The Role of IT Capabilities and IT Governance on Accountability and Performance of Higher Education Institutions During the COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic has urged higher education institutions (HEIs) to improve their information technology (IT) capabilities due to online demands in almost all activities. However, a large IT investment does not guarantee added value for an organisation if the effectiveness of IT governance does not accompany it. Since studies on this issue are still lacking, this study examined the effect of IT capabilities and perceived effectiveness of IT governance on the accountability and performance of HEIs during the COVID-19 pandemic. This study also tested the role of IT governance as a mediator. This study employed a survey method with hypothesis testing using the Partial Least Squares (PLS) technique. The sample comprised 129 HEIs located on Java Island, Indonesia. Cluster sampling was utilised to ensure the representativeness of the sample between the provinces located in Java, covering Banten, the Special Capital Region of Jakarta, West Java, Central Java, East Java, and the Special Region of Yogyakarta. The results showed that when IT capabilities positively affected IT governance, either IT capabilities or IT governance positively affected HEIs accountability and performance during the COVID-19 pandemic. Further, IT governance was found to be a mediating variable.

Keywords: IT capabilities, IT governance, accountability, performance, COVID-19 pandemic

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INTRODUCTION

The COVID-19 pandemic has forced a rapid change in most sectors worldwide, including higher education. Many governments globally imposed social distancing policies to limit the spread of the virus. In addition, a general trend worldwide to respond to the situation was switching from face-to-face to online systems (Murphy, 2020). In higher education institutions (HEIs), this shifting to online activity was applied not only to learning but also to most HEIs activities (Rashid & Yadav, 2020). Consequently, HEIs were compelled to develop faster and more established information technology (IT), comprising various applications. As such, effective IT governance has become a significant issue in HEIs (Sengik, Lunardi, Bianchi, & Wiedenhöft, 2022).

On the one hand, the accountability and performance pressure that HEIs face has persisted and has not decreased amid the pandemic. For example, HEIs that have not effectively managed the e-learning requirement and have consequently seen a decline in their learning process performance during the COVID-19 period are highly likely to obtain a reputation as deficient from the community. As found on the ground, prospective students will therefore not include such HEIs within their list of preferred institutions as they would prefer to study at HEIs that have successfully dealt with the issues posed by the problem through the effective use of IT, especially regarding the quality of e-learning. Nonetheless, because of its complexity and the need for careful integration between IT and its human users, IT adoption does not necessarily benefit (Ali et al., 2015). Hence, good IT governance is a new challenge today within the HEIs sector.

While the majority of HEIs have started to advance their IT capabilities during the pandemic due to the increased demand for online activities, it is argued within some of the literature that uncertain conditions could influence the effect of IT use on organisational performance (Chen et al., 2014; Queiroz, Tallon, Sharma, & Coltman, 2018; Sabherwal, Sabherwal, Havakhor, & Steelman, 2019). Thus, Queiroz et al. (2018) advised that future research related to IT capabilities could investigate whether and how IT capabilities contribute to the organisation amid environmental uncertainties, in this case, the COVID-19 pandemic. Besides, Sabherwal et al. (2019) revealed that, in dynamic environmental conditions, IT investment would

be able to improve companies' performance if it is accompanied by strategic alignment capabilities owned by management. However, the study comes from a company setting, while similar studies in the context of HEIs are still a research gap.

On the other hand, Sofyani et al. (2020) noted that IT does not always yield benefits for the organisation. It is also confirmed by some findings of other studies that, in certain cases, IT did not significantly influence company performance (Chae et al., 2018; Sardjono & Retnowardhani, 2019). Nevertheless, as a factor that might influence IT and performance relationships, Chae et al. (2014) suggested examining whether an organisation is equipped with sufficient skills to leverage IT assets for its business needs. Moreover, Sofyani et al. (2020) found that the influences of commitment to IT compliance on service quality, accountability and transparency in local governments were mediated by effective IT governance. In essence, effective IT governance is a prerequisite for IT investment to yield benefits for the organisation.

