PREDICTING THE INFLUENCE OF DIGITAL LEADERSHIP ON PERFORMANCE OF PRIVATE HIGHER EDUCATION INSTITUTIONS: EVIDENCE FROM MALAYSIA

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Abstract

This paper aims to investigate the impact of digital leadership on the institutional performance of private higher education institutions (PHEIs) in the digital era. Supported by the Resource-Based View Theory and the digital leadership dimensions based on the International Society for Technology in Education-Administrators (ISTE-A) standards, the study examined the roles of visionary leadership, digital-age learning culture, professional excellence, systemic improvement, and digital citizenship influencing the performance of PHEIs in Malaysia. An online questionnaire survey was adopted, and a non-probability sampling method utilizing purposive sampling was applied. A total of 121 usable responses were collected from leaders in Malaysia PHEIs and analyzed based on structural equation modelling via the SmartPLS 3.3. The results showed that digital-age learning culture, professional excellence, and digital citizenship positively affect the PHEIs performance. However, visionary leadership and systemic improvement do not have a significant positive relationship with performance. The findings provide information to future researchers and leaders in PHEIs on the vital roles of a digital-age learning culture, professional excellence and digital citizenship in today's institutions. The novelty of this study contributed to the body of knowledge in digital leadership and performance in the context of PHEIs in an emerging market.

Research paper

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Introduction

Private Higher Education Institutions (PHEIs) has expanded significantly world-wide and is one of the rapidly growing sectors in the higher education field. In 2006, PHEIs market was approaching USD400 billion worldwide and is expected to continue to grow (Bjarnason et al., 2009). According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), as Altbach (2009) reported, 30% of the new enrolment in global higher education was in PHEIs. The growth is mainly due to increased demand for higher education (Lee, 2004; Sanyal & Johnstone, 2011). In Malaysia, the higher education sector is categorized into public and private institutions. Consequent to the legislation of the Private Higher Educational Institutions Act in 1996, the number of PHEIs grew significantly. The Ministry of Higher Education Malaysia (2011) reported that 41.6% of students enrolled in PHEIs, and 59.4% in public HEIs (Thian, 2014). However, in 2011, PHEIs made up 75% of educational institutions and public HEIs only 25%, suggesting that the number of enrolments per PHEI was much lower compared to public HEIs. As PHEIs expand significantly in Malaysia and globally, profit, financial issues, quality, and performance are the main issues in PHEIs (Sanyal and Johnstone, 2011). Based on the Department of Statistic Malaysia (2015), the gross output of private higher education in Malaysia in 2014 was RM 7,469,486,000, which was increased from RM 5,994,669,000 in 2010. However, statistics in Higher Education Department (2019) showed that the number of PHEIs has dropped from 479 (January 2018) to 451 (February

2019). In fact, the number of PHEIs in Malaysia has been declining since January 2018.

PHEIs are not financially supported by government, hence, it is difficult to solicit additional funding from stakeholders when student enrollment has not increased. The National Blueprint estimated the number of students in PHEIs will expand from 455,000 in 2012 to 800,000 in 2025, reflecting an annual growth rate of 5%. There was a red alert when the Allianz University College of Medical Sciences was closed in 2014, forcing the relocation of more than 2000 students and impacting the job security of 500 staff, and the share price of its parent company fell drastically to RM0.68 in April 2015 from RM4.24 in 2010, which led to changes in shareholders and management team. From this issue, we can link that the leadership factor is high and possible to bring significant impacts on PHEIs' performance. In one of a recent case, Paramount had announced that Australia's University of Wollongong (UOW) had agreed to spend a total RM38.5 million to buy a 65% stake in the business and operations of KDU University College (KDU UC) with RM16 million and KDU Penang University College (KDU Penang UC) for RM22 million, and 70% stake in KDU College Petaling Jaya (PJ) for RM500,000 (KDU UC, 2018). KDU UC and KDU College PJ reported a loss after tax of RM8.3 million and RM3 million, respectively, for the financial year ended Dec 31, 2017 (FY17) (The Edge Market, 2018). This indicates that the performance was bad and led to the acquisition of KDU UC. Thus, this calls for a need to identify what is lacking in PHEIs to not repeat the same mistake in future for other PHEIs.

The twenty-first century brings in digitalization and transformation (Ahlquist, 2016). Thus, strategies must be in place to achieve the beneficiaries' expectations, benefits, and wishes (Abu Naser & Al Shobaki, 2016; Goodarzi et al., 2018). Effective leadership plays an essential role in all fields (Goon, 2012). Leaders with beliefs, values, passion, and mission play a critical role in determining the success of an institution (Noeme, 2019). Advancement in communication and technology has shifted the focus of PHEIs towards the digital leadership concept (Chee & Salamzadeh, 2020). Leaders in PHEIs need to be well-equipped with technological and related professional skills. Therefore, digital leadership is vital in the digital education era (Dana & Salamzadeh, 2021). Digital leaders are expected to be familiar with globalization as the current generation prefers to deal with technology (Noeme, 2019). McLeod and Lehmann (2012) believe that leaders need to have the knowledge and leadership skills to develop digital classrooms and practical exercises and be able to sustain the innovations in their schools. In the twenty-first century, research about leadership has evolved rapidly (Dinh et al., 2014; Salamzadeh, 2015). Research has shown how different types of leadership affect team performance through several electronic media in applied psychology and management fields (Raghuram et al., 2018; Salamzadeh et al., 2019). Moreover, there was limited research on different perspectives of leadership, especially when a digital element is concurring in this era (George et al., 2019). The Industrial revolution 4.0 (IR4.0) emphasized that digital leader-

ship is vital in the higher education industry. Thus, the impact of digital leadership on the business performance of PHEIs in Malaysia is important in the digital era.

