Advanced International Journal of Business, Entrepreneurship and SME's
EISSN: 2682-8545
AIJBES
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

ADVANCED INTERNATIONAL JOURNAL OF BUSINESS, ENTREPRENEURSHIP AND SMES (AIJBES)
www.aijbes.com

GLOBAL ACADEMIC EXCELLENCE

EXPLORING CRITICAL SKILLS ELEMENTS IN MALAYSIA'S ELECTRONICS INDUSTRY

Norhamimi Hamdan[1,2*], Asnul Dahar Minghat[3], Fatimah Salim[4]

[1] Department of Embedded Systems, MARA-Japan Industrial Institute, Malaysia
Email: hamimi.hamdan@mara.gov.my
[2] Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, Malaysia
Email: norhamimi.hamdan@graduate.utm.my
[3] Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, Malaysia
Email: asnul@utm.my
[4] Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, Malaysia
Email: sfatimah.kl@utm.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 27.10.2024
Revised date: 11.11.2024
Accepted date: 15.12.2024
Published date: 26.12.2024

To cite this document:

Hamdan, N., Minghat, A. D., & Salin, F. (2024). Exploring Critical Skills Elements In Malaysia's Electronics Industry. *Advanced International Journal of Business Entrepreneurship and SMEs, 6* (22), 291-305.

DOI: 10.35631/AIJBES.622021

This work is licensed under CC BY 4.0

Abstract:

This study aims to explore Critical Skills Elements in Malaysia's Electronics Industry. An investigation was conducted to identify the skills requirement and insufficient critical skills among fresh graduates for entering the job market, as well as its impact on productivity and the success of company operations. Through interviews with five participants consisting of managers and company executives in the electronic engineering industry, several key themes were identified. The findings show the importance of technical skills, communication ability, problem-solving ability, and adaptation to new technology. This lack of skills is identified as the main reason for the decrease in productivity and disruption in company operations. Recommendations to educational institutions were also discussed to ensure that the curriculum offered aligns with current industry needs. As a result of the study, an academic model was formed to solve this problem, concentrating on closer integration between educational institutions and industry. This study contributes to a deeper understanding of the skills gap between graduates and industry needs, as well as providing practical recommendations to strengthen the fit of the engineering education curriculum with the demands of the job market.

Keywords:

Electronic Engineering Graduates, Industrial Skills, Company Productivity, Educational Curriculum, Industrial Integration

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

Introduction

The electronics industry in Malaysia is one of the most important sectors in supporting the country's economic growth. This sector not only contributes greatly in terms of gross domestic product (GDP) but also offers various job opportunities. Malaysia's Electrical and Electronics manufacturing industry contributes to GDP and job opportunities through a total export percentage of 37.8% in 2019 (Hashim & Abdullah, 2021). However, there are growing concerns about the employability of electronics engineering graduates, particularly in relation to the critical skills required by industry. Although Malaysia continues to produce many electronic engineering graduates every year, the reality shows that many of them have difficulty finding jobs that match their qualifications. According to many reports, most software engineering graduates face difficulties starting their careers because what they learn is different from what the industry needs (Garousi *et al.*, 2019). A study of LinkedIn profiles by (Ezika *et al.*, 2022) shows that more electronics engineering graduates are moving into software development and IT roles, as demand is higher compared to traditional electronics and telecommunications engineering positions. This issue is detrimental to the individuals concerned but also affects the development of the electronics industry itself, which requires a competent and quality employee.

Wang and Huang (2018) in their article mention that postgraduate training in electronics and information majors needs to focus more on information acquisition, intelligent processing, big data analysis and applications. This is aimed at training technical personnel and high-level engineering management to meet market demand (Z. Wang & Huang, 2018). The marketability of electronic engineering graduates depends on how well they can meet the needs of the industry, especially in terms of technical and practical skills. However, there is a significant gap between what is taught in technical institutions and what is required by the industry. This results in many graduates lacking the critical skills needed to compete in an increasingly challenging job market. Soft skills that are very important for employability, such as critical thinking, problem-solving, effective communication, and teamwork, are sorely lacking among graduates (Soundararajan *et al.*, 2020; Damoah *et al.*, 2021; Kamarova, 2021). In addition, graduates often fail to meet the demands of employers who require practical skills and real-world experience (Crosta & Banda, 2022; Arif *et al.*, 2023; Nadeem *et al.*, 2023). This lack of skills forced many graduates to choose either to work in fields unrelated to their studies or to be unemployed. This study was conducted corresponding to the lack of critical skills among electronic engineering graduates in Malaysia, which resulted in increased unemployment and employment outside their field of study. This issue has a direct impact on their marketability in the electronics industry, where there is a clear gap between what is learned in education institutions and what the industry needs. Therefore, this study aims to identify the factors that contribute to the lack of these skills and analyse their impact on the marketability of graduates.

