



Determinants of SPAN's User Performance: Examination of Technology Performance Chain

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ABSTRACT

Integrated Financial Management Information System (IFMIS) is designed to improve accountability, transparency, and efficiency of the government financial management. The core of IFMIS in Indonesia is SPAN (*Sistem Perbendaharaan dan Anggaran Negara*). SPAN plays main role in organization process. SPAN supports job completion as well. This research links information system (SPAN) and individual performance. This study investigated the relationship among technology characteristics, task characteristics, Computer Self Efficacy (CSE), Task Technology Fit (TTF) and utilization toward SPAN's user performance. This was a causal explanatory research. Questionnaires were distributed to SPAN's users in Lombok Island and analyzed by partial least square (Smart PLS). Analytical results showed that technology characteristics and task characteristics had positive influences to TTF and TTF had positive influence of utilization.

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INTRODUCTION

Development of technology has encouraged changes in financial management. Traditional management has been replaced by the use of integrated information systems. The goal is to improve the accountability, effectiveness and transparency in the management of government financial transactions. World Bank and several countries have developed the *Financial Management Information System* (FMIS) for developing countries in supporting government financial management system reform. Up to August 2015, World Bank has funded 121 projects in 74 countries (World Bank, 2015b). In Indonesia, FMIS is implemented in Government Financial Management and Revenue Administration Project (GFMRAP). The project resulted as Sistem Perbendaharaan dan Anggaran Negara (SPAN), an integrated information system in the management of central government financial transactions (Kementerian Keuangan, 2013). Operating SPAN in Treasury Directorate General (DJPB) is located in 8 treasury directory units, 33 provincial

treasury offices and 181 treasury branch offices or KPPN (*Kantor Pelayanan Perbendaharaan Negara*). SPAN is fully operated since February 2015 by managing 100 percent of all government financial transactions of over 24,000 spending units in Indonesia (World Bank, 2015a).

In the first year of the implementation of SPAN, there were constraints such as non transferable data from former database to SPAN database, record duplication, different record with partner's database, limitation use of SPAN by schedule, display changes and regular maintenance of the system. This affected not only in difficulty of information systems, but also led to disruption of service and employee performance. As an integrated information system, SPAN is the business core in organization process. SPAN is used as a means of task completion either by individuals or organizations as a whole. Therefore, the use of SPAN is closely associated with the performance achievement of employees and organizations, it shows the significance impact of SPAN for both employees and organizations. The expectation for improving efficiency, accuracy,

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and accountability is very high. However, the ability of employees to operate SPAN is different. Individual ability in using information systems is affected by the ability to operate computer, the amount of participated training and the experience of similar applications use (Compeau and Higgins, 1995).

Goodhue and Thompson (1995) investigated relationship between success of information technology and individual performance with Technology Performance Chain (TPC) Model. Technology must be utilized and fit to user task, so technology will have positive impact to individual performance. Task Technology Fit (TTF) measure fit of right technology tool for task being performed. TTF does help to predict utilization. In TPC Model, technology characteristics moderate relationship between task characteristics and TTF (Hollingsworth, 2015). Examining the subset of TPC Model, Goodhue and Thompson (1995) found that antecedents of TTF are task characteristics and technology characteristics. TTF and utilization affect the individual performance (Goodhue and Thompson, 1995; Sunarta and Astuti, 2005; Rahmi, 2006; Susanti, 2006; Setianingsih and Supriatna, 2009; Weyai, 2012; and Maulina, *et al.*, 2015).

There is still inconclusive result utilization does not affect on performance (Rahmi, 2006), meanwhile some studies indicate otherwise. Computer Self-Efficacy (CSE) defines users' belief in their ability to use computer to accomplish their task (Compeau and Higgins, 1995). Considering CSE construct, Bani Ali (2004) in Mew (2009) combined CSE with TTF construct for examining project management software. Project management software is mandatory area, like SPAN. He found that there was positive relationship among CSE, use, and performance.

This study examined the relationship among task characteristics, technology characteristics, Computer Self-Efficacy, Task Technology Fit, utilization and performance. The aim of this research was to learn more about understanding the usage of information systems with TPC models. The addition of CSE variable can provide broader understanding of the model of TPC and its ability to predict the successful implementation of information systems.

