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Article

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Does institutional investor influence information technology investment decisions and corporate performance?

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ABSTRACT

This paper examines the role of institutional investors foreign-owned firms and government-linked companies, in improving firm performance through the channel of IT investment decision. The data sample comprises information collected from the annual reports of 231 companies listed on Bursa Malaysia, spanning the years 2010 to 2019. This study concludes, on the basis of the Generalized Method of Moments (GMM) dynamic model, which mitigates the endogeneity issue linked to the equity multiple value model, that institutional ownership moderates the relationship between IT investment and firm performance in a positive direction. The results of the study shed light on the capacity of institutional investors to allay apprehensions regarding agency problems that arise from the rent-seeking conduct of managers. The implications of this finding are both theoretical and practical, given that IT expenditures continue to constitute a substantial proportion of the capital budgets of organisations. However, several studies indicate that there is no direct relationship between firm IT investment levels and firm performance. This study contributes to the body of knowledge by examining the influence of institutional investors on IT investment decisions. It does so by integrating agency theory, which explains performance shortfalls, and corporate governance, which oversees and controls managers' inappropriate investment choices, thereby illuminating the antecedents of IT investment decisions. The present investigation would furnish significant insights for stakeholders, investors, and the general public, thereby augmenting their understanding of the pivotal significance of institutional ownership and guaranteeing that investments in IT are adequately regulated.

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1. Introduction

The key decision-makers in corporate organisation are the board of directors and top-level management. Their decisions affect the operating outcome of the firm (Abdulmalik et al., 2020; Nwoba et al., 2021). On behalf of the shareholders, the board of directors reviews, approves, and keeps an eye on the investment decisions and corporate strategy put forth by the management team (Fu et al., 2020). Therefore, they have the primary duty and a basic concern to make optimal investment decisions, since these decisions and their outcomes impact the firm's long-term growth and survival through determining its cash flows and profitability (Cao et al., 2020). A crucial strategic corporate decision in today's business climate, particularly in the midst of disruption waves, is to invest in information technology (IT) with the goal of improving corporate outcomes. (Usman et al., 2023). Business leaders are scrambling to invest in technology to meet the demands of the digital age while maintaining competitiveness (Shankar, 2019; Singh, 2019). The 2021 Gartner CEO survey, shows that CEOs are consistently investing a significant amount of money in their IT and digital capabilities (Starita, 2021). Corporate executives believe that

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investing in the right IT could improve performance by lowering operating costs, time commitments, and business risk, which are essential to long-term business viability (Alghorbany et al., 2022; Australian Trade & Investment Commission, 2019; Thames & Schaefer, 2016). Unfortunately, the failures of some IT investing firms arising from distortions have raised doubts about the efficacy of IT investment in improving overall firm performance (Aydiner et al., 2019; Hamdan et al., 2019).

Investment distortion, which can cause IT investments to fail, can theoretically stem from asymmetric information and a lack of alignment between managerial and shareholder interests, according to previous empirical findings (Cao et al., 2020). Managers have the option to act in a self-serving manner that prioritises their personal gain over the firm's success. It is possible, for example, for decision-makers to act in their own self-interests to make operational decisions that reduce returns for shareholders by investing in unproductive IT projects. On the other hand, decision-makers might be influenced to seek out investment opportunities by factors other than logical economic considerations, such as intuition and imitation (Ravichandran et al., 2009). When taken as a whole, these factors increase the risk that the manager might occasionally over- or underinvest in IT projects, or that IT investment decisions would not align with organisational strategy, causing the investing organization's value to decrease (Abdulmalik et al., 2020; Che-Ahmad et al., 2020). Many empirical studies on the economic effects of IT investment and IT failures in investing organisations have yielded inconsistent results. In some studies, IT investment has a negative impact on performance, while others find no relationship between the variables. Based on the inconsistent results, it is clear that the debate over the economic benefits of IT investment is far from over (Borja et al., 2018; Loheswar, 2019; Sirisomboonsuk et al., 2018; Niyonsenga & Mwaulambo, 2018). Therefore, it is imperative to reassess the relationship between IT investment and firm performance, specifically in the context of Malaysia, so as to comprehend the organizational externalities that manifest the financial benefit.