To address this issue, this study focused on two main objectives. The first objective is to identify the factors that contribute to the lack of critical skills among electronic engineering graduates in Malaysia. This includes an analysis of the curriculum used in the institutions, the effectiveness of industrial training programs and the suitability of learning experiences with industrial realities. The second objective is to analyse the effect of the lack of skills on the marketability of graduates in the electronics industry in Malaysia. Through this analysis, this study will try to understand how this issue affects graduate employment opportunities and to what extent it contributes to the unemployment rate among electronic engineering graduates.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

This article is crucial because it provides a critical look at the skills gap that exists between graduates and industry. From the government's perspective, the results of this study can be used as a basis for formulating more effective policies to improve the technical and vocational education (TVET) system as well as the engineering curriculum in Malaysia. The findings of this study can also be used as a reference in efforts to strengthen cooperation between education institutions and industry to ensure that the graduates produced really meet the needs of the job market. For the community, this study can raise awareness of the need for critical skills and how important it is for graduates to adapt to the changing demands of the industry. From an industry perspective, this study can help employers understand weaknesses in the new workforce and take proactive steps to overcome this problem, either through internal training programs or collaboration with educational institutions. In addition, this study also contributes to the new literature on skill development and marketability in the Malaysian context, particularly in the electronics industry.

The scope of this study is focused on the critical skills required in the electronics industry in Malaysia. This study will involve interviews and discussions with the industry to understand the challenges graduates face in entering the job market. By focusing on these aspects, this study hopes to provide a clearer picture of the issues faced by electronic engineering graduates and suggest solutions that can be taken to improve this situation. This article is organised as follows: The Introduction section provides the background and states the research problem as well as the research objective. The next section will discuss the relevant literature review, followed by the research methodology. After that, the findings of the study and discussion will be presented before this article ends with conclusions and recommendations.

Literature Review

The electronics industry is one of the fastest-growing sectors in Malaysia and plays an important role in the country's economy. However, the main challenge faced is the low marketability of electronic engineering graduates, mainly due to the lack of critical skills required by the industry. Thus, to prepare graduates with competitive abilities and easy employment, it is important to bridge the gap between teaching courses and industry needs (Ashour, 2023). Therefore, this study aims to understand this issue in depth by examining previous studies and forming a conceptual framework that can help deal with this problem. Much research has been done on critical skills in the electronics industry, showing their importance in ensuring a competent workforce. In the past few decades, the skills gap between graduates and industry needs has widened, especially in high-tech sectors such as electronics. According to Ibrahim & Mat Nashir (2022), the five most important soft skills according to academics are discipline followed by responsibility, problem-solving or complex problem-solving, thinking skills and teamwork skills. He added, however, that the perspective of industry players shows teamwork as the most important skill, followed by discipline, responsibility, analytical thinking, problem-solving and, finally, critical thinking. This shows that the priority of skills is different according to the stakeholders, which also creates the Skills gap (Ibrahim & Mat Nashir, 2022).

The definition and importance of critical skills are a central theme in this literature. Critical skills are divided into two main categories: technical and soft skills. Technical skills involve the ability to operate electronic equipment efficiently, understand engineering theory, and apply technical principles in practical situations. Soft skills include the ability to communicate well, work in a team, and solve problems in a complex work environment. The entire content in engineering education institutions is focused on technical aspects. However, soft skills

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

training should also be highlighted because graduates later need to work with various stakeholders to develop technology for human benefit (Fouzia, 2022). The role of higher education institutions is also widely discussed in the literature. Universities and polytechnics in Malaysia have introduced various initiatives to improve students' critical skills, including industrial training programs, the use of the latest teaching technology, and curriculum improvements that place more emphasis on project-based learning. Analysis shows that cooperation and commitment between companies and educational institutions create a positive impact on student motivation to advance in their careers as well as flexibility in employers' expectations (Arthur-Mensah, 2020). However, the effectiveness of this approach is still debated, especially in the context of graduates' ability to meet industry needs. Not only education institution, it is important for graduates to understand the exact skills and abilities that employers want, such as basic skills, thinking skills, personal quality skills, resource skills and capabilities, interpersonal skills, information skills and system technology skills (Holidi & Abu Seman, 2023).

In addition, the issue of the skills gap between graduates and industry needs is often a topic of discussion. Many studies show that this gap is widening, leaving graduates lacking the practical skills needed in the electronics industry. This creates a big challenge for graduates in getting suitable jobs, and some even have to work outside their field of study. This lack of skills not only affects the employability of graduates but also threatens the industry's competitiveness. Furthermore, there is a lack of research that directly links these skills shortages with the impact on graduates' employability. Existing studies often discuss the issue of employability in general but less examine how a lack of specific skills contributes to unemployment or employment outside the field of study. More in-depth research is needed to understand these dynamics and provide more effective recommendations. Based on the available literature, a conceptual framework can be formed by taking into account several key elements. First, technical and soft skills need to be integrated into one model to assess the extent to which graduates are able to meet the needs of the industry. Second, the academic curriculum needs to be analysed to ensure it is in line with the current needs of the electronics industry. Third, practical exposure through industry training and hands-on projects should be considered an important element in the formation of critical skills. By considering these elements, the conceptual framework formed can be used to evaluate the effectiveness of the current educational approach and suggest the necessary improvements.

