HOW READY ARE WE? INVESTIGATING THE LEVEL OF BYOD IN EDUCATIONAL INSTITUTION AT MALAYSIAN PUBLIC UNIVERSITIES

Mohamad Rahimi Mohamad Rosman[1], *
Nik Nur Izzati Nik Rosli[2]
Amira Idayu Mohd Shukry[3]
Noor Rahmawati Alias[4]
Noor Azreen Alimin[5]
Noor Masliana Razlan[6]
Nurfatihah S Baharuddin[7]
Meida Rachmawati[8]

[1,2,3,4,5,6] Information Science Studies, Universiti Teknologi MARA Kelantan Branch, Malaysia
[7] Perpustakaan Negara Malaysia, Malaysia; nurfatihahsb@pnm.gov.my
[8] Universitas Ngudi Waluyo, Indonesia; meida_r@unw.ac.id
* Correspondence: rahimimr@uitm.edu.my

_____

Abstract: *BYOD concept has been around for almost 30 years; however, the real importance of the concept has not been realized until recently. The re-emergence of BYOD concept is spearheaded by several factors; such as long pandemic of COVID-19, economic downturn, reduction of government and private fundings, political instability, and cross-border issues. Thus, in response to these issues, organizations, especially non-profit government agencies had to turn to BYOD concept as a response to decrease funding. However, since the BYOD concept is on the rise again, the is a dearth of research on the level of BYOD among Malaysian public universities. Therefore, this study provide insight into the current state of BYOD adoption and implementation in Malaysia. A quantitative research method was adopted and a total of 476 valid responses were analyzed using Statistical Package for Social Sciences (SPSS) version 26. Finding indicated that the current BYOD level among Malaysian educational institutions is slightly high.*

Keywords: *BYOD, level, educational institution.*
_____

Introduction

The rapid advancement of technology has significantly influenced various sectors, including education. One such technological initiative is Bring Your Own Device (BYOD), which allows individuals to use their personal devices for work or educational purposes. This concept has gained considerable attention globally due to its potential to enhance productivity, reduce costs, and facilitate the acquisition of essential skills. In educational settings, BYOD can support students in acquiring critical skills such as teamwork, problem-solving, creativity, and social networking, which are crucial in the future job market.

In Malaysia, the adoption and implementation of BYOD in public universities present a unique set of opportunities and challenges. This study aims to investigate the extent of BYOD adoption and its implementation in Malaysian public universities. By examining technological readiness, individual preparedness, contextual readiness, organizational readiness, BYOD adoption, and productivity, this research seeks to provide a comprehensive understanding of the factors influencing BYOD adoption in these institutions.

The research adopts a quantitative approach, utilizing data collected from 476 respondents. The reliability of the instrument used for data collection was confirmed through Cronbach's Alpha coefficient, and the data were analysed using the Statistical Package for Social Sciences (SPSS) version 26. The study focuses on understanding the correlations between various forms of readiness and BYOD adoption, as well as the impact of BYOD adoption on productivity.

By addressing the factors that influence BYOD adoption and identifying areas for improvement, this research aims to provide valuable insights for policymakers, educators, and institutions to enhance the integration of technology in higher education. The findings of this study could help in formulating strategies to overcome challenges, maximize the benefits of BYOD, and foster a conducive environment for its adoption in Malaysian public universities.
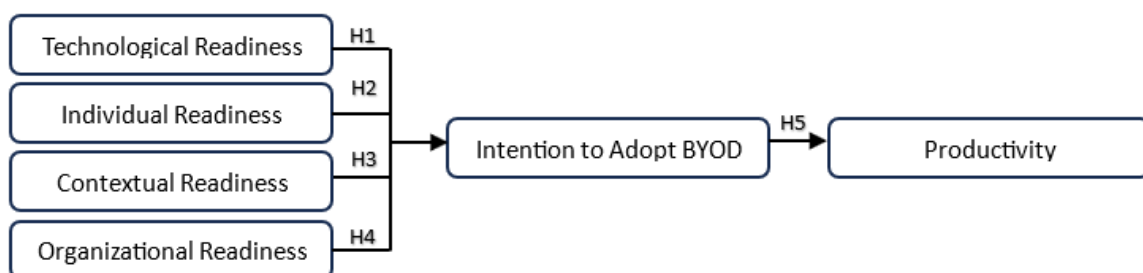
Research Model

Figure 1: Research Model

Technological Readiness

Technological readiness is the extent of individual access to technological supports to implement BYOD practices. A study found that BYOD practice had been implemented in 63% of US organisations since 2011 and this number were increased to 78.48% in 2018 (Deyan, 2019). In 2015, China also shown development in BYOD infiltration where almost 70% Chinese worker use their own devices at workplace (Y. Chen, 2023; Shakhnov, Zinchenko, Rezchikova, & Glushko, 2015). It can be seen that employees are ready to implement BYOD as it gives benefits to their productivity. BYOD also will benefits student to acquire critical skills such as teamwork, problem solving, creativity, production, and social networking that are

crucial in the job market of the future (Al-Okaily, 2015). Gartner Research found that employees are more interested in using their own devices instead of using corporate devices in performing their work which helps organisation to reduce cost (Stamford, 2016). Therefore, it can be hypothesized that:

