THE DEVELOPMENT OF PRODUCTIVITY PERFORMANCE MODELS: BASED ON SELF-EFFICACY, TRUST, SYSTEMS QUALITY, AND INFORMATION QUALITY. STUDY ON INFORMATION SYSTEMS OF PT PINDO DELI PAPER PRODUCTS

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Abstract

This research proposes a development model that explains productivity performance impacts of IS at the individual level. This research aims to test productivity performace's model by adding new constructs such as self-efficacy, trust, system quality and information quality as well as analyze the causality impact among variabels of productivity performance's model in PT Pindo Deli Paper Products. The sample used were 265 respondent. The results show that all variabels in this research have significant impact to productivity performance. This development model can gain a fuller understanding of IS-productivity performance impact not only by using the IS and nature of IS use but also by including self-efficacy, trust, system quality and information quality. The theoritical contribution of this research lies in the development of a model for productivity performance impact of IS that have significantly higher explanatory power than the existing models.

Keywords: Productivity performance models, nature of IS use, self-efficacy, trust, system quality, information quality.

1. INTRODUCTION

Research Background

The development of technology innovation has triggered the entity of either business or non business in utilizing a certain feature of technology for supporting its activities in every detail. Invest in advanced technology has an expectation that it will provide potential benefit either for individual or group of organization, and either direct or indirect impact (Jain and Kanungo, 2005). The impact of using technology will vary based on respective user. The success can be measured from the rate of information system use, the characteristics of the users, and the nature of information system use. The success of an information system is not only supported by the use of the system, but also demanded compliance with the work environment and the user needs of information system.

The internal and external factors become the decisive factors which determine the success of information system use. Internal factor such as the trust toward system and self-efficacy, determine in influencing individual behavior in using information system. Each individual has respective personal factor which is different from that of others so the performance result that is achieved will be different from each others. External factor of information system use such as system quality and information quality have major influence on which supports productivity performance. This aspect affects someone's cognitive side in using information system which make their work more efficient and effective.

Davis (1989), shows that information system performance is often distorted by users behavioural, because the users cannot accept and resistant to use a system. Some researchers such as Jain and Kanungo (2005) and Goodhue and Thompson (1995) have done researches which show that there is a correlation between information system use and the increase of productivity performance at individual level. Lucas and Spitler (1999) have shown a different result, that negative correlation between both things. DeLone and McLean (1922) conduct a research on information system success model. This model represents system quality and information quality affects system use to individual and organization performance.

Jain and Kanungo (2005) develop a construct of nature of information system use which influence to the increase of productivity performance. According to them, researcher interested in testing various factors which influence information system use and impact to productivity performance at individual level. This research will develop previous study by considering self-efficacy, trust, system quality and information quality, which is used to obtain empirical evidence, which aims to demonstrate the depth of the influence of personal and external factors of information systems use. This study changes the quality concept of DeLone and McLean (1992) into the concept of productivity performance Jain and Kanungo (2005). It aims to encourage the impact of system quality and information quality in increasing productivity performance at individual level. In addition, this study adds self-efficacy and trust as a control variable.

2. LITERATURE REVIEW

Information Technology System

Information system is defined as regular combination of individuals, hardware, software, communication network, and data resource. This combination is able to collect, change the data, and spread the information to the user (Brown et al.,2009). Oxford (1995) defines information technology as the use of electronic devices, especially computer in saving and analyzing information. Every ease has things to do with personal behavior. Information system success can be measured from the system quality and the user acceptance toward this system. A system is used in order to improve productivity performance in an organization, efficiency and effectiveness in an organization.

Productivity Performance Models

Productivity Performance is developed by Jain and Kanungo (2005). The result shows that there is causal and effect correlation between information system uses, the nature of information system use toward the improvement of productivity performance. This model is mainly concerning on the system use analysis which gives impact toward the work productivity in individual level of system users. The research's result is a model called IS-Enabled Productivity's Performance Model.