This conceptual framework also needs to consider the industry's role in supporting the development of graduates' skills. Collaboration between universities and companies in providing more intensive training programs can be one way to overcome the skills gap. Aliu *et al.* (2019) stated that the responsibility of developing marketability skills among graduates should not only be shouldered by educational institutions. Industry employers also play a role in developing skills and competencies among new graduates through in-house training, work rotations, coaching and mentoring, and cross-functional teams (Aliu *et al.,* 2019). Furthermore, mentoring and support programs after graduation can also help graduates adapt to the needs of the industry. Key findings from previous studies show that there is a significant gap between what is taught in higher education institutions and the needs of industry. There is a substantial difference between the skills taught in higher education institutions and those required by industry, especially in rapidly growing fields such as IT and software engineering. *(Manta et al.,* 2023; Sahin & Celikkan, 2020). Additionally, higher education often focuses on theoretical knowledge rather than practical skills, which employers value more (Sánchez-Cifo *et al.,* 2023; Dobslaw *et al.,* 2023). Graduates often do not have

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

enough practical skills to function effectively in the work environment. Although they may have strong theoretical knowledge, their lack of practical experience makes them less prepared to face the challenges of the workplace. These findings sparked discussions about the need for higher education institutions to introduce more practical components in their curricular.

However, there is controversy over the extent to which higher education institutions are responsible for ensuring that graduates have sufficient skills. Some argue that the industry should also play a greater role in guiding and training new graduates. The industry is said to need to be more involved in the education process, either through joint training programs, the provision of wider industry training opportunities, or collaborating with higher education institutions in forming a curriculum that is more relevant to current needs. Several studies show that a curriculum that is too theoretical and places less emphasis on practical skills is the main cause of the lack of skills among graduates. Curriculum changes in vocational colleges lead to developing the latest curriculum in line with industry progress, ensuring graduates have the latest knowledge and skills (Md Saleh *et al.*, 2023). In this context, a more in-depth study is needed to evaluate the effectiveness of various approaches taken by higher education institutions in dealing with this issue. This study is expected to contribute to existing knowledge by providing a foundation for further research that will examine the factors contributing to this lack of skills and how they can be overcome to increase the marketability of electronic engineering graduates in Malaysia.

Research Methodology

This study uses a qualitative research approach to investigate in depth the factors that contribute to the lack of critical skills among electronic engineering graduates in Malaysia and its impact on their employability. The chosen methodology involves various carefully arranged steps to ensure that this study can achieve the objectives that have been set. Qualitative research methods are used in this study because they allow a deep understanding of the complex issues faced by graduates and employers in the electronics industry. Qualitative research is flexible, produces in-depth information, and minimises data loss, although it is prone to subjectivity, complex data analysis and limited generalisability (Mwita, 2022). The researcher interviewed five participants, who were employers in the electronics industry, to get their views on this critical skills shortage issue. The research design used is Basic Qualitative Inquiry, which was chosen because of its suitability in exploring the perspectives and experiences of individuals directly involved in this field.

Basic Qualitative Inquiry was chosen as the research design because it focuses on exploring the experiences and views of the participants in their natural context (Creswell & Creswell, 2023). This design is very suitable with the objective of the study which aims to identify and analyse the factors that contribute to the lack of critical skills among electronic engineering graduates in Malaysia. This approach allowed for the collection of rich and detailed data from the participants, which in turn allowed the researcher to understand the issues at hand in greater depth. There are four questions that have been used to interview employers in the electronics industry to solve the problems stated in the problem statement.

- *What critical skills do you consider most important for electronics engineering graduates to possess in your industry?*
- *What are the main gaps in the skills of electronic engineering graduates that make it difficult for them to meet the needs of the industry?*

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

- *How does this lack of skills affect your decision to hire electronic engineering graduates to work in your company?*
- *What steps can higher education institutions take to improve the employability of electronic engineering graduates based on the current needs of the industry?*

Data Collection

Data collection in this study was done through semi-structured interviews and observations. Semi-structured interviews were used as the main method because they allowed the participants to share their views and experiences in depth (Castillo-Montoya, 2016). Interview questions were formulated based on the objectives of the study, which allowed the participants to provide information that was relevant and related to the issue under study. Observations were also carried out to complement the data obtained from the interviews by assessing the context of the work environment and social interactions at the workplace. The combination of these two methods provides comprehensive and inclusive data to answer the research questions.

