

Received: 21 Nov., 2020; Accepted: 26 Feb., 2021; Published: 25 Mar., 2021

Impact of Organizational Factors on User Satisfaction and Net Benefit of COTS System in the Post-Implementation Period

A Case Study: The COTS System of SPAN-IFMIS Indonesia

¹Sudarto, ²Nilo Legowo

¹BINUS Graduate Program-Master of Information Systems Management, Bina Nusantara University,
Kebon Jeruk Raya Road No. 27, Kebon Jeruk, Jakarta Barat 11530, Indonesia
sudarto@binus.ac.id

²BINUS Graduate Program-Master of Information Systems Management, Bina Nusantara University,
Kebon Jeruk Raya Road No. 27, Kebon Jeruk, Jakarta Barat 11530, Indonesia
nlegowo@binus.edu

Abstract: This paper examines the roles of the organizational factors in the implementation of a complex information system (IS) within the modified Delone and McLean (D&M) model. It analyses the adoption of Commercial-Off-The-Self (COTS) for the development of an Integrated Financial Management Information System (IFMIS) in the Government of Indonesia (GOI). This project, which is called SPAN Project, took more than 12 years from initiating until rolling out with tremendous challenges. However, it is now in the fifth year of its post-implementation phase and has successfully helped the GOI enhance the performance of public financial management. Therefore, within the modified D&M model and by adding the organizational factors as an exogenous variable in the SEM equation, it analyses the questionnaire data of 688 users. The results show that the organizational factors positively determine the continual improvement of system quality, information quality, and service quality. This IS quality dimensions subsequently influences the user satisfaction and net benefit. Hence, this study concludes that it is very critical to ensure full support from the organizational factors for the successful implementation of COTS-IFMIS solutions or other complex IS adoptions.

Keywords: IFMIS, COTS, Organizational Factors, IS Success Model, SEM

I. Introduction

Nowadays, the state financial managements in every country heavily rely on the usage of IS to enhance the cost-effectiveness, transparency, and accountability. Many of them utilize the COTS system to simplify and speed up the implementation process. However, implementing a COTS system as a solution for an Integrated Financial Management

Information System (IFMIS) is as complex as adapting a large ERP system in a big corporation. Hence, COTS-IFMIS and ERP implementations could experience similar challenges; besides, ERP systems are commercial-off-the-self products [1]–[3].

Since the enactment of the Public Financial Law in 2003-2004, the GOI had envisioned to implement a COTS system as the core of IFMIS. After very long process of planning and designing, the international procurement finally started in 2007. However, it took two years to finish the procurement and the contract was signed at the end of 2009. The implementation process which was initially planned for four years took one and a half year longer. The piloting process was started at the end of 2013 and the rolling out for 214 treasury offices across Indonesia just completed in May 2015. As consequences, the cost of the project increased approximately 10% from the initial contract.

This core of the Indonesia-IFMIS is called SPAN (*System Perbendaharaan dan Anggaran Negara*). It is developed based on Oracle E-Business Suits for Public Sector. It is currently in the fifth years of post-implementation period and has become the main back bone of the public financial management in Indonesia. SPAN now has approximately 4,200 users from more than 214 offices across Indonesia. Despite various challenges faced during the planning and development, SPAN has tremendously improved the accountability and transparency of public financial management in Indonesia [4]. From the last four years of internal survey implementation supported by a prominent university in Indonesia, the level of user satisfaction for the year of 2016, 2017, 2018, and 2019 were respectively 4.12, 4.57, 4.72, and 4.64 in 5 scales which are in very good level [5]. As the SPAN project is a very complex project and has experienced a lot of hurdles during the development, it is very

beneficial to study the factors contributing to the user satisfaction level during the post-implementation period.

Moreover, the situation faced during the SPAN implementation is not unusual during the development of IFMIS in many countries. The World Bank reported that based on the 148 IFMIS projects in 82 countries partially or fully financed by the World Bank, they took 5.9 years on average to complete the project from the initiation time. Furthermore, based that report, 95 out of 110 completed projects (86%) are now in operation, while the rest (14%) are stopped [6].

That situation is not peculiar if it is compared to the ERP implementation statistics. Depending on the sources, it was mentioned that 53 percent of businesses have failed to realize half of their projected benefits, while 65 percent of businesses have suffered operation stoppages after ERP post implementation phase [7].

Hence, the SPAN project is a very good example of a very complex project in the public sector. Therefore, this paper examines the factors affecting the user satisfaction and net benefit of SPAN in this post-implementation period. Moreover, the results of this study will obviously be beneficial to the Indonesia Ministry of Finance (MoF) which is now also launching multi-years and bigger IT projects, including: (i) a project based on COTS-ERP system, namely Core Tax System, and (ii) SAKTI, an in-house-developed financial software similar function to SPAN but for approximately 22.000 government working units across Indonesia with more than 240.000 expected users.

This study will utilize the modified D&M IS Success Model, especially by incorporating organizational factors as part of information system success factors. We arranged this study in the following structure: research problem, scope of the research, research purposes, literature review, research model, hypothesis, distribute questionnaire, result analysis, conclusion and recommendation.

II. Research Problems

- a) How do the SPAN users rate the benefit of the SPAN?
- b) What are the factors determining the benefit of SPAN?
- c) How do the relationships among the factors determining the benefit of SPAN?
- d) What are the critical roles of the organizational factors in enhancing the performance of SPAN in this post-implementation stage?

III. Research Scopes

- a) This research was conducted at the Ministry of Finance of the Republic of Indonesia, studying the factors determining the IS success dimensions of COTS-SPAN at the current post-implementation stage as a case study.
- b) The respondents of survey for this research are the employees of the Ministry of Finance of the Republic of Indonesia as the users of COTS-SPAN.

IV. Research Purposes

- a) To identify the benefit of COTS-SPAN in supporting the public financial management
- b) To understand factors ensuring the continual benefit of COTS-SPAN

- c) To analyze the relationship among the factors ensuring the continual benefit of COTS-SPAN
- d) To identify the important roles of organizational factors to guide policies ensuring the performance of SPAN
- e) To provide insight for next similar research that may be conducted in the future

V. Theoretical Framework

A. ERP and COTS-IFMIS

Enterprise Resources Planning (ERP) system is continuously popular among big corporations. Though implementing ERP is commonly expensive and complex, it is continuously becoming a part of strategies to excel in market. The ERP system is commonly aimed to integrate and support all critical business processes, such as accounting, finance, manufacturing, procurement and inventory, or human resources management, in a unified platform of database, applications and technology infrastructures. However, implementing ERP system could confront complicated challenges and cause considerably high rate of ERP implementation failure. For example, it is mentioned that 25% of corporations suffered from poor performance of ERP in the post-implementation stage [8].

A COTS-IFMIS implementation could experience similar complexities as those of ERP implementations. Hence, COTS-IFMIS implementations could get benefit from massive studies on the success and failure of ERP implementations, and vice versa. As previously mentioned, COTS-IFMIS implementations in many countries faced delay and cost increase, while some of IFMIS projects finally did not operate though they were completed. Furthermore following [2], [3], there are some critical success factors that determine the COTS-IFMIS implementation, namely: (i) political and top management commitment, (ii) ICT competencies of the internal teams, (iii) project readiness which includes: business process improvement, network quality, change management, user training, and communications.