H1: *Technological readiness has a positive and significant relationship with the intention to adopt BYOD.*

Individual Readiness

Nelson (1990) stated that individual readiness plays a significant role in the success of information technology advances, just as much as the technology itself. Individual differences are frequently attributed to demographic characteristics like age, income, education, and so forth (Baharuddin & Rosman, 2020; Rosman, Baharuddin, et al., 2022; Rosman, Ismail, Masrek, Branch, & Campus, 2019). Gender and age have positive effect on intention to adopt BYOD as employees in the older age group are more likely to have the intention to implement the BYOD practice, and men and women are equally inclined to do so (Gupta, Varma, & Bhardwaj, 2019). Therefore, it can be hypothesized that:

H2: *Individual readiness has a positive and significant relationship with the intention to adopt BYOD.*

Contextual Readiness

Task uncertainty and task resources are two identified factors that are related to contextual readiness (Rosman et al., 2019). Task uncertainty is the extent to which the precise needs of a task or activity, or its intermediate outcomes, cannot be understood in advance or expected (Rustagi, King, & Kirsch, 2008) while task resources can be referred as the degree to which a task's psychological, social, and physical components are either functional or ineffective for achieving objectives at work (Schaufeli, Bakker, & Salanova, 2006).The findings of a prior study quote the Protection Motivation Theory (PMT), whereby the participants' intentions to comply with a BYOD policy were mostly driven by self-efficacy (belief in themselves to abide by the rules and policies recommended by the institution) and response efficacy (belief that the rules, guidelines, and policies imposed by the institution are good to be practiced for the intended purposes). This study conducted a poll of students and full-time employees to understand what inspires their willingness to follow the BYOD policy (Crossler, Long, Loraas, & Trinkle, 2014). This PMT is also discussed in other BYOD adoption studies, showing its relationship with BYOD adoption in institutions (Alaskar & Shen, 2016; Dang-Pham & Pittayachawan, 2015). Therefore, it can be hypothesized that:

H3: *Contextual readiness has a positive and significant relationship with the intention to adopt BYOD.*

Organisational Readiness

Organisational readiness refers to the amenities, services, and support that an organization offers each member of an institution or organization in implementing BYOD. A study found that employees have some level of knowhow in implementing mobile device that access and use the system, however, the capability of substructure to support the usage of devices that BYOD would bring is not equipped where it leads to security weaknesses (Ruxwana & Msibi, 2018). Therefore, it can be hypothesized that:

H4: *Organizational readiness has a positive and significant relationship with the intention to adopt BYOD.*

Intention to Adopt BYOD and Productivity

The operational definition of behavioural intention to adopt BYOD is an individual's degree of urgency or predisposition to either adopt or reject to implement BYOD practices (Rosman, Baharuddin, et al., 2022). Previous study found that future employees' expectations about improved job performance as a result of greater mobility and freedom are the primary drivers behind their adoption of BYOD practices (Loose, Weeger, & Gewald, 2013). Productivity is the efficiency with which resources are used to achieve organizational goals and objectives. BYOD contribute to the flexibility, convenience and portability of devices which leads to the potential to enhance employees' workflow that will encourage employees' productivity, commitment and morale (H. Chen, Li, Chen, & Yin, 2021; Doargajudhur & Dell, 2019, 2020; French, Guo, & Shim, 2014). Therefore, it can be hypothesized that:

H5: *Intention to adopt BYOD has a positive and significant relationship with productivity.*

Analysis

A quantitative research paradigm was adopted for the purpose of the study. An instrument was developed by adapting to previous instruments of Mohamad Rosman, Ismail, and Masrek (2023), Rosman, Razlan, et al. (2022), Rosman, Alias, Arshad, Hamid, and Idris (2022), Rosman, Aziz, et al. (2022), Davis (1989), Bandura (2001), DeLone and McLean (2003), Baharuddin and Rosman (2020), Khan, Masrek, and Mahmood (2019), Masrek and Gaskin (2016), Samadi and Masrek (2015), Rosman et al. (2023), Y. Chen (2023), and Rosman, Ismail, and Masrek (2022). A total of 476 responses were received – indicating a sufficient response for data analysis. The responses were imported to Statistical Package for Social Sciences (SPSS) version 26 for the next process.

Reliability Analysis

Cronbach's Alpha coefficient was conducted on the dataset to determine whether the responses is reliable for further analysis. The following table 1 shows the reliability assessment of the study. The resulting Cronbach's Alpha coefficient is between 0.863 (lowest indicator) and 0.954 (highest indicator) – indicating all values surpassing the minimum threshold of 0.7 as suggested by Nunnally (1978). Thus, it can be confirmed that the resulted Cronbach's Alpha coefficient indicates that the instrument is reliable for data collection process.

