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Skills of future workforce: skills gap based on perspectives from academicians and industry players

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ABSTRACT

Apart from having specific knowledge, graduates are expected to possess a set of soft and hard skills to be employed. This study aims to identify soft and hard skills relevant to the future workforce in the electrical and electronic (E&E) industry based on two perspectives; academicians from public higher education institution (HEI) and E&E industry players. Further, the study aims to investigate skills gaps between two stakeholders. A total of 50 academicians and 31 industry players in Malaysia were surveyed using a structured questionnaire. Statistical analysis was performed using an independent t-test. In terms of soft skills, analytical thinking skills, communication skills, and discipline were more perceived by academicians, whereas decision-making skills, teamwork skills, and discipline were more favored by industry players. For hard skills, both players favored technology use, except for organizational capabilities which were perceived more by academicians while troubleshooting was favored more by industry players. This study contributes to the collaboration between public HEI and the E&E industry to address the skills gaps, which will benefit all stakeholders. This study focuses on the skills that are perceived more by both stakeholders.

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1. INTRODUCTION

Soft skills are fundamental characteristics that should be instilled by an individual from a young age. Furthermore, soft skills are strongly associated with graduates' future careers [1]. Soft skills refer to the abilities or features relating to behavioral personality or character in everyday life [2]. Soft skills can be defined as knowledge in the human mind and very personal [3]. Meanwhile, Ahmad [4] defined soft skills as embedded in experiences and actions, which include value, idealism, and emotions. In addition, soft skills are related to the various types and capabilities that are considered important in preparing for work [4]. According to Ritter *et al*. [5], soft skills defined as interpersonal skills that are associated with emotional intelligence, whereas Qizi [6] opined those soft skills are personal qualities that permit an individual to cooperate effectively and harmoniously with others.

Communication skills, thinking skills, creativity, leadership skills, problem-solving skills, management skills, lifelong learning skills, and teamwork skills are typical examples of soft skills [7]. Meanwhile, employers value critical thinking skills, flexibility or adaptability, ability to work in a team or group, ability to work independently, time management and multitasking as compared to the higher education

institution (HEIs) [8]. Soft skills were also described as complementary to hard skills, which encompass capabilities and learning outcomes of operational procedures or practical tasks [9]. This has been supported by Chan *et al.* [10] in which soft skills refer to a form of non-technical ability to be possessed by every individual working in the industrial field. Soft skills are vital as hard skills. Soft skills lead to the mastery of a person in a skill focused on the development of personal skills, personality and humanity [11]. The development process of soft skills occurs during learning either within or outside the campus and at the workplace [12]. Based on the definitions developed by previous research, it can be concluded soft skills are related to the ability, knowledge and capabilities of an individual. This study defines soft skills as abilities relating to individuals' characteristics and behavior in everyday life in the era of Industry 4.0.

Other than soft skills, students also need to equip themselves with hard skills. There are various definitions of hard skills. Hard skills are related to the ability to use specialized tools, procedures and techniques [4]. Hard skills are the abilities to deploy and generate specific knowledge and skills in a real context and work [12]. It reflects an individual's group of skills and abilities that enable him or her to execute a specific task or activity [6]. Some researchers posited that hard skills can be created, written and transferred between companies [13]. Nevertheless, Azmi *et al.* [9] defined hard skills as the skills that are more specific, teachable, and commonly linked to professional knowledge, techniques or tools within a profession, including technical or administrative procedures related to the core business of an organization. This definition was also supported by Yaakob *et al.* [11], whereby hard skills refer to the ability to understand a particular activity efficiently, particularly those involving methods, processes, procedures, and techniques.

Hard skills can also be defined as the ability to successfully execute a given task, which necessitates special knowledge, competence or ability [11]. These scholars also described hard skills as an art-a technique gained via experience or training which specifically includes the use of limbs. Aligning with this position, Ritter *et al.* [5] posited that hard skills encapsulate the knowledge that could be gained from experience or in the classroom, with intelligence being the main typical concept that underlines its proficiency. A prior study by Kenayathulla *et al.* [14] revealed that employers demand business graduates to have a sufficient level of technical skills. Hence, hard skills are needed for graduates nowadays given that the industries use high technology that requires the workforce to handle the technology successfully. This study defined hard skills as the ability related to hands-on job which requires knowledge in and beyond the classroom, thus aligning with the era of industry 4.0.

