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# THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN AGRICULTURAL RISK MANAGEMENT BY THE AGRICULTURAL EXTENSION SERVICES IN MALAYSIA

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## ABSTRACT

The study was aimed to determine the existing status of extension services provided for agricultural risk management in making use of Information and Communication Technologies (ICTs). There were 360 farmers selected through multistage cluster sampling technique and data were collected from four areas of Malaysia. The results reveal that farmers could get limited information from extension staff on the use of ICTs for disaster information. Moreover, most of the farmers still could not get support from extension staff to integrate ICTs for agricultural risk management. Farmers highlighted that extension staff need training to improve their capacity. Therefore, public and private sector should initiate various training programs firstly for the extension field staff and then diffuse various management skills and techniques into farmer fields for better agricultural risk management using ICTs.

**Keywords:** Agricultural extension, Agricultural risk management, ICTs, Malaysia

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## INTRODUCTION

Climate change is one of the serious challenges to agricultural extension services that affect farms and farmers in various dimensions. According to Mulder [1], impacts of climate changes should not be ignored for sustainable development. However, the extension service providers are not yet fully sensitized and equipped with techniques to help farmers in managing agricultural risks through immediate and low cost solutions. In Malaysia, extension services are offered by public (Department of Agriculture) and private sector. The extension wing of public and private sectors is responsible to disseminate useful information and agricultural technologies among farmers through field level staff. However, extension services are mostly focused on just traditional style of agricultural technology transfer but less attention has been paid on using ICTs for agricultural risk management. As day by day farmers have to face different problems dissimilar to the past so, there is a need to opt digital options for quick solutions and making this sector sustainable. Extension service providers can motivate the farming community to use available digital options for minimizing the risks associated with agricultural sector. These risks can be related with production, price, market, technology, legal, health, and personal [2]. Risk in agricultural sector is related to various factors which leave negative impacts originated from different variables like natural, biological, climatic and input and output prices [3, 4, 5].

Similarly, Wossen et al. [6] highlighted that adoption of technologies were not only alleviating poverty but also increasing income and productivity of farmers. That is why, adoption of technologies would ultimately trigger economic growth along with wide marketing opportunities, reducing poverty at large [6]

and making agriculture more sustainable [7].

According to Baharuddin [8], apart from blessed natural landscape with numerous resources in Malaysia, natural disasters such as floods, droughts and land sliding are causing adverse effects on the agricultural sector. In Malaysia, the flood prone area is nearly 9% of the total land area (2.97 million ha). In fact, agricultural sector needs more attention of public, private, NGOs and development sector as more problems are emerging with the passage of time. In this regard, extension as a central player has to accelerate the pace for addressing issues for the farmers and with the farmers. Baig and Aldosari [9] also mentioned that in Asian countries, there is a need to reconsider extension system in the present scenario as there are many challenges emerging.

In this era of digital technologies, not only extension personnel but also farmers are naturally getting interest and attention to use ICTs in the agricultural sector. It is due to the fact that they are already using ICTs for social interaction in various forms. However, farmers are not well informed and equipped with the benefits hidden in the ICTs which can be harnessed for keeping them informed about weather forecasts, agricultural best practices, innovations in agricultural sector and many more. Indeed, various ICTs are getting attention of various development sectors in various states of Malaysia as these are convenient, speedy and resourceful. However, digital based agricultural sector is less focused due to lack of awareness and knowledge about its potential role in the management of agricultural risks. Baig and Aldosari [9] along with other authors [10, 11, 12] have pointed out that existing extension methods (traditional) like individual, group and mass contact methods need to be grafted with ICTs for making the information available to all players in an efficient, quick and effective manner [11]. Ultimately, it would give boost to the traditional extension system. Tata and McNamara [13] conducted study in Kenya and emphasized that there is a need to incorporate ICTs in agricultural extension system through government level investments. Importantly, failure to graft ICTs in agricultural extension could lead to underperformance of digital technologies for better extension service delivery particularly in agricultural risk management and generally in agriculture.