The objective of this research is to investigate the impact of digital leadership on PHEIs' performance in Malaysia. Specifically, this study aims to: (i) To examine the impact of visionary leadership on PHEIs performance in Malaysia, (ii) To examine the impact of digital-age learning culture on PHEIs performance in Malaysia, (iii) To examine the impact of professional excellence on PHEIs performance in Malaysia, (iv) To examine the impact of systemic improvement on PHEIs performance in Malaysia, (v) To examine the impact of digital citizenship on PHEIs performance in Malaysia.

The digital leadership concept is still at the infancy stage, especially in the higher education industry in the Malaysian context. Therefore, this study aims to find out what are the leadership elements and skills needed for the new digital era in the higher education industry.

Literature Review and Hypotheses Development

The theoretical literature review in this section presents the synthesis of Resource-Based View (RBV) theory and its linkage to digital leadership and the PHEIs performance in Malaysia.

There are a few types of HEIs in Malaysia that are playing an important role in creating future leaders in both public HEIs and PHEIs. Public HEIs consist of universities, polytechnics and community colleges, while

PHEIs involve universities, branch campus of foreign universities, university colleges and colleges. Number of PHEIs has continued to increase from 365 units in 2011 (Thian, 2014) to 479 units in Dec 2017 (Jabatan Pendidikan Tinggi Malaysia, 2018). Also, it is an important sign that percentage of students' enrolment in PHEIs has increased from 40.6% in 2011 (Thian, 2014) to 46.2% in 2017 (Ministry of Education (Higher Education, 2017). This indicates that more students chose to further their tertiary education in PHEIs. The number of enrolments in PHEIs has increased from 428,973 students (Thian, 2014) to 565,852 students in 2017 (Ministry of Education) (Higher Education, 2017).

Performance is the output of a list of activities in an organization (El Talla et al., 2018). It is a result of investing various resources in an HEI to meet the goals and maintain performance. According to El Talla et al. (2018), Husseini explained performance is a holistic event that defines if a firm is successful, achieves sustainability, and are adaptable to the environment. In order to ensure that an HEI is a success and can cope with the environmental changes, HEI must be able to perform at the highest level to compete with other HEIs. Hence, high performance cannot be neglected. The new era management style in HEIs is according to the concepts and principles to monitor their performance, staff behaviour and put maximum efforts to achieve excellent performance. Defining a clear vision, mission, and organization's goals are the important elements as well (El Talla et al., 2018).

Leadership is important because leaders are the ones who outline a particular HEI's strategies, goals, and policies. These elements will lead the

HEI to move in the direction which has been set. By having strategies and policies, HEI's structures and systems can form, which eventually will define the job and responsibilities, and power for a particular person in HEI. Through this system and structure, El Talla et al. (2018) believes that an HEI can generate high performance and eventually differentiate itself from other HEIs. There are standard elements used to measure performance. However, the criteria might change according to the different context of study. Anyway, these are scientifically proven and standard measurements. The European Model of Excellence has different criteria to evaluate the results for performance (EFQM, 2013). Basically, the measurement criteria included the outcomes of beneficiaries, individual outcomes, community results, and the outcomes of overall performance (NIST, 2014).

Resource-Based View (RBV) theory is popular in information system-related research related to performance. Research also shows that RBV is affecting resources and performance (Tippins & Sohi, 2003; Wade & Hulland, 2004). Digital leadership is part of the IS research area, and hence, it is suitable to apply RBV theory in this study. RBV theory refers to a firm that groups all the resources in order to allow it to grab the market opportunities so that it can improve that firm's performance (Penrose, 1959). Resources are the basic elements in a firm's processes (Grant, 1991), and the availability of resources in an organization will allow a particular firm to sustain itself in that industry. Barney (1991) continued to argue RBV that resources in a particular organization will enforce its competitive advantage which is also based on the resources' traits. RBV was examined in the strategic management field

but also influenced other fields (Barney et al., 2001). Although researchers have found that digital resources are not enough for a firm to gain a competitive advantage, research also proved that they are important to improve organization's performance (Wade & Hulland, 2004).

The success of an organization relies not only on its ability to deal with its competitive environments, but also on another key strength, which is the internal factor that is going to impact an organization's performance (Lockett, Thompson, and Morgenstern, 2009). The availability and use of a leader's resources are other critical factors to help an organization succeed. Undoubtedly, leaders are the main resources in a particular company, as they play an important role in an organization's success or failure. Hence, RBV theory is adaptable in this context.

