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Vulnerability and Sustainable Livelihood of Paddy Farmers in The North Terengganu Integrated Agriculture Development Area (IADA KETARA), Malaysia

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ABSTRACT

The quality of life for paddy farmers greatly determines the prospect of food security in Malaysia. The unpromising economic development and the high vulnerability have become a big challenge to the effort to improve paddy farming sector in a sustainable manner. A farmer's life can be called as sustainable when it can manage to overcome and anticipate the context of the vulnerability available that is adapting with changes or trends, can overcome stress and shocks and anticipate season change (season ability) that could occur, as well as to maintain existing ability and resources or to further improve it for now and the future without ruining it. This study aims at explaining the factors for vulnerability that influence the life of the paddy farmers/community. The survey was used questionnaire on 426 of farmers in the IADA KETARA (North Terengganu Integrated Agriculture Development Area). The study found that the climate change, economy and social vulnerability were led to influence the rice production and livelihood of farmers. Increase of plant destroyed is the most effected to the rice production due to the climatic vulnerability, was inquire the innovation and good management of irrigation as an adaptation strategies to ensure the IADA KETARA retain as a contributor to national food security. Increasing of inputs costing was led to the economic vulnerability among farmers and cause the heavily dependency on government subsidies. The threatening ability to get the knowledge and technology are required the government to take notice and affective approaches to strengthen the knowledgeable and technology user concern among paddy farmers in IADA KETARA. The outcome of this study can be used either to plan development activities or to evaluate the contribution of the activities that have been implemented for the sustainability of life in the context of food security. Furthermore, it will be to ensure the agriculture sector still relevant as an important engine of economic growth and contribution on GNI of Malaysia to achieved high income country by 2020.

Keywords: Food security, Sustainable Agriculture, Vulnerability, Paddy Farmer's Communities, IADA KETARA

INTRODUCTION

The agriculture sector plays an important role in Malaysia's economic development namely providing rural employment, uplifting rural incomes and ensuring national food security. The Agriculture NKEA will focus on selected sub-sectors which have high-growth potential, namely paddy and livestock sub-sectors were selected due to their strategic nature in ensuring national food security, aquaculture, seaweed farming, swiftlet nests, herbal products, fruit and vegetables and premium processed food. This will enable Malaysia to tap a large global market is rapidly expanding (MOA, 2013). In Malaysia, National Agro-food Policy (NAP) is intending to replace the Third National Agricultural Policy (NAP3). NAP aims to increase food production in the country to meet the growing demand and high value agricultural development, which is an increase in the contribution of the rice production to national income and agriculture entrepreneurship development. The focus of this policy is to increase the production and productivity to ensure food supply, exploration of high-value agriculture, strengthening supply chain, the implementation of sustainable agricultural practices, and human capital development, and more participation by the private sector and effective government support (MOA 2011). To further enhance the country agricultural sector, this sector was identified as one of the National Key Economic Areas (NKEA) under the Economic Transformation Programme. NKEA agriculture will focus on the sub-sector that has great potential growth to drive Malaysia to participate in global markets, which focuses on strategic sub-sector to ensure the country's sufficient food supply. A total of 16 initial Entry Point Projects (EPPs) and 11 potential projects were identified to generating about RM49.1billion Gross National Investment (GNI) by 2020. Simultaneously it can create 74,600 new jobs, mainly in rural areas (MOA, 2011). Three out of sixteen EPPs identified, will involve the rice sector namely EPP 9 (variety of fragrance rice cultivation in idle land) EPP 10 (cultivation of rice in Muda) and EPP 11 (rice cultivation in the others granary (including KETARA). Furthermore, the government has allocated RM839.3 million for the purpose of projects implementation which comprises RM6.75 million for EPP9, RM97.78 million for EPP 10 and RM136 million for EPP 11 (MOA, 2011).

Paddy farmers are an important asset to the government because they are the main players to the attainment of the national food security. In addition to being the producer of rice which is the staple food for almost every Malaysians, they are also the biggest user of the rice in such a way that it greatly influences the prospect of the food itself. Although the farmers are the main factor for food security, the majority of them are still under the critical level of poverty with low income. The unpromising economic growth in agricultural sector has led to the decrease in the number of workforce in this sector. Most of the younger generation are not interested to work as farmers. The 2005 Census on Agriculture estimated that 45% of the farmers are those with age above 55 years and this has caused some difficulty for them to contribute towards production improvement effort. The application of mechanisation in modern agriculture aimed at improving productivity has also influenced the socio-economic situation of the farmers that is the reduction in labour demand. The increase in input price especially fertilisers, pesticides, petrol and diesel has been a burden to the operators to further increase their output. According to Tan (2009), the cost of paddy production in Malaysia is high rather than to the income. Thus, paddy agricultural sector is not attractive in terms of return of investment. This is mainly caused by the small size of land as well as outdated infrastructures.

