DETERMINATION OF INFORMATION SYSTEM ELEMENTS TO SUPPORT INITIAL PROMOTION OF FARM MANAGEMENT INFORMATION SYSTEM USAGE

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ABSTRACT

The purpose of this paper is to determine the Information System Elements (ISE) in Farm Management Information System (FMIS) through multiple requirements elicitation before the development of FMIS to support the initial promotion of Farm Management Information System (FMIS) usage among smallholder farmers in Malaysia. The system requirements elicitation used three sources which literature review, existing software comparison in the market and empirical data collected from the smallholder farmers which been analysed by the researcher using descriptive statistic analysis. The result shows nine information system elements needed in FMIS and the system mobility availability is the most needed element with the highest mean score of 4.44. The result gave the researcher basic ISE indicator in the FMIS to support initial promotion of system usage before the development of the FMIS prototype for the smallholder farmers.

Keywords*: Information System Elements, Software Requirement Elicitation, FMIS Prototype*

INTRODUCTION

An information system element (ISE) is a service that helps people to organise and analyse data to achieve their objective. An ISE is widely used in most organisations nowadays as part of ICT deployment to improve business processes and to enhance the organisation's performance (Laudon & Laudon, 2007). Such processes are usually represented in the hierarchy of the organisation, and are usually reflected by the people in the organisation. Several levels incorporate ISE, such as transaction processing systems, management information systems, decision support systems, and finally, at the top of the hierarchy, executive information systems.

As the ISE is most representative of the organisation, it also directly interacts with the people who are represented as the users of the system. The elements or components of the ISE interact with the users to ensure the functionality of the ISE is feasible. The elements

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or components of the ISE are usually involved with the content and presentation, which leads into more details of the functions and features available in the system (Bakar, Sazili, Zaini, & Ali, 2010; Sørensen, Pesonen, Bochtis, Vougioukas, & Suomi, 2011). The researcher outlines five functions and four features commonly available in the system based on the literature, data collected from the smallholder farmers and existing system comparisons available in the market. The ISE determination is part of software requirement elicitation process that being used widely by scholars in computer sciences and information systems (Chengfeng & Jinghua, 2010; Sommerville, 2004).

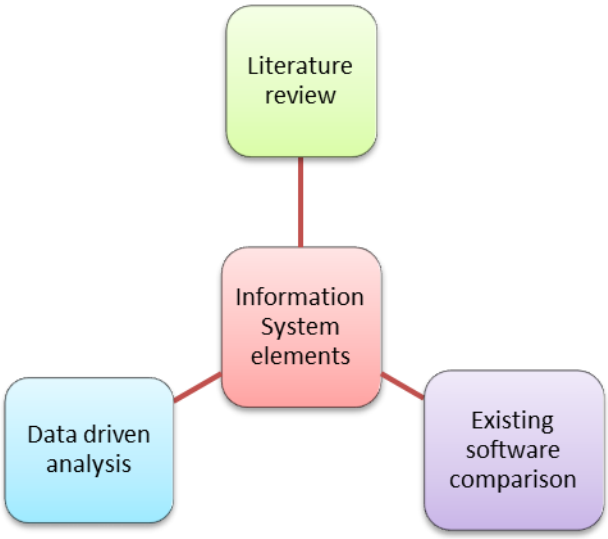

Figure 1: Determination of information system elements from multiple software requirement elicitation

The system functions outline five functions available in the system: system availability, device accessibility, login accountability, user authority, and open system. System availability refers to the functions that allow the users to access the application anywhere. Usually, the use of the internet allows the system to be mobile. A system that demonstrates mobility can be used anywhere at any time. Therefore, the system must have internet capability in order to ensure its availability. Device accessibility is the function that allows cross application system accessibility using multiple applications and devices, such as personal computers, notebooks, and smartphones or tablets. Meanwhile, the login accountability is the function that allows users to have account capability where all the information stored has security and accountability. The user authority is the function whereby the main user can create other users to assist them in managing their farms by inserting information into the system. Lastly, the open system function makes it possible to open the system to allow any user to register and use the system without restriction and limitation to the local farmers or good agricultural practice by certified farmers.

