

The IT Governance Role on Internal Accountability and Performance in Higher Education Institutions: Testing the Intervening Role of IT Capabilities and Performance Measurement System

Hafiez Sofyani¹ ✉, Suryo Pratolo², and Wahyu Manuhara Putra³

^{1,2,3}Department of Accounting, Faculty of Economics and Business,
Universitas Muhammadiyah Yogyakarta

DOI: <http://dx.doi.org/10.15294/jda.v15i2.43150>

Submitted: March 8th, 2023 Revised: April 25th, 2023 Accepted: September 6th, 2023 Published: September 11th, 2023

Abstract

Purposes: This study examined the role of IT governance practices on the internal accountability and performance of higher education institutions (HEIs) through two intervening variables: performance measurement system (PMS) and IT capabilities.

Methods: This study involved HEIs in Java Island using a survey approach with hypothesis testing. A structural equation modelling-partial least square technique (SEM-PLS) was employed to analyze the data of 1,477 HEIs located on Java Island, 149 HEIs (10.08%) were successfully included in this study.

Findings: The results implied that IT governance could directly promote good PMS implementation and IT capabilities. Furthermore, IT governance was found not to be directly related to internal accountability and performance of HEIs, but it had to go through the PMS implementation as intervening. These results indicate that good IT governance does not necessarily provide added value to HEIs if a good PMS implementation does not accompany it.

Novelty: This study presents empirical evidence that addresses the research gap on the role of IT governance on internal accountability and performance by putting the PMS policy as an intervening variable. This study also presents novelty in setting, namely HEIs, where competitive advantage is needed to maintain viability amid increasingly tough HEIs competition.

Keywords: *IT Governance, Internal Accountability, Performance, Performance Measurement System, IT Capabilities, Higher Education Institutions.*

How to cite (APA 7th Style)

Sofyani, H., Pratolo, S., & Putra, W. M. (2023). *The IT Governance Role on Internal Accountability and Performance in Higher Education Institutions: Testing the Intervening Role of IT Capabilities and Performance Measurement System*. *Jurnal Dinamika Akuntansi*, 15(2), 166-179.

INTRODUCTION

Competition among higher education institutions (HEIs) regarding ranking and accreditation concerns HEI management about quality issues (Tjahjadi et al., 2019). As an indicator of HEI quality, internal accountability and performance of HEIs are also in the spotlight. However, accountability and performance of HEIs in developing countries, for example, Indonesia, are still unsatisfactory (Pratolo et al., 2020). Therefore, to improve the ranking position and accreditation

author (✉)

E-mail: hafiez.sofyani@umy.ac.id

status, accountability and performance continue to be the object of improvement in the HEI environment. Various policies have been pursued to achieve this goal, including investing in information technology (IT) (Sofyani, Tahar, et al., 2022). However, to make IT investment benefits the organization, various works of literature require effective IT governance practices. Several studies have noted that effective IT governance can improve accountability and organizational performance (Chau et al., 2020; Tahar et al., 2021; Zhen et al., 2021). However, these various studies only focus on this issue in the realm of companies and government institutions, while in the HEIs sector, the related studies are still lagging (Sofyani, Tahar, et al., 2022).

Some early studies related to IT governance noted that the goal of IT governance is to improve accountability and performance as it aims at five issues, namely: (1) ensuring the intercourse between business plans and IT (strategic alignment); (2) handling of IT asset security (risk management); (3) securing optimal investment (management resources); (4) tracking project delivery (performance measurement); and (5) optimizing IT spending and IT value (ITGI, 2003; Sofyani et al., 2020; Webb et al., 2006a). These indicators are prerequisites for accountability and organizational performance to be pursued. Asiaei et al. (2021) found that PMS policy drove organizations to orchestrate other internal resources to pursue organizational achievement targets. In addition, several studies also noted that the role of IT aspects in improving performance could only be done by placing it as a strategic tool; hence, there is a demand that an organization's IT policy organization synchronize with other policies (Ali et al., 2015). Strategic Tool refers to IT is not only treated as a tool, but more than it, IT becomes an instrument that can be used to support an organization's business implementation, for example, value creation, risk mitigation, and performance measurement (Ali et al., 2015; Jatmiko et al., 2022; Sofyani et al., 2020). For example, several HEIs are developing e-learning, e-monitoring, e-auditing/assurance, and e-services in a more advanced manner to increase value, performance, and quality, satisfy existing students, and attract prospective students. Based on this understanding, the relationship between IT governance, accountability and performance may only be able to contribute to the organization if they are carried out in a harmonious and well-synchronized manner. This claim aligns with the proposed resource orchestration theory (Asiaei et al., 2021; Sirmon et al., 2011; Sofyani, Hasan, et al., 2022). However, related studies that provide empirical evidence regarding this claim are still lacking, especially in this research topic in the context of the HEIs environment. To answer these gaps, this study was initiated.

In addition to IT governance issues, the pursuit of accountability and performance at HEI is mainly related to initiating the performance measurement system (PMS) and IT capabilities policies (Nazaruddin et al., 2020; Tahar et al., 2022). However, previous studies have argued that PMS cannot always contribute to the pursuit of performance in HEI. Implementing PMS may be considered complex and unsuitable for work culture in an academic environment. This differs from the work culture in companies full of performance targets (Decramer et al., 2013). Because of this condition, PMS often fails to be adequately implemented and to benefit the HEIs. On the other hand, although several studies have highlighted the importance of IT capabilities to support accountability and performance (Sofyani, Tahar, et al., 2022; Tahar et al., 2021; Teng & Tsinopoulos, 2021), studies examining its determinants are still lacking. Addressing these gaps, thus, the current study also examines whether effective IT governance promotes exemplary PMS implementation and IT capabilities.

