Impact and Sustainability of Integreted Agriculture Development Project (IADA): A Structural Equation Model (*SEM*) Analysis

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ABSTRACT

Paddy farming isa key agenda in achieving food security in Malaysia. One of the government's policies for achieving this goal is through the establishment of the Northern Terengganu Integrated Development Project (IADA KETARA). This study is intended to clarify the effects of IADA KETARA on sustainable paddy farming based on economic, social and environmental aspects. For the purpose of this study, a total of 425 rice farmers were selected as respondents for their perceptions related to the purpose of the study. Determinants of agricultural sustainability were analyzed according to the methods of structural equation modeling (SEM) using the AMOS program. The results showed that the capacity of economic factors have a positive effect (0.011) on the sustainability of rice farming in IADA KETARA while loading factors forsocial and environmental elements also have a negative effect (-0.028 and -0.067).

***Keywords**: Paddy Farming, Sustainable Development, Structural Equation Model.*

INTRODUCTION

Paddy farming is a very important sub-sector in agricultural development in Malaysia. Not only it is part of the goal of the national food security of the country, but it is also something that the majority of the farmers depend upon for livelihood. To ensure the sustainability of paddy farming, the government has introduced several important policiesincluding among others, the setting up of an Integrated Development Project (IADA). This project has been implemented since the Third Malaysia Plan (1976-1980).

In general, the establishment of the IADA is intended to increase rice production, farmers' income, diversification of commodities, the number of agricultural entrepreneurs, and assisting in reducing poverty for the rice farming community to achieve food security. This program,to an extent, meets the requirements of sustainable development that is focused on the area development with engagement of the various departments and agencies involved in agriculture and non-agriculture in the supply of capital, equipment, technology, marketing and management.

In addition, this program also provides for agricultural infrastructure needed to sustain and modernize the agricultural sector. Although many IADA objectivesare mostly compatible with the concept of sustainable development, but the project gives less emphasis on environmental and ecological custodianship problem.

Among the granary areas in Peninsular Malaysia that have been part of the government project is The Northern Terengganu Integrated Agricultural Development (IADA KETARA). Although this area can only contribute a total of 3:06 per cent of the country's rice production, it is the largest contributor to the state production, that is 73.47 percent. Therefore, this study is important to determine the effectiveness of the project in achieving the goals of the government that is focused specifically on increasing rice production, improving the well-being of farmers and enhancing environmental custodianship.This is to enable IADA program to be modified accordingly to suit the actual concept of sustainable development.

LITERATURE REVIEW

The concept of sustainable development is in fact ‘back to nature’, the concept of development that does not destroy, does not change, in compatible, in coordination, and in consistent with the environment or in other words, exhibit obedience and submission to the rules of nature. The efforts of the people who reject the rules of ecosystems or nature may be able to drive productivity and profitable in a short term. However, in the long term, itusually ends with the destruction of the environment that can affect the life of all.

The term sustainable development according to the World Commission of Environment and Development is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (WCED 1987). It is a perspective on activities that are carried out in a systematic and organized manner within the framework of economic well-being, quality of life and environmental humanity without reducing access and opportunity for future generations to enjoy and gain benefits from it.

Pearce et al (1994) argued that sustainable development has a meaning and a purpose greater than the sustain\able economic growth. According to Munasinahe (1993) sustainable development includes three dimensions: economic (profit), social (people), and protection of ecological / environmental (planet). The three dimensions interact and influence each other to achieve a balanced situation. Thesethree dimensions is known as the Triple-P concept or the triangle pillars of sustainable development as shown in Figure 1.

According to Thrupp (1996) sustainable agriculture is agricultural activity that is ecologically feasible, economically profitable, and socially accountable. In the development of sustainable agriculture, the increase in food production to meet the needs of an ongoing population is done by minimizing its potential negative impacts on the environment and quality of life. It should be done in ways that are sustainable such as by minimal reduction or destruction of the fertility of the soil, by not increasing soil erosion, minimizing the use of and reliance on the non-renewable resources, supporting the lives of the rural communities, increase jobs and provide a

decent and peaceful life the communities, reduce poverty and hunger, does not endanger the health of the community who work or live in the arable land and the health of consumers of agricultural produce, preserve and enhance environmental quality, natural resources and biodiversity, as well as the empowerment of farmers.

