The Moderating Role of IT Development on the Relationship between Internal Control and the Quality Performance of Higher Education Institutions

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ABSTRACT

Purpose: This study examines the extent to which IT development for internal control purposes has been implemented. Also, it investigates the moderating effect of IT development on the relationship between internal control implementation and Higher Education Institution (HEI) quality performance.

Methodology/Approach: This research employed a survey method by distributing questionnaires to HEIs in all 34 provinces of Indonesia. As a result, 191 HEIs participated in this study. A Partial Least Squares (PLS) with the second-order analysis was utilised to test the relationship among the variables.

Findings: The results revealed that the IT development for internal control purposes was generally moderate. Additionally, IT development was positively associated with internal control implementation and strengthened the relationship between internal control and HEI quality performance.

Research Limitation/Implication: This study was based solely on a weak survey study regarding depth and breadth of exploration. Additionally, it did not cross-validated by re-testing the proposed model with secondary data.

Originality/Value of paper: This study adds to the body of knowledge on the moderating role of IT development. Also, the results of this research can be a meaningful input for HEI management since many consider internal control carried out manually to be sufficient without the role of IT. In fact, IT development can strengthen (be a moderator) the positive relationship between internal control and HEI quality performance.

Category: Research paper

Keywords: higher education institution; internal control; information technology; quality performance

1 INTRODUCTION

Information technology (IT) developments in not-for-profit organisations (NFPOs), such as government, higher education institution (HEI), hospital and others, can be said to lag the corporate sector. However, NFPOs have also started concentrating on more advanced IT development for governance and performance improvement purposes. For instance, by 2018, the Indonesian government had recommended that all HEIs advance IT to support all management and governance practices, including internal control (IC) implementation (Kemenristekditi, 2018). This recommendation is also a follow-up to the issuance of the 2009 regulation for implementing internal control to mitigate fraud in HEI and promote better HEI quality performance (Sofyani, Abu Hasan and Saleh, 2022). As much literature claims, strengthening IT's aspects can maximise the role of internal control within the organisation (Rubino, Vitolla and Garzoni, 2017; COSO, 2013). However, certain IT investments in organisations do not always guarantee additional value-added if the readiness of human resources and organisational environment is not considered (Reich, 2021). So far, empirical research that answers the basic question of the extent to which HEI has developed IT for internal control purposes and whether it has promoted any value toward HEI is still lacking.

In addition, research exploring other roles from the IT aspect apart from being a determinant of performance and good governance, as moderator, for instance, is still rare, especially in developing country settings, such as Indonesia. Hence, Rubino, Vitolla and Garzoni (2017) suggested exploring this issue further to get more empirical evidence about IT development for internal control, especially related to its organisational contribution. Ali, Green and Robb (2015) also claimed that IT can play a role in an organisation's strategy to pursue competitive advantage when it is positioned not only as a tool yet integrated with the organisation's strategy. Likewise, Asiaei et al. (2021) contended that, as resource orchestration theory suggested, mobilised resources integrated into a robust system could create better alignment, coordination and direction for specific organisational achievement. Drawing on that insight, a better HEI quality performance could be achieved if the two internal HEI resources, IT and internal control, could be mobilised in harmony. However, this premise lacks empirical evidence.

To address highlighted gaps above, this study explicitly examines the extent to which IT development for internal control purposes has been implemented in the HEI sector in developing countries study setting by taking a sample of Indonesia.

2 METHODOLOGY

Explicitly, this study investigates the role of IT development as a determinant of internal control and as a moderator of the relationship between internal control and HEI quality performance. By doing so, this study provides fresh insights

regarding the empirical evidence on the role of IT development for internal control purposes in the context of non-enterprise organisations, namely the HEI sector that, according to Chalmers, Hay and Khlif (2019), still receive minimal attention by academics. The findings of this study are also useful as input for practitioners and the development of related literature.