These conditions have caused the main focus of farmers on food security to diminish. The effect of low income from farming has encouraged the farmers to resort to sectors other than agriculture. The majority of the farmers with low income treated paddy field activities as only their secondary or additional work to increase their income. They are unable, non-self sufficient and heavily dependent upon other parties. Although paddy industry received subsidy assistance and many other government interventions (such as guaranteed minimum pricing, licensing, rice ceiling pricing, and etc.), this industry however, has not shown a good productivity performance. The average national paddy output is 3.8 tonne/ha which is lower than those of Bangladesh and Indonesia (see figure 1). Of more concern is that the slow productivity growth rate after the 'Green Revolution' in 1960s and 1970s and the subsidy burden as well as intervention from other markets have increased since the 2008 food crisis (Fatimah et al. 2010).

Government's programmes, political intervention and subsidies often increase the heavy dependence of farmers on the government. These could diminish various human's potential of the farmers such as initiative, innovation and local wisdom. The multi-tasking and limitation of farmers such as the quality of human's capital, land and capital ownership, access to markets and information have made farmers as a developmental object rather than a subject and the determinant of agricultural development. Development has produced advancements in various fields; however, it cannot be denied

that development has also created various new problems as impact to the failure to achieve a balance situation. Policy and the priorities of development programmes greatly influence the future of communities' livelihood. The life of a farmer can be considered sustainable when it can overcome and anticipate the context of existing vulnerability that is anticipating the possible season ability changes as well as maintaining the ability and existing resources or even increasing it for the present and future needs without decrementing it. This study intends to explain vulnerability factors that have influenced the livelihood of communities/farmers in the North Terengganu Integrated Agriculture Development Area (IADA KETARA), Malaysia. The outcome of this research can be used either in planning development activities or in evaluating the contribution of activities that have already been implemented for sustainable livelihood in the context of food security to ensure the agriculture sector is an important engine of economic growth contribution on GNI of Malaysia.

LINKAGE BETWEEN FOOD SECURITY AND CLIMATE CHANGE

Food security has several dimensions, all of which face difference threats. There are a number of definitions for food security both at national, community and household level. The Food and Agricultural Organization (FAO 2003) defines food security as a situation in which all households have both physical and economics access to adequate food for all members, and where households are not at risk of losing such access. World Health Organisation (WHO) 2011 defines the concept of food security as physical and economic access to food that meets dietary needs and food preferences. For them, the health problems associated with excessive eating, malnutrition and food-borne diarrhoea become increasingly burdensome threat. Meanwhile, at the household level, Frankerger et al. (1995) state that food security at the individual level will be achieved when individuals get access to adequate nutrition and diet for the purpose of physical activity, disease preventing and sufficient for growth including during pregnancy and breastfeeding. Timmer (2004) emphasises both micro and macro perspectives that food security can be viewed as a continuous spectrum, from the micro perspective of nutritional requirements of individuals and the macro perspective that assures stable supplies in national, regional and local markets.

Rice production is affected by environmental changes, such as climate change (IWRM, 2007) and it climate change has emerged as key concern for environmentally and economically vulnerable countries (Sarker et al, 2012). Climate change impacts on production of crops in many countries around the world (FAO, 2005), damage to infrastructure, affecting food prices and increased reliance on food aid import (FAO, 2008).The impacts of climate change on rice production have been a subject of research by many researchers due to its importance on human life. It also effects food production, food prices, and social well-being of the country. Some studies have investigated the economic effects of climate change on agricultural production in developing countries (Kurukulasuriya and Ajwad, 2007; Deressa and Hassan, 2009; Wang et al., 2009; Vaghefi et al, 2011). These studies reveal that crop agriculture in developing countries is highly susceptible to climate change. In Malaysia, empirical investigations on the influence of climate change on agricultural production have been limited. Climate impacts on agriculture span a wide range of attributes and outcomes depending on the specific climate scenario, geographical location and nature of study (Alam et al, 2011). Climate change will definitely affect this sector, particularly with respect to agricultural output and productivity (Roslina and Abu Kasim, 2009). According to Mad Nasir and Ahmad Makmom (2009), the direct impact of climate change to agriculture can be classified in: (i) decreasing the agricultural productivity (ii) increasing of food insecurity, and (iii) affecting the supply chain of production. Chamhuri et al., (2009) reviewed that production and yields changes may be due to reduction in the water available for irrigation, loss of land due to sea level rise and salinization and risk of weeds, insect, and diseases could increase. The crop productivity will be altering due to changes in climate and weather events (Chamhuri and Abul Quasem, 2009). Roslina and Ali (2009) studied the impact of global warming on Malaysian agriculture by using time series data of 28 years (1980-2007). The study indicates that agricultural activity comprising harvesting area (ha), yield (kg/ha) and quantity of production (ton) were estimated to decrease by between 0.94-2.06%, 0.43-0.61%, and 1.2-5.5% respectively, due to the global warming. According to Vaghefi et al. (2011) the impact of climate change due to increase in temperature and carbon dioxide on rice production will give adverse implication on economic growth in Malaysia. The authors used ORYZA crop model to simulate rice yield data of MR 219 variety in eight granary areas of Malaysia from 1997-2007. Under the scenario of an increase in temperature by 2^0C and the current level of CO_2 of 383 ppm, the model predicted a reduction in rice yield of 0.36 t ha^{-1} and subsequent the economic loss was estimated at RM162.531 million per year. If the temperature increases by 2^0C in tandem with level of CO_2 increases to 574 ppm, there will also be a decline in rice yield by 0.69 t ha^{-1}