The result of this research showed that the task characteristics, technology characteristics and CSE have significant impact on TTF. Moreover, TTF positively affects the utilization. Meanwhile, TTF, utilization and CSE become significant

predictor to the employee's performance. Being one of performance assessment component, SPAN is supposed to accommodate both fit tasks and technology.

The remainder of the paper is organized as follows. Firstly, introduction describes background and objectives. The second part consists of a literature review and hypothesis development. The next part illustrates research methods, operational definition of variables, sample collection and analysis method. The following part presents the result analysis and discussion followed by conclusions, implications, and limitations of the study.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Research focus on the relationship between information technology and individual performances are classified into the utilization and Task Technology Fit focus research. Utilization focused-research based on planned behavior theory. According to Theory of Planned Behavior (TPB), human behavior is guided by behavior belief, normative belief and control belief (Ajzen, 1991). TPB suggests if one believes that technology can increase his performance (behavior), he will use it actual behavior. It also states that technology characteristics affect one's behavior beliefs and affect on information systems which lead to the increase on its utilization. The uplift of utilization affects on performance impacts. Task technology fit focused-research states that task and technology characteristics create Task Technology Fit. TTF improve performance impact (Goodhue and Thompson, 1995).

A Technology Performance Chain (TPC) developed by Goodhue and Thompson (1995) is a model of the way in which technologies lead to performance impacts at individual level. TPC is a combination between utilization and TTF focused-research. TPC is designed to reduce the limitation of utilisation focused-research i.e. if the utilization is not on the basis of voluntary and when the enhancement of utilization does not longer improve individual performance. In addition, TPC model also overcomes the weaknesses of TTF focused-research. The model fit is not sufficient to predict the performance impact because in fact, technology must be utilized before giving any impact to performance.

TTF model has four constructs, task characteristics, technology characteristics which affect TTF which affect outcome construct, either utilization or performance (Dishaw, 2002). Tasks are broadly defined as the actions carried out by individuals in turning inputs into outputs. Technology is a tool used to support the task completion. TTF is the degree to which a technology assists an individual in performing his or her portfolio of tasks. Individual characteristics (experience, training, motivation) influence a person to use technology. The antecedents of TTF are the interactions between task, technology and individual. Technology should be utilized and fit for the task to give greatest net benefit. Information technology will be used if it does not give sufficient advantages. Utilization is the condition when people use technology. Utilization is influenced by beliefs in the consequences of use, effect upon use and social norms. Technology implementation that meet the TTF and the belief that the system is more efficient, useful and advantageous, will encourage utilization. Utilization and TTF gives impacts on individual performance (Goodhue and Thompson, 1995).

The task completion in DJPB uses information systems especially SPAN applications. Task characteristics reflect nature and types of tasks that require the technology assistance. TTF is a fit between task and technology used. Maulina *et al.* (2015) showed that the higher task characteristics, the higher TTF among users. Susanti (2006) proved that task characteristics are the predictor of TTF. To do the job, employees will increase using information technology to get the latest data. If task characteristics is in accordance with the principals, task completion can be reflected properly. It will have a positive impact on TTF.

H₁: Task Characteristics are positively associated with Task Technology Fit.

Organizational support is important in providing information technology to improve organizational performance. Organizational changes must be made to meet challenges of the external environment and globalization, including changes in information technology. Changes in the Ministry of Finance are started from manual management, the management of the local database, so that SPAN is a financial information system that utilizes web-based technologies.

The higher technology characteristics, the higher Task Technology Fit (Maulina *et al.*, 2015).

Goodhue and Thompson (1995) states that the technology characteristics significantly affect four of eight TTF dimensions. A similar study conducted by Susanti (2006), technology characteristics affect the TTF. Characteristics of information technology that can be applied properly, such as user friendly, provide information quickly, Stable technology with rapid innovation also enhances TTF.

H₂: Technology Characteristics are positively associated with Task Technology Fit.

In developing explanatory variables for computer usage, Computer Self-Efficacy is the belief that one has the ability to complete computer-related actions required to achieve a desired outcome (Mew, 2008). Compeau and Higgins (1995) developed conceptualization of CSE to provide a measure that can be applied to any computer system. In order to enable understanding of user choice in using the application, Dishaw *et al.* (2002) tries to connect CSE with TTF.