There is still no research examining factors affecting the COTS-IFMIS in the post-implementation period. However, there are ample of researches on the post-implementation period for ERP systems [7]–[9]. During the post-implementation period, [8] mentioned that there are at least two main contributing IS success factors in the post-implementation phase, including: (i) continuous improvement efforts, and (ii) organizational support. The continuous improvement efforts are largely determined by the existence of two factors, namely: continuous process improvement, and continuous system integration and extension.

Moreover, this continuous improvement efforts will only take place if there are considerably organizational supports, which is determined by four main factors: top management support, competency of the internal ERP team, user training, and inter-department collaboration and communication. Furthermore, [8] mentioned that the success in the pre-implementation and implementation stages did not guarantee that the ERP would survive in the post-implementation stage. In addition, [8] outlined that the ERP must be continuously improved, ensuring the ERP remains relevant to the current needs. However, that continuous improvement effort can only occur if there is strong organizational support.

B. FMIS and SPAN

FMIS can generally be defined as a series of automated integrated solutions that enable governments plan, execute and monitor budgets, by assisting in prioritizing, executing and reporting expenditures and revenues. Based on their coverage, FMIS can be divided into two groups, namely Core FMIS and Integrated FMIS (IFMIS). In this case, the Core FMIS, which includes IS in the budgeting process (B = Budgeting) and budget execution (T = Treasury), plus other supporting applications (O = Others). Core FMIS (B + T + O) is based on real time transactions with a single database and Centralized Data Center (CDC) or Data Recovery Center (DRC). The number of users is generally in thousands and across ministries/units according to their scope. In many countries, Core FMIS is developed based on COTS or ERP such as Systems, Applications, and Products (SAP), PeopleSoft, and Oracle E-Business Suite (EBS); although some are developed independently (in house development). Core FMIS expands into IFMIS, when Core FMIS has been supported by a Data Warehouses (DW) with multi-dimensional data analytic tools and increasingly opened to interface with various external IS [1]–[3], [6], [10]–[13]

SPAN is developed based on the concept of IFMIS. As explained earlier, in line with the issuance of the 2003-2004 State Finance Law Package, the GOI has also developed IFMIS, with SPAN as the core of the IFMIS. SPAN is built based on COTS Oracle E-Business Suits for Public Sector. It covers almost all functions of the public financial management, from budgeting, commitment management, payment and receipt management, cash management, and accounting and reporting. As mentioned earlier, the development of SPAN took very long time periods, various delays, and cost increase. As mentioned above, this situation is not uncommon for the development of IFMIS in many countries because the IFMIS project is actually not only an IT project but also basically a public financial management reform. This is actually what happened in the development of SPAN in Indonesia. Therefore, a longer time was required because there was a need for more coordination with multiple stakeholders, new business process readiness, the competence of the internal IT team, as well as massive change management and communication.

After the project completion in May 2015, SPAN has undergone to the post-implementation period. Since then, there have been many additional features added to SPAN and various application tuning following new requirements and problems encountered during the operation. And so far, the SPAN technical team, with or without external supports, was able to handle those challenges.

In this case, considering the impacts of organizational supports in the IS success factors in the post-implementation stage and the high level of user satisfaction of the SPAN users, this paper will study the factors affecting this continual improvement of SPAN quality. There is still a lack of study in this area and it will be very beneficial to analyze as feedback to continuously improve the SPAN as the public financial management in Indonesia is very dependent on it.

C. IS Success Model: The Modified D&M Model

In line with the efforts to evaluate factors that influence the successful implementation of information systems including ERP-COTS, several measurement models have been developed. One of the most popular models is the DeLone and

McLean IS Success Model (D&M Model) [14]. After incorporating inputs from various studies, the D&M Model is improved to become the Updated D&M Model as shown in Figure 1 [15]. The updated D&M Model seeks to explain the relationship among six latent variables describing the IS success implementation. As shown in Figure 1, the three latent variables in IS quality dimension determine the latent variable Intention to Use and Use, User Satisfaction, and Net Benefit. Those three IS quality latent variables are System Quality, Information Quality, and Service Quality.

Furthermore, these six latent variables are measured with indicators as follows:

1. System Quality

System quality is a dimension of expected IS characteristics in terms of usability and system. There are several indicators that can be measured, including *Responsive, Convenience, Reliability, Easy to Understand, Flexibility, Availability, Integration, Continual improvement, and Security* [8], [16]–[22].

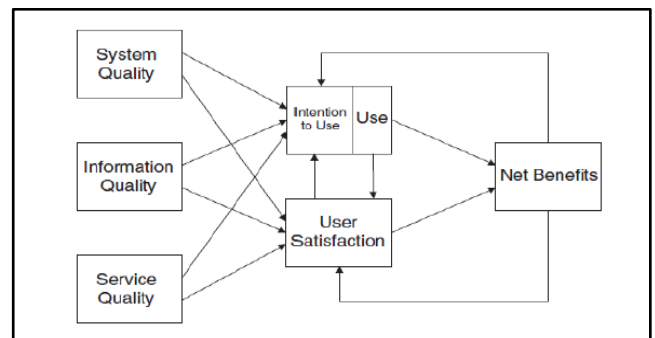


Figure 1. The updated D&M Model

2. Information Quality

Information quality is a dimension of expected IS characteristics in terms of usefulness of information for users. There are several indicators that could be used to measure the quality of information, such as Completeness, Ease to be understood, Relevance, Flexible Form, Timeliness, Accuracy, Consistence, and Up to Date [8], [17], [21]–[25].

3. Service Quality

Service Quality dimensions cover the quality of support gained by users from the IT service provider. There are several indicators commonly used to measure the quality of service, such as *Infrastructure Facility, Response Quickness, Response Accuracy, Service desk support, Data Transmission Security, and Access Security* [16], [17], [26], [27].

4. System Use and Use

The dimension of System Use represents the extent and manner of users to adopt the IS. There are several indicators to measure the intensity of use, including *Actual Use, Daily Use, Frequency Use, Intention to Re-Use, and Nature of Use* [15].

5. User Satisfaction

The dimension of user satisfaction is the level of user satisfaction when they are utilizing the IS. There are several indicators to measure it, such as Satisfactory, Pride, and Usefulness [16], [27]–[29].

6. Net Benefit

The Net Benefit dimension is the point where an information system contributes to the success of

stakeholders. Some indicators are commonly used to measure the net benefits, including *Productivity Enhancement, Experience Expansion, Knowledge Elaboration, Simplify the Process, Accelerate Operation, Service Enhancement, Employee Performance Enhancement, and Organization Performance Enhancement* [17] [16], [26][27].

Furthermore, there have been also many researchers utilizing the modified-updated D&M Model, reviewing many literatures, and focusing on the role of organizational factors, for example, [22] developed a framework that links organizational factors and IS success dimensions based on their research on e-government implementation in Malaysia. Moreover, [7], [22], [30] explained that there is a strong influence by organizational factors on the IS success dimension. These organizational factors include decision-making structures, top management support, goal alignment, managerial IT knowledge, management systems, and resource allocations. The IS success dimension includes system quality and information quality, which in turn affect the usefulness and user satisfaction. Using the same framework, similar results were obtained by [21] in the Iran agricultural e-government research.