More importantly, it is not just attitude, motivation, behavioural intention and behaviour of farmers and extension staff but also their capacity and competency in both agricultural risk management and ICT usage and well equipped institutions to support ICTs for timely risk management from the perspective of present and future. Indeed, agricultural sector has become more risky due to climate changes and extension agents are supposed to help farming community to use ICTs for agricultural risk management. That is why this study was planned to assess the existing situation of extension services at different states of Malaysia. The study would be helpful in understanding the role being played by extension service providers in the study area. The result would also be useful for policy makers, extension professionals and farmers to realize the importance of extension services and ICTs in agricultural risk management.

## METHODOLOGY

The research was conducted in four areas of Malaysia affected by disasters or perceived to be prone to natural catastrophes. Multi stage cluster sampling method was used. In this regard, three clusters namely East, South and North zones were chosen on account of geographical locations which were reflecting the three states. Then, areas such as Pahang, Terengganu (East), Johor (South), Kedah (North) were randomly selected from the three states. Lastly, the lists of farmers were obtained to randomly select sample size from each area. Thus, 90 farmers were chosen by using simple random technique that was representing areas of four state districts as mentioned in the Map of Malaysia (Figure 1). The selection criteria of respondents' selection were natural disaster experience. So, the total sample size was 360 farmers. Study data were collected using structured questionnaire forms completed by local enumerators during face to face farmer interviews. Descriptive method of Statistics was used to analyze the data. The results were generated by using Statistical Package for Social Sciences (SPSS version 21).

## RESULTS AND DISCUSSION

### Sources of Information on Weather Forecast

Information acts like power and also empowers the farmers which can ultimately help in action and reaction (decision).

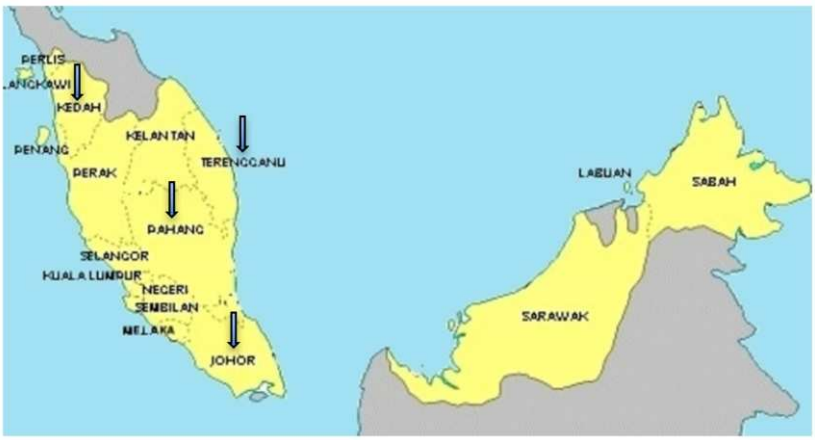


**Figure 1.** Study area location.

According to Demiryurek [14], one of the important factors in agriculture is information which helps the farmer in better management of agriculture and facilitate in better decision making when provided by extension service, research, academia and other agricultural organizations. It makes the farmer more knowledgeable that inhibits making wrong decisions. Mittal and Mehar [15] conducted a survey in Indo-Gangetic plains of India to assess the agricultural information networks and needs of farmers along with risk management strategies and found that farmers had multiple sources of information and did not rely on single source, on the basis of information accessibility, precision and trustworthiness.

Farmers use single or various sources regarding weather forecasts for appropriate management of agricultural risks. In this regard, farmers were asked about different sources of information (more than one) and the results of empirical research in Table 1 depict that television and fellow farmers were the main sources of information as revealed by 79.4% and 61% of the farmers. The results are consistent with Ngathou et al. [16] who conducted research in North Alabama to explore sources of information by limited resource farmers and found that information received by face to face contact and through television programs are most useful methods. Almost 40% of farmers said opinion leaders are their main source of information. Similarly, radio and newspapers were also sources of information as reported by 37.2% and 35.3% of the farmers. Almost similar percentage of farmers highlighted Department of Meteorology and Department of Agriculture as their information pool pertaining to weather updates. Regardless to these sources, self-judgment was perceived effective by more than slightly half of the research population. Moreover, state authority was least significant as a source of weather information as only 2.2% farmers were able to obtain relevant information. There were only five farmers who said that they did not have any information at all. Whereas, only 1.9% of the farmers disclosed that they had other sources of information like trade dealers and relatives etc.

