

Determinant Factors in the Implementation of Information Technology Strategic Management to Academicians' Performance in Higher Education Institution

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ABSTRACT

This study aimed to understand the determinant factors of information technology (IT) strategic management to individual (lecturer) performance using data samples from selected higher education institutions in Indonesia. Since the use of IT innovation in (HEI) is often considered a lens representing the strength of strategy, competitiveness, and quality within a corporate view, it is vague on its impact on individual performance. The investigation included data collection based on an online survey conducted on 325 respondents to investigate the relationship between strategic factors, elaborated into several relevant criteria. The results of statistical data processing showed that of all the strategic factors involved, the business model and strategic alignment categorized in high determinations in influencing academicians' performance at HEI

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1. INTRODUCTION

Information technology is the organizations' backbone to increase competitiveness. As an organization, a Higher Education Institution (HEI) is required to have a strategy in providing qualified and competitive services to the stakeholders to achieve a predetermined target. Hardware, software, and brainware are the primary resources for universities in serving the needs of their stakeholders. Besides, HEI must understand the environmental conditions that impact the existence of the HEI itself and vice versa so that the community can recognize its existence. The implementation of an HEI contains at least five dimensions including: 1) scientific; 2) educational; 3) social; 4) ethics, and; 5) the corporation dimension [1]. These five dimensions are the main foundation of HEI as a public service institution in serving the needs of its customers [2].

Based on the process, the targeted customers are divided into two categories, namely internal (e.g. faculty and student) and external (student, employer, and society or government) [2]. Furthermore, to improve the quality of services to the customers, HEI requires to utilize information and communication technology as increasing learning experience [3], services quality over time, aligning and supporting business strategies, controlling and minimizing IT risks and increasing stakeholder's value and reduce cost [4]. With the fulfillment of task characteristics, user characteristics, social characteristics, project characteristics, and organizational characteristics [5]. For the internal, the effects are the affirmation of the institutional process, assessments, and performance outcomes, while for the external, by communicating the results of the process [6]. This process cannot be carried out without a management process and policies that support implementing information and communication technology at the HEI.

One of the steps that can be taken to improve these services is to pay attention to policies related to IT governance [4]. This policy will later control the use of IT and communication, including information systems on the HEI to provide services to its customers. This IT service is in line with the Quality Management

System (QMS) and IT Service Management System (ITSM) policies which are ISO: 9001 to ISO/ IEC 20000-1 standard [7].

The question is how far HEI can adopt fully applicable information technology to achieve customer satisfaction. The challenges HEI faces vary due to differences in colonial influence, geographic boundaries, language, developmental stage, and policy priorities [8]. For this reason, the study will examine the determinants that influence the application of information technology on HEI in serving both internal and external customers, especially academicians who are directly involved in the activities and existence of HEI.

2. METHOD

2.1. Research Flow

Figure 1 below illustrates the overall stages of the study.



Figure 1. The research flows

The ITSM concept and model comparison process were carried out at the literature study stage in the previous research. The results of this comparison determines the elements used as independent variables which are divided into three categories, namely technological innovation [9]–[20], business model [4], [13], [15], [18], [21]–[24], and strategic alignment [12], [14], [25]–[27]. The questionnaire stage includes designing, distributing, and collecting data from three HIE in West Java, Indonesia. The statistical analysis stage includes an explanation of the analysis of the survey data results to conclude the research results using statistical methods to find the correlation between the determinant factors that support academicians' performance in higher education. The final stage is the research result in the form of a conclusion explaining the influence of the determinant factors in technological innovation, business models, and strategic alignment in the application of ITSM to academic performance in HEI.

2.2. Previous Research

Many factors become the background for implementing information technology strategic management in HEI. In the previous research, Slamet (2019) explained that the environment of SMIT encompasses four primary layers [25]: organization theory [2], [5], [6], business strategy [5], [7], information systems (IS) planning, and IS strategy. In line with Pereira and Da Silva (2003) and Kirkwood and Price (2014), HEI as an organization that carries out the educational process is divided into two categories: the teaching process and the learning process [2], [3]. At this point, the temporary conclusion leads to that the HEI should serve customers consisting of internal (faculty and student) and external (student, employer, and society/government) [2], by adopting appropriate and efficient technology [3], and implementing a framework that supporting IT governance [4] to improve the quality of teaching process and learning process services.