The role of top management support which determines the information quality of an accounting information system is also obtained from research by [31], [32] which were also based on the modified D&M model. In this case, [31], [32] mentioned that the top management supports—which included some indicators: providing human resources, hardware, software and fund as needed—had proven to greatly affect the reliability, integration and accessibility of the accounting information system.

Moreover, there have been also many studies analyzing the post-implementation of an ERP system. Some utilized the modified D&M Model, which were developed based on the updated D&M Model [15]. They were commonly done by adding or subtracting several dimensions to further enrich the D&M Model, adapting to the required analysis of the study. For example, [7] examined the effect of information quality, service quality, and system quality on employee performance on post-implementation of ERP implementation in SME in Malaysia. Furthermore, [17] used the modified D&M model to investigate post-implementation ERP implementation in a company in Indonesia. In this model, information quality, service quality, and system quality have a direct effect on net benefits in addition to system use and user satisfaction.

Therefore, this research merely focuses on the role of organizational factor supporting the continual improvement of COTS-SPAN based on the modified D&M Model which has not been researched previously. The results of this research obviously add to the discussions of IS success model in the post-implementation period. Moreover, in practice it is very beneficial for the policy makers to have more information to ensure the success of IS implementation in the public sector.

VI. Methodology

A. Research Model

The research model used in this study is shown in Figure 2. This research model adopts the modified D&M Model, in which the User Satisfaction and Net Benefit are directly influenced by System Quality, Information Quality, and Service Quality. Meanwhile, Net Benefit is also influenced by

User Satisfaction. The main contribution of this research model is by adding the Organizational Factors as the critical enabler for continual improvement of the System Quality, Information Quality, and Service Quality. In order to get the full benefit of SPAN and maintain the user satisfaction, the quality of system, information, and service must be improved to be continuously fit with the changing requirements. As previously discussed, the Organizational Factors will be the enabler of the continual improvement.

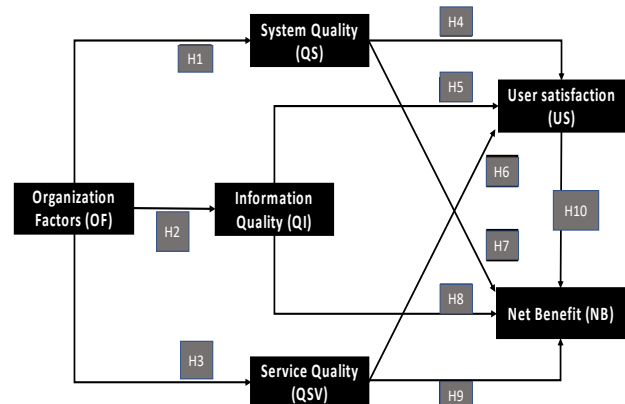


Figure 2. Research Model

B. Hypothesis

Based on the research model in Figure 2, the hypotheses formulated in this study are as follows:

- H1: The Organizational Factors does not affect positively the System Quality.
- H2: The Organizational Factors does not affect positively the Information Quality.
- H3: The Organizational Factors does not affect positively the Service Quality.
- H4: The System Quality does not affect positively the User satisfaction.
- H5: The Information Quality does not affect positively the User satisfaction.
- H6: The Service Quality does not affect positively the User satisfaction.
- H7: The System Quality does not affect positively the Net Benefit.
- H8: The Information Quality does not affect positively the Net Benefit.
- H9: The Service Quality does not affect positively the Net Benefit.
- H10: The User Satisfaction does not affect positively the Net Benefit.

C. Population, Sample and Data Collection

The population of this research are the active users of SPAN who are the employees of Directorate General of Treasury of the Indonesia Ministry of Finance. Currently, there are around 4,200 users in 214 treasury offices across Indonesia. This research employs the stratified random sampling to ensure that there is always representative form each treasury office. Currently, all treasury offices have the same structure, process businesses, and IS. The survey was done through online survey in which each respondent was given 38 closed questions in 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 strongly agree). After a week

of survey, there were 688 active SPAN users that have finished completely this online survey.

D. Construct Variables and Indicators

This study employs six construct variables and 38 indicators. Table 1 shows those construct variables and their respective indicators developed based on the previous literature review. Moreover, during the online survey, each respondent was given 38 online closed question in 5-point Likert scale based on construct variables and indicators as shown in Table 1.

E. The Structural Equations and Hypothesis Evaluation

Considering the research model in Figure 2, construct variables and their indicators, the equations of structural model could be developed as follows:

$$\xi_1 = \alpha_1 \omega + \zeta_1 \tag{1}$$

$$\xi_2 = \alpha_2 \omega + \zeta_2 \tag{2}$$

$$\xi_3 = \alpha_3 \omega + \zeta_3 \tag{3}$$

$$\eta_1 = \gamma_{11} \xi_1 + \gamma_{21} \xi_2 + \gamma_{31} \xi_3 + \zeta_4 \tag{4}$$

$$\eta_2 = \gamma_{12} \xi_1 + \gamma_{22} \xi_2 + \gamma_{32} \xi_3 + \beta_{12}\eta_1 + \zeta_5 \tag{5}$$

Note:

- ω = Organizational Factor (OF) variables
- η_1 = User Satisfaction (US) variables
- ξ_1 = System Quality (QS) variables
- η_2 = Net Benefit (NB) variables
- ξ_2 = Information Quality (QI) variables
- α, γ, β = path coefficients
- ξ_3 = Service Quality (QSV) variables
- ζ = error terms

Variables		Indicators	References
Organization Factors (OF)	OF1	Top management support	[8], [9], [21], [22], [30]–[32], [36], [37]
	OF2	IT Human Resources Capacity	
	OF3	User Training	
	OF4	Inter-department collaboration and communication	
System Quality (QS)	QS1	Responsive	[8], [16]–[22]
	QS2	Convenience	
	QS3	Reliability	
	QS4	Easy to be learnt	
	QS5	Flexibility	
	QS6	Availability	
	QS7	Integration	
	QS8	Continual improvement	
	QS9	Security	
Information Quality (QI)	QI1	Completeness,	[8], [17], [21]–[25]
	QI2	Easy to be understood	
	QI3	Relevance	
	QI4	Flexible forms	
	QI5	Timeliness	
	QI6	Accuracy	
	QI7	Consistence	
	QI8	Up to Date	
Service Quality (QSV)	QSV1	Infrastructure facility	[16], [17], [26], [27]
	QSV2	Response quickness	
	QSV3	Response accuracy	
	QSV4	Service desk support	
	QSV5	Data transmission security	
	QSV6	Access security	
User Satisfaction (US)	US1	Satisfactory,	[16], [27]–[29]
	US2	Pride,	
	US3	Usefulness	
Net Benefit (NB)	NB1	Productivity Enhancement,	[17] [16], [26][27]
	NB2	Experience Expansion,	
	NB3	Knowledge Elaboration,	
	NB4	Simplify the Process,	
	NB5	Accelerate Operation,	
	NB6	Service Enhancement,	
	NB7	Employee Performance Enhancement,	
	NB8	Organization Performance Enhancement	