It is clear from Table 1 that television, fellow farmers and self-judgment were better sources of weather information for the management of agricultural risks in the eyes of farming community in the research area. The links with fellow farmers in terms of agricultural sector development can never be ignored as these links facilitate farmer to farmer interaction and mirror the snowball effect. This effect ensures that most of the farmers access each other and get informed about any update because inter communication is supposed to be good and cheap solution for majority of the farmers.

It was observed from the research area that most of the farmers waste their precious time to gather the information, judging the credibility, reliability and matching with own needs which some time lead to delay in the decision and final action. Moreover, type and nature of risk, time, technology, information source (s) and decision making ability could be important factors for the farmers. So, rapid digital technologies (ICTs) and extension service providers either public or private might help the farmers in taking the decision. Similarly, farmers can also confirm the consequences of their decision through discussion with extension experts and also results of other farmers through ICTs.

**Frequency of Visits by Agriculture Extension Staff**

Extension workers in their mandate areas play a vital role in the agricultural development. They contact farmers face to face or indirectly help them select the best fit actions to address their challenges. In this regard, their frequency of contact may differ from country to country and even area to area within the same country. FAO [17] highlighted that extension officers are important frontline workers as they visit the farmers for the establishment of extension-farmer tie-ups, motivation, and detections of problems. Extension programs organized by extension field staff also transform rural areas for ultimate development. Aonngernthayakorn and Pongquan [18] pointed out that extension programs were one of the agricultural information sources of the paddy farmers in central Thailand.

Table 2 displays, the frequencies of extension staff's farmer visits. It is obvious from the table that most of the farmers were visited on annual and biannual basis. Again, one of the most striking results is that an important proportion of the farmers have never been visited (23.9%). This finding is in harmony with Phetsamone [19] who reported that 26% of the surveyed farmers did not have access to extension services in Laos.

**Contributions by Extension Workers**

Farming community needs help by the extension experts most of the time in agricultural sector. They not only inform farmers to adopt new technologies but also contribute to convey new ideas into their existing agricultural practices. Davis et al. [20] pointed that there was a need to change the existing traditional role of extension into new dimensions of support services which must help in variety of emerging challenges like malnutrition, risk and disaster preparation, adaptation to climate variations and resilience of farmers. In this regard, farmers were asked the supports or contributions given by extension staff in integrating ICTs into the agricultural risk management. The results were presented in Table 3.

The results disclosed that farmers had mixed feelings on the supports by extension workers. It may be due to the fact that extension staff is not well equipped and trained in drawing the attention of farmers. So, if extension staff is already trained then these digital innovations in the agricultural risk management would be easy. Lastly, Extension officers have to be fully supportive particularly in the areas where farmers are more prone to natural catastrophes.

**Information about Use of ICTs from Officers**

Farmers try to receive as much as information especially in the risk management field and their areas. Indeed, it is a common perception that extension staff is well trained and better informed in the variety of issues in agricultural sector. Farmers were asked about information they have received (more than one answer) from agriculture extension staff about various uses of ICTs in the management of agricultural risks. The empirical results given in Table 4, demonstrate that 33.3% of the farmers responded that they received information about use of ICTs for disaster prevention. While, 27.2% of the farmers said that extension officers informed them about use of ICTs for well preparation in case of any disaster occurrence. Moreover, 22.2% of farmers acknowledged that extension specialists facilitated the farmers in the ICT usage for pre and post recovery. In addition, there were 23.1% farmers who replied that extension workers brought into their notice about use of digital means for knowing about market price condition during disasters. There were 38.6% of the farmers who highlighted any other as information given by extension personnel like pest and diseases, health related issues, destruction of physical infrastructure, food shortage, shifting to secure places, public and private services for disaster victims, relocation of livestock, volunteers, emergency medical services and government polices etc.

Therefore, it can be gathered that farmers receive variety of information from extension field staff before, during and post disasters for agricultural risk management by the use of ICTs. However, still there are many farmers who remained uninformed about sudden natural disasters which might lead them towards losing interest in the agricultural sector. Thus, if all the farmers are well informed and prepared in advance to tackle any natural disaster by the help of ICTs then risk management in agriculture can also be ensured to some extent. Efforts of extension field staff are being desperately needed in this regard.

