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# Are Malaysia's Graduates Prepared The Fourth Industrial Revolution Workforce?: A Systematic Literature Review

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**Abstract**

The Fourth Industrial Revolution is defined by artificial technologies and the Internet of Things, leading to the disappearance of some jobs while creating new ones. Most emerging technologies require advanced technical expertise and academic qualifications, significantly impacting employment, education, and TVET training for skilled workers. Skilled labor is essential for economic advancement and achieving a high-income economy, making it crucial to enhance the quality and participation in TVET. This literature review identifies the new skills needed in the workforce for the Fourth Industrial Revolution, focusing on "fourth industrial revolution skills" and "graduate readiness." The literature is categorized into nine Malaysia Future-Proof Skills: 1) Creativity & Innovation, 2) Holistic, Entrepreneurial & Balance, 3) Resilience, 4) Leadership, 5) Compassion & Mindfulness, 6) Value & Ethics, 7) Flexibility & Adaptability, 8) Critical Thinking & Problem Solving, and 9) Communication & Language Proficiency. Utilizing a systematic literature review methodology and the PRISMA procedure, this study synthesizes findings from journals and industry reports. The findings suggest that the nine Future-Proof Skills are consistent with the requirements of businesses that are in search of 4IR professionals. Therefore, further research on human resource perspectives regarding 4IR skills is necessary. Strengthening these skills among Malaysian graduates is vital to fostering high-quality, future-proof talent. To thrive in the machine-human technology era of 4IR, Malaysian graduates must embrace all nine future-proof skills. This study aims to enhance understanding of 4IR skills among graduates, institutions, and industries.

## 1. Introduction

The Fourth Industrial Revolution (4IR) is driven by modern technologies like AI, IoT, robots that transforms industries. This technology revolution also alters labour dynamics, skill needs, and organisational structures. A holistic strategy that considers employment, education, and management methods is needed to address 4IR concerns. Automation and fast technological change might eliminate jobs, a major 4IR issues. By 2025, 85 million jobs may be lost and 97 million new ones created to accommodate the new human-machine division of labour Oosthuizen (2022). The divergence emphasises the necessity for people to learn technology-driven economic skills. Critical thinking, creativity, and emotional intelligence are valuable since robots cannot imitate these (Amanda,2022; Anshari & Hamdan, 2022; Saari et al., 2021). Educational institutions need to help prepare workers for these developments. Updating curriculum to reflect 4IR capabilities is necessary. So, collaboration of Industry stakeholders and educational institutions may work together to ensure graduates have the skills needed

for the changing employment market (Tajuddin et al., 2022). Lifelong learning and professional development are crucial because technological progress demands people to adapt and reskill throughout their careers (Elayyan, 2021; Sofiadin, 2022).

In addition to the skills gap, the 4IR challenges talent management and organisational culture. Companies face a challenging environment with growing worker diversity and strategic HRM (Whysall et al., 2019). Management practices must evolve to develop an inventive and agile organisation that can adapt to quick changes when technology is introduced into the workplace (Shamim et al., 2017). Technology and flexible work patterns can boost cooperation and productivity (Tunji-Olayeni, 2024). Organisations must adjust swiftly to changing conditions, as the COVID-19 epidemic has expedited 4IR technology adoption. The pandemic has highlighted the need for businesses to use innovative technology to be competitive (Ojo-Fafore et al., 2021; Min et al., 2018). As organisations face these difficulties, they must train a workforce with both technical and soft skills to succeed in a collaborative and dynamic environment (haini, 2019).

As AI and robotics become more powerful, practically every profession will alter (Bernard Marr, 2022). According to Smit et al. (2020), automation poses the biggest risk to individuals with minimal education and competence, but AI will also affect skilled industries. Along with new technology and other changes, creativity, critical thinking, teamwork, problem-solving, and resiliency are essential for future employment and must be emphasised. The 4IR values creativity and critical thinking (Amanda Taylor, 2022). These talents appear to be common across the essential employment skills most demanded on the future labour force, so there is a need to study the skills graduates need to find work in the fourth industrial revolution.

