JOURNAL OF TECHNICAL EDUCATION AND TRAINING
ISSN: 2229-8932 e-ISSN: 2600-7932

JTET

Vol. 16 No. 2 (2024) 115-123
https://publisher.uthm.edu.my/ojs/index.php/jtet

Factors Contributing to the Students' Intention to Apply Mechatronic Technology After Graduation

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DOI: https://doi.org/10.30880/jtet.2024.16.02.010

Article Info

Received: 12 March 2024
Accepted: 11 July 2024
Available online: 30 September 2024

Keywords

Perceived ease of use, perceived usefulness, behavioural intentions, mechatronic technology, TAM Model

Abstract

Mechatronic Technology is a field of specialization that offers job opportunities in various sectors of industry. Demand for skilled and semi-skilled labour has increased over the years. However, there are still graduates who do not pursue careers in this field of study. Therefore, this study aimed to identify the factors contributing to the intention to apply mechatronic technology after graduation. The design of this study was conducted using a survey design, using a questionnaire as the instrument for data collection. Moreover, this study also consisted of 90 Mechatronic Technology Certificate students from ITI Bukit Katil and ITI Tangkak. Data were descriptively analyzed using mean scores and standard deviations. Multiple linear regression was used to identify the most dominant factor contributing to the student's intention to apply Mechatronic Technology after graduation. The results showed that factors of technology ease of use, technology usefulness and student behaviour intentions to apply mechatronic technology were high. The findings also demonstrated that ease of use of technology was the most dominant and significant factor in students' intention behaviour to apply mechatronic technology after graduation. The impact of this study also provides insight into the TAM Model to understand students' intention to apply mechatronic technology after graduation.

1. Introduction

Education not only gives knowledge and the formation of a student's personality, but education also helps students get a good job to improve the quality of life and economic development of the country. In this regard, various policies and systems were formed to improve the quality of education in the country, among which the government has strengthened the Technical and Vocational Education and Training (TVET) Education System in Malaysia. TVET is an educational and training process that addresses the workplace with a primary emphasis on the needs of work or practice in the industry to produce skilled and competent workers in specific disciplines (Bello & Muhammad, 2021; Gyimah, 2020; Sulaiman et al., 2018). The expansion of TVET institutions commencing in 1964 demonstrates the importance of TVET to the Malaysian education system (Ariffn et al., 2021).

Manpower Department is one of the Institutes of Public Skills Training (IPST) that specialises in technical skills training provided by the Industrial Training Institute (ITI) and the Advance Technology Training Centre (ADTEC) at the Manpower Department Training Institute (MDTI). Aligning with the vision of the Manpower Department as a pioneering organisation in workforce development (Saad, 2022), students who have completed their training are awarded certificates recognised by the Skills Development Department (SDD). The Manpower Department provides various technical fields through ten key clusters by industrial needs. The Mechatronics Technology programme is a highly sought-after field of employment, particularly in the manufacturing sector. The Mechatronics Technology curriculum is one of 81 programmes offered by the Electrical and Electronics cluster at MDTI (Manpower Department of Malaysia, 2021). The combination of multiple disciplines of expertise provides graduates with extensive employment opportunities. The field of mechatronics is the significance of combining mechanical, electrical, computer, and information systems. It is considered that mechatronic design is a sequential process in which design mechanisms are created by a predetermined series of steps (Sima, 2020; Isermann, 2002).

In line with Malaysia's industrial technology advancement in this industrial revolution era, graduates of the mechatronic Technology Department are greatly in high demand. This is consistent with the findings of Kuru and Yetgin (2019), who found that the manufacturing industry has a high demand for Mechatronics Technology, which is prevalent in the industrial sector. Combining several disciplines of expertise within mechatronics technology makes it more skilled and endowed with a variety of skills that can aid in enhancing the quality of work. Current technological changes necessitate that graduates possess a variety of skills, most of which involve technology. In addition, it can cultivate problem-solving skills and innovate to use of digital technology (Wu & Ying, 2024).