High-skilled workforce plays a crucial role in the growth of Malaysia's electrical and electronic (E&E) industry and for the country to achieve a developed status. In doing so, Malaysia needs to restructure the workforce by emphasizing future workforce with appropriate skills [14]. Communication skills, teamwork skills, and digital skills are important and may differ between industries [15]. Unfortunately, the difference between what the industry expects and how the HEI prepare the graduates somehow causes an issue of skill gap. This issue, especially when unresolved, leads to the rise in the unemployment rate among graduates [16]. For instance, Tan *et al.* [17] adopted qualitative inquiry in exploring the expectations of the industry experts and academicians on fresh graduates' skills. Resultantly, graduates were expected to possess five soft skills for them to secure future employment. These skills were listed in terms of priority or preference as problem-solving and critical thinking, communication skills, lifelong learning, teamwork, and independence. Meanwhile, industry experts have different expectations as they urged graduates to polish their analytical skills as compared to lifelong learning.

It is undisputable that both soft skills and hard skills are important for graduates' future career as these skills allow them to perform a given task effectively [1]. Furthermore, the skills and knowledge needed by the graduates can be obtained from HEIs. In addition, the jobs created with new positions and new job descriptions produced by the industries require additional requirements and the need to develop knowledge and skills [18]. Therefore, HEIs are responsible to produce graduates with the appropriate skills [19]. In fact, a high number of graduates are produced annually by HEI. As mentioned by Ministry of Higher Education (MOHE) [20] in the report of the Graduates Tracer Study, the number of graduates produced from 2015 to 2019 depicts an increasing trend in both public and private HEIs. Even though there is a growing number of graduates produced by HEI, prospective employers still facing with difficulty to recruit new employees, mainly among fresh graduates.

However, at present, employers still keep complaining regarding issue of skills gap among workers in Malaysia [21], [22]. This skills gap is due to lack in certain skills demanded by the employees [23]. A study conducted by Hanapi *et al.* [24] reported a gap in soft skills between community college graduates in the electrical field and employers in the industry. A total of 103 industry players and 162 graduates of community college in the electrical field participated in the survey. The researchers found a significant gap in soft skills, including communication skills, information management skills, self-management skills, ethics and professionalism, leadership skills, and teamwork skills. All the listed soft skills were suggested by the industry to be implemented in the teaching and learning process.

In a recent study by Nadarajah [21], graduates were reported to be more competent in information and communications technology (ICT) skills. Interestingly, the job market skills required by the industry recorded the least percentage for the ICT skill. According to the researcher, the ICT skill entails the use of email, PowerPoint, mobile phone services, preparing the reports, and utilizing the internet for data collection. On the other hand, Patacsil and Tablatin [25] stated that information technology (IT) students and industry ranked the same in terms of ICT skills, which include knowledge of standard software applications, computer hardware and networking. Not only that, but they also revealed that in terms of hard skills, the highest skill gap between IT students and industry occurred in design skills and programming skills related to programming languages. These findings reflect that the industry emphasized document processing and hardware operation and maintenance skills. Further, the prospective employers claimed that fresh graduates were lacking with required skills related to the job [26], [27]. Despite of positive declined in graduate unemployment rate from 4.4% in 2020 to 4.1% in 2020, yet, there is an increased in semi-skilled and low-skilled job categories in the labor market from 31.2% in 2020 to 33.9% in 2021 [28].

A rise of industry 4.0 complicates and adds impact to future workforce. The industry 4.0 will change the nature of work as well as skills demanded in future with the replacement of automation and robots. The present world is undergoing a rapid transformation due to advanced technology as depicted by the fourth industrial revolution, which is also known as industry 4.0. This everchanging transformation has a significant impact on human lives. Likewise, the industrial revolution has intensified the diverse ways of teaching and learning in the HEI to a certain degree [29].