Based on the preceding discussions, this study explicitly answers the research gap related to the role of IT governance on internal accountability and HEI performance by positioning PMS and IT capabilities as intervenings. This study also examines the direct role of IT governance on PMS and IT capabilities. By so doing, this study provides a new discussion related to IT governance issues in the realm of HEI. This study also adds to the debate on the role of IT aspects and PMS implementation in determining HEI accountability and performance, which is described from the perspective of resource orchestration theory. Apart from the research gap, this study is crucial, considering that the issue of improving the quality of HEI is still a hot topic today,

especially in the era of ranking and accreditation competitions. Despite the pros and cons, the HEI competition, however, could encourage an increase in the quality of education. The quality of education itself is regarded as a critical factor in a country's future progress. Practically, this study provides valuable input for HEI management to highlight how internal resources within HEI must be managed and organized to contribute to internal accountability and performance as part of HEI quality indicators. In the context of this study, the internal resources in question are related to IT and PMS implementation.

Theory and Hypotheses

Explicitly this study uses resources orchestration theory, which premises that organisations must manage their internal resources well, harmoniously and integrated to achieve a competitive advantage, usually indicated by organizational performance and achieving accountability (Sirmon et al., 2011). Explicitly, Sirmon et al. (2011) explain, through this theory, that the orchestration process is carried out in three ways: structuring, bundling and leveraging the organization's resources. According to Sirmon et al. (2011), external resource acquisition, internal resource accumulation, and divesting disposable resources are all parts of the first step of structuring the resource portfolio. The second step is to combine resources into capabilities by making minor adjustments (i.e., stabilizing), enhancing present capabilities, or using novel methods to create new capabilities. Finally, these capabilities must be utilized through three subprocesses: mobilization, coordination, and physical deployment in the product market. Mobilization involves identifying the necessary qualifications and coordination and integrating them into capability configurations.

Bringing this theory to the context of this research, it is argued that for higher education institutions to achieve superior performance and good accountability, the development of IT must be accompanied by the creation of IT capabilities and the effectiveness of performance measurement (Asiaei et al., 2021; Zhou et al., 2017). IT's ability to quickly respond to environmental changes is a critical necessity for today's higher education success and accountability. For example, Sofyani, Tahar, et al. (2022) found that universities that can adapt during the COVID-19 pandemic to the demands of online operating policies, which can only be achieved through increasing IT capabilities, are a crucial determinant for increasing accountability and performance of higher education institutions. In another context PMS implementation becomes a vital determinant in achieving higher education performance. On the other hand, according to Sofyani et al. (2020) and some scholars (Ali et al., 2015; Chae et al., 2018; Sardjono & Retnowardhani, 2019), the development of IT does not always bring benefits if the IT orchestration with performance teaching does not work effectively. Meanwhile, Asiaei et al. (2021) revealed that PMS is an essential mediator between knowledge assets and organizational performance. Considering this, there is a PMS potential to mediate the relationship between IT and higher education performance and accountability. The PMS's implementation for sub-units and personnel aims to get precise information about their performance goals (Nazaruddin et al., 2020). In the meantime, IT governance develops into a tactical tool for achieving the organization's vision (Khouja et al., 2018). As such, it stands to reason that when IT governance and PMS are implemented in a company cooperatively, performance improvement and internal responsibility will result.

Hypothesis Development

IT governance is made up of five fundamental content domains, as previously described in various studies: (1) ensuring the relationship between business and IT plans (strategic alignment); (2) maximizing IT expenditure and demonstrating the value of IT (value delivery); (3) ensuring optimal investment and proper management of crucial IT resources (resource management); (4) handling the security of IT assets, disaster recovery, and continuity of operations (risk management); and (5) monitoring IT services (performance measurement) (Meyer et al., 2003; Webb et al., 2006b). According to several studies (De Haes & Van Grembergen, 2008; Ilmudeen, 2022), Zhang et al. (2016) argued that IT governance entails a set of methods for assuring the development of essential IT competencies since it has an impact on a company's ability to promote

company synergies across business units. As a result, we suggest that there is a connection between IT governance and IT competence because IT governance provides a strong incentive for enterprises to develop their superior IT skills. According to the IT Governance Institute, IT governance is as important at the board and management levels as corporate governance. The institute also offers frameworks to help enterprise leaders ensure that IT supports business objectives, makes the most of IT investment, and manages risks and opportunities effectively (Wilkin & Chenhall, 2010). According to the justifications above, the following hypothesis is reasonable to be formulated:

H₁: IT governance is associated with IT Capabilities.