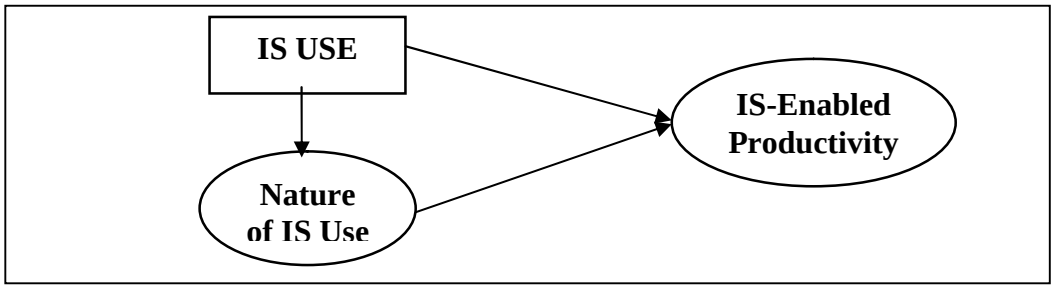

Figure 2.1 Productivity Performance Models

Source: Jain dan Kanungo (2005)

Information System Use

Information systems use is defined as the utilization of information systems by individuals, groups, or organizations. Information systems use is a major variable in numerous studies in the field of information systems. Davis (1989) stated that in order to gain benefit from information systems, at least this information system must be initially used. Therefore, there is a consensus among researchers that information system use affects in performance (Davis, 1989) and (Straub, 1995).

Nature of IS Use

Nature of IS Use is defined to be the degree to which a person differs from others in the way he or she uses a particular information system. Jain and Kanungo (2005) states that the purpose of nature of information systems use construct is to capture the differences across people in the way they use information systems. Agarwal (2000) stated that the differences nature of information system lies on how individuals use and utilize technology. Each individuals have different characteristics and always eager to innovate in exploring the use of technology so that the characteristics of each individual will vary and change over time.

IS-Enabled Productivity

IS-Enabled Productivity is an indicator whether the gain of the task meets the expectation or not. IS-Enabled Productivity is the higher performance achieved by the use of information systems. This includes increasing the efficiency and productivity of individual performance (Goodhue and Thompson 1995). Productivity performance was assessed in terms of individuals and the organization, as a tool to evaluate their work. This study focuses on the productivity performance at the individual level, especially productivity that is generated by the individual users of information systems. Jain and Kanungo (2005) states individu who use information system can complete tasks more quickly or may be able to do their job better or improve the quality of their work rather than not using information systems.

DeLone and McLean of Information System Success Model

The model of information system success is developed by DeLone and McLean (1992). The result shows that the success of information system can be represented by system quality, information quality, use, user satisfaction, individual impact, and organizational impact. Based on the model of DeLone and McLean (1992), this research takes two causal and effect correlations between system quality and information quality toward the use of information system. This research changes the quality concept of DeLone and McLean (1992) into productivity performance concept which is adopted from Jain and Kanungo's research (2005).

System Quality

System quality is the individual's perception of the system's performance (Freeze et al., 2010). According to DeLone and McLean (1992), system quality is defined as a characteristic inherent in the system itself. System quality is a combination of hardware quality and software quality in information systems. The combination can describe the extent of the hardware, software, policies, and procedures of information systems to meet the users need.

Information Quality

Information quality is needed to measure the quality of the system information's output. This information quality indicates the quality of the products produced by the information system (Hartono, 2007). Research conducted by Freeze et al. (2010), measuring information quality is more focused on the accuracy of the information, completeness, relevance, the required content, and timelines.

Trust

Trust represents the cognitive structure which is developed by individual after doing a certain process, information gathering, processing information about information system and including individual assessment from various results which is pertaining to the use of information system (Agarwal, 2000). Trust is required by information system user to make him more certain that information systems use will be able to assist him in carrying out the task and to improve individual performance.

Social Cognitive Theory

Social cognitive theory is a theoretical framework to analyze individual motivations, thoughts and actions that reflect an interaction between events, personal and behavioral factors. Social cognitive theory based on the premise that environmental influences such social pressures or unique situational characteristics, cognitive, personal factors include personality and demo graphic characteristics, and behaviors (Hartono , 2007).