If the computer skills and experience of an employee are good, technology will increasingly be used by employees. But if there are obstacles, such as reluctance to learn, having computer anxiety, the employee will refuse to operate computers and SPAN application as well. This usually happens to elderly employees (Plude and Hoyer (1995) in Venkantesh (2003)). It is consistent with Theory of Planned Behavior, that their past and trust constraints will limit behavior. DJPB NTB employees generally have the basic ability to operate computer, which is expected to enhance TTF.

H₃: Computer Self Efficacy is positively associated with Task Technology Fit.

Skill and belief to do something encourage someone to use information technology intensively, as set out in Theory of Planned Behavior. Since Self-efficacy is defined as a person's belief in their ability to accomplish a specific task, the outcome variable in models employing a Self-efficacy construct is often some measure of Task Performance. So CSE can be a key determinant in predicting performance (Dishaw *et al.*, 2002). Performance is achievement of a series of individual tasks with existing technology supports (Goodhue and Thompson, 1995). Mew (2008) states that Computer Self Efficacy is a predictor of computer task performance, and that measurement of user computer self-efficacy is essential to predict acceptance of technology applications.

CSE has positive effect on performance (Alannita and Suaryana, 2014). This is in line with Suyati (2015). User with good CSE will perform their task relating to the use of the information system effectively.

H₁: Computer Self Efficacy is positively associated with performance.

Belief about information system usage affects system use and social norms related to the theory of planned behavior. Goodhue and Thompson (1995) stated that utilization is a consequence of size of the job and/or TTF from the information system, not the choice of use systems. Relationship between TTF and utilization can be seen from the relationship between TTF and belief in usage consequences. TTF becomes important determinant whether the information system is believed to be more useful, more important, or more relatively advantageous.

If TTF is high, someone will use the system more frequently. TTF will be a positive influence on utilization (Sunarta and Astuti, 2005; Setianingsih and Supriatna, 2009; Weyai, 2012; Maulina *et al.*, 2015). Susanti (2014) stated that user which fully uses information system will depend on system utilization.

H₂: Task Technology Fit is positively associated with utilization-

Goodhue and Thompson (1995) suggested that the higher the TTF is not only maximize the utilization but it also increase performance impact regardless of why the system is utilized. At any level of utilization, higher TTF will lead to improve performance as it closely meets task towards the individual needs of a system. But TTF influence on the performance should also be supported by the system utilization. In the system utilization that is not voluntary (mandatory) as the SPAN utilization, the performance impact will

increase in line with the increasing of TTF compared to the utilization. Moreover, TTF will predict the performance if the technology provides features that match the criteria mandates. This study will prove that there is a positive influence between information systems and performance if there is a relationship between the functionalization of the system to the needs of user tasks.

TTF has positive effect on performance (Sunarta and Astuti, 2005; Susanti, 2006; Setianingsih and Supriatna, 2009; Weyai, 2012; Maulina *et al.*, 2015). Users can adjust the task and the technology so that their performance will be better and optimal. If TTF is increasingly precise, the performance will be assisted, more effective, and improved.

H₃: Task Technology Fit is positively associated with performance.

Goodhue and Thompson (1995) found actual experience on the utilization of information technology will lead users to conclude that technology has a positive effect on performance, depending on their expectations of technology. In addition, users will learn more in the utilization of technology and improve the compatibility of their technology tasks. Utilization has positive effect on performance (Sunarta and Astuti, 2005; Susanti, 2006; Setianingsih and Supriatna, 2009; Weyai, 2012; Maulina *et al.*, 2015). SPAN application usage in state financial management which unites several functions at the Ministry of Finance is expected to make the performance more effective. Development of the system is done continuously to improve the performance of system itself. The higher utilization of technology is, the higher their performance will increase and become more effective.

H₄: Utilization is positively associated with performance.