Table 1. Variables and Indicators

Furthermore, utilizing equations [1], [2] and [3], the first three hypotheses mentioned previously could be evaluated as follows:

H1 = H₀ is accepted if $\alpha_1 \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\alpha_1 > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H2 = H₀ is accepted if $\alpha_2 \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\alpha_2 > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H3 = H₀ is accepted if $\alpha_3 \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\alpha_3 > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

Moreover, based on equations (4) and (5), the rest of hypotheses could be analyzed as follows:

H4 = H₀ is accepted if $\gamma_{11} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\gamma_{11} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H5 = H₀ is accepted if $\gamma_{21} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\gamma_{21} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H6 = H₀ is accepted if $\gamma_{31} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\gamma_{31} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H7 = H₀ is accepted if $\gamma_{12} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\gamma_{12} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H8 = H₀ is accepted if $\gamma_{22} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\gamma_{22} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H9 = H₀ is accepted if $\gamma_{32} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\gamma_{32} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

H10= H₀ is accepted if $\beta_{12} \leq 0$ and $t\text{-value} < 1.96$, otherwise if $\beta_{12} > 0$ and $t\text{-value} \geq 1.96$ so H₁ will be accepted.

This research employs PLS-SEM (Partial Least Square-Structural Equation Model) approach and SmartPLS 3.3.2 software. Following [33]–[35], the evaluation was carried out in two stages: (i) evaluation of the outer model or measurement model, and (ii) evaluation of the inner model or structural measurement. The evaluation of measurement model is a measure of the correlation between indicators and constructs variables. By knowing the correlation, the validity and reliability of a model will be known. Table 2 describes the types of evaluation and measurement criteria for this measurement model.

No	Model Measurement	Admissibility
Validity Evaluation		
1	Covergent Validity: To measure the correlation between indicators of construct variables	
	<ul style="list-style-type: none"> ▪ Loading Factor (<i>lf</i>) ▪ Average Variance Extracted (AVE) 	<ul style="list-style-type: none"> <i>lf</i> > 0,7 AVE > 0,5
2	Discriminant validity To ensure a construct variable has strongest relationship with its own indicators	
	<ul style="list-style-type: none"> ▪ Fornell-Larcker Criterion ▪ Cross-loading 	<ul style="list-style-type: none"> The square root of each construct's AVE > the correlations with other latent constructs The loading indicators on the assigned construct have to be higher than all loading of other constructs
Reliability Evaluation		
3	To measure internal consistency	
	<ul style="list-style-type: none"> ▪ Composite Reliability (CR) ▪ Cronbach's Alpha 	<ul style="list-style-type: none"> CR > 0,7 Cronbach's Alpha > 0,7

Table 2. The Outer Model Evaluation

Furthermore, the evaluation of structural measurements is carried out on the relationship between latent variables, namely between the affected endogenous variables and the influencing exogenous variables. Table 3 explains the types of evaluations for evaluating structural measurement, along with the assessment criteria.

No	Structural Measurement	Admissibility
1	Inner Collenarity To measure the correlation between construct variables.	VIF (Variance Inflation Factors) occurs if the VIF value > 5
2	Path Coefficient To describe the estimated value of the effect of exogenous variables on endogenous variables	t-value > t-test (t-test = 1.96 for the test level of 5%)
3	R square (R²) To measure the amount of variability of exogenous variables which is determined by the variability of endogenous variables	0.67 ->substantial; 0.33 > moderate; 0.19 >poor

Table 3. The Inner Model Evaluation

VI. Result and Discussion

A. Respondent's Characteristics

The online questionnaires were distributed to all 214 offices of Directorate General of Treasury of the MoF across Indonesia as the main users of the SPAN. There were 688 respondents that replied the survey. As shown in Figure 3, all offices have been considerably represented in the sample.

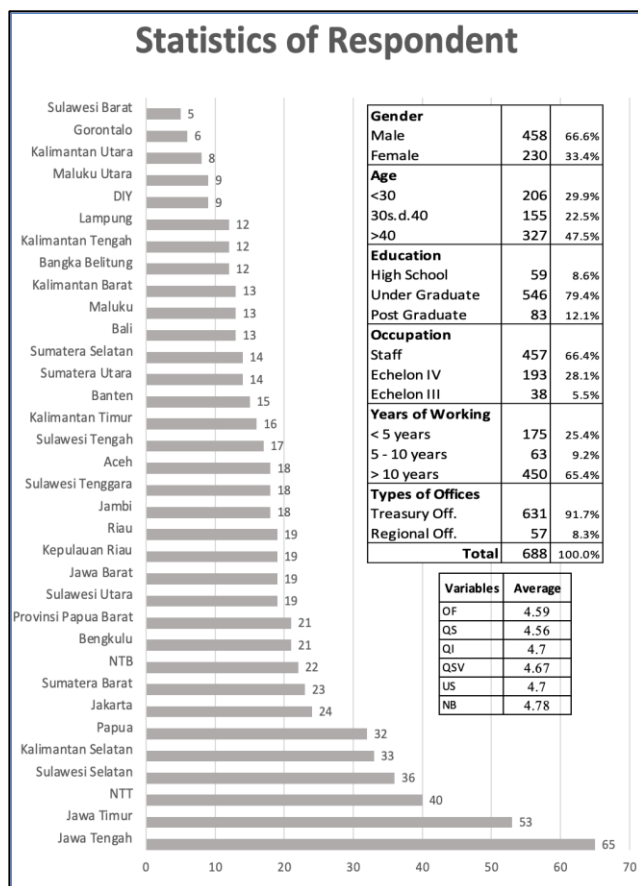


Figure 3. Statistics of Respondent

Most of them are staffs (66.4%), but they are also Echelon IV or middle managers (28.1%) and Echelon III or Head of Offices (6%). Moreover, based on education backgrounds, the majority is diploma/undergraduate (79.4%), while high school and master graduate are 8.6% and 12.1%, respectively. The majority of respondent is male (66.6%), and mostly they are in the 30-40 years old and have worked for more than 10 years.

Moreover, as shown in Figure 3, based on simple average of the questionnaire results of every indicator from each variable, all respondents are close to strongly agree that every variable has very good performance. For example, the average value of user satisfaction (US) questionnaire result is 4.7, while that of the net benefit (NB) is 4.78. Hence, these average values confirm the very high user satisfaction of the SPAN users during this post-implementation period.

B. Evaluation of the Outer Model or Measurement Model

This study utilizes SmartPLS 3.3.2 software. Figure 4 is the initial research model developed using the SmartPLS software, including the loading factors (*lf*) of each indicator from each construct variable.

