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Determinants Influencing the Intention to Use Mobile Expert System for Diagnosis of Pests and Potatoes Diseases

Sunar,* Setyowati,R.,* Nikmah*, Tobing, S.L*)

Abstract:

This research aims to examine and analyze technology acceptance model which consist of perceived ease of use (PEOU), perceived usefulness (PU), perceived enjoyment (PE) impact on intention to use (ITU) Mobile Expert System for Diagnosis of Pests and Diseases Potatoes.

The research population is farmers who are using Mobile Expert System for Diagnosis of Pests and Diseases Potatoes. Research sample are 275 farmers who are using Expert System for Diagnosis of Pests and Diseases Potatoes once a week at least. Sample determination considers purposive sampling while research data analysis using IBM SPSS Statistic 19.

The results of the research indicate perceived ease of use has positive and significant effect on intention to use, perceived usefulness has positive and significant effect on intention to use, and perceived enjoyment has positive and significant effect on intention to use.

Keywords: *Expert System, perceived ease of use, perceived usefulness, perceived enjoyment, intention to use;*

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1. Introduction

Crop pest and disease diagnosis are amongst important issues arising in the agriculture sector since it has significant impacts on the production of agriculture for a nation. The applying of expert system technology for crop pest and disease diagnosis has the potential to quicken and improve advisory matters. However, the development of an expert system in relation to diagnosing pest and disease problems of a certain crop as well as other identical research works remains limited. Mobile phones are nowadays the most popular and widely used means of communication for its compact size, versatility, and ease of handling. Expert systems (ESs) are intelligent software applications that utilize acquired expertise from experts in a specific domain to provide advice to its users through a dialog or a conversation

conducted between the user and the ES application. Mobiles are no doubt the most widely used means of communication for its ease of use, ease of handling, and increasing capabilities. Most of the mobiles nowadays are equipped with top edge technologies that enable the user to communicate data in high rates and provide geospatial services that make the user identify his position on the earth accurately (Patel and Abowd,2003). The diffusion of mobile services in our daily life is due to the flexibility, interaction and efficiency they provide for the users (Balasubramanian & Sirka, 2002; Leung & Wei, 2000). In this electronic environment, companies need to recognize the ways of interacting with their customers and presenting their services. To achieve this, it requires an understanding of the driving forces (determinants) that may affect customers' intention to use these kinds of services and their perception of the high value that results from using them (Anckar & D'Incau, 2002). To date, there is a limited extent of studies that reinforce a well-built theory on the essential aspects of developing mobile commerce (Jih, 2007; Nysvenn et al., 2005a; Yang, 2005), which mobile phone and its services are considered to be the most important tools of it (Anckar & D'Incau, 2002; Mort & Drennan, 2005). Previous studies have recommended the importance of a deeper vision to get to a better understanding of the determinants that may either compel the user to use mobile services or impede this use (Rao & Troshani, 2007).

2. Literature Review

The technology acceptance model (TAM) originally formulated by Davis (1986) is the preeminent theory that is widely used to explain and predict user acceptance of new information system. Many studies have been conducted concerning users' intentions for adoption of mobile services, most of which have been based on the model of Davis's (1989). However, parsimony has been one of TAM's strengths, but also its major weakness consists in its limited use in explaining users' behavioral intention to adopt complex mobile services (Venkatesh & Davis,2000). That is the reason why the current study sought to extend this model through adding new determinants to fit it well with the characteristics of mobile services (Amin, 2007; Qingfei et al., 2008; Snowden & Spafford, 2006; Wong & Hsu, 2008; Yang, 2005). TAM was rooted in the theory of reasoned actions (TRA), a model suggests that beliefs influence attitudes, attitudes influence intention and this may generate behaviors (Ajzen and Fishbein, 1980). Based on TAM model, the level of technology acceptance by users depends on two main constructs, namely, perceived usefulness and perceived ease of use." The original TAM model is shown in Figure 1. The main idea of TAM model is that the potential user's overall behavioral intention to use an information system is considered as the major factor that determines a person's system usage. The behavioral intention to use the system is influenced by attitudes towards using the system. These attitudes are influenced by two beliefs, namely, perceived usefulness and perceived ease of use that person holds about the use of technology. Perceived ease of use has causal effects on perceived usefulness. External variables can directly influence perceived usefulness

and perceived ease of use. The success or failure of technological innovations depends on the latitude of their users' acceptance (Wong & Hsu, 2008).