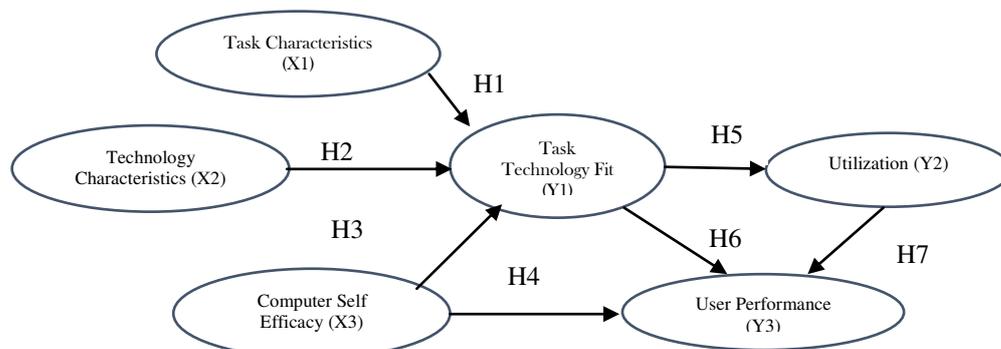


Figure 1. Research Model

Table 1. Operational Definition of Variables

NO	Variables and Definition	Indicators	Question Items	Reference
1	Task Characteristics SPAN's user perception on the task characteristics	Autonomy	5	Morgeson and Humphrey (2006)
		Skill Variance	2	
		Task Significance	3	
		Task Identity	3	
		Feedback	2	
2	Technology Characteristics SPAN's user perception on the SPAN's characteristics	The ability to provide enough information	1	Maulina <i>et al.</i> (2015)
		User friendly	1	
		Reliable	1	
		Fast innovation cycle	1	
		Minimum response time	1	
3	Computer Self Efficacy SPAN's user perception on the ability to operate SPAN	Technology is Diverse and Stable	1	Compeau and Higgins (1995)
		Decentralization/ individualism	1	
		Personal ability	1	
		Past Experience	1	
		Application Guidelines	1	
		Assistance if any problem	1	
		Assistance in starting application	1	
		Assistance in training	1	
		Availability time to task completion	1	
		Data Quality	1	
4	Task Teknology Fit SPAN's user perception on the task-SPAN fit	Locatability of Data	1	Goodhue and Thompson (1995)
		Authorization to Access Data	1	
		Data Compatibility	1	
		Ease of Use/Training	1	
		Production Timeliness	1	
5	Utilization SPAN's user perception on using SPAN	System Reliability	1	Davis (1989) and Maulina <i>et al.</i> (2015)
		Relationship with Users	1	
6	Performance SPAN's user perception on performance impact of SPAN	Frequency of use	1	Goodhue and Thompson (1995)
		Diversity of application	1	
		SPAN's impact to effectiveness and productivity	1	
		SPAN's impact to performance	1	

RESEARCH METHODS

The research model of this study can be depicted in Figure 1. This study is a causal explanatory research. The questionnaires were distributed to 42 SPAN users in KPPN Mataram, KPPN Selong, and West Nusa Tenggara Provincial Treasury Office. 39 questionnaires were returned, so the response rate is 92.8%. All variables in the questionnaires were measured by semantic differential scale. The questionnaires were analyzed by using partial least square (PLS). Operational definition of variables are described in Table 1.

RESULTS AND DISCUSSIONS

Characteristics of Respondents

Respondents were 39 people consisting of 20.51% female and 79.49% male. In terms of education levels they have 15.38% completed high school/equivalent, 20.51% finished Diploma I, 60.54% Diploma IV / Strata 1 and 2.56% Master Degree. In terms of education backgrounds the respondents are practitioners at 25.64% Accounting, 20.51% state treasury and 53.85% outside the majors. Based on the working period in DJPB, 5.23% for 1-5 years, 7.69% between 6-10 years,

30.77% for 11-15 years and 56.41% are more than 15 years.

Measurement Model

Validity is determined by convergent and divergent validity. Measurement of convergent validity is done by looking at the value of loading. Expected loading is above 0.7. Measurement of discriminant validity is viewed by crossloading. With in construct item loads higher than loading of other construct (cross loading). (Chin *et al.* 1997; Abdillah and Jogiyanto, 2015). There are some items that are dropped from the model because they do not meet the measure of validity. Loading and Cross Loading values table are presented in the appendix.