However, the HEI have different manners and results when applying technology. The association between information technology and organizational performance are divergent in how they conceptualize key constructs and their interrelationships [28], [29]. Performance improvement and setting the long-term objectives clearly needs to integrate these dimensions [30]. Table 1 below lists several studies explaining the relationship between factors that affect the activities of implementing ITSM on the HEI at different levels.

Table 1. Summary of Study Comparison

References	Research Variable			Research Strategy
	Independent	Dependent	Other	
Devaraj & Kohli (2003) [10]	Technology usage	Firm performance		
Melville & Kraemer (2004) [13]	IT business value	Organization performance	Competitive advantage	organizational level
Floodstrom (2006) [26]	Strategic alignment; agility	Organization performance	Competitive advantage	
Norzaiddi et al. (2007) [31]	Intranet usage	Managers' performance		individual level
Salwani et al. (2009) [23]	E-commerce usage	Business performance		
Tallon & Pinsonneault (2011) [14]	Strategic alignment; agility	Organization performance		organizational level

Table 1. Summary of Study Comparison

References	Research Variable			Research Strategy
	Independent	Dependent	Other	
Hong & Ghobakloo (2013) [32]	IT Investment	Marketing performance		
Fuller & Haefliger (2013) [15]	Technological innovation; business model	Organization performance		
Melville et al. (2013) [33]	IT usage (transaction & partnering)	Labours productivities, total inventory	Demand volatility	
Sakas, et al. (2014) [16]	Competitive advantage	Organization performance		
Iyengar, Sweeney, & Montealegre (2015) [17]	IT Use	Effectiveness in knowledge transfer, absorptive capacity, franchisee performance		
Wamba et al. (2017) [27]	Big data analytics capability	Firm performance	Process-oriented dynamic-capability	
Luftman, Lyytinen, & Zvi (2017) [22]	IT-business alignment	Company performance		
Moqbel & Fiona (2017) [34]	Enterprise social media	Knowledge workers' performance	Workplace integration, positive emotions	individual level
Mikalef & Pateli (2017) [18]	IT-enable dynamic capabilities	Competitive performance	Organizational agility	organizational level
Ramanathan et al. (2017) [21]	Business analytics	Firm performance	adoption level, IT integration & trust	level
Mauerhoefer, Strese, Brettel (2017) [19]	Firm-level IT capability	New product development performance	Usage frequency, competence	individual level
Burns et al. (2018) [20]	Project governance, IT governance	Project performance	Strategic alignment	
Wang, Wang, & McLeod (2018) [11]	IT investment	Financial performance and productivity	Intermediate business process	organizational level
Chege, Wang, & Suntu (2020) [35]	IT innovation, organization structure, business environment	Firm performance	Innovativeness, firm development	
Slamet (2019) [25]	Technological Innovation, Business Model, & Strategic alignment	Academicians' performance		individual level

The authors consider that the overall variables studied can be collaborated into three main concepts: technological innovation, business models, and strategic alignment. These three concepts are considered more relevant to explain how the SMIT process correlates with performance in an organization.

2.3. The Data

In this research, all respondent attributes were filled in completely so that the data distribution was considered feasible and representative to describe the instrument's objective conditions to be measured. Table 2 depicts the variables of respondents into several categories.

Table 2. Variables of Respondents

Variable	Type	Sum	Percentage
Gender	Male	177	54%
	Female	148	46%
Work time	0 - 5	92	28,30%
	5 - 10	71	21,85%
	> 10	162	49,85%
Status	1) Lecture	166	51%
	2) Lecture with structural position	159	49%

Moreover, to determine the size of IT implementation on HEI, this study provides six categories rating of each variable. The calculating class length at each interval using the following equations:

$$P = \frac{X_{max} - X_{min}}{b} = \frac{R}{b}$$

Where:

- P** = The length of the class at each interval
- X_{max}** = maximum value
- X_{min}** = minimum value
- R** = range (data distance)
- b** = number of classes

The equation results in the following value:

$$P = \frac{6 - 1}{6} = \frac{5}{6} = 0.83$$

Table 3 below presents the Score Assessment Interval.