Research suggests nine future-proof talents in Malaysia: creativity and innovation; holistic, entrepreneurial, and balance; resilience; leadership; compassion and mindfulness; and values and ethics. 7) Flexibility and Adaptability, 8) Critical Thinking and Problem Solving, and 9) Communication and Language Proficiency are expected to dominate the future job market. Under Malaysian graduation requirements, this set of skills will highlight global perspective and contextual awareness. Most studies are examining the employability skills graduates need to succeed in the Fourth Industrial Revolution..Therefore, it is very crucial to review journal articles regarding 4IR skill of graduates readiness in the Industrial 4.0. This is because it can serve as the foundation for defining the important skill that are in context with Fourth Industrial Revolution work force, which is necessary to ensure that graduates are prepared in accordance with the requirements of industry and the global labour market.

This study method is using a systematic literature review depend specifically on integrative review analysis where quantitative, qualitative, and mixed methodologies are used. This study focuses on the dilemma of gradute skills for fourth industrial revolution that have been interested topic of experts around the world. While Maisiri et al. (2019); Mtshali & Ramaligela, (2020); Cicek et al. (2019); Maria Pauceanu et al. (2020) explored gradute preparedness of 4IR skills in South Africa, Turkey and UAE, (Adnan et al., 2021; Puriwat & Tripopsakul, 2020; Teng et al., 2019) focused their research on the same topic in China and ASEAN country like Malaysia, Thailand, Indonesia, and Brunei. Using Systematic Literature Review, researchers analyse, interpret, and critique the current body of information related to studies. These procedure enables them to find the patterns of previous results, comprehend the breadth and depth of existing information, and suggest areas required by future research (Mohamed Shaffril et al., 2021).

Recently, Malaysian researchers have started to look at how gradute see 4IR skills from a practical point of view (Adnan Et Al., 2021; 'Aini Abdullah Et Al., 2020; Azmi Et Al., 2018; Hashmi Et Al., 2020; Hassan A S, 2020; Lai Wei Sieng & Noradilah Aziz, 2019; Rahmat Et Al., 2019; Tanius Et Al., 2020; Teng Et Al., 2019). For these past studies to be useful, they need to be organised and easy to see. In a nutshell, a systematic literature review of the study on gradute 4IR skills is lacking as this methodology are more organised collection of previous studies. There are 2 research questions of this study:

1. What is the phenomenon of readiness among Malaysian and global graduates that have already explored and what platforms are used to obtain data?
2. What is the most 4IR skills of graduate impact in Malaysia, from a systematic literature review point of view.

## 2. Methodology

This paper's methodology is a systematic literature review contributing to the prooft talent that graduates must possess in the Fourth Industrial Revolution. There are several guidelines or protocols that can be used to collect and ensure the selection of the most relevant past studies when using a systematic literature review method. In accordance with Mohamed Shaffril et al., (2021) perspective, systematic literature review highlight uses of PRISMA procedure to evaluate and synthesize items. PRISMA, or its full title Preferred Reporting Items for Systematic Systematic Review is a protocol for presenting systematic literature. PRISMA was chosen as a guide since it controls article quality and quantity in large databases like Scopus and Google Scholar. PRISMA regulates

Online Journal for TVET Practitioners Vol. 10 No. 1 (2025) p. 97-110

article quality and quantity that criteria 4 key parts such as 1) identification, 2) screening, 3) eligibility, and 4) inclusion.