In order to overcome the impact of technology, the MOHE has introduced education 4.0 that aligned with industry 4.0 [20]. Due to the advanced technology used in industry 4.0, industries such as manufacturing have also applied the technology in their industry. The manufacturing industry, especially the electrical and electronic (E&E) industry, demands skills that align with business needs. The skills set possessed by graduates has become one of the tickets for them to secure employment in their careers. Hence, the HEI and the industry itself need to work together in producing graduates possessing the latest skills in line with the demands of the industry 4.0 era [30]. Eventually, this collaboration also assists both stakeholders in further reducing the skills gap. Other than education 4.0 initiatives, collaboration between the stakeholders can be implemented through industrial training. Such training able to expose students with the real workplace [31].

Besides, one of the efforts taken by the MOHE is the launching of the National Graduate Employability Blueprint 2012-2017. One of the aim under this blueprint is to overcome the issues related to skills mismatch and deficiency [32]. From the point of view of Mustafa [33], the need for collaboration between the industry and HEI is highlighted in the Malaysia Education Blueprint 2015-2025. For example, it encompasses apprenticeships, real life simulations, hands-on training, and specialized employer training programmers. Other than that, the benefits could be enhanced through research and innovations through joint research projects, commercialized products and improved teaching and learning systems by engaging the industry players. It will benefit the students in terms of acquiring skills and better knowledge. In short, the collaboration between both stakeholders is one of the successful ways to close the loopholes in terms of the skills gap between the stakeholders.

Based on the issues and review, it serves an alarm for the present study to examine both soft skills and hard skills based on the perspectives of academicians and industry players. Further, it also aims to explore the skills gap between these two stakeholders in order to align with the demand and supply of the industry players and HEI. The findings of this study provide benefits in the aspect of empirical and practical implications. Empirically, the findings of this study contributed in terms of body of knowledge. The novelty of this research with regards to its method and gap analysis will contribute to the body of knowledge pertaining to skill gaps between the two stakeholders. Practically, by understanding skills that required in future, all stakeholders (student, academicians and industry players) able to have planning in meeting with the required skills. It also helps to support governments' policies created in every area of the stakeholders.

2. RESEARCH METHOD

The research objectives were executed by conducting an online survey, which involved a total of 50 academicians from public higher education institutions and 31 respondents from electrical and electronic industry players in Malaysia. The questionnaire was designed in three sections in which section A focused on the soft skills, section B on the hard skills, and section C contained items relating to respondents' demographic information. A descriptive questionnaire was planned and utilized to document the importance of soft skills and hard skills needed for the graduates, as well as the skills gaps based on the perceptions of academicians from public HEIs and E&E industry players. Overall, 28 soft skills and 10 hard skills were included in the questionnaire.

The categories included in the soft skills were cognitive skills, interpersonal skills and personal skills. Meanwhile, only two categories of hard skills (digital skills and technical skills) were considered in the survey. The items were assessed using a 10-point Likert scale of level of importance. All the collected data were analyzed by using descriptive analysis and an independent t-test. These analyses assisted in identifying the level of importance of both soft skills, as well as the skills gap between both stakeholders.

3. RESULTS AND DISCUSSION

A total of 50 academicians and 31 industry players completed the survey. The researcher only managed to gather 81 usable questionnaires. As expected, female respondents dominated the sample in terms of academician profiles as compared to male respondents. In contrast, the industry players were dominated by males as compared to females. Malay respondents recorded the highest number of respondents for both stakeholders. In terms of age, most respondents were between 31 and 40 years old as academicians while industry players were between 25 to 30 years old.

In terms of academic discipline, most of the respondents belong to the social science discipline, followed by science and technology. The majority of respondents were under grade DS51/DS52, and most of the respondents claimed that they were experienced in developing academic programs at the undergraduate level. For the industry players, most respondents were working in the technical department as compared to the administration, production and operations departments. Most of the respondents had less than five years of working experience in the industry. Furthermore, they were also working in large companies having at least a total of 201 employees.

Tables 1 and 2 depict the subcategories of cognitive skills, interpersonal skills, and personal skills. Table 1 represents the soft skills based on the academicians' perceptions. Under cognitive skills, analytical skills are recorded as the most important skills as compared to other skills such as decision-making, creative thinking and critical thinking skills. Besides, in the interpersonal skills, 11 soft skills were included with communication skills documented as the most important by the academicians of the public HEIs (μ=9.20, σ=0.904). This was followed by teamwork skills and agility and adaptability skills (μ=9.06, σ=1.058). On the other hand, a total of 12 subskills were recorded in the personal skills category. This category revealed that discipline is the most important, followed by time management and ethics and professionalism.