2.1 Research Model

IT development is considered able to support governance policies, including internal control (Queiroz et al., 2018). In this paper, the IT_IC term is used to express IT development for internal control purposes. Although IT_IC is part of the internal control systems, several studies have tested the relationship between the two concepts. Grant, Miller and Alali (2008) found that companies with more IT_IC deficiencies reported more accounting errors and internal control weaknesses and paid more audit fees. It aligns with Mazza and Azzali (2018), who found that companies with good IT_IC tended to be low risk, and as a result, the audit fee would be small. Moreover, Abbaszadeh, Salehi and Faiz (2019) revealed that alteration of data collection methods from traditional to modern (IT-based) had enhanced the internal control effectiveness in Iranian state agencies.

In addition, an optimal IT role in improving performance can be done by putting it as a strategic tool. To do so, IT must be synchronised with other policies (Ali, Green and Robb, 2015; Sofyani, Riyadh and Fahlevi, 2020). Drawing from this insight, the IT and internal control will be more powerful in encouraging the organisation to achieve its competitive advantage if these resources are run in harmony and well synchronised. This condition corroborates the premise of the resource orchestration perspective (Sirmon et al., 2011). Several studies have examined IT's role as a moderating variable influencing organisational performance using the resource orchestration theory's perspective. Zhou et al. (2017) suggested that integrating resource management with modern IT might assist firms in effectively identifying and accumulating their unique resources, developing their capabilities and creating values. Meanwhile, Saeidi et al. (2019) uncovered that IT strategy and IT structure directly affected the competitive advantage and had a moderating effect on the enterprise risk management-competitive advantage relationship.

Based on the theoretical framework and forgoing discussions, the research model was formulated as presented in Figure 1, and the hypotheses were developed as follows:

H_1: IT_IC development is positively associated with internal control implementation.

H_2: IT_IC development strengthens the relationship between internal control implementation and HEI quality performance.

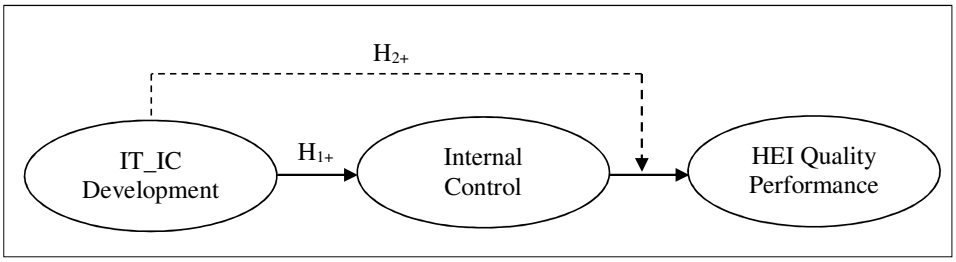

Figure 1 – Research Model

This study involved all Indonesian HEIs as a population. The samples were determined by a non-probability approach, namely purposive sampling. HEIs were chosen as samples if they had implemented internal control and developed IT to support that policy (Sekaran and Bougie, 2019). In selecting respondents, judgment sampling was employed. In addition, the respondents should be in the best position to provide the required information (Sekaran and Bougie, 2019). Hence, in this study, the respondents involved were management members of internal control and internal quality assurance units in HEI. As this study utilised a non-probability sampling technique, Memon et al. (2020) argued that power analysis is recommended to determine sample size. Based on the power calculation, the minimum sample size of this study was 77 HEIs.

The questionnaire used in this research was adapted and developed from previous internal control and accounting information system studies. Besides, the Indonesian Government Regulations regarding the internal control for Indonesian HEI were also referred to. Explicitly, the COSO integrated framework (2013) was adapted as the primary reference in developing internal control measurement since the Indonesian government has officially adopted it. In detail, it consists of five components: control environment, risk assessment, control activities, information & communication, and monitoring activities (Figure 2). Furthermore, in developing IT_IC measurement, Rubino, Vitolla and Garzoni (2017) were adapted as the main reference since it was formulated following the internal control framework developed by COSO (2013). Specifically, IT_IC includes three dimensions: IT organisational controls, IT process controls, and IT soft variables controls. Additionally, due to the research context, an accreditation assessment instrument for the Indonesian HEI of 2019 was employed to measure HEI quality performance.