and consequently the economic loss will be at RM299.145 million per year. The most acute challenge faced by this sector has been the shortfall in the production of rice commodities in meeting domestic demand (Khor, 2008). Consequently, it will cause the market price to rise due to shortage of supply and adversely affect the consumption level and consumer welfare. The main concern is that, most of the vulnerable peoples to climate change are the poor and hard core poor who have relatively larger household member, including the East Coast states of Terengganu and Kelantan in Malaysia, projected to have large temperature and rainfall changes (Rawshan, et al. 2011). Furthermore, the good methods of adaptation to the changes in various climatic vulnerabilities are needed to avert any adverse effect on farmer livelihood sustainability and national food security (Alam et al. 2012). Quantifying the impacts of climate change on agriculture is a challenging task because of large uncertainties in the regional climate change projection, in the response of crop to environmental changes, in the coupling between climate models and crop productivity functions, and in the adaptation of agricultural systems to progressive climate change (Roudier et al, 2011). For instance, the adaptation of sustainable livelihood is part and parcel of sustainable agriculture, where the WCE 1978, defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Vorley, 2001). Sustainable agricultural management based on the definition, does not only measure a particular development, but it also has a more open concept depending upon a particular group or individual with different views and objectives (Azis et al, 2003). Sustainability concept in agricultural sector in Malaysia is based on three main objectives that were proposed and is suitable to be used, these are: profit and economic sustainability, awareness of the environment as well as social acceptance (Quah 1999; Faridah, 2001).

METHODOLOGY

This study relies on the secondary data and primary data that were collected through a survey on farmer's perception on the climate change, economy and social vulnerability in the area. The target group of the survey is paddy producing farmers. A structured questionnaire was used and data were collected through face to face interview guided by the regular enumerators of IADA KETARA under the direct supervision of IADA KETARA officials. A sample of 426 farmers cultivating a total of 12,000 hectares for paddy area in the Districts of Besut and Setiu was considered for this study and they were selected purposely selected. Farmers perception on climate change, economy and social vulnerability on their activities were measured using a 5-point scale with 1 as strongly disagree and 5 as strongly agree to the statement are given. Research data was analysed using SPSS version 21software and Excels 2007 and the data were present under the framework of a descriptive model using tables, graphs and percentages.

Study area

Integrated Agricultural Development Area of North Terengganu (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 Asia Development Bank (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 eight granary areas that are involved in the paddy plains project in the country (see figure 2). 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. 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 KETARA paddy plant (pasel) is 4,876 hectares with 2,677 farmers (IADA KETARA, 2012)

FINDING AND DISCUSSION

Paddy Production of IADA KETARA

IADA KETARA is the main paddy plains in Terengganu. IADA KETARA's contribution towards paddy production of Terengganu is very high which achieve 73.47% in 2011. Nonetheless, its national contribution is only 3.06% in the same year. Based on paddy production performance for all seasons from 1996 to 2011, only during the last 5 years (2007-2011) of the period, which is has shown encouraging outcome with significant improvement level compared during the preceding 10 years (1996-2006) the production level was not stable (Figure 3). In 1996, paddy production of the IADA KETARA area reached 43,352 MT. It later went down to 29,904 MT in 1998 and 27,647 MT in 1999. In the year 2000, paddy production figure was successfully increased to 40,378 MT, however, in 2001 it went down again to 27,704 MT. From 2001 to 2004, paddy production has increased but it went down again for the next two years (2005 and 2006). New production seems to stabilise from 2007 to 2011 with annual average increase of 7.56%.

