EXAMINING A MODEL OF INFORMATION TECHNOLOGY ACCEPTANCE BY USERS OF ENTERPRISE RESOURCE PLANNING

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Abstract

Enterprise resource planning (ERP) system is a complex system that involves various stakeholders as users of ERP system within an organization. This research is the development of Hwang's research (2005) who applies the implementation and adoption of ERP system in informal controls, such as self-control and cultural control. Perceived enjoyment as self-control and uncertainty avoidance as cultural control are used in the implementation of ERP systems and connected to technology acceptance variables for investigating the relationship between these variables. Field data taken through surveys of ERP system users in Indonesia (n=188) are analyzed by Amos. The results support the hypothesis of this research which shows that perceived enjoyment as self-control and uncertainty avoidance as cultural-control are important determinants of ERP system acceptance.

Keywords: enterprise resource planning, technology acceptance model, perceived enjoyment, uncertainty avoidance, subjective norm

Abstrak

Sistem enterprise resource planning (ERP) adalah sebuah sistem kompleks yang melibatkan berbagai stakeholder sebagai user ERP dalam suatu organisasi. Penelitian ini merupakan pengembangan dari penelitian Hwang (2005) yang telah mengadakan implementasi dan adopsi sistem ERP dalam pengendalian informal, seperti pengendalian diri dan pengendalian budaya. Kesenangan sebagai pengendalian diri dan penghindaran ketidakpastian sebagai pengendalian budaya telah digunakan dalam implementasi sistem ERP dan dapat dihubungkan pada variabel yang dapat menyerap teknologi untuk menyelidiki hubungan antara variabel – variabel tersebut. Data lapangan yang diambil melalui survei dari pengguna sistem ERP di Indonesia (n=188) telah dianalisis menggunakan Amos.

Kata kunci: enterprise resource planning, technology acceptance model, perceived enjoyment, uncertainty avoidance, subjective norm

JEL Classification: M15

1. Introduction

Enterprise Resource Planning (ERP) system is a complex system that integrates all business processes within a company, resulting in changes that affect all parts and functions, including strategy, technology, attitude, culture, management system, human resource, structure (Indrajit dan Djokopranoto, 2009). All implementations of ERP system, therefore, are not is successful in companies. Standish Group reveals that only 10% of companies successfully apply the ERP; 35% of the projects are canceled and 55% of them experience delays (Djatmiko, 2004). Failure or delay to apply ERP systems is generally caused by human factors. Deloitte and Touche (Brown and Nasuti, 2005) who conducted a study of 164 users from 62 Fortune companies 500 of them that are using ERP systems, they found that 62% of the problems are caused by those factors, 16% of them are caused by business processes, 12% of them are caused by the information technology. Whereas, it has been known that the information technology investment requires substantial funds to get billions of rupiah (Sudarmadi, 2007). Thereby, in

reducing the failure level of implementation causing a loss, so it is still needed the further studies related to the user acceptance of ERP system.

Hwang (2005) investigated the ERP implementation and adoption of informal controls, such as cultural control and self-control, which are seen as a tacit perspective in knowledge management. Uncertainty avoidance and perceived enjoyment are applied as informal controls in the implementation of ERP connected to the variables of Technology Acceptance Model or TAM (perceived usefulness, perceived ease of use, and behavioral intention). Socio-technical design, organizational control mechanisms, knowledge management, and individual motivation are also studied by Hwang (2005) to support this potential relationship in the model. The results show that uncertainty avoidance as cultural control and intrinsic motivation as self-control are important antecedents of adopting ERP system. However, there is no direct correlation between uncertainty avoidance and perceived enjoyment on behavioral intention.