In this research, two sets of questionnaires were prepared. Ques-1 containing questions related to IT_IC and internal control variables was given to internal control unit management members. Meanwhile, Ques-2 containing quality performance was given to management members from the internal quality assurance unit. This separation of data sources considered the suitability of the parties who filled in the questionnaire where they should be the ones who expertise the points being asked (Sekaran and Bougie, 2019). In addition, separating data sources is also useful to avoid Common Method Bias (Chang, Witteloostuijn and Eden, 2020). All variables in the questionnaire were scaled

using a Likert of 0 to 5, where 0 = Not Visible/Not Implemented and 5 = Strongly Agree. Following Lewis, Templeton and Byrd (2005), some experts were asked to validate the questionnaire before utilising it in a field. The expert consultation results were followed up with questionnaire improvement.

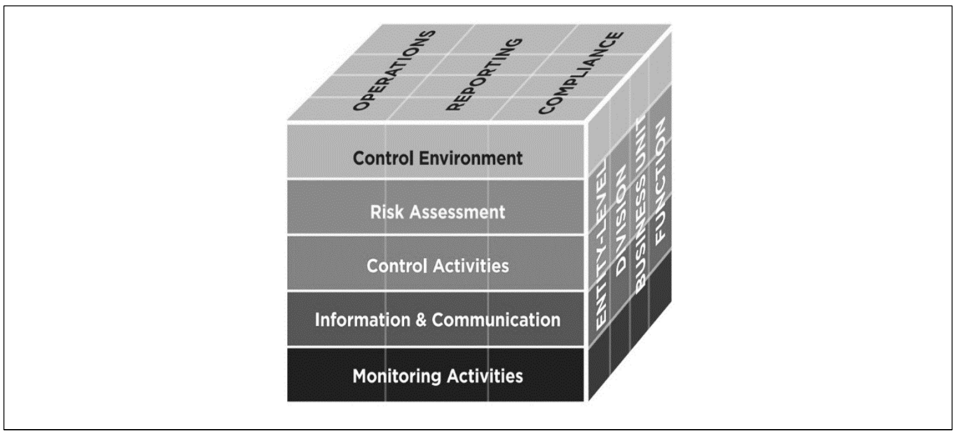

Figure 2 – COSO Integrated Framework of 2013 (COSO, 2019, p.5)

Then, data analysis was conducted to provide descriptive statistics and hypothesis testing results. To do so, Microsoft Excel and the variant-based Partial Least Square-Structural Equation Modelling (PLS-SEM) approach were employed. Specifically, this study used a higher-order construct analysis because the internal control and IT_IC variables were constructed by several dimensions with formative types (Becker, Klein and Wetzels, 2012). Additionally, a two-stage approach was adopted for testing the moderating effect because it was considered the most suitable for formative constructs compared to other approaches (Memon et al., 2019).

3 RESULTS

Details of the current study response rate are presented in Table 1. As highlighted earlier, the minimum sample size for this study should be 77 HEIs. Then, since this study could get 191 HEIs as the final sample size, it had reached the required minimum sample size suggested.

Due to the self-reported nature of the survey research data, there was a potential for common method variance (CMV) (Podsakoff et al., 2003). One of the common methods used to detect this issue is Harman's single factor test (Tehseen, Ramayah and Sajilan, 2017). The results showed that a total variance explained 78.62%, and the first factor only explained 29.57% or less than 50%. These results confirm that common method bias was not a serious problem in this research (Podsakoff et al., 2003).