Today, however, related research about IT capabilities and IT governance in the HEIs sector is still lacking. For more than a decade, even the latest research, studies related to IT capabilities and IT governance have focused more on the context of companies and government institutions (e.g., Abdollahbeigi & Salehi, 2020; Sofyani et al., 2020; Luna-Reyes, Juiz, Gutierrez-Martinez, & Duhamel, 2020). Nonetheless, very little is known about their role in the HEIs context. Furthermore, the determinants and consequences of IT capabilities and IT governance have often been discussed, yet related studies examining the role of IT capabilities within a climate of uncertainty, such as that imposed by a pandemic, are lacking (Queiroz et al., 2018). There is also a scarcity of related studies highlighting IT governance as a mediator (Sofyani et al., 2020). To meet these gaps, this study examined the influence of IT capabilities on the accountability and performance of HEIs through IT governance as a mediator. In this study , Indonesia was used as the research setting to reflect that the Indonesian government has called for more advanced IT development in HEIs since 2018. The study context also reflects the COVID-19 pandemic by which an increasing pressure is being placed on IT development, notably to support the online running of most activities in HEIs.

Moreover, the current study offers several significant contributions to scientific and practical developments in the HEIs sector in particular. First, it provides new insights into effective IT governance as a mediating variable or a prerequisite for IT capabilities to optimise their benefits in the organisation, especially HEIs. It also contributes new literature related to discussions on IT capabilities and governance in a rarely studied setting, namely HEIs and during a pandemic. From a practical point of view, the results provide valuable input for practitioners regarding the crucial factors to consider in improving the accountability and performance of HEIs, especially concerning aspects of their IT development during a pandemic. Specifically, effective IT governance must be a major concern for HEIs management, in addition to IT capability enhancement, in improving performance and accountability practices.

LITERATURE REVIEW

According to Ghobakhloo, Hong, and Jabeen (2015), IT capabilities are the organisation's ability to leverage different IT resources for intangible benefits. Meanwhile, van de Wetering and Besuyen (2021) defined IT capabilities as firms' ability to mobilise and deploy IT-based resources in combination or co-present with other resources and capabilities to differentiate from the competition. On the other hand, the IT Governance Institute (ITGI) claimed that IT governance is the element of corporate governance that comprises the various mechanisms implemented to ensure that IT investments are appropriate and can promote the achievement of the organisation's strategic goals (ITGI, 2003). Specifically, IT governance can be defined as the capacity of top management to control the formulation and implementation of IT strategies via organisational structures and processes that produce desirable behaviours, which will ensure that IT initiatives sustain and extend the organisation's strategy and objectives (Bradley et al., 2012). IT governance is also concerned with the appropriation of decision rights of the IT function (Weill & Ross, 2005). Particularly, it refers to the level to which an organisation has developed a flexible IT infrastructure, meaning that its portfolio is decomposed into independent subsystems, which is suggested to positively contribute to market atonement and responsiveness (Mikalef, Pateli & van de Wetering, 2021).

From these insights, IT capabilities and IT governance should be linked. The difference between the two lies in their focus. While IT capabilities target the optimisation of IT for the efficiency and effectiveness of business processes, IT governance emphasises the role of top leaders in aligning strategic IT goals with organisational goals.

Given the many publications that have appeared in leading journals over the last two years, 2020–2021, IT capabilities remain a key topic for research. A study by Zeng and Lu (2020) showed that IT capabilities significantly influenced agri-food supply chain performance. Meanwhile, Wei et al. (2021) found that IT capabilities positively affected both breadth and depth of knowledge, consequently improving digital innovation in Chinese firms. In addition, Teng and Tsinopoulos (2021) uncovered that supplier integration fully mediated the effects of IT capabilities for flexible IT infrastructure and supply chain activities toward cost performance and partially mediated the influence of operations manager IT knowledge on cost performance. These studies have highlighted clearly that IT capabilities, either directly or mediated by integration policies, can improve organisational performance. However, other studies have found that IT capabilities do not affect performance. For example, firms with sophisticated IT were not found to perform better than firms with low IT capabilities (Chae et al., 2014; Chae et al., 2018). This contradiction, therefore, highlights the importance of examining potential intermediary variables that might influence the IT capabilities-performance relationship (Chae et al., 2014).