The Technology Acceptance approach (TAM), which was first put forth by Davis in 1986, has been a useful approach that has helped researchers pinpoint and clarify the variables affecting users' attitudes toward technology acceptance (Marangunić & Granić, 2015). Perceived usefulness and perceived ease of use are the two primary components of TAM. The most often utilised elements in TAM to account for the variation in users' behaviour intention. TAM has been extensively utilised in information technology research (Li, Qi & Shu, 2008). Due to TAM's great capacity to explain technology adoption, researchers often include other variables to expand TAM and provide a more thorough explanation of technology adoption (Gangwar, Date & Raoot, 2014). TAM is used by researchers using diverse samples and scenarios to explain variations in users' behaviour and intentions to use technology. Studies have revealed that researchers have been using TAM more frequently and dominantly (Scherer, Siddiq & Tondeur, 2019). Likewise, Khaksar et al., (2021) applied TAM to explain carer's perception of social assistive technology acceptance and adoption.

Shyr et al., (2022) found that aspects of the TAM that influence the acceptance of the automation platform learning are correlated and include perceived delight, perceived usefulness, perceived ease of use, attitude towards usage, and behavioural desire to use. Sánchez-Prieto et al., (2020) on the other hand, the aspects of TAM-Based Tool to Measure AI-based Assessment are perceived usefulness, perceived ease of use, attitude towards use, behavioural intention, and actual use. Choe, Kim & Hwang (2021), successfully pointed out that the attitude, subjective norm perceived behavioural control, and personal norm were hypothesised to play significant roles in the formation of behavioural intentions and were statistically supported. They also indicated that perceived ease of use positively affects perceived usefulness, which in turn exerts a positive influence on attitude. Lin, Chi and Gursoy (2020), Chatzopoulos (2022) and Park et al., (2023) applied TAM in an evaluation of the robot, and Iqbal and Sidhu (2022) studied the acceptance of a dance training system based on augmented reality and TAM. Similarly, Ali et al., (2023) discovered that there was a favourable association between teachers' intentions to employ Lego Mindstorms based on the TAM model in their future instruction and attitudes towards perceived ease of use, perceived teaching usefulness, and perceived learning usefulness.

In Malaysia, studies about factors contributing to the intention to apply mechatronic technology after graduation from mechatronics technology courses students specifically in technical colleges are lacking. This led to a knowledge gap that this study filled. Therefore, this study aimed to identify the factors contributing to the intention to apply mechatronic technology after graduation. Factors measured in this study were technology usefulness and ease of use. The study also identified the most prominent aspects of Southern Zone MDTI Mechatronic Technology Programme students' behavioural intentions after graduation.

2. Methodology

This investigation was conducted through quantitative survey research. Quantitative methods utilise survey instruments because they are the simplest, quickest, most cost-effective, and most useful (Kircher & Zipp 2022; Buang et al., 2019). This method is appropriate for identifying the factors contributing to the student's intention to apply mechatronic technology after graduation.

2.1 Population and Research Sample

This study comprises all students enrolled in semesters 1, 2 and 3 of the ITI Mechatronic Technology Programme in Bukit Katil, Melaka and ITI Tangkak, Johor. ITI Bukit Katil had a total of 42 students enrolled in the Mechatronic

Technology Programme, while ITI Tangkak had a total of 48. There are 90 students in total. In this study, the investigation uses the entire population as its sample. Islam and Aldaihani (2022), Mohajan, (2020) and Fraenkel et al., (2012) asserted that population selection as a sample study is appropriate if researchers wish to focus on the outcomes of groups with similar characteristics.

2.2 Research Instrument

A research instrument is a tool designed to collect data and information for research purposes. There are numerous techniques for collecting data, including surveys, observations, interviews, documents, and testing. The study employs survey questioning instruments because it is straightforward to accomplish the study objectives and the data is represented numerically (Iberahim et al., 2022). This study's survey question was designed to answer the research question regarding the intention to apply mechatronic technology after graduation for Mechatronics Technology Programme students via guided Model TAM. The developed instruments were based on the research of Mouhcine (2021), Letchumanan (2021), and the Manpower Department of Malaysia (2016).