Table 1: Cronbach's Alpha Coefficient

Variable	Cronbach's Alpha	Result
Technology Readiness	0.863	> 0.7
Individual Readiness	0.924	> 0.7
Contextual Readiness	0.906	> 0.7
Organizational Readiness	0.950	> 0.7
BYOD Adoption	0.954	> 0.7
Productivity	0.919	> 0.7

Respondent's Demographic

The following table 2 shows the demographic details of respondents. Not surprisingly, most respondents are female (N=352) compared to male respondents with 124 respondents. The lack of male respondents does not contribute towards common method bias, as Harmann Single

Factor Test indicated a value of less than 50% for a single variable. The result is also in line with other study as that indicated the lower response among male counterpart – due to several reasons such as lower enrolment among male's respondents, lack of interest on participating in surveys, and most male respondents prefer face-to-face interaction rather than online survey. In relation to level of study, most respondents enrol for undergraduate studies (N=473), while the rest enrol for post-graduate education (N=3)

Table 2: Demographic

Item	Cronbach's Alpha	Frequency
Gender	Male	124
	Female	352
Study Level	Undergraduate	473
	Post-graduate	3

Descriptive Analysis

To identify the level of BYOD in the context of Malaysian public universities, a descriptive analysis test was conducted using Statistical Package for Social Sciences (SPSS) version 26. A total of 6 variables were involved in the analysis – namely technology readiness, individual readiness, contextual readiness, organisational readiness, BYOD adoption, and productivity. Table 3 shows the descriptive mean value for technological readiness. A total of 5 items were used to measure the variables. The highest mean value is 5.87 and the lowest is 4.83. The overall mean for technological readiness is 5.58, indicating a level of slightly high.

Table 3: Technological Readiness

Item Code	Item	Mean
TRE1	I have adequate device(s) to support my learning process.	5.77
TRE2	I have access to good Internet connection.	4.83
TRE3	I can perform my work using computer or other devices without sharing with others.	5.87
TRE4	I am able to install latest application on my device (s).	5.80
TRE5	I am able to updates my software to the latest version provided by the software developers.	5.63
	Total Mean	5.58

Table 4 shows the descriptive mean value for individual readiness. A total of 5 items were used to measure the variables. The highest mean value is 5.22 and the lowest is 4.61. The overall mean for individual readiness is 4.92, indicating a level of neutral.

Table 4: Individual Readiness

Item Code	Item	Mean
IRE1	I have a positive perception on BYOD concept and adoption	5.22
IRE2	I have relevant knowledge on the concept of BYOD	4.61
IRE3	I have adequate skills to implement BYOD concept	4.65
IRE4	I have the ability to adopt BYOD concept	5.00
IRE5	I consider BYOD as an important approach in supporting my institution vision and mission	5.10
	Total Mean	4.92

Table 5 shows the descriptive mean value for contextual readiness. A total of 5 items were used to measure the variables. The highest mean value is 5.86 and the lowest is 5.71. The overall mean for contextual readiness is 5.79, indicating a level of slightly high.

Table 5: Contextual Readiness

Item Code	Item	Mean
CRE1	My lecturers encourage me to bring my own device to the class.	5.71
CRE2	My friends encourage me to bring my own device to the class.	5.75
CRE3	My family encourage me to bring my own device to the class.	5.85
CRE4	The subject that I am enroll for the current semester require me to bring my own device to the class.	5.86
CRE5	The faculty that I am currently enroll require me to bring my own device to the class.	5.77
	Total Mean	5.79

Table 6 shows the descriptive mean value for organizational readiness. A total of 5 items were used to measure the variables. The highest mean value is 5.20 and the lowest is 5.05. The overall mean for organizational readiness is 5.13, indicating a level of slightly high.

Table 6: Organizational Readiness

Item Code	Item	Mean
ORE1	My institution provides necessary knowledge on the BYOD implementation.	5.20
ORE2	My institution provides adequate standard operating procedure (SOP) on BYOD implementation.	5.07
ORE3	My institution provides technical support in the implementation of BYOD.	5.05
ORE4	My institution encourages me to implement the concept of BYOD.	5.20
ORE5	My institution motivates me to implement the concept of BYOD.	5.11
	Total Mean	5.13

Table 7 shows the descriptive mean value for BYOD adoption. A total of 5 items were used to measure the variables. The highest mean value is 5.47 and the lowest is 5.33. The overall mean for BYOD adoption is 5.41, indicating a level of slightly high.

Table 7: BYOD Adoption

Item Code	Item	Mean
IAB1	I plan to adopt BYOD concept in supporting my learning process.	5.43
IAB2	Adopting BYOD enables my institution to cut operational cost	5.33
IAB3	I intent to adopt BYOD to complete my academic assignment	5.47
IAB4	I predict that I would continue to adopt BYOD	5.37
IAB5	I intend to adopt BYOD to improve my performance	5.46
	Total Mean	5.41

Table 8 shows the descriptive mean value for productivity. A total of 5 items were used to measure the variables. The highest mean value is 5.60 and the lowest is 5.38. The overall mean for productivity is 5.49, indicating a level of slightly high.