Vulnerability Due To Climate Change

One of vulnerability factors that were faced by farmers in IADA KETARA area is climate change. Farmers are experienced and could give their perception in term of the climatic impacts on rice production. There are several climatic change factors affecting rice production such as high temperature, excess or lack of rainfall, lack of water supply from drainage and insect attacked. Increase of plant destroy is very high effect to the perception of farmers in term of climatic condition which are 55.4% agreed with that factor. With respect to water supply to the paddy fields, 50.7% of farmers said it has increased, while shortage of rainfall and high temperature affect 35.9% and 31.0%, of farmers respectively. Farmers have referred to this situation as seasonal unpredictability. Other than that 39.0% agree excessive rainfall will affect rice production (Figure 4).

The rain condition that is considered unpredictable, sometimes with prolonged draught has caused water supply to be very little, while some other times, excessive water has caused flooding. Both insufficient and excessive water supply can cause damage to paddy farming as a mention by Chamhuri et al (2009).

Various strategies at varying situation are adopted by farmers to mitigate climatic vulnerability. Their approaches are based on the knowledge, experiences, perception, nature and degree of vulnerability. IADA KETARA provides the irrigation facilities which are fully utilise by farmers for rice cultivation. Regarding to the seasonal unpredictability and affected by plant destroyed, more than 90% of farmers are need to the innovation of irrigation and good of water management (see Figure 5). Meaning that, farmers still heavily dependence on IADA KETARA authority to manage the impact and mitigation of climatic effect. The factors of irrigation (79.2%), weather forecasting (79.1%) and early warning system (73.5%) are also important to the farmers as tools to facing the adverse effect of climatic uncertainty to ensure the rice production as a schedule system. About 50.9% of farmers said that plant diversity is not very important as an adaptation strategy due to the field is maintained for paddy cultivation.

Economic Vulnerability

There are several economic vulnerability factors effecting rice production such as loan, marketing, input costing, price and input sufficiency. Among the factors, costs of inputs are considered as a challenge to the rice production. This study was found more than 50% farmers are facing the increasing cost of pesticide (54.6%) and fertilizer (52.3%). The marketing policy and strategy that is not favourable to the farmers has caused paddy price to fall to an extent that it jeopardizes their livelihood. Which that, the results shows 52.1% of farmers felt this factor is affected to their production. Furthermore, increasing of plant costing (46.2%) and the commodity price fluctuation (42.7%) are also considered as vulnerabilities from economic aspect. According to IADA KETARA (2011), on average the paddy farmers' income is only RM687/month/hectare. Therefore, these economic vulnerability factors may almost affect their wellbeing. Access to technology seems to be only moderate. It is same goes to access towards loans as capital source (see figure 6).

Figure 7 shows half of farmers in IADA KETARA are highly dependent upon government subsidies there are given about 52% of the respondents expressed that they will not continue the farm

activities without assistance from the government. All this while, the Government has given a lot of subsidies to farmers such as fertilisers, seed, pesticides as well as favourable pricing. In addition, National Agro-food Policy (2011) has elaborate several incentives to farmers in the form of output improvement incentive as well as paddy production incentive. IPH is aimed to encourage farmers to increase their own output. It is given to all farmers who can increase their current seasonal output by at least 1% compared to the previous season. The rate of the incentive is RM650 per metric tonne per hectare for additional output and will be given in cash when the farmers sell their unprocessed paddy at the factory gate. For farmers who operate paddy farming of less than 2 hectares, but have obtained at least 1% increase in output will get minimum IPH payment of RM200. For farmers who have successfully achieved paddy production output of 10 metric ton per hectare, they will receive an additional bonus of RM650 per hectare in addition to output increment incentive as soon as they achieve the output of 10 metric ton per hectare. Payment to farmers will be channelled through BERNAS. Paddy production incentive (IPP) is aimed to assisting the farmers to siphon production costs. It is given to farmers in the form of:

1. Wage assistance for flow. With a maximum value of RM100 per hectare per season
2. Agricultural input assistance such as additional fertilisers with maximum value of RM140.

Social Vulnerability

The knowledge and technology of paddy farming has evolved day by day. Farmers' ability to increase their knowledge and technology is an important part of the effort to further increase paddy production output. This study found that majority of the respondents; the farmers' ability to acquire knowledge and technology nowadays has increased (18.1%) which is among the highest of threaten factor of social vulnerability. Even though the government provided agricultural counselling services through IADA KETARA officers that they have always engaged themselves with the farmers in introducing and implementing technology application as well as to assist in overcoming each problem faced by farmers such as farming, conserving, fertility increment, pests and plant diseases control and many other things. Cooperation between farmers is very strong. It shows by low threaten on social discrimination (57.3%) and neighbourhood collaboration (52.6%). They work in groups under the coordination of IADA KETARA. Farmer groups comprise of water usage group (KPA), mini estate and 10 ton project. Through this approach, farmers felt that they would have a better social life. The ease of access to health, education as well as infrastructure is not serious threats, which are 66.7%, 65.2% and 46.9% of low threatening respectively. Due to the democratic right, 46.3% of respondent felt that they are have a freedom in determining political choice.