Literature Review was utilised to answer this research issue by selecting papers that satisfied the predetermined criteria. The significance of this approach in this study is that it allows researchers to find and analyse articles systematically in accordance with the specified stages relevant to journals and corporate report regarding graduate readiness and graduate knowledge of 4IR skill that must possess in the context of Fourth Industrial Revlution era. The main step is to choose a database repository. This systematic literature review uses Google Scholar and Scopus as its databases. Articles published in international journals between year 2018 untill 2022 are main criteria of selection article of this paper. Fourth Industrial Revolution skill related keywords used are "fourth industrial revolution", "fourth industrial revolution skills" and "readiness" in searching article. The literature search approach is based on a selected database, after that selected articles that match the next term are retrieved (screened) and those that do not match are rejected (excluded). The papers that match the keywords are picked (eligibility), and then each article's abstract and keyword is assessed. The number of articles acquired from the search results was 19 585 but only 20 items have been chosen as the final selection. Figure 1 illustrate the procedure of the PRISMA flowchart systematic literature review.

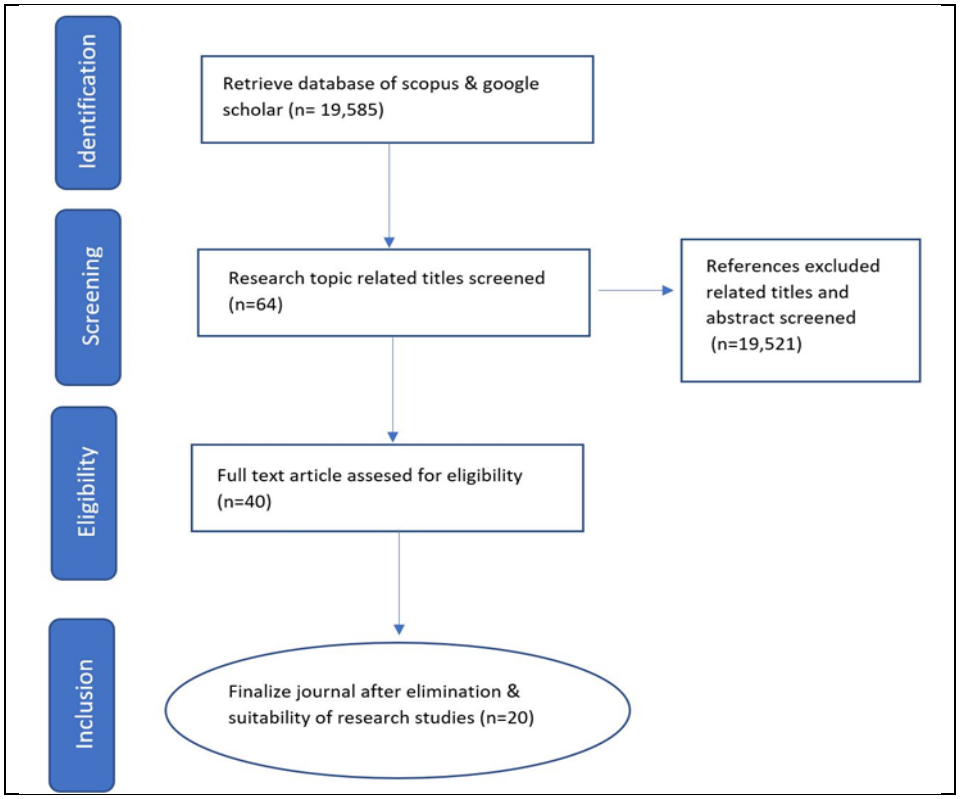


**Fig. 1** *The procedure of the PRISMA flowchart systematic literature review*

## 3. Result and Discussion

On the basis of 20 publications analysed by previous researchers on the preparation of Malaysian and worldwide graduates for the 4IR skills they must possess in the context of 4IR, a variety of responses have been gathered in Table 1: keywords and its criteria and Table 2: overview of limitations. This section also discusses 9 Malaysia future-proof skills that have been mentioned by the selection article on this study, which are 1) Creativity and innovation; 2) Holistic, entrepreneurial, and balance; 3) Resilience; 4) Leadership; 5) Compassion and mindfulness; and 6) Values and ethics. 7) Flexibility and adaptability, 8) Critical thinking and problem solving, and 9) Communication and language proficiency.