The main concept of social cognitive theory in this research is self-efficacy, which can be understood as a belief in one's ability to do something. Self-efficacy is a belief in someone's ability to perform a certain behavior. Self-efficacy affect the choices of doing the behavior, effort and persistence to deal with the obstacle. Bandura (1986) defines self-efficacy as a human considerations about his abilities to organize and carry out a set of planned activities. Computers sel-efficacy represent individual perceptions about the ability in using computers to complete a task, instead of reflecting the components of expertise. The concept of self-efficacy show someone's identity who is confident in his ability to do something and mastering the task.

Research Model

This research model is the development of previous research by Jain and Kanungo (2005) that examined information systems use to increase the productivity of individual performance. This study changed the concept of quality DeLone and McLean (1992) to the concept of productivity performance.

In addition, this study adds the variable of self-efficacy and trust as a control variable which is expected to influence information system use so that the individual productivity performance can be gained.

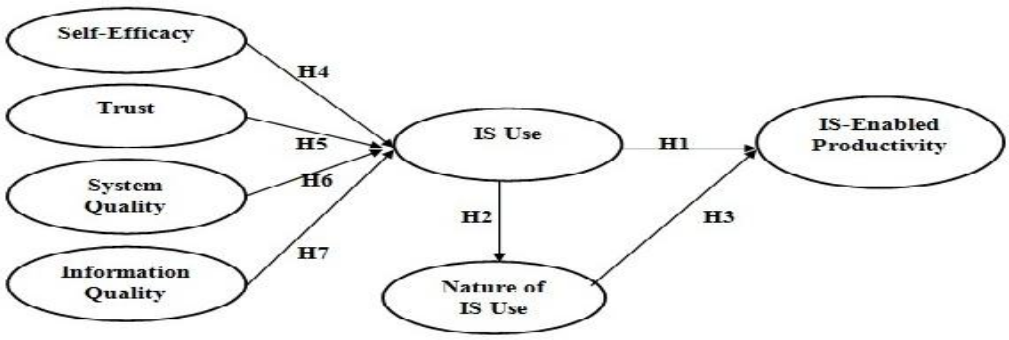

Figure 2.2 Research Model

Hypothesis

1. **Information System Use to Productivity Performance**
   Information system use is a behavior for realizing the target of productivity from the use of a certain information system. Any sophisticated information system will not provide any benefits when it is not used. Productivity gains will appear later when individual interacting or using the information system. Some researchers like Jain and Kanungo (2005) and Goodhue and Thompson (1995), conduct research which the results show that there is positive correlation between the use of information system and the increase of work productivity in individual level.

   H1: There is a positive correlation between the information system use and productivity performance.

2. **Information System Use to Nature of Information System Use**
   Jain and Kanungo (2005) states that the purpose of nature of IS use's construct is to capture the differences in the way each person using information systems. The time spent by users of information systems to manipulate the system as studied short cuts, use a new function, use the software in a different way to get the job done, can determine the level characteristic of information systems use for each user. In short we can say that users are more likely to use information system will have more experience in using a variety of information systems applications.

   H2: There is a positive correlation between information systems use and nature of information systems use.

3. **Nature of Information System Use to Productivity Performance**
   Productivity performance is a function that is not only measured by how much time on utilizing the system, but also how users use the system. Individual, who is more intensive in exploring the functions of information systems, will be trained and experienced in optimizing the function of the system. These individuals easily find new effective ways in the completion his tasks. Therefore, the productivity performance increases when an individual use information systems efficiently and effectively.

   H3: Nature of information systems use positively influence to productivity performance.

4. **Self-Efficacy to Information System Use**
   Individual who has higher self-efficacy is proved using computers more frequent than others. The greater the level of someone's self-efficacy the more often he/she interacts using information systems. This is supported by Fagan et al. (2003) which found that self-efficacy has a positive effect on the use of computers.

   H4: Self-efficacy positively influence to information systems use.

5. **Trust to Information System Use**
   Trust is required by the user information system to make it more certain that information systems use will be able to assist him in carrying out the task and to improve individual performance. Each individual will behave depending on the application software to do its job because the individual believes that the system can help him in completing tasks. Jumaili (2005) and Hidayat (2010) research shows the a positive relationship between trust and use of information systems

H5: Trust positively influence to information systems use

6. **Systems Quality to Information System Use**
   According to Davis (1989), external factor can indirectly affect a person's attitude toward the behavior, by affecting a person's beliefs about the consequences of doing the behavior. If the systems available have poor quality, the system response will be very slow, so the user will not use the system. It just waste time and do not provide much benefit to him. Freeze et al. (2010) support the concept that system quality has a positive influence on information systems use.