Sampling

The sampling strategy used in this study is purposive sampling, where five employers in the electronics industry were selected as participants. The selection of participants is made carefully based on the set criteria, namely those who have extensive experience in the industry and are directly involved in the recruitment of electronic engineering graduates. A sample size of five people is considered sufficient in a qualitative study because the focus of the study is to obtain depth of data from each participant (Sharma *et al.*, 2024). This sample size allows for in-depth and detailed data collection, which is necessary to achieve the study's objectives.

Data Analysis

The collected data was analysed using coding and thematic analysis. This process is done manually using Microsoft Word. Coding is used to identify the main themes that emerge from the interview data, while thematic analysis helps in grouping the data based on the themes that have been identified. This analysis method was chosen because it is suitable for a qualitative study that aims to understand the meaning given by the participants to their experiences. Manual analysis provides flexibility in managing data systematically and ensuring that all relevant data is thoroughly analysed.

In conducting this study, ethical considerations are an important aspect that is taken into account. Before the study began, ethical approval was obtained from the institutional ethics committee. All participants were given detailed information about the purpose of the study and their right to withdraw at any time. Participant confidentiality is also guaranteed, and the data collected is stored securely and used only for research purposes. This is to ensure that this study is conducted in compliance with high ethical standards and safeguarding the interests of the participants. To ensure the validity and reliability of the data, the triangulation method is used by combining data from interviews and observations. In addition, member checking is done where participants are given the opportunity to check and verify the data taken from them. This helps to ensure that the researcher's interpretation is accurate and in line with the actual views of the participants. These steps are taken to ensure that the data collected is accurate, relevant, and reliable.

Findings

The results from interviews with five participants from employers in the electronics engineering industry provide a clear picture of the skills gap between graduates and the

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

suitability of the curriculum offered by educational institutions. From the coding analysis point of view, five main themes were identified, as shown in Table 1, Table 2, Table 3 and Table 4. The findings, as shown in Table 1, emphasise the critical skill elements required in the electronics industry in Malaysia. Some of the identified themes, such as technical skills, communication skills, practical experience, work attitude, and collaboration skills, are all directly related to the study's objectives. The factors that influence the readiness of electrical and electronics engineering students to enter the job market can be seen through the need for strong technical and communication skills, which are required by the industry to ensure that graduates are able to function efficiently. All of this shows that these critical skills are important factors that affect the employability of graduates in the electronics industry. Table 2 highlights the main skills gap facing electrical and electronics engineering graduates. Deficiencies in practical skills, communication skills, problem-solving, team skills, and technology adaptation reflect the challenges of graduates in meeting industry needs, which are closely related to the study's objectives. The lack of certain skills, such as problem-solving skills and technology adaptation skills, can have a negative impact on graduates' employment opportunities. The problem of lack of relevant skills and practical experience in critical technical fields is also explained through the difficulty of graduates in applying theory to actual practice, as well as the ability to adapt to the rapid development of technology.

Table 1: What Critical Skills Do You Consider Most Important For Electronics Engineering Graduates To Possess In Your Industry?

Participant (P)	Theme	Quotes	Interpretation/remark
P1	Technical Skills	*If the theory is strong but you can't apply it at work, it's hard.*	Technical skills are very important to ensure graduates can perform tasks efficiently and quickly in the workplace.
P2	Communication Skills	*I'm looking for graduates who can communicate well... if they can't communicate, it's hard.*	Communication skills are considered as important as technical skills, especially for working in teams at work.
P3	Practical Experience	*If you don't have experience, it's hard to adapt to real work.*	Practical experience such as an internship or related part-time work is highly valued as it helps graduates adapt to work tasks.
P4	Work Attitude and Adaptation	*If he has a good attitude, can work under pressure, and can learn new things quickly, that's what's important.*	A positive attitude and the ability to learn quickly are key criteria, although technical skills are also important.
P5	Soft Skills and Collaboration	*Technical skills are important, but if you can't work together, it's hard to get good results.*	Soft skills such as collaboration, work ethic and discipline are considered essential for overall success in the workplace.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

Table 2: What Are the Main Gaps in The Skills Of Electronic Engineering Graduates That Make It Difficult For Them To Meet The Needs Of The Industry?

Participant (P)	Theme	Quotes	Interpretation/remark
P1	Practical Skills	*They know the theory, but when asked to do manual work, hmm, it looks a bit blurry.*	Graduates lack the practical skills to apply theoretical knowledge in real work situations.
P2	Communication Skills	*When you want to explain or discuss something with a team mmm, sometimes you don't get what you want to convey.*	Graduates find it difficult to communicate effectively, especially in a teamwork environment.
P3	Problem-Solving Skills	*When there is a technical problem, they don't know where to start.*	Graduates are less adept at solving technical problems or complex situations at work.
P4	Teamwork Skills	*They prefer to work alone, not used to collaborating or, emm, sharing ideas with others.*	Graduates lack the skills to work in teams and find it difficult to collaborate or share ideas.
P5	Adaptation Skills with New Technology	*When new technology comes uhh, it seems like a struggle to catch up.*	Graduates find it difficult to adapt to new technological developments in the industry.