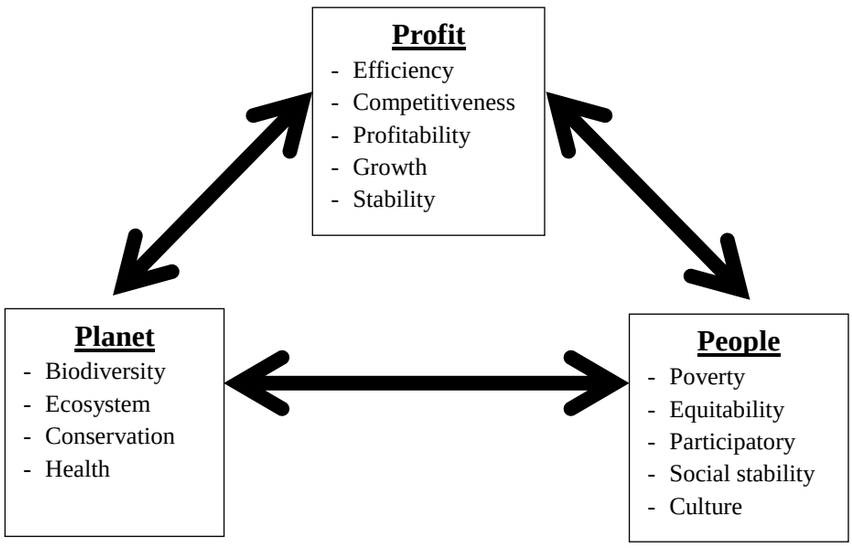

Figure 1. The Three Pillars of Sustainable Agricultural Development

In many ways, the problem of whether sustainable development of agriculture or natural resources stems from the need to meet current demand. We are blessed with valuable resources (including agriculture) and given a choice of how resources canbe used in a manner that is most favorable to the universal significance of the present and future generation. Thus, the issue of sustainable agricultural development is an issue is an issue that is both beneficial and insightful to be discussed. Sustainable agricultural development focused on the question of how agricultural activities should be managed in order to survive or provide endurance, if possible, in the era of competition from other sectors such as those industries that are more viable (Hashim Nik Mustapha 1995).

MATERIALS AND METHODS

This study involved 425 rice farmers (farmers) in the IADA KETARA as determined by the purposive sampling of respondents. The sample size is to fulfil the requirementof SEM analysis method whichstates that the appropriate sample size is estimated to be between 200 to 500 samples (Zainal& Tony 2012). Data were measured using questionnaires with interval scale of 1 to 5: (1) Strongly Disagree, (2) Disagree, (3) Moderate, (4) Agree, and (5) Strongly Agree. The data were filled into SPSS (Statistical Package for the Social Sciences) for analysis by method of

Structural Equation Modeling (SEM) using the program AMOS (Analysis of Moment Structure).

The study uses the theory of the three pillars of sustainable agricultural development (Triple-P), which is the concept of sustainable development that is based on the balance of the aspects of economic (profit), social (people) and the environment (planet). Economic aspects consist elements such as efficiency, competitiveness, profitability, growth and stability. The social aspect meanwhilecomprises elements such as poverty, equality, participation, social and cultural stability. Whereas environmental aspects includes biodiversity, ecosystems, conservation and health. These aspects are usually treated using their livelihood strategies and the role of program / institutional development.

The relationship between the aspects of sustainable agricultural development is analyzed based on Structural Equation Model (SEM) using AMOS with the study and analysis procedure as follows:

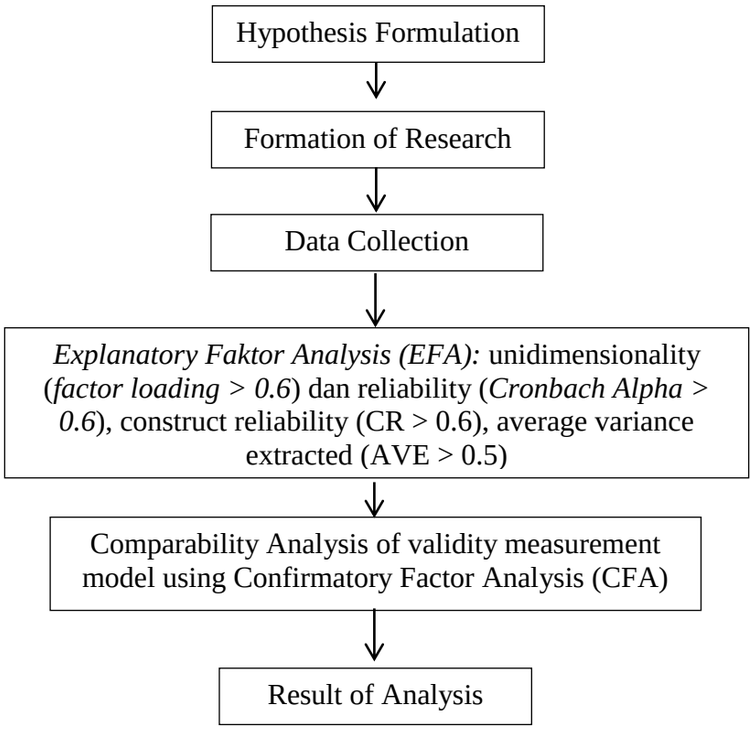

Figure 2. Research and Analysis Procedure

Confirmatory Factor Analysis (CFA) refers to the Good of Fit Index follows:

Table 1. Index Category and the Level of Acceptance for Every Index

No	Name of category	Name of index	Level of acceptance	Comment
1	Absolute fit	Chisq	P > 0.05	Sensitive to sample size > 200
		RMSEA	RMSEA < 0.08	Range 0.05 to 0.1 acceptable
		GFI	GFI > 0.90	GFI = 0.95 is a good fit
2	Incremental fit	AGFI	AGFI > 0.90	AGFI = 0.95 is a good fit
		CFI	CFI > 0.90	CFI = 0.95 is a good fit
3	Parsimonious fit	Chisq/df	Chisq/df< 5.0	The value should be less than 5.0

Source: Zainudin Awang (2012)

The hypothesis of this study is stated as follows:

The null hypothesis : Aspects of economic, social and environmental factors are not affecting the sustainability of paddy farming in the IADA KETARA.

Hypothesis study : Aspects of economic, social and environment are all factors that effect on sustainable paddy farming in IADAKETARA.

RESULT AND DISCUSSION

Descriptive of IADA Ketara

Integrated Agricultural Development Area of North Terengganu or better known as IADA KETARA was established in 1992 with approvals from the State Government and Federal Government under the Ministry of Agriculture of Malaysia. The establishment was done after an agreement with the ADB which was signed on 28 October 1991. IADA KETARA was given the responsibility to further improve the development of agricultural sector in North Terengganu which covers an area of 198,739 hectares incorporating the whole Besut District and the bigger part of Setiu District. In addition to this target, KETARA's role is also to further reduce poverty rate among the community that is involved in agricultural activities and specifically the paddy farmers (IADA KETARA, 2012).

IADA KETARA is one of 8 paddy plains that are involved in the paddy plains project in this country. Paddy plain is a big water irrigation scheme (with an area of more than 4000 hectares) and is certified (approved) by the Government as stipulated in the National Agricultural Policy for the main national paddy production.

Beside IADA KETARA, there are seven other paddy plains in Peninsular Malaysia namely: (1) Muda Agricultural Development Board (MADA), (2) Integrated Agricultural Development Area of Kemubu (KADA), (3) Integrated Agricultural Development Area of Kerian Sungai Manik (IADA KSM), (4) Integrated Agricultural Development Area of Northeast Selangor (IADA BLS), (5) Integrated Agricultural Development Area of Penang (IADA P.Pinang), (6) Integrated Agricultural Development Area of Seberang Perak (IADA Seberang Perak), and (7) Integrated Agricultural Development Area of KemasinSemerak (IADA KemasinSemerak).

Figure 3. Map of IADA KETARA

KETARA IADA area covers Besut and Setiu Districts. Besut District has area of 122,831 hectares while Setiu District has 139,905 hectares. Overall, the size of this area is 258,736 hectares incorporating 58,000 hectares for agriculture and 12,000 hectares for paddy area. The physical area of the paddy plains (passel) KETARA is 4,876 hectares with 2,677 farmers (IADA KETARA, 2012).