The IS elements also outline a few system features, such as upload, reports, search, and analysis. The upload feature allows the system to upload files and documents in certain areas and sections within the system. Thus, it might be useful for uploading images, such as the symptom of a livestock disease. The report feature allows the system to generate reports in Malaysia Good Agricultural Practice (MyGAP) within the system. This feature

can assist the farmers to achieve the MyGAP certification and ease the reporting capability, which would be useful during the MyGAP audit. Meanwhile, the search feature is common for searching and retrieving the information stored in the system. Lastly, the analysis feature allows the users to carry out analysis in the system, such as profit and loss calculation, human resource cost, and others to assist farmers in decision-making. All IS element functions and features were highly needed in modern computerized farm management (Öhlmér, 2008).

In summary, there are total of nine IS elements determined in this study. The elements are important to the smallholder farmers in order to develop a Farm Management Information System (FMIS) prototype which is useful to promote the initial FMIS usage to support agribusiness among smallholder farmers in Malaysia.

LITERATURE REVIEW

The IS elements were based on the literature review, existing software comparison in the market and empirical data collected from the smallholder farmers which been analysed by the researcher (Bakar et al., 2010; Department of Agriculture, 2013; Sørensen et al., 2011). The functions aspect is important in application to improve the quality of the system (Kuo & Chen, 2011). The system availability offered the wide range of the application reachability anywhere and anytime (Wagner & Szűcs, 2002; Yu-Mei, Xue-jun, & Li, 2010). This is to ensure the system performance and the farmers able to use the system continuously.

Meanwhile, the device accessibility is the cross application system capability where the system can be used in multiple apps and devices, such as PC and mobile applications (Davis & Chen, 2010). This offer more scalability towards the system and high accessibility by the farmers. This IS element also related to the system availability and the system architecture design is important to ensure the success of implementation for both elements (Browne, Dongarra, Garner, London, & Mucci, 2000; Davis & Chen, 2010; Ko, Lankoff, Banasik, & Lisowska, 2003).

The login accountability to ensure all the information stored in the system has security and accountability (Hansen & Atkins, 1993; Kautz, Selman, Coen, Ketchpel, & Ramming, 1994; Kuo & Chen, 2011). This IS element also improved the user trust into the system and improved the system usage (Bakar et al., 2010). All farmers account in the system will be differentiated with each other and the privacy as well as security level will be upgraded.

User authorization is to increase the utilisation of the system from multiple users or agents (Goldman & Saperstein, 1997). The main user which is the farm owner or manager should be able to create sub users such the farm workers to help them to manage their farms information. The collaboration between multiple users will increase the use of the system and enrich the information stored without affecting the privacy and security of the system (Goldman & Saperstein, 1997; Pearlman, Welch, Foster, Kesselman, & Tuecke, 2002).
Meanwhile, the open system is the concept that the system should be used by everyone, especially the smallholder farmers. All farmers may use the system and not only restricted to MyGAP certified users. The open concept need thoroughly handle by the system and user in order to manage the information quality and richness stored in the system (Glaser, 2004). The open system also may helpful in order to improve the integrity of the

information stored with more transparency and accessibility by the use of the system (Cho & Choi, 2004).

The upload feature is the one of the system feature that able to support uploading of extra files and documents of certain areas and sections for additional record purposes (Stein et al., 2002). This will extend the information that is able to be stored in the system (Alvares, Carlos, & Ferreira, 2008; Liang, Banatao, Klein, Brutlag, & Altman, 2003). This IS element is also considered as essential to any system feature available nowadays.

The reporting feature is the report generated in MyGAP report format. The MyGAP reports features capable for record keeping which complies with MyGAP requirement for Good Agricultural Practice (GAP) certification (Department of Agriculture, 2013). Most of the system provide report customization and flexibility in order to fulfil the requirement by the user to increased judgments competency of the user and system (Beirekdar, Keita, Noirhomme, & Randolet, 2005; Westerman, Spence, & Heide, 2012). The report feature consolidated the information stored in the system for assisting the user to make further decision.

The search feature is the system should capable to search existing stored information faster and save time. It is part of system identification and detection which need some of method to be used for searching and retrieving back the information stored into the system (Saitta, Kripakaran, Raphael, & Smith, 2009; Shah & Rogers, 1988). This IS element is also essential element in any system available nowadays.

The analysis feature in IS element that support additional feature to utilize and consolidate the information stored in the system. The output through the analysis features able to assist farmers in decision-making which is usual feature in decision type support system (Eastwood, Chapman, & Paine, 2012; Faiz & Edirisinghe, 2009; Fountas, Wulfsohn, & Blackmore, 2006; Rauscher, 1999). The analysis feature may extend the usability of the system feature available in this research.