Table 3 shows a significant impact on the productivity and effectiveness of company operations. The lack of practical skills, communication skills, problem-solving, teamwork, and adaptation to new technologies complicates the decision of employers to hire graduates in their companies. Meanwhile, the impact of lack of skills on graduate job opportunities is shown in the inability of graduates to work productively and contribute to the achievement of the company's goals. The lack of relevant skills in industry and practical experience in critical technical fields is further explained through graduates' weaknesses in solving technical problems, working in teams, and adapting to new technologies. Failure to have these skills leads to decreased productivity and potential losses for companies, explaining the urgent need for educational programs that are more relevant to the needs of the industry.

Table 3: How Does This Lack of Skills Affect Your Decision To Hire Electronic Engineering Graduates To Work In Your Company?

Participant (P)	Theme	Quotes	Interpretation/remark
P1	Lack of Practical Skills	*Work that should be completed in one day, mmm, can take two or three days because graduates are not competent.*	Lack of practical skills leads to decreased productivity and delays in company operations.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

P2	Lack of Communication Skills	*If communication is not good mmm, it's hard to coordinate work. Work must be redone.*	Lack of communication skills leads to misunderstandings, duplication of work, and decreased productivity.
P3	Lack of Problem-Solving Skills	*When you don't have problem-solving skills, aa, this can slow down your work.*	Lack of problem-solving skills slows down the work and operations of the company.
P4	Lack of Teamwork Skills	*If you can't work in a team, hmm, it's hard to reach the company's target.*	Lack of teamwork skills reduces cooperation and affects the achievement of company targets.
P5	Lack of Adaptation Skills with New Technology	*When new technology comes, ehh, it seems like a struggle to catch up.*	The lack of adaptation skills with new technology causes delays in the work process and affects the company's bottom line.

The findings in Table 4 show the recommended measures to increase the marketability of electronic engineering graduates in Malaysia, which are closely related to the industry's need for critical skills. The addition of practical training, collaboration with industry, more extensive industrial training programs, curriculum flexibility, and an emphasis on soft skills are all important in ensuring graduates have relevant skills. The factors that influence students' readiness to enter the job market can be seen through the need for real-world exposure and more intensive practical skills training. On the other hand, the lack of certain skills affects the job opportunities of graduates, which is also clearly related to the issue of lack of practical experience in critical technical fields, as stated in the research problem. A lack of industry collaboration and a less flexible curriculum limit graduates' opportunities to acquire up-to-date skills, thus making it difficult for them to meet the needs of employers. Therefore, closer involvement with the industry and adaptation of the curriculum is important to enable graduates to be prepared with skills that align with the needs of the electronics industry.

Table 4: What Steps Can Higher Education Institutions Take to Improve The Employability Of Electronic Engineering Graduates, Based On The Current Needs Of The Industry?

Participant (P)	Theme	Quotes	Interpretation/remark
P1	Addition of Practical Training	*Mmm, the institution should add practical training because the industry needs strong hands-on skills.*	More practical training is needed to meet the industry's need for students' hands-on skills.
P2	Cooperation with Industry	*Aa, I think institutions should involve more industries in the curriculum, mmm, for real-world exposure.*	There should be more collaboration with industry through real-world projects to provide early exposure to students.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

P3	Wider Internship Program	*Emm, maybe there should be more internships or attachments mmm, before they graduate.*	A more extensive internship or attachment program is needed to give students real work experience before graduation.
P4	Curriculum Flexibility	*Mmm, the curriculum has to be flexible and err, quickly updated according to the latest technology.*	The curriculum needs to be more flexible and constantly updated according to the latest technological developments.
P5	Emphasis on Soft Skills	*Aa, students need to focus more on soft skills, mmm, such as communication and leadership.*	Soft skills such as communication and leadership need to be given more emphasis in the curriculum to equip students to face the world of work.

All four tables presented analysed participants' responses to interview questions, with emphasis on key themes such as technical skills, communication ability, technology adaptation, and problem-solving. Each participant provided a coherent view, with some differences in priorities, reflecting the diversity of their experience and industry backgrounds. Quotes taken from the participants show the urgent need for graduates who are better prepared to face the industry's challenges. At the same time, interpretations from their responses emphasise the importance of a stronger connection between the educational curriculum and current industry needs. This analysis helps formulate a relevant academic model to close the skills gap.

This study suggests some improvement steps that should be done by educational institutions to increase the marketability of electrical and electronic engineering graduates. By introducing more practical training, strengthening cooperation with industry, expanding internship programs, adapting the curriculum to technological changes, and emphasizing soft skills, educational institutions can produce graduates who are better prepared to face the challenges of modern industry.