Table 1 – Survey Response Rate

Detail	Internal Control and IT Controls Questionnaire Responses (Ques-1)		HEI Quality Performance Responses (Ques-2)	
	Frequency	%	Frequency	%
Sent	628	100.00	628	100.00
Received	271	43.15	233	37.1
Un-appropriate respondent	15	4.30	25	3.98
Extreme answer	5	0.80	1	0.16
Did not fill in Ques-1	-	-	15	2.39
Did not fill in Ques-2	60	9.55	-	-
HEI that completed both questionnaires	191	30.41	191	30.41
Usable questionnaire for hypothesis testing (the percentage based on ideal sample size, i.e., 77)	191	53.80	191	53.80

Furthermore, Table 2 presents the results of descriptive statistical analysis. In this paper, the scoring of policy implementation was divided into three levels following the Likert scale: 0 to 2 = low; 2.1 to 3.9 = moderate; 4 or more = high. It was found that, in general, the internal control and IT_IC dimensions implementation was at a moderate level. In comparison, the quality performance of HEI was also at a moderate level, not yet high. It indicates that, in general, these variables still need to be improved. Additionally, some dimensions even had a minimum score of 0.00. It denotes that the dimensions in question have not yet been implemented by related HEIs.

Table 2 – Descriptive Statistics

	COEV	RISKAS	COACT	INCOM	MON	IT_OC	IT_PC	IT_SVC	QUAL
Min	1.59	0.00	1.30	0.00	0.40	0.00	0.00	0.00	1.03
Max	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.93
Mean	3.92	3.78	4.09	4.09	3.85	3.78	3.85	3.53	3.30
SD	0.69	0.87	0.76	0.73	0.87	0.92	0.90	0.98	0.67

Notes: COEV: Control Environment; RISKAS: Risk Assessment; COACT: Control Activities; INCOM: Information and Communication; MON: Monitoring; IT_OC: Information Technology Organisational Controls; IT_PC: Information Technology Process Controls; IT_SVC: Information Technology Soft Variables Controls; QUAL: Quality Performance.

As this study focused on IT_IC development, only the findings on the implementation of this variable were elaborated in detail.

3.1 IT Organisational Controls

In general, according to Table 3, the IT organisational controls implementation was still at a moderate level. A "Not Visible" answer was also found in each indicator, meaning that the policy in question was not implemented yet. In other words, the implementation of the indicators was still done manually. In addition, some respondents answered "Disagree" and "Strongly Disagree", indicating that implementing IT organisational controls indicators has not been going well. However, those who answered these scales were still low, under 10% of the total respondents.

Table 3 – Mean and Frequency Scores of IT Organisational Controls

Code	Indicator	Mean Score	Not Visible		Strongly Disagree + Disagree		Agree + Strongly Agree	
IT_OC1	IT use to oversee authority in an assignment	3.73	3	1.20%	21	8.37%	167	66.53%
IT_OC2	IT use to oversee the implementation of an assignment's responsibilities	3.79	3	1.20%	19	7.57%	171	68.13%
IT_OC3	IT use to manage formal reporting lines (activity and program reports)	3.80	4	1.59%	17	6.77%	169	67.33%
IT_OC4	IT use to oversee the implementation of tasks	3.79	5	1.99%	16	6.37%	175	69.72%
IT_OC5	IT use to monitor individual employee performance	3.76	6	2.39%	18	7.17%	172	68.53%
IT_OC6	IT use to organise adequate segregation of functions to prevent fraudulent collusion	3.73	5	1.99%	22	8.76%	174	69.32%
IT_OC7	IT use to regulate the implementation of all transactions in accordance with applicable SOPs/policies	3.84	7	2.79%	15	5.98%	182	72.51%

Notes: Respondents' answer on a scale of 3 was not included. IT_OC: Information Technology Organisational Controls.

