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主　論　文　の　要　旨

論文題目	Rice Farmers' Adoption of Good Agricultural Practices in Ayeyarwady Region, Myanmar: A Case Study of Myaungmya District (ミャンマーのエーヤワディー地域における稲作農民の優良農業技術選択：ミャウンミャ県の事例)
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論　文　内　容　の　要　旨

The Ministry of Agriculture and Irrigation (MOAI) of Myanmar targeted 5 ton/ha as the national average rice yield in 2007. To accomplish this, MOAI introduced a set of Good Agricultural Practices (GAPs) in rice production as one of the agricultural development strategies in 2008. Despite not only MOAI's extension efforts to GAPs in rice production but also benefits of GAPs in rice production, the adoption rate of GAPs in rice production in terms of cultivated area in 2018 remained low (15.41%). To ensure the sustainability of and enhance the adoption of GAPs in rice production, the linkage or sequence of awareness, perception, attitude, and adoption as a process must be a focal point. Therefore, this study was conducted with the following three objectives.

(i) To examine the features and their determinants of farmers' awareness of the low yield of conventional rice production,

(ii) To clarify the features and determinants of farmers' perception of GAPs in rice production,

(iii) To analyze the structure of adoption process of GAPs in rice production through the linkage of awareness, perception, attitude, and adoption.

In the study, the primary data were collected from 315 farmers in Myaungmya District, Ayeyarwady Region, Myanmar. Rice cultivation area occupies around 70 % of the total arable land in the region. The region is suitable for applying GAPs in rice production in both wet and dry seasons due to its favorable soil and water conditions. The field survey was conducted from July to August 2018 by using structured questionnaire interviews, and an additional survey was carried out in September 2019. Seven chapters organize the dissertation.

Chapter 1 introduces the background of GAPs in rice production, problem statement, objectives of the study, significance of the study, and structure of the dissertation.

Chapter 2 is the literature review, focusing on concepts of GAPs, benefits of GAPs to farmers, and adoption of new technologies. Empirical studies on the adoption of new technologies are reviewed to identify the relevant methodologies and variables for this study.

Chapter 3 explains the study's methodology, which consists of the study area, sampling and sample size, socioeconomic conditions, extension services, and adoption rates of GAPs in rice production in sample townships, data collection, and analytical methods.

Chapter 4 deals with the first objective of the study: the features and determinants of farmers' awareness of the low yield of conventional rice production. It revealed that most of farmers were aware of general risks as reasons for the low yield of conventional rice production. However, farmers had low awareness of farmer's management and Ministry's management as reasons for the low yield of conventional rice production. In farmer's management, only 33.3 % of farmers were aware of labor force problems. A remarkable lack of awareness was identified in Ministry's management: unhelpful agricultural extension services. Meanwhile, based on their awareness of the low yield of conventional rice production, farmers were classified into three Clusters, and most of them belonged to Cluster 3, which showed their broader awareness. Seven factors such as age, gender, farming experience, household size, income from crop production, farmland size, and receiving agricultural information were identified as determinants, showing a significant association with farmers' awareness of the low yield of conventional rice production.

Chapter 5 clarifies the feature and determinants of farmers' perception of GAPs in rice production (that is, the second objective). It found that almost all farmers perceived that all component technologies of GAPs in rice production have three characteristics: relative advantage, complexity, and observability. In the perception of compatibility, among 14 component technologies of GAPs in rice production, farmers perceived that GAP1 (Quality seeds), GAP4 (Systematic care of nursery), GAP7 (Seedlings per hill), GAP10 (Pest and disease management), and GAP12 (Submerging) were compatible with their current farming practices. Farmers perceived that all component technologies of GAPs in rice production, except GAP13 (Drainage), could be quickly tried on their farms. Based on the structure of farmers' perception of GAPs in rice production, farmers were classified into three Clusters. Around a quarter of farmers were involved in Cluster 1 and the features of this Cluster were the lowest perception of CF1 (trialability) but the highest perception of CF3 (observability). Only a few farmers (9%) belonged to Cluster 2, and the features were the lowest perception of CF3 and CF5 (observability) and lower perception of CF1 (trialability). Most farmers (68%) were involved in Cluster 3, which were different from Cluster 1 and Cluster 2. On the whole, farmers' perception in Cluster 3 was neither high nor low, but in Cluster 1 and Cluster 2, it was a feature that only CF1 (trialability) was highly perceived. Eight factors significantly influenced farmers' perception: gender, education, farmland size, access to credit, income from crop production, contact with extension workers, receiving agricultural information, and receiving GAPs in rice production training.