Table 1. Academicians' perception of soft skills

No.	Soft skills	Mean (μ)	SD (σ)	Description	Rank according to importance by category
1.	Cognitive skills				
	Analytical thinking skills	9.06	0.843	Most important	1
	Creative thinking skills	8.76	1.061	Most important	4
	Critical thinking skills	8.96	0.968	Most important	3
	Decision-making skills	9.02	.915	Most important	2
	Innovative thinking skills	8.56	1.264	Most important	5
	Problem-solving/complex problem-solving skills	8.96	1.068	Most important	3
2	Interpersonal skills				
	Agility and adaptability skills	8.86	1.050	Most important	3
	Autonomous leadership skills	8.46	1.147	Most important	8
	Communication skills	9.20	.904	Most important	1
	Coordinating with others/coordination skills	8.82	.962	Most important	4
	Emotional Intelligence	8.64	1.467	Most important	6
	Flexibility skills	8.70	1.055	Most important	5
	Intercultural skills	8.22	1.298	Most important	10
	Negotiation skills	8.46	1.403	Most important	8
	Networking skills	8.56	1.248	Most important	7
	Project management skills	8.42	1.326	Most important	9
	Teamwork skills	9.06	1.058	Most important	2
3.	Personal skills				
	Discipline	9.14	1.050	Most important	1
	Driving and managing to change	8.66	1.189	Most important	7
	Entrepreneurial skills	7.76	1.393	Important	12
	Ethics and professionalism	9.04	1.087	Most important	3
	Language proficiency	7.90	1.460	Important	11
	Lifelong learning	8.18	1.637	Most important	10
	Proactive	8.46	1.313	Most important	9
	Responsibility	9.00	1.069	Most important	4
	Self-development	8.52	1.129	Most important	8
	Self-management	8.76	1.041	Most important	6
	Stress management	8.82	1.137	Most important	5
	Time management	9.10	1.055	Most important	2

Table 2 depicts the results of soft skills based on electrical and electronic industry players. The cognitive skills category recorded decision-making skills as the most important skills in the industry. This is followed by analytical thinking skills and problem-solving or complex problem-solving skills. This category consists of six subskills. However, 11 subskills were included in the interpersonal skills category in which teamwork skills were recorded as the most important (μ=8.97, σ=0.912). Meanwhile, communication skills were documented as the second most important skill based on industry players' perceptions (μ=8.55, σ=1.362). In addition, for the personal skills category, 12 subskills were included such as discipline, driving and managing to change and entrepreneurial skills. In this category, discipline was recorded as the most important skill, followed by responsibility, time management, ethics and professionalism and driving and managing to change.

In conducting the survey, two categories were included for hard skills; digital skills and technical skills. The digital skills comprised three subskills: ICT literacy, new media literacy, and technology use. On the other hand, seven subskills were included in the technical skills category; coding and programming skills, data analytics, design skills, organizational capabilities, research skills, troubleshooting, and writing skills.

Table 2. Industry players' perception of soft skills

No.	Soft skills	Mean (μ)	SD (σ)	Description	Rank according to importance by category
1.	Cognitive skills				
	Analytical thinking skills	8.55	1.179	Most important	2
	Creative thinking skills	8.52	1.061	Most important	3
	Critical thinking skills	8.48	1.208	Most important	4
	Decision-making skills	8.61	1.334	Most important	1
	Innovative thinking skills	8.23	1.499	Most important	5
	Problem-solving/complex problem-solving skills	8.52	1.313	Most important	3
2.	Interpersonal skills				
	Agility and adaptability skills	8.42	1.089	Most important	5
	Autonomous leadership skills	8.45	1.028	Most important	4
	Communication skills	8.55	1.362	Most important	2
	Coordinating with others /coordination skills	8.52	1.092	Most important	3
	Emotional Intelligence	8.42	.992	Most important	5
	Flexibility skills	8.13	1.088	Most important	7
	Intercultural skills	8.00	1.291	Most important	8
	Negotiation skills	8.26	1.154	Most important	6
	Networking skills	8.52	1.180	Most important	3
	Project management skills	8.55	1.150	Most important	2
	Teamwork skills	8.97	.912	Most important	1
3.	Personal skills				
	Discipline	8.90	1.044	Most important	1
	Driving and managing to change	8.48	1.092	Most important	5
	Entrepreneurial skills	8.19	1.250	Most important	10
	Ethics and professionalism	8.52	1.180	Most important	4
	Language proficiency	7.48	1.768	Important	12
	Lifelong learning	7.87	1.455	Important	11
	Proactive	8.26	1.064	Most important	9
	Responsibility	8.68	.945	Most important	2
	Self-development	8.42	1.148	Most important	7
	Self-management	8.45	1.179	Most important	6
	Stress management	8.39	1.606	Most important	8
	Time management	8.55	1.457	Most important	3