## 3.1 Malaysian And Worldwide Graduates Readiness Of 4IR Skills

**Table 1** Keywords and its criteria

| Keywords | Predetermined Criteria |
|---|---|
| Fourth Industrial Revolution (KW1) | Previous works that mention of the Fourth Industrial Revolution and Fourth Industrial Revolution in Higher Education and industry based. |
| Fourth Industrial Revolution Skills (KW2) | Type of 4IR skill that must be possessed , listed of 4IR skill acknowlegde by graduate and the higher education student, or Fourth Industrial Revolution skills change or future work skills. |
| 4IR Skills of Graduates Readiness (KW3) | Graduate preparedness to be employbility in IR 4.0. The fundamental elements that contributed to employment preparedness in 4.0. |

This literature review by Mudzar & Chew (2022) identifies 4IR workforce competencies. This research analyses journal publications and organisational reports. The literature review found that Fourth Industrial Revolution requires high-level technical, higher-order cognitive, and human or interpersonal skills. Despite being the new highly demanded skills, low- and middle-skilled employees' present skills are not contradictory but Pre-existing skills will be used to enhance higher-order skills. While the perspectives of the communication and media industries for graduates' employability abilities revealed that the industry in the Fourth Industrial Revolution requires the following competence: communication, ICT or digital, leadership, interpersonal, and personal qualities skills (Ahmad Tajuddin et al., 2022). Study of Amanda Taylor (2022) mention that problem solving/decision making, critical thinking/analysis and assessment, collaboration/teamwork, creativity/innovation/originality, leadership/management, flexibility/adaptability, self-management, and emotional intelligence are the eight key employment skills of 2035.

These 8 skillset showed a high level of consistency regarding the most vital employment abilities, but when looking at the most rigorous research those on different data-collection methods and employer views, this study discover that 'creativity' isn't ranked as highly. Several of these studies reference 'critical thinking' less than top-level findings due to jargon. This eight core job skills exclude critical thinking as its demonstrates that problem-solving skills include critical thinking. Thailand 4.0's lowest skill set is digital and information skill, followed by learning and innovation skill (M = 3.03), and life and career skill (Puriwat & Tripopsakul, 2020). Studies by (‘Aini Abdullah Et Al., 2020; Azilan Et Al., 2018; Hassan A S, 2020 ; Tanius Et Al., 2020; Zaleha Binti Salamon& Asnidatul Adilah Binti Ismail, 2019) demostratet graduate unprepared to be employ in Fourth Industrial Revoluion workforce while (Ilias Et Al., 2019; Lai Wei Sieng & Noradilah Aziz, 2019; Rahmat Et Al., 2019 ; Hashmi Et Al., 2020) studies mention that graduate knowledge of Industrial Revolution 4.0 skills are at higher level but there are still need improvement in academic and extracurricular endeavors that will contribute to sharpening 4IR skills

Meanwhile Adnan et al., (2021) empirical study analysed qualitative data from ASEAN student leaders at five tertiary polytechnics in Brunei, Indonesia, and Malaysia regarding the World Economic Forum's vital skills for Fourth Industrial Revolution. These participants are still clueless regarding the skills they need to acquire for Fourth Industrial Revolution and how they must refine such skills before entering an unpredictable workforce in 2020 further. According Mtshali & Ramaligela (2020) in South Africa, instructors' poor understanding is a challenge faced on how to prepare students for 4IR in civil technology. It illustrated how strengthening learners' employability skills should be the major purpose and emphasis of civil technology educators. Adapting instructional techniques and learning programmes will better prepare students for industry advancements. Hence this studies suggested that educators should undertake continual professional development. While study of Satpathy et al. (2020) in India reveals that over half (54%) of students are aware of and preparing for the demands of Fourth Industrial Revolution.

