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Determinants of artificial intelligence acceptance among undergraduates

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ABSTRACT

Despite the potential benefits of artificial intelligence (AI) brings to education, its extensive use does not automatically guarantee effective integration or consistent improvements in learning. Hence, this research aims to identify the determinants of AI acceptance among undergraduates and examine the relationship between these determinants and AI acceptance. Five determinants of AI acceptance were identified based on the technology acceptance model (TAM) and empirical evidence: perceived effectiveness of AI, user satisfaction, user attitude toward AI technology, attitude toward using AI, and user self-efficacy. This quantitative study focused on 791 undergraduates from a management school in Malaysia. A questionnaire was distributed to 310 undergraduates using a stratified sampling method, and 259 responses were collected. Descriptive analysis results indicated that undergraduates perceive attitudes toward AI technology and using AI as very important determinants of AI acceptance. Pearson correlation analysis also revealed that four determinants (perceived effectiveness of AI, satisfaction in using AI, attitude towards AI technology, attitude towards using AI) significantly correlated with AI acceptance. This finding suggests that, within the context of AI acceptance among management school undergraduates, attitude-related determinants are the primary drivers. The findings from this research could be used by the management school as a reference to enhance undergraduates' AI acceptance levels and identify areas for inclusive education system improvement.

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1. INTRODUCTION

Artificial intelligence (AI) refers to the application of machines or computers designed to replicate and demonstrate cognitive abilities and behavior characteristic of humans [1]. AI can be described as a computer program that imitates human functions to enhance efficiency and cost-effectiveness across various industries [2]. It encompasses a wide range of advanced technologies that enable computers to perform tasks such as text and speech comprehension, information analysis, suggestion generation, and more.

AI technology is often characterized as an advanced system that allows computers to manage tasks traditionally performed by humans, thereby reducing human workload and increasing efficiency [3]. The advent of the Fourth Industrial Revolution has led to a surge in the use of AI technologies. A study in 12 developed countries predicted a substantial economic impact driven by AI, potentially doubling the annual

growth rate by 2035. As a result, the evolving job market now requires undergraduates to be proficient in AI technologies, which can enhance productivity, reduce workloads, and contribute to organizational growth. To remain competitive and meet the evolving needs of stakeholders, Malaysian higher education institutions are compelled to integrate AI technology into their teaching and learning processes [4]. The implementation of AI in education opens up numerous possibilities and opportunities, allowing higher education services to expand at an unprecedented rate [5]. AI technology serves three primary purposes in education: facilitating the educational process, conducting educational analysis, and assessing educational levels [6].

AI has demonstrated its capacity to fulfil diverse roles in teaching and learning by assisting students in acquiring knowledge and improving their academic outcomes [7]. AI-powered tools such as chatbots, virtual tutors, and adaptive learning platforms are increasingly common in Malaysian classrooms. These innovative technologies are designed to provide personalized and impactful learning experiences for students, acting as virtual assistants tailored to meet each student's unique needs [6].

However, despite the potential benefits that AI brings to education, its extensive use does not automatically guarantee effective integration or consistent improvements in learning outcomes [8]. The acceptance of technology by users is critical for its successful adoption [9]. Evaluating the effectiveness of AI in education necessitates an understanding of students' acceptance of the technology and the determinants influencing undergraduates' acceptance of AI applications in education. Thus, this research aims to identify the key determinants for the acceptance of AI among undergraduates and to examine the relationship between these determinants and undergraduates' acceptance of AI. The research seeks to address the following two research objectives (RO): i) to identify the important determinants for the acceptance of AI among undergraduates (RO1); and ii) to assess the relationship between the determinants and the acceptance of AI among undergraduates (RO2).

2. LITERATURE REVIEW

2.1. Acceptance of AI

AI signifies the capability of a computer system to imitate human intelligence for the purpose to solve complex problems [10]. AI is commonly defined as an artificial entity or system that can meet or exceed task requirements while accounting for cultural and demographic factors [11]. Defining AI remains challenging due to the variety of definitions proposed by experts, each shaped by their distinct perspectives and experiences [12].