3.2 IT Process Controls

Based on the mean and frequency analysis results shown in Table 4, this aspect was also not running optimally, seen from none of the mean indicator scores

exceeding a scale of 4. However, this dimension was generally implemented at a moderate level because most of the mean scores were above 3.75, and most respondents answered "Agree" and "Strongly Agree".

Table 4 – Mean and Frequency Scores of IT Process Controls

Code	Indicator	Mean Score	Not Visible		Strongly Disagree + Disagree		Agree + Strongly Agree	
IT_PC1	IT use to regulate the documentation of transactions in accordance with applicable SOPs/policies	3.91	5	1.99%	13	5.18%	193	76.89%
IT_PC2	IT use to regulate the recording of transactions in accordance with applicable SOPs/policies	3.92	5	1.99%	13	5.18%	196	78.09%
IT_PC3	IT use to regulate the authorisation/ratification of all transactions in accordance with the applicable SOP/policies	3.81	7	2.79%	15	5.98%	179	71.31%
IT_PC4	IT use to prepare information for reference decision making at all levels of management	3.87	6	2.39%	12	4.78%	189	75.30%
IT_PC5	IT use to limit accessibility to important information	3.78	6	2.39%	21	8.37%	175	69.72%
IT_PC6	IT use to report programs and activities	3.91	4	1.59%	16	6.37%	190	75.70%
IT_PC7	IT use to oversee the adequacy of financial resources for campus operations	3.82	4	1.59%	26	10.36%	175	69.72%
IT_PC8	IT use to oversee the use of campus financial resources	3.84	5	1.99%	23	9.16%	180	71.71%
IT_PC9	IT use to oversee the use of campus physical assets	3.76	4	1.59%	23	9.16%	172	68.53%

Code	Indicator	Mean Score	Not Visible		Strongly Disagree + Disagree		Agree + Strongly Agree	
IT_PC10	IT use to calculate employee incentives based on their performance	3.82	6	2.39%	24	9.56%	176	70.12%

Notes: Respondents' answer on a scale of 3 was not included. IT_PC: Information Technology Process Controls.

3.3 IT Soft Variables Controls

IT soft variables controls refers to maximising the role of IT to monitor the socialisation and implementation of the code of ethics formulated by the organisation. The results revealed that this dimension implementation was the lowest in the Indonesian HEIs context, with the mean scores ranging from 3.31 to 3.88, as displayed in Table 5.

Table 5 – Mean and Frequency Scores of IT Soft Variables Controls

Code	Indicator	Mean Score	Not Visible		Strongly Disagree + Disagree		Agree + Strongly Agree	
IT_SVC1	IT use to monitor the availability of information on campus code of ethics	3.46	10	3.98%	29	11.55%	140	55.78%
IT_SVC2	IT use to socialise the campus code of ethics periodically	3.48	8	3.19%	31	12.35%	145	57.77%
IT_SVC3	IT use to report violations of the campus code of ethics	3.31	8	3.19%	42	16.73%	123	49.00%
IT_SVC4	IT use to calculate the number of employees attendance (lecturers and employees) in training held by the campus	3.88	3	1.20%	25	9.96%	174	69.32%

Notes: Respondents' answer on a scale of 3 was not included. IT_SVC: Information Technology Soft Variables Controls.

3.4 Measurement Model

It should be noted that the constructs in this model consisted of two types, wherein internal control and IT_IC used formative constructs, while HEI quality performance employed a reflective type. Therefore, validity and reliability testing referred to different criteria (Hair et al., 2021). In the first test, some of the

construct indicators' outer weight and loading values did not meet the rule of thumb. Hence, they were dropped. In the second test, it was found that the loadings test results showed that all loadings had been more than 0.5 (Table 6). It was also uncovered that the HEI quality performance construct had the AVE value that agreed with the rule of thumb required of 0.50 (Table 8). Therefore, the data met convergent validity (Hair et al., 2021).