Table 3 depicts the result of hard skills based on academicians' perceptions. The academicians perceived that all hard skills were the most important except for coding and programming skills which were recorded as only important for the future workforce in the industry. For the first category of digital skills, technology use was ranked first (μ=8.80, σ=1.143), followed by ICT literacy skills (μ=8.76, σ=0.960), and new media literacy (μ=8.42, σ=1.052). On the second category of technical skills, the first rank was organizational capabilities (μ=8.50, σ=1.266), followed by data analytics (μ=8.38, σ=1.308), and troubleshooting (μ=8.38, σ=1.227). Meanwhile, only coding and programming skill (μ=7.87, σ=1.453) was considered important skill, which indicated that these skills were less important compared to other hard skills. The present results reflect that the academicians perceived technology use and organizational capabilities skills as more important.

The results of industry players' perceptions are presented in Table 4. Digital skills comprise skills such as technology use, which was recorded as the most important (μ=8.39, σ=1.667), followed by ICT literacy skills (μ=8.06, σ=1.652) and new media literacy skills (μ=8.03, σ=1.426). For the technical skills,

troubleshooting skills were documented as the most important (μ=8.42, σ=1.523), followed by data analytics (μ=8.35, σ=1.704) and writing skills on the third rank (μ=8.23, σ=1.334). Out of seven skills, the coding and programming skills were recorded as the less perceived by the industry players with a mean of 7.77 and a standard deviation of 1.978. These results indicate that the industry players perceived technology use and troubleshooting as most important for both categories. However, new media literacy and coding and programming skills research skills were ranked fifth.

Table 3. Academicians' perception of hard skills

No.	Hard skills	Mean (μ)	SD (σ)	Description	Rank according to importance by category
1.	Digital skills				
	ICT literacy	8.76	.960	Most important	2
	New media literacy	8.42	1.052	Most important	3
	Technology use	8.80	1.143	Most important	1
2.	Technical skills				
	Coding and programming skills	7.82	1.453	Important	6
	Data analytics	8.38	1.308	Most important	2
	Design skills	8.06	1.346	Most important	5
	Organizational capabilities	8.50	1.266	Most important	1
	Research skills	8.14	1.370	Most important	4
	Troubleshooting	8.38	1.227	Most important	2
	Writing skills	8.16	1.167	Most important	3

Table 4. Industry players' perception of hard skills

No.	Hard skills	Mean (μ)	SD (σ)	Description	Rank according to importance by category
1.	Digital skills				
	ICT literacy	8.06	1.652	Most important	2
	New media literacy	8.03	1.426	Most important	3
	Technology use	8.39	1.667	Most important	1
2.	Technical skills				
	Coding and programming skills	7.77	1.978	Important	7
	Data analytics	8.35	1.704	Most important	2
	Design skills	7.90	1.758	Important	6
	Organizational capabilities	8.13	1.408	Most important	4
	Research skills	8.06	1.504	Most important	5
	Troubleshooting	8.42	1.523	Most important	1
	Writing skills	8.23	1.334	Most important	3

The second objective of this study was achieved by performing the independent t-test gap analysis. According to Patacsil and Tablatin [25], a higher mean gap score indicated more discrepancies between the academicians from public HEI and E&E industry players in terms of their perceptions of soft and hard skills. In addition, a positive result for a mean gap score indicated the skill was more important for industries, while academicians perceived skill as being of greater importance when the result exhibited a negative mean gap score. Accordingly, the mean differences between these two stakeholders were assessed by performing an independent sample t-test, which is also considered a parametric test.