This research will prove the concept of Hwang's theoretical and empirical research (2005) by adding subjective norms in the model. Davis et al. (1989) mention that the roles of social influence in the acceptance and the use of information technology are important areas for a better understanding of the real TAM application. Studies of TAM that has included the subjective norm indicate that the mixed result and its role are not convincing (Lee et al., 2003; Schepers and Wetzels, 2007). Malhotra and Galletta (1999) and Mathieson (1991) found a weak correlation between subjective norms and other variables. Meanwhile, Venkatesh and Davis (2000), Venkatesh and Morris (2000), Lucas and Spitler (1999), Taylor and Todd (1995) found significant correlation between subjective norms and other variables.

TAM has extensively been used in the field of information systems for situations and different contexts both in North America countries and other countries. However, McCoy et al. (2007) show that TAM applications in other countries should be careful because many relationships between TAM variables do not show significant influence. TAM applications in each country can show the various results depending on the cultural value of each country (Hofstede, 1980). Uncertainty avoidance as cultural control in informal control mechanism tested by Hwang (2005) based on the sample taken from United States that needs to be re-examined by using samples from Indonesia. Will this research support the research conducted by Hwang (2005) because the cultural values of United States are different from the cultural values of Indonesia based on studies of Hofstede (1980)? In addition, this research will also examine the correlation between the uncertainty avoidance and perceived enjoyment that have no direct relationship in Hwang's study (2005) on behavioral intention.

2. Literature Review

2.1. Control Theory

Control is defined as all attempts to motivate individual to achieve desired objectives, and it can be exercised via formal and informal modes (Kirsch et al., 2002). The formal modes of control are behavior and outcome (Ouchi, 1979; Eisenhardt, 1985; Kirsch, 1997) and formal control mechanisms are generally associated with performance evaluation. The informal modes of control are social or people-based, focusing on the role that individual or group norms and values play in the exercise of control (Eisenhardt, 1985; Jaworski, 1988; Kirsch, 1997). The informal control mechanisms allow the introduction of some type of self-regulation rather than the formal control mechanisms that are based on organization and agency theories.

Jaworski (1988) summarizes the marketing and management literature regarding control, and proposes the comprehensive research framework. In his framework, formal and informal controls directly have behavioral effects at the individual level. Formal controls are documented by management whereas informal controls are unwritten determinants of behavior. Plans, budgets, regulations, and quotas are considered formal controls; group norms and organizational culture are informal controls. Formal controls also tend to be initiated by managers, whereas

informal controls typically are constructed by the workers (Hopwood, 1974).

Self-control dan culture control are attributes of informal controls (Jaworski, 1988). Self-control (Manz et al., 1987), one mode of informal controls, occurs when an individual sets his own goal, monitors his goal achievement, and rewards or sanctions himself appropriately. Self-control is a function of individual objectives and standards (Jaworski, 1988) and intrinsic motivation (Manz et al., 1987). Self-managed individuals define their own goals and processess for the task. These goals or processess may or may not be formally documented, but the important thing is that they emanate from the individual. In organizations where self-control is valued and encouraged, rewards are based, in part, on how well individuals control themselves (Manz and Sims, 1980).

Malhotra (2002) also argues that self-control is based on the intrinsic motivation or perceived enjoyment of the systems. Enjoyment refers to the extent to which the activity of using a computer system is perceived to be personally enjoyable in its own right aside from the instrumental value of the technology (Davis et al., 1992). Davis et al. (1992) define perceived enjoyment as a type of intrinsic motivation and perceived usefulness as a type of extrinsic motivation.

Previous studies that use perceived enjoyment as an intrinsic motivation in determining the perceived ease of use and perceived usefulness have been carried out by several researchers such as Venkatesh (2000), Venkatesh et al. (2002), Yi and Hwang (2003), Hwang (2005). Yi and Hwang (2003) found that perceived enjoyment has positive effect on perceived ease of use and perceived usefulness of web-based information systems. Hwang (2005) also found that enjoyment is the dominant determinant of usefulness than ease of use. Thus, the hypothesis are expressed as the following:

H_1: Perceived enjoyment (self-control) will have positive effect on perceived usefulness.
H_2: Perceived enjoyment (self-control) will have positive effect on perceived ease of use.