Table 8: Productivity

Item Code	Item	Mean
PRO1	I am satisfied with the quality of my academic assignment	5.38
PRO2	I am satisfied with the quantity of the academic assignment that I have produced	5.38
PRO3	BYOD enables me to complete my academic assignment quickly	5.51
PRO4	BYOD enabled me to quickly obtain the information that I seek	5.60
PRO5	Overall, BYOD increased my productivity	5.58
	Total Mean	5.49

Pearson's Correlation

The following Figure 2 shows the Pearson's Coefficient Correlation between variables. The results of the Pearson's Correlation of this study are interpreted as follow: (1) there is a strong positive correlation between technological readiness and BYOD adoption among students in selected Malaysian's public universities ($r = 0.434$, $n = 476$, $p = 0.00$); (2) there is a very strong positive correlation between individual readiness and BYOD adoption among students in selected Malaysian's public universities ($r = 0.722$, $n = 476$, $p = 0.00$); (3) there is a strong positive correlation between contextual readiness and BYOD adoption among students in selected Malaysian's public universities ($r = 0.553$, $n = 476$, $p = 0.00$); (4) there is a very strong positive correlation between organizational readiness and BYOD adoption among students in selected Malaysian's public universities ($r = 0.766$, $n = 476$, $p = 0.00$); (5) there is a negligible correlation between gender and BYOD adoption among students in selected Malaysian's public universities ($r = 0.104$, $n = 476$, $p = 0.023$); (6) there is a weak positive correlation between study level and BYOD adoption among students in selected Malaysian's public universities ($r = 0.204$, $n = 476$, $p = 0.000$); and (7) there is a very strong positive correlation between BYOD adoption and productivity among students in selected Malaysian's public universities ($r = 0.204$, $n = 476$, $p = 0.000$).
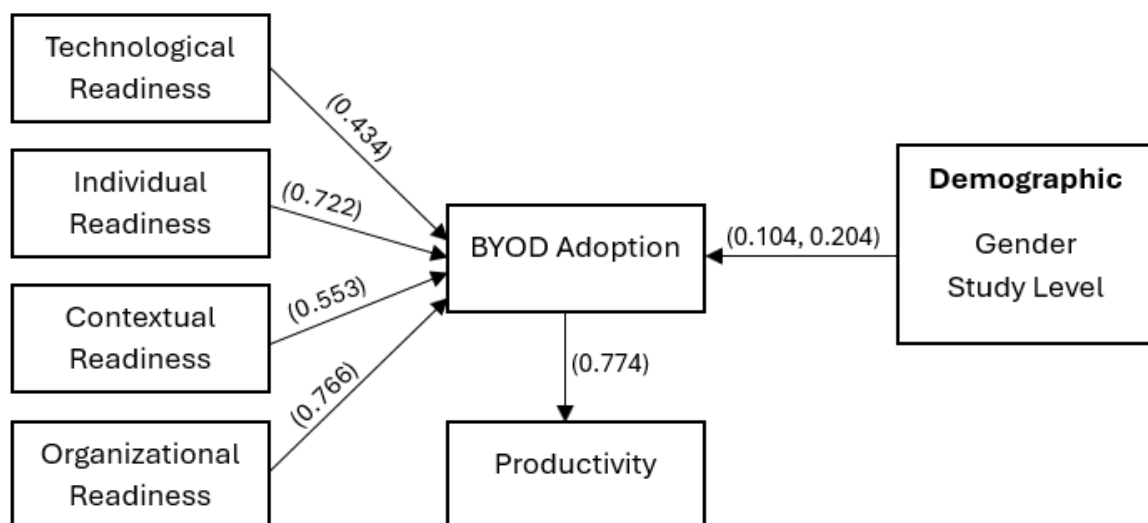

Figure 2: Pearson's Correlation Coefficient

Discussion

The aim of this research was to investigate the level of BYOD adoption and implementation in the Malaysian public universities. The study used a quantitative research paradigm. An instrument was created by adapting prior instruments from various studies, and a total of 476 responses were received, indicating a sufficient response for data analysis. Cronbach's Alpha coefficient was conducted on the dataset to determine whether the responses is reliable for further analysis and the resulted Cronbach's Alpha coefficient indicates that the instrument is reliable for data collection process. The data were entered into the Statistical Package for Social Sciences (SPSS) version 26 for the descriptive analysis test. The analysis included six variables: technological readiness, individual preparedness, contextual readiness, organisational readiness, BYOD adoption, and productivity.

The results of the Pearson's Correlation of this study are interpreted as follow: (1) there is a strong positive correlation between technological readiness and BYOD adoption among students in selected Malaysian's public universities; (2) there is a very strong positive correlation between individual readiness and BYOD adoption among students in selected Malaysian's public universities; (3) there is a strong positive correlation between contextual readiness and BYOD adoption among students in selected Malaysian's public universities; (4) there is a very strong positive correlation between organizational readiness and BYOD adoption among students in selected Malaysian's public universities ; (5) there is a negligible correlation between gender and BYOD adoption among students in selected Malaysian's public universities; (6) there is a weak positive correlation between study level and BYOD adoption among students in selected Malaysian's public universities; and (7) there is a very strong positive correlation between BYOD adoption and productivity among students in selected Malaysian's public universities.

The following discussion will focus on the detailed interpretation of the descriptive analysis of the collected data.

