MALAYSIAN ONLINE JOURNAL OF EDUCATIONAL MANAGEMENT (MOJEM)

OCTOBER 2022, VOLUME 10, ISSUE 4, 15 - 28
E-ISSN NO: 2289 – 4489

EMPLOYABILITY SKILLS OF MALAYSIAN UNIVERSITY STUDENTS FOR IR4.0: A SYSTEMATIC LITERATURE REVIEW

Fathima Nasreen[1], Siti Hajar Halili[1]*, Rafiza Abdul Razak[1]

[1]
Department of Curriculum & Instructional Technology,
Faculty of Education,
Universiti Malaya
Malaysia

Corresponding Author:
Department of Curriculum & Instructional Technology,
Faculty of Education,
Universiti Malaya
Malaysia
E-mail:
siti_hajar@um.edu.my

ABSTRACT

Employability skills in the industry is an essential aspect of education. The increasing unemployment trend which is occurring in numerous countries including Malaysia, shows a skills mismatch between education and the industry. The researchers predicted the expansion of this gap to appear during Industrial Revolution 4.0 (IR4.0). Hence, this research investigates the reasons for unemployment among university students in Malaysia with special reference to relevant employability skills for IR4.0. This study mainly used existing research published between 2017 to 2022. Three databases, namely Web of Science, Scopus, and Google Scholar, were used to search for articles using the following keywords: employability skills, unemployment, IR4.0. The inclusion criteria was used to select the relevant articles published in English. This study used the PRISMA methodology to conduct a systematic literature review. The analysis included 47 papers. This study found a significant association between skill mismatch and unemployment. This research also found 15 employability skills and four skills related to IR4.0: soft skills, hard skills, information literacy, and attitude. This research recommends that educational institutions consider these skills and update the curriculum and instructional technologies in line with the vision of IR4.0.

Keywords: **Employability Skills, Industrial Revolution 4.0, Unemployment, Skills Mismatch, Reasons for Unemployment**

MALAYSIAN ONLINE JOURNAL OF EDUCATIONAL MANAGEMENT (MOJEM)

INTRODUCTION

The employability of university graduates is a crucial issue in Malaysia. According to the labour force statistics, more than 500,000 persons were unemployed in May 2019 (Department of Statistics Malaysia, 2019). There are many reasons for unemployment which includes excess graduates due to the increasing number of public and private universities (Azmi et al., 2018; Hossain et al., 2018), lack of employability skills among graduates (Hanapi & Nordin, 2014), lack of hard skills, particularly, technical skills (Lim et al., 2016), as well as lack of problem-solving and communication abilities (Halili et.al., 2021: Hanapi & Nordin, 2014; Verma et al., 2018).

Skill mismatch is another reason for unemployment among Malaysian graduates. According to a report in 2005, about 30000 graduates working in the industry are not relevant to their qualifications (Hanapi & Nordin, 2014). Ministry of Education Malaysia (2015) further explained the concept of mismatched skills through the concept of demand and supply. Although the graduates were educated with knowledge and skills, they were not trained based on the industry's requirements. Therefore, graduates with mismatched skills find it difficult to secure a job in the industry.

Hence, scholars found the skill mismatch as the primary reason for unemployment in Malaysia (Jamaludin et al., 2019; Teng et al., 2019). According to Nazron, Lim and Nga (2017), lack of soft skills such as self-confidence, time management, communication, problem-solving abilities, critical thinking, originality, behaviour, interaction, and leadership abilities is the main reason for unemployment while Jamaludin et al. (2019) and Azmi et al. (2018) emphasised skills mismatch as the main reason for unemployment in Malaysia. Hence, this research investigates the reasons for unemployment in Malaysia with a special focus on the skill set that is required of graduates based on the industry for Industrial Revolution 4.0 (IR4.0).

METHODOLOGY

This study used a systematic literature review to study the link between employability skills and unemployment. This study complies with Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines to obtain data based on relevant journal articles published between 2017 to 2022, mainly from three databases, namely Web of Science, Scopus, and Google Scholar. PRISMA offers commonly acknowledged peer technique guidelines that were tightly bound to support the revision process by assuring its quality and reproducibility. In addition, a protocol was created to outline the requirement for selecting articles, the search approach, the methods