In implementing PMS, the following actions are necessary: 1) Data creation: the rules, practices, and systems needed to create the necessary data; 2) Data Collection: The policies, procedures, and systems necessary for data collection at regular intervals; 3) Data Analysis: The policies, procedures, and systems necessary to transform the collected data into useful information, such as trend charts, comparison charts, summary reports, statistical analysis, etc.; and 4) Information Distribution: the systems, rules, and processes necessary to convey this information to the appropriate individuals at the appropriate time to assist decision-making (Nudurupati & Bititci, 2005). However, implementing PMS fails in many businesses due to lacking IT assistance (Järvinen & Karjaluoto, 2015). Effective IT governance is needed to align the needs of the four activities above (Bovaird, 2005). For example, when an organization has determined what key performance indicators must be achieved, an effective and efficient way of collecting, processing and reporting data must be made so that the feedback decision-making process in pursuit of performance can be carried out quickly. Effective IT governance will be able to orchestrate all the needs for an effective PMS implementation (Tahar et al., 2021). From this insight, the following hypothesis is formulated.

H₂: IT governance is associated with effective PMS implementation.

To improve accountability and regulatory compliance, several leading firms have already turned to IT governance (Lee et al., 2008). The adoption of good governance practices by organizations is the ITG's ultimate objective (Bailey et al., 2017). Responsiveness, accountability, and openness are the three basic tenets of good governance in local governments (Ulum & Sofyani, 2016). With IT governance and IT assistance, the organization will be more aware of the need to emphasize service delivery to the community through IT by boosting the effectiveness and efficiency of services provided through e-government. The IT can be planned to work in harmony with the entity's operations. The same situation may also apply to HEI, considering that the main objective of HEI is not much different from local government, namely the delivery of services in the form of quality education. According to Sofyani et al. (2020), good IT governance could influence service quality favourably and enhance either accountability or transparency procedures in the Indonesian local government. In the context of higher education, it was found that IT governance was also able to build accelerated capabilities to continue to fulfil accountability even amid the COVID-19 pandemic (Sofyani, Tahar, et al., 2022). Based on the above arguments, it is logical to hypothesize as follows:

H₃: IT governance is associated with internal accountability.

Not only focusing on accountability, but IT governance is also intended to increase organizational performance, which is its primary goal (Tahar et al., 2021). Effectively designed IT governance suits the organisation's business processes, business models, and strategies (Ali et al., 2015). In this condition, the organization will position IT as a tool and a strategic instrument to provide a competitive advantage (Weill & Ross, 2004). For example, with adequate IT governance, Sofyani, Tahar, et al. (2022) found that higher education performance can still be pursued despite the COVID-19 pandemic crisis. Additionally, IT governance is crucial for minimizing the flaws

and hazards that impede attempts to achieve the best possible performance in the company's operations (Syafei, 2015). Bianchi and Sousa (2016) discovered that the performance of HEIs in terms of student learning, teaching, and research activities was significantly impacted by IT governance in the study setting of HEIs. Based on the above arguments, the following hypothesis was derived:

H₄: IT governance is associated with performance.

Various literatures have highlighted the importance of IT capabilities in improving organizational performance (Chae et al., 2018; Chae et al., 2014). van de Wetering and Besuyen (2021) defined IT capabilities as a firm's ability to mobilize and deploy IT-based resources in conjunction or co-present with other resources and capabilities to separate itself from the competition. An organization with outstanding IT capabilities can constantly update its IT application portfolio and establish innovative IT resource combinations to improve accountability and performance (Queiroz et al., 2018; Sofyani, Tahar, et al., 2022). Increased IT capabilities could include, for example, a new customer service site to replace outdated, inefficient methods of transmitting service requests, such as email and fax. As a result, the company may be able to cut costs, streamline procedures, and grow its market (Queiroz et al., 2018).

On the other hand, IT governance is defined as top management's ability to control the formulation and implementation of IT strategies through organizational structures and processes that produce desirable behaviours, ensuring that IT initiatives sustain and extend the organization's strategy and objectives (Bradley et al., 2012). From this, it can be concluded that IT capability is one of the goals of IT governance. Departing from this logic, it is predicted that effective IT governance will increase IT capabilities, promoting increased internal accountability and performance.

H₅: IT governance is associated with internal accountability (H_{5a}) and performance (H_{5b}) through IT capabilities.

Another essential issue in HEIs to improve performance and accountability practices is PMS practices (Guerra-López & Hutchinson, 2013). Various studies have provided empirical evidence regarding the importance of an effective PMS in improving employee and organizational performance (Star et al., 2016). A PMS provides clear indicators of accomplishment targets that lecturers must meet to support the aims of their business. These specific goals will boost performance on their own (Locke & Latham, 2013). PMS is also useful for new academics who have recently joined an HEI and may not yet know their responsibilities as lecturers (Nazaruddin

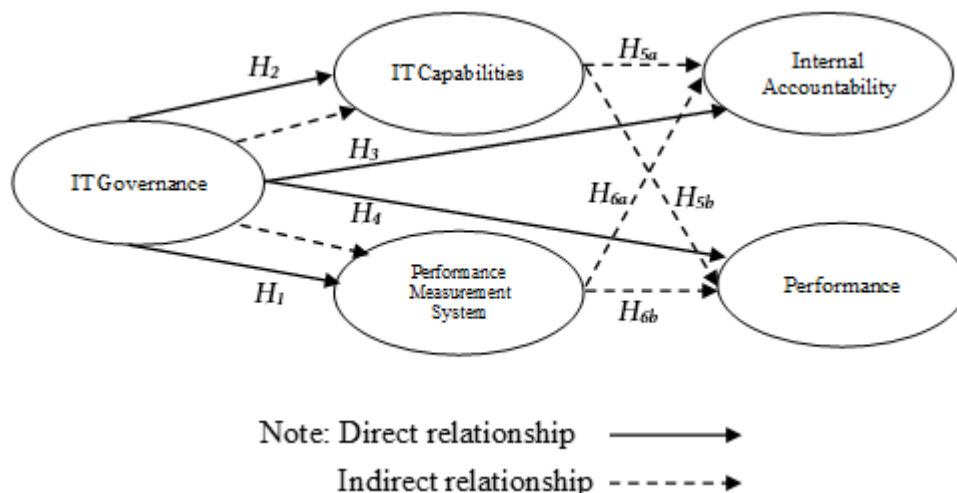


Figure 1. Research Model
(Source: Formulated by Researchers)

et al., 2020).