The current study adopts the agency theory of corporate governance, which holds that social or self-pressures occasionally influence investment decisions. Institutional investors are relatable because they have a greater ability to influence business outcomes. There is little doubt that institutional investors have a greater impact on a company's ability to make sound investment decisions by influencing key strategic decisions and enhancing internal controls and governance practices (Fung & Tsai, 2012). Institutional investors hire skilled professionals to manage huge fund of third parties, as such they are always interested in the organization's growth and profitability, and they will rationally support investment decisions that increase the firm's future cash flow (Hansen & Hill, 1991). These investors have the wherewithal to put pressure on the corporate board and the top management to act responsibly when decisions are not in the organization's best interests. As a result, institutional investors can protest a poorly informed IT investment decision that reduces future cash flow by voting against it at the AGM or selling their stake in the company, a practice known as shareholder activism in corporate governance.

The current study fills a knowledge gap in the IT investment literature by investigating the influence of institutional investors on IT investment decisions and business performance. There have been several empirical studies on the relationship between corporate governance attributes and firm performance (Ravichandran et al., 2009; Ravichandran & Zhao, 2018), but none have addressed the context of the current investigation. There is a particular lack of research into the role that institutional investors play in the overall efficiency-enhancing outcome of Malaysian businesses' IT investment decisions. Recent research has only looked at internal factors, such as the number of CIOs, the existence of an IT committee, the company's information security policy, and the presence of independent directors (Houqe & Ali, 2018; Panetta & Santoboni, 2017). The current study adds to the IT investment literature in three important ways. First, the study examined the impact of institutional investors on the relationship between firm IT investment and firm performance in an emerging economy context. There is a technology gap between developed and emerging economies, and the existing conflicting findings on IT investment and firm outcomes are primarily from industrialised countries (Borja et al., 2018; Chong et al., 2017; Niyonsenga & Mwaulambo, 2018; Sirisomboonsuk et al., 2018). Emerging economies have tended to adapt rather than innovate in technology, and they frequently lack critical resources to maximise the benefits of their efforts. Studies show that reporting environments are also influenced by the institutional frameworks of the countries in which they are located (Getachew & Beamish, 2021;

Ravichandran et al., 2009; Xu et al., 2021). As a result, existing empirical findings cannot be extrapolated beyond the investigation's scope.

Second, the study adds to the literature on institutional investors' roles in addressing agency concerns that may arise as a result of the corporate board's IT investment decisions. As a result, this study examines Malaysia's prominent institutional ownership pattern in relation to foreign institutional investors and government-linked companies (GLIC), with the goal of identifying the channels through which institutional investors improve IT investment efficiency. Government Linked Investment Companies (GLIC) and Foreign Owned Companies (FOWC) are intriguing institutional ownership structures found in Malaysia. Malaysia piques interest because of the economic role that government-owned companies play. These GLICs (Government Link Investment Companies) invest on behalf of the public and the government, so they are of particular interest. As part of the 1970s New Economy Policy, the primary motivation for the establishment of GLICs is to assist the Bumiputera community in amassing wealth through stock ownership. Unlike other regions, only five GLICs hold 70% of the institutional shareholdings in companies listed on the Bursa Malaysia (Abd Mutalib et al., 2016). On the other hand, data released by the Malaysian Department of Statistics (DOS) in 2024 show that FDI had a significant impact on the growth of investment inflows to Malaysia. Furthermore, according to the DOS report, FDI increased to 48.1 MYR billion in 2021 from 32.4 MYR billion in 2019 (MIDA, 2024).

The study's other sections are as follows: [section 2](#) reviews the literature on IT investment, GLIC, FOWC, and business performance, and [section 3](#) discusses the study's methodology. Finally, [section 4](#) offers the study's empirical findings, while [Section 5](#) discusses the investigation's findings and implications, limits, and recommendations for further research.