Integrating AI into education has the potential to enhance individualized learning, facilitate more efficient learning experiences, empower students to uncover their talents, stimulate creativity, and reduce the workload of educators [13]. The acceptance of AI by undergraduates refers to their willingness to adopt and participate in AI-empowered teaching and learning systems, such as virtual classrooms, interactive learning, AI-powered chatbots, smart campuses, adaptive learning, and teaching evaluation systems. Empirical reviews suggest that the technology acceptance model (TAM) is the most commonly adapted theory in studies of AI acceptance.

2.2. Technology acceptance model

The TAM suggests that external factors, such as media and societal influences, can shape individuals' perceptions of the usefulness and ease of use of technology. These perceptions, in turn, affect their intentions to use the technology, which subsequently influences their actual usage behavior, as seen in Figure 1. TAM has been adapted in numerous research studies to fit the specific technological context being examined [14]. The assessment of consumer acceptance of AI technology is commonly based on TAM [15].

Since the late 1990s, numerous social media platforms have emerged, prompting the adaptation of the TAM in many studies to explore technology acceptance within specific contexts. Since then, TAM has become a dominant model in research focused on the acceptance and use of information systems [16]. The TAM was selected as the underpinning theory for this research due to its robust theoretical foundation and extensive empirical support.

The TAM is also valued for its flexibility in incorporating additional variables, making it suitable for studying the acceptance of new technologies across various contexts. For instance, Kelly *et al.* [3] examined the determinant of user self-efficacy, while Kashive *et al.* [17] focused on user satisfaction. Moreover, previous studies have detailed the impact of perceived ease of use by exploring attitudes toward new technology [18] and attitudes toward using technology [19].

Based on TAM and findings from prior studies, this research considers the determinants of AI acceptance from two holistic perspectives. The first perspective is the perceived usefulness of AI, which encompasses the perceived effectiveness of AI [15] and user satisfaction with using AI [17]. The second perspective is the perceived ease of using AI, including user attitude toward AI technology, attitude toward

using AI, and user self-efficacy in using AI [18], [19]. Therefore, the research framework for this study consists of five determinants of AI acceptance as independent variables and the acceptance of AI as the dependent variable, as illustrated in Figure 2.

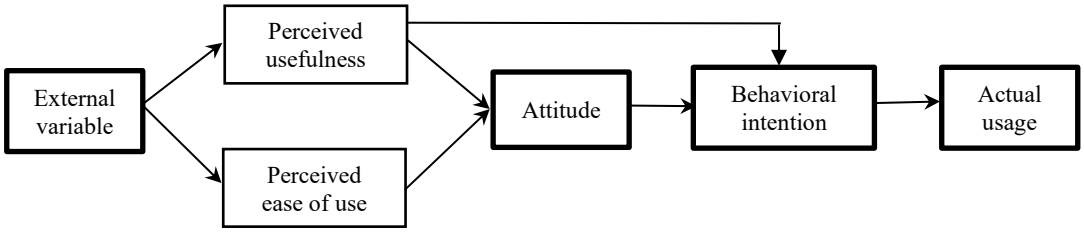

Figure 1. TAM

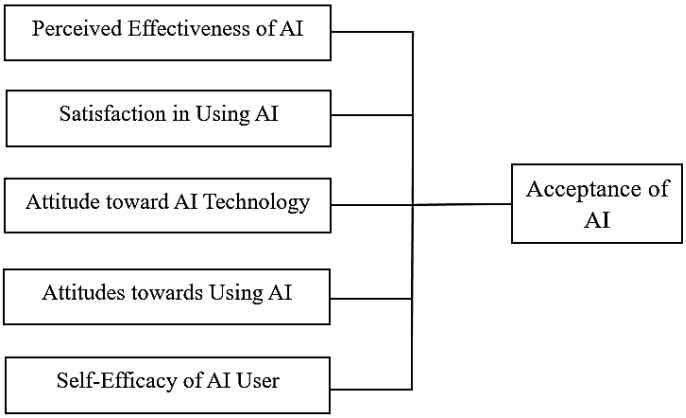

Figure 2. Research framework for Acceptance of AI

2.3. Perceived effectiveness of AI

Perceived effectiveness is defined as the extent to which the use of a technology is anticipated to provide benefits to users when they perform specific tasks [16]. The potential for AI in the education sector is substantial. AI applications, utilizing advanced algorithms and machine learning, can offer personalized learning experiences, tailored content, and real-time feedback [20]. In this research, the perceived effectiveness of AI is referred as the extent to which undergraduates believe that AI is an effective tool for acquiring new knowledge and providing valuable learning opportunities. For example, when individuals view AI applications as effective, they are likely to believe that this technology facilitates more efficient and enhanced learning experiences.