On the one hand, IT governance is a supporting aspect for management processes, governance mechanisms, and practices to run well. Considering the logic in the development of hypothesis 2, where IT governance will support PMS implementation while PMS itself will lead to performance achievement, it can be predicted that PMS will have an intervening role in the relationship between IT governance and HEIs accountability and performance. Based on the preceding discussion, the following hypothesis is formulated:

H₆: IT governance is associated with internal accountability (H_{6a}) and performance (H_{6b}) through effective PMS implementation.

Based on theoretical exploration and hypotheses development, the research model is manifested in Figure 1.

METHODS

This research was conducted with a survey method by distributing questionnaires and analyzing the data using a statistical approach. This puts this research into the category of quantitative or positivism. The sample of this research is HEIs located in several provinces on the island of Java, Indonesia. Thus, cluster sampling was used to select samples and distribute questionnaires by considering the number of provinces on Java Island. HEIs in Java were chosen as samples as most Indonesia-developed HEIs are on this island. Also, the variation of HEIs in Java is sufficient to represent all HEIs in Indonesia, for instance, in terms of the owner (public or private) and the size and type (academy, specialized school, institute, and university). For filling out the questionnaire, the respondents involved are those who are considered capable of answering the questions in the questionnaire (Sekaran & Bougie, 2019). Therefore, structural officials at the study program level, deans and even top management were involved in filling out

Table 1. The Distribution of the Sample

No	Characteristics	Description	Frequency	(%)
1	Types of University	Number of samples	149	100
		Polytechnic	7	5
		Specialized School	53	36
		University	68	45
		Institute	5	3
		Academy	16	11
		2	Accreditation	Number of samples
A	14	8		
B	68	46		
C	41	28		
Unaccredited	26	17		
3	Province	Number of samples	149	100
		West Java	25	17
		Banten	25	17
		Jadebek	25	17
		Central Java	21	14
		East Java	29	19
		Daerah Istimewa Yogyakarta	24	16

Source: Processed Data

the questionnaire. Table 1 presents the distribution of samples from this study that were collected.

The variable measurement instrument refers to several previous studies that have been carried out previously in Indonesia. Therefore, a pilot study was not conducted. However, discussions between researchers were performed three times to ensure the questionnaire's validity, reliability and readability. The IT governance variable was adopted from the study by Sofyani, Tahar, et al. (2022), internal accountability was referred to a study by Suzan et al. (2020), and the performance measurement system was adopted from the research of Chen et al. (2009). Meanwhile, Pratolo et al. (2016) and Sofyani, Hasan, et al. (2022).

This study used Partial Least Squares-Structural Equation Modelling (PLS-SEM) to test the hypotheses. The PLS-SEM is appropriate for use in this study as it focuses on testing the relationship among variables instead of the goodness of fit of the research model. Besides, the PLS allows a study with a relatively small sample size, around 100s, and a theoretical foundation that is not strong yet (Chin et al., 2003); in this case, resource orchestration theory was utilized in the HEI sector study context. Hair et al. (2010) advised that the minimum sample size when using PLS-SEM as an analysis technique is the '10 times rule'. It means the sample size should be greater than a variable with the highest number of indicators within a model. In this study, internal accountability and PMS implementation were the variables with a maximum number of indicators (5). Therefore, as Hair et al. (2010), the minimum sample size should be 50 (5x10). The minimum sample size requirement has been met, with 149 samples successfully collected for this study.

RESULTS AND DISCUSSION

Result

Table 2 presents the results of the descriptive statistical analysis. It can be seen that, in general, the average respondent answered that the observed variable was at a high level, indicating a mean value above 4. This suggests that IT development in HEI on the island of Java is relatively advanced. This is the positive side of the COVID-19 pandemic, which has forced HEIs to develop their IT capabilities and governance. The internal accountability variable is also perceived as high, meaning the HEI financial governance process is becoming more accountable. However, the average performance of HEI is still considered to be at a moderate level, below a scale of 4. This is in line with the findings of Pratolo et al. (2020), where HEI performance in Indonesia is relatively still not optimal. Compared to HEI in Malaysia, Singapore and Thailand, HEI in Indonesia can still not compete. Additionally, there are HEIs whose PMS implementation is still low, indicated by a minimum score of 1.60. This could also mean that many HEIs outside Java are still weak in implementing PMS.