Almost eighty-nine percent of students seek out extra training to improve their soft skills and express an interest in furthering their education with a certificate or specialty programme to fulfil the needs of their future jobs. Studies by (Abdullahi et al., 2020) contrast with Mtshali & Ramaligela (2020) as both mention Entrepreneurial skills enable learners develop and operate their own firms, contributing to the economy and establishing a bigger and more sustainable talent pool. Using innovative, student-centered teaching approaches like Problem-Based Experts Agreed on the Most Effective Teaching Methods for 4IR Entrepreneurial Skills Methodology: Project-based learning, problem-oriented project-based learning, thinking-based learning, service

Online Journal for TVET Practitioners Vol. 10 No. 1 (2025) p. 97-110

learning, competency-based learning, design thinking, and corporative learning may foster 4IR entrepreneurial abilities (Abdullahi et al., 2020). Findings from Maria Pauceanu et al. (2020) in UAE, there is a mismatch between the capabilities the labour market will need in the future and the talents that students believe they will need to succeed in the workplace in the fourth industrial revolution.

Article of Cicek et al. ( 2019) analyses and identifies future marine skills requirements to bridge training gaps and industry demands. Mapping forth future human resource skill sets in the marine product which gives maritime education and training institutions a fresh perspective on how to educate skilled professionals sailors. This research identifies 33 competencies futureproof marine are described in 4 categories. The stated competencies help marine education and training institutions modify their programmes to provided professional advancement. Study of Teng et al. (2019) which were analysed using factor analysis and confirmatory factor analysis indicated that the university curriculum fosters the development of soft skills in students, particularly in Malaysian universities, and supports the relationship between soft skills and student employment readiness. The findings also reveal that compared to respondents from Chinese universities, respondents from Malaysian universities were more likely to agree about their university's capacity to enhance their soft skills.

In conclusion, both Malaysian and worldwide graduates of the 4ir skills section revealed that practically the whole nation is training graduates to fulfil the employment requirements of the Fourth Industrial Revolution, ensuring that no one is left unemployed. Graduates of all academic fields are conscious of the dynamic nature of the work force and strive to gain the skills that will make them more competent than in the past. Although there are few studies indicating that they are not adequately prepared to meet the challenges of the Fourth Industrial Revolution, graduates are well aware that they must adapt to the current situation because the world is rapidly transforming into a human-machine industry that will create new and numerous employment opportunities.