Culture control (Jaworski, 1988), another informal control, is realized by the accumulation of organizational stories, rituals, legends, and norms of social interaction (Meyer and Rowan, 1977; Sminth and Steadman, 1981), involving an entire division or firm (Wilkins and Ouchi, 1983). Culture is defined as the broader value and normative pattern that guide worker behavior within an entire organization (Ouchi, 1979). The cultural control mechanism is usually thought to be the a dominant control mechanism for management positions requiring non-routine, non-programmatic decisions (Jaworski, 1988), which is the common case in ERP implementation.

Uncertainty avoidance cultural orientation is the degree to which people prefer to structured situation than unstructured situations (Hofstede, 1980; Dorfman and Howell, 1988). Structured situation is standardized such as the use of information technology. Research conducted by Hwang (2005) applies this cultural orientation since environmental uncertainty is an important antecedent to the mechanism and control of behavior. Hwang (2005) uses the measurement of culture at the individual level, adapted from Dorfman and Howell (1988) based on the cultural dimensions (Hofstede, 1980). This Hwang's (2005) research is the first empirical research, applying individual-level cultural measures proposed by Dorfman and Howell (1988), while based on McCoy et al. (2005), explaining the extended TAM in the ERP system implementation.

Research conducted by Hwang (2005) of 101 ERP system users using a web of different types of companies shows the importance of the role of uncertainty avoidance culture in ERP system adoption through perceived ease of use. Similarly, Devaraj et al. (2002) found positive correlation between the reductions of uncertainty and the ease of use. Srite's research (2006) using a Chinese and the United States samples which are tested separately supports these results. For Chinese samples, there is a significant correlation between uncertainty avoidance and

perceived ease of use, but for the United States samples, no significant correlation is found. Furthermore, Srite's research (2006) also shows that for both Chinese and American samples, there is no significant correlation between uncertainty avoidance and perceived usefulness and subjective norm. Similarly, the research conducted by Hwang (2005) indicates that there is no significant correlation between uncertainty avoidance and behavioral intention. Thus, the hypotheses are expressed as the following:

H_3: Uncertainty avoidance (cultural control) will have positive effect on perceived ease of use.
H_4: Uncertainty avoidance (cultural control) will have positive effect on subjective norm.
H_5: Uncertainty avoidance (cultural control) will have positive effect on behavioral intention.

2.2. Theory of Reason Action (TRA)

TAM is the development of the TRA (Fishbein and Ajzen, 1975) but it does has not entered a subjective norm in the model. TRA model can be applied because the decision made by individuals to receive an information system technology is a conscious act that can be explained and predicted by the behavior intentions (Jogiyanto, 2007). Venkatesh and Davis (2000) develop TAM to TAM2 by including subjective norm in the model aiming to increase an understanding of user adoption behavior. TAM2 also examines the role of impact moderation of experience toward correlation between subjective norms and perceived usefulness, and between subjective norm and behaviour intention. TAM2 also examines the role of impact moderation of voluntariness of correlation between subjective norms and behavior intention.

Research conducted by Taylor and Todd (1995) compare non-decomposed TAM with decomposed TPB (Theory of Planned Behavior) to assess which the best model is proper to help understanding the use of information technology. The decomposed model is divided into four blocks, i.e. the model that show: (1), behaviour, (2) attitudinal belief structure, (3) normative belief structure, and (4) behavioural control belief structure. The results indicate that the three compared models show the fit model which is expected to explain the behavior. Subjective norm either in non-decomposed or decomposed TPB suggests that there is significant influence on behavioral intention. Thus, subjective norm is an important determinant of behavioral intention.