Discussion

The findings of this study emphasise some important requirements that educational institutions should pay attention to to improve the marketability of electrical and electronic engineering graduates. Based on the interviews conducted, several key issues have been identified, especially related to practical preparation and exposure of graduates to the real needs of the industry. One participant stated, "Mmm... I think many of these graduates are weak in practicals. When they enter the industry, they don't seem to know how to work with the tools available here." This statement reflects the general view that sufficient practical training has not been given to students at the university level, leaving them less skilled when entering the world of work. Most graduates do not have the ability to develop professional and practical skills due to the lack of adequate training channels and a lack of attention to pre-employment training (R. Wang, 2020).

The need for closer cooperation between educational institutions and industry was also emphasised. Another participant said, "Hmm... if you ask me, the most important thing is the collaboration between the university and the industry. For them, exposure to the real world means they know what is needed." This shows how important it is for educational institutions

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

to involve industry in the learning process, such as through projects based on real situations or structured industrial training programs. According to Okolie *et al.* (2020), industry involvement in adapting the curriculum is very important to be in line with current standards and requirements. This includes updating course content to reflect the latest technological advances and practices in the industry (Okolie *et al.*, 2020).

In addition to technical skills, soft skills are also recognised as important elements that are often overlooked. Meanwhile, technical aspects are at the core of engineering education, and soft skills such as communication and teamwork are also needed to ensure that graduates can function well in the work environment. One of the participants stated that graduates with strong, soft skills are often more adaptable and learn the technical skills required when in a real work environment. "Ehhh... for me, if the graduate has good soft skills, I'm not too worried about his technical skills. Because those technical skills can be learned on the job, but if he doesn't have soft skills, it's a little difficult," he said. This shows that while technical skills are important, soft skills can be the determining factor for a graduate's success in industry. Employers often prioritise soft skills over technical skills when hiring, as these skills are important to adapt to changes in the job market (Succi & Canovi, 2020).

The findings also show that educational institutions need to put more emphasis on practical training, strengthen collaboration with industry, and ensure the development of soft skills among students. Although there is a view that soft skills may be more important than technical skills in some circumstances, it is important for educational institutions to balance these two aspects. With a more dynamic and relevant approach, electrical and electronic engineering graduates will be better prepared to face the challenges of modern industry and increase their marketability in the job market. This also means that the curriculum needs to be constantly renewed and adapted to the changing needs of the industry to ensure that the graduates produced are truly prepared to contribute to the growth and success of the industry.

Conclusion

The conclusion of this study emphasises some key findings that are important in understanding the issue of the marketability of electrical and electronic engineering graduates in Malaysia. This study found that graduates often lack the practical and soft skills required by the industry. This shortage is due to the lack of practical exposure at universities and training that does not meet current industry needs. The findings of this study clearly show that there is an urgent need to strengthen the practical elements in the engineering education curriculum, in addition to improving soft skills that can help graduates adapt to the needs of the industry. Traditional university skills training models must struggle to meet the growing demand for innovative and practical talent in new engineering (Zhou *et al.*, 2023).

The discussion about this finding also relates the results of the study to the objectives that have been set. The objective of this study, which is to identify the factors contributing to the lack of skills among graduates and analyse their impact on their marketability, has been achieved through an in-depth analysis of the data obtained. A key theme emerging from this analysis is the need to increase collaboration between educational institutions and industry, as well as ensure that relevant practical training is provided to students while they are still at university.

Overall, this study makes a significant contribution to the field of engineering education and training in Malaysia. By emphasising the balance between technical and soft skills, this study suggests that universities and industry work closely together to ensure that the graduates

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

produced are more prepared and competitive in the job market. The measures proposed in this study are expected to increase the marketability of graduates and further make a greater contribution to the development of the electrical and electronic engineering industry in this country.

The academic model that has been produced in the form of the given diagram illustrates a process or cycle involving five main components, as shown in Figure 1 below. The five components surrounding the central component can be seen as important aspects that support the development of these critical skills. Each component represents factors such as Curriculum, Practical Training, Industry Engagement, Project Based Teaching and Continuous Assessment. All these factors play an important role in ensuring that graduates have the skills required by the industry. Each of these components is connected through arrows that show a linear or sequential relationship with each other, reflecting a dynamic and iterative process.

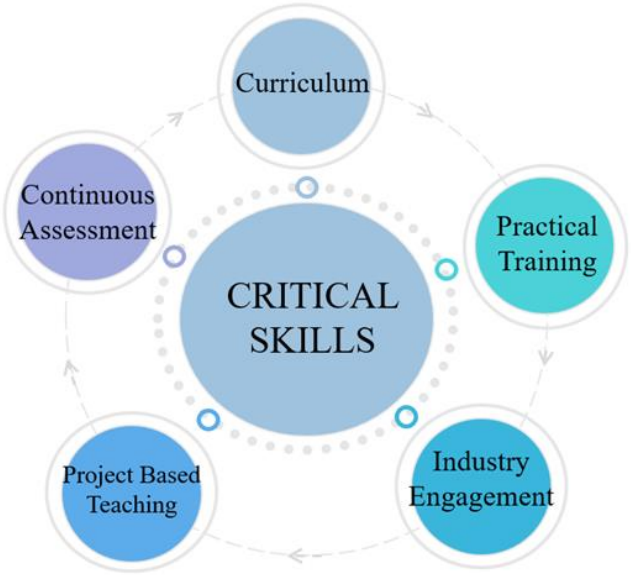

Figure 1: Academic Model of Solution.