Furthermore, reliability is examined by the value of Cronbach's alpha and composite reliability. Reliable data has a Cronbach's alpha and composite reliability above 0.7 (Ghozali and Latan, 2015). Value of Cronbach's alpha and composite reliability of the model are as follows:

	Cronbach's Alpha	Composite Reliability	Conclusion
X1	0,936	0,946	Reliable
X2	0,917	0,936	Reliable
X3	0,799	0,880	Reliable
Y1	0,937	0,946	Reliable
Y2	0,906	0,955	Reliable
Y3	0,937	0,969	Reliable

Structural Model

Relationships between variables in the model (coefficient value and variance) are shown in Figure 2. Final R² value (at variable performance) is 0,282. It means that only 28.2% of variance performance can be explained by the model. While R² for TTF is 0.643 which means that the change of task characteristics, technology characteristics and CSE explains 64.3% the change of TTF. TTF only explains 48.9% utilization.

The hypothesis testing showed that there are only three relationships between the significant variables supporting the hypothesis. It is seen from the P Values of each relationship (P values $\alpha = 0.05$). Task characteristics (X1) and technology characteristics (X2) give positive effect on TTF (Y1). TTF has positive effect on utilization (Y2). Effect of CSE to TTF (X3 to Y1) and TTF, utilization and CSE to the performance (X3 to Y3,

Y3 to Y1 and Y2 to Y3) are positive but not significant. Furthermore, the result is shown in Table 3.

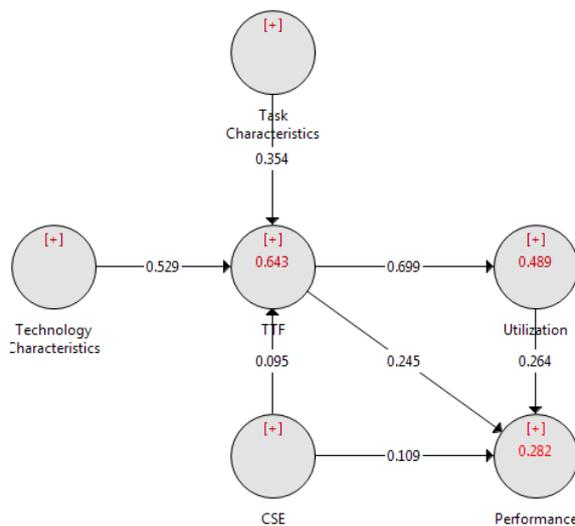


Figure 2. Path Coefficients Testing Result

The effects of task characteristics through skill variety, task identify, task significant and job feedback indicators are positive on the TTF. The positive effects are also showed between the technology characteristics of the TTF. This shows that users SPAN know very well the characteristics of each task. Moreover, SPAN’s characteristics are considered good and they support the completion of the task so that the fit between task and technology (TTF) are also increased. It supports the research done by Goodhue and Thompson (1995), Susanti (2006) and Maulina (2015).

TTF has a positive impact on utilization. The higher TTF will increase the utilization. Because the SPAN utilization is mandatory there is no other application that can be used to provide and process information. That SPAN is an information system can be accepted well by the users is shown by the high utilization. Positive and significant impact shows that TTF as a good predictor to the use of technology (SPAN). It also shows that in the implementation of IFMIS, the tasks that should be done by DJPB have been appropriate to the adopted technology fit. These results are in accordance with the research done Goodhue and Thompson (1995), Susanti (2006) and Maulina (2015).

CSE has positive effect on the TTF and the CSE also gives positive influence on the performance, although the relationship is not significant. With the training and continuously using, utilization becomes a habit and the user is already

Table 3. Results of Hypothesis Testing

Path	Coefficients	T Statistics	P Values	Conclusion
H1: X1 -> Y1	0,354	2,750	0,006	Supported
H2: X2 -> Y1	0,529	4,059	0,000	Supported
H3: X3 -> Y1	0,095	0,975	0,330	Not Supported
H4: X3 -> Y3	0,109	0,627	0,531	Not Supported
H5: Y1 -> Y2	0,699	7,042	0,000	Supported
H6: Y1 -> Y3	0,245	1,614	0,107	Not Supported
H7: Y2 -> Y3	0,264	1,438	0,151	Not Supported

capable to operate SPAN in task completion. CSE will likely have a significant effect on the TTF and the current performance of the initial implementation. The experience in using SPAN will provide deeper understanding about it. This also results in the decrease of CSE effects when experience gets increased. The same thing is found in the research done by Venkantesh *et al.* (2003), Davis *et al.* (1989).