Chapter 6 contributes to the third objective, examining the linkage and structure of the adoption process of GAPs in rice production by Structural Equation Modeling (SEM). It is an encouraging point that more than 70 % of farmers had a positive economic attitude of GAPs in rice production except for GAP7 (*Seedlings per hill*) and GAP12 (*Submerging*). Most farmers had a positive environmental attitude of GAPs in rice production, regardless of component technologies of GAPs in rice production. Supposing that more than 50 % of farmers is a criterion, farmers adopted only six-component technologies of GAPs in rice production: GAP1 (*Quality seeds*), GAP4 (*Systematic care of nursery*), GAP10 (*Pest and disease management*), GAP11 (*Balanced inputs*), GAP13 (*Drainage*), and GAP14 (*Combine harvester*). From the viewpoint of decision making on the adoption of GAPs in rice production, two adoption processes were identified through structural relationships. These processes were

(i) Awareness → perception of compatibility →adoption, and

(ii) Awareness → perception of trialability →adoption.

It could be pointed out that the feature of adoption process is as follows:

(i) There was no linkage between awareness and adoption,

(ii) There was no linkage between attitude and adoption, and

(iii) Perception of relative advantage and observability did not link to adoption.

Finally, Chapter 7 provides concluding remarks and policy recommendations to the further adoption of and the sustainability of GAPs in rice production in Myanmar. This dissertation highlighted farmers' practical adoption processes for GAPs in rice production. Comparing that Rogers and Shoemakers (1971) say that there are many possible adoption processes, the dissertation found two processes of adoption for GAPs in rice production, coinciding with that of Rogers and Shoemakers (1971). However, it must be careful that this dissertation deals with farmers' awareness of actual problem (i.e. low yield of conventional rice production), while Rogers and Shoemakers (1971) do farmers' awareness of technology itself. Among five characteristics of component technologies of GAPs in rice production, two characteristics (that is, compatibility and trialability) as farmers' perception were concerned in the adoption process. Meanwhile, Smathers (1982) and Herath and Wijekoon (2013) found one adoption process of new agricultural technology, such as farmers' perception, attitude, and adoption, though they did not take farmers' awareness as part of process into account.

Thus, the findings imply that the current extension programs need to be improved to disseminate component technologies of GAPs in rice production to farmers. Farmers' awareness of reasons for "rice yield is low" can be increased by developing extension programs such as Hybrid Rice Program, Integrated Pest Management Program, etc. to effectively distribute useful information on rice production. It is significant that agricultural extension workers select target groups, especially farmers who manage larger farmland size and earn higher income from crop production.

The compatibility of five component technologies, such as GAP3 (*Covering*), GAP8 (*Plant population*), GAP11 (*Balanced inputs*), GAP13 (*Drainage*), and GAP14 (*Combine harvester*) is crucial to enhancing farmers' perception of GAPs in rice production. It is important that the determinants of perception as well as the target farmers are varied among those five component technologies. For GAP13 and GAP14, MOALI should improve the related infrastructure (for example, land consolidation) which must be a requirement to the adoption.

Since some component technologies of GAPs in rice production, relating to nursery management, crop management, and water management, are labor-intensive technologies, these are more suitable for small-landholder farmers. Therefore, so that large-landholder farmers can be motivated and encouraged to adopt these labor intensive component technologies of GAPs in rice production, agricultural extension workers should help them prepare work schedules and estimate labor requirements for rice production.