AI assists individuals in learning more effectively and achieving their educational goals. Bansah and Agyei [10] argued that perceived effectiveness is a crucial determinant in a user's acceptance of a particular technology. Therefore, based on these insights, the following hypothesis is proposed: there is a positive and significant relationship between the perceived effectiveness of AI and the acceptance of AI among undergraduates (H1).

2.4. Satisfaction in using AI

Satisfaction can be defined as the disparity between what users expect to gain from a particular experience and the actual gains they perceive [21]. Satisfaction with AI refers to an emotional and cognitive state characterized by feelings of pleasure, contentment, and fulfilment when using AI technology. In the context of education, AI's capacity to provide personalized learning experiences, deliver adaptive feedback, and facilitate interactive learning environments contributes to the satisfaction of both learners and educators [13]. The integration of AI into educational practices is anticipated to bring about substantial transformations within educational systems [22]. A higher level of satisfaction with a system correlates with an increased willingness to use it [23]. Consequently, based on these insights, the following hypothesis is formulated: there is a positive and significant relationship between satisfaction in using AI and the acceptance of AI among undergraduates (H2).

2.5. Attitude toward AI technology

Attitude toward new technology refers to individuals' overall beliefs, perceptions, and feelings towards emerging technologies, including their willingness to adopt and utilize them. Previous studies have suggested that a positive attitude toward new technology is associated with a greater readiness to embrace technological products [23]. For instance, individuals with a favorable attitude toward new technology are likely to recognize its potential to solve problems and improve experiences. Yeşilyurt *et al.* [24] also proposed that when someone holds a positive overall view of technology, they are more inclined to adopt and utilize it. Based on these insights, the following hypothesis is suggested: there is a positive and significant relationship between attitude toward AI technology and acceptance of AI among undergraduates (H3).

2.6. Attitudes towards using AI

Attitude towards use refers to individuals' overall perception and emotional response to using a specific technology or system. Sánchez-Prieto *et al.* [25] emphasize that it encompasses one's feelings, viewpoints, and positive or negative evaluations regarding the use of technology. Believing in a technology's ability to enhance performance and reduce effort fosters a favorable attitude toward its use [26]. For example, users may find enjoyment, interest, and pleasure in using AI applications due to their perceived usefulness. This enjoyment and interest can motivate people to integrate AI into their daily lives, seeking opportunities for positive experiences. Consequently, the hypothesis is suggested: there is a positive and significant relationship between attitudes towards using AI and acceptance of AI among undergraduates (H4).

2.7. Self-efficacy of AI user

Self-efficacy in the context of AI refers to an individual's belief in their ability to comprehend even the most challenging material presented through AI, grasp fundamental concepts related to AI, and successfully use AI technologies [24]. Individuals with high self-efficacy in AI learning believe they can make informed decisions and achieve desired outcomes when using AI. According to Lai *et al.* [27], self-efficacy influences individuals' attitudes towards using technology. Those with strong self-efficacy in AI learning are more likely to believe in their capacity to succeed and to make the most of AI applications. Therefore, the following hypothesis is proposed: there is a positive and significant relationship between self-efficacy and acceptance of AI among undergraduates (H5).

3. RESEARCH METHOD

3.1. Population and sampling

The application of AI in educational teaching and learning is diverse, with varying scopes and areas of application across different universities. Additionally, the framework and approach to AI integration differ between engineering and non-engineering faculties. As a result, generalizing AI research populations across various universities and faculties is not feasible. This research specifically targeted undergraduates from a management faculty within a Malaysian public university as the research population. The total population consists of 791 undergraduates enrolled in three different programs. Based on Krejcie and Morgan's sampling table, a sample size of 260 is required. A sampling plan was developed using the stratified sampling method, and samples were randomly selected according to the sampling plan.