Research conducted by Malhotra and Galletta (1999) includes social influences ie. Compliance, identification, and internalization in the original model (Davis, 1989 and Davis et al., 1989). The overall findings of this study suggest that social influences play an important role in determining the acceptance and usage behavior of information technology. However, a direct path between social influence and behavioral intention indicates that there is no significant correlation. In contrary, research conducted by Venkatesh and Davis (2000) show that subjective norm significantly affects perceived usefulness through internalization and identification of behavioral intention. In addition, subjective norm also has direct impact on behavioral intention for mandatory but not for voluntary. Srite's study (2006) shows that there are significant correlation between subjective norm and behavioral intention for Chinese samples, but there is no significant correlation between subjective norm and behavioral intention for the United States samples. Thus, the hypothesis is expressed as follows:

H_6: Subjective norm will have positive effect on behavioral intention.

2.3. Technology Acceptance Model (TAM)

TAM has been well known in the field of information system research. The correlation between perceived ease of use and perceived usefulness and impact on behavioral intention has been investigated and supported by many studies on TAM (eg. Davis, 1989; Venkatesh and Davis, 1996). Davis (1989) is the first researcher who builds the measurement of TAM variables. Research conducted by Davis (1989) means to develop and legalize new measurement scale for

the variables of perceived usefulness and perceived ease of use which is hypothesized to be fundamental determinant of user acceptance. The results show that perceived ease of use affects perceived usefulness, and these two variables affect the user's behavioral intention to use information technology systems.

Although both variables of perceived usefulness and perceived ease of use statistically have significant impact on behavioral intention variables, research conducted by Davis (1989) shows that perceived usefulness more significantly influences behavioral intention than perceived ease of use. This phenomenon indicates that although the technology is easy to use, it will be less useful or not helpful to improve the job performance. Hence, the ease of use is not relevant consideration for the user. Research conducted by Chau and Hu (2002) also support this phenomenon in which the results show that the correlation between perceived ease of use and perceived usefulness is not significant. Chau and Hu (2002) investigate the telemedicine technology acceptance decisions by individual physicians for health services in Hong Kong. The result means that the doctors do not consider technology as useful thing because it is easy to use.

Davis (1989) states that perceived ease of use directly affects perceived usefulness. In other words, if someone feels that the system is easy to use, then that person will consider the system being useful. For those who consider that this dimension is high, the correlation between perceived ease of use and perceived usefulness is expected to be stronger than for those who consider that this dimension is low. This is caused by these people will get benefit from higher system if it is easy to use. However, study by van der Heijden (2004) who examines the influence of perceived ease of use as a strong predictor of perceived usefulness compared to hedonic system shows no significant influence on behavioral intention. Thus, perceived ease of use is an important variable in developing information systems, but it will be more important if hedonic information system is developed. Thus, the hypotheses can be stated as follows:

H_7: Perceived ease of use will have positive effect on perceived usefulness.
H_8: Perceived ease of use will have positive effect on behavioral intention.
H_9: Perceived usefulness will have positive effect on behavioral intention.

3. Research Method

The population of this present study is the ERP system users in companies that have adopted ERP system in Indonesia. The data are taken from one of ERP vendors and internet. The questionnaire is made in the form of website and sent to the contact person at several companies via email. For East Java region and its surroundings, the questionnaires are directly delivered and given to the contact person at companies that apply ERP system. The amount of delivered questionnaires is 469 and 229 questionnaires was responded. The ineligible questionnaires are 41, so the used questionnaires are 188.

The targeted respondents of this research are the managers at all levels ranging from lower managers, middle managers, and top level managers for all departments/functions. The age of the respondents is ranging between 25-49 years as many as 87% and dominated by male users is 73%. Moreover, the users from undergraduate level are 75% and the duration of the ERP system ranging between 2-5 years is 58%.

The question items for all variables in this research are adapted from the previous research except the subjective norm developed independently. Five items of uncertainty avoidance are adapted from Dorfman and Howell (1988). Three items of perceived enjoyment are adapted from Davis et al. (1992). Four items of subjective norm are developed from Fishbein and Ajzen (1975). TAM variables are adapted from Davis (1989) consisting of six items of perceived usefulness and perceived ease and three items of behavioral intention. All the questionnaire items are measured by using Likert scale with five response options; the lowest response is given point 1 and the highest is given point 5.