Furthermore, in the latest references, the trend for IT governance studies to be undertaken is mainly in the context of a company and government entities, and very few related studies have been conducted in non-profit organisations, such as in the HEIs sector. In Thailand, Jairak and Praneetpolgrang (2013) examined the critical issues regarding IT governance implementation in HEIs. They suggested that in practice, a well-socialised IT strategy and policy should be developed before IT governance can be enabled. In the HEIs context, to reduce capital risk and the trial-and-error failure, it is suggested that HEIs primarily consider their current IT governance performance before progressing any further. Moreover, using the COBIT 05 framework, Nugroho (2014) proposed a specific conceptual framework related to IT governance mechanisms for HEIs in Indonesia. He suggested that IT governance mechanisms should be organised by

considering regional governance or regional management, each of which should be considered in a certain domain to serve as a guideline for HEIs to build up an IT blueprint. As such, IT governance would not only support the IT aspects of academic and non-academic activities but also examine the scope of HEIs governance overall.

Additionally, Khouja, Rodriguez, Halima, and Moalla (2018) conducted a systematic review regarding the issue of IT governance in HEIs, with their findings revealing a mixed situation. They uncovered that several countries get top-level management support to introduce IT governance in HEIs by adopting common laws and regulatory frameworks. However, other countries maintain their strong culture of IT governance. The different cases presented in the paper revealed no consensus on the IT governance framework or standard to adopt in HEIs. Yet, most HEIs adopt the COBIT or ISO as a benchmark. In addition, some countries have developed their own IT governance frameworks.

Hypotheses Development and Research Model

The COVID-19 pandemic has forced all HEIs, willingly or unwillingly, to improve their IT capabilities and IT governance. Although the journey of increasing IT capabilities may expose a variety of IT development problems (Curry, Guyon, Sheridan, & Donnellan, 2012), it has further raised awareness of the weightiness of IT governance. It is because HEIs management has begun to realise that the IT investment alone, without good IT governance, is likely to create inefficiency rather than bring added value (Ali and Green, 2005; Sofyani et al., 2020). Therefore, this study assumed that HEIs' journey in rapidly developing their IT capabilities during the pandemic, which has now been ongoing for over a year and a half, might also increase the effectiveness of IT governance in HEIs. Based on the foregoing arguments, the hypothesis was formulated as follows:

H_1: IT capabilities have a positive effect on effective IT governance.

Some studies have delivered empirical evidence that greater performance can be gained from empowering internal resources such as IT (Lunardi, Becker, Maçada, & Dolci, 2014; Queiroz et al., 2018). An organisation with superior IT capabilities enables it to continuously renew its IT applications portfolio and build modern IT resource combinations to

enhance accountability and performance (Queiroz et al., 2018). For example, increased IT capabilities may includ a new customer service portal to replace old, not efficient methods of sending service requests, such as email and fax. As such, the company could reduce costs, streamline processes, and expand the market (Queiroz et al., 2018).

In HEIs, increasing the IT capabilities in financial management will increase accountability in safeguarding financial assets and management efficiency in terms of budget allocation, authorisation, reporting and evaluation (Bawono, Kinasih, & Rahayu, 2020). Boosting IT capabilities related to teaching (e-learning) can be expected to maintain the quality of the online learning provided during a pandemic (Alqahtani & Rajkhan, 2020; Maatuk, Elberkawi, Aljawarneh, Rashaideh, & Alharb, 2022). In addition, research collaboration can be conducted more broadly, even with foreign partners, and more efficiently. The conducting of research meetings by teleconference makes it easier to coordinate and share ideas. IT teleconference support integrated with social media also renders more straightforward community service in the form of training or the socialisation of innovations obtained from research development (Agusriadi, Elihami, Mutmainnah, & Busa, 2021). Developing this, it is logical that increased IT capabilities will also improve HEIs' accountability and performance during a pandemic. Thus, the hypothesis proposed was as the following:

H_2: IT capabilities positively affect (a) the accountability and (b) performance of HEIs during the COVID-19 pandemic.