3.2. Research instrument

The research is based on a quantitative approach. The questionnaire used in this study is adapted from previous works [12], [18], [19], [24]. It consists of three parts; part A focuses on collecting demographic information, such as gender, age, year of study, and enrolled course. Parts B and C address the independent and dependent variables, respectively. Respondents express their level of agreement or rating using a 5-point Likert scale, ranging from “strongly disagree” (rating 1) to “strongly agree” (rating 5).

3.3. Analysis tools

The validity and reliability of the data were assessed using a normality test and Cronbach’s alpha test. Data from part B of the questionnaire were analyzed using descriptive analysis to address RO1. The correlation between the AI determinants (from part B) and AI acceptance (from part C) was evaluated using the Pearson correlation test.

4. RESULTS AND DISCUSSION

The questionnaire was distributed to 310 management undergraduates and 259 responded, resulting in a response rate of 83.54%. Data screening and missing value analysis indicated that all 259 questionnaires were valid for further analysis.

4.1. Normality and reliability test

The normality of the numerical data from parts B and C of the questionnaire was tested using skewness and kurtosis values in SPSS. The skewness values for all variables ranged from -1.367 to -1.653, and the kurtosis values ranged from 1.571 to 2.274, both within the acceptable threshold range of +/-3. This suggests that the data collected is normally distributed. The reliability of the numerical data was assessed using the Cronbach's alpha coefficient. The Cronbach's alpha coefficients for the independent and dependent variables ranged from 0.877 to 0.974, exceeding the threshold value of 0.7. Therefore, the data collected is suitable for further descriptive and inferential analysis.

4.2. Descriptive analysis for RO1

A descriptive analysis is employed to address RO1. In this study, RO1 aims to identify the important determinants for AI acceptance among undergraduates. The descriptive analysis was performed on the numerical data collected from Part B of the questionnaire. The mean scores for each of the AI determinants were calculated and summarized in Table 1.

The importance level of each determinant was evaluated using the importance level scale [28]. According to this scale, a mean score of 2.5 to below 3.5 indicates that respondents regard the determinant as "important". A mean score of 3.5 to below 4.5 is considered "fairly important", and a mean score of 4.5 to 5.0 indicates "very important". As shown in Table 1, undergraduates perceive attitudes toward AI technology and attitudes toward using AI as very important determinants for AI acceptance. This finding aligns with previous research [19], [25]. Sánchez-Prieto *et al.* [25] concluded that the attitude toward using AI has been theoretically and empirically established as a key driver in promoting the acceptance of new technology. Furthermore, the likelihood of individuals forming favorable opinions about a specific type of technology increases in direct proportion to the degree to which they perceive the technology as beneficial and easy to learn [19].

Satisfaction with using AI is regarded as a fairly important determinant for AI acceptance, while perceived effectiveness of AI and self-efficacy among undergraduates are viewed as important determinants. These findings are consistent with previous research, which has demonstrated that AI provides personalized learning experiences that offer satisfaction to learners [29]. Additionally, Bansah and Agyei [10] noted that AI helps individuals learn more effectively and achieve their learning objectives. Lai *et al.* [27] further suggested that individuals with high self-efficacy in AI are confident in their cognitive abilities and skills to comprehend complex AI-related information and processes.

Table 1. Descriptive analysis result

Determinants	Mean	Level
Perceived effectiveness of AI	3.4819	Important
Satisfaction in using AI	4.1977	Fairly important
Attitude towards AI technology	4.5144	Very important
Attitude towards using AI	4.5221	Very important
Self-efficacy	3.1578	Important

4.3. Pearson correlation analysis for RO2

Research objective 2 aims to assess the relationship between AI determinants and the acceptance of AI among undergraduates. To address RO2 and test hypotheses H1 to H5, the bivariate correlations between the data from Parts B and C of the questionnaire were analyzed using the Pearson correlation test at a 95% confidence level. The results of the bivariate correlation analysis are presented in Table 2.