Before hypothesis testing was performed, validity and reliability tests were conducted on the instrument to ensure the quality of the data collected. It should be noted that the validity test on the SEM-PLS includes convergent and discriminant validity tests where to ensure the fulfilment of these two validity conditions, the outer loading and discriminant validity values of Fornell and Larcker are referenced. In the first test, it was found that some of the loadings of the indicators were less than 0.5, so referring to Hair et al. (2021), the low value should be removed. In a second test, the results implied that all rules of thumb of convergent validity, discriminant

Table 2. Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
IT Governance	2.20	5.00	4.1194	0.56659
IT Capabilities	2.20	5.00	4.1806	0.55337
Performance Measurement System	1.60	5.00	4.0409	0.57483
Internal Accountability	2.00	5.00	4.2194	0.52941
Performance	2.00	5.00	3.8290	0.54049

Table 3. Outer Loading

Variables/Statement of Indicator	Loading
<i>Internal Accountability</i>	
HEI budgeting and disbursement are carried out based on the operating standards set.	0.781
The use of funds in HEI is accounted for and supported by correct evidence.	0.794
At HEI, financial statements are audited by an internal supervisory unit or a public accounting firm.	0.747
HEI always reports the procurement of facilities and infrastructure based on regulations that have stipulations.	0.810
<i>Performance</i>	
HEI procures goods/services with price selection to get the cheapest goods/services but still follows the quality standards of goods/services set.	0.801
HEI uses resources in the form of goods to maximize the outcomes that have been set.	0.760
HEI uses resources in the form of services to maximize the outcomes that have been set.	0.727
The teaching and learning process in the classroom achieves the objectives according to the SLP (semester lesson plan).	0.647
The specific level of quality of facilities and infrastructure available at HEI.	0.686
<i>IT Capabilities</i>	
An effective information system supports administrative services at HEI.	0.749
Information Technology staff at HEI have qualified skills.	0.762
HEI is equipped with complete hardware that meets learning needs.	0.787
HEI is equipped with an internet network and sufficient bandwidth.	0.781
<i>Performance Measurement System Implementation</i>	
Based on performance information, HEI is taking follow-up actions to improve organizational performance.	0.808
At HEI, the performance measurement system at the work unit is carried out quickly and on time.	0.855
Based on personnel information, HEI follows up on improving the performance of lecturers and education staff.	0.733
At HEI, the quality of the personnel performance measurement system is evaluated every period.	0.830
The personnel performance measurement system at HEI is conducted quickly and on time.	0.851
<i>IT Governance</i>	
In developing information technology, HEI always bases on organizational goals.	0.762
Types of information technology developed in HEI anticipate future needs.	0.820
In software development, HEI does it transparently.	0.693
The process and results of software development at HEI are reported to stakeholders.	0.822

Source: Processed Data

validity, and reliability for all constructs had been fulfilled. The data presented in the following tables are the second test's results. Table 3 shows the loading value of each indicator, where all of them are higher than 0.5, as suggested (Hair et al., 2021). Validity fulfilment is also indicated by the AVE value of each construct which is more than 0.05 (Hair et al., 2021).

Furthermore, Table 4 presents the results of the discriminant validity test. It was found that the AVE root of each construct on the bolded diagonal line had a greater value than the correlation of the construct with other constructs. This indicates that discriminant validity has

Table 4. Discriminant Validity (Fornell and Larcker)

Construct	IA	ITG	ITC	P	PMS
Internal Accountability	0.784				
IT Governance	0.406	0.776			
IT Capabilities	0.382	0.723	0.770		
Performance	0.593	0.344	0.321	0.726	
Performance Measurement System	0.674	0.386	0.360	0.677	0.817

Source: Processed Data

been established (Fornell & Larcker, 1981; Hair et al., 2021).

Moreover, Table 5 presents the reliability test results that can be seen in Cronbach's Alpha and Composite Reliability values. In short, the reliability of the data has been met because the values of the two criteria referred to show numbers that are greater than the rule of thumbs, namely 0.6 for Cronbach's Alpha and 0.7 for Composite Reliability (Chin et al., 2003; Hair et al., 2021). With the fulfilment of the conditions of validity and reliability, the structural model testing can be continued (Table 6).

From Table 6, IT governance significantly promotes the implementation of PMS and IT capabilities. Nevertheless, it cannot directly promote the internal accountability and performance of HEIs. However, the role of IT governance in internal accountability and performance of HEIs is significant through PMS as an intervening. These results indicate that the role of PMS is purely intervening, which means that it is an essential requirement for the relationship of IT governance to the two dependent variables studied. On the one hand, the adjusted R2 value shows a moderate level, i.e., ranging from 0.458 to 0.474 (Chin, 1998). This indicates that the role of the independent and intervening variables in explaining the dependent variable is good. Therefore, the current research model must consider the practical implications.