Further, IT governance is pivotal in reducing weaknesses and risks that inhibit efforts to achieve optimal performance in its business (Syafei, 2017). Many top companies have already turned to IT governance to pursue gains in accountability and regulation compliance (Lee, Lee, Park, & Jeong, 2008). Additionally, some researchers have found that IT governance contributes to helping organisations in achieving better performance and targeted goals (Wu, Straub, & Liang, 2015; Ilmudeen, 2021). Sofyani et al. (2020) also pointed out that IT governance effectiveness could influence service quality positively and improve either accountability or transparency practices in local government in Indonesia. In the HEIs study context, Bianchi and Sousa (2016) uncovered that IT governance significantly impacted HEIs' performance in terms of student learning, teaching, and research activities. Based on the above arguments, the following hypothesis was derived:

H_3: Effective IT governance has a positive effect on (a) the accountability and (b) the performance of HEIs during the COVID-19 pandemic.

On the other hand, the main goal of IT governance is to comprehensively promote good governance practices in organisations (Bertot, Jaeger, & Grimes, 2010), including the IT aspect. Ali and Green (2005) asserted that implementing IT within the organisation's processes does not necessarily increase an entity's performance if the process is not accompanied by effective IT governance. Instead, the development of IT capabilities should be alongside effective IT governance. Doing so, will create an awareness within the organisation of the particular need to focus on using IT to deliver value to the HEIs community by enhancing the effectiveness with which the HEIs achieve their key performance indicators (KPIs). For this reason, it is essential to take effective IT governance into account during IT capability development (Buchwald, Urbach, & Ahlemann, 2014). This situation, therefore, indicates that IT governance plays a mediating role in achieving organisational goals. Ali and Green's claim was proven empirically by Sofyani et al. (2020) that IT governance mediated the relationship between commitment to IT compliance and accountability, transparency, and service quality of Indonesian local government working units. However, it has not been empirically tested in the context of the HEIs sector. Thus, using the same reasoning, it was logical to propose the following hypothesis:

H_4: Effective IT governance mediates the influence of IT capabilities on (a) accountability and (b) performance of HEIs during the COVID-19 pandemic.

Based on the existing literature and hypotheses detailed above, the research model was formulated as in Figure 1.

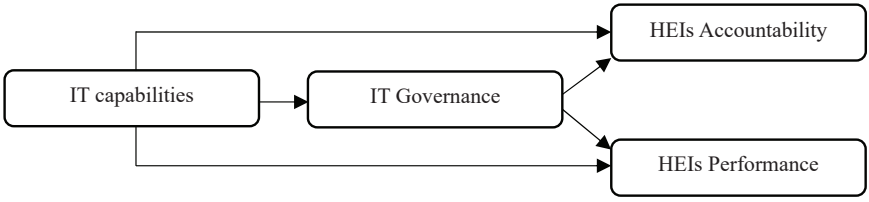


Figure 1: Research Model (Sources: Formulated by Researchers)

METHODOLOGY

Design of Research

This study employed a survey method with hypothesis testing based on quantitative data obtained from questionnaires. The survey was conducted among HEIs located on Java Island since this is where most Indonesian HEIs are located. The purposive sampling technique was used in determining the sample. The criterion for inclusion in the sample was the HEIs that had developed IT to support their operations. The research also applied cluster sampling, whereby samples were chosen by considering the six provinces in Java: West Java, Central Java, East Java, Banten, the Special Region of Yogyakarta, and the Special Capital Region of Jakarta. Following Sekaran and Bougie (2019), respondents considered to have sufficient knowledge regarding the development of IT in their HEIs and the performance of their HEIs were invited to complete a questionnaire. Therefore, members of management at all levels were involved as respondents, including the following job roles: head of the department, director, rector, vice-rector, vice-director, deputy, and dean.