CONCLUSION

The quality of life for paddy farmers greatly determines the prospect of food security in Malaysia. This study aims at explaining the factors are influence to paddy farmers/community livelihood in the IADA KETARA (North Terengganu Integrated Agriculture Development Area) in term of climatic condition, economy, and social vulnerability based on the knowledge, experiences, perception, nature and degree of vulnerability. In this regards, adaptation play a prominent role in the long run for livelihood and agriculture sustainability. Government should need to build appropriate preparedness for climate change especially the financial supports for socioeconomic stability, innovation of technology and infrastructural development in addition to conduction several skill development programs and training to the farmers. The preparation of planned, proactive, synergy and dynamic adaptation strategy in secure the economic, social and agricultural system in Malaysia are important to ensure the sustainability livelihood of farmers inclusively in the context of food security in Malaysia.

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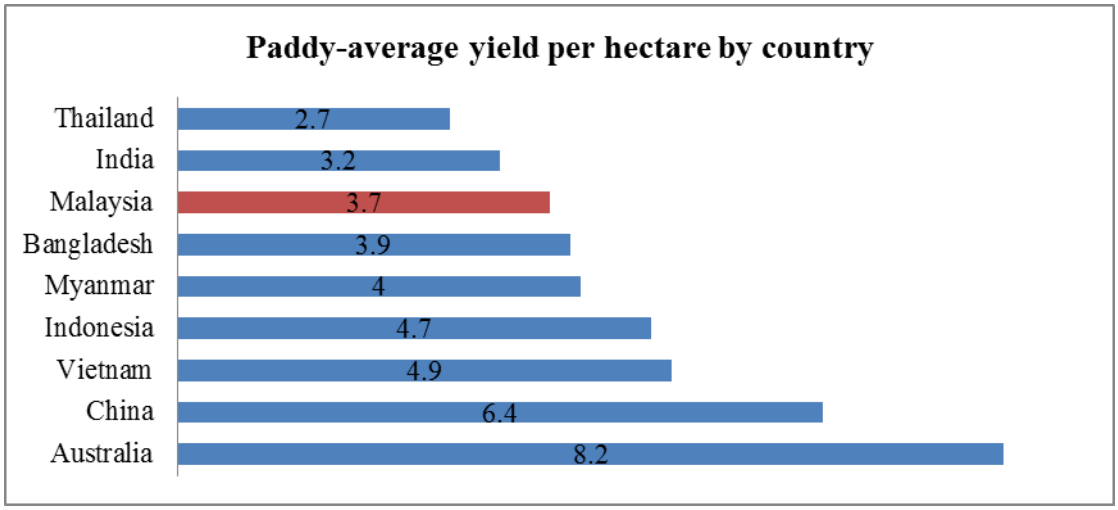


Sources: Adaptation from Ministry of Agricultural and Agro-Based Industry of Malaysia (2013)

FIGURE 1: Malaysia's agricultural productivity lags that of other countries.

FIGURE 2: Map of IADA KETARA Area (Source: IADA KETARA 2012)