In achieving the objective of this study, a soft skills gap analysis was conducted to examine the mean difference in soft skills as perceived by the two stakeholders, the academicians from public HEIs and E&E industry players. Overall, for the cognitive skills category, analytical thinking was favored more by academicians compared to industry players. In the interpersonal skills category, communication skills were more perceived by academicians, whereas teamwork skills were more favored by industry players. However, in terms of personal skills, discipline was the most favored by both stakeholders.

Table 5 reveals that the mean difference in the importance of soft skills ranged from -0.008 to 0.44. For the cognitive category, the lowest skills gap was recorded for creative thinking skills with a gap of -0.244 while analytical thinking skills exhibited the highest skills gap of -0.512. This result indicated a discrepancy in the perceptions of these two stakeholders regarding analytical thinking skills. However, both stakeholders almost agreed in terms of analytical thinking skills. Meanwhile, an independent sample t-test analysis revealed that there was a significant difference in analytical thinking skills. Furthermore, in the interpersonal skill category, project management skills exhibited the highest skill gaps. A positive mean difference implied that industry players tended to regard a skill more highly than academicians. Based on Table 5, only project management skills were rated higher by industry player than academicians as the result reflect a positive mean difference gap. The remaining subskills obtained a higher ranking by the industry players. Next, the finding in terms of personal skills indicates that entrepreneurial skills recorded the highest mean difference while the lowest mean difference gap was for time management skills.

Table 5. Gap analysis of soft skills

No.	Soft skills	Mean (μ)		Mean difference (Gap)	t	Sig.
		Academicians	Industry players			
1.	Cognitive skills					
	Analytical thinking skills	9.06	8.55	-0.512	-2.274	.026*
	Creative thinking skills	8.76	8.52	-0.244	-1.006	.318
	Critical thinking skills	8.96	8.48	-0.476	-1.955	.054
	Decision-making skills	9.02	8.61	-0.407	-1.630	.107
	Innovative thinking skills	8.56	8.23	-0.334	-1.076	.285
	Problem-solving/complex problem-solving skills	8.96	8.52	-0.444	-1.663	.100
2.	Interpersonal skills					
	Agility and adaptability skills	8.86	8.42	-0.441	-1.810	.074
	Autonomous leadership skills	8.46	8.45	-0.008	-0.33	.974
	Communication skills	9.20	8.55	-0.652	-2.590	.011*
	Coordinating with others/coordination skills	8.82	8.52	-0.302	-1.312	.193
	Emotional Intelligence	8.64	8.42	-0.221	-0.738	.463
	Flexibility skills	8.70	8.13	-0.571	-2.340	.022*
	Intercultural skills	8.22	8.00	-0.220	-0.743	.460
	Negotiation skills	8.46	8.26	-0.202	-0.672	.503
	Networking skills	8.56	8.52	-0.044	-0.157	.876
	Project management skills	8.42	8.55	0.128	0.445	.658
	Teamwork skills	9.06	8.97	-0.092	-0.402	.689
3.	Personal skills					
	Discipline	9.14	8.90	-0.237	-0.989	.326
	Driving and managing to change	8.66	8.48	-0.176	-0.668	.506
	Entrepreneurial skills	7.76	8.19	0.434	1.415	.161
	Ethics and professionalism	9.04	8.52	-0.524	-2.040	.045*
	Language proficiency	7.90	7.48	-0.416	-1.149	.254
	Lifelong learning	8.18	7.87	-0.309	-0.861	.392
	Proactive	8.46	8.26	-0.202	-0.722	.473
	Responsibility	9.00	8.68	-0.323	-1.379	.172
	Self-development	8.52	8.42	-0.101	-0.387	.699
	Self-management	8.76	8.45	-0.308	-1.232	.222
	Stress management	8.82	8.39	-0.433	-1.419	.160
	Time management	9.10	8.55	-0.552	-1.973	.052

**Significant at the 0.01 level (2-tailed); *Significant at the 0.05 level (2-tailed)

A hard skills gap analysis was measured by examining the mean difference between the perceptions of academicians and industry players relating to the importance of these skills for the future workforce in the manufacturing industry. The higher the mean difference score, the higher the gap or mismatch in those skills based on these two stakeholders' perceptions. The digital skills category reflects that ICT literacy obtained the highest mean difference as shown in Table 6. Meanwhile, the lowest mean difference was demonstrated by new media literacy skills. Further analysis revealed a significant difference in the hard skills. In other words, this study found a hard skills gap based on the academicians' and industry players' perceptions. The public HEI perceived organizational capabilities as most important for the technical skills category. However, the troubleshooting skills and writing skills indicate the positive mean difference.