Discussion

The current study results confirm that IT governance can enhance PMS implementation within the organization. As explained earlier, the IT governance concern includes five crucial aspects, of which performance management is one (ITGI, 2003; Webb et al., 2006a). In the current IT era, IT is essential to support the implementation of the organization's internal policies, including PMS. Technically, PMS implementation requires managing a large amount of data and information, including data on performance targets, activities, programs, interim achievements, and alignment of performance achievements with organizational goals. Good IT governance will be able to translate IT resources for PMS purposes. It, therefore, makes sense that if the IT governance is effective, then PMS implementation will also work well. The results of this study answer the research gap related to the relationship between IT governance and PMS, which is still lacking. Furthermore, this study affirms prior studies on IT governance promoting IT capabilities. IT governance involves a set of mechanisms for ensuring the attainment of necessary IT capabilities (Grembergen & De Haes, 2004), and by so doing, it can affect an organization's

Table 5. Reliability Test Results

Construct	Cronbach's Alpha	Composite Reliability
Internal Accountability	0.791	0.864
IT Governance	0.778	0.858
IT Capabilities	0.771	0.853
Performance	0.774	0.847
Performance Measurement System	0.875	0.909

Source: Processed Data

Table 6. Structural Model

Relationship	Hypo.	β	t	P-value	Conclusion
Direct					
IT Governance → PMS	H ₁	0.386	5.746	0.000	Supported
IT Governance → IT Capabilities	H ₂	0.723	18.496	0.000	Supported
IT Governance → Internal Accountability	H ₃	0.114	1.431	0.077	Unsupported
IT Governance → Performance	H ₄	0.063	0.775	0.219	Unsupported
Indirect					
IT Governance → IT Capabilities → Internal Accountability	H _{5a}	0.058	0.916	0.180	Not Intervening
IT Governance → IT Capabilities → Performance	H _{5b}	0.030	0.452	0.326	Not Intervening
IT Governance → PMS → Internal Accountability	H _{6a}	0.233	5.166	0.000	Pure Intervening
IT Governance → PMS → Performance	H _{6b}	0.246	5.147	0.000	Pure Intervening

Adjusted R²: Internal Accountability = 0.474; Performance = 0.458

Source: Processed Data

capability to leverage IT synergies across business units (Perdomo-Ortiz et al., 2009).

However, this study's results conclude that IT governance's role in internal accountability and performance of HEIs cannot occur directly but must go through PMS implementation as an intervention. This indicates how crucial the role of PMS implementation in HEIs is. Explicitly, the novelty of this study is examining the vital role of PMS as the orchestrator (mediator/intervening) of the development of IT governance to pursue performance and accountability. This was inspired by the study of Asiaei et al. (2021), which found that PMS significantly mediated the relationship between knowledge assets and organizational performance. However, studies examining the mediating role of PMS on IT governance and performance and accountability in the context of HEIs are scarce. Related studies are crucial to execute, considering IT development efforts in HEIs continue to be massively conducted to help drive performance and accountability.

On the other hand, it was also found that IT capabilities cannot intervene in the relationship between IT governance, internal accountability and HEI performance. From this study's finding, it can be deduced that an organization's IT resources may only act as a supporting aspect. Still, the most important thing to achieve internal accountability and optimal performance is organizational policies directly related to performance management, namely PMS. It is because PMS implementation can direct how IT should be managed and governed, what software is needed, what IT training is suitable for users, and what kind of IT/IS capabilities are required to support PMS. For example, to measure performance and accountability achievements, financial and management information system software is very feasible to develop. This requires synchronization between policies, organizational structures, and information needs. To design compatible IT governance, performance measurement policies need to be referenced. This aligns with previous studies deducing that an effective PMS is crucial in achieving accountability and organizational performance (Grafton et al., 2010; Nazaruddin et al., 2020; Teeratansirikool et al., 2013). Asiaei et al. (2021) concluded that PMS implementation is an organisational orchestration driver that mediates the relationship between knowledge assets and company performance. At the same time, Nasiri et al. (2020) found that PMS significantly mediates the relationship between digital-related human and collaboration capabilities and financial performance.

Based on the findings presented, the study explicitly conveys two important implications, both practically and theoretically. Practically speaking, IT development has become an urgent

need today, especially after the COVID-19 pandemic, where many HEIs have learned a lot related to IT governance to increase accountability and performance, which in the end is improving the quality of HEIs (Sofyani, Tahar, et al., 2022). However, this study emphasizes another essential point: to make IT investment value-added, HEI needs to concentrate on PMS practices running both for units within the HEIs and, individually, lecturers and employees. The ineffectiveness of PMS implementation makes organizations lack information regarding their positioning in the middle of the year and the middle of the journey to achieving goals, vision and mission. To encourage the effectiveness of PMS itself, this study deduced that IT governance is essential to be concerned about. Moreover, theoretically, this study hints at the relevance of the resource orchestration theory promoted by Sirmon et al. (2011). This study confirms the findings from Asiaei et al. (2021) that PMS implementation could drive the orchestration of other internal resources to achieve more optimal company performance.

CONCLUSIONS

This study examines the role of IT governance on internal accountability and performance of HEIs through PMS implementation and IT capacity as an intervening variable. In addition, it also examines the direct relationship between IT governance, PMS implementation, and IT capabilities. Involving 149 private HEIs on the island of Java, the results of this study conclude that effective IT governance has a direct positive relationship with PMS implementation and IT capabilities. Furthermore, it was found that IT governance only has an indirect positive relationship to internal accountability and performance of HEIs through PMS implementation. These results suggest that PMS implementation is the key to orchestrating internal resources so that IT governance can contribute to efforts to achieve internal accountability and performance, which are important indicators of HEI quality.

This study has several limitations, which then initiate suggestions for further research. First, this study only involves private HEIs on the island of Java. Therefore, the reader needs to be careful in concluding the results of this study. Further research in a broader scope is highly recommended to complement the results of this study. Second, this study is also not corroborated by the cross-validation results by testing a similar model using relevant secondary data. This is because the required secondary data is not publicly available. Thus, if cross-validation can be carried out in the future, it will undoubtedly be constructive to complement the results of this study.

