

Title	農民の商品選択と土地評価に関する意思決定を支援する 地理情報システム(GIS)に関する研究
Author(s)	HANHAN, MAULANA
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Description	Supervisor:金井 秀明, 先端科学技術研究科, 博士

# Research on a Geographic Information System (GIS) to Assist Farmers in Making a Decision Regarding Commodity Selection and Land Evaluation

Hanhan Maulana

## Abstract

This study proposes a framework of the Geographic Information System (GIS) to assist farmers in decision-making. Bandung Regency is one of the centers of agriculture in the province of West Java. The main agricultural product of this district is vegetable commodities, but the production of food crops is also one of the pillars of the fulfillment of food needs in Indonesia. Bandung Regency area was chosen as the study area because it has good potential for agriculture. The challenge that motivates the Research on GIS is that farmers can use GIS directly and practically to assist in decision making. This study divides into three major stages. The first stage aims to develop a decision-making system for selecting potential commodities in Indonesia. This stage generates commodity rankings to support efficiency-based agriculture. This study complements the AHP method with alternative selection and classification. It is because there are so many commodities that farmers can cultivate. We select agriculture commodities based on plant characteristics and the topology of Indonesian agricultural areas to make alternative comparisons equal. The final ranking shows that the AHP method with selection and classification extension on the criteria makes the commodity ranking more valid. The second stage integrates the Multi-Criteria Decision Making (MCDM) with Geographic Information System (GIS) Method to evaluate the land suitability for potential commodities. This study proposed framework for land suitability evaluation. The first part the framework focuses on providing Georeferenced to the collected data. Part two focuses on building the thematic maps layer. In the third part, this study complements the AHP method with alternative selection and classification. We provide limitations and classifications of alternative selection based on plant characteristics and the topology of Bandung District agricultural areas. Based on the distribution of land suitability areas, then comparing with the statistical data of the current situation, this second stage concludes that the integration between MCDM and GIS methods can produce valid and relevant land suitability maps. The last research stage aims to integrate GIS with AR visualization capabilities to present interactive 3D maps. This study proposes a mobile-based system to visualize land suitability maps to make it easier for farmers to understand the map. Then to enrich the usability aspect, this study equips the system with augmented reality features. This study evaluates the system with two testing methods. The first testing method is the performance test, and the second is a qualitative test using a questionnaire that aims to find out the user's response to the system. Based on the evaluation results, this study can conclude that overall, AR-GIS can provide good information visualization. However, some farmers still have difficulties in understanding the land suitability map. In future research, adding collaboration features to AR-GIS will be a challenging topic. Collaborative AR can facilitate the knowledge exchange between

farmers, GIS experts, and other stakeholders. The system with Collaborative AR-GIS is expected to enhance the farmer's understanding of the land suitability map. Furthermore, with good insight into the land suitability map, it is hoped that it will reduce the risk of crop failure and increase the productivity of the agricultural sector in the future.

**Keyword:** Augmented Reality GIS, Commodity Selections, Decision-Making, Land Suitability Evaluation, MCDM.