Determinant of the use mobile system expert:

'Perceived Ease of Use' refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 323). In the mobile setting, it represents the degree to which individuals associate freedom of difficulty with the use of mobile technology and its services in everyday usage (Knutsen et al., 2005). Any technology that is not hard to understand will be less threatening to individuals so, the degree of its complexity is certainly a factor that determines the intention to use it (Agarwal & Prasad, 2000; Bhatti, 2007; Moon & Kim, 2001; Venkatesh & Davis, 2000; Venkatesh, 2000). Ease of use is perceived through variables such as the diversity of the modes of insertion and the clarity, understanding and ease of operating, among others. In addition, this determinant affects the attitude towards mobile services in general (Amin, 2007; Nysveen et al., 2005b; Pagani, 2004; Roa & Troshani, 2007), considering the arguments above, we suppose the following hypothesis:

H1: Perceived ease of use has a significant influence on the intention to use mobile expert system.

'Perceived Usefulness' is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). This determinant has been given different names such as utility expectancy or performance expectancy in order to adapt it to the nature of diverse technological applications (Qingfeietal, 2008; Venkatesh et al., 2003). Perceived usefulness of Mobile service is affected by several variables, the most effective of which are both the rapidity and convenience in achieving the dealings compared with other payment methods (Dewan & Chen, 2005). This determinant affects the attitude towards mobile services in general (Amin, 2007; Nysveen et al., 2005b; Pagani, 2004; Rao & Troshani, 2007). According to TAM, there is also a significant impact of perceived usefulness on intention to use resulting from an outside motive, such as achieving a certain goal or gaining a reward (Davis, 1989; Venkatesh & Morris, 2000). An empirical research has also confirmed that users will use mobile expert systems for practical reasons, that is, for the relative advantage those systems provide in financial transactions (Kimet et al., 2010). Considering the arguments above, we suppose the following hypothesis:

H2.: Perceived usefulness has a significant influence on the intention to use mobile expert system.

'Perceived Enjoyment' refers to "the extent to which the activity of using the (computer) technology is perceived to be enjoyable in its own rights apart from any performance consequences that may be anticipated" (Davis et al., 1992). Bruner and Kumar (2003) have added this constraint to the original TAM. Perceived enjoyment

is considered as one of the most important motives in accepting and using mobile services (Anckar & D’Incau, 2002; Cyr et al., 2006; Kaufaris, 2002; Leung & Wei, 2000; Novak et al., 2000). This determinant affects the attitude towards the service (Bauer et al., 2005; Nysveen et al., 2005a; Pagani, 2004; Rao & Troshani, 2007), and, as another study asserted it also directly affects the intention to use mobile services (Nysveen et al., 2005a). This determinant has a considerable importance in the field of mobile commerce applications. Since, from a point of view adopted by Qingfei et al. (2008), the term expected performance has been exchanged with expected benefit because of the importance of enjoyment in achieving the benefit from these kinds of applications, which include personal entertainment. However, the availability of enjoyment is not a requisite in all the applications of mobile commerce services, especially those related to financial dealings that require more sensible and practical involvement. Considering the arguments above we suppose the following hypothesis:

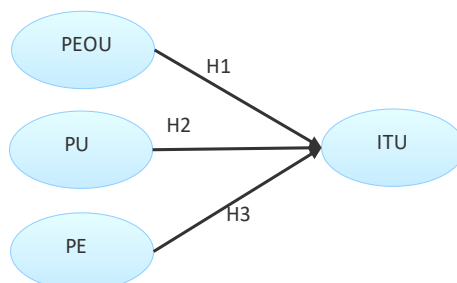
H3: Perceived enjoyment has a significant influence on the intention to use mobile expert system.

The above arguments reveal the diversity and multiplicity of the determinants that affect the adoption of mobile service. From the viewpoint of previous studies, the availability of these different determinants, specially perceived usefulness, perceived ease of use, security and privacy of the service is indicative of a sense of optimism among customers about the benefits gained from this new service, which accordingly strengthens the intention to use it (Dewan & Chen, 2005). However, the research at issue tests the extent to which all these previously mentioned determinants affect the attitude towards this service and the intention to use it in the farmer.

3. Methodology

The sample consisted of 275farmes in six province Indonesia. Respondents’ ages ranged from 19 to 38, with a mean age of 23.15 years and standard deviation of 2.97 years. Majority of the respondents (99.5 percent) admitted that they have good mobile phone skills.

Figure 1. The conceptual framework



For this study, the questionnaire consisted of 18 items assessed four constructs: perceived ease of use (PEOU), perceived usefulness (PU), perceived enjoyment (PE) and intention towards use (ITU) based on the research model. All the 18 items used a five-point Likert scale with 1 representing “strongly disagree” and 5 representing “strongly agree”. The items used to measure PEOU, PU, PE and ITU were adopted from previous research (Davis, 1989; Davis et al., 1989; Moon and Kim, 2001; Venkatesh, 2000) with some modifications to suit the research contexts.