**Table 2** *Overview of limitations*

| No. | Article Title | Country | KW1 | KW2 | KW3 | Scopus | Google Scholar |
|---|---|---|---|---|---|---|---|
| 1. | Change in Labour Force Skillset for the Fourth Industrial Revolution: A Literature Review (Mudzar & Chew, 2022) | Malaysia | √ | √ | √ | √ | |
| 2. | The expectations of employability skills in the Fourth Industrial Revolution of the communication and media industry in Malaysia (Ahmad Tajuddin et al., 2022) | Malaysia | / | √ | × | | √ |
| 3. | The Skills Imperative 2035: what does the literature tell us about essential skills most needed for work? (Amanda Taylor, 2022) | United Kingdom | × | √ | × | | √ |
| 4. | Systematic Literature Review: Work readiness of vocational high school graduates in facing the industrial 4.0 era (Nurjanah et al., 2022) | Indonesia & Malaysia | × | √ | √ | | √ |
| 5. | Fourth Industrial Revolution critical skills and career readiness of ASEAN TVET tertiary students in Malaysia, Indonesia and Brunei (Adnan et al., 2021) | Malaysia | / | √ | √ | | √ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. | Fourth Industrial Revolution Skillsets and Employability Readiness for Future Job (Adegbite & Adeosun, 2021) | South Africa | √ | √ | × | | √ |
| 7. | Global framework on core skills for life and work in the 21st century(ILO, 2021) | Switzerland | × | √ | × | | √ |
| 8. | A study on the new design thinking for industrial revolution 4.0, requirements and graduate readiness (Satpathy et al., 2020) | India | √ | / | × | √ | |
| 9. | The Malaysian Graduate Readiness to be employed in IR 4.0 (Tanius et al., 2020) | Malaysia | / | √ | √ | | √ |
| 10. | Preparing for Fourth Industrial Revolution-will youths have enough essential skills?: An evidence from Thailand (Puriwat & Tripopsakul, 2020) | Thailand | √ | √ | √ | | √ |
| 11. | Contemporary employability skills needed for learners to succeed in the civil technology field in the 4ir era (Mtshali & Ramaligela, 2020) | South Africa | × | × | × | | √ |
| 12. | Developing 4IR Engineering Entrepreneurial Skills in Polytechnic Students. A Conceptual Framework (Abdullahi et al., 2020) | West Africa | / | √ | × | | √ |
| 13. | Industry revolution 4.0: the readiness of graduates of higher education institutions for fulfilling job demands (‘Aini Abdullah et al., 2020) | Malaysia | √ | × | / | | √ |
| 14. | Students' Readiness In Facing Industrial Revolution 4.0 Among Students of Technical Teacher's Education (Hassan A S, 2020) | Malaysia | / | / | √ | | √ |
| 15. | Perceiving The Importance of Job-Related Skills in The 4 th Industrial Revolution Era From The Perspectives of Graduates And Employers (Hashmi et al., 2020) | Malaysia | × | √ | √ | | √ |
| 16. | Employability Under The Fourth Industrial Revolution Employability Under The Fourth Industrial Revolution (Maria Pauceanu et al., 2020) | UAE | √ | √ | √ | √ | |
| 17. | Graduate readiness for the employment market of the 4th | Malaysia & China | / | √ | √ | √ | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | industrial revolution: The development of soft employability skills (Teng et al., 2019) | | | | | | | |
| 18. | Perception On Graduate Employability In Era of Fourth Industrial Revolution (Lai Wei Sieng & Noradilah Aziz, 2019) | Malaysia | √ | × | / | | √ | |
| 19. | Acknowledgment assessment of revolutionary Fourth Industrial Revolution in university of malaya and institute of teacher education ipoh campus (Ilias et al., 2019) | Malaysia | / | / | √ | | √ | |
| 20. | Future Skills Requirements Analysis in Maritime Industry (Cicek et al., 2019) | Turkey | × | √ | √ | √ | | |
| | Total | | | | | | 5 | 15 |

*Indicator: ✓ Fulfilled the requirement needed; / Partily fulfilled requirement needed; × Unfulfilled requirement need; KW1 = Fourth Industrial Revolution ; KW2 = Fourth Industrial Revolution Skills (KW2); KW3 = 4IR Skills of Graduates Readiness

## 3.2 9 Malaysia Future Proof Skills

The current development of technological advancement in the Fourth Industrial Revolution has resulted in changes many sectors of employment that demand for existing skills set is no longer adequate to fulfil the market's requirements and desires. In this respect, a broader grasp of general skills is required so that graduates are equipped for employment that did not exist in the previous 10 or 5 years back. In line with this, the 9 Malaysia Future-Proof Skills which are 1) Creativity & Innovation, 2) Holistic,Entrepreneurial & Balance, 3) Resilience, 4) Leadership, 5) Compassion & Mindfulness, 6) Value & Ethics, 7) Flexbility & Adaptability, 8) Critical Thinking & Problem Solving, 9) Communication & Language Proficient. The frameworks of the 4IR skill set that Malaysian graduates should acquire and modify in context of the influence of digitalization and technological innovation on the workforce are identified. Therefore, this section develops a frequency matrix analysis on skill set of the selected article to categorize all the skill sets mentioned by other authors to fit with categories of the 9 Malaysia Future-Proof Skills, the classification of talents emphasised in Table 3.

Brosens et al. (2022) found that design education is transitioning from a high dependency on domain-specific knowledge to a partnership between domain-specific knowledge and skill development. Reflective thinking, collaboration, interdisciplinary multidisciplinary, communication, entrepreneurial, holistic technology, innovative predictive, multicultural empathy, cooperation project management skills. These nine talents are needed for future designer skills and Industry 4.0. According to Islam (2022), employability in the Industry 4.0 era requires both technical and business skills. Critical thinking, cognitive flexibility, complex problem-solving, adaptive thinking, qualitative skills, and communication are business skills. Programming, math, data interpretation, visual analytics, and virtual collaboration are technical skills. The evaluation of future accountants' skills in response to the 4IR suggests four categories: Ethical, digital, business, and soft skills.