REFERENCES

- Ali, S., Green, P., & Robb, A. (2015). Information technology investment governance: What is it and does it matter? *International Journal of Accounting Information Systems*, 18, 1-25.
- Asiaei, K., Rezaee, Z., Bontis, N., Barani, O., & Sapiei, N. S. (2021). Knowledge assets, capabilities and performance measurement systems: a resource orchestration theory approach. *Journal of Knowledge Management*, ahead-of-print (ahead-of-print).
- Bailey, A., Minto-Coy, I., & Thakur, D. (2017). IT governance in e-government implementations in the Caribbean: Key characteristics and mechanisms. *Information Technology Governance in Public Organizations: Theory and Practice*, 201-227.
- Bianchi, I. S., & Sousa, R. D. (2016). IT Governance mechanisms in higher education. *Procedia Computer Science*, 100, 941-946.
- Bovaird, T. (2005). Performance Measurement and Evaluation of E-government and E-governance Programmes and Initiatives. In *Practicing e-government: A global perspective* (pp. 16-42). IGI Global.
- Bradley, R. V., Byrd, T. A., Pridmore, J. L., Thrasher, E., Pratt, R. M., & Mbarika, V. W. (2012). An empirical examination of antecedents and consequences of IT governance in US hospitals. *Journal of Information Technology*, 27(2), 156-177.
- Chae, H.-C., Koh, C. E., & Park, K. O. (2018). Information technology capability and firm performance: Role of industry. *Information & Management*, 55(5), 525-546.
- Chae, H.-C., Koh, C. E., & Prybutok, V. R. (2014). Information technology capability and firm performance:

- contradictory findings and their possible causes. *MIS Quarterly*, 38(1), 305-326.
- Chau, D. C., Ngai, E. W., Gerow, J. E., & Thatcher, J. B. (2020). The effects of business-IT strategic alignment and IT governance on firm performance: a moderated polynomial regression analysis. *MIS Quarterly*, 44(4).
- Chen, S. H., Wang, H. H., & Yang, K. J. (2009). Establishment and application of performance measure indicators for universities. *The TQM Journal*, 21(3), 220-235.
- Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. In (Vol. 22, pp. 7-16): *MIS Quarterly*.
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information systems research*, 14(2), 189-217.
- De Haes, S., & Van Grembergen, W. (2008). Analysing the relationship between IT governance and business/IT alignment maturity. *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)*,
- Decramer, A., Smolders, C., & Vanderstraeten, A. (2013). Employee performance management culture and system features in higher education: relationship with employee performance management satisfaction. *The International Journal of Human Resource Management*, 24(2), 352-371.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50.
- Grafton, J., Lillis, A. M., & Widener, S. K. (2010). The role of performance measurement and evaluation in building organizational capabilities and performance. *Accounting, Organizations and Society*, 35(7), 689-706.
- Grembergen, W., & De Haes, S. (2004). It governance and its mechanisms. *Information Systems Control Journal*, 1, 27-33.
- Guerra-López, I., & Hutchinson, A. (2013). Measurable and continuous performance improvement: The development of a performance measurement, management, and improvement system. *Performance Improvement Quarterly*, 26(2), 159-173.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.
- Ilmudeen, A. (2022). Information technology (IT) governance and IT capability to realize firm performance: enabling role of agility and innovative capability. *Benchmarking: An International Journal*, 29(4), 1137-1161.
- ITGI. (2003). *Board Briefing on IT Governance*.
- Järvinen, J., & Karjaluo, H. (2015). The use of Web analytics for digital marketing performance measurement. *Industrial Marketing Management*, 50, 117-127.
- Jatmiko, B., Sofyani, H., & Putra, W. M. (2022). The IT resource orchestration and performance during the pandemic: evidence from higher education institutions. *Cogent Business & Management*, 9(1), 2148333.
- Khouja, M., Rodriguez, I. B., Halima, Y. B., & Moalla, S. (2018). IT governance in higher education institutions: A systematic literature review. *International Journal of Human Capital and Information Technology Professionals (IJHCITP)*, 9(2), 52-67.
- Lee, C.-H., Lee, J.-H., Park, J.-S., & Jeong, K.-Y. (2008). A study of the causal relationship between IT governance inhibitors and its success in Korea enterprises. *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)*,
- Meyer, M., Zarnekow, R., & Kolbe, L. M. (2003). IT-Governance - Begriff, Status quo und Bedeutung. *Wirtschaftsinformatik*, 45(4), 445-448.
- Nasiri, M., Ukko, J., Saunila, M., Rantala, T., & Rantanen, H. (2020). Digital-related capabilities and financial performance: the mediating effect of performance measurement systems. *Technology analysis & strategic management*, 32(12), 1393-1406.
- Nazaruddin, I., Sofyani, H., & Saleh, Z. (2020). The role of ethical leadership, organizational support and participative decision-making in the implementation of effective performance measurement systems in higher education institutions. *MOJEM: Malaysian Online Journal of Educational Management*, 9(1), 38-57.
- Nudurupati, S. S., & Bititci, U. S. (2005). Implementation and impact of IT-supported performance