2. Theoretical background and hypothesis development

2.1. Theoretical background

Managerial opportunism, which varies depending on the situation under study, influences IT adoption and likely explains why there are discrepancies in empirical evidence (Chae et al., 2018; Houqe et al., 2019; Le et al., 2006; Peng et al., 2016). Agency problems are related to the success or failure of IT investments, as shown by Houqe et al. (2019) and Chae et al. (2018). It is worth noting that Aydiner et al. (2019) found a weak association between IT expenditure and business success, suggesting that other factors (such as governance mechanisms) can strengthen this connection. It has been recommended by both Houqe et al. (2019) and Ho et al. (2011), who attribute conflicting findings to agency problems, that the agent may be overinvesting to create an excessive amount of IT assets for their career interests. Ning et al. (2020) argued that managers (agents) might be 'more value-oriented and strive to establish personal pride and self-identity'. As a result, steps should be taken to mitigate the agency problems typically associated with IT expenditure. Therefore, elements that enhance decision-making to generate high business value should moderate the connection between IT investment and corporate performance. According to agency theory, institutional investors (including government-affiliated investment firms and foreign-owned businesses) can help reduce management opportunism by effectively influencing and coordinating corporate resources (Ghahroudi, 2011; Halkos & Tzeremes, 2010; Ting et al., 2016; Uwuigbe & Olusanmi, 2011). Institutional investors are uniquely placed to observe and potentially influence corporate behaviour (Ravichandran et al., 2009).

2.2. IT investment, GLIC, and corporate performance

Companies owned by the Malaysian government have been referred to as 'Government Linked Investment Companies' (GLICs). The focus of the Malaysian GLIC is on for-profit enterprises. Most of the voting stock in these businesses is owned by the Malaysian government, which also has a say in who runs them and who sits on their boards of directors (OCED, 2013). Employees' Provident Fund (EPF), Armed Forces Savings Fund (Lembaga Tabung Angkatan Tentera or LTAT), Permodalan Nasional Berhad (PNB), National Social Security Organization of Malaysia (SOCSO), Pilgrims' Savings Fund (Lembaga Tabung Haji or LTH), Kumpulan Wang Amanah Pencen (KWAP), and Ministry of Finance Inc (MFI) are the seven GLICs (Abd

Mutalib et al., 2016; IMF, 2013; OECD, 2013). KWAP and MOF invest on behalf of the government, while the other GLICs invest in the name of their contributors, unitholders, and depositors. In addition, KNB and MFI focus on a national strategy that is difficult to determine, as stated by Taufil-Mohd et al. (2013), making their goals distinct from those of other GLICs. Impressively, GLICs are less concerned with the company's short-term performance because they have long-term investment horizons.

In Malaysia, GLICs have been crucial to economic growth (OECD, 2013; Lau & Tong, 2008). Even though the GLICs make up only 5% of the population of entire ownership of the Malaysian Public Listed Companies market companies, they account for 36% of Bursa Malaysia's market cap and 54% of the Kuala Lumpur Composite Index (OECD, 2013). According to available statistics, seventy percent of the institutional investor shareholding in Malaysian PLCs is held by just five major GLICs (Abd Mutalib et al., 2016; Taufil-Mohd et al., 2013). Comparing GLICs to state-owned enterprises (SOEs), a common form of ownership in other economies reveals significant distinctions. As opposed to state ownership, the Federal government merely keeps an eye on the five GLICs and does not get involved in their day-to-day operations. Instead, unitholders keep tabs on how well the funds are utilised in the business.