Table 6 – Outer Loadings

Dimension	Indicator	Item	Loadings
Control Environment	COEV1	Our campus details the activities needed to complete tasks in each campus unit position (i.e., Dean, Head of Department, Head of Units and others.).	0.803
	COEV4	Our campus adjusts the organisational structure concerning environmental changes if necessary.	0.737
	COEV5	All our campus employees (lecturers and employees) have the competencies to carry out their duties/jobs.	0.643
	COEV6	The finance staff team responsible for preparing financial reports in all campus units has a background in accounting education.	0.533
	COEV10	People appointed as leaders at all levels of management have strong capabilities.	0.798
	COEV17	Top leaders at our campus are always careful in taking action/decisions.	0.793
Control Activities	COACT6	Campus physical asset control reviews are conducted periodically.	0.835
	COACT7	Information technology updates for control purposes are carried out periodically.	0.877
	COACT9	Academic activities get continuous supervision.	0.821
Information and Communication	INCOM1	Our campus management at all levels/units is supported by various communication features easily accessible for coordination (for example, chat, video conferencing and e-mail).	0.727
	INCOM5	Reviews of the implementation of internal control on campus are carried out by always involving competent external campus parties (assessors from HEI accreditation assessors, other HEIs' internal control forums or auditors from public accounting firms).	0.872
Monitoring	MON1	At our campus, the results of audits or reviews related to internal control are always followed up.	0.904
	MON2	At our campus, rapid procedures for identifying internal control weaknesses are available.	0.875
	MON3	Identified internal control weaknesses are always reported to the authorities on campus.	0.823

Dimension	Indicator	Item	Loadings
Risk Assessment	RISKAS1	Campus goals/targets are prepared by always considering possible risks.	0.848
	RISKAS3	On our campus, at every management level, the relevant risks are analysed first before a decision is taken/made.	0.889
	RISKAS4	Any potential fraud that can affect campus goals/targets is always identified to be mitigated.	0.888
IT Organisational Control	IT_OC3	IT use to regulate the authorisation/ratification of all transactions in accordance with the applicable SOP/policies	0.958
	IT_OC5	IT use to monitor individual employee performance	0.820
IT Process Control	IT_PC10	IT use to calculate employee incentives based on their performance	0.860
	IT_PC5	IT use to limit access to important information	0.605
	IT_PC6	IT use to report programs and activities	0.854
	IT_PC9	IT use to oversee the use of campus physical assets	0.842
IT Soft-Variable Control	IT_SVC3	IT use to report violations of the campus code of ethics	0.915
	IT_SVC4	IT use to calculate the number of employees attendance (lecturers and employees) in training held by the campus	0.783
Quality Performance	QUAL3	The number of study programs accredited by the International Accreditation Board recognised by the Indonesian Government	0.736
	QUAL4	Accreditation predicate of study program by Ministry of Education and Culture	0.706
	QUAL6	The number of new student selection	0.760
	QUAL7	The number of international students	0.709
	QUAL12	The outcome of the community service program	0.680
	QUAL13	Income generation performance	0.751
	QUAL14	Income level other than tuition fee	0.717
	QUAL24	The alumni work in multi-national companies or international institutions	0.660
	QUAL26	Number of patents or simple patents generated	0.672
	QUAL28	Number of appropriate technology, products, artwork, social engineering	0.688

Furthermore, the discriminant validity test results (Table 7) showed that the correlation between the HEI quality performance – the only reflective construct – was lower than the AVE root value itself (Fornell and Larcker, 1981). Thus, it signifies that discriminant validity has been established. Meanwhile, for formative constructs, this test was not required (coded FC) (Hair et al., 2021)