Technological Readiness

From the perspective of technological readiness, the descriptive analysis generates an overall mean value of 5.58 across five items, indicating a slightly high degree of technological readiness with the individual item mean values range from 4.83 to 5.87. Item 1 tested the appropriateness of equipment for learning and yielded a high mean (5.77), indicating that most participants believe they have adequate devices to help their learning process. This is a good predictor of technological preparedness because having the right technology is essential for engaging with digital learning materials and activities. Item 2 had the lowest mean value of 4.83, showing that participants' access to a good Internet connection is a relative weakness. Internet access is required for communication with peers, utilization of online resources, and involvement in virtual classes. The lower mean indicates a potential obstacle to optimal technology preparedness and an area for improvement.

Item 3 which assessed the ability to use the device independently, received the highest mean value in this study, indicating that participants are confident in their ability to use computers or other devices independently, without the need to share. This autonomy is crucial for students 'continuous learning and task fulfilment, indicating a high level of technology preparedness. Item 4 assessed participants' ability to install the latest programmes and received a high mean, indicating that participants believe they can install the latest applications on their devices which

allows students to access new features, security upgrades, and increased functionality, all of which improve the overall learning experience. The last item measured ability of students to update software also showed a reasonably high mean, indicating that most participants can update to the latest versions to ensure security and compatibility with new apps. All these can contributes positively to technical readiness.

Individual Readiness

The survey findings for the individual preparedness to adopt the (BYOD) idea indicates a neutral degree of readiness with an overall mean value of 4.92 across five items. Item 1 measured the positive perception of the BYOD idea and received the highest mean value, indicating that participants typically have a positive perception of the BYOD concept and its implementation. This favourable attitude is important because it demonstrates an openness to incorporating personal gadgets into their learning environment, which is a fundamental component of individual preparedness. Item 2 assessed students' relevant knowledge of BYOD and yielded the lowest mean value, showing that awareness of the BYOD concept is quite limited among participants. Understanding the ideas and benefits of BYOD is critical to its effective adoption. The low mean indicates a possible area for educational activities to raise awareness and knowledge.

Item 3 examined participants' skill to adopt BYOD, and the mean result for this item suggests that participants believe they are only somewhat adept at implementing the concept. This moderate rating indicates that, while some participants believe they are capable, there is still potential for skill development. Item 4 examined participants' ability to adopt the BYOD concept, and a mean value of 5.00 indicates that participants believe they are capable of doing so. This preparedness is significant because it demonstrates participants' confidence in incorporating personal devices into their daily activities, which is essential for the practical use of BYOD. Item 5 measured students' perceptions of BYOD as a significant method. This high mean score suggests that participants believe BYOD is a significant strategy for promoting their institutional vision and goals, and this acknowledgment is critical for driving the adoption.

Contextual Readiness

The contextual readiness section in the survey results revealed that there is a slightly high level of contextual readiness to support BYOD adoption from the overall mean value of 5.79 across five items. The individual item mean values range from 5.71 to 5.86, demonstrating the supportive environment surrounding the BYOD initiative. The results show that encouragement from lecturers, family, and friends plays a crucial role in adopting new practices like BYOD. Requirements to bring their own devices by the faculty and the current semester courses also reinforce its importance in the academic setting and ensure that students are equipped with the necessary tools for their coursework.

BYOD adoption encouragement from educators is crucial to helping create a conducive learning environment that embraces technological integration. Peer support is also significant as it can drive individual behaviour and attitudes towards adopting new practices like BYOD. Another main driving factor is family encouragement since it provides the necessary moral and sometimes financial support for students to acquire and use their own devices. Whereas the faculty and institutional requirements to adopt BYOD reinforce its importance in the academic setting, provide a structured formal framework for the adoption of BYOD policies, and facilitate their implementation.

Organisational Readiness

In terms of organisational readiness aspect, the analysis of the tested items yielded an overall mean value of 5.13 across five variables, indicating a slightly higher level of organisational readiness. The mean values for the individual elements range from 5.05 to 5.20, revealing specific characteristics of institutional support for BYOD. The high mean values for items 1 (provision of knowledge on BYOD) and item 4 (encouragement to implement BYOD) indicate that the institution effectively provides the essential knowledge and actively encourages students for BYOD implementation. This could include information about the benefits, challenges, and best practices of BYOD, ensuring that students are well-informed.

The mean value of items 2 and 5 are also rather high, indicates that the institution not only promotes but also stimulates students to use BYOD and provides suitable standard operating procedures (SOPs) for BYOD deployment. Motivation can come from a variety of sources, including recognition, and demonstrating successful BYOD implementations. SOPs are required to create clear standards and expectations, thus facilitate to standardise the deployment of BYOD across the institution. Item 3 (technical support) had the lowest mean value, indicating that there is still room for improvement. Adequate technical support is critical for resolving issues, assisting with device connectivity, and ensuring that users can fully utilise their gadgets.