The complexity and usefulness of an IS elements are represented in how it utilises the non-functional requirements of the IS design itself (Chung, 1991). However, the researcher argues that the functionality of IS elements are important and leads to system usage. The IS elements, including the functions and features outlined, will be studied and empirically explored in this research.

METHODOLOGY

The researchers use multiple system requirement elicitation methodology to determine the information system elements. The method begins with the literature review and existing software comparison in the market. The existing software comparison has been selected from several software companies which are developing and selling FMIS in the market such as FarmLogic, AgSquared, FarmWork and FarmLogs (Mohd Danuri, Shahibi, & Abd Rahman, 2016). The researcher used the results to construct a questionnaire which adapted from literature (Avison & Fitzgerald, 1995; Pedersen et al., 2008; Rob & Coronel, 2007; Sørensen et al., 2011). The questionnaire then distributed to 209 smallholder farmers in order to complete the software requirement elicitation through the quantitative survey

(Venkatesh, Brown, & Bala, 2013). The result analysed using SPSS and the IS elements will be determined if the if shows medium and high level of mean score.

Instrument and Respondent

The instrument used in this study was adapted from scholars which was derived from established system requirement and elicitation (Avison & Fitzgerald, 1995; Pedersen et al., 2008; Rob & Coronel, 2007; Sørensen et al., 2011). The questionnaire was selected due to the reliability and validity of the questionnaire in context of their previous study which will assist researcher in this study. This survey used 6-point scale, ranging from 1 which is strongly disagree (*sangat tidak setuju*) to 6 which is strongly agree (*sangat setuju*). The respondents were 209 Malaysian smallholder farmers and use to several ICT devices such personal computer, smartphone as well as using internet located in Taman Kekal Pengeluaran Makanan (TKPM) in Selangor.

ANALYSIS AND FINDINGS

The IS elements outlined nine aspects that represent the features and functions of the prototype system developed for the smallholder farmers. These features were system availability anywhere and at any time, multiple device accessibility, login accountability and multiple user authority for the system, and open system for any farmers to access including but not limited to MyGAP users. Meanwhile, some functions, such as uploading, searching, analysing and MyGAP reporting capability, were also a part of the IS elements.

Table 1: Mean score and standard error aspect information system elements factor that influence FMIS usage

Aspect	Mean	S.D	Interpretation
System mobility availability	**4.4354**	**0.82444**	**High**
Multiple device accessibility	3.9904	1.14770	Medium
Login accountability	4.0718	0.97548	Medium
Multiple user authorization	3.9426	0.96902	Medium
Open system for any farmers to access	4.0574	1.31798	Medium
Upload feature	3.5694	1.12499	Medium
MyGAP reports feature	3.3541	0.98985	Medium
Search feature	3.9952	1.09412	Medium
Analysis feature	4.0670	1.14157	Medium
The information system elements factor that influence the FMIS usage among smallholder farmers	**3.9230**	**0.73049**	**Medium**

Above analysis results show that most of the aspects had a medium level of influence on FMIS usage among smallholder farmers. The system mobility availability indicates that the system having availability anywhere and at any time had the highest level of influence on FMIS usage. This means that the availability of the system was important in FMIS usage among smallholder farmers. The overall information system elements functionality had a medium level of ICT usage with a mean value of 3.92 which can be considered as accepted and needed by the smallholder farmers.

DISCUSSION

This study was conducted to find out the Information System Elements (ISE) to support the initial promotion of Farm Management Information System (FMIS) usage among smallholder farmers in Malaysia. Through the multiple software requirement elicitation method, there are nine elements that have been determined for the development of FMIS. The system mobility availability has the highest mean value with 4.44 which indicates the most needed ISE in the FMIS. Therefore, the development of FMIS must have the capability to be used anywhere and anytime. The most common way to implement it, the ISE must available through the internet and support the multiple devices to ensure the system performance and the farmers able to use the system continuously.

Supporting evidence give the researchers better understanding to elements needed for the information system prototype that will be developed and accepted by the smallholder farmers. This is important to support the initial promotion of Farm Management Information System usage in the future.

CONCLUSION

This study has focused on the determination of Information System Elements (ISE) to support initial promotion of Farm Management Information System usage. Based on three methods such literature review, existing software comparison in the market and empirical data collected from the smallholder farmers using quantitative, the researcher able to determine the Information System Elements (ISE) and validate the finding through multiple methodology of software requirement elicitation. The result allows the researcher to develop the FMIS prototype which includes all elements with the focus on highest needed element that has been found in this research.

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