   H6: System quality positively influence to information systems use

7. **Information Quality to Information Systems Use**
   Individuals tend to be more confident and believe in the information system if the information quality produced is good. Individuals will often use information systems in order to further improve the results of their work. The higher the information quality produced by an information system, the higher the system is used. DeLone and McLean (1992) and Freeze et al. (2010) showed a positive relationship between the information quality and information systems use.

   H7: The information quality has a positive effect on information systems use.

3. RESEARCH METHODS

Population and Sample

Research population is all users of PT Pindo Deli Paper Products systems information. Sampling technique used in this study is purposive sampling, selecting sample groups which already understand research objects. There are sample criteria used in this study:

1. Respondents have been using the application of SAP at least for one year.
2. Respondents have a direct interaction with the transaction process as well as using information output.

Techniques of data collection used in this study are survey. The used instrument is a questionnaire. The measuring instrument is Likert scales.

Methods of Data Testing

The data testing is performed with two ways of testing, namely validity test and reliability test. Good values of convergent validity analysis are seen from loading factor > 0.50 (Ghozali, 2008). Values of discriminate validity analysis are seen with comparing roots of variance average extracted (AVE) for each construct and correlations among construct. If the roots of the AVE value for each construct are greater than the correlation value among the constructs, the values of discriminate validity are good (Ghozali , 2008).

The reliability test intends to assess the extent of measuring instrument evaluating research instruments' stability and consistence (Hartono, 2008). The used method is a calculation of construct reliability values. The construct reliability values which are above 0.70 indicate good reliability, while reliability from 0.60 to 0.70 is acceptably provided with one condition that the validity of used indicators is good (Ghozali , 2008).

Structural Equation Model (SEM)

Hypothesis testing is completed with SEM in the software package of AMOS. SEM is a multivariate statistical technique combining and integrating multiple regression analysis (path analysis). SEM also possibly carries out an evaluation of overall performances of a model by checking all goodness of fit hypothesis models, compared with a singular test of individual coefficients as what multiple regressions do (Bagozzi, 1989). One hypothesis would be accepted if its probability value is smaller than the significance level. If the value of p is ≤ 0.05, the hypothesis is accepted; and if the value of p is ≥ 0.05, the hypothesis is rejected.

4. RESULTS AND DISCUSSION

Results of Chart Testing

Data were collected from 265 respondents or 66% of the total distributed questionnaires. Based on these data, the causal flowcharts between constructs, indicators, results of the model measurement and testing can be illustrated in Figure 4.1. The flowchart consists of 7 constructs and 26 indicators.