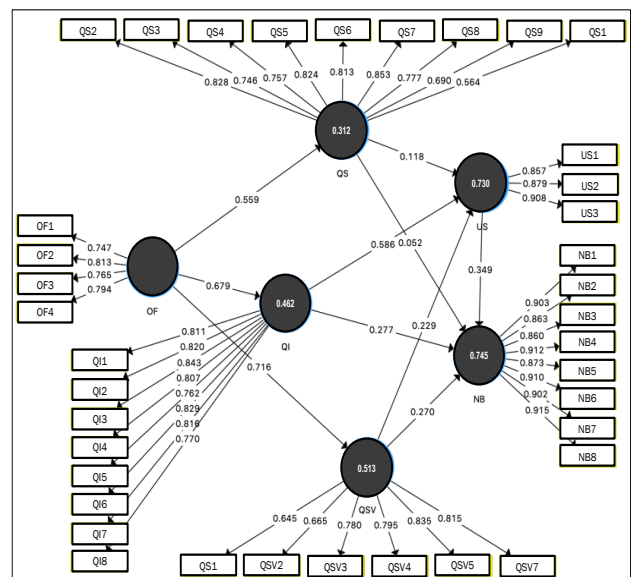


Figure 4. The Initial Research Model & Loading Factors

Based on the convergent validity test as mentioned in Table 3, some of the *lf* values from several indicators—QS1, QS9, QSV1, QSV2—are less than 0.7; therefore, they must be excluded from further analysis. After the exclusion, the research model was run for the second time, and the result is shown in Figure 5.

As shown in Figure 5, all loading factor values are higher than 0.7, with the lowest value is 0.759 for the indicator QS3. Moreover, this study further applies the discriminant validity test based on Fornell-Larcker Criterion and Cross Loading examination. Table 4 is the Fornell-Larcker Criterion of the second research model. As shown in Table 4, for the construct variable QI, the square root of construct's AVE (0.808) is smaller than the one of the correlations of QI with other construct variables, such as between QI and US which is 0.835. Hence, this study further excluded an indicator with the smallest loading factor value which was QI5.

Figure 6 below is the third research model, and Table 5 below is the values of Cronbach's Alpha, CR and AV, after

excluding five indicators: QS1, QS9, QSV1, QSV2 and QI5. As shown in Figure 6, all indicators have loading factors greater than 0.7. In addition, as shown in Table 5, all AVE values are also above 0.5, meaning that all indicators and variables passed the convergent validity test. Moreover, all values of Cronbach's Alpha and CR are above 0.7, meaning all construct variables are considered reliable for this research model.

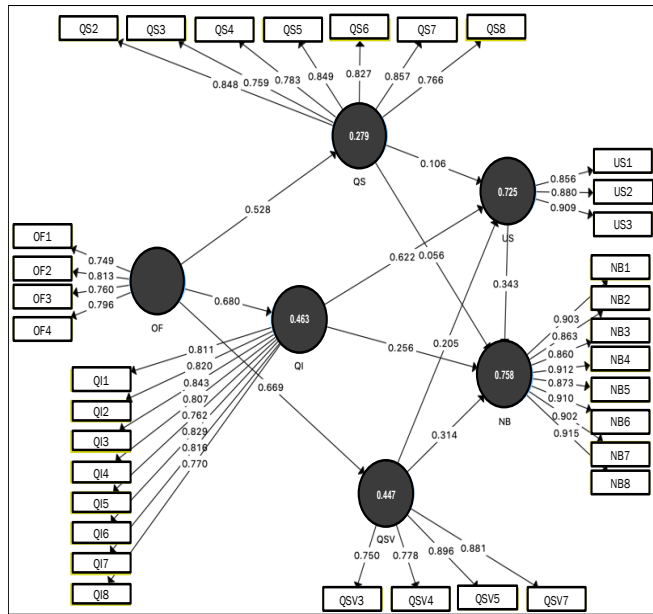


Figure 5. The Second Research Model & Loading Factors

	NB	OF	QI	QS	QSV	US
NB	0.893					
OF	0.616	0.780				
QI	0.808	0.680	0.808			
QS	0.532	0.528	0.578	0.814		
QSV	0.773	0.669	0.741	0.438	0.829	
US	0.812	0.689	0.835	0.555	0.713	0.882

Table 4. Fornell-Larcker Criterion of the Second Research Model

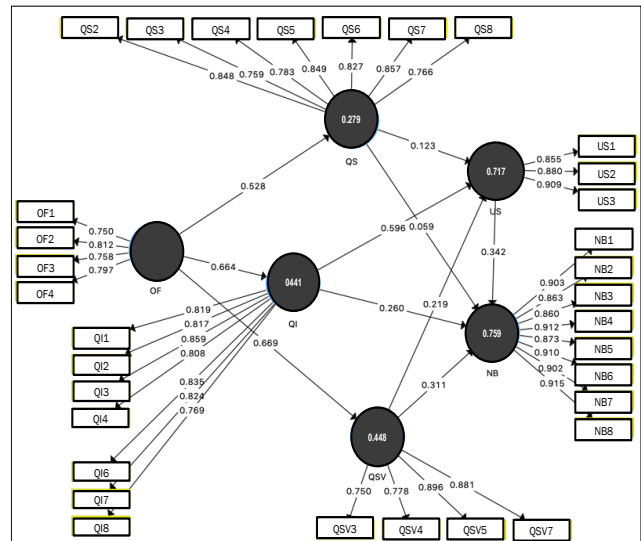


Figure 6. The Third Research Model & Loading Factors

Construct Variables	Cronbach's Alpha (>0.7)	CR (>0.7)	AVE (>0.5)
NB	0.963	0.969	0.797
OF	0.787	0.861	0.609
QI	0.924	0.937	0.652
QS	0.914	0.932	0.662
QSV	0.846	0.897	0.687
US	0.857	0.913	0.777

Table 5. Cronbach's Alpha, CR and AVE of the Third Research Model

Furthermore, as shown in Table 6, the discriminant validity test based on Fornell-Larcker Criterion could be concluded that all construct variables already have the correlation between themselves which are higher than those of other construct variables. Similarly, as shown in Table 7, the loading indicators on the assigned construct have been higher than all loading indicators of other constructs. For example, the loading factors of indicator NB1-NB8 to construct variable NB are higher than those to OF, QI, QS, QSV, and US. Therefore, all construct variables passed the test of overall measurement model.

	NB	OF	QI	QS	QSV	US
NB	0.893					
OF	0.614	0.780				
QI	0.806	0.663	0.819			
QS	0.660	0.671	0.795	0.820		
QSV	0.773	0.667	0.738	0.649	0.829	
US	0.811	0.688	0.727	0.791	0.713	0.882