According to Brynjolfsson and McAfee's (2014), as cited in Petry's (2018) research, three key factors that will influence digital technologies are significant growth of digitalization and digitalization economies where digital products are nearly zero marginal costs and compatibility of different technologies. Digital leadership is described as a social influence practice intervened by the use of advanced information technologies to create changes in feelings, thinking, attitude, performance, and behaviour with individuals, groups or organizations (Chee & Salamzadeh, 2020).

Digital leadership is one of the concepts that can be applied in the digital world. James (2019) explained three core elements in digital leadership as (i) leaders need to fully understand people, (ii) organizations must become more digitalized, and (iii) leaders must drive and integrate tech

trends. A digital leader must be very familiar with what people prefer, including the way people communicate and the main factors that cause people to have such preferences. The digital leader will mould a particular organization to become more digitalized towards the new trend by having the above characteristic. Growing a digitalized organization is becoming natural today and is also applied in PHEIs. Through digital technologies, people will become more innovative and efficient (James, 2019). Following the technology steps will help a leader to become a great leader. Digital leaders will apply new technologies such as AI and integrate them into corporate strategy.

In conjunction with digitalization, digital leadership has become one of the concepts of new leadership trends in the digital era. The digital leadership concept links instructional technology and leadership. A few researchers have defined digital leadership in different meaning; Kearsley and Lynch (1994) defined digital leadership as educational technology leadership; Afshari, Bakar, Luan, and Siraj (2012) said it is information and communication technology (ICT) leadership; some said it is technology leadership (Arokiasamy, Abdullah, & Ismail, 2014), and e-leadership (Jameson, 2013). Meanwhile, school principals' digital leadership style plays an important role in introducing technology in schools (Anderson & Dexter, 2005). School leaders' digital leadership not only requires leaders to equip themselves with digital technology skills, but they also must share the goal of technology, and at the same time, they are the ones to plan and strategize how to train their educators with the technology skills (Kearsley & Lynch, 1992).Petry (2018) has a different thought on the characteristic of digital leadership. Petry (2018)

found that in order to achieve digital leadership, network, openness, participation, and agility are the key elements.

There was cooperation about the Collaborative for Technology Standards for School Administrators (TSSA Collaborative) between a few organizations such as the American Association of School Administrators (AASA), National Association of Elementary School Principals (NAESP), ISTE, etc. In 2001, TSSA formed the technology standards that school leaders have to know and deal with technology (McCampbell, 2001). After the TSSA Collaborative had been released for a year, ISTE also introduced National Educational Technology Standards (NETS) for Administrators (ISTE, 2002). There are six dimensions listed by NETS for Administrators to assess digital leadership, which are (i) Leadership and vision; (ii) Learning and teaching; (iii) Productivity and professional practice; (iv) Support, management, and operations; (v) Assessment and evaluation, and (vi) Social, legal, and ethical issues.

There are different standards to explain each dimension. After a year, NETS-A has played the main role in digital leadership. ISTE's report shows that many states adopted NETS-A standards. Moreover, in Macaulay (2008) research, ISTE standards were adopted as the theoretical framework to study how school leaders lead the school through digital leadership. The findings show that educators needed technology skills development. While Anderson and Dexter (2005) adopted NETS-A standards to form digital leadership indicators, Yu and Durrington (2006) used NETS-A standards to evaluate

school administrators' technology competencies. They also studied the differences of the indicators, and the findings showed a significant difference between those indicators. During that time, the most similar study was the Principals' Technology Leadership Assessment (PTLA) by American Institutes for Research. PTLA consists of six parts developed from NETS-A standards. PTLA was used to evaluate principals' digital leadership abilities. However, Raman, Don and Latif Kasim (2014) found that it is not a good instrument, and in order to effectively evaluate principals to meet the new NETS-A standards (ISTE-A, 2009), the PTLA instrument must develop a new assessment instrument.

One of the purposes of this study is to examine what is the result of applying the new ISTE-A standards (ISTE-A, 2009) in Malaysia PHEIs context. So, this study has adapted the new instrument to examine the impact of digital leadership in higher education industry performance where there is still limited similar study conducted in Malaysia's private higher education industry context.

ISTE-A standards are normally used to examine at the school level. However, in the latest research done by Noeme (2019), it was recommended that for higher education industry leaders to sustain in the twenty-first century, digital leadership is the new trend they must possess. In that research, digital leadership is linked to the five areas mentioned in ISTE-A, which are: (i) visionary leadership, (ii) digital-age learning culture, (iii) professional excellence, (iv) systematic improvement, and (v) digital citizenship. ISTE has re-named the new NETS-A standards to ISTE-A to help the education leaders

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face the fast-paced digital era. This study will indicate old standards as NETS-A and the new standard as ISTE-A standard. In fact, the ISTE-A standard is more focused on the technological area that administrators must possess (Schrum et al., 2011). In 2008, ISTE-A updated five dimensions which included: visionary leadership, digital-age learning culture, excellence in professional development, systemic improvement, and digital citizenship (ISTE, 2002).

ISTE-A standards have been used to assess digital leadership studies. Researchers normally take ISTE-A standards as the base to indicate what types of technology skills a staff should have and assess their digital leadership skills (Winslow et al., 2011; Garcia & Abrego, 2014; Newton et al., 2011; Winslow, Dickerson, Lee, & Geer, 2012). Visionary leaders have become leader and think about how the new technologies affect teaching and learning. Larson, Miller, and Ribble (2009) found that communication and collaboration are equally important. In order to seek and promote this through referring to ISTE-A standards dimensions. Garcia and Abrego (2014) research found that digital leadership skills should include: getting used to technology software and hardware, always communicating with stakeholders, always referring to information and data, and planning the resources and managing it, similar to the dimensions proposed by ISTE-A.

