Improving information service performance of informatics management and computing in Private schools

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ABSTRACT

Improving information service performance of private schools offering informatics management and computing program becomes a substantial complexity in Indonesia. In reality, incompatibility and insufficiency of information through IT services application portfolios tend to be partial. As TI services only focus on a system implementation, these services fail to optimize interrelationships between all academic information system applications and school operations. The identified problem is the budget allocated to investment, instrument procurement, and partial academic information system applications. The novelty of the present research is to focus on the improvement of information service performance of private schools based on the information needs and IT service management productivity. This research empirically used an explanatory design to measure variables of IT innovation adoption and IT governance to improve information service performance of private schools using IT service management. Data were collected with Likert scales, and SEM-PLS (SmartPLS 3.0) was used for data analysis. Results were validated through explanation given by informants. Hypothetical testing design for information system success shows positive and, significant effects. The success of improving information service performance of informatics management and computing in private schools can only be actualized through quality information assessment of the external quality system.

Introduction

Information Technology (IT) services are a powerful tool for information dissemination and an essential factor for information processing in private schools. More specifically, IT tool supports organization, filtering, searching, and presentation of academic information for major decision making regarding the three main duties of private schools (Indrayani, 2013). To achieve integrated information performance, availability and continuity provide important contributions for the administration of academics, managerial needs, and accessibility of information services for academicians to assist them to manage the private schools (Hasan et al., 2017; Irawan et al., 2016; Maria et al., 2012).

IT services management is critical for supporting schools' academic activities based on different information characteristics from IT service management to hospitals, hotels, aviation, and the management of other sectors. Specifically, effective management of schools' process, such as education, lecturing, teaching, research, staff management, students, and alumni rely on IT service management. Thus, IT services actualize synchronization and interoperability of internal and external information, providing information characteristics for all stakeholders. Thus, IT services support management needs by providing long-term interrelationships and electronic communication between lecturers, students, and alumni.

Previous studies that focus on IT services for private schools show that information processing mechanisms provide crucial roles in improving the effectiveness of academic data based on the perspective of information services (Denwattana & Saengsai, 2016; Hermanto & Kusnanto,

2017; Yeh & Ramirez, 2016). In this context, the flows of information services of work units become an essential platform to build communication and achieve synchronization and interoperability of academic data of private schools (Noaman et al., 2015; Petter et al., 2012).

However, it is found that some handful of private schools can actualize the implementation of information, as most of them allocate budget on investment and procurement of instruments to develop application portfolios of academic information systems. Nonetheless, these schools are unable to process and provide the expected academic information needs (Prabowo, 2012), making, information exchange in work units be biased and unstructured (Maria et al., 2013). These bring complexities in processing and improving information service performance of private schools (Indrajit & Djokopranoto, 2016).

However, previous studies that focus on the substance of information service performance of private schools in Indonesia is neglected as inappropriateness, incompatibility, and insufficiency of information and application IT services portfolio still exist (Maria et al., 2013). Therefore, there is the inconsistency of accreditation of information services by the National Accreditation Board of Higher Education (BAN-PT) (Raditya et al., 2016). An improvement of application portfolios for information systems is required for successful implementation of information services (Prabowo, 2012; Trapnell, 2007). The disintegration of information services leads to the incompatibility of synchronization and complexities of data interoperability on quality assurance systems of private schools (Prasetyo, 2014). Moreover, insufficiency and inconsistency of information services can debar information exchange of school operations (Putri et al., 2015). Thus, information

services system implementation fails to optimize the interrelationships of academic information system applications (Indrayani, 2013; Subiyakto et al., 2016).

Complexities and hindrances based on the perspective of information services obviously create a very significant impact on managing the private schools because of the inability to provide information for evaluation and mapping of strategic planning for quality private schools (Prasetyo, 2014; Putri et al., 2015). Grade accreditations are the tools to evaluate school quality (Permenristekdikti No.32, 2016). Thus, the existing problems certainly require a serious attention as private schools in Indonesia that obtain accreditation Grade "A" are only at the university level. The present uses the case study to investigate the Informatics Management and Computing in Indonesian private schools. Despite that these schools produce graduates specializing in IT, they are still unable to obtain accreditation Grade "A" (BAN-PT, 2018; PDDIKTI, 2018).