Consequently, the presence of GLICs in a company will encourage management performance monitoring. The reason is that GLIC investors will have more say in the voting process and will put more pressure on management (Muda et al., 2019), which may improve alignment between managers' and stakeholders' interests. If the performance of GLICs is poor, unitholders have the right to question the competence of GLICs managers as they have a vested interest in improving business performance. To achieve this, GLICs will keep closer tabs on the companies they have invested in. It has been shown that institutional investors play a significant role in shaping corporate governance structures (Faller & zu Knyphausen-Aufseß, 2018; Lamb & Butler, 2018). From a different angle, GLICs understand the significance of IT adoption because they have been shown to exhibit distinctive patterns of investment behaviour. Research and development literature (e.g. Munari et al., 2002) has found that R&D spending is typically high in companies where GLICs hold dominant shares. This may be related to the fact that fostering technological innovation is a priority for the government (Choi et al., 2012). Equally important, GLICs have easy access to the essential infrastructure and a wide range of tax and non-tax incentives from the government, all of which could boost the adoption of IT and the performance of businesses.

Based on the evidence above, the study posited the following hypothesis:

H1: The interaction of IT investment with government-linked companies will positively affect firm performance.

2.3. IT investment, FOWC, and corporate performance

Another common form of ownership in Malaysia is companies in which foreign investors own most shares. These businesses are also known as multinational corporations (50 per cent shareholdings). In effect, the foreign investor makes significant strategic decisions on the company's day-to-day operations (Legal information institute (LII), 2011). Records show that foreign investment significantly impacts Malaysia's Gross Domestic Product (GDP) (Bank Negara Malaysia, 2018; Chan et al., 2014). According to the United Nations Conference on Trade and Development (UNCTAD) 2015 World Investment Report, Malaysia is the fifth-largest recipient of FDI inflows in East and Southeast Asia and the most preferred destination for FDI by 15 multinational corporations from 2015 to 2017' (Mohd-Noor, 2017, p.136). Strong predictive skills and high monitoring mechanisms have been critical factors in the success of Malaysian companies owned by foreign investors (Hassan Che Haat et al., 2008). In addition, foreign investors contribute capital and technical and managerial know-how and reduce agency issues through active manager monitoring to improve corporate governance and firm productivity and performance due to their enormous stake in the organisation (Boyer & Zheng, 2009; Douma et al., 2006; Kamardin, 2014; Sulong & Nor, 2008). The management of a foreign-owned company consists of seasoned business individuals who are always looking for profitable new ventures (Taufil-Mohd et al., 2013). Therefore, the presence of foreign institutional shareholders should promote more optimal supervision of management performance (Buchanan et al., 2018; Hu et al., 2017).

Based on this, the present study employed the following hypothesis:

H2: The interaction of IT investment with foreign-owned firms will positively affect firm performance.

3. Methodology and data

3.1. Data and sample

The study population consisted of 889 financial and non-financial listed companies traded on Bursa Malaysia between 2010–2019. According to previous research (Jaafar & Halim, 2013; Mohd-Noor, 2017), companies with inadequate IT disclosure were excluded from the study. As a result of using this selection criterion, the final sample consisted of only 231 firms, with a total of 2,205 unbalanced firm-year panel data observations, this means 658 firms were excluded. Table 1 includes the complete sample description based on industry classification. The sample businesses include 558 Products & Services, 460 Consumer Products, 362 Technology, 206 Real Estate, 194 Trading-Services, 96 Plantation, 80 Construction, 40 Transportation & Logistics, and 30 Health Care sector. The annual reports of the 231 firms for the years under study were downloaded from the Bursa Malaysia website.

3.2. Model and variable measurement

Equation (1) was used to estimate the relationship between IT investment and firm performance and as well established the moderating role of GLIC and FOWF, which is consistent with previous studies on IT investment (such as Houqe et al., 2019; Aydiner et al., 2019; Lee et al., 2016, Chae et al., 2018).

$$FP_{it} = \alpha_{it} + \beta_1 FP_{i,t-1} + \beta_2 ITINVEST_{it} + \beta_3 ITINV * GLIC_{it} + \beta_4 ITINV * FOWF_{it} + \beta_5 GLIC_{it} + \beta_6 FOWF_{it} + \beta_7 BOSIZE_{it} + \beta_8 BIND_{it} + \beta_9 LEV_{it} + \beta_{10} FSIZE_{it} + \beta_{11} SGROWTH_{it} + \beta_{12} MARKSH_{it} + \beta_{13} FAGE_{it} + \beta_{14} INDUSTRYD_{it} + \mu_{RQ} \quad (1)$$