Variables Measurement and Questionnaire Administration

IT capabilities refers to the ability of HEIs to build IT according to the requirements of its business processes or operations. The measurement of this variable in this research relied on ten indicators adopted from Dahiya and Mathew (2018). Then, IT governance alludes to certain policies that accord roles and value-added to the environment at the organisation at every level. As a variable, it was measured by referring to Sofyani et al. (2020). Next, accountability refers to being accountable for the results obtained after carrying out certain activities. In this study, accountability is related to financial management. Based on Sofyani et al. (2020), seven indicators measured accountability. In addition, the performance of HEIs alludes to the HEIs accomplishment that has been planned and realised during a specified time. This variable was measured using related regulations issued by the National Accreditation Board for Indonesian HEIs. In so doing, an instrument from Tahar, Sofyani, and Kunimasari (2021) was adopted. The regulation was referred to since the measurement dealt with Indonesia's research context. Each variable was measured using a 1–5 Likert scale, indicating 1 as 'strongly disagree' and 5 as 'strongly agree'.

Following suggestions by Lewis, Templeton, and Byrd (2005), before distributing the research questionnaire, it was consulted and validated with the assistance of four associate professors from the fields of public sector accounting, accounting information systems, and management accounting. Once receiving some suggestions, several improvements were made to the questionnaire. The questionnaires were then distributed directly, both online using Google Forms and in person, from 15 September to 15 December 2020.

Table 1 presents the sample and respondent demographics data. After eliminating the unsuitable respondents, the remaining 248 responses (data) originating from 129 HEIs were included for data analysis. In this regard, the self-reporting nature of the survey data brings the potential for common method variance (CMV) (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), whereby a respondent may attempt to answer the questionnaire in a normative way (Chang, van Witteloostuijn, & Eden, 2020). Harman Single Factor analysis was used to test for this bias (Tehseen, Ramayah, & Sajilan, 2017). Podsakoff et al. (2003) argued that the bias could be considered significant in influencing the validity of study results if one common factor accounts for a large proportion of the covariance between measures, i.e., more than 50%. In this study, the test showed only 33.67% for a single factor (i.e., less than 50%). As such, it is possible to reveal that CMV did not significantly influence the validity of the current study's results.

Table 1: Demographics of Sample and Respondents

Description	Number	Percentage
Samples:		
Category:		
Academy	16	12
Polytechnic	9	7
Higher School	43	33
Institute	13	10
University	48	37
Accreditation Predicate:		
A (Excellent)	13	10
B (Good)	80	62
C (Good enough)	31	24
Not Accredited	5	4
Types:		

Description	Number	Percentage
Private HEIs	117	91
Public HEIs	12	9
Province:		
Banten	5	4
Special Capital Region of Jakarta	0	0
West Java	7	5
Central Java	55	43
East Java	12	9
Special Region of Yogyakarta	50	39
Number of Samples:	129	100
Respondents:		
Education levels:		
Bachelor	32	13
Master	163	66
Doctoral	53	21
Positions:		
Top management	106	43
Faculty management	42	17
Head of the study program	100	40
Number of Respondents:	248	100

Data Analysis

In this study, Partial Least Squares-Structural Equation Modelling (PLS-SEM) was used to test the hypotheses. PLS-SEM works by measuring the relationship paths simultaneously to check for statistical problems. PLS-SEM also tends to cope with data distribution and multicollinearity problems (Gustafsson & Johnson, 2004). Also, PLS-SEM is appropriate for this research since it requires minimal data assumptions and data requirements and a relatively small sample (Pratolo, Sofyani, & Anwar, 2020). This study focused on testing the relationship between variables rather than the goodness of fit of the research model, which was another reason why PLS-SEM is more suitable than covariant-based SEM.

In terms of sample size, Hair, Black, Babin, Anderson, and Tatham (2010) advised that the minimum sample size when using PLS-SEM as an analysis technique is the '10 times rule'. It means that the sample size should be greater than a variable with the highest number of indicators within a model. In this study, IT capabilities had a maximum number of indicators

(10). Therefore, as suggested by Hair et al. (2010), the minimum sample size should be 100 (10x10). With 129 samples successfully collected for this study, the minimum sample size requirement was met.