Table 7 – Discriminant Validity

	COACT	COEV	INCOM	IT_OC	IT_PC	IT_SVC	MON	QUAL	RISK
COACT	FC								
COEV	0.719	FC							
INCOM	0.654	0.644	FC						
IT_OC	0.605	0.587	0.571	FC					
IT_PC	0.612	0.600	0.566	0.739	FC				
IT_SVC	0.510	0.558	0.485	0.566	0.649	FC			
MON	0.674	0.709	0.621	0.575	0.621	0.546	FC		
QUAL	0.290	0.295	0.240	0.265	0.284	0.177	0.302	0.709	
RISK	0.655	0.742	0.595	0.603	0.676	0.618	0.690	0.217	FC

Notes: COEV: Control Environment; RISK: Risk Assessment; COACT: Control Activities; INCOM: Information and Communication; MON: Monitoring; IT_OC: Information Technology Organisational Controls; IT_PC: Information Technology Process Controls; IT_SVC: Information Technology Soft Variables Controls; QUAL: Quality Performance.

The reliability test results also agreed with the rule of thumbs (Table 8); Cronbach's alpha and composite reliability values were more than 0.6 and 0.7, respectively (Chin, Marcolin and Newsted, 2003).

Table 8 – Reliability Test of HEI Quality Performance Construct

Indicator	**Value**
Average Variance Extracted (AVE)	0.502
Cronbach's Alpha	0.910
Composite Reliability	0.892

The validity of the higher-order formative construct was tested by looking at the outer weight and loading and their significance values. The test results shown in Table 9 indicate that each first-order construct contributed positively and significantly to its higher-order construct (Hair et al., 2021). As all criteria had been met, thus, the results of the measurement model test deduced that the final data in this study could be used for structural model assessment (hypothesis testing).

Table 9 – Outer Weight, Loading and Significance Values

First Order Contribution	Outer Weight		Loading	
	Original Sample	P-Values	Original Sample	P-Values
COEV → INCON	0.469	0.096	0.869	0.000
INCOM → INCON	0.000	0.500	0.679	0.000
MON → INCON	0.555	0.028	0.896	0.000
RISASK → INCON	0.352	0.119	0.619	0.000
COACT → INCON	0.368	0.113	0.849	0.000
IT_OC → IT_IC	0.466	0.082	0.910	0.000
IT_PC → IT_IC	0.640	0.037	0.951	0.000
IT_SVC → IT_IC	0.052	0.439	0.625	0.002

Notes: COEV: Control Environment; RISK: Risk Assessment; COACT: Control Activities; INCOM: Information and Communication; MON: Monitoring; IT_OC: Information Technology Organisational Controls; IT_PC: Information Technology Process Controls; IT_SVC: Information Technology Soft Variables Controls; QUAL: Quality Performance.

3.5 Structural Model

The results of the structural model assessment (Table 10) implied that the model with the moderation had a higher adjusted R^2 value (0.107) than that without the moderation of IT_IC (0.098). It indicates, however, that a moderated model was better and was suggested for practical implications (Chin, 1998). This justification was also strengthened by the value of f^2, indicating the effect size of the moderator variable at a moderate level (0.015) (Aguinis et al., 2005). Additionally, the model proposed in this study met the goodness of fit as the SMRM value was less than 0.10 (Henseler et al., 2014).

Table 10 – Summary of Structural Model Assessment Results

Hypothesis	Without Moderation		With Moderation	
	ß	P-Value	ß	P-Value
IT_IC → Internal Control (H_1)	0.788	0.000**	0.788	0.000**
IT_IC → Quality Performance	0.098	0.154	0.098	0.163
Internal Control → Quality Performance	0.236	0.001**	0.311	0.001**
Internal Control*IT_IC → Quality Performance (H_2)			0.100	0.046*
Adjusted R^2		0.098		0.107
f^2 (Effect size) of IT Controls as Moderator				0.015
SRMR (model fit)				0.083

Notes: *P<0.05; **P<0.01.

