AWARENESS AND ACCEPTANCE OF INTERNET OF THINGS (IoT) TOWARD AGROTECHNOLOGY STUDENTS

Muhamad Haziq Abd Rahman[1], Siti Mariam Shamsi[1*]

[1]*Faculty of Plantation and Agrotechnology*
Universiti Teknologi Mara (UiTM), Kampus Jasin, 77300 Merlimau, Melaka

[*]*Corresponding author: mariam_shamsi@uitm.edu.my*

Abstract

Internet of things (IoT) is having a significant impact on the educational experience in a variety of different ways. IoT allows educational institutions, particularly those in the higher education sector, to improve learning outcomes by offering more efficient learning experiences, increasing operational efficiency, and boosting student performance, among other things. This is especially true for educational institutions that use IoT. This study is focused on agrotechnology students, and its purpose is to investigate their awareness and acceptance of the internet of things (IoT). A survey was conducted with the participants for the purpose of this study. A questionnaire was created using Google Forms for data collection. The questionnaire utilized a five (5)-point Likert scale for the participants to rank their opinions as strongly disagree, disagree, undecided, agree, and strongly agree. The coefficient of determination for Internet of Things acceptability was 44.6%, which indicates that non-technical students' adoption of IoT was contributed to by independent factors to the extent of 44.6%. With a significance level of 0.000, the regression F values was 51.502. Regarding awareness of the Internet of Things, the regression coefficient R^2 was 43.4%, and the F value was 49.076 with a significance level of 0.000. In conclusion, these findings indicate a significant possibility for incorporating IoT into their educational experiences.

Keyword: acceptance, agrotechnology student, awareness, internet of things

Introduction

The Internet of Things (IoT) refers to the network interconnection of common things, which typically contain pervasive intelligence. IoT will integrate each thing to interact via embedded systems, so expanding the universality of the Internet and building a highly scattered network of gadgets to communicate with humans and other devices (Feng et al., 2012).

IoT presents enormous prospects for a multitude of new applications that are anticipated to enhance our quality of life. IoT solutions are gradually being implemented in practically every aspect of daily life, resulting in a variety of IoT application areas (Wortmann & Flüchter, 2015). Among the most popular application areas is smart industry, where the development of intelligent production systems and interconnected production sites is frequently discussed under the name of Industry 4.0.

Previous research has examined various aspects of IoT, including user perceptions, acceptance, behavioral intentions, as well as the awareness and use of IoT applications in educational. Cavdar et al. (2018) emphasized understanding consumer behaviour by comparing the perceptions of IoT users and non-users in an effort to fill research gaps in the business field. Shaqrah et al. (2022) studied the acceptance and implementation of IoT

applications in education, highlighting influential factors from perspective of students. Albanadreh et al. (2022) evaluated the level of awareness among graduate students in Jordanian universities regarding the significance and implementation of IoT technology in the educational process. Wiechetek et al. (2017) investigated the perceptions of students from various academic disciplines regarding the IoT and its future development.

Considering the growing recognition of the benefits of technology, particularly the IoT, educational institutions are becoming increasingly cognizant of the advantages of incorporating a variety of technological tools into classroom experiences. Students pursuing non-technical fields, such as agriculture, human resources, and law, may be less inclined to utilize IoT technology. However, as a result of rapid technological advancement, smart farming practices based on IoT have merged in the field of agriculture (Malavade & Akulwar, 2016). This presents a unique opportunity to connect the benefits of IoT to the agricultural industry.

IoT has enabled farmers and agricultural business to meet the rising demand for food by enhancing their analytical capabilities and production efficiency. IoT applications in agriculture, such as precision farming, have the potential to optimize operational efficiency and increase yields via precise pesticide and fertilizer spraying, cost reduction, and data driven decisions for increase productivity (Elijah et al., 2017).

This study provides important information for agrotechnology students by understanding the significance of IoT in agriculture and emphasising its practical uses, particularly in precision farming. The study aims to evaluate the awareness and acceptance of Internet of Things (IoT) among students studying agrotechnology. Overall, it enhances the awareness and acceptance of IoT technologies among agrotechnology students, making it easier for them to integrate these technologies into their academic and professional pursuits in the agricultural sector.