Due to its ability to mitigate endogeneity issues between firm performance measures and corporate governance variables (Sheikh et al., 2018; Ullah et al., 2018; Wintoki et al., 2012), model 1 was estimated using the two-step general method of moments (GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998). The GMM estimation technique will create the first difference variables and the lagged value of the dependent variable, which removes the unobserved effect. Thus, this makes it an appropriate estimation technique to control for endogeneity (Arellano & Bover, 1995). Moreover, the GMM estimation method is more effective than the two-stage least square method when there is heteroscedasticity and serial correlation in the error terms (Arellano & Bover, 1995).

3.2.1. Principal components analysis technique

Performance was measured in previous IT and business performance studies using ROA and Tobin-Q. (Ho et al., 2011; Houqe et al., 2019; Zhang et al., 2015). The short-term, or the current year's profitability, was the focus of this measurement perspective (Zhang et al., 2016). However, many investors are more concerned with the value of their investment in the form of rising share prices than with the firm's overall value (Shittu, 2015). Since Zhang et al. (2016) relate market projections of future profits to technology investments, the equity value multiple (EVM), which is crucial for accurately predicting equity value, was used in this study to measure company performance. Also, compared to other performance indicators, equity value multiples offer a more accurate appraisal of stock (Schreiner, 2007; Shittu et al., 2016).

Table 1. Industry classification.

Industry	Observation
Construction	80
Consumer Products	460
Financial Services	194
Health Care	30
Industrial Products & Services	558
Plantation	96
Properties	206
Transportation & Logistics	40
Technology	362
Trading-Services	179
Total number of observations	2,205

This study measures firm performance by utilizing the Equity Value Multiple (EVM), which is a ratio calculated based on both price to book value and price to sales. EVM was carried out using the trailing approach mainly because the company's annual reports contain information on the trailing method. Further, a two-step regression was used to calculate the individual value multiples for the sampled firms based on the principal components analysis technique (PCA) to choose the EVM. The PCA technique minimises the four components of equity value multiples (price to book value and price to sales). Consistent with Ashton, Cooke, Tippett, and Wang's (2003) aggregation theorem of equity and market value, this study presents the following EVM regression:

$$EVM_{(t)} = \beta_{(0)} + \beta_{(1)} PBM_{(t)} + \beta_{(2)} PSM_{(t)} + \varepsilon_{(t)}$$

EVM = firm performance

$PBM_{(t)}$ = price to book value

$PSM_{(t)}$ = price to sales

β = coefficient of valuations related to all elements of reducing valuation mode.

$\varepsilon_{(t)}$ = error term.

Table 2 lists the dependent variables, independent variables and the control variables proxies and definitions.

4. Results

4.1. Descriptive Statistics

The descriptive statistics for the variables used in this study are shown in Table 3. The mean and median EVM values in Table 3 were 3.81 and -0.32, respectively. The mean of ITINVEST, which represents the average amount Malaysian businesses have invested in IT from 2010 to 2019, was RM13,900,000, and the amount spent ranged from RM13,000 to RM494,000,000. Comparing this finding with Thakurta and Deb (2018) findings that showed Indian firms were making such investments across the years with a minimum of RM742.59 in 2002 and a maximum of RM93,738,144.82 in 2015. Board size (BOSIZE) and board independence (BOIND) had mean values of 7.48 and 0.49, respectively. The average value of leverage (LEV) was 0.43. The log of firm size (FIRMSIZE) had a mean of 5.60, and the means of sale growth (SALEGROW) and firm size (FIRMSIZE) were 4.48 and 5.60, respectively. Lastly, the market share's mean value (MARSH) was 0.57.

Table 2. Variables definition.