Table 6. Fornell-Larcker Criterion of the Third Research Model

	NB	OF	QI	QS	QSV	US
NB1	0.903	0.565	0.747	0.645	0.708	0.766
NB2	0.863	0.587	0.726	0.610	0.705	0.743
NB3	0.860	0.571	0.681	0.560	0.679	0.694
NB4	0.912	0.525	0.712	0.613	0.703	0.737
NB5	0.873	0.514	0.689	0.602	0.629	0.728
NB6	0.910	0.540	0.723	0.564	0.713	0.710
NB7	0.902	0.532	0.749	0.560	0.675	0.707
NB8	0.915	0.548	0.724	0.558	0.703	0.704
OF1	0.474	0.751	0.485	0.495	0.467	0.514
OF2	0.506	0.814	0.549	0.544	0.564	0.559
OF3	0.351	0.765	0.427	0.535	0.393	0.472
OF4	0.561	0.791	0.587	0.524	0.625	0.591
QI1	0.624	0.519	0.819	0.701	0.565	0.689
QI2	0.654	0.572	0.817	0.760	0.602	0.699
QI3	0.707	0.534	0.859	0.672	0.646	0.698
QI4	0.627	0.580	0.808	0.700	0.554	0.676
QI6	0.695	0.533	0.835	0.572	0.625	0.683
QI7	0.651	0.549	0.823	0.590	0.603	0.676
QI8	0.660	0.511	0.769	0.560	0.637	0.615
QS1	0.456	0.495	0.547	0.762	0.436	0.586
QS2	0.531	0.557	0.645	0.847	0.464	0.678
QS4	0.521	0.547	0.637	0.832	0.531	0.632
QS5	0.584	0.584	0.707	0.852	0.577	0.690
QS6	0.533	0.523	0.608	0.786	0.537	0.627
QS7	0.610	0.589	0.749	0.836	0.631	0.672
QSV3	0.533	0.543	0.556	0.549	0.750	0.525
QSV4	0.558	0.642	0.593	0.642	0.778	0.603
QSV5	0.715	0.513	0.649	0.495	0.896	0.616
QSV6	0.740	0.516	0.642	0.473	0.881	0.611
US1	0.642	0.636	0.691	0.769	0.579	0.858
US2	0.732	0.589	0.703	0.658	0.648	0.879
US3	0.767	0.599	0.789	0.671	0.655	0.907

Table 7. Cross-Loading Factor of the Third Research Model

C. Evaluation of the Inner Model or Structural Measurement

Following [33]–[35], the model is tested for inner collinearity. Table 8 shows the inner collinearity evaluation which is used to measure the correlation between construct variables. The high correlation leads the effect to be repeated, so that the power of the prediction is less reliable and less stable. In this case, the VIF indicator is used, where an inner model collinearity occurs if the VIF value > 5 . Based on Table 8, all of inner VIF values are less than 5, so that there is no collinearity problem in the research model and data.

	NB	OF	QI	QS	QSV	US
NB						
OF			1.000	1.000	1.000	
QI	3.862					2.607
QS	1.522					1.468
QSV	2.370					2.199
US	3.536					

Table 8. The Inner VIF Values Criterion of the Third Research Model

Moreover, based on Table 9, the structural measurement evaluation is continued by examining the path coefficient together with hypothesis testing as follows:

H1 = The path coefficient of OF->QS or $\alpha_1 = 0.528$ and the t -value = 13.526. Because $\alpha_1 > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that organizational factors affect positively system quality.

H2 = The path coefficient of OF->QI or $\alpha_2 = 0.664$ and the t -value = 21.002. Because $\alpha_2 > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that organizational factors affect positively information quality.

H3 = The path coefficient of OF->QSV or $\alpha_3 = 0.669$ and the t -value = 25.609. Because $\alpha_3 > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that organizational factors affect positively service quality.

H4 = The path coefficient of QS->US or $\gamma_{11} = 0.123$ and the t -value = 3.180. Because $\gamma_{11} > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that system quality affects positively user satisfaction.

H5 = The path coefficient of QI->US or $\gamma_{21} = 0.596$ and the t -value = 11.252. Because $\gamma_{21} > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that information quality affects positively user satisfaction.

H6 = The path coefficient of QSV->US or $\gamma_{31} = 0.219$ and the t -value = 4.432. Because $\gamma_{31} > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that service quality affects positively user satisfaction.

H7 = The path coefficient of QS->NB or $\gamma_{12} = 0.059$ and the t -value = 1.551. Though $\gamma_{12} > 0$ but t -value < 1.96 , hence H_0 is accepted and H_1 is rejected, meaning that system quality does not affect net benefit.

H8 = The path coefficient of QI->NB or $\gamma_{22} = 0.260$ and the t -value = 4.197. Because $\gamma_{22} > 0$ but t -value > 1.96 , H_0 is rejected and H_1 is accepted, meaning that information quality affects positively net benefit.

H9 = The path coefficient of QSV->NB or $\gamma_{32} = 0.311$ and the t -value = 6.395. Because $\gamma_{32} > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that service quality affects positively net benefit.

H10 = The path coefficient of US->NB or if $\beta_{12} = 0.342$ and the t -value = 5.451. Because $\beta_{12} > 0$ and t -value ≥ 1.96 , H_0 is rejected and H_1 is accepted, meaning that user satisfaction affects positively net benefit.

Table 9 summarizes the hypothesis test. All hypotheses are rejected, except H7 in which System Quality (QS) does not positively affect the Net Benefit (NB). Moreover, as shown in Figure 7, the R^2 values of QS, QI, QSV, US, and NB are 0.279; 0.441; 0.448; 0.717 and 0.759, respectively. Therefore, Organizational Factor (OF) variability can explain about 27.9% of System Quality (QS) variability, about 44.1% of the Information Quality (QI) variability, and about 44.8% of the Service Quality (QSV) variability. Therefore, the Organizational Factors have an effect on System Quality, Information Quality, and Service Quality, but with moderate strength. Furthermore, System Quality, Information Quality, and Service Quality have a strong influence on User Satisfaction and Net Benefit variability. It can be seen from the R^2 values for 0.717 and 0.759, respectively, or they can explain more than 70% of the User Satisfaction and Net Benefit variables.

	Path Model	Path Coefficient	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistics	P-Values	Accept/Reject
H1	OF -> QI	0.664	0.666	0.032	21.002	0.000	Accept
H2	OF -> QS	0.528	0.528	0.039	13.526	0.000	Accept
H3	OF -> QSV	0.669	0.671	0.026	25.609	0.000	Accept
H4	QS -> US	0.123	0.124	0.039	3.180	0.002	Accept
H5	QI -> US	0.596	0.593	0.053	11.252	0.000	Accept
H6	QSV -> US	0.219	0.219	0.050	4.432	0.000	Accept
H7	QS -> NB	0.059	0.061	0.038	1.551	0.122	Reject
H8	QI -> NB	0.260	0.256	0.062	4.197	0.000	Accept
H9	QSV -> NB	0.311	0.311	0.049	6.395	0.000	Accept
H10	US -> NB	0.342	0.344	0.063	5.451	0.000	Accept

Table 9. Mean, STDEV, T-Values, P-Values

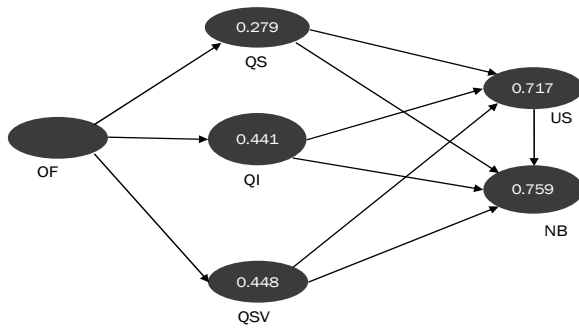


Figure 7. The R-Square (R^2)

D. Discussion

Based on the study results discussed above, it can be concluded that the research model already has good prediction. The indicators of organizational factors, consisting of the top leader support, the competency of internal ICT team, the user training and the inter-department collaboration and communication, positively affect the overall SPAN quality dimension. It is in line with what has been mentioned by [7], [8], [21], [22], [30]–[32], the organizational factors are essential for the continuous improvement efforts of the COTS-SPAN quality dimension in the post-implementation period. It also implies that the COTS-SPAN has been continuously enhanced in this post-implementation period and make them always relevant and satisfy to the user needs.