**Extension Staff Knowledge**

The intensity of risk may be even higher when service providers either do not help farmers at

In this regard, farmers were asked to assess extension staffs' knowledge capacity on agricultural risk management by using ICTs. So, the results demonstrate that (as displayed in Table 5) more than 62% of farmers believed that extension staff's knowledge capacity on the use of ICTs is low and needs improvement. As a matter of fact, when extension staff is experienced, well equipped with up-to-date knowledge, they can be beneficial to farmers and satisfying their needs. Another point to remember is the possibility that extension staff with a continuous or frequent contact might be ranked as good or very good by the respondents.

**Table 1.** Sources of information on weather forecast.

| Sources | Frequency (*) | Percentage |
|---|---|---|
| Television | 286 | 79.4 |
| Fellow farmers | 220 | 61.1 |
| Self-judgment | 187 | 51.9 |
| Opinion leaders | 146 | 40.6 |
| Radio | 134 | 37.2 |
| Newspapers | 127 | 35.3 |
| Department of Meteorology | 39 | 10.8 |
| Department of Agriculture | 38 | 10.6 |
| Department of Veterinary Sciences | 15 | 4.2 |
| State authority | 08 | 2.2 |
| Telecommunication Company | 07 | 1.9 |
| Department of Fisheries | 05 | 1.4 |
| No information | 05 | 1.4 |
| Any other | 07 | 1.9 |

(*) Respondents gave more than one answer

**Table 2.** Frequency of agriculture extension staff visits.

| Frequency of visits | Frequency | Percentage |
|---|---|---|
| Weekly | 14 | 3.9 |
| Fortnightly | 11 | 3.1 |
| Monthly | 38 | 10.6 |
| Bi annually | 103 | 28.6 |
| Annually | 108 | 30.9 |
| Never | 86 | 23.9 |
| **Total** | **360** | **100.0** |

**Table 3.** Contributions by extension workers.

| Support | Frequency | Percentage |
|---|---|---|
| No support | 81 | 22.5 |
| Minimal support | 68 | 18.9 |
| Some support | 43 | 11.9 |
| Adequate support | 130 | 36.1 |
| Very supportive | 38 | 10.6 |
| **Total** | **360** | **100.0** |

**Table 4.** Information about use of ICTs from officers.

| Purpose of using ICTs | Frequency (*) | Percentage |
|---|---|---|
| Market prices | 83 | 23.1 |
| Disasters information | 120 | 33.3 |
| Relocation in case of emergency | 55 | 15.3 |
| Well preparedness for any possible disaster | 98 | 27.2 |
| Pre and post recovery | 80 | 22.2 |
| Others | 139 | 38.6 |

(*) Respondents gave more than one answer

**Table 5.** Extension staff knowledge.

| Extension Staff Knowledge | Frequency | Percentage |
|---|---|---|
| Very Poor | 139 | 38.6 |
| Poor | 41 | 11.4 |
| Fair | 44 | 12.2 |
| Good | 97 | 26.9 |
| Very Good | 39 | 10.8 |
| **Total** | **360** | **100.0** |

## CONCLUSION AND RECOMMENDATIONS

It can be concluded that the primary sources of weather forecast were T V and fellow farmers as agricultural extension services in the research area were not satisfying. It was due to less frequent farmer and the inadequate supports by extension field. Although, farmers have been receiving information on the use of ICTs from extension agents exclusively for disasters through ICTs, extension agents need building their knowledge capacities on agricultural risk management. Frequent visits, skills and knowledge up-gradation through training programs on regular basis, farmer friendly support and policy measures and decisions particularly at the time of disasters and help for resource-poor small farmers are required in general but especially in disaster prone areas in Malaysia.

In order to reach majority of disaster prone farmers, extension service providers need to be fully aware, equipped and empowered themselves in all aspects so that they can easily help the farmers required. Additionally, there is a need to allocate more funds, develop methods to integrate ICTs and involve all stakeholders for proper agricultural risk management. Lastly, extension service providers' role and duties should be redefined.

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