	Description	Source
Dependent Variable		
EVM	EVM stands for equity value multiple, a measure for firm performance using the book value and sales value.	Alghorbany et al. (2022), Nenkov (2019), Shittu (2015)
Independent variables		
ITINVEST	ITINVEST is equivalent to the natural logarithm for the amount of Net Cash for IT Investing Activities	Alghorbany et al. (2022), Mohd-Noor (2017).
Interacting Variables		
GLIC	GLIC signifies the percentage of the ordinary shares maintained by each GLICs.	Abd Mutalib et al. (2016), Abdul Wahab et al. (2008).
FOWF	FOWF is the proportion of foreign shares divided by total shares outstanding in a firm in a year.	Musallam and Lin (2019), Ismail, et al. (2016), Ho et al. (2011).
Control variables		
BOSIZE	BOSIZE is the sum of directors at a company.	Kamardin (2014).
BIND	BIND signifies the total number of independent non-executive directors divided by the total number of directors.	Haider et al. (2016).
LEV	LEV signifies the total debt to total equity.	Alghorbany et al. (2022), Kamardin (2014).
FSIZE	FSIZE signifies the logarithm of total assets.	Alghorbany et al. (2022), Kamardin (2014).
SGROWTH	SGROWTH signifies the change in sales revenue.	Alghorbany et al. (2022), Houqe et al. (2019).
MARKSH	MARKSH signifies square the market shares of all firms in a market and then summing the squares.	Alghorbany et al. (2022), Houqe et al. (2019).
FAGE	FAGE is the total number of firm (i) age.	Hamdan et al. (2019).
INDUSTRYD _{it}	INDUSTRYD Industry dummies are based on financial and non-financial firms.	Hamdan et al. (2019).

Table 3. Descriptive Statistics.

	Obs	Mean	Median	Std. Dev	Min	Max
Dependent variable						
EVM	2,205	3.81	-0.32	1.08	-1.19	12.65
Independent variable						
ITINVEST (log)	2,205	6.49	6.48	0.82	4.11	8.69
ITINVEST(Rm)	2,205	13,900,000	3,055,000	30,700,000	13,000	494,000,000
Interacting Variables						
GLIC	2,205	5.41	0	13.23	0	81.74
FOWF	2,205	3.97	0	11.89	0	74.97
Control variable						
BOSIZE	2,205	7.48	7	2.06	4	17
BOIND	2,205	0.49	0.47	1.29	.14	.90
LEV	2,205	0.43	0.14	2.55	0	64.35
SALEGROW	2,205	4.48	4.58	25.68	-93.17	99.61
FIRMSIZE(log)	2,205	5.60	5.46	0.86	3.92	8.02
FIRMSIZE(Rm)	2,205	3,765,836	292,000	11,700,000	8,298	106,000,000
MARSH	2,205	0.57	0.49	0.42	0.001	3.14

Table 4. Correlation matrix.

Variables	1	2	3	4	5	6	7	8	9	10	11
1 EVM	1										
2 ITINVEST	0.05	1									
3 GLIC	0.01	-0.09	1								
4 FOWF	0.28	0.06	-0.02	1							
5 BOIND	0.02	-0.08	0.34	0.03	1						
6 BOSIZE	-0.03	-0.03	0.31	0.04	0.60	1					
7 LEV	-0.02	0.01	0.04	-0.02	0.03	0.05	1				
8 FIRMSIZE(log)	0.23	-0.01	0.045	0.17	0.36	0.44	0.07	1			
9 SALEGROW	0.01	0.02	-0.00	0.02	0.00	0.00	0.00	0.08	1		
10 MARSH	-0.14	0.11	-0.11	0.03	-0.05	0.04	0.02	-0.18	0.09	1	
11 FIRMAGE	-0.09	-0.05	0.019	-0.02	0.22	0.16	0.05	0.21	-0.04	-0.04	1

The correlation matrix is displayed in Table 4. Again, all variables were below 0.7, indicating that the correlation values are within the acceptable range and that the variables are not highly correlated (Pallant, 2013).