4. Results and Discussion

4.1. Data Analysis

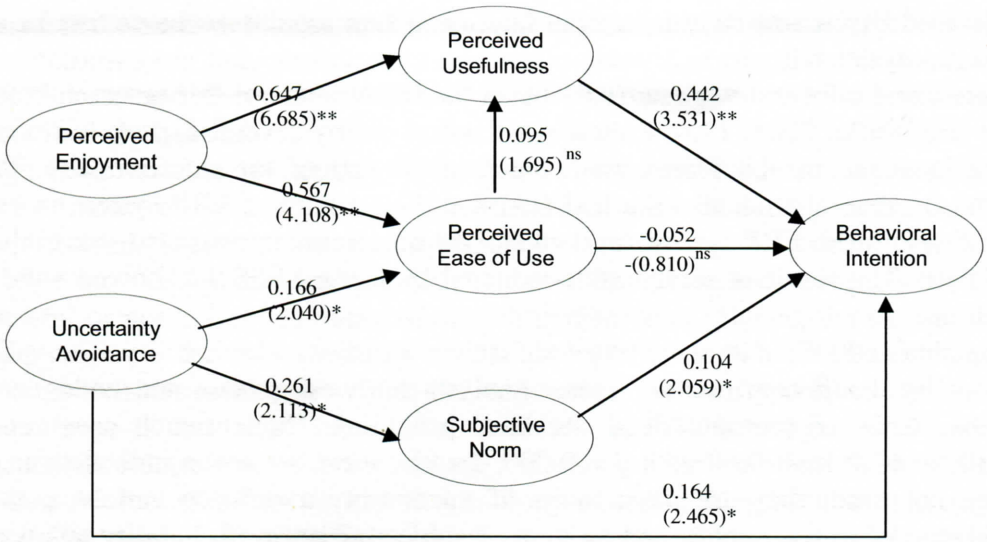
Pretest and pilot test were carried out on the instruments of this research before making a field test (Jogiyanto, 2008: 145). Pretest was carried out by several experts to review the use of Indonesia language in accordance with the original text of the questionnaire. Pilot test was carried out on several students who had attended the training of ERP system in campus which had been dealing with ERP system vendors and the questionnaire was also sent to the mailing list users of ERP. The result of pilot tests conducted by using SPSS 12 showed valid and reliable constructions.

The obtained field data were retested for their validity and reliability. The validity test was carried out by using confirmatory factor analysis both exogenous and endogenous variables assisted by Amos 16 (computerized statistical program). This research uses cut-off value of loading factor of at least 0.60 with p = 0.000, thereby there are seven indicators in this research which are not used; they are three items of uncertainty avoidance variables, three items of perceived ease of use variables, and an item of subjective norm. Reliability test was carried out by using SPSS 12 with cut-off Cronbach's alpha at least 0.70. The result indicates that reliability value of this study is relatively good because the total value of Cronbach's Alpha is not under 0.70. In addition, the assumption is also made on the sample size, normality, outlier, multicolinearity and singularity. The research model testing was in SEM (Structural Equation Modeling) assisted by Amos 16, the results show that this research is relatively fit that can be seen in Table 1 and the research model can be seen in Picture 1. SEM is used in this research in considerations of (a) the simultaneous causal path can be tested all at once; (b) the ability of SEM in joining latent variables in the analysis; and (c) SEM results a model (Hair et al., 2006: 711-713).