At the time the present study is conducted, only 41 (30.83%) of 133 private schools of Informatics Management and Computing in Indonesia receive institutional accreditation Grade "B" (29.27%) and Grade "C" (70.73%). Of the 225 private schools that receive accreditation in Indonesia, 33.78% receive accreditation Grade "B" and 66.22% receive Grade "C" (BAN-PT, 2018; PDDIKTI, 2018). This is ironic, thus, a solution to enhancing, readiness, effective, and transparent and management of information service performance of private schools is required. Alignment, availability, continuity of information services, and accreditations fulfilment rely on these solutions (Maria et al., 2013; Prasetyo, 2014; Putri et al., 2015; Raditya et al., 2016; Trapnell, 2007).

Besides, actualizing information service performance for private schools assist in providing the optimal and effective information services capabilities (Liu, 2015). This operation also helps to manage the academic information systems (Phahlane & Kekwaletswe, 2014) and, assisting in obtaining the accreditation for private schools (Reis et al., 2013). Principally, there is a strong relationship between the quality of information service performance pertains to the success of information systems (DeLone & McLean, 2016).

Improving the information service performance requires readiness of IT service (Subiyakto et al., 2016) to support the management of private schools (Tjong et al., 2017). IT service management supports and delivers services continuity and information flows (Chin et al., 2017). Optimizing IT service management requires IT innovative capabilities to conform to the data processing through IT internalization (Mangula et al., 2017). The success of IT innovation adoption is also influenced by technology, organization, and environment (Baker, 2012), using the IT governance that consist of structures, processes, and relational mechanisms. All these facets ease synchronization and interoperability and integration of appropriateness of information services for private schools (Tjong et al., 2017). Based on the existing problem identification, there has been no specific discussion on the improvement of information service performance for private schools, which are influenced and mediated by IT innovation adoption, IT governance and IT service management. However, interrelationships of IT service management for the improvement of information service performance for private

schools are absent. Previous research only focuses on the private school performance with relations to IT innovation adoption and IT governance, which is the major requirement for information service performance mediated by IT service management for private schools.

Formulation of research problems is based on information service performance improvement for private schools, which are influenced by IT innovation adoption and IT governance mediated by IT service management. The study formulates the following research questions: (a) How are the IT innovation adoption and IT governance on the improvement of information service performance for private schools are mediated by IT service management?; (b) Does IT innovation adoption influence information service performance of private schools?; (c) Does IT innovation adoption influence information service performance mediated by IT service management?; (d) Does IT innovation adoption influence IT service management?; (e) Does IT innovation adoption influence IT service management through IT governance?

The novel aspect of this research is to investigate the quality of IT innovation adoption and IT governance for the improvement of information services for private schools mediated by IT service management. The aims of the present study are as follows: (a) To analyse, the influences of IT innovation adoption and IT governance for the improvement of information service performance of private schools mediated by IT service management; (b) To analyse the influences of IT innovation adoption on information service performance of private schools; (c) To analyse the influences of IT innovation adoption on information service performance of private schools mediated by IT service management; (d) To analyse the influences of IT innovation adoption on IT service management of private schools; (e) To analyse the influences of IT innovation adoption on IT service management through IT governance of private schools.

Referring to the previous framework, the study develops the following hypotheses: (a) Hypothesis 1: There are direct, significant influences of IT innovation adoption on information service performance of private schools; (b) Hypothesis 2: There are direct, significant influences of IT innovation adoption on information service performance of private schools through IT service management; (c) Hypothesis 3: There are direct, significant influences of IT innovation adoption on IT service management; and (d) Hypothesis 4: There are direct, significant influences of IT innovation adoption on IT service management through IT governance.

Research Methodology

This research empirically used an explanatory design to measure variables of IT innovation adoption and IT governance to improve information service performance of private schools, through IT service management. A saturated sampling technique was applied based on the sampling population of 133 Informatics Management and Computing private schools in Indonesia (PDDIKTI, 2018). However, some of these schools did not return their questionnaires. As a result, 99 respondents consist of heads and deputy heads of the private schools. The study used Likert scales as the

survey instrument with intervals of 1 (strongly disagree) to 6 (strongly agree). It is noted that Likert-type and ordinal-scale response can enhance the accuracy of the data through the elimination of a hesitation tendency factor (Creswell, 2014).