BYOD Adoption

The analysis results on BYOD adoption among the participants suggested a slightly high level of adoption. The analysis revealed an overall mean value of 5.41 across five items, indicating The individual item mean values range from 5.33 to 5.47, providing insights into different aspects of BYOD adoption among participants. The high mean value in Item 1 regarding students' planning to adopt BYOD in their learning suggests that students see the potential benefits of integrating personal devices into their educational activities, which can enhance their learning experience. Item 2 on operational cost reduction has the lowest mean value, demonstrating that, while BYOD has the potential to reduce institutional operational expenses, it is not the key motivator for students. It demonstrates that the perception of cost reductions can be more important to institutional decision-makers than individual pupils.

Adoption for academic assignments (Item 3) and adoption to increase performance (Item 5) had the highest mean values in this category, indicating that students believe personal devices can be advantageous for their coursework, possibly due to the convenience and flexibility that BYOD offers. Students believe that BYOD adoption also can boost their academic achievement. The high mean value in the prediction to continue adopt BYOD as tested in item 4 reflects high participants' prediction that they will continue to adopt BYOD in the future. This finding demonstrates potential long-term commitment of participants to use personal devices to integrate technology into their academic activities.

Productivity

The data on productivity revealed a connection between BYOD and students' productivity, with an overall mean value of 5.49 across five items, indicating a slightly high degree of perceived productivity. The individual item mean values range from 5.38 to 5.60, providing specific information about how BYOD affects students' academic work. Item 1 which measures the student's satisfaction with the quality of academic assignments indicates that students are generally satisfied with the quality of their academic assignments. The mean value of Item 2 indicates that students are moderately satisfied with the quantity of academic tasks produced.

This means that, while students believe they can do a respectable amount of work, there may be room to increase productivity even further.

The mean value of analysis for Item 3 (speed of completing assignment), Item 4 (easy of acquiring information), and Item 5 (total gain in productivity) is higher than the two preceding items. This suggests that students see BYOD as a valuable tool for completing academic assignments faster. It also demonstrates that students find BYOD incredibly useful for quickly acquiring the knowledge they require. Furthermore, it indicates a broad consensus that BYOD improves their capacity to complete academic activities more successfully and efficiently.

Suggestions based on the findings
To enhance technological readiness in BYOD, infrastructure development in institution should be take into consideration by creating study spaces and classrooms where workgroups can function, enabling the integration of students cooperating and working together. Institutions should focus on improving Internet connectivity for students, as this is a critical component of technological readiness. Continuous support for device maintenance and software updates can also help maintain the high levels of readiness in this area.

To improve individual readiness on BYOD, institutions can encourage good perceptions by maintaining a supportive attitude towards BYOD. This can be accomplished by showcasing success stories, offering assistance, and demonstrating how BYOD corresponds with institutional goals, as well as providing extensive information about the benefits, obstacles, and best practices to help improve students' understanding and readiness. Besides that, to help students use mobile devices for academic reasons, educational institutions might offer workshops or training sessions. This covers subjects including cybersecurity best practices, digital literacy, and using particular programs or apps for educational purposes. By giving students access to online lessons, tools, and guidelines, organizations may lessen the workload of technical support workers by enabling them to solve common problems on their own.

To maintain contextual readiness for BYOD, it is critical to provide ongoing encouragement from lecturers, classmates, and family members to assist students in embracing BYOD. Aside from that, institutional regulations can be enhanced by ensuring that faculty and course requirements for BYOD are explicitly communicated and supported by appropriate resources, such as device specification guidelines, usage policies, and technical assistance. The concept of lecturing will be replaced by "educational coaching" as mobile devices become more widely used; however, this cannot be done without the right tools and training. The manner in which students behave in class is evolving and will do so for the foreseeable future (Aguirre, Chaves, & Burban, 2019).

To sustain organisational readiness for BYOD, it is vital to enhance technical support to students by strengthening the technical support infrastructure to guarantee that all users receive timely and effective assistance. Also need to regularly examine and update the standard operating procedures to reflect the latest technological advancements and get input from users. To locate areas for improvement, it can be quite helpful to set up a structured method for feedback where students can share their experiences with technical support and BYOD guidelines. Surveys, focus groups, and special routes for making suggestions and reporting problems are some examples of this feedback loop. Institutions can find areas of user dissatisfaction, new trends, and reoccurring issues by routinely monitoring and evaluating feedback data. Then, using this data, technical support procedures may be improved, policies

can be updated, and investments in new or upgraded infrastructure can be prioritized. This kind of interaction with students shows that you are dedicated to attending to their wants and concerns, which promotes a sense of cooperation and ownership in the BYOD project. Additionally, it guarantees that organizational preparedness continues to be flexible and adaptable to changing technological environments and user expectations.

To promote adoption of BYOD among students, institutions need to ensure that the basic infrastructure, such as strong Wi-Fi and technical assistance, are in place to facilitate continuous BYOD adoption. Educational institutions also can produce user-friendly policies or guides that provide detailed instructions on how to connect to the Wi-Fi network, resolve common technical problems, and use personal devices to access institutional resources. This can assist address technical issues and improve the user experience.