The elderly employees have less information and understanding of the SPAN than the younger employees (Compeau and Higgins, 1995). When people get older, it tends to be harder for them to process stimuli and pay attention to the information related to the job (Plude and Hoyer, 1985 in Venkantesh, 2003), so they tend to be ordered to operate SPAN for repetitive, routine and easy tasks.

Utilization has significant effects on performance, but the relationship is not significant. It is probably caused by lack of users' motivation to use SPAN. In the mandatory environment in which tasks are routine and already determined, as well as the achievement of the performance targets that have been formulated and predetermined, utilization technology as a means to do the tasks will get decreased. Some respondents use SPAN as an important part in the task completion. Some use SPAN just to get the output information from SPAN. It can be concluded that the use of SPAN is only to job target fulfillment. It is in accordance with expectations in motivation theory; the less motivation to use SPAN is, the less performance.

TTF has significant effect on the performance, but the relationship is not significant. SPAN is an integrated and complex system. This probably causes TTF has no significant effect on performance. Task completion by using SPAN requires linkages between the work with one another. In TTF, the users notice the suitability of the work with the technology characteristics used partially based on the authority but to complete the tasks and achieve the performance, the support from other users is necessary.

CONCLUSIONS

This study attempted to examine the SPAN system to measure the performance of employees by using Technology Performance Chain model. The result showed that antecedents of performance are TTF, CSE and utilization, but the relationship is not significant. While TTF was formed by task characteristics and technology characteristics as the model proposed by Goodhue and Thompson (1995).

This study is conducted only in 3 area in Lombok island, with a relatively small sample size. The results of the analysis were not significant for testing CSE, TTF and utilization to the performance and CSE to TTF. It is probably due to the sample size. Further research is expected to increase the sample size to make a powerful and sufficient analysis. SPAN system used in this study is an integrated information system that is only conducted by the Ministry of Finance and the application is mandatory for agencies. Next research using other applications or information systems will possibly give different results.

Research related to information system has been highly developed in the private sector, but research in public sector is still limited. One purpose of this study is to enrich research in public sector information systems by using a research model that is still rarely used in Indonesia. The further researches are expected to develop research in the public sector in Indonesia either by using a research model that is frequently used to improve the validity, making modifications to increase suitability models with environment faced, or using a new model that has never been used before.

Research related to information systems in the public sector, particularly in Indonesia, most of them are simply related to how information systems can be accepted by the user (Technology Acceptance Model) and the success of information systems. When it is viewed from the use of information systems concept, there is use of information systems for decision-making and imple-

mentation of use systems information (Burton-Jones and Straub, 2006). Future studies are expected to develop further in the concept.

Task characteristics and technology characteristics in TPC models can strongly support the performance, where the system and tasks are robust size (Burton-Jones and Straub, 2006). The next research can take more concern of in-depth linkage of performance to be achieved by the use of information systems, so that the constructs formed are in accordance with the context. Thus, it is expected to increase the significance of the relationship to performance. Researchers must also consider cultural factors and individual ability.

Performance in this model can only be explained by 28%, indicating that there are a lot of things outside the model that influence it, e.g. organizational factors (structure and environment) as in the model HOT Fit (Yusof *et al.*, 2006). For further research, it is supposed to connect CSE to computer usage (utilization) as Aktag (2015). For more complex and integrated information system, the development model of TPC is necessary since this model is more suitable for simple applications such as those used Goodhue and Thompson (1995).

SPAN system has also been investigated by using TAM. For further research, it can be investigated with other models. For mandatory applications, the measurement of net benefit (in this case the performance) could be mediated by user satisfaction as in Koh *et al.* (2010). For further SPAN development, it is expected to pay more attention to the suitability of the technology task (TTF) from technology characteristic e.g. keeping SPAN technology into a system that is up to date and minimal disruption.

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