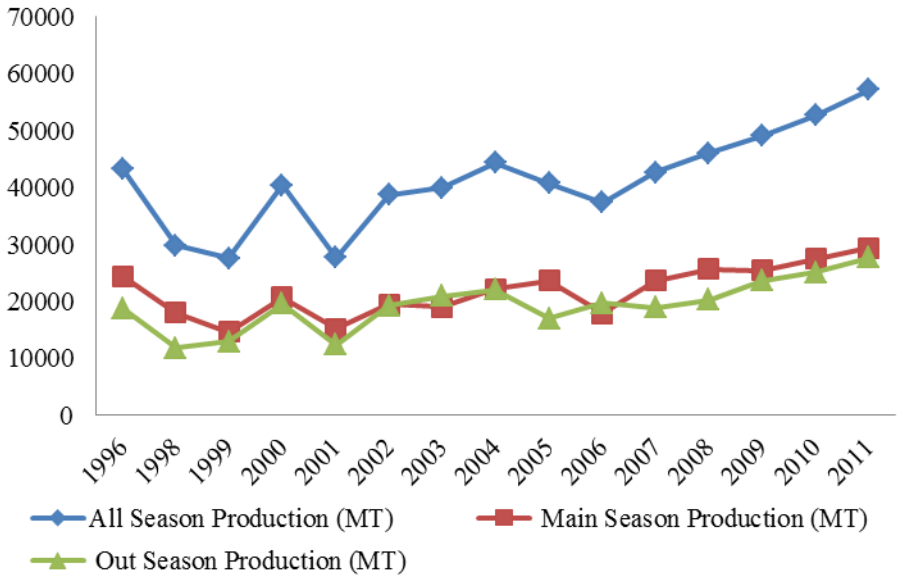
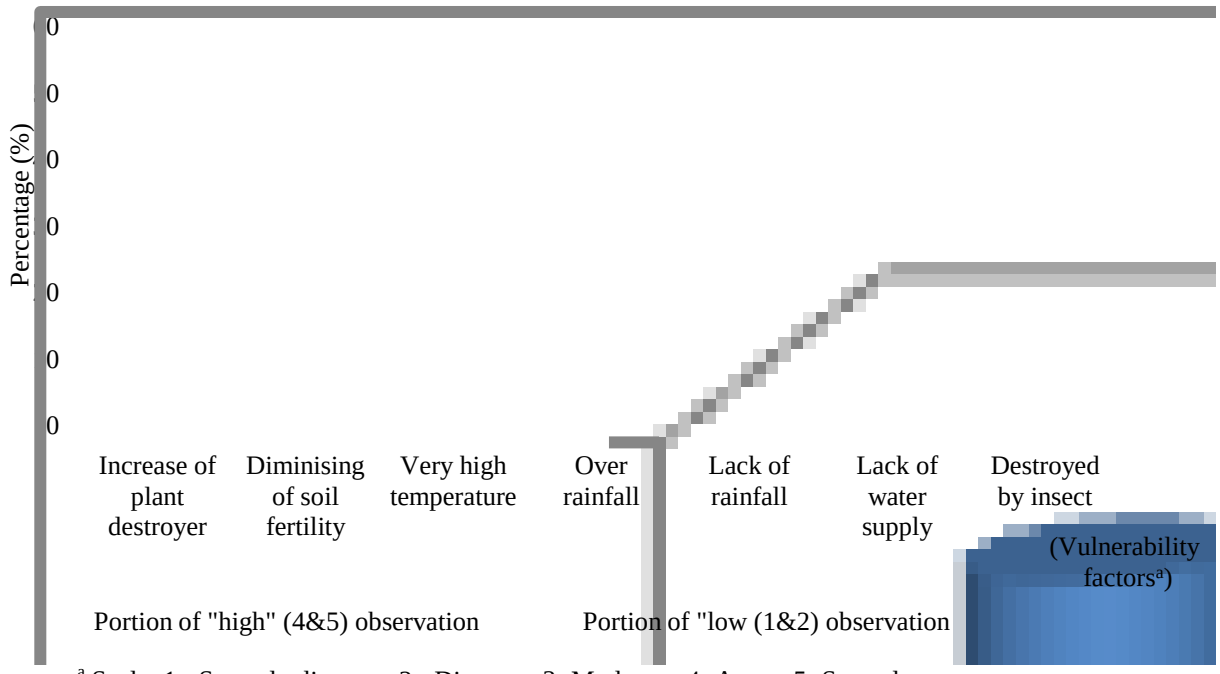
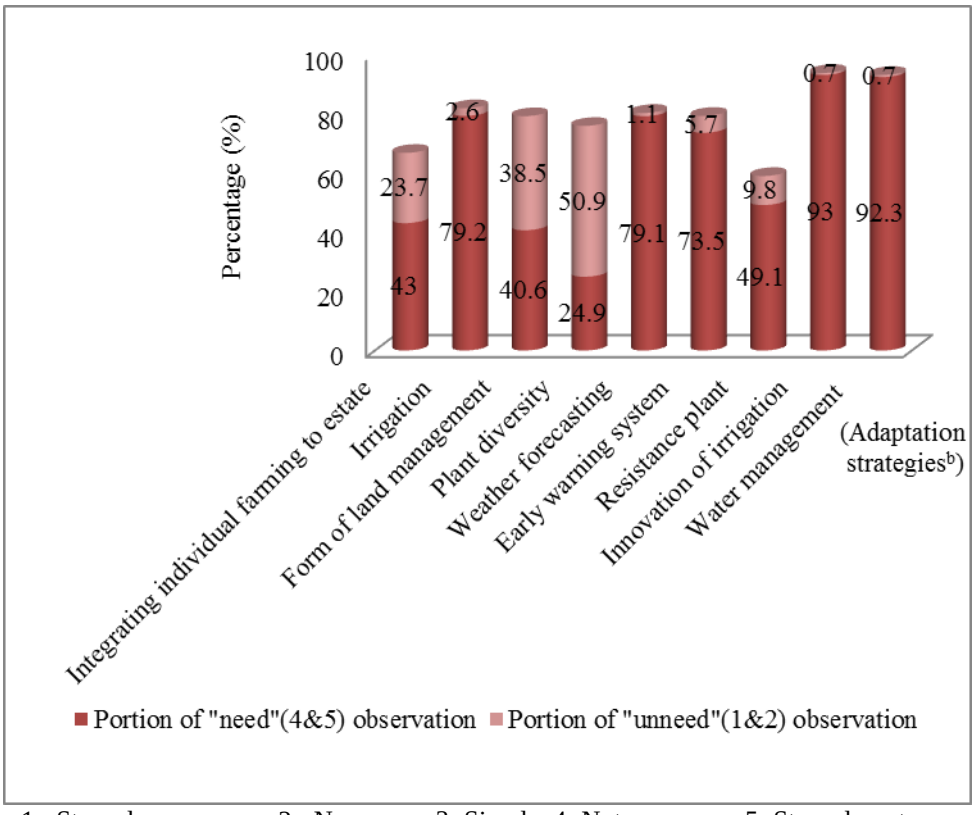