To increase the productivity of students while adopting BYOD, institutions may provide additional tools and support to help students maximise the quality and quantity of their academic work by providing, among others, reliable and high-speed internet access as well as comprehensive digital libraries and databases. Adding to that are courses on smart utilisation of digital tools, time management, and strategies to improve assignment quality when using BYOD. Through the provision of sophisticated technical skills and knowledge, educational institutions enable their students to fully utilize their devices for academic purposes, leading to increased productivity and the promotion of a culture that values ongoing learning and innovation.

Limitation and future research
As far as limitations of this research is concerned, the results may not be a completely accurate reflection of the level of BYOD in educational institutions at Malaysian public universities. There are several limitations to the study. First, there is a lack of male respondents compared to female respondents, which may introduce gender bias in the findings. This imbalance in gender representation could impact the validity of the study's conclusions, making it difficult to generalize the findings to the broader population. For future research, it is recommended that researchers examine how gender affects the adoption of BYOD and productivity in learning environments. They should also examine the differences between the use of personal devices by male and female students for academic purposes, as well as the ways in which institutions might address gender bias in the BYOD implementation.

Second, there is limited diversity in the educational levels of respondents. The majority of respondents were enrolled in undergraduate studies, with very few in postgraduate studies. The lack of representation from postgraduate students and other educational levels could limit the broader applicability of the study's findings. Future research is recommended to conduct studies on BYOD adoption and productivity under different educational levels (undergraduate, graduate, etc.). Researchers should examine how students engage with BYOD efforts at different educational stages and devise plans to address the various needs of students at different academic levels. Although 476 respondents were analysed, the sample size may still be considered relatively small for generalizing the findings to the larger population of Malaysian public universities. This small sample size could limit the study's ability to provide reliable and generalizable results, potentially impacting the validity of the conclusions.

The study focused on specific variables related to BYOD adoption and productivity, potentially overlooking other relevant factors that could influence the outcomes. For future research, it is

suggested that researchers focus on different variables. Another limitation is that this study specifically targeted Malaysian public universities, which might limit the generalizability of the findings to other educational settings or countries. Therefore, future research could focus on cross-national studies. Researchers could examine how public universities in Malaysia have adopted BYOD and what obstacles they are facing in comparison to other nations. They should analyse the institutional, technological, and cultural elements that affect the BYOD integration's success in global higher education settings.

Finally, the single method of data collection is a limitation of this study. It primarily used a quantitative research method, potentially missing out on qualitative insights that could provide a more comprehensive understanding of the subject matter. The use of a single data collection method could limit the study's ability to capture the complexity of the phenomenon under investigation, potentially impacting the validity of the findings. By focusing on these research areas, academics can assist the ongoing development of technology integration for improved learning experiences, inform policy decisions, and add to the ongoing discussion about BYOD in educational settings.

Conclusion
In a nutshell, this study on BYOD adoption and implementation in Malaysian public universities revealed strong positive correlations between technological, individual, contextual, and organizational readiness and BYOD adoption, with a notable link between BYOD adoption and increased productivity. Despite the overall high levels of readiness and adoption, challenges such as limited internet access and the need for improved technical support were identified. To enhance BYOD adoption, institutions should focus on infrastructure development, fostering positive perceptions, providing ongoing support, and addressing gender and educational level biases in future research. The findings emphasise the importance of a supportive environment and continuous improvement in technology integration to maximise the benefits of BYOD in educational settings.

References
Aguirre, J., Chaves, S., & Burban, K. (2019). Adoption, adaptation, and use of mobiles by university students: a Central American example. *Journal of Applied Research in Higher Education, 11*(3), 493-505.

Al-Okaily, R. (2015). Mobile learning BYOD implementation in an intensive English program *International Handbook of E-Learning Volume 2* (pp. 311-324): Routledge.

Alaskar, M., & Shen, K. N. (2016). Understanding bring your own device (BYOD) and employee information security behaviors from a work-life domain perspective.

Baharuddin, N. S., & Rosman, M. R. M. (2020). Factors affecting the usage of Library e-services in the aftermath of COVID-19 Pandemic. *Academic Journal of Business and Social Sciences, 4*(1), 1-14.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual review of psychology, 52*(1), 1-26.

Chen, H., Li, Y., Chen, L., & Yin, J. (2021). Understanding employees' adoption of the Bring-Your-Own-Device (BYOD): the roles of information security-related conflict and fatigue. *Journal of Enterprise Information Management, 34*(3), 770-792.

Chen, Y. (2023). Influencing Factors of Postgraduates' Online Learning Satisfaction: A Case Study of a Public University in Chongqing, China. *ABAC ODI Journal Vision. Action. Outcome, 11*(1), 361-377.

Crossler, R. E., Long, J. H., Loraas, T. M., & Trinkle, B. S. (2014). Understanding compliance with bring your own device policies utilizing protection motivation theory: Bridging the intention-behavior gap. *Journal of Information Systems, 28*(1), 209-226.

Dang-Pham, D., & Pittayachawan, S. (2015). Comparing intention to avoid malware across contexts in a BYOD-enabled Australian university: A Protection Motivation Theory approach. *Computers & Security, 48*, 281-297.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems, 19*(4), 9-30.

Deyan, G. (2019). 41 Eye- opening BYOD stats and facts to know in 2019. Retrieved from https://techjury.net/stats-about/byod/.