Structural Equation Modeling (SEM) and PLS (Partial Least Square) were used for the computation of quantitative analyses. SmartPLS 3.0 software using the SEM-PLS Model is used to analyse limited sample data, complex model, numerous constructs and indicators, and formative or reflective data processing. Thus, the analyses will assist in eliminating the error scores in variables (Ghozali & Latan, 2015; Haryono & Wardoyo, 2013; Wijanto, 2015).

The research model covered latent, exogenous variables (IT innovation adoption and IT governance), a mediating variable (IT service management), and a latent, endogenous variable (information service performance of private schools). Next, the entire results were validated through justification by all informants using a purposive sampling technique. Apart from the quantitative technique for data collection, the study also used the in-depth interviews to collect data, selecting the research population through inclusion and exclution criteria (Bandur, 2016). The study uses the triangulation process to reduce personal bias and enhance the accuracy of the data collected (Bandur, 2014).

Results And Discussions

The study employs the SEM Model for the analysis of the exogenous, latent variables such as IT innovation adoption and IT governance. The intervening, latent variable is used to study IT service management, and the endogenous, latent variable is used to study information service performance of private schools. In the dimensions of variables, it is revealed that the first exogenous, latent variable is IT innovation adoption (X1). Other variables are the dimension of technology (X1.1) indicators of perceived benefits or relative advantages (ITAI1), conformity of IT infrastructure support or compatibility (ITAI2), and perceived easiness of use or complexity (ITAI3). In the dimension of organizations (X1.2), the indicators are top management supports (ITAI4), organizational readiness (ITAI5), and experiences in IT (ITAI6); the dimension of the environment (X1.3) with the indicators of competitive pressure (ITAI7), and external supports (ITAI8).

In the second exogenous, latent variable is IT governance (X2). This variable includes the dimension of structures (X2.1) with the indicators of IT steering committee (ITG1), strategic IT committee at the management level (ITG2), and IT project steering committee (ITG3); the dimension of processes (X2.2) with the indicators of portfolio management (ITG4), strategic planning of information system (ITG5), and project governance (ITG6); and the dimension of relational mechanisms (X2.3) with the indicators of awareness of IT governance (ITG7) and IT leadership (ITG8).

In the third exogenous, latent variable is IT service management (X3). This variable covers the dimension of service supports (X3.1) with the indicators of synchronization of information needs (ITSM1), acceleration of information availability (ITSM2), and configuration of IT infrastructure (ITSM3); the dimension of service deliveries (X3.2) with the indicators of continual information availability (ITSM4), punctual information services (ITSM5), and smooth IT services (ITSM6).

In the endogenous, a latent variable is information service schools performance (Y). This variable is the system quality (Y1) with the indicators of information completeness (ISPHE1), information accuracy (ISPHE2), and information availability (ISPHE3); the dimension of information quality (Y2) with the indicators of information reliability (ISPHE4), information flexibility (ISPHE5), and easiness of information access (ISPHE6); the dimension of system quality (Y3) with the indicators of service responsiveness (ISPHE7), service assurance (ISPHE8), and service reliability (ISPHE9).

Evaluation of SEM-PLS requires none of the distribution assumptions for parameter estimation. Hence, the parametric techniques for examining the significance level are absent. Evaluation of SEM-PLS Model is based on the non-parametric attributes using Outer Model and Inner Model (Chin, 1998; Ghozali & Latan, 2015). Outer Model is conducted through factor analysis using the validity and reliability of latent constructs. Meanwhile, Inner Model is applied with significance examination of effects among constructs or variables.

The Outer Model includes convergent validity, discriminant validity, composite reliability, and Cronbach's alpha. Convergent validity is a loading factor score of latent variables and indicators. On the other hand, discriminant validity holds that different constructs provide no strong correlation. The measurement is based on cross-loading score, in which each variable is greater than 0.70 (> 0.70). Moreover, reliability is obtained through Cronbach's alpha and composite reliability. All scores must be greater than 0.70 (> 0.70) in exploratory research. Thus, the Average Variance Extracted (AVE) score is greater than 0.50 (> 0.50) (Chin, 1998; Ghozali & Latan, 2015).

Next, Inner Model employ the t-test, R-Squares, an estimate off path coefficients, and prediction relevance (Q Square). The t-test is conducted to cognize latent effects, latent independent variables, and dependent variables. R-Squares are the determination coefficients of endogenous constructs. R-Squares of a strong, moderate, and weak model are 0.67, 0.33, and 0.19 respectively. The estimate for path coefficients reflects how strong the effects of latent constructs using a bootstrapping. Furthermore, examination of relevance prediction (Q Square), used to cognize prediction capabilities has this score compositions: 0.02 (low), 0.15 (moderate), and 0.35 (high).