FIGURE 3: Paddy Production of IADA KETARA



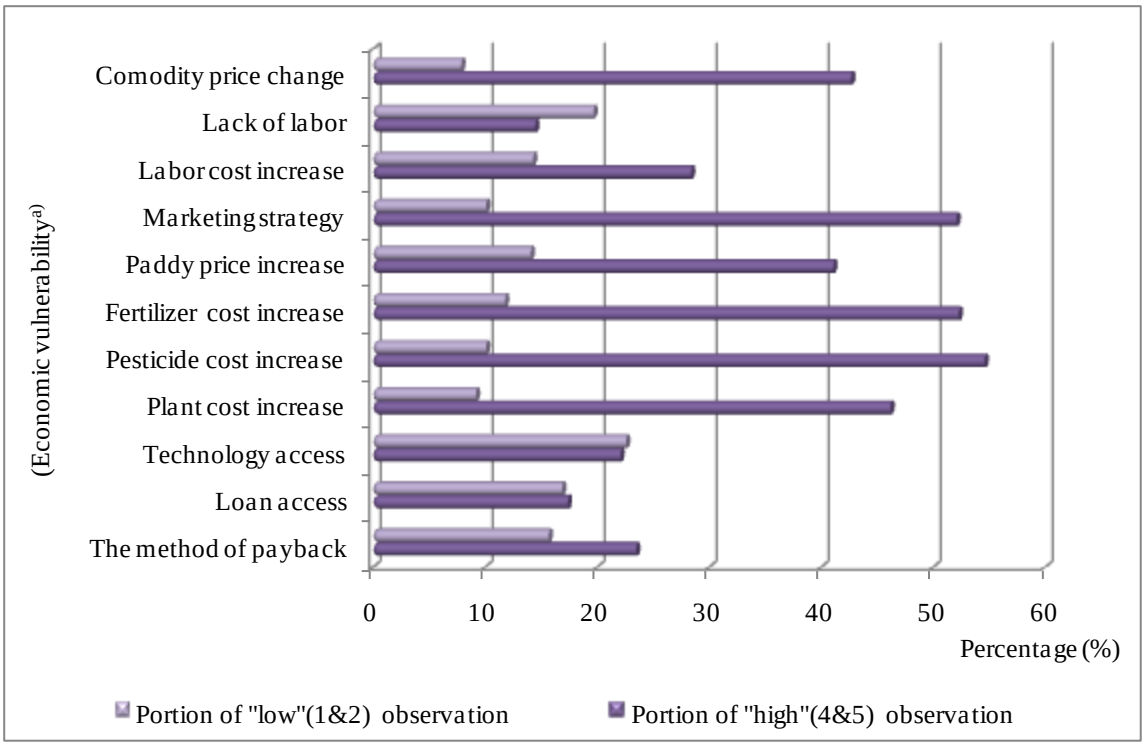
[a] Scale: 1= Strongly disagree, 2= Disagree, 3=Moderate, 4=Agree, 5=Strongly agree

FIGURE 4: Perception of respondent toward climate change vulnerability



[b]Scale : 1= Strongly necessary , 2= Necessary, 3=Simple, 4=Not necessary, 5=Strongly not necessary

FIGURE 5: Adaptation strategy by farmer on climate change impact



[a] Scale: 1= Strongly disagree, 2= Disagree, 3=Moderate, 4=Agree, 5=Strongly agree