Referring to Table 2, the p-values for hypotheses H1 to H4 are all less than 0.05, suggesting that the relationships between these AI determinants and AI acceptance are statistically significant. However, the relationship between self-efficacy and AI acceptance (H5) is not significant. Attitude toward AI technology (H3) and attitudes toward using AI (H4) showed very strong positive relationships with AI acceptance, with correlation coefficients of 0.837 and 0.804, respectively. This finding aligns with previous research. Study by Sánchez-Prieto *et al.* [25] suggested that the acceptance of new technology depends on an individual's attitude toward it, which includes openness, willingness to embrace innovation, and belief that technology provides solutions to problems, enables limitless possibilities, and enhances overall achievements. Additionally, a positive attitude toward new technology fosters greater adoption [12].

Satisfaction in using AI (H2) and perceived effectiveness of AI (H1) were also significantly correlated with AI acceptance. This finding echo research by Seo *et al.* [21], which suggested that AI usage in education enhances learning experiences, leading to greater satisfaction among learners. Similarly, research by Bansah and Agyei [10] found that AI helps individuals learn effectively and achieve their learning objectives. In contrast, undergraduates' self-efficacy (H1) is found insignificant and weakly correlated with AI acceptance, the finding is not in line with previous study. Prior study generally suggested that users self-efficacy was significantly correlated with acceptance of new technology [30].

Undergraduates' self-efficacy in AI refers to their belief in the ability to understand AI concepts and applications. Previous studies have suggested that self-efficacy influences individuals' acceptance of technology [31]. However, findings from this research suggest that while undergraduates may perceive self-efficacy as an important determinant for AI acceptance, it does not significantly influence their acceptance of AI. This could be because the population under study consists of knowledge-based individuals who have already been exposed to AI concepts and applications. As a result, self-efficacy may naturally develop within these individuals, and thus, it does not affect their acceptance of AI.

Table 2. Pearson correlation analysis result

Hypothesis	Coefficient of correlation	p-value	Result
H1 (Perceived effectiveness of AI)	0.485 (Medium)	0.032	Significant
H2 (Satisfaction in using AI)	0.759 (Strong)	<0.001	Significant
H3 (Attitude towards AI technology)	0.837 (Very strong)	<0.001	Significant
H4 (Attitude towards using AI)	0.804 (Very strong)	<0.001	Significant
H5 (Self-efficacy)	0.302 (Weak)	0.078	Not significant

5. CONCLUSION

Perceived usefulness and perceived ease of use, as outlined in the TAM are prominent determinants widely adopted in research related to the acceptance of new technology. In this research, perceived usefulness of AI is examined in terms of perceived effectiveness and user satisfaction, while this study expands TAM by viewing ease of use from the perspectives of attitude toward AI technology, attitude toward using AI, and user self-efficacy in using AI. Findings from both RO1 and RO2 suggest that attitude towards AI technology and attitude towards using AI technology are very important determinants for AI acceptance. Both determinants are significantly correlated with AI acceptance. This finding implies that, within the context of AI acceptance among management school undergraduates, attitude-related determinants are the main drivers for AI acceptance.

An individual's attitude reflects their belief. According to the theory of planned behavior, attitude is considered a behavioral belief and is one of the most important factors influencing behavioral intention. Theoretically, fostering undergraduates' belief in AI technology could enhance their positive feelings and willingness to embrace and utilize AI technologies (i.e., attitude towards AI technology) and improve their perception and emotions regarding the utilization of AI technology.

The research provides significant practical implications. The findings could be used by the management school as a reference to enhance undergraduates' level of AI acceptance and to identify areas for improvement. By focusing on strengthening positive attitudes toward AI, educational institutions can increase the likelihood of undergraduates adopting AI technologies, thereby aligning with modern educational trends and improving learning outcomes.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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Lim Kim Yew		✓		✓	✓				✓					
Goh Chin Fei	✓					✓		✓		✓				
Ong Choon Hee				✓	✓					✓	✓			

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author [TOK], upon reasonable request.

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