Analysis of GoF Outer Model (Measurement Model)

The goodness of Fit (GoF) Analysis is conducted using PLS Algorithm and Bootstrap Output. Bootstrapping uses an algorithm to create a number of a subsample (resample) and a resampling using the replacement method. In other words, every resamples consists of a set of rows that can be selected and reselected from a set of original random data (Sholihin & Ratmono, 2013). Examination of quality of Outer Model through PLS Algorithm is revealed in Figure 1.
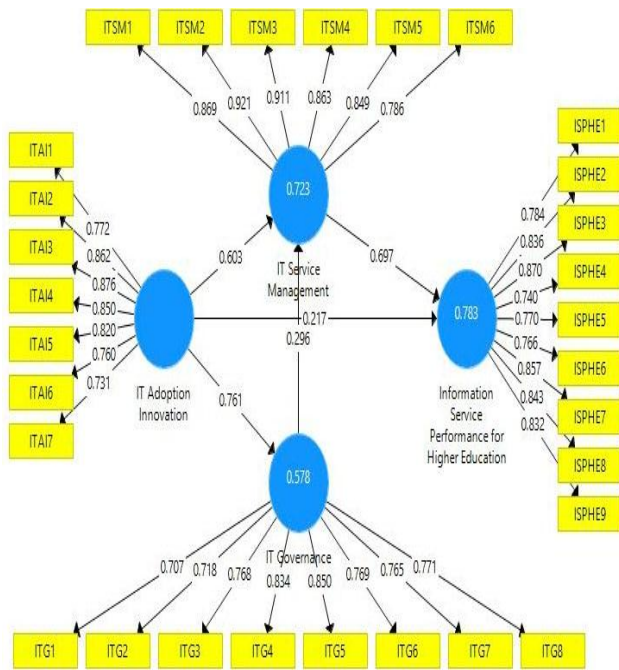
Figure 1. Diagram of Research Model Paths.

Based on outer loading results, ITAI8 Indicator (an innovation of IT application portfolios supported by the third parties) is to be eliminated from the model because the loading factor is only 0.540, which cannot be used for hypothetical examination. Calculation of cross-loading (discriminant validity) indicates that a correlation of constructs and indicators has a score greater than other indicators, which fulfills the requirements of discriminant validity. This is strengthened by Fornell-Larcker Criterion (AVE) scores (see Table 1), which is greater than the correlation of latent variables (see Table 2). Besides, AVE > 0.50 is used for hypothetical testing. Moreover, reliability obtained through Cronbach's alpha and composite reliability is greater than 0.70 (> 0.70), which can be used for hypothetical testing (see Table 3).

Table 1 Discriminant Validity

Fornell-Larcker Criterion	IT Adoption Innovation (Criterion #1)	IT Governance (Criterion #2)	IT Service Management (Criterion #3)	Information Service Performance for Higher Education (Criterion #4)
Criterion #1	0.812			
Criterion #2	0.761	0.774		
Criterion #3	0.828	0.755	0.868	
Criterion #4	0.794	0.784	0.877	0.812

Table 2 Latent Variable Correlations

Latent Variable Correlations	IT Adoption Innovation (Criterion #1)	IT Governance (Criterion #2)	IT Service Management (Criterion #3)	Information Service Performance for Higher Education (Criterion #4)
Criterion #1	1.000	0.761	0.828	0.794
Criterion #2	0.761	1.000	0.755	0.784
Criterion #3	0.828	0.755	1.000	0.877
Criterion #4	0.794	0.784	0.877	1.000

Table 3 Constructs of Reliability and Validity

Constructs Reliability and Validity	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
IT Adoption Innovation	0.913	0.931	0.659
IT Governance	0.904	0.923	0.599
IT Service Management	0.934	0.948	0.753
Information Service Performance for Higher Education	0.935	0.946	0.659

Referring to the result of each construct of Outer Model (see Figure 1), the most dominant indicators are ITAI3 (perceived easy to use), ITG5 (strategic planning of information system), ITSM2 (continuity of information availability), and ISPHE3 (assurance of information availability) with the loading factors of 0.876, 0.850, 0.921, and 0.870, respectively. However, the worst indicators are ITAI7 (motivation of competitiveness), ITG1 (existence of IT steering committee in providing information services), ITSM6 (well-operated information services), and ISPHE4 (availability of punctual information) posses the loading factors of 0.731, 0.707, 0.786, and 0.740, respectively.