RESULTS AND DISCUSSION

Measurement Model

In assessing the measurement model, PLS algorithm analysis was employed (Chin, 2010). The measurement model was assessed by testing for the following: individual convergent validity, discriminant validity, and item reliability.

To evaluate convergent validity, the average variance extracted (AVE) and the outer loadings of the indicators were assessed (Hair et al., 2021). In the first assessment, the results showed an unsatisfactory outer loading score (<0.05) on several indicators, namely ITC3, ITC5 (IT capabilities), ACC6 (accountability), and PER5 (performance). As a result, the AVE values of the three constructs did not satisfy the rule of thumb (<0.05). After removing the above-mentioned weak indicators, reassessment of the measurement model results revealed that all indicators of the constructs met the required values for outer loadings and AVE. The second set of analysis results displayed in Table 2 shows that the outer loading and AVE values ranged from 0.51 to 0.89 and 0.52 to 0.75, respectively.

Table 2: Outer Loadings and AVE scores

Construct/Indicators	Loading	AVE
Accountability		0.54
Valid evidence for each financial and non-financial transaction during the COVID-19 pandemic	0.793	
Financial report format compliance with the regulation applied in HEIs during the C COVID -19 pandemic	0.783	
Good transparency regarding the acquisition and use of budgets during the COVID-19 pandemic	0.630	
Completeness of financial reports during the COVID-19 pandemic	0.841	
Timeliness of financial reporting during the COVID-19 pandemic	0.728	
Conformity of activities with the budget set at the beginning of the year during the COVID-19 pandemic	0.624	
HEIs Performance		0.60

Construct/Indicators	Loading	AVE
Teaching according to the new regulated curriculum during the COVID-19 pandemic	0.710	
Effective online lectures during the COVID-19 pandemic	0.782	
Completion of timely supervision of student's final assignments during the COVID-19 pandemic	0.823	
Publishing a large number of articles in national accredited journals during the COVID-19 pandemic	0.514	
Organising community service work programs to solve problems that exist in partner communities during the COVID-19 pandemic	0.788	
Providing effective services to all campus academics during the COVID-19 pandemic	0.868	
Providing fast service to all campus academics during the COVID-19 pandemic	0.878	
In general, the key performance indicators of HEIs are met during the COVID-19 pandemic.	0.806	
Perceived Effective IT Governance		0.75
The positive impact of IT on the environment at every HEIs level	0.896	
The added value brought by IT to the HEIs	0.899	
The significant supporting factor of IT governance in the HEIs	0.798	
IT capabilities		0.52
IT staff technical skills	0.724	
IT staff job management skills	0.741	
IT team's ability to meet the high demand for campus IT needs	0.717	
Correspondence feature capabilities for internal usage	0.751	
Wireless network capability	0.739	
Correspondence feature capabilities for external usage (to support communication with external parties)	0.686	
Website-based service application capabilities (course registration, personnel accounts, new student registration, etc.)	0.729	
Online-based learning application capabilities, including video conferencing	0.665	

Furthermore, in PLS, discriminant validity can be assessed using the Fornell–Larcker criterion. As shown in Table 3, the discriminant validity values of all constructs were higher than their highest cross-correlation. Therefore, the results indicated that all constructs had discriminant validity (Fornell and Larcker, 1981).

Table 3: Discriminant Validity Test Result Using Fornell–Larcker

Construct	Accountability	IT capabilities	IT Governance	Performance
Accountability	0.738			
IT capabilities	0.305	***0.720***		
IT Governance	0.172	0.206	***0.866***	
Performance	0.158	0.295	0.345	***0.779***

Moreover, composite reliability and Cronbach's alpha were used to measure internal reliability or the consistency of the construct evaluation. The measures must have composite reliability and Cronbach's alpha values higher than 0.70 (Hair et al., 2021). From Table 2, acceptable values can be seen for both composite reliability (0.876–0.924) and Cronbach's alpha (0.836–0.904). Thus, all constructs implied good internal reliability (Chin, 2010; Hair et al., 2021).