4 DISCUSSION

In general, this study deduced that IT development for internal control purposes (IT_IC) in Indonesian HEIs was still moderate. However, IT_IC development was indeed positively associated with internal control implementation; thus, H1 was supported. This result affirms previous studies, uncovering that IT development could benefit organisational governance practices (Rubino, Vitolla and Garzoni, 2017; Mazza and Azzali, 2018; Queiroz et al., 2018). In addition, this result confirms that the efforts made by the Indonesian government in encouraging IT development at HEI have had a positive impact, although, in general, the implementation of each dimension of IT_IC was still at a moderate level.

On the other hand, although it was not a hypothesis, the tests also found a positive relationship between internal control and HEI quality performance. Thus, this result expands the findings of previous studies that internal control in the corporate contributes to improving performance (Al-Thuneibat, Al-Rehaily and Basodan, 2015; Länsiluoto, Jokipii and Eklund, 2016). Based on this study's findings, however, internal control was associated not only with financial performance but also with non-economy achievement, i.e., quality performance, which is the main concern of HEI.

Furthermore, from the testing results of both models, with moderation and without moderation, it was discovered that IT_IC was not associated with HEI quality performance, but its role as moderator was significant. As such, it can be deduced that the IT_IC acted as a pure moderator (see Table 10) (Durmusoglu et al., 2014). In other words, the relationship between internal control and HEI quality performance was strengthened by IT_IC development. These results affirm the study by Zhou et al. (2017) and Saeidi et al. (2019) that the orchestration of organisational resources, in this case, IT and internal control, is indispensable in the pursuit of competitive advantage. In contrast to their research in the corporate context, this study presents empirical evidence in the HEI sector, which is for ranking and accreditation in the competition era, both nationally and globally.

From the findings described above, this study initiates both practical and theoretical implications. First, practically, the results of this study suggest that the development and orchestration of IT_IC at HEI should continue to be improved considering the benefits it brings. Even at the moderate implementation level, as this study found, IT_IC development can be positively related to internal control implementation, and strengthened the internal control-quality performance realtionship. Indeed, investing in IT is not cheap and sometimes complicated. However, considering its benefits are also great for increasing organisational capability and competitive advantage, it is important to continue this policy. In fact, many HEIs still consider the implementation of internal control to be done enough with a manual mechanism. Therefore, many of them still have not developed IT_IC today. For regulators, perhaps, the formulation of

certain SOPs, guidance or frameworks related to how IT_IC should be developed needs to be done to become a benchmark for HEI.

Theoretically, the results of this study confirm that the orchestration of the organisation's internal resources is pivotal to improving internal capabilities, which are then useful for pursuing competitive advantage. It is evident from the development of IT_IC, which is directly and positively associated with the implementation of internal control. Even IT_IC can strengthen the relationship between internal control and HEI quality performance. Thus, this study complements the resource-based view theory by Barney (1991) that focuses on four criteria that must be met so that internal resources can promote competitive advantage, including valuable, rare, inimitable and non-substitutable. Rather, this study adds that harmonious interaction (orchestration) between internal resources is also crucial to realising sustained competitive advantage. For this purpose, the role of leadership is absolutely vital (Asiaei et al., 2021; Sirmon et al., 2011).

5 CONCLUSION

This study examines the extent of the IT_IC development in HEI in Indonesia after the 2018 government recommendation. It also investigates the IT_IC role in implementing internal control and its role as a moderator in the relationship between internal control and HEI quality performance. By involving 191 HEIs, this study concludes that IT_IC was positively associated with internal control implementation. In addition, IT_IC played a role as the pure moderator; in other words, it strengthened the relationship between internal control and HEI quality performance. Drawing from these insights, this study suggests that IT_IC development should concern HEI management because of its great benefits. From a theoretical point of view, the results of this study strengthened the premise of resource orchestration theory empirically, suggesting that it is necessary to enrich existing internal resources to increase the organisational capability to achieve a competitive advantage. In this study, internal control effectiveness enhancement associated with HEI quality performance can be executed by orchestrating IT_IC development.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.