Analysis of GoF Inner Model (Structural Model)

The inner Model analysis is carried out to ensure that all variables are significant. The t-value is compared with z-score. If t-value > z-score, the significance is achieved (Wijanto, 2015). Examination of the significance level of each path is conducted based on Bootstrap outputs (see Table 4). Thus, it is found that the effects are positive because the results of all paths are at, significant levels (t-value > 1.96 and probability value < 0.05).

Table 4 Path Significance Test

Path Significance Test	Original Sample	t-value	p-values
IT Innovation Adoption to IT Governance	0.761	15.153	0.000
IT Innovation Adoption to IT Service Management	0.603	5.026	0.000
IT Innovation Adoption to IT Information Service Performance for Higher Education	0.217	2.813	0.005
IT Governance to IT Service Management	0.296	2.419	0.016
IT Service Management to IT Information Service Performance for Higher Education	0.697	9.687	0.000

Based on R Square-Adjusted, IT Governance = 0.574, IT Service Management = 0.717, and Information Service Performance for Higher Education = 0.779. Moreover, the result of R Square-Predictive Relevance is 0.973 or 97.3%, implying that this research model has very big predictive relevance (approaching 100%).

In addition, the results of the hypotheses shows that all the t-values > 1.96, and all p-values < 0.05 (see Table 5). From the results, hypotheses H0 is rejected, whereas H1, H2, H3, and H4 are accepted of the variable effects of IT innovation adoption on information service performance of private schools, IT innovation adoption on information service performance of private schools mediated by IT service management, IT innovation adoption on IT service management, and IT innovation adoption on IT service management through IT governance.

Table 5 Examination Results of Hypotheses

Test Results of Each Research Hypotheses	Original Sample	t-value	p-values
IT Innovation Adoption → Information Service Performance for Higher Education	0.794	22.744	0.000
IT Innovation Adoption → IT Service Management → Information Service Performance for Higher Education	0.420	4.561	0.000
IT Innovation Adoption → IT Service Management	0.828	22.866	0.000
IT Innovation Adoption → IT Governance → IT Service Management	0.225	2.207	0.028

The results indicate the effects of IT innovation adoption and IT governance for the improvement of information service performance of private schools are mediated by IT service management. This is the strategy for improving information service performance of private schools of Informatics Management and Computing in Indonesia. This strategy also assists in enhancing the capabilities of IT service management to support and deliver information services. IT service management supported through effective and efficient academic information systems. Information service performance of all private schools of Informatics Management and Computing in Indonesia significantly depends on the IT application portfolios for the continuity and availability of information services of academic administration.

Availability and continuity of information services are critical for managing all administration needs, and information system internal quality assurance for private schools. More importantly, external information is fulfilled because of the assessment of accreditation. To actualize information services accurately and accountable, effective management of IT services and adopt IT innovation should be developed. Integration of IT innovation adoption requires users to develop new ways of achieving the project objectives. Readiness to work with IT innovation is required to create IT governance and IT service management as IT governance possesses essential roles in integrating all forms of IT application portfolios and operation of IT service management.

Conclusions

Analysis of the results reveals that all variables have significant direct effects for improving information service management of private schools. The significance results of each path coefficient are H1 = 0.794, H2 = 0.420, H3 = 0.828, and H4 = 0.225, revealing. That important indicators are required for improving information service performance of private schools.

A number of important indicators that requires immediate attention are as follows: (a) In IT innovation adoption, there is a need for the development of IT application portfolios. Knowledge of human resources on IT innovation should be improved, and innovation of IT application portfolios should motivate users; (b) For IT governance, IT steering committee needs to be active, and IT strategy committee should be better trained to provide information services based on information needs of the users; (c) For IT service management, IT service operation should be improved to fulfill information needs of each work unit; (d) Private schools information service performance should be designed to enhance the availability of information and fulfillment the information needs for managing the information assurance. Thus, future research required for the application portfolios of IT services management, using factors, such as demography, intensity, and users' behaviors for the effective implementation of IT service management based on the IT innovation adoption

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