Methodology

The study was conducted on 196 students that were currently enrolled in semester 1 to 7 in the Faculty of Plantations and Agrotechnology at the UiTM Jasin Campus. These students were selected specifically as representatives of the students' group with limited Internet of Things (IoT) knowledge. The Faculty of Plantations and Agrotechnology offers programs that are notably non-technical in nature, focusing on plantations and agricultural practices. The selection of this group of students assumed that they would have less exposure to and understanding of IoT than students in electronic or IT-related fields.

A survey was conducted with the participants for the purpose of this study. A questionnaire was created using Google Forms for data collection. The questionnaire utilized a five (5)-point Likert scale for the participants to rank their opinions as strongly disagree, disagree, undecided, agree, and strongly agree.

Results and Discussion

The results and discussion of the study have two focuses: 1) Acceptance of Internet of Things (IoT) Towards Agrotechnology Students and 2) Awareness of Internet of Things (IoT) Towards Agrotechnology Students

Acceptance of Internet of Things (IoT) Towards Agrotechnology Students

A comprehensive range of questionnaires were developed to evaluate the acceptance of IoT among agrotechnology students. The purpose of these questions was to assess the students'

perspectives regarding the possible advantages of IoT, such as its ability to improve understanding, ease of use, influence on academic achievement, and readiness to incorporate the technology into everyday activities.

The score for social influence, knowledge, and perceive of behaviour was computed based on questionnaire items that measured these factors. The significance of the regression coefficient was determined using the t-statistic, while the coefficient of determination (R^2) and adjusted R^2 were used to evaluate the regression's fit. The score was viewed as an independent variable for predicting the acceptability of IoT by agrotechnology students. The score of social influence, knowledge, and perceive of behaviour was employed as the independent variable in a set of regression models calculated using the entry approach.

Table 1 The result for Multiple Linear Regression for acceptance of Internet of Things (IoT) Towards Agrotechnology Students

	Coefficient (B)	**SE**	**t-value**	**P-value**	**Tolerance**	**VIF**
(Constant)	1.817	0.260				
Social Influence	0.325	0.074	4.403	0.000	0.489	2.047
Knowledge	0.233	0.088	2.657	0.009	0.194	5.145
Perceive of Behaviour	0.061	0.088	0.690	0.491	0.271	3.696
R Square	0.446			SE Estimate	0.38247	
Adjusted R Square	0.437			Durbin-Watson	2.026	
Note: F = 51.502	Sig = 0.000					

Table 1 displays the results of the multiple linear regression analysis indicate that social influence and knowledge significantly effect to the acceptance of the Internet of Things (IoT) among Agrotechnology students, with coefficients of 0.325 ($p < 0.001$) and 0.233 ($p < 0.01$). Social Influences shows the most influential factor, suggesting that peer and social factors play a crucial role in shaping students' attitudes towards IoT acceptance. Knowledge also positively influences IoT acceptance, implying that students with greater understanding of IoT are more likely to accept its use. In contrast, Perceive of behaviour did not show a significant effect ($p = 0.491$), suggesting that students' perceive control over their behaviour does not significantly impact their acceptance of IoT. The model explains approximately 44.6% of the variance in IoT acceptance (Adjusted $R^2 = 0.437$). Furthermore, the absence of severe multicollinearity issues, with VIF values < 5.145, confirms the reliability of these findings. The model has statistically significant ($F = 51.502$, $p < 0.001$), demonstrating that social influence and knowledge play a crucial role in influencing IoT acceptance among agrotechnology students.

Awareness of Internet of Things (IoT) Towards Agrotechnology Student

A comprehensive of questionnaires were developed to evaluate the awareness among agrotechnology students on IoT. The questions consisted of inquiries regarding utilization of IoT in their studies, their perspective on the capacity of IoT to enhance efficiency in daily activities, the perceived significance of IoT in completing tasks and their perspective on the benefit of IoT in supporting their studies.

Table 2 shows the results of a multiple linear regression analysis examining the relationship between Internet of Things (IoT) awareness towards agrotechnology students. The table provides the coefficients (B), standard errors (SE), t-values, levels of significance,

tolerance, and variance inflation factors (VIF) for each predictor variable.

The constant term in the regression equation is 1.266 and the standard error is 0.267. Regarding the predictor variables, social influence has a coefficient of 0.483, indicating a positive relationship with IoT awareness. This coefficient is statistically significant (t-value = 6.35, $p < 0.001$) and its tolerance value of 0.489 indicates low multicollinearity (VIF = 2.047).