To further understand each performance indicator in digital leadership, Richardson, Bathon, Flora, and Lewis (2012) have done a summary study on journals published from 1997 to 2000. The literature review revealed that the researchers did not really focus on digital citizenship and systemic

improvement. Their recommendation is to have more research in these dimensions to assist education leaders in facing the dynamic environment full of challenges. In Malaysia, there is a need to explore this part; hence, this is one of the purposes of this study.

Digital leadership research is still at the infancy stage, especially in the HE industry (Salamzadeh et al., 2019). Noeme (2019) studied the digital leadership practices of deans in Philippine universities. The research found that visionary leadership and professional excellence are the most popular leadership practices dimension, while deans' digital citizenship is the least practised. That research also claimed that digital leadership is the twenty-first century leadership style. Petry (2018) also highlighted that digital leadership is the new leadership in the dynamic digital era. Noeme (2019) further stated that visionary leaders are more open to new information and persist in putting in innovation elements with the aid of technology. This helps those who are weak in digital-age learning and may lead to professional excellence. With this, leaders may improve the systems more systematically. Eventually, this will increase the leaders' digital citizenship at the society level. This might improve the performance of an institution; hence, below are the hypotheses formed for this study:

H₁: Visionary leadership has a significant positive influence on PHEIs performance in Malaysia.

**H₂:** Digital-age learning culture has a significant positive influence on PHEIs performance in Malaysia.

H₃: Professional excellence has a significant positive influence on PHEIs performance in Malaysia.

H₄: Systemic improvement has a significant positive influence on PHEIs performance in Malaysia.

H₅: Digital citizenship has a significant positive influence on PHEIs performance in Malaysia.

Theoretical Framework

This study aims to identify the influence of digital leadership dimensions in Malaysian PHEIs. The theoretical model is adopted from a set of digital leadership indicator measurements, which is the ISTE-A standards where it includes five dimensions: digital citizenship, systemic improvement, excellence in professional practice, digital-age learning culture, and visionary leadership. Based on the above literature review, ISTE-A standards are normally applied in primary and secondary levels of education. However, Noeme (2019) recently adopted the standards and examined the digital leadership practices of deans in universities. Hence, by referring to the literature and ISTE-A standards, the research framework is presented in Figure 1.
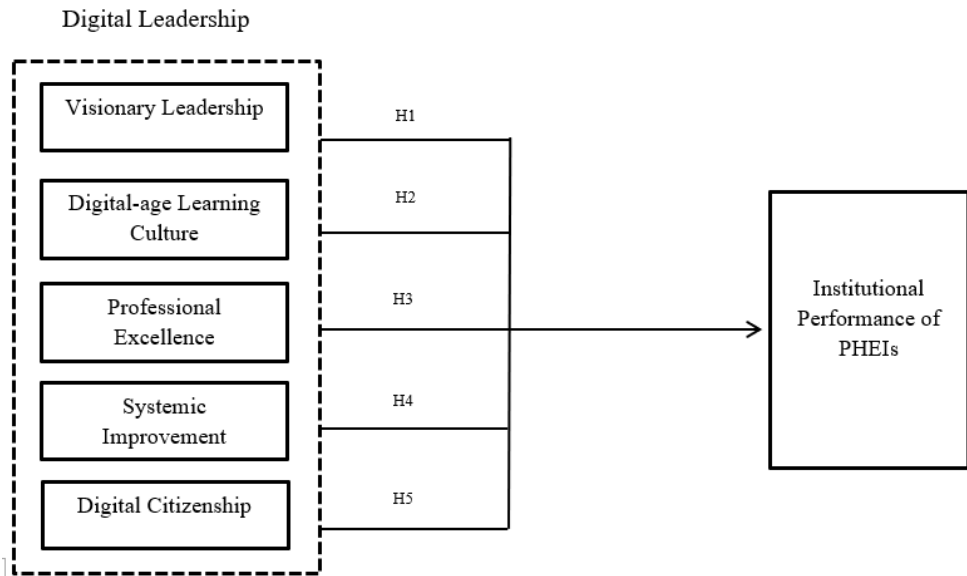
Figure 1. Research Framework

Methodology

This study adopted ISTE-A standards to define the required digital leadership skills. Next, the independent and dependent variables are examined to answer the research questions and to meet research objectives. Structured questionnaires were distributed to respondents, and a statistical approach was used to analyze the data to obtain the findings. The data collection was done online. The respondents are those leaders in PHEIs in Malaysia, and the link to answer the questionnaires had been sent through e-mail. The survey questionnaires consisted of seven sections: (i) Demographic information, (ii) PHEIs performance, (iii) Visionary leadership, (iv) Digital-age learning

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culture, (v) Professional excellence, (vi) Systemic improvement, (vii) Digital citizenship

There are 451 PHEIs in Malaysia as of February 2019, the unit of analysis is set as organizational level. The PHEIs contact information is obtained from the MOE (HE) website. The respondents were program leaders/ managers, department heads, deputy deans, deans, deputy vice-chancellors, and vice-chancellors in Malaysia PHEIs. This requirement is mainly because they are the leaders in respective institutions who have the leadership skills required in their daily job, which directly impact a particular PHEI performance. This study collected 121 respondents (Sekaran et al., 2016; Hair et al., 2014).