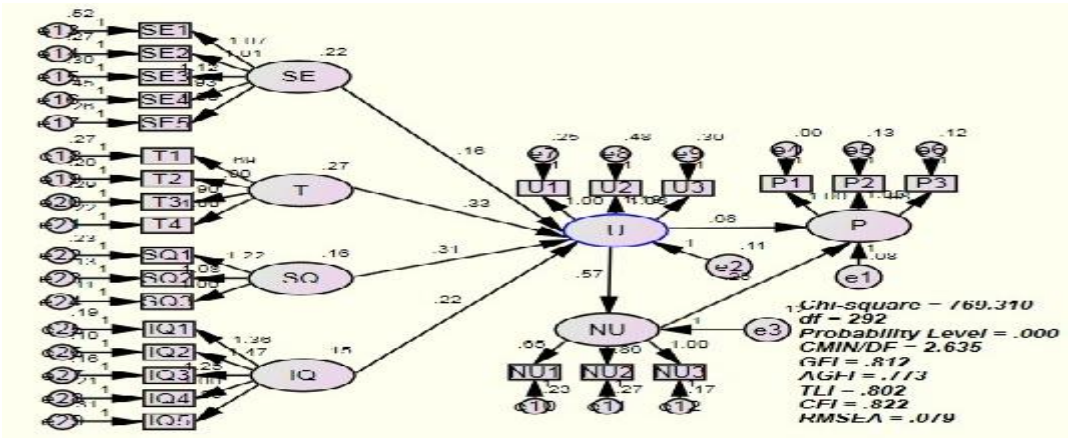

Figure 4.1 : Results of Model Testing of Causal Diagram Flowchart

Results of Validity and Reliability Test

Based on the result of validity test in Table 4.1, the data shows that the value of convergent validity from the total indicators is greater than 0, 50. Therefore, the convergent validity of this study is excellent. The test results of discriminate validity indicate that the productivity variables, system and information quality have a very good discriminate validity value ≥ 0.70. The results of reliability test indicate that the tested constructs have reliable indicators. It is reflected in the reliability value of each construct which is greater than 0.60. Therefore, all constructs in this study is valid and feasible to use.

Table 4.1 Result of Validity and Reliability Test

	Convergent Validity	Discriminate Validity	Reliability Construct
Productivity	2.411	0.804	0.846
Use	1.848	0.617	0.647
Nature of IS Use	1.793	0.604	0.628
Self-Efficacy	3.152	0.633	0.768
Trust	2.669	0.671	0.764
System Quality	2.259	0.753	0.797
Information Quality	3.613	0.732	0.849

Result of Goodness of Fit Index

The result of goodness of fit index model SEM in this research is as follows:

Table 4.2 Result of Goodness of Fit Index

Criteria	Critical Value	Model Result	Note
Chi-Square (χ2)	Expected less	769,310	*Fit*
CMIN/DF	≤ 3,00	2,635	*Strong Fit*
GFI	≥ 0,90	0,812	*Medium Fit*
AGFI	≥ 0,80	0,773	*Medium Fit*
TLI	≥ 0,90	0,802	*Medium Fit*
CFI	≥ 0,90	0,822	*Medium Fit*
RMSEA	≤ 0,08	0,079	*Strong Fit*

Based on Table 4.2, the results of this study are categorized to *medium fit* and *strong fit*. It means that this research has good suitable index.

Result of Hypotheses Tests

Result of the data analysis towards hypothesis test in this study is briefly described in Table 4.3.

Table 4.3 Result of Hypothesis Test

H	Causality	Prediction	Estimation	S.E.	C.R.	P	Conclusion
H1	P <--- U	Positive	0.678	0.102	6.623	0,000	Supported
H2	NU <--- U	Positive	0.572	0.097	5.874	0,000	Supported
H3	P <--- NU	Positive	0.253	0.104	2.429	0,015	Supported
H4	U <--- SE	Positive	0.158	0.071	2.222	0,026	Supported
H5	U <--- T	Positive	0.325	0.078	4.163	0,000	Supported
H6	U <--- SQ	Positive	0.312	0.084	3.728	0,000	Supported
H7	U <--- IQ	Positive	0.22	0.095	2.324	0,020	Supported

Based on Table 4.3, it can be concluded that the results of the entire tests of hypotheses are significant and supported. It can be viewed that all p-values are smaller than the confidence level 0.05, so all hypotheses are significantly proved.

Information System Use to Productivity Performance

Result of hypothesis test 1 (H1) in Table 4.3 shows the value of 0.678 with a p-value of 0.000, less than 0.05. Results of this study indicate that higher uses of information systems are proven to increase performance of individuals using the system. It is caused by users' increased ability along with the increasing the systems use. Therefore, the users will be more efficient and effective in carrying out their duty. These results support Jain and Kanungo's research (2005) and Goodhue and Thompson (1995) who found that there is a positive relationship between information systems use to productivity at the level of individual performance.

Information Systems Use to Nature of Information System Use

Result of hypothesis test 2 (H2) in Table 4.3 shows the value of 0.572 with the p-value 0.000, less than 0.05. It shows that the users utilizing the SAP application systems tends to be experienced as they more often interact and exploit various existing service. Therefore, the users are more successful and outstanding than others in use of information systems. These results support the research conducted by Jain and Kanungo (2005) and Hidayat (2010) who found that there is a positive relationship between information systems use with nature of IS use.

Nature of Information System Use to Productivity Performance

Result of hypothesis test 3 (H3) in Table 4.3 shows the value of 0.253 with p-value 0.015, less than 0.05. This result indicates that experienced users using the application of information systems tend to be more familiar and easier to interact with a wide variety of existing service. Therefore, users are more efficient and effective than others in using information systems in order to increase their productivity. These results support the research conducted by Jain and Kanungo (2005) which indicates that there is a positive relationship between nature of IS use on productivity performance.