Tabel 1. Compatibility Index of SEM

Index	Recommendation Value	Observation Value	Description
Chi-Square (χ^2)	Expected to be small	290.241	χ^2 with df = 159 is 189
Significance of Probability	≥ 0.05	0.000	Not so good
RMSEA	≤ 0.08	0.066	Good
CMIN/DF	≤ 2.00	1.825	Good
TLI	≥ 0.90	0.915	Good
CFI	≥ 0.90	0.929	Good

Figure 1 shows the estimate and critical ratio of the hypothesis testing of the proposed research model. The first hypothesis (H_1) is significantly supported by the estimate of 0.647 and the critical ratio of 6.685 ($p < 0.001$). These results indicate that perceived enjoyment has positive and significant effect on perceived usefulness. The second hypothesis (H_2) is significantly supported by the estimate of 0.567 and the critical ratio of 4.108 ($p < 0.001$). These results indicate that perceived enjoyment has positive and significant effect on perceived ease of use. The third hypothesis (H_3) is significantly supported by the estimate of 0.166 and the critical ratio of 2.040 ($p < 0.05$). These results indicate that uncertainty avoidance has positive and significant effect on perceived ease of use. The fourth hypothesis (H_4) is significantly supported by the estimate of 0.261 and the critical ratio of 2.113 ($p < 0.05$). These results indicate that uncertainty avoidance has positive and significant effect of subjective norm. The fifth hypothesis (H_5) are significantly supported by the estimate of 0.164 and the critical ratio of 2.465 ($p < 0.05$). These results indicate that uncertainty avoidance has positive and significant effect on behavioral intention.



*p < 0.05; **p < 0.001; ns=not significant

Figure 1. The Result of Hypothesis Testing

The sixth hypothesis (H_6) is significantly supported by the estimate of 0.104 and the critical ratio of 2.059 ($p < 0.05$). These results indicate that subjective norm has positive and significant impact on behavioral intention. The seventh hypothesis (H_7) is not supported by the estimate of 0.095 and the critical ratio of 1.695 (ns). These results indicate that perceived ease of use has no positive and significant impact on perceived usefulness. The eighth hypothesis (H_8) is not supported by the estimate of -0.052 and the critical ratio of 0.810 (ns). These results indicate that perceived ease of use has no positive and significant impact on behavioral intention. The ninth hypothesis (H_9) is significantly supported by the estimate of 0.442 and the critical ratio of 3.531 ($p < 0.001$). These results show that perceived usefulness has positive and significant impact on behavioral intention. In addition, the results of testing the direct influence of perceived enjoyment on behavioral intention and the influence of uncertainty avoidance on the perceived usefulness have no influence between these variables.

4.2. Discussion

This research proves the concept of theoretical and empirical research underlining Hwang (2005) that supports the important role of perceived enjoyment (self-control) and uncertainty avoidance (control culture) functioning as an informal control in ERP systems implementation. There are four things that need to be discussed from the result of this research. First, perceived enjoyment on perceived usefulness has stronger effect than perceived ease of use on perceived usefulness. The findings of this study support the research of Yi and Hwang (2003) and Hwang (2005) which indicate that the perceived ease of use does not significantly affect the perceived usefulness. This phenomenon indicates that enjoyment has more dominant determinant of usefulness than the ease of use. Enjoyment is self-control and an intrinsic factor of user motivation in accepting and using ERP systems. Thus, this shows that the ERP system are pleasure and useful to users and they will intend to receive and use the ERP system.

The second thing that is necessary to be discussed is the influence of perceived ease of use on behavioral intention which is not significant. The finding of this study reinforces the finding of the first discussions showing that perceived ease of use is not a determinant factor of acceptance of information technology. These results also prove the research of McCoy et al. (2007) which states that the TAM model may not be applied to people who have high power distance value based on Hofstede's study (1980). Power distance value of Indonesia is 78, it means that Indonesia have higher power distance value than the average power distance value of

71 in Asian countries and 40 in U.S. Both findings above are not in line with the theory of TAM (Technology Acceptance Model) which states that the ease of use is a determinant factor for perception usefulness and behavioral intentions (Davis, 1989; Davis et al., 1989). This is probably caused by the complexity of an ERP system involving many users integrated together, so the ease of use is not a determinant factor intention for users to accept and to use the ERP system but rather on the benefits of this system.