Data collection is critical since the findings will improve the knowledge of the theoretical framework. The sample is the people who have been selected to represent the targeted population in a study. According to Sekaran and Bougie (2016), there are a few steps in designing the sample. First, a researcher must identify the target population; second, determine the sampling scope; third, select the sampling technique; fourth, confirm the sample size; and finally, conduct the sampling process. This study engaged the 10 times rule approach, which is popular in research sampling size determination (Hair et al., 2011). Based on this rule, the sample size is targeted at 120. Sekaran et al. (2016) also suggested that the sample size should be between 30 and 500 for scientific research. This sample size is also supported by Hair et al. (2014), where the sample size must fall between 100 to 400. The dependent variable in this study is the PHEIs performance in Malaysia.

All the measurement items are adapted from Noeme (2019), which is used to measure digital leadership.

This study engages the five-point Likert scale ranging from 1, strongly disagree, to 5, strongly agree. This is used to measure all the independent and dependent variables. According to Ramanathan and Raja (2014), Likert scales are used to measure attitudes, dispositions, and opinions by requesting the user to make value judgments. The five-point Likert scale allows respondents to respond more accurately to the questionnaire. According to (Chong, Tham & Kam, 2017), the five-point scale or seven-point scale will not bring any difference to improve the reliability rate.

Structural equation modelling (SEM) via the SmartPLS software is used to evaluate the variables as it does not require normal distribution, and it is possible to use a small sample size to analyze a complex model (Tajpour, Salamzadeh, & Hosseini, 2021). Also, SEM is chosen due to its high accuracy of statistical estimates and capabilities in evaluating the constructs (Tajpour et al., 2021).

Results

In terms of the category of institutions, the majority of institutions that participated in this study was college, which was more than half of the re-spondents, at 62.8%. University College was the least, at 14.9% and Univer-sity at 22.3%. Out of these 121 respondents, only 3.3% were from interna-tional institutions, and the rest were local institutions. In terms of location,

Selangor and Wilayah Persekutuan States have the most respondents at 37.2% and 24.8%, respectively. This is mainly due to these two states having the most institutions in Malaysia, which were 129 (Selangor) and 102 (Wilayah Persekutuan) institutions (MOE (HE) 2017). Almost half of the responded institutions had been established for more than 20 years. Another interesting finding is that majority of the responded institutions have their own institution's website and social media account. This may be one of the reasons they chose to participate in this study, where digital sense may play a certain role in their institutions.

Around 60% of the respondents were male. Only 2 of the respondents were more than 55 years old, while a majority of the respondents were between 36 to 45 years old. The majority of the respondents are heads of departments in their institutions, followed by program leader positions. Regarding the highest qualification level, around 30% have a doctorate degree, while a majority of the respondents (43.8%) have master's degree. The demographic data are shown in Table 1.

Table 1. Background of the Institutions and Demographic of the Respondents

Category of Institution	Freq.	%	Possess own institution website?	Freq.	%
College	76	62.8	No	2	1.7
University College	18	14.9	Yes	119	98.3
University	27	22.3	Possess own institution social media account?		
Country of Origin			No	3	2.5
International Institution	4	3.3	Yes	118	97.5
Local Institution	117	96.7	Gender		
Location			Female	47	38.8
Johor	8	6.6	Male	74	61.2

Kedah	1	0.8	**Age**		
Kelantan	1	0.8	25-35 years old	17	14.0
Melaka	7	5.8	36-45 years old	60	49.6
Negeri Sembilan	5	4.1	46-55 years old	42	34.7
P. Pinang	15	12.4	> 55 years old	2	1.7
Pahang	3	2.5	**Position**		
Perak	2	1.7	Program Leader	29	24.0
Perlis	1	0.8	Head of Department	65	53.7
Sabah	1	0.8	Deputy Dean	14	11.6
Sarawak	1	0.8	Dean	11	9.1
Selangor	45	37.2	Deputy Vice-Chancellor	1	0.8
Terengganu	1	0.8	Vice-Chancellor	1	0.8
Wilayah Persekutuan	30	24.8	**Highest Qualification Achieved**		
Years of Establishment			Bachelor's Degree	31	25.6
< 5 years	5	4.1	Master's Degree	53	43.8
5-10 years	13	10.7	Doctorate's Degree	37	30.6
11-15 years	17	14.0			
16-20 years	27	22.3			
> 20 years	59	48.8	**Total**	**121**	**100.0**

Measurement Model

The measurement model is shown in Table 2. Each item's reliability was assessed to check the consistency of measurement (Urbach & Ahlemann, 2010). Hair et al. (2014) indicated that factor loading of each item should be higher than 0.7. Hence the results show that almost all items have more than 0.7, and this has validated the items' reliability.