IBM SPSS Statistic 19 was used to analyze the collected data of this study. In order to test the internal reliability of the constructs, reliability test in terms of Cronbach’s α was computed. The Cronbach’s α value for the four constructs PEOU, PU, PE and ITU of this study were 0.675, 0.694, 0.783, and 0.676, respectively. As suggested by Cuieford (1965) and Nunnally (1978), the Cronbach’s α value of all these constructs were above the conventional level of 0.6. Thus, all these constructs were deemed to exhibit adequate reliability.

4. Result and Discussion

Table 1 presents means, and standard deviations computed for various determinants. The scores for the perceived ease of use, perceived usefulness, perceived enjoyment and intention to use were observed to lie in-between.

Table 1. Summary of descriptive statistics of the constructs

	Mean	Std. Deviation
Perceived ease of Use	4.1553	.43944
Perceived Usefulness	4.1841	.42929
Perceived Enjoyment	4.1369	.56961
Intention to use	4.1455	.58784

Hypotheses Testing: H1: Perceived ease of use has a significant influence on the intention to use mobile expert system:

Figure 2 shows that the perception of ease of use has a positive and significant influence on the intention of use with the coefficient value of the path of 0.16 and p value <0.01 with a fault tolerance (alpha) of 5%. Hypothesis (H1) which states the perception of ease of use has a positive and significant influence on the intentions of the use of mobile expert systems of pests and diseases diagnosed potato plants, so ease of use becomes an important point for users to improve the intent of use. The perception of the ease of use of expert systems of pests and potato disease diagnoses can be the cause of success or failure of use. Perception of ease of use of expert system of potato pest and disease diagnosis, which is one form of development of information technology, can be reviewed from user interface design. Practically the user often feels the interface design of an application difficult. User interface design

should be made easy, so that interaction between users can be done as simply and efficiently as possible.

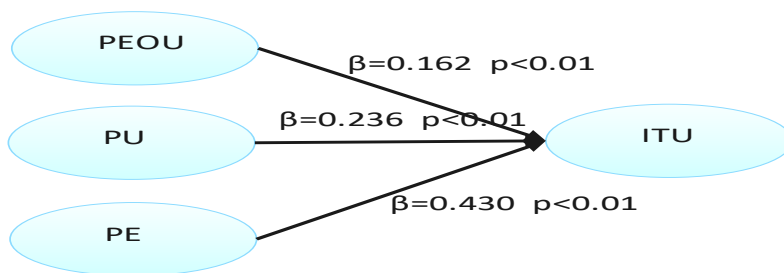
H2.: Perceived usefulness has a significant influence on the intention to use mobile expert system:

Figure 2 shows that the perception of benefits has a positive and significant effect on the intention of use with the coefficient value of the path of 0.236 and p value <0.01 with a fault tolerance (alpha) of 5%. Hypothesis (H1), which states the perception of benefits, have a positive and significant influence on the intent of use-supported expert system of pest and potato disease diagnosis.

H3: Perceived enjoyment has a significant influence on the intention to use mobile expert system:

Figure 2 shows that the perception of acceptance has a positive and significant influence on the intention of use with the coefficient value of the path of 0.430 and p value <0.01 with a fault tolerance (alpha) of 5%.

Figure 2. Results of research model



Hypothesis (H1) which states acceptance perception has a positive and significant influence on the intent of use supported by the appearance of an interesting application, a complete application, in accordance with what is desired and the satisfaction of the use of this application.

The effect of Perceived Enjoyment (PE) ($\beta=0.430$) was relatively higher than that of Perceived Usefulness (PU) ($\beta=0.236$) or Perceived ease of Use (PEOU) ($\beta=0.162$), was found to have a direct effect on intention to use. This result indicates that the expectation confirmation theory model also has a strong explanatory power in predicting users' continuance intention in the context of Mobile Expert System for Diagnosis of Pests and Diseases Potatoes.

The study confirmed that multiple factors influence farmers' intention to use Mobile Expert System for Diagnosis of Pests and Diseases Potatoes. The findings of this study can be useful to better understand the underlying factors of users' continued usage of Mobile Expert System for Diagnosis of Pests and Diseases Potatoes. In addition, this study yields practical implications as to how to promote consistent use

of Mobile Expert System for Diagnosis of Pests and Diseases Potatoes to farmers, as well as implies a new approach to assess Mobile Expert System for Diagnosis of Pests and Diseases Potatoes.

5. Conclusion

The purpose of this study was to investigate the intention of using Mobile Expert System for Diagnosis of Pests and Diseases Potatoes. The results of the research indicate perceived ease of use has positive and significant effect on intention to use, perceived usefulness has positive and significant effect on intention to use, and perceived enjoyment has positive and significant effect on intention to use. The effect of Perceived Enjoyment (PE) ($\beta=0.430$) was relatively higher than that of Perceived Usefulness (PU) ($\beta=0.236$) or Perceived ease of Use (PEOU) ($\beta=0.162$), was found to have a direct effect on intention to use.

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