In addition, referring to [2], [3], the organizational factors are not only essential during the development of an COTS-IFMIS, but it is also very important for the whole lifecycle of the COTS-IFMIS. As common cases of COTS-IFMIS implementations are similar to those of complex ERP implementations, this study strengthens previous studies in the post-implementation period of ERP that to get the full benefit of IS investment, the continual improvement of the IS qualities is very essential.

The results also amplify the last five year surveys as shown by [5] that the COTS-SPAN users are satisfied, pride, and continuously regard that the COTS-SPAN is very useful. The high user satisfaction also positively affects the net benefit, meaning the satisfied users could operate the COTS-SPAN more productively and this subsequently drives the better net benefit of the organization, including the productivity of the MoF.

However, it must be well noted that the H_7 is rejected (H_0 is accepted; H_1 is rejected) because the effect of System Quality on Net Benefit is not significant even though it is positive. This means that, based on the results of this survey, the SPAN users consider that the quality of the COTS-SPAN system needs to be improved. It is very likely caused by the fact that in order to keep the COTS-SPAN always relevant, it must be continuously adjusted to the latest business process developments. However, it is common that the new developments are not as fast as expected. Moreover, each new deployment of a new function in the COTS-SPAN requires training of around 4,200 users throughout Indonesia. Therefore, these factors could be the main cause of the lower user perceptions on the COTS-SPAN system quality and subsequently less impact to the net benefits, both for individual and for organizational performance.

Therefore, it can be concluded that the Organizational Factor support is very important to ensure the continuous improvement of System Quality, Information Quality, and

Service Quality of the COTS-SPAN application. Furthermore, this IS quality dimension has a further impact on improving User Satisfaction and Net Benefits of the COTS-SPAN application.

E. Policy Implications

Based on the previous discussion, at least there are two implications from this study:

- Implications for research:* This modified D&M IS Success Model which includes organizational factors has given evidence that the future IS success model research could be further extended based on this model. In addition, this study also confirms to the previous literature that the successful implementations of an ERP or COTS system are not guaranteed that they will always be relevant to the user need if they are not continuously improved.
- Implications for practices:* This study has given a very beneficial lesson-learned in regard to maintaining the quality of IS during the post-implementation period. The top management has to allocate adequate resources to maintain the performance of the IS. They must ensure the quality of ICT team competence, the availability of ICT infrastructures, the possibility of system integration and extension, the adequate allocation of funding, and the alignment to the overall organization strategy. This situation could make the ICT team have better responses to the changing requirement and therefore continuously relevant to the users.

VII. Conclusion And Recommendation For Future Research

This study has satisfactorily answered the research problems. *First*, based on the results of the survey, it shows that the SPAN users are strongly satisfied with the performance of the SPAN in this post-implementation period. It also confirms that the continuously improved SPAN qualities have proven that the public investment in the COTS-IFMIS project is very beneficial to support the MoF in improving the state finance operation.

Secondly, following the research problem of this study, it has shown the factors and their detail relationship determining the very good net benefit of the COTS-SPAN in the post-implementation period. Those factors include the organizational factors, the system quality, the information quality, the service quality and the user satisfaction. The organizational factors positively affect the overall qualities of the COTS-SPAN by providing the driving forces for the continual improvement in this post-implementation period. Subsequently, the enhanced COTS-SPAN system quality, information quality, and service quality support the SPAN user satisfaction. Furthermore, this study also shows that this high user satisfaction impacts the better level of COTS-SPAN net benefit. Based on the research model of this study, it also concludes that the COTS-SPAN information quality and service quality have direct positive impact to the COTS-SPAN net benefit. However, the system quality has minimum direct impact on the net benefit, suggesting that the MoF team has not enhanced the SPAN system quality to the level that is expected by the users.

Thirdly, based on the previous literature and the results of this study, the organizational factors which are measured by

four indicators consisting of top management support, IT human resource competency, user training and inter-department collaboration and communication positively determine the continual improvement of the COTS-SPAN quality. Hence, the organizational factor critically ensures the continual improvement of the COTS-SPAN quality which subsequently impact to the high level of user satisfaction and net benefit of the COTS-SPAN in the era of post-implementation

However, we have to acknowledge that the modified D&M Success model adopted in this study is based on the COTS-SPAN which is regarded to successfully satisfy the user needs and improve the state financial management in Indonesia during the last five years. This could be one of the weaknesses of this study. This model must be further tested on the various cases of the ERP, COTS or other complex IS implementations, including the ones which have many problems in the post-implementation phase. The further research will obviously sharpen the model and hence improve the capability to explain the relationship among factors affecting the IS success model especially the role of the organizational factors.