Composite Reliability (CR) examines the model's internal consistency reliability. According to Hair et al. (2014), a value greater than 0.7 confirms the model reliability. Based on the findings, all the constructs are

higher than 0.7, which proved that internal consistency reliability is supported. In order to test convergent validity, Average Variance Explained (AVE) is assessed to validate the correlation of the items and their latent constructs. The AVE should be higher than 50% (AVE ≥ 0.5) (Hair et al., 2014). Referring to the findings in Table 2, AVE is higher than 0.5, and it has satisfied the convergent validity.

Table 3 shows the discriminant validity used to check if each construct is distinct from one another. In order to validate the distinctness of each construct, discriminant validity was assessed by Heterotrait-Monotrait Ratio (HTMT). HTMT value should be less than 0.85 (Kline, 2015). All HTMT values were less than 0.85, which has confirmed the discriminant validity.

Table 2. Measurement model results

Construct	Items	Factor Loading	CR	AVE
Visionary Leadership	VL1	0.828	0.917	0.688
	VL2	0.858		
	VL3	0.856		
	VL4	0.803		
	VL5	0.799		
Digital-age Learning Culture	DA1	0.854	0.911	0.719
	DA2	0.815		
	DA3	0.869		
	DA4	0.853		
Professional Excellence	PE1	0.844	0.883	0.716
	PE2	0.894		
	PE3	0.798		
Systemic Improvement	SI1	0.677	0.885	0.607
	SI2	0.763		
	SI3	0.869		
	SI4	0.815		
	SI5	0.758		
Digital Citizenship	DC1	0.613	0.900	0.646
	DC2	0.810		
	DC3	0.893		
	DC4	0.857		
	DC5	0.815		

Performance	P1	0.799	0.925	0.579
	P2	0.794		
	P3	0.835		
	P4	0.739		
	P5	0.763		
	P6	0.809		
	P7	0.724		
	P8	0.586		
	P9	0.773		

Note: CR: Composite Reliability, AVE: Average Variance Extracted

Table 3. Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT)

	A1	**A2**	**A3**	**A4**	**A5**	**B1**
A1						
A2	0.846					
A3	0.835	0.812				
A4	0.698	0.795	0.791			
A5	0.668	0.707	0.835	0.812		
B1	0.619	0.738	0.810	0.715	0.723	

Structural Model

The structural model was assessed via bootstrapping with 5000 resamples in order to test the hypotheses. Based on the findings in Table 4, digital-age learning culture (A2), professional excellence (A3) and digital citizenship (A5) showed a positive relationship towards Malaysia PHEIs performance (B1) (H2: $P<0.01$, T-value 2.487, H3: $P<0.001$, T-value 2.505 & H5: $P<0.01$, T-value 2.503). Hence, the hypotheses of a digital-age learning culture, professional excellence, and digital citizenship positively affected Malaysia PHEIs performance and were supported. However, visionary leadership (A1) and systemic development (A4) were not showing a positive impact on Malaysia PHEIs performance (B1) (H1: $P>0.05$, T-value 0.328 & H4: $P>0.05$, T-value 0.748). In short, 3 out of 5 hypotheses were supported (H2,

H3, & H5), while H1 and H4 were not supported in this study. Hence, the prediction of a positive relationship between visionary leadership and systemic improvement towards Malaysia PHEIs performance was not supported.

Based on the findings, R square value is at 0.561. This can be defined as the model proposed in this study is significant. The potential determinant can illustrate the PHEIs performance in Malaysia. The R square value also showed that 56.1% (more than half) of the variance of Malaysia PHEIs performance is explained by the digital leadership dimensions applied in this study.

Table 4. Summary of bootstrapping analysis

Hypotheses	Relationships	Path Coefficient	T Statistics (|O/STDEV|)	P Values	Decision
		Direct Effect			
H1	A1 -> B1	-0.025	0.328	0.371	Not Supported
H2	A2 -> B1	0.258	2.487**	0.006	Supported
H3	A3 -> B1	0.255	2.505**	0.006	Supported
H4	A4 -> B1	0.079	0.748	0.227	Not Supported
H5	A5 -> B1	0.296	2.503**	0.006	Supported

Note: *$p<0.05$; **$p<0.01$
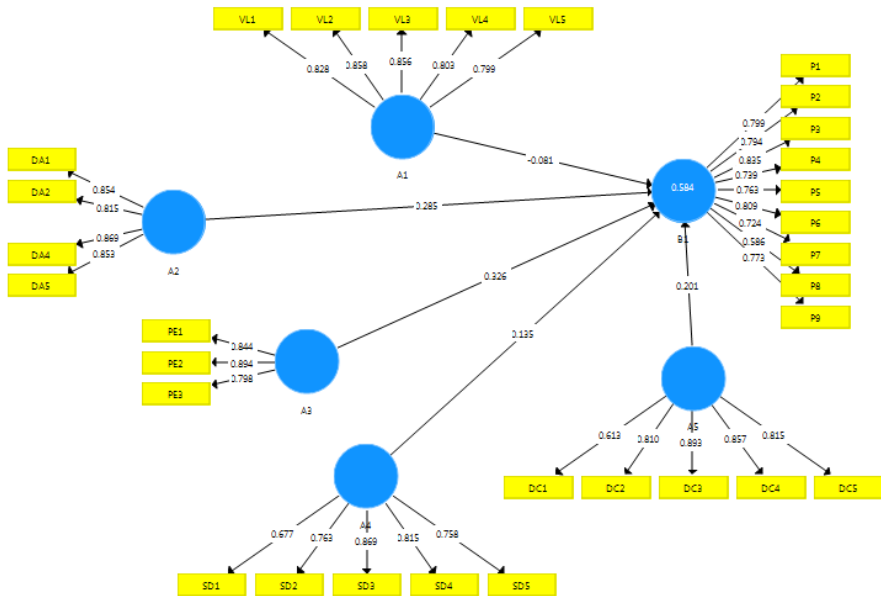
Figure 2. Bootstrapping Model