Table 4: Internal Reliability Test Results

Construct	Cronbach's Alpha	Composite Reliability	Numbers of indicator[a]
Accountability	0.837	0.876	7 (7)
IT capabilities	0.867	0.896	10 (8)
IT Governance	0.836	0.900	3 (3)
Performance	0.904	0.924	9 (8)

[a] Number of initial indicators (number of remaining indicators)

Structural Model (Hypotheses Testing)

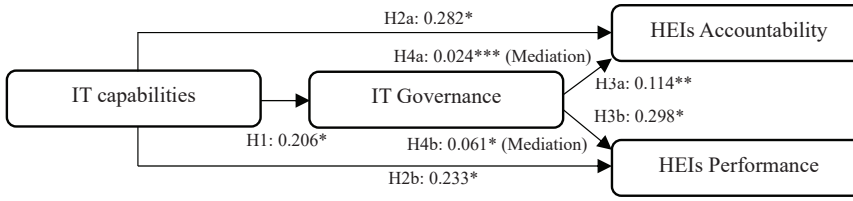
The hypotheses were tested by performing bootstrapping analysis. The results as presented in Table 5 show that all hypotheses were supported, with different significance values.

Table 5: Hypotheses Testing Results

Hypothesis	Code	Coefficient	SD	T-value	P-value	Conclusion
Panel 1: Direct effect						
ITC -> ACC	H_1	0.282	0.061	4.618	0.000*	Significant
ITC -> ITG	H_{2a}	0.206	0.066	3.129	0.001*	Significant
ITC -> PER	H_{2b}	0.233	0.072	3.231	0.001*	Significant
ITG -> ACC	H_{3a}	0.114	0.063	1.804	0.036**	Significant
ITG -> PER	H_{3b}	0.298	0.074	4.054	0.000*	Significant
Panel 2: Indirect effect						
ITC -> ITG -> ACC	H_{4a}	0.024	0.016	1.449	0.074***	Marginally Significant
ITC -> ITG -> PER	H_{4b}	0.061	0.025	2.464	0.007*	Significant

a = * < 0.01; ** < 0.05; *** < 0.10
ITC: Information Technology Capabilities; ITG: Information Technology Governance; ACC: Accountability; PER: Performance

Figure 2 illustrates the path relationship between variables from the bootstrapping test results on PLS.



*a = *<0.01, ** <0.05, *** <0.10*

Figure 2: Path Relationship Testing Results

Discussion

This study concludes that IT capabilities positively influenced effective IT governance. It indicates that Indonesian HEIs are beginning to consider IT governance in addition to merely investing in IT capabilities, potentially demonstrating an awareness that IT investment alone will not necessarily bring added value to an organisation if it has poor IT governance. A growing awareness around IT governance may also not be separate from the context of a pandemic that has altered methods of functioning over a relatively long period; in the case of the COVID-19 pandemic, for more than two years when this study was completed. During such a time, HEIs would inevitably pay attention to the state of their IT governance; it provides the potential for awareness of the need to improve the effectiveness of IT governance to emerge. These results extend previous research by Zeng and Lu (2020), Wei et al. (2021), and Teng and Tsinopoulos (2021). Their studies have examined the role of IT capabilities but did not relate them to the IT governance initiation in organisations.

Furthermore, this study confirms that IT capabilities and perceived effective IT governance positively affected the accountability and performance of HEIs during a pandemic. As seen during the COVID-19 pandemic, most HEIs activities took place online. It included financial accountability activities, such as budgeting, verification, authorisation, recording and financial reporting, and activities for achieving HEIs performance, such as learning, research and publication, involvement in community service, administrative services, and others. Moreover, it is important to note that accountability and performance are elements of HEIs

quality and become indicators of HEIs accreditation assessment, which HEIs continually pursue. In such a situation, the role of IT is becoming increasingly critical in terms of meeting these two demands. The current findings affirm the studies by Queiroz et al. (2018) and Zeng and Lu (2020), which found that IT capabilities contributed to improving organisational performance. The results are also in line with Sabherwal et al. (2019) that within dynamic, complex, and hostile environments, strategic IT alignment reflecting a capability could enhance the positive effect of IT on firm performance. This study also extends the finding of Sofyani et al. (2020) that IT governance plays a critical role in organisational accountability and performance. While prior studies were conducted in the context of companies and government institutions and normal times (not a pandemic), this study provides empirical evidence related to HEIs settings during the COVID-19 pandemic.