Doargajudhur, M. S., & Dell, P. (2019). Impact of BYOD on organizational commitment: an empirical investigation. *Information Technology & People, 32*(2), 246-268.

Doargajudhur, M. S., & Dell, P. (2020). The effect of bring your own device (BYOD) adoption on work performance and motivation. *Journal of Computer Information Systems, 60*(6), 518-529.

French, A. M., Guo, C., & Shim, J. P. (2014). Current status, issues, and future of bring your own device (BYOD). *Communications of the Association for Information Systems, 35*(1), 10.

Gupta, R., Varma, S., & Bhardwaj, G. (2019). A structural equation model to assess the factors influencing employee's attitude & intention to adopt BYOD (bring your own device). *Int. J. Recent Technol. Eng, 8*(3), 63030-66308.

Khan, A., Masrek, M. N., & Mahmood, K. (2019). The relationship of personal innovativeness, quality of digital resources and generic usability with users' satisfaction: a Pakistani perspective. *Digital Library Perspectives, 35*(1), 15-30.

Loose, M., Weeger, A., & Gewald, H. (2013). BYOD–the next big thing in recruiting? Examining the determinants of BYOD service adoption behavior from the perspective of future employees.

Masrek, M. N., & Gaskin, J. E. (2016). Assessing users satisfaction with web digital library: the case of Universiti Teknologi MARA. *The International Journal of Information and Learning Technology, 33*(1), 36-56.

Mohamad Rosman, M. R., Ismail, M. N., & Masrek, M. N. (2023). Determinants and Impacts of Digital Library Engagement: Evidence from Research-Based Universities in Malaysia. *International Journal of Information Science and Management (IJISM), 21*(3), 49-65. doi:10.22034/ijism.2023.1977682.0

Nelson, D. L. (1990). Individual adjustment to information-driven technologies: A critical review. *MIS quarterly*, 79-98.

Nunnally, J. C. (1978). An overview of psychological measurement. *Clinical diagnosis of mental disorders: A handbook*, 97-146.

Rosman, M. R. M., Alias, N. R., Arshad, I. H., Hamid, H. A., & Idris, Z. (2022). Assessing Students' Perceived Engagement and Perceived Performance for E-Learning in East Coast Malaysia: A Partial Least Square Structural Equation Modeling Approach. *IEEE Engineering Management Review, 51*(1), 63-75.

Rosman, M. R. M., Aziz, M. A. A., Alimin, N. A., Azman, N. A., Ramli, F. N., & Shuhaimi, F.

B. (2022). *What drives digital library user's satisfaction behavior? Investigating the level and its determinants.* Paper presented at the Advances in Information, Communication and Cybersecurity: Proceedings of ICI2C'21.

Rosman, M. R. M., Baharuddin, N. S., Alimin, N. A., Rosli, N. N. I. N., Shukry, A. I. M., & Razlan, N. M. (2022). *Bring-your-own-device (BYOD) and productivity: A conceptual framework.* Paper presented at the Proceedings.

Rosman, M. R. M., Fadzil, F. H., Abdullah, N., Zawawi, M. Z. M., Arshad, I. H., Saleh, M. S. M., & Baharuddin, N. S. (2023). Waste Management Perspective in Malaysia: A Conceptual Framework. *Malaysia Journal of Invention and Innovation, 2*(3), 19-30.

Rosman, M. R. M., Ismail, M. N., & Masrek, M. N. (2022). Development and validation of a tool for measuring digital library engagement. *Int. J. Electr. Comput. Eng.(IJECE), 12*, 4146-4154.

Rosman, M. R. M., Ismail, M. N., Masrek, M. N., Branch, K., & Campus, M. (2019). Investigating the determinant and impact of digital library engagement: a conceptual framework. *Journal of Digital Information Management, 17*(4), 215.

Rosman, M. R. M., Razlan, N. M., Alimin, N. A., Rosli, N. N. I. N., Shukry, A. I. M., & Baharuddin, N. S. (2022). Modelling Referencing Competency and Individual Performance. *International Journal of Information Science & Management, 20*(1).

Rustagi, S., King, W. R., & Kirsch, L. J. (2008). Predictors of formal control usage in IT outsourcing partnerships. *Information systems research, 19*(2), 126-143.

Ruxwana, N., & Msibi, M. (2018). A South African university's readiness assessment for bringing your own device for teaching and learning. *South African Journal of Information Management, 20*(1), 1-6.

Samadi, I., & Masrek, M. N. (2015). Assessing digital library effectiveness of selected Iranian universities. *Journal of Information and Knowledge Management (JIKM), 5*(2), 1-15.

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and psychological measurement, 66*(4), 701-716.

Shakhnov, V. A., Zinchenko, L. A., Rezchikova, E. V., & Glushko, A. A. (2015). *An opportunity in engineering education: Russian BYOD tendencies: BMSTU case study.* Paper presented at the 2015 International Conference on Interactive Collaborative Learning (ICL).

Stamford, c. (2016). Gartner survey shows that mobile device adoption in the workplace is not yet mature [Press release]