Paddy Farming Sustainability of IADA KETARA

The sustainability of paddy farming in the IADA KETARA area is affected by three aspects namely economic, social and environmental factors. These three aspects are latent variables measured by their observed variables respectively. The impacts of economic aspects are measured based on ten indicators namelyincrease in yield (EKN3), increase in sales revenue (EKN4), increase in planted area (EKN5), reduced number of working days (EKN6), increase in assets (EKN7), reduction of maintenance expenses (EKN10) provision of facilities and product marketing (EKN11), increase in debt (EKN12), provision of adequate fertilizer (EKN14) and ability to buy additional fertilizer (EKN15).

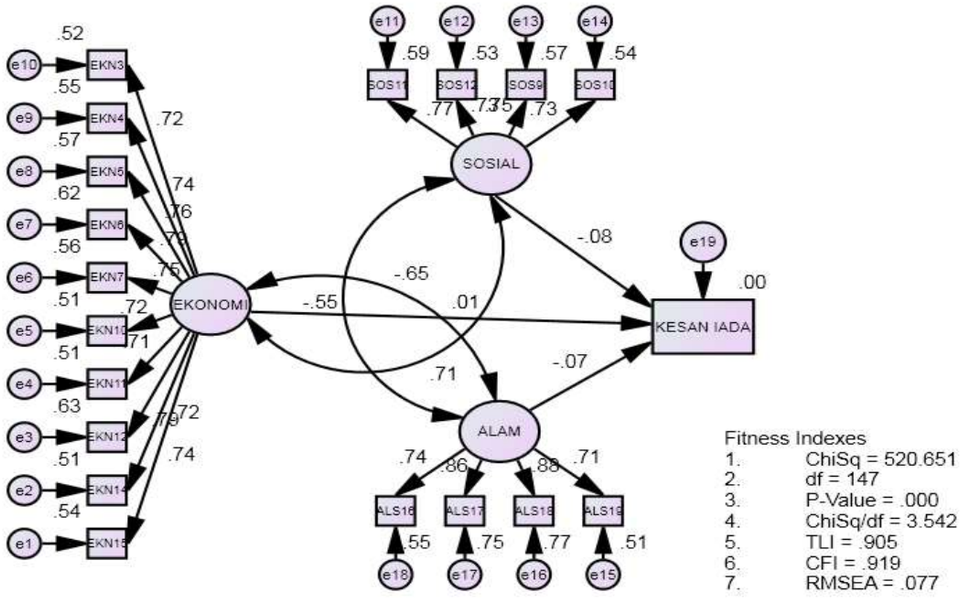

Figure 4. Structural Model for Paddy Farming Sustainability in IADA KETARA

The impact of social and environmental aspects respectively are determined based on four indicators. Social aspects indicators include better financial management (SOS9) more open-minded farmers (SOS10), clearer pelan by farmers (SOS11), and better agricultural infrastructure (SOS12) whereas the environmental aspects indicators include land degradation (ALS16), warmer weather (ALS17), usage of environmentally harmful chemicals (ALS18), and usage of chemicals harmful to humans (ALS19).

Based on the model determining the sustainability of paddy farming as shown in Figure 3, IADA KETARA is able to have a positive impact on the economic aspects of rice farmers with a load factor of as high as 0.011. However, in terms of social and environmental aspects, it has negative effects of load factor respectively -0.082 and -0.067. The three latent variables (economic, social, and environmental) show a significant relationship at the level of p <0.01. The relationship between economic and social aspects show a positive value (0.711), while the relationship between the economic aspects of the environment or social environment shows a negative value of -0.648 and -0.547. This proves that the role of IADA KETARA is definitely more focused on improving the ability of rice farmers at the ignorance of the economic sustainability of the social and environmental aspects.

In the economic component, it is found that EKN12 (increasing debt load) has a high load factor of 0.792 compared to nine other components. While for the social component, the SOS11 (clearer plan) has a high load factor of 0.768 compared to the three other components. While the for component of the environment, the load factor was the highest for ALS18 (use of chemicals harmful to the environment) which was at 0.877 compared to the three other components. Based on Table 1, asa whole, the above model has achieved a good fitness index that is acceptable.

CONCLUSION

Based on the results, it is clear that the IADA KETARA has positive impact only on economic aspects, whereas for social and environmental aspects, it has negative impact. This shows that the concept of development that is carried out by IADA KETARA as an organization has only emphasized purely on economic aspects. To achieve sustainable paddy farming, the IADA KETARA should also focus on the social and environmental aspects to enable IADA program to adopt the real concept of sustainable development.

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