Using Google Forms, the survey questions were developed online. Online data collection is likely to increase response rates compared to paper-based methods. The question items and quantity of question items are developed according to construction. Part A contains four categories of optional items: gender, semester, education level, and institution. Part B has 20 items of technology usefulness factor. Part C is comprised of 19 questions about the ease of use of technology and Part D is comprised of 8 questions about behavioural intention. The survey instrument is written in a language that corresponds to the respondent's level of language proficiency. The query is understandable and straightforward. The query is brief and requires no thought from the respondent. The sequence of questions begins with the next specific general question or the progression from easy to difficult questions. Researchers use the Likert Scale to measure the level of respondents' agreement and disagreement with something attributed to respondents. Items on the survey form are rated on a scale ranging from one to five points. Respondents will select their responses by consulting the Likert scale.

2.3 Validity of The Study

Reliability is an effective method for measuring the uniformity of instruments (Saldana, 2013). According to Asdhiani et al., (2020), quality instruments have high score values that influence the results obtained. Using the alpha Cronbach scale (α) to measure instrument reliability is one of the most common ways to assess the reliability of survey instruments (Creswell, 2005). The alpha Cronbach value ranges from 0 to 1. A coefficient value (α) close to 1 indicates the reliability of certain high-quality study instruments. If the value of the coefficient (α) is near zero, then the instrument's reliability is low. This research established an adequate level of coefficient value by exceeding 0.60 (Sürücü & Maslakci, 2020; Bond & Fox, 2015). Items with a score of less than 0.60 require maintenance.

This study was conducted on individuals or groups with similar or nearly identical characteristics to those of the selected respondents. Students enrolled in the ITI Pedas Mechatronic Technology Programme are chosen as pilot test participants because they share similar characteristics with the actual sample. The pilot test was conducted with 32 participants. According to Johanson and Brooks (2010) and Kerlinger et al., (2000), at least 30 individuals were selected as samples. A population of 30 to 50 individuals is adequate for a groundbreaking investigation (Hale, Burg & Steeves, 2012).

Alpha Cronbach was used to ascertain the reliability of a survey. Amirzadeh, Rasouli and Dargahi (2024), Cheng et al., (2021) and Bond and Fox (2015) suggest that a reliability index value between 0.6 and 0.9 is acceptable. The results of the reliability analysis for each item. In this investigation, Part B, technology usefulness, has a reliability value of 0.98, Part C (ease of use in technology) reliability is α=0.967 and Part D, which is the intent of conduct, has a credibility value of α=0.882. Such values indicate that the manufactured product has superior dependability and performance, as well as a high level of consistency.

2.4 Data Collection and Analysis

The questionnaire is distributed to respondents to capture precise data and details. 90 of the respondents are students of the Mechatronic Technology Programme at ITI Bukit Katil and ITI Tangkak were provided with questionnaires. The survey topics were developed online using Google Forms and distributed URLs to participants via WhatsApp Group. The researchers asked instructors for assistance in collecting responses from respondents. Researchers have purged imprecise information from the data.

Percentages, mean scores, and standard deviation are determined using descriptive analysis. Usefulness and ease of use are independent variables in this study, while the dependent variable is behavioural intention. A double-linear regression analysis is performed to determine which independent variable has the greatest impact on the dependent variable. The survey's Part A consists of respondents' basic information (demographics), as well as data analysis and presentation in percentage form. The queries in Parts B and C are evaluated using both mean

scores and standard deviation. According to Wiesma (2000), items are categorised into three distinct levels according to the mean scores derived for high, medium, and low.

3. Results and Discussion

3.1 Usefulness of Mechatronic Technology

The results indicated that the usefulness factor of mechatronic Technology was the mean score=4.10 (SD=0.451). According to the findings, respondents concur that all Mechatronic Technology items related to usefulness contribute to the student's intention to apply Mechatronic Technology after graduation. In addition, students believed that individual skills in managing the use of technology assist them in obtaining employment and enhancing their industry performance. This demonstrates that ITI students have been exposed to the need to use and operate Mechatronics Technology-related equipment throughout their education. Students gain knowledge and abilities in equipment handling to enhance their performance in future careers. This study, along with Davis (1989) and Okcu et al., (2019), suggests that the perceived usefulness of technology by students can be expressed as the level of individual user confidence that employing technology will result in improved work performance. According to Ovjak et al., (2015), perceived benefits also enhance performance. Davis (1989), Yuvaraj and Nadheya (2018) and Bolodeoku et al., (2022) also supported an employee's belief that the use of particular technologies enhances their work performance. The usefulness of technology depicts the extent to which students believe that technology enhances academic performance.

