards farmers' engaging collectively in crops production and marketing through producer organizations. Farmers' organizations as institutional innovation tools are inclusive of the poor and are charged with the purpose of becoming a market outlet for smallholder farmers.

Empirical studies on smallholder farmer productivity and farmer organizations in Guinea remain largely scanty, isolated and devoid of in depth analyses of the income effects, resource use efficiency of smallholder cash crops farmers and how membership in farmer organizations affects farm income. The current study was therefore designed to provide insights into the trade-offs between horticultural crops production, the institutional players and the effects of the latter on farming income in Guinea. Mainly, the study emphasizes on pineapple, potato and eggplant production economics, farmers' resource use efficiency and the income effects of their participation in farmer organizations. Using econometric analytical tools, the analyses performed in this study are based on a set of primary data collected from a sample of 268 farmers in a two-wave field survey in 2012 and 2014, respectively in Middle Guinea (Pita and Labe prefectures) and Lower Guinea (Kindia prefecture). The main objective of the study is to investigate the income effects, resource use efficiency in the Guinean horticulture sector and the linkages with farmer organizations. To achieve this goal, the analytical tools employed include: descriptive statistics analysis, profitability analysis, productivity analysis, the Heckman two-step selection model, production function analysis and resource use efficiency among others.

The study is organized and presented in eight chapters. The First Chapter introduces the dissertation with highlights on the background of the study, the problem statement and research

questions and the objectives of the study. In addition, the chapter presents the significance and limitations of the study and finally concludes with the organization of the dissertation and the conceptual framework employed for the study. The Second Chapter presents an overview of the agricultural development, the horticulture sector and farmer organizations in Guinea. Chapter Three provides details on the research design and methodology, including a description of the study areas, sampling procedure and data collection as well as the analytical tools used for the study and a framework of analysis.

In Chapter Four, an assessment of the effects of farmer organizations on the smallholder potato farmers' income is presented with highlights on the profitability analysis of potato farming and the determinants of membership in farmer organizations. In this chapter, the Heckman two-stage sample selection model used to assess the effects on farm income of group membership, revealed in its first stage that the age of the potato farmers, land ownership, extension service, credit access and off-farm income are positively associated with group membership while gender and education level of the farmer negatively influenced their decision to join farmer groups. Results of the second stage outcome equation found positive farm income effects of group membership. Furthermore, results revealed that farm income is predominantly determined by labor used, the size of the cultivated potato area, share of potato sold and potato market price. In Chapter Five, the Cobb-Douglas production function and a supply function were used to investigate the determinants of potato production and supply by smallholder farmers. The results showed that potato area, improved seeds use and fertilizer, positively influenced the potato output, while production losses are negatively associated with the potato output. Results from the supply function revealed that quantity produced, price of potato and share of sales four weeks after harvest were positively associated with quantity of potato supplied to the market, whereas quantities retained for seed, food and gifts, and post-harvest losses have negative effects on the quantity of potato marketed. Results also revealed that none of the relevant production inputs used by the sample farmers were efficiently allocated and utilized. Insights from the econometric model used to explore the pineapple production economics and resource use efficiency presented in Chapter Six, showed significant results. Pineapple output was positively associated with the farm size, membership in cooperatives and labor used. Estimates of the marginal value and efficiency of resource use revealed that none of the resources was optimally allocated as their marginal value products were not sufficient to offset costs. Fertilizer and other agrochemicals, labor were underutilized while. The profitability analysis however showed that pineapple farming is highly profitable for the farmers; with cooperative members realizing nearly twice the profit on farm investment. The eggplant production economics and its contribution to farmers' income is covered in Chapter Seven. Results from the multiple linear regression showed that income from eggplant production is determined by the farm size, ratio of active family members, membership in cooperatives and the market price; while the cost of production was significant and negatively associated with the farm income. Despite the low levels of technology adoption, the profitability analysis showed a highly significant ratio of net farm profit to revenue, especially for female producers.

Finally, in Chapter Eight, the conclusion and policy implications are presented. In the first part, the summary of findings confirms that farmers are indeed resource-poor, cultivating on average less than one hectare and presenting no significant difference in terms of socioeconomic and demographic characteristics. With poor farm assets, farmers face numerous and similar production and marketing constraints across the study areas, including the lack of inputs, poor irrigation, pest and diseases, poor infrastructures, the lack of adequate storage facilities among others. The government and development stakeholders should therefore encourage and support farmer organizations as the latter play a significant role in providing inputs and output markets with positive impact on producers' income; promote the adoption of improved agricultural technologies and practices through effective extension services; improve the agricultural and market infrastructures so as to boost smallholder farmers' productivity and income earning capacity. Overall, the findings of the study are important and provide knowledgeable facts on smallholder horticulture production and farmer organizations in Guinea. This also immensely contributes to the limited body of literature and as such, provides useful insights for the government policy makers, researchers and other relevant stakeholders whose interest might be in subsequent studies.