References

- [1] A. Hashim, *A Handbook on Financial Management Information Systems for Government: A Practitioners Guide for Setting Reform Priorities, System Design and Implementation*. Washington, DC: The World Bank Group, 2014.
- [2] C. Dener, A. J. Watkins, and L. W. Dorotinsky, *Financial Management Information Systems: 25 Years of World Bank Experience on What Works and What Doesn't*. Washington, DC: The World Bank Group, 2013.
- [3] C. Dener and S. Y. S. Min, *Financial Management Information Systems and Open Budget Data: Do Governments Report on Where the Money Goes?*, no. June. 2013.
- [4] The World Bank, *Indonesia: Public Expenditure and Financial Accountability Assessment: Assessment Report 2017*. 2018.
- [5] DJPB and Institut Pertanian Bogor, "Laporan Akhir Laporan Akhir: Survei Tingkat Kepuasan User Terhadap Sistem Informasi dan Teknologi DJPB Tahun 2019 (Final Report: Survey of User Satisfaction Levels on Information Systems and Technology DJPB 2019)," Jakarta, 2019.
- [6] The World Bank, "Financial Management Information Systems Database," *The World Bank Data Catalog*, 2020. <https://datacatalog.worldbank.org/dataset/financial-management-information-systems-database> (accessed Oct. 02, 2020).
- [7] E. K. Ghani, S. A. M. Yasin, and M. M. Ali, "Examining enterprise resource planning post implementation and employees' performance in small and medium enterprises using delone and mclean's information system success model," *Int. J. Financ. Res.*, vol. 10, no. 3, pp. 153–169, 2019, doi: 10.5430/ijfr.v10n3p153.
- [8] Y. M. Ha and H. J. Ahn, "Factors affecting the performance of Enterprise Resource Planning (ERP) systems in the post-implementation stage," *Behav. Inf. Technol.*, vol. 33, no. 10, pp. 1065–1081, 2014, doi: 10.1080/0144929X.2013.799229.
- [9] H. A. Alghamdi, F. Saleem, and A. A. Al-ghamdi, "A Post Evaluation Framework to Evaluate ERP Project 's Acceptance and Success in Saudi Arabia : Literature Review," pp. 54–66, 2018, doi: 10.17148/IJARCCCE.2018.7211.
- [10] S. Gupta, M. Keen, A. Shah, and G. Verdier, "Digital Revolutions in Public Finance," in *Digital Revolutions in Public Finance*, S. Gupta, M. Keen, A. Shah, and G. Verdier, Eds. Washington, DC: IMF, 2017.
- [11] B. Allan and A. Hashim, *Treasury Reference Model*. Washington, DC: World Bank, 2001.
- [12] C. Pimenta and A. Seco, "Technological Opportunities and Recommendations for Modernizing Integrated Financial Management Information Systems in Latin America and the Caribbean Institutions," 2019.
- [13] C. Dener and S. Y. Min, *Financial Management Information Systems and Open Budget Data*. 2013.
- [14] W. H. DeLone and E. R. McLean, "Information systems success: The quest for the dependent variable," *Inf. Syst. Res.*, vol. 3, no. 1, pp. 60–95, 1992, doi: 10.1287/isre.3.1.60.
- [15] S. Petter, W. DeLone, and E. McLean, "Measuring information systems success: Models, dimensions, measures, and interrelationships," *Eur. J. Inf. Syst.*, vol. 17, no. 3, pp. 236–263, 2008, doi: 10.1057/ejis.2008.15.
- [16] Y. M. Huang, Y. H. Pu, T. S. Chen, and P. S. Chiu, "Development and evaluation of the mobile library service system success model A case study of Taiwan," *Electron. Libr.*, vol. 33, no. 6, pp. 1174–1192, Nov. 2015, doi: 10.1108/EL-06-2014-0094.
- [17] A. E. Wirawan and T. A. Napitupulu, "Factor affecting the implementation benefit of enterprise resource planning system using modified delone and Mclean information system success model," *J. Theor. Appl. Inf. Technol.*, vol. 96, no. 23, pp. 7702–7711, 2018.
- [18] P. Lillrank, "The quality of information," *Int. J. Qual. Reliab. Manag.*, vol. 20, no. 6, pp. 691–703, 2003, doi: 10.1108/02656710310482131.
- [19] W. A. Sodeman, *Management information systems*, 6th ed. New York: McGraw-Hill/Irwin, 2007.
- [20] J.-E. Mai, "The quality and qualities of information," *J. Am. Soc. Inf. Sci. Technol.*, vol. 64, no. 4, pp. 675–688, Apr. 2013, doi: 10.1002/asi.22783.
- [21] A. Rezaei, A. Asadi, A. Rezvanfar, and H. Hassanshahi, "The impact of organizational factors on management information system success: An investigation in the Iran's agricultural extension providers," *Int. Inf. Libr. Rev.*, vol. 41, no. 3, pp. 163–172, 2009, doi: 10.1016/j.iilr.2009.05.002.
- [22] R. Hussein, N. S. A. Karim, N. Mohamed, and A. R. Ahlan, "The Influence of Organizational Factors on Information Systems Success in E-Government Agencies in Malaysia," *Electron. J. Inf. Syst. Dev. Ctries.*, vol. 29, no. 1, pp. 1–17, 2007, doi: 10.1002/j.1681-4835.2007.tb00195.x.
- [23] S. Makau, C. Lagat, and R. Bonuke, "The Role of

- Information Quality on the Performance of Hotel Industry in Kenya,” *Eur. Sci. Journal, ESJ*, vol. 13, no. 20, p. 169, 2017, doi: 10.19044/esj.2017.v13n20p169.
- [24] M. Sami, H. H. Abdullah, M. Z. Othman, and A. Warokka, “Quality of Information As Strategic Factor in Accounting Information System (Ais) Towards Better Organizational Performance,” *Jural Ris. Manaj. Sains Indones.*, vol. 2, pp. 1–17, 2011.
- [25] S. Westin, “Managing Data and Information Quality in Construction Engineering: a System Design Approach,” 2014.
- [26] P. T. Chen and H. H. S. Hu, “The mediating role of relational benefit between service quality and customer loyalty in airline industry,” *Total Qual. Manag. Bus. Excell.*, vol. 24, no. 9–10, pp. 1084–1095, 2013, doi: 10.1080/14783363.2012.661130.
- [27] C. N. K. Naik and S. B. Gantasala, “Service Quality (Servqual) and its Effect on Customer Satisfaction in Retailing Introduction -Measures of Service Quality,” 2010.
- [28] G. P. Z. Montesdioca and A. C. G. Maçada, “Measuring user satisfaction with information security practices,” *Comput. Secur.*, vol. 48, pp. 267–280, Feb. 2015, doi: 10.1016/j.cose.2014.10.015.
- [29] R. A. Zuama, J. M. Hudin, D. Puspitasari, E. H. Hermaliani, and D. Riana, “Quality dimensions of Delone-McLean model to measure students’ accounting computer satisfaction: An empirical test on accounting system information,” Oct. 2017, doi: 10.1109/CITSM.2017.8089318.
- [30] M. A. M. B. Lotfy, “Sustainability of Enterprise Resource Planning (ERP) Benefits Postimplementation: An Individual User Perspective,” p. 223, 2015.
- [31] J. Darma, A. Susanto, S. Mulyani, and J. Suprijadi, “The role of top management support in the quality of financial accounting information systems,” *J. Appl. Econ. Sci.*, vol. 13, no. 4, pp. 1009–1020, 2018.
- [32] A. Fitriati and A. Susanto, “The accounting information system quality improvement through internal control and top management support effectiveness,” *J. Theor. Appl. Inf. Technol.*, vol. 95, no. 19, pp. 5003–5011, 2017.
- [33] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, “When to use and how to report the results of PLS-SEM,” *Eur. Bus. Rev.*, vol. 31, no. 1, pp. 2–24, 2019, doi: 10.1108/EBR-11-2018-0203.
- [34] J. Hair, T. Hult, C. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks, CA: Sage Publications, Inc., 2014.
- [35] S. Haryono, *Metode SEM Untuk Penelitian Manajemen dengan AMOS 22.00, LISREL 8.80 dan Smart PLS 3.0 (SSEM method for management research with AMOS 22.00, LISREL 8.80 and Smart PLS 3.0)*, vol. 53, no. 9. 2012.

Author Biographies



Sudarto is a Senior Advisor for the Minister of Finance of Indonesia in Organization, Bureaucracy, and Information System and the same time as the Chief of Information Officer at the Ministry of Finance. He has a PhD in Economics from the University of New South Wales, Australia in 2008 and an MBA in Finance from the International University of Japan in 2001. He also held two undergraduate degrees in Accounting and Management. He is now studying for master degree at the Graduate Program in Information System Management in the University of Bina Nusantara, Jakarta.



Nilo Legowo is an Associate Professor at the Graduate Program of the Management Information System at the Bina Nusantara University. He completed his undergraduate degree in Education Management in 1994, and his master degree in Informatic Engineering in 1997. He finished his Doctoral degree in 1997. He has been a lecturer since 1997 in the field of Computer Science and Information Systems. He joined as a faculty member at the Computer Science Department of the Bina Nusantara University Jakarta in 2009 as a Subject Content Coordinator (SCC) in the Software Engineering and Object Programming areas. Since 2011, he has been assigned as the Deputy Head of Department managing the Graduate Program in the Management Information Systems. He has published a lot of papers in the areas of management information systems in various international journals.