Self-efficacy to IS Use

Result of hypothesis test 4 (H4) in Table 4.4 shows p-value 0.026, less than 0.05. Self-efficacy in the operational information system has a positive influence on the level of use of information systems. This is reflected in the behavior of individuals who believe that he has a sufficient capability in operational information systems, so that individuals will be more likely to optimize information systems use to complete tasks. These results support the research conducted by Fagan et al. (2003). The results of this study indicate that the level of self-efficacy proved to further enhance information systems use.

Trust to Information Systems Use

Result of hypothesis test (H5) in Table 4.3 shows the value of 0.325 with p-value of 0.000, less than 0.05. This result showed that higher level of individuals' trust on information system increased the use of information systems. This is reflected by individuals who are confident to deal with the information system being dependent on the application. They believe the information systems could assist their tasks.

These results support the research conducted by Jumaili (2005) and Hidayat (2010) who found that there is a positive effect of trust on information systems use.

System Quality to Information Systems Use

Result of hypothesis test (H6) in Table 4.3 shows the value of 0.312 with p-value of 0.000, less than 0.05. This study result shows that the qualified information systems improved the use of the information system. The systems which meet the availability standards, response speed, and simplicity will be more interesting for the user to explore the available facilities. These results support the research conducted by Freeze et al. (2010) who found that the quality of a system is a positive influence on information systems use.

Information Quality to Information Systems Use

Result of hypothesis test (H7) in Table 4.3 shows the value of 0.220 with p-value of 0.020, less than 0.05. It shows the increasing information systems use is influenced by the users' trust on the quality of its results. This indicates that the users of information systems are more motivated to use the system information if that information system can give superior outputs. The better the quality of information produced by system, the higher the level of information systems use. These results support the research conducted by Freeze et al. (2010).

Research Findings

Information system use remains an important benchmark of productivity models. The shift from the manual task completion to the computerised task has accelerated the improvement of the employees' productivity. More uses of the information systems will improve their understanding to the system. They easily operate the application are available and find more effective and efficient ways to complete each task.

In general, this research model is better than the main model developed by Jain and Kanungo (2005). This study model changed the quality model of DeLone and McLean (1992) to the model of productivity performance. Therefore, this model can explain in-depth the construct of productivity performance by introducing two important aspects, namely aspects of the individuals' behavior (self-efficacy and trust) and external aspects (system quality and information quality), that further reinforce improved productivity performance. Development productivity performance model shows that increased productivity performance is not enough in terms of the use and nature of system use, but also involving aspects of self-efficacy, trust, system quality and information quality.

5. CONCLUSION

This study aims to examine the development of productivity model on self-efficacy, trust, systems quality and information quality. In addition, this study also examined the effect of self-efficacy, trust, systems quality and information quality, information systems use, and nature of information systems use towards productivity performance. The study found that the development of productivity model was proved fit and significant in line with its correlation variables. The development productivity performance model in this study had a good fit value. User's behavior in the SAP information system applications PT Pindo Deli and Paper Products showed a positive attitude towards information systems use. The use of such applications may reflect an increase in the productivity of their performance.

Research Implications

This result contributes to PT Pindo Deli Paper Products. Especially, it helps the information system manager in determining the behavior of the information systems users and the impact of the use of SAP information system application on the users' productivity. It also assists the manager in evaluating and designing appropriate strategies to optimize the use of SAP. In the academic field, the results specifically contribute in the theoretical development of productivity model.

Research Limitation

The sample of this study is limited to PT Pindo Deli Paper Products, so the results cannot be generalized. In addition, the object level of SAP system application in PT Pindo Deli becomes the main limitation of the research. It is caused by the level of SAP as an obligatory internal company system.

Suggestion

For the company, the management is suggested to increase the company asset value with an improvement of system and information system. The productivity improvement could be reached if the management could encourage the users' performance with trainings on applications of the system. Further researcher on the similar interests are suggested to expand their sampling scope, objects, and constructs in supporting the development of productivity model, such as subjective norms and task technology fits.

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