- measurement systems. *Production Planning & Control*, 16(2), 152-162.
- Perdomo-Ortiz, J., Gonzalez-Benito, J., & Galende, J. (2009). The intervening effect of business innovation capability on the relationship between Total Quality Management and technological innovation. *International Journal of Production Research*, 47(18), 5087-5107.
- Pratolo, S., Sofyani, H., & Anwar, M. (2020). Performance-based budgeting implementation in higher education institutions: Determinants and impact on quality. *Cogent Business & Management*, 7(1), 1786315.
- Pratolo, S., Yaya, R., & Sofyani, H. (2016). *Akuntansi Keuangan Pemerintah Daerah (Konsep dan Implementasi untuk Akademis dan Praktisi)*. LP3M UMY.
- Queiroz, M., Tallon, P. P., Sharma, R., & Coltman, T. (2018). The role of IT application orchestration capability in improving agility and performance. *The Journal of Strategic Information Systems*, 27(1), 4-21.
- Sardjono, W., & Retnowardhani, A. (2019). Analysis of failure factors in information systems project for software implementation at the organization. 2019 International Conference on Information Management and Technology (ICIMTech),
- Sekaran, U., & Bougie, R. (2019). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects. *Journal of management*, 37(5), 1390-1412.
- Sofyani, H., Hasan, H. A., & Saleh, Z. (2022). The Moderating Role of IT Development on the Relationship between Internal Control and the Quality Performance of Higher Education Institutions. *Quality Innovation Prosperity*, 26(2), 128-146.
- Sofyani, H., Riyadh, H. A., & Fahlevi, H. (2020). Improving service quality, accountability and transparency of local government: The intervening role of information technology governance. *Cogent Business & Management*, 7(1), 1735690.
- Sofyani, H., Tahar, A., & Ulum, I. (2022). The Role of IT Capabilities and IT Governance on Accountability and Performance of Higher Education Institutions During the COVID-19 Pandemic. *Management and Accounting Review*, 21(2), 167-190.
- Star, S., Russ-Eft, D., Braverman, M. T., & Levine, R. (2016). Performance measurement and performance indicators: A literature review and a proposed model for practical adoption. *Human Resource Development Review*, 15(2), 151-181.
- Suzan, L., Sudrajat, J., & Daud, Z. M. (2020). Accounting information systems as a critical success factor for increased quality of accounting information. *Revista Espacios*, 41(15), 1-8.
- Syafei, N. (2015). Effect of IT governance, continuous auditing and IT goals alignment to company's performance (Study on plantation companies in the group of PT. Astra Agro Lestari Tbk in Riau). *Jurnal Al-Iqtishad*, 11(1), 45-57.
- Tahar, A., Sofyani, H., Arisanti, E. N., & Amalia, F. A. (2022). Maintaining higher education institution performance amid the COVID-19 pandemic: The role of IT governance, IT capability and process agility. *MOJEM: Malaysian Online Journal of Educational Management*, 10(1), 45-61.
- Tahar, A., Sofyani, H., & Kunimasari, D. P. (2021). IT governance and IT application orchestration capability role on organization performance during the COVID-19 pandemic: An intervening of business-IT alignment. *JEMA: Jurnal Ilmiah Bidang Akuntansi dan Manajemen*, 18(1), 1-20.
- Teeratansirikool, L., Siengthai, S., Badir, Y., & Charoenngam, C. (2013). Competitive strategies and firm performance: the mediating role of performance measurement. *International Journal of Productivity and Performance Management*, 62(2), 168-184.
- Teng, T., & Tsinopoulos, C. (2021). Understanding the link between IS capabilities and cost performance in services: the mediating role of supplier integration. *Journal of Enterprise Information Management*, ahead-of-print(ahead-of-print).
- Tjahjadi, B., Soewarno, N., Astri, E., & Hariyati, H. (2019). Does intellectual capital matter in performance management system-organizational performance relationship? Experience of higher education institutions in Indonesia. *Journal of Intellectual Capital*, 20(4), 533-554.
- Ulum, I., & Sofyani, H. (2016). *Akuntansi (Sektor) Publik*. Aditya Media.
- van de Wetering, R., & Besuyen, M. (2021). How IT-enabled dynamic capabilities add value to the development of innovation capabilities. In *Encyclopedia of Organizational Knowledge, Administration, and Technology* (pp. 999-1016). IGI Global.

- Webb, P., Pollard, C., & Ridley, G. (2006a). Attempting to define IT governance: Wisdom or folly? null,
- Webb, P., Pollard, C., & Ridley, G. (2006b). Attempting to define IT governance: Wisdom or folly? Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06),
- Weill, P., & Ross, J. W. (2004). IT governance: How top performers manage IT decision rights for superior results. Harvard Business Press.
- Wilkin, C. L., & Chenhall, R. H. (2010). A review of IT governance: A taxonomy to inform accounting information systems. *Journal of Information Systems*, 24(2), 107-146.
- Zhang, P., Zhao, K., & Kumar, R. L. (2016). Impact of IT governance and IT capability on firm performance. *Information Systems Management*, 33(4), 357-373.
- Zhen, J., Xie, Z., & Dong, K. (2021). Impact of IT governance mechanisms on organizational agility and the role of top management support and IT ambidexterity. *international Journal of Accounting information Systems*, 40, 100501.
- Zhou, N., Zhang, S., Chen, J. E., & Han, X. (2017). The role of information technologies (ITs) in firms' resource orchestration process: A case analysis of China's "Huangshan 168". *International Journal of Information Management*, 37(6), 713-715.