4.2. Regression analysis

This research investigated the interaction between institutional ownership (GLIC and FOWF) and firm performance as determined by equity value multiples (price to book value and price to sales). Table 5 displays the inferences of regression results. The relationship between firm performance and the interaction term IT investment and GLIC (ITINV*GLIC) was predicted in hypothesis 1 (H1) as positive. The findings show a strong and significant correlation between IT investment and firm performance ($b=0.01$, $p<0.01$). The result suggests that GLIC investment in IT improved the firm's performance (EVM) by about 0.01. This finding supports the claims made by Abd Mutalib et al. (2016) and Muda et al. (2019) that GLICs can provide effective monitoring that improves decision-making and helps the firm perform at its best. Hypothesis 2 (H2) stated a positive relationship between the interaction term of IT investment and foreign-owned firms (ITINV*FOWF) and firms. Consistent with the stated hypothesis, the result revealed a positive and significant relationship ($b=0.01$, $p<0.01$). Accordingly, foreign-owned firms that made good IT investment decisions experienced an improved performance (EVM) by 0.01. The finding is consistent with the past literature that argued that foreign-owned firms could effectively monitor firm decision-making and enhance firm performance (Abd Mutalib et al., 2016; Muda et al., 2019).

In the EVM model, some control variables were significant, while others were not. For instance, the EVM model's coefficient of board size (BOSIZE) ($b=-0.1$, $p<0.01$) was significant but negative. The implication is that a sizable board is not necessary for a company to achieve high performance (Kweha et al., 2019). On the other hand, the EVM model's coefficient for board independence size (BOIND) was significant and positive ($b=0.02$, $p<0.01$). Following Houqe et al., this result suggests that a high level of board independence can enhance firms' performance (2019). Finally, the EVM model's LEV coefficient,

Table 5. Regression Results for Equity Value Multiples.

Variable	coeff	t-value	VIF
L.EVM	0.70	8.53***	–
ITINVEST	–0.40	–8.67***	1.02
<i>ITINV * GLIC</i> (H1)	0.01	2.85***	
<i>ITINV * FOWF</i> (H2)	0.01	8.80***	
BOSIZE	–0.01	–4.48***	1.79
BOIND	0.02	0.64*	1.66
LEV	–0.01	–2.29**	1.02
FIRMSIZE	0.89	10.49***	1.38
SALEGROW	–0.01	–2.54***	1.03
MARSH	0.31	3.76***	1.09
FIRMAGE	–0.03	–5.92***	1.10
_cons	–3.39	–7.99***	–
Industry Dummy	Yes	–	–
Mean VIF	–	–	1.2
No. of obs	1,974	–	–
No. of groups	231	–	–
<i>Prob > chi2</i>	0.00	–	–
Hansen J	0.32	–	–
AR(1)	0.01	–	–
AR(2)	0.57	–	–

Note: The coefficient values are presented with the t-statistics in parenthesis, * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. EVMt-1: is a lagged dependent variable. The lagged value of the dependent variable is automatically added in STATA to account for any dynamic endogeneity present in the regression; ITINVEST is IT spending and is the independent variable.

which was highly significant and negative ($b = -0.01$, $p < 0.05$), suggests that the leverage factor has a negative impact on firm performance. The outcome for leverage is consistent with earlier research (Byoun et al., 2016; Gyapong et al., 2019).

The coefficient for the firm size (FIRMSIZE) in the EVM model was significant and positive ($b = 0.89$, $p < 0.01$). It implied that big businesses could boost their performance, which aligned with Kamaruzaman et al. (2019) findings. However, the sales growth coefficient (SALEGROW) had a markedly negative value ($b = -0.01$, $p < 0.01$). This result is consistent with earlier studies (Houqe et al., 2019). Market share (MARSH) in contrast was significant and positive in the EVM model ($b = 0.31$, $p < 0.01$), indicating that firms with high market share had successful operations in line with Houqe et al. (2019). Finally, firm age (FIRMAGE) was negatively significant in the EVM model ($b = -0.03$, $p < 0.01$), supporting the claim made in earlier studies (Houqe et al., 2019).