Table 3. Score Assessment Interval

Average Value	Rating Category
≥ 1 dan ≤ 1.83	Very low
> 1.83 dan ≤ 2.67	Low
> 2.67 dan ≤ 3.50	Tend to be low
> 3.50 dan ≤ 4.33	Tend to be high
> 4.33 dan ≤ 5.17	High
> 5.17 dan ≤ 6	Very high

3. RESULTS AND DISCUSSION

This section will explain descriptive statistical analysis using a linear model to predict the correlation between academicians' performance variables influenced by technology innovation, business models, and strategic alignment. Figure 2 presents the process of calculating the regression analysis carried out on the survey data.

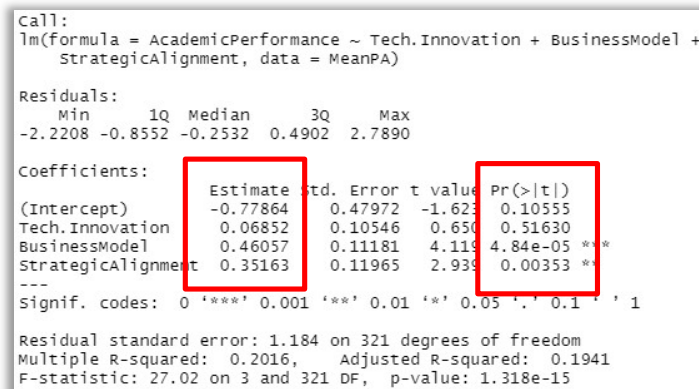


Figure 2. Correlation of Technological Innovation, Business Model, Strategic Alignment to the Academician Performance

From Figure 2, an estimate is obtained for the beta coefficient (Estimate column) and significant value (column Pr (> |t|)) for each variable. The Technological Innovation variable has an estimate of 0.06852, the Business Model variable has an estimate of 0.46057, and the Strategic Alignment has an estimate of 0.35163. At this point, it can be analyzed that the correlation between the three variables with Academicians' Performance where Business Model and Strategic Alignment are more significant influence than Technological Innovation.

The next step, to reduce the problems that occur in the correlation between variables, a stepwise regression process is carried out [36], [37]. This step aims to improve which variables that have a strong correlation with the dependent variable, Academicians Performance. If it is not possible to improve the fitting value during the iterative process, then the variable will be eliminated, which causes the correlation with the

dependent variable to be insignificant. Adjustment of fitting values was performed using the AIC metric [38], [39] to estimate the quality of each variable. Figure 3 below shows the stepwise regression process.

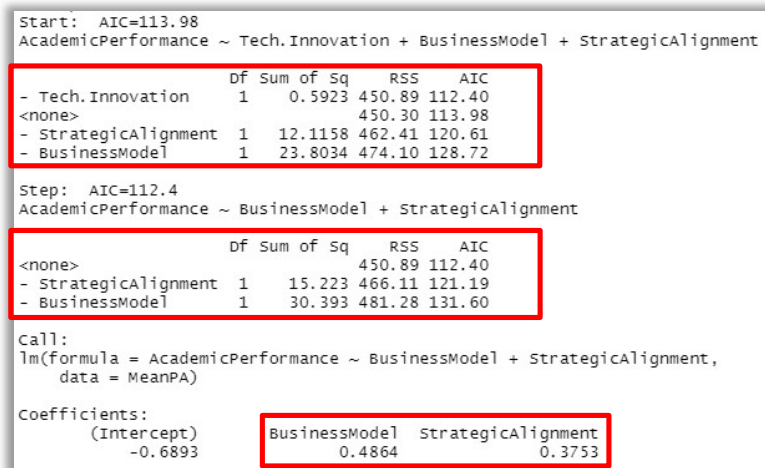


Figure 3. Stepwise Regression Process

Having given the result of a stepwise regression process, the variable of Technological Innovation are eliminated. This is because the estimated value for this variable at the iteration stage (AIC metric = 112.4) cannot be corrected for the correlation with the value of the dependent variable. So that in the next iteration, the Technological Innovation variable is excluded in estimating the correlation value between the variables being compared. So that the variables that correlate and influence Academicians Performance are obtained, namely the Business Model and Strategic Alignment.