Next, this study asserts that IT governance had a mediating effect on the relationship between IT capabilities and HEIs accountability and HEIs performance. Despite being only a quasi-mediation role, this finding has important implications. The study's findings indicate that effective IT governance is a prerequisite for the relationship between IT capabilities and accountability and HEIs performance during the rapid changes engendered by the pandemic. The result aligns with Teng and Tsinopoulos (2021) that the relationship between IT capabilities and organisational performance was mediated by the organisation's integration policy. Where Teng and Tsinopoulos (2021) used supplier integration as the mediator, this study employed IT governance. This study also corroborates the finding of Sofyani et al. (2020) that IT governance had a mediating role in enhancing performance and accountability.

Furthermore, regarding practical implications, these research findings simply explain that the HEIs sector must pay attention to the effectiveness of its IT capabilities and IT governance (Bianchi & Sousa, 2016). Increasingly intensive IT development during the COVID-19 pandemic is urgently needed to ensure accountability and the performance of HEIs. Although the findings of this study were derived during a pandemic, IT's critical role is likely to apply equally in normal times. Today, however, most HEIs still regard IT as a tool, not as an organisation's strategic 'weapon'. As suggested by Ali, Green, and Robb (2015), IT and the units that manage

it should be treated with privilege because IT empowerment will greatly impact the organisation. Conversely, the limited paradigm of IT utilisation at HEIs has resulted in only limited exploration and exploitation of the benefits that it may bring.

Theoretically, the results of this study conform to the dynamic capabilities theory proposed by Teece, Pisano, and Shuen (1997). In contrast to the Resource-Based Theory by Barney (1991), which emphasises four unique criteria of internal resources as a condition for achieving competitive advantage (valuable, rare, imperfectly imitable, and not substitutable), the main idea of dynamic capabilities emphasises the ability of organisations to adapt quickly in a drastically changing environment. On this basis, the dynamic capabilities perspective was more appropriate in this study, explaining how HEIs tried to upgrade IT capabilities and the effectiveness of IT governance during the COVID-19 pandemic to maintain accountability and performance proxies for competitive advantage. In addition, this study's support for dynamic capabilities theory is evident from the support of all hypotheses, although at different significance levels. Concretely, IT capabilities have sparked awareness of increasing the effectiveness of IT governance, and these two variables have contributed to improving HEIs accountability practices and performance during the COVID-19 pandemic, where most activities in HEIs take place online.

CONCLUSION

In summary, this study highlights the important role of IT capabilities in increasing the effectiveness of IT governance. In addition, both IT capabilities and IT governance have been shown to positively affect the accountability and performance of HEIs during the COVID-19 pandemic. Lastly, IT governance was found to have a positive and significant role as a mediator in the relationship between IT capabilities and HEIs accountability and performance during the pandemic. From these findings, this study confirms the critical role of IT capabilities and effective IT governance in HEIs. Therefore, HEIs management needs to pay serious attention to the condition of IT and its governance within their organisation. This study also extends the body of knowledge in terms of the role of IT governance as a mediating variable.

Naturally, this study has its limitations. First, it only sampled HEIs located on Java Island, Indonesia. Hence, readers should exercise caution when drawing any conclusion, especially generalising. Saying that further study might seek to investigate similar topics in other regions (islands) in Indonesia or even in other countries to extend this study. Second, the study only employed a single approach, in this case, a survey. It did not investigate either the maturity of IT capabilities and the effectiveness of IT governance in detail or the framework used by HEIs. Based on that, a detailed explanation of how IT capabilities and IT governance were developed and ultimately influenced HEIs performance during the pandemic was not presented. As such, future studies should employ a qualitative research method to complement the results obtained.

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