In contrast, the knowledge variable exhibits a coefficient of -0.185, indicating a negative correlation with IoT awareness. This coefficient possesses statistical significance (t-value = -2.056, $p = 0.041$). the tolerability value for knowledge is 0.192, indicating a moderate degree of multicollinearity (VIF = 5.145).

Perceive of behaviour, the third predictor, has a coefficient of 0.429, indicating a positive relationship with IoT awareness. This coefficient is statistically significant (t-value = 4.747, $p < 0.001$) and its tolerance value of 0.27 suggests low multicollinearity (VIF = 3.696).

Table 2 The Multiple linear Regression result for awareness of Internet of Things (IoT) Towards Agrotechnology Students

	Coefficient (B)	**SE**	**t-value**	**P-value**	**Tolerance**	**VIF**
(Constant)	1.266	0.267				
Social Influence	0.483	0.076	6.355	0.000	0.489	2.047
Knowledge	-0.185	0.090	-2.056	0.041	0.194	5.145
Perceive of Behaviour	0.429	0.090	4.747	0.000	0.271	3.696
R Square	0.434			SE Estimate	0.39340	
Adjusted R Square	0.425			Durbin-Watson	2.034	
Note: F = 49.076	Sig = 0.000		**p<0.05			

The results indicate that social influence, knowledge, and perceived behaviour significantly influence the awareness of IoT among agrotechnology students. The model explains 43.4% of the variance in IoT awareness, and the overall regression model is statistically significant.

Conclusion

In conclusion, the study shows that agrotechnology students had a moderate level of awareness and acceptance towards IoT incorporation in their field. The multiple linear regression analysis revealed that social influence and knowledge significantly influence students' acceptance of IoT. These factors represented 44.6% of the variance in the student's acceptance of IoT, indicating a moderate level of influence. Although this proportion may seem relatively low, it still signifies a significant impact on students' attitudes towards IoT. Additionally, regression model explained 43.4% of the variance in IoT awareness. Despite the moderate level of explanation provided by the model, the overall regression indicates a significant relationship between acceptance and awareness of agrotechnology students towards IoT. The study suggests that a positive inclination towards the incorporation of IoT technologies in agrotechnology education among the students.

Ethics Statement

The research does not require research ethics approval.

Authors Contribution

Writing - Original draft preparation, Muhamad Haziq Abd Rahman; Literature Review, Muhamad Haziq Abd Rahman; Methodology, Muhamad Haziq Abd Rahman, Siti Mariam Shamsi; Writing – Review and editing, Siti Mariam Shamsi.

Acknowledgement

The author would like to thank the Plantation and Agrotechnology Faculty for providing the chance to perform this research. This study could not have been completed without the assistance of many people, both directly and indirectly.

Conflict of interests

The authors declare that there are no conflicts of interest with this paper.

References

Albanadreh, S. M. O., & Samkari, M. H. (2022). Differences in the degree of awareness of graduate students in Jordanian universities of the importance of using internet of things (IoT) technology in the educational process. International Journal of Health Sciences, 6(S9), 3410–3422.

Cavdar, N., Alan, A. K., & Kabadayi, E. T (2018). Comparing Users and Non-Users of Internet of Things (IoT): A Research Proposal About Acceptance of IoT. 17th Internationally Participated Business Congress.

Elijah, O., Orikumhi, I., Rahman, T. A., Babale, S. A., & Orakwue, S. I. (2017, November). Enabling smart agriculture in Nigeria: Application of IoT and data analytics. In *2017 IEEE 3rd International Conference on Electro-Technology for National Development (NIGERCON)* (pp. 762-766). IEEE.

Feng, X., Yang, L. T., Wang, L., & Vinel, A. (2012). Internet of things. *International Journal of Communication Systems*, *25*(9), 1101-1102.

Malavade, V. N., & Akulwar, P. K. (2016). Role of IoT in agriculture. *IOSR Journal of Computer Engineering*, 2278-0661.

Shaqrah, A., & Almars, A. (2022). Examining the internet of educational things adoption using an extended unified theory of acceptance and use of technology. Internet of Things, 19, 100558.

Wiechetek, L., Banaś, J. (2017). Do Young People Want the Internet of Things? A Comparative Study of Computer Science, Management and Psychology Students, INTED2017 Proceedings, 4090-4100.

Wortmann, F., & Flüchter, K. (2015). Internet of Things. *Business & Information Systems Engineering*, *57*(3), 221–224.