The third discussion dealing with the result of uncertainty avoidance indicates a positive influence on ease of use and the result is consistent with the research of Hwang (2005) and Srite (2006). Unlike with the influence of uncertainty avoidance of the behavioral intention showing a significant influence, this result is not consistent with the findings of Hwang (2005). Similarly, the influence of uncertainty avoidance of subjective norm result is a significant, but this result is not consistent with the findings given by Srite (2006) both for the China and the United States samples. It means that uncertainty avoidance is an influential cultural control either directly or indirectly to the behavioral intention through the subjective norm. Therefore, this phenomenon shows that the uncertainty avoidance cultural control of ERP system implementation affects the users' intention to accept and to use the ERP system whether through or not the encouragement of people in the company.

The fourth or the last discussion in this research relates to the subjective norm of subjective norm results indicating a positive influence on behavioral intention. Research conducted by Schepers and Wetzels (2007) shows that subjective norm has a greater influence on behavior intention than Western studies, but several studies on non-Western cultures reveal a stronger influence of subjective norm on behavioral intention. These findings reinforce the influence of subjective norm on behavioral intentions in non-Western countries. Furthermore, this research also examines the influence of subjective norm on perceived usefulness, but it shows insignificant results. This finding is inconsistent with the research of Kim et al. (2009) and views on the cultural dimensions of Hofstede (1980) who considers Indonesia as a civilized nation which has high collective value and high power distance where people opinions have greater impact to individual. Consequently, the role of subjective norm to the variables of acceptance information technology is still mixed.

4.3. Conclusion

This study aims to prove the theoretical and empirical concepts underlining Hwang's research (2005) by adding subjective norms in the model. This study obtains empirical evidence regarding the acceptance of an ERP system from users in Indonesia in terms of aspects of self-control and cultural control. Both of these informal controls perceive enjoyment as self-control and uncertainty avoidance as cultural are correlated to the variables of technology acceptance by adding subjective norms in the model to investigate the correlation between these variables. The results of this study support and prove the theoretical and empirical concepts underlining the research proposed by Hwang (2005) but they are inconsistent with the theory of TAM (Davis, 1989; Davis et al., 1989) and this study proves what has been proposed by McCoy et al. (2007) and the role of subjective norm is still mixed.

For the researchers, these findings indicate that there are differences in technology acceptance by users of ERP business system with the other users. The users of TAM model are not supported in this research, but this study supports the research conducted by McCoy et al. (2007). Further researches should focus on other business systems in order to understand the technology acceptance decisions by users and provide additional empirical support from research findings. Furthermore, new variables can be added in the model which may produce additional correlation which are necessary to be tested theoretically and empirically, so that the results can be considered to be applied in the environments of different cultures. A longitudinal investigation is also needed to test the important changes in the key factors of technology

acceptance. Reevaluating the instruments, creating a new instrument, and or modifying an existing are conducted in order to convince the appropriateness with the context and the targeted user groups. It is expected that the findings can improve the understanding of causality between variables in important decisions and the differences between the technologies used by individual professionals, and users of system and business managers.

For practitioners, one way of managements to participate in the success of ERP system implementation is to consider the important role of the factors of informal control. Enjoyment and uncertainty avoidance are the determinants of technology acceptance decisions for the users. Another determinant factor is the use of the system. In this case, positive perceptions about the benefits of ERP systems need to be spread and communicated since in the beginning of the system implementation. Communication and dissemination of positive perceptions can be done through the key persons who can encourage the implementation of ERP system.

There are several limitations in this research. First, caution is needed to generalize the results of this research into other technologies, users of other systems, or other environments. This research applies only specific business technology, specific user group, and specific geographic area. Second, it is difficult to know the number of population because there is no database of ERP system users whose numbers vary in each of the companies that have implemented ERP system in Indonesia. Data owned by companies which have implemented ERP system are only available from one vendor in Indonesia because it is a secret thing in a company. In addition, the data are also taken from Internet.

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