This model is designed to address the issue of critical skills shortages by integrating various important elements in engineering education. Each component contributes to the achievement of the main goal, which is to improve graduates' critical skills relevant to industry needs. In this model, the active role of educational institutions, collaboration with industry, and emphasis on practical training are key to solving the problems identified in the study. With this continuous cycle in place, this model proposes a holistic approach where each element works together to ensure that graduates not only have strong theoretical knowledge but also the practical skills needed to compete in the job market. This is directly related to the study's objective to identify and overcome critical skills shortages among engineering graduates.

Through the application of this model, educational institutions can improve their approach to training graduates and further contribute to the development of a workforce that is more competitive and in line with industry needs.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

Acknowledgements

I would like to express my deepest gratitude to my mother, my husband, and my children, who have always provided moral support throughout the course of this research. Many thanks to my supervisor and co-supervisor, who provided valuable guidance and direction. I would also like to thank Universiti Teknologi Malaysia as the institution where I gained knowledge, as well as my employer, Majlis Amanah Rakyat, who has given me the opportunity and support to complete this study. Finally, thank you to everyone who helped me write this.

References

Aliu, J., Aigbavboa, C., & Thwala, W. (2019). Role of industry employers in fostering employability skills. *ISEC 2019 - 10th International Structural Engineering and Construction Conference*, 1–6. https://doi.org/10.14455/isec.res.2019.145

Arif, A., Mir, T. T., & Gul, F. (2023). IDENTIFYING ESSENTIAL EMPLOYABILITY SKILLS FOR NEW GRADUATE TEACHERS: SCHOOL EMPLOYERS' PERSPECTIVES. *Pakistan Journal of Social Research*. https://doi.org/10.52567/pjsr.v5i02.1222

Arthur-Mensah, N. (2020). Bridging the industry–education skills gap for human resource development. *Industrial and Commercial Training*, *52*(2), 93–103. https://doi.org/10.1108/ICT-11-2019-0105

Ashour, H. A. (2023). An Approach of Skill-Based Education for Industry-Ready Electrical Engineers: Power Electronics Course as A Case Study. *IEEE Conference on Power Electronics and Renewable Energy, CPERE 2023*, 1–6. https://doi.org/10.1109/CPERE56564.2023.10119647

Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *Qualitative Report*, *21*(5), 811–831. https://doi.org/10.46743/2160-3715/2016.2337

Creswell, J. W., & Creswell, J. D. (2023). Research Design Qualitative, Quantitative and Mixed Methods Approaches. In *SAGE Publications*. http://repo.iain-tulungagung.ac.id/5510/5/BAB 2.pdf

Crosta, L., & Banda, V. (2022). Are young graduates ready for the job market of the future? *GiLE Journal of Skills Development*. https://doi.org/10.52398/gjsd.2022.v2.i1.pp26-43

Damoah, O. B., Peprah, A., & Brefo, K. O. (2021). Does higher education equip graduate students with the employability skills employers require? The perceptions of employers in Ghana. *Journal of Further and Higher Education*, *45*, 1311–1324. https://doi.org/10.1080/0309877X.2020.1860204

Dobslaw, F., Angelin, K., Öberg, L.-M., & Ahmad, A. (2023). The Gap between Higher Education and the Software Industry — A Case Study on Technology Differences. *Proceedings of the 5th European Conference on Software Engineering Education*. https://doi.org/10.1145/3593663.3593690

Ezika, I. J. F., Olayemi, M., & Orji, C. T. (2022). Career Progression of Electronic Engineering Graduates: A Study of LinkedIn Career Profiles. *2022 5th Information Technology for Education and Development (ITED)*, 1–6. https://doi.org/10.1109/ITED56637.2022.10051612

Fouzia, M. (2022). More than technical experts: Engineering professionals' perspectives on the role of soft skills in their practice. *Industry and Higher Education*, *36*(3). https://doi.org/https://doi.org/10.1177/09504222211034725

Garousi, V., Giray, G., Tüzün, E., Catal, C., & Felderer, M. (2019). Aligning software engineering education with industrial needs: A meta-analysis. *Journal of Systems and Software*, *156*, 65–83. https://doi.org/10.1016/j.jss.2019.06.044

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021
Hashim, N., & Abdullah, M. F. (2021). Technical Efficiency (TE) in Malaysia Electric and Electronic Manufacturing Industry: A Stochastic Frontier Analysis (SFA) Approach. *Global Conference on Business and Social Sciences Proceeding*, *12*(1), 98–98. https://doi.org/10.35609/gcbssproceeding.2021.12(98)