5. Discussion and conclusion

This paper empirically investigates the role of institutional ownership in the relationship between IT investment and firm performance. The paper hypothesises that the existence of a conflict of interest is detrimental to firm IT investment decisions, as managers may place personal pride and self-identification above firm value (Ning et al., 2020). As a result, agency issue concerns will determine the success or failure of the IT investment outcome. (Chae et al., 2018; Houqe et al., 2018; Nawi et al., 2013). This study discovered evidence that institutional ownership enhances firm performance through IT investment. GLIC and FOWF provide a better monitoring function to improve the quality of IT investment decisions. This finding emphasises the role of institutional investors in improving the outcomes of firms' IT investment decisions. The impact of firms' IT investment on firm performance is higher when interacting with government-affiliated investment firms and foreign-owned businesses.

The findings are consistent with previous research (Faller & zu Knyphausen-Aufseß, 2018; Lamb & Butler, 2018; Muda et al., 2019), indicating that institutional investors can provide monitoring and improve corporate performance. Most especially, when evidence adduces that IT-related expenditure takes time to pay off, with no immediate impact on corporate performance (Kauffman et al., 2015). However, the interaction effect of institutional ownership offers excellent monitoring procedures that could reduce managerial opportunism and enhance the adoption of the proper IT resources (Ting et al., 2016; Uwuigbe & Olusanmi, 2011). The agency theory, which underpins the findings of this study, states that institutional ownership can mitigate the agency problem by providing external

monitoring that reduces managerial opportunism and promotes the adoption of appropriate IT resources (Ghahroudi, 2011; Halkos & Tzeremes, 2010; Ting et al., 2016; Uwuigbe & Olusanmi, 2011). Previous studies indicate that GLIC provides efficient monitoring that improves business decision outcomes (Abd Mutalib et al., 2016; Muda et al., 2019).

This finding should be of interest to managers, practitioners, and IT researchers. First, this study found that IT investment has an impact on firm performance via an intermediate variable known as institutional ownership. Thus, when it comes to IT investment decisions, institutional owners play an important role in monitoring. The reason for this is that only when the agency's concerns about the IT investment decision are addressed can the performance outcome be seen. Finally, the study has some limitations. The literature on IT investment in Malaysia is still developing, so the study's reliance on institutional ownership as the sole factor influencing the relationship between IT investment and firm performance suggests that the findings may not be generalizable to other developed countries with more advanced IT investment adoption. There are several directions for future research, including conducting a similar study with the addition of other interaction effects to better understand investor behaviour.

In other words, the study's current evidence recommends and suggests that investing in technology will be a value-add that can improve corporate performance when other factors are taken into account. As a result, other factors, such as the CEO's personality, can help to mitigate the impact of managerial opportunism on firm decisions, thereby strengthening and improving decision-making and generating higher/better business value. Furthermore, the current study's sample was limited to companies listed on Bursa Malaysia's main board and did not include non-listed companies, particularly small and medium-sized businesses. It also recommends that future researchers broaden their sample to include non-listed small and medium-sized businesses, which account for a sizable portion of Malaysia's business sector. As a result, the current study focused solely on the Bursa Malaysia main board.

Author contributions

The first author was involved in the conception and design, analysis and interpretation of the data. The second author was involved in the conception, and the third and fourth authors were involved in the drafting of the paper, revising it critically for intellectual content; and the final approval of the version to be published; and that all authors agree to be accountable for all aspects of the work.

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Data availability statement

I utilized data from my previous article in the current study, incorporating a moderator variable to examine the relationship. Sure, the data of the IT Investment variable, Firm Performance variables and control variables are the same, but the moderator variable did not exist in my previous article, here are the differences. The authors confirm that the data of this study are available within my previous article: <https://doi.org/10.1080/23311975.2022.2055906>.

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