According to the findings, the two most important personal attributes for future accountants are adaptability and a lifelong attitude to continuing professional development (Tsiligiris & Bowyer, 2021). It has been shown that fundamental digital abilities, together with social and emotional competencies, are essential for success in the workplace (Tsiligiris & Bowyer, 2021; ILO, 2021). Individuals need both fundamental and technical expertise to enter the workforce, advance in their professions, effectively use digital technology in the workplace and in daily life. Graduate of 4IR era should realise their personal and professional potential, and make positive contributions to society at large that integral to one's success in both the professional and personal lives. Studies by (Adnan et al., 2021; Tsiligiris & Bowyer, 2021; Teng et al., 2019; Deloitte, 2018) indicate that 4IR talents were once seen as soft skills, but are now regarded as crucial and highly important for employment entrance and future job preparedness. Without a doubt, for the Industry 4.0 era and beyond, these abilities will no longer be seen as only soft or inferior skills compared to technical and vocational skills, but as important and vital skills to thrive in the future workplace.

McKinsey & Company 2021 identified 56 foundational skill to put in as four broad skill categories such as cognitive, digital, interpersonal, and self-leadership. Two skill sets that belong to the cognitive category are

communication and mental flexibility, while collaboration competence falls to interpersonal category. (Mtshali & Ramaligela, 2020) studies used the Australian Learning and Teaching Council's (2011) themes for employability skills. In terms of generic skills, the challenge was how learners to be develop with these such adaptability, use ICT, show leadership, and operate a business. This showed that most Civil Technology students still don't have the social and personal resource skills that are needed for strong performance under 4IR. Using the list of engineering skills set by 18 engineering accreditation bodies and skills in demand in 2018 versus 2022, it was clear that existing skills and 4IR skills were very different.

By 2022, some of the skills that are needed to do jobs today will have changed. What both sets of skills have in common and what makes them different are that the most valued are analytical thinking and innovation, active learning and learning strategies, creativity, originality, and initiative, critical thinking and analysis, solving complex problems, having emotional intelligence, analysing and evaluating systems, and designing and programming technology, leading and influencing others, and solving problems (PwC 2018; Kamaruzaman & Hamid, 2019 ; WEF, 2020;). Azilan et al. (2018) analyse college students majoring in agriculture talents they need to face for Industry 4.0 using Schultz's human capital theory, which identifies nine different domains skill sets: communication skills, teamwork skills, leadership skills, entrepreneurial skills, ethical and moral skills, technological and information skills, social skills, critical thinking skills and problem-solving abilities, and spiritual.

Meanwhile, Maria Pauceanu et al.,(2020) use competencies from a 2016 World Economic Forum report on the "future of work." Complex problem solving, analysis, invention, criticism, creativity, emotional intelligence, system evaluation, leadership, social influence, judgement, and decision making are 4IR skills that UAE graduates need to know. This section concludes that some authors use the World Economy Forum 2016 as a basis for determining the 4IR skill set for their research analyses (Adegbite & Adeosun, 2021; Adnan et al., 2021; Kamaruzaman & Hamid, 2019; Maria Pauceanu et al., 2020; Rahmat et al., 2019), while others use goldsmith's soft assessment (Hashmi et al., 2020; Teng et al., 2019). Finally, the scholars' perspectives on the 4IR skills graduates need to thrive in the workforce are summarised.The 4IR skill sets emphasise interpersonal skills, employability, and foundational competencies.Therefore, the 9 Malaysia Future-Proof Skills and 4IR abilities align with the skills desired by organisations and businesses in 4IR professional.