The goodness of Fit Index (GoF)

The GoF was calculated as follows:

Goodness of Fit= $\sqrt{(R^2 \times AVE)} = \sqrt{(0.561 \times 0.579)} = 0.57$

The calculated value (0.57) is above the minimum value of 0.36, was appropriate to examine the models with significance levels based on the minimum AVE of 0.5 (Fornell & Larcker, 1981; Cohen, 1988) on the effect size.

Discussion

Visionary leadership is defined as the ability to lead and to inspire the growth and implementation of a shared vision to synthesize technologies in

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order to achieve organisational transformation and excellence (ISTE-A, 2009). The first hypothesis (H1) proposed that visionary leadership has a significant positive relationship with PHEIs performance. However, the findings were found in contrast with previous studies (Taylor, Cornelius, & Colvin, 2014; Sooksan, 2006), but it is supported by other studies (Lindred, Astrid, Annebel, & Deanne, 2012; Mora-Whitehurst, 2013). Hence, the hypothesis (H1: $P > 0.05$, T-value 0.624) is rejected. Based on the questionnaire response, most of the respondents did not agree that their institutions engage in an ongoing process of technology-infused strategic plans aligned with a shared vision. This study also found that the institutions were not focused on this part due to the majority of the respondents are in the college category, and they may not have much budget to implement the plan. PHEIs industry focuses on short-term goals, such as attracting students to enrol in their institutions. By having the goal to earn more profit, they will offer popular courses such as business management, accountancy, finance, law, engineering courses, etc., but not focus on the vision for long-term goals for their institutions. They may not have envisioned their roles in helping this country to develop through offering the low demand courses such as social science, public management courses, etc. This could be due to those leaders from colleges (the majority of the respondents in this study) lacking experience in playing visionary leadership roles compared to university level leaders. With this, the respondents do not think that visionary leadership has a positive relationship with PHEIs performance.

A digital-age learning culture is defined as creating, promoting, and sustaining a digital-age learning culture that makes available a rigorous, relevant, and engaging educational environment to all learners (ISTE-A, 2009; Dana et al., 2021; Salamzadeh et al., 2021). The second hypothesis (H2) stated that digital-age learning culture has a positive relationship with Malaysia PHEIs performance, supported by Zhong (2017) and Petry (2018). The findings also showed that digital-age learning culture has a positive relationship with Malaysia PHEIs performance (H2: P<0.01, T-value 2.817). This means that the leaders in Malaysia PHEIs are playing role models to promote frequent use of technology in terms of providing technology or learning resources to meet the diverse needs of all learners to achieve institutions' performance. The institutions also facilitate effective practice or infusion of technology in their curriculum and program endeavors, consistent with findings from Larson, Miller, & Ribble (2010). From the PHEIs perspective, the university and university college category respondents found that higher education institutions should create and foster digital-age learning culture since we are moving towards digital and AI era. As leaders in a particular higher education institution, they noticed the importance of creating and promoting digital-age learning culture in their institutions to yield quality future leaders and human capital. By having this culture in their institutions, they can get more student enrollment and indirectly improve their performance. Furthermore, they are profit-oriented PHEIs and need profit to sustain their business.

Professional excellence is defined as leaders providing a professional and innovative learning environment to allow teachers to help students learn

through technology resources (ISTE-A, 2009). The third hypothesis found that professional excellence (H3) has a positive relationship with Malaysia PHEIs performance (H3: $P<0.001$, T-value 3.693), supported by findings from Zhong (2017) and Petry (2018). PHEIs in Malaysia are encouraging stakeholders to communicate via digital-age tools like smartphones, computers, tablets, etc. In addition, the PHEIs are staying abreast with emerging trends and updates of technological tools that can be used in the workplace. To achieve institutions performance, they seek or evaluate new programs which have potential in developing the utilization of technology in professional practice, in line with previous study findings (Chang, 2012). From the Malaysia PHEIs leaders' perspective, they believe that leaders need to provide the environment professionally and creatively that can help the educators to conduct classes and teach their students to be familiar and excel with digital technologies. When their students are fully equipped with digital technologies knowledge and skills, they are ready to face the working environment which is fully equipped with a digitalization culture. With that, they are more confident of performing in their organizations. From a long-term perspective, PHEIs leaders also believe this will improve their institutions' performance by producing quality students ready to face the real industry confidently.

The fourth hypothesis (H4) was rejected due to the findings show that systemic improvement has no significant positive relationship with Malaysia PHEIs performance (H4: $P>0.05$, T-value 1.346), which is in contrast with the findings from Zhong (2017) where the findings showed that through systemic improvement strategies, principals managed to improve performance.