Lee and Wan (2010) define usefulness as how far consumers perceive that technology enhances their performance. When it comes to mastering technology, individuals tend to continue using it if they feel secure doing so. Putro and Haryanto (2015) stated, contrary to their beliefs, that the usefulness of technology alludes to the user experience when employing technology. Improved performance, productivity, and efficacy in the use of technology are advantageous for users. The utilizability of experienced technology is a crucial component of student career readiness for future career advancement. Students are more likely to embrace technology if they believe it will enhance their future employability (Taylor, 2018). Perceived technology usefulness refers to the direction of the subjective evaluation of an individual's willingness to practise and utilise specific technologies to enhance student performance, skills, and networking abilities for future careers. In addition, the findings of Rosli and Saleh (2022), indicate that student adoption of the usefulness of technology can aid in the development of complex skills, such as problem-solving abilities.

The usefulness of technology serves an important role in guiding students' intention to apply Mechatronic Technology after graduation. The intention of technology's usefulness increases students' self-competence, confidence, and ease of use of the technology required by the skills programme, particularly about the most recent technologies (Pan, 2020). Students believed that skills obtained during learning sessions enhance industry performance and productivity. The use of acquired technology by students improves both the work process for completing tasks and the function of skilled individuals in terms of enhancing organisational performance (Bolodeoku et al., 2022). In conclusion, student approval of the usefulness of technology provides an advantage in assisting students with career exploration, skill development, and career advancement.

3.2 Ease of Use of Mechatronics Technology

The results showed that the ease of use factor of Mechatronic Technology was at a high level with a mean score of 4.11 (SD=0.431). According to Antee (2021), students' access to technology affects their technological proficiency. For instance, students with limited access to technology will find it more difficult to use than those with permanent access, for whom it will be simpler. The ease of use in technology is one of the primary aspects of TAM that directly predicts a person's intention to use the technology based on their perceived usefulness and ease of use to utilise the technology (Worthington, 2021). He et al., (2021) also demonstrated that technological proficiency influences an individual's belief that technology will facilitate task completion. This result is consistent with the findings of Worthington (2021), which indicates that if students' ease of using technology increases, their intention to use the technology will also increase. Students believed that the ease of use of specific technologies is advantageous and influences their intentions to use technology. The capacity to utilise technology has a substantial impact. When students can utilise technology, they will view its use as more beneficial and valuable (Dutta, 2016).

Perceived ease of use in technology is just as essential as its usefulness. When students perceive that learning to use an application of technology is simple and quick, they are more likely to be proficient with it. Hall and Connell, (2017) revealed that the ease of use in technology refers to the approval of students' abilities to use provided technology. A study by Luik et al., (2021) revealed that students' technological intentions can be predicted in part by their technological proficiency. Students have the option to utilise technology with an intuitive interface (Holden et al., 2011). If students can easily utilise technology, they can readily adapt to technological change. Students believe that the ease of use in Mechatronic Technology-related equipment and machinery enhances performance and produces high-quality work. The confidence and trust that students have

in technology can enhance their abilities to operate a variety of apparatus and machines and make them more skilled. This study's findings, along with those of Alyoussef (2021), indicated that the ability of instructors to use technology has a positive impact on learning enjoyment, as well as on student satisfaction and performance. In conclusion, the ease of use of technology is a significant factor in predicting the behavioural intentions of Mechatronic Technology Programme students to use technology after graduation.

3.3 Behavioural Intention of Mechatronics Technology

The student's behavioural intentions towards Mechatronic Technology are high (mean=4.23, SD=0.441). The findings of this study indicated that students' adoption of technology in terms of ease of use and usefulness to operate student technology equipment is high. Peng et al., (2022), found that behavioural intentions are influenced by behaviour-related beliefs, such as the expectation of being able to use technology to enhance performance and the anticipation of efforts to enhance the efficacy of technology. This demonstrates that the acceptance of technology by students and their ease of use of Mechatronic Technology drives the behavioural intention to perpetually improve skills in Mechatronic Technology. A study by Rauniar et al., (2014) also revealed that students' adoption of technology is influenced by its ease of use and usefulness. Two beliefs motivate behavioural intent, usefulness and ease of use in technology. This study's findings are in line with Jang (2019), which confirms that students' behavioural intentions are influenced by their technology skills and mastery..