Online Journal for TVET Practitioners Vol. 10 No. 1 (2025) p. 96-109

**Table 3** *The classification of talents emphasised in 9 Malaysia future-proof skill*

| No | Author, Year | 9 Malaysia future-proof skill | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Creativity & Innovation | Holistic Entrepreneurial & Balance | Resilience | Leadership | Compassion & Mindfulness | Values & Ethics | Flexibility & Adaptability | Critical Thinking & Problem Solving | Communication & Language proficient |
| 1. | (Brosens et al., 2022) | √ | √ | | √ | √ | √ | √ | √ | √ |
| 2. | (Islam, 2022) | | √ | | | | | √ | √ | √ |
| 3. | (Tsiligiris & Bowyer, 2021) | √ | √ | | | √ | √ | √ | √ | √ |
| 4. | McKinsey & Company 2021 | √ | √ | | | √ | | √ | √ | √ |
| 5. | Adnan et al., 2021 | √ | | | | √ | | √ | √ | √ |
| 6. | (ILO, 2021) | √ | | | | | | | √ | √ |
| 7. | (Mtshali & Ramaligela, 2020) | √ | √ | | | | | √ | √ | √ |
| 8. | (Abdullahi et al., 2020) | √ | √ | | √ | √ | √ | | √ | √ |
| 9. | (Hassan A S, 2020) | | | | √ | √ | | | √ | √ |
| 10. | (Hashmi et al., 2020) | √ | √ | | √ | √ | | √ | √ | √ |
| 11. | (Maria Pauceanu et al., 2020) | √ | | | | √ | | √ | √ | √ |
| 12. | (WEF, 2020) | √ | | √ | √ | √ | | √ | √ | √ |
| 13. | (Kamaruzaman & Hamid, 2019) | √ | | | √ | √ | | | √ | |
| 14. | Ilias et al., 2019 | √ | | | | √ | | √ | √ | √ |
| 15. | Maisiri et al., 2019 | √ | √ | | √ | √ | | √ | √ | √ |
| 16. | (Teng et al., 2019) | √ | | √ | | √ | | √ | √ | √ |
| 17. | (Cicek et al., 2019) | √ | | | √ | | | √ | √ | √ |
| 18. | (Deloitte, 2018) | √ | √ | √ | √ | √ | | √ | √ | √ |
| 19. | PwC 2018 | √ | √ | | √ | √ | | √ | √ | |
| 20 | Azilan et al., 2018 | | √ | | √ | | √ | √ | √ | √ |

## 4. Conclusion

The fourth industrial revolution is predicted to have effects professional lives by significantly changing the nature of work, employment, and industry in the future by 2025, as current occupations will be eliminated due to the advancement of technology. Therefore, purpose of the 9 Malaysian skill sets that are being used in this study will be an informative to help recent graduates prepared for the Fourth Industrial Revolution so that risk of skills gaps and large groups of students not seeking employment will not been as phenomena of graduate unemployeed. This study only included a small number of document anaylses that was chosen with predetermined criteria thus, further research is necessary if we are to achieve a study of the whole country. Futher research to looked on human resource prespective on 4IR skills would be addition to current research studies as students will find it will be helpful in terms of preparing them for the workforce, and employers may also find it valuable in terms of knowing the current trend of 4IR skills that every graduate must have to be a employee with the guided of 9 Malaysian skill sets. In this study the 9 Malaysia Future-Proof Skills are not mentioning the important of digital skills and Green technology hence it need to be another research study that would best explore by other future researcher. Skilled individuals will be more in demand in the job market and less skilled will have trouble getting job offers. Last but not less, empower the 9 Malaysian skill sets and 4IR skills in every individual of Fourth Industrial Revolution era is a must to ensure universal and high-quality future-proof citizens' skills that involve human and machine to collabrate in world of work.

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## Conflict of Interest

The authors declare that there is 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:*** *Syuhada Yunos, Ahmad Rizal Madar;* ***data collection:*** *Syuhada Yunos;* ***analysis and interpretation of results:*** *Syuhada Yunos, Ahmad Rizal Madar;* ***draft manuscript preparation:*** *Syuhada Yunos; All authors reviewed the results and approved the final version of the manuscript.*

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