Systemic improvement, defined as the effective use of information and technology, enables leaders to perform a digital era leadership style and eventually improve organization performance (ISTE-A, 2009). Furthermore, studies from Lim, Fauziah, Nur Adiana, and Yen (2016) showed that public universities obtained many grants from the government in order to improve their institutions systematically; this includes technology infrastructure improvement. However, Lim et al. (2016) found public universities to be inefficient in their financial performance. Hence, this is consistent with this study where systemic improvement has no significant positive relationship with Malaysia PHEIs performance. By looking at the respondents' age, more than half of the respondents are Gen-X who are not digital-born era leaders and may not be able to use digital technology effectively. Hence, they might not apply systemic information concepts in their institutions, consistent with the culture where local colleges are not keen on digital institutions compared to university level or top-ranking world universities. From PHEIs' industry perspective, because PHEIs are profit-oriented organizations, investing in digital technology might require huge capital and may consume a big amount of their annual budget. Hence, improving their institution's performance through systemic improvement may not become a priority for them. With this, systemic improvement shows no significant positive relationship with Malaysia PHEIs performance.

The last hypothesis (H5) found that digital citizenship has a significant relationship with Malaysia PHEIs performance (H5: $P<0.01$, T-value 1.877), supported by Petry (2018) and Zhong (2017). Malaysia PHEIs is

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providing equitable access to appropriate digital tools for all learners and staff. The organizations also promote policies for safe, legal, and ethical use of digital information and technology through online announcements and posts. They are even disseminating information or official announcement through digital devices. This is also supported by Savilla and Rachel (2014) in their study that assessed the performance of educators. In order to perform well in PHEIs industry, the majority of the PHEIs leaders must also be alert to the importance of social, ethical, and legal concerns while moving toward the digital era. The majority of the respondent's institutions have been established for more than 20 years, based on the management experiences, which confirms that social, ethical, and legal concerns are as important as profit-seeking. They believe this is one of the reasons to make them sustain and perform in the long run. They also take this opportunity to educate their students on social concerns while making a profit. Hence, PHEIs leaders perceived that digital citizenship has a significant relationship with Malaysia PHEIs performance.

Theoretical and Practical Implications

Digital leadership in this study is defined as the use of technology and digital instruments to stimulate HEIs transformation and eventually improve organization performance. Digital leadership helps to understand further which elements are playing an important role while moving towards a high-performance institution. In Malaysia, digital leadership is still at infancy stage

in terms of theoretical and practical perspectives. A limited study has been done in Malaysia for digital leadership and its impact on organization performance, especially in the higher education industry in Malaysia. This study findings contribute to the future researchers who are going to do related research. The findings from this study revealed that digital-age learning culture, professional excellence and digital citizenship are impacting Malaysia PHEIs performance. However, results also found that visionary leadership and systemic improvement has no significant positive relationship with Malaysia PHEIs performance. This is in contrast with previous studies (Taylor et al., 2014; Sooksan, 2006; Zhong, 2017) but supported by (Lindred et al., 2012; Mora-Whitehurst, 2013; Lim et al., 2016).

Limitations and Future Research

This study was limited only to Malaysian PHEIs and not inclusive of public HEIs in Malaysia. Hence, this study cannot differentiate the results between public HEIs and PHEIs. Furthermore, this study was not able to recognize if the respondent's institution is really implementing the digitalization concept. If their institutions are not applying the digitalization concept, they might provide bias responses. Also, the majority of the respondents were from big cities in Malaysia like Selangor (37.2%), Wilayah Persekutuan (24.8%), and Pulau Pinang (12.4%). These three states have represented more than 70% of the results obtained. Hence, the results were not represented in a more general way. Finally, since the survey forms were only distributed online, it

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was not able to identify the person and his or her position who answered the questionnaires because the questionnaires were only sent to the chief executive officer of each institution.

More than 50% of the hypotheses in this research framework were significant. Therefore, future researchers may examine a similar topic by referring to this framework. For future research, it is suggested to gather more data from other states and include public HEIs as target respondents to have a broader view of Malaysia PHEIs industry. Other variables may be used to examine digital leadership and performance. It is recommended to add either moderator or mediator in the future research framework to better understand digital leadership.

Conclusion

Malaysia's PHEIs are growing tremendously. The findings show that they are applying digital leadership concept in their institutions and have achieved a certain level of performance. Digital leadership is popular internationally at the school level but still at a limited level in Malaysia. PHEIs are the transforming centers that produce future leaders. They also play an important role in helping government generate future human capital and leaders. Hence, each PHEI should move towards the digital era to face IR4.0 successfully. Digital-age learning culture, professional excellence, and digital citizenship were found to have a significant impact on Malaysia PHEIs performance. Fostering the digital-age learning culture creates the learning culture

in institutions in this dynamic environment. Also, leaders have become pioneers to lead the organizations to change and move towards digital-keen organizations. Digital citizenship cannot be neglected as that is the supporting pillar to make a particular PHEI stronger and sustainable in the long-term. These attributes not only allow a particular PHEI to earn a profit, but it also fosters the next generation to face the digital era while producing future digital leaders.

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