Both objectives of this study have been successfully achieved. The findings indicate that soft skills and hard skills were recorded as important and most important, respectively. Soft skills are vital given the rapidly changing technology and scenario globally, thus prompting employers to be more prudent in hiring new employees [34], [35]. The present-day jobs require employees to be more dynamic, flexible, multitasking and independent [36]. Hence, soft skills are now considered essential prerequisites in seeking employment in all industries and sectors [37]–[40]. The result was in line with a study by Ihsan [41], analytical thinking skills is one basic aspect of workforce that they must know and have to solve any issue occurred. In contrast, result of this study depicted that industry players perceived more on decision-making skill. Employers from manufacturing favored more on decision making skill as compared to banking and finance industry which found that analytical thinking skill and problem-solving skill were most important [15].

The results revealed that there are skill gaps between some of the categories. Nevertheless, the present findings are inconsistent with previous studies. For instance, Tan *et al.* [17] found that soft skills based on the perception of those in HEI involved solving problems, thinking critically, communicating and being independent, as well as showing the capacity for lifelong learning. However, lifelong learning was not an expectation according to the industry experts. They stated that analytical skill, rather than lifelong learning, is a skill that graduates must possess. According to Nadarajah [21], graduates are more competent in ICT skills. However, these skills can be divided into two categories, basic and advanced ICT skills. Basic ICT skills include the use of email, mobile phone services, PowerPoints and using the Internet for data collection. Meanwhile, advanced ICT skills include tools like participating in forums or chats and operating software.

Table 6. Gap analysis of hard skills

No.		Soft skills	Mean (μ) Academicians	Mean (μ) Industry players	Mean difference (Gap)	t	Sig.
1.	Digital skills	ICT literacy	8.76	8.06	-0.695	2.400	**.019***
		New media literacy	8.42	8.03	-0.388	1.405	.164
		Technology use	8.80	8.39	-0.413	1.323	.190
2.	Technical skills	Coding and programming skills	7.82	7.77	-0.046	.120	.905
		Data analytics	8.38	8.35	-0.025	.075	.941
		Design skills	8.06	7.90	-0.157	.452	.652
		Organizational capabilities	8.50	8.13	-0.371	1.228	.223
		Research skills	8.14	8.06	-0.075	.232	.817
		Troubleshooting	8.38	8.42	0.039	-.128	.899
		Writing skills	8.16	8.23	0.066	-.226	.816

**Significant at the 0.01 level (2-tailed); *Significant at the 0.05 level (2-tailed)

4. CONCLUSION

The outcomes of this study contribute empirically to the body of knowledge concerning soft skills and hard skills based on the perceptions of the public HEI and E&E industry. This study focused on identifying the gaps between both stakeholders in order for them to take corrective actions. Most importantly, this study is the first attempt to examine the gaps between soft skills and hard skills between both stakeholders in Malaysia. Practically, this study is beneficial to stakeholders such as public HEI, the E&E industry, policymakers and students. Public HEI can revise the syllabus or programmers related to the E&E. In addition, academicians in the public HEI can improve their teaching and learning process by nurturing the students with the appropriate skills that aligned with the industry demand. The public HEI should prepare good infrastructure in ensuring their students possess the necessary skills. The E&E industry can improve its employees' skills by providing training that assists employees to adapt with the current changes.

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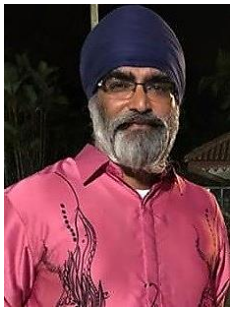

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