Iqbal et al., (2015) also found that behavioural intentions are not influenced by attitudes, but rather by beliefs regarding the ease of use of technology. A student's behavioural intent can be determined by multiple factors that influence his or her desire to use technology. This depends on the student's capacity to act and the effort used to pursue the intended behaviour (Ishfaq & Mengxing, 2021). In conclusion, students of MDTI Southern region in the Mechatronic Technology Programme have a strong intent to apply mechatronic technology after graduation.

3.4 The Most dominant Factor of The Behavioural Intentions to Apply Mechatronic Technology After Graduation

The findings also demonstrated that ease of use of technology was the most dominant and significant factor in students' intention to apply mechatronic technology after graduation with a value of β=0.603, p=0.00, and a contribution value of 49.1%. This finding shows that the most dominant factor in the behavioural intentions of students in the Mechatronic Technology Programme using Mechatronics Technology is the technology's ease of use. The factor of students' acceptance of the technological usefulness shows insignificant value. The findings clearly show that the factor of technology ease of use dominates the behavioural intentions of southern region MDTI students in the Mechatronic Technology Programme to apply mechatronic technology after graduation. This shows students' belief that using certain technologies becomes easy (Al-Ajam et al., 2013).

In line with the findings of the study by Aburagaga et al., (2020), it showed that acceptance of technology ease of use seen has a significant effect on behavioural intent. The acceptance of students in terms of their ease of use of technology is a major contributor to their intention to use technology, according to the results of the research that has been carried out. Jang (2019) and Billanes and Enevoldsen (2022) also showed that the technology's ease of use had a significant influence on behavioural intentions that ultimately influenced students' attitudes towards the use of technology. Students who use technology actively will find that technology ease of use is an important factor in their acceptance of the increased ease of use of technology. This increased acceptance is associated with a positive attitude towards the behavioural intention of technology ease of use.

The ability of students to use technology can improve the convenience, efficiency, and effectiveness of various tasks. This admission has a positive effect on student attitudes and beliefs, leading to increased behavioural intentions to engage in the use of technology. The results of this study are consistent with the study of Weng et al., (2018) and Arsanti et al., (2018), showing that the ease of use of technology is the most dominant factor compared to the usefulness of technology to the behavioural intentions of students in using technology. If the student finds the technology difficult to use, this assumption will negatively affect the student's behavioural intentions to use it.

Students tend to have a positive attitude towards the ease of use of technology, which can affect their future career development. The ease of use of technology is an important factor in predicting the intention to use technology in education among students (Holden et al., 2011). The technology's ease of use experienced by students has a significant impact on behavioural intentions and promotes student career development. Technological development continues to play an important role in various industrial sectors. Students who have high-tech skills and have the ease of using competent technologies more competently in the job market

4. Conclusion

The study results show that technology's ease of use is the factor that has the greatest influence on students' intentions to apply mechatronic technology after graduation. Study revenues show that student acceptance of the usefulness aspects, ease of use, and students' behavioural intentions in the Mechatronics Technology programme

is high. This shows that students of the Mechatronics Technology Programme find this technology easy to use, and this technology helps facilitate work, especially in the industry. This study also provides insight into the TAM Model to understand students' intention to apply mechatronic technology after graduation. However, further study needs to be carried out to confirm the students' attitudes to applying mechatronic technology. Policymakers and educators might benefit from the study's findings for planning and curriculum development.

Acknowledgment

Communication of this research is made possible through monetary assistance from Universiti Tun Hussein Onn Malaysia and the UTHM Publisher's Office via Publication Fund E15216.

Conflict of Interest

The author declares no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Suhaila Yusof, Nurul Hidayah Liew Abdullah;* ***data collection:*** *Suhaila Yusof;* ***analysis and interpretation of results:*** *Suhaila Yusof, Nurul Hidayah Liew Abdullah, Aini Nazura Paimin, Zhu Yuying;* ***draft manuscript preparation:*** *Suhaila Yusof, Nurul Hidayah Liew Abdullah, Aini Nazura Paimin, Zhu Yuying. All authors reviewed the results and approved the final version of the manuscript.*

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