FIGURE 6: Perception of respondent toward economic vulnerability

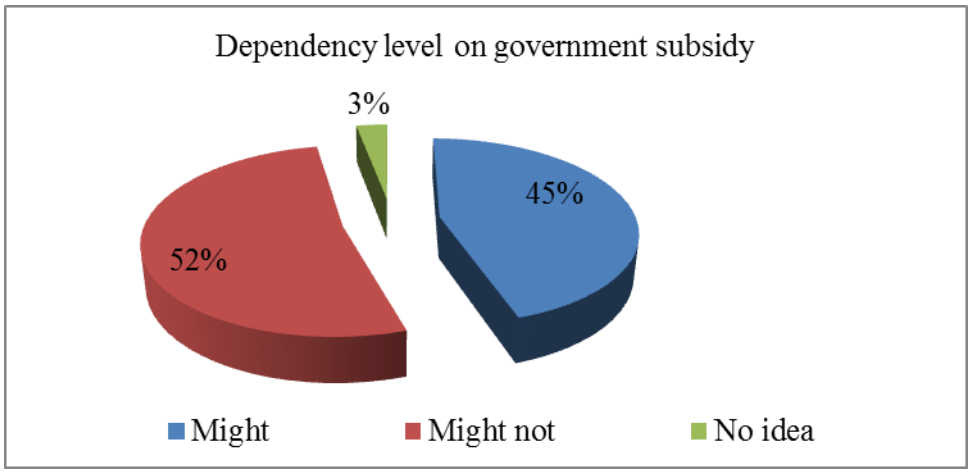
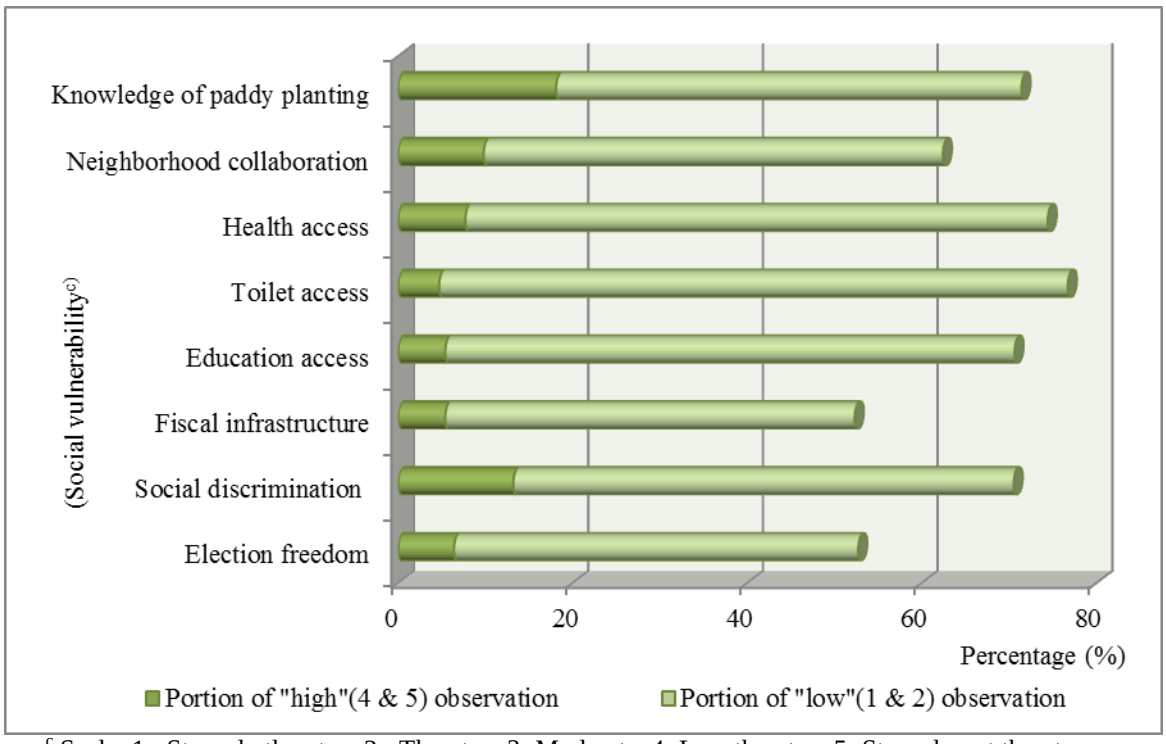


FIGURE 7: Dependency level of farmers on goverment subsidy



[c] Scale: 1= Strongly threaten, 2= Threaten, 3=Moderate, 4=Less threaten, 5=Strongly not threaten

FIGURE 8: Perception of respondent toward social vulnerability