Figure 4 below depicts the plotting result obtained after fitting the model to the survey data. It can be analyzed that the influence of the Business Model and Strategic Alignment continues to increase until the interval 3.7 - 4.9 it is *Tend To Be High - High* (based on Score Assessment Interval table).

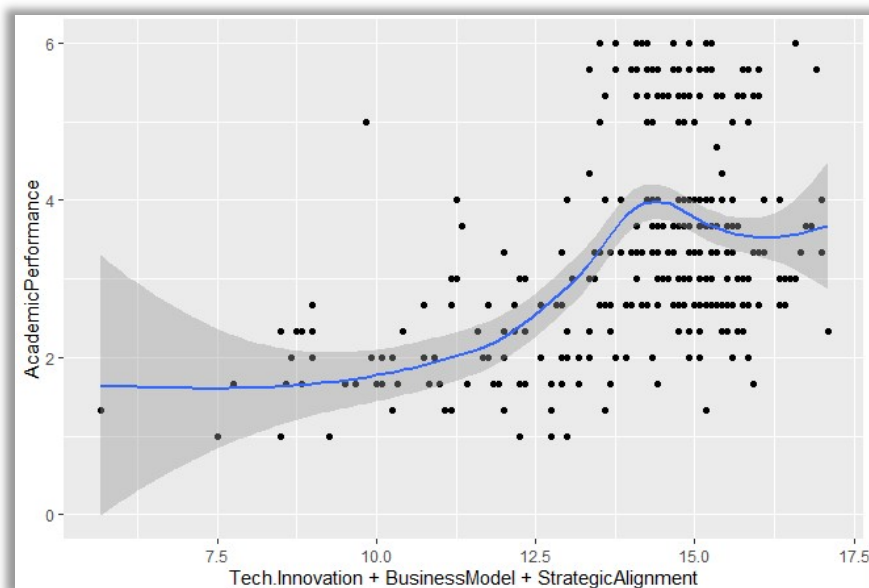


Figure 4. Plot the model

However, for a long-term implementation the influence of the variables may decrease as seen in figure 4. In terms of technological innovation, it requires sophisticated reasoning about the purpose of each

intervention, evaluation design and interpretation of the results in a particular educational context so as to contribute to effective education [3]. Furthermore, from a business perspective, the connection between business model choice and technology is two-way and complex [15]. Yet, the technology will itself influence business model possibilities such as adapted information technology [15] influence many sector. Furthermore, in terms of strategy alignment, advances in information technology (IT) have enabled firms to increasingly rely on open innovation [12].

4. CONCLUSION

Having analyzed the result of survey data, it is concluded that the determinant factors that influence the Academicians Performance are the Business Model and Strategic Alignment. In addition, the technological innovation factors focus on technical attributes (products and processes). The business model factor is related to managerial aspects that are formulated as a form of business strategy created by HEI. In contrast, the strategic alignment factor will be focused on the blending mechanisms of the concept in strategic management and information technology. Since many organizations utilize technology (infrastructures and applications) in a case-by-case approach, the result of this study will be relevant for the top management in an HEI as holistic guidance to their focus on improving academicians' performance by integrating technological approach. It would provide better advice for all levels of the organization on the crucial point of what they are doing with SMIT, make managers more aware of changes, new opportunities, and threat. Providing the managers' rationale that make sense regarding the priority allocation of resources owned by the HEI, guiding to integrate various decisions related to specific strategies carried out by multi-layer managers in various fields in HEI, and creating a management manner that is more proactive than to be reactive.

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