Holidi, N. A., & Abu Seman, N. A. (2023). A Study of Employability Skills: From the Employers and Youth Perspective. *Journal of International Business, Economics and Entrepreneurship*, *8*(1). https://doi.org/10.24191/jibe.v8i1.23141

Ibrahim, A., & Mat Nashir, I. (2022). Demand-supply Mismatch in TVET Academic Programmes: What Is It and What Should It Be? *Journal of Technical Education and Training*, *14*(2). https://doi.org/10.30880/jtet.2022.14.02.016

Kamarova, T. (2021). NECESSARY COMPETENCES OF STUDENTS AND UNIVERSITY GRADUATES FOR SUCCESSFUL EMPLOYMENT. *Vektor Nauki Tol'yattinskogo Gosudarstvennogo Universiteta. Seriya Ekonomika i Upravlenie*. https://doi.org/10.18323/2221-5689-2021-4-25-35

Manta, L. F., Cojocaru, D., Abagiu, M., Mariniuc, A., & Dragomir, A. (2023). Developing a New Course "Mechatronics in Automotive" in Collaboration with Companies with Experience in the Field. *2023 32nd Annual Conference of the European Association for Education in Electrical and Information Engineering (EAEEIE)*, 1–6. https://doi.org/10.23919/EAEEIE55804.2023.10181533

Md Saleh, S. N. H., Jamaluddin, K. A., & Hamzah, I. (2023). Curriculum Changes in Vocational Colleges: Effects and Improvement Suggestions for Effective Implementation. *Advanced Journal of Technical and Vocational Education*, *7*(1), 23–28. https://doi.org/10.26666/rmp.ajtve.2023.1.4

Mwita, K. (2022). Strengths and weaknesses of qualitative research in social science studies. *SSRN Electronic Journal*, *11*(6), 618–625. https://doi.org/10.2139/ssrn.4880484

Nadeem, M. A., Sher, D. F., & Liaqat, S. (2023). Perception of Employers about the Employability Skills of Fresh Graduates: A Case Study of Distt. Lahore, Punjab, Pakistan. *Contemporary Issues in Social Sciences and Management Practices*. https://doi.org/10.61503/cissmp.v2i3.52

Okolie, U. C., Nwajiuba, C., Eneje, B., Binuomote, M. O., Ehiobuche, C., & Hack-Polay, D. (2020). A critical perspective on industry involvement in higher education learning: Enhancing graduates' knowledge and skills for job creation in Nigeria. *Industry and Higher Education*, *35*, 61–72. https://doi.org/10.1177/0950422220919655

Sahin, Y., & Celikkan, U. (2020). Information Technology Asymmetry and Gaps Between Higher Education Institutions and Industry. *J. Inf. Technol. Educ. Res.*, *19*, 339–365. https://doi.org/10.28945/4553

Sánchez-Cifo, M. A., Bermejo, P., & Navarro, E. (2023). DevOps: Is there a gap between education and industry? *Journal of Software: Evolution and Process*, *35*. https://doi.org/10.1002/smr.2534

Sharma, S. K., Mudgal, S. K., Gaur, R., Chaturvedi, J., Rulaniya, S., & Sharma, P. (2024). *Navigating Sample Size Estimation for Qualitative Research*. 133–139. https://doi.org/10.4103/JME.JME

Soundararajan, G., Ravikumar, A., & Aro-Gordon, S. O. (2020). EMPLOYERS PERCEPTION ON GRADUATE SKILL DEFICIENCY TO SUIT PRODUCTIVITY. *Humanities and Social Sciences*, *8*, 1415–1421. https://doi.org/10.18510/hssr.2020.83142

Succi, C., & Canovi, M. (2020). Soft skills to enhance graduate employability: comparing students and employers' perceptions. *Studies in Higher Education*, *45*, 1834–1847. https://doi.org/10.1080/03075079.2019.1585420

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 22 (December 2024) PP. 291-305
DOI 10.35631/AIJBES.622021

Wang, R. (2020). A Study on the Cultivation of Practical Teaching Ability for Normal University Students Based on the Perspective of Core Literacy A Study on the Cultivation of Practical Teaching Ability for Normal University Students Based on the Perspective of Core. *Journal of Physics: Conference Series*. https://doi.org/https://doi.org/10.1088/1742-6596/1578/1/012151

Wang, Z., & Huang, S. (2018). Research on Postgraduate Training Mode of Electronic Information Specialty Degree. *Proceedings of the 2018 8th International Conference on Management, Education and Information (MEICI 2018)*. https://doi.org/10.2991/meici-18.2018.183

Zhou, H., Kuang, T., Liu, H., & Ma, X. (2023). Research on Industry-Education Integration Training of Practical Innovation Talents in "New Engineering" — A Case Study of Materials Science and Engineering Major. *Journal of Higher Education Research*, *4*(3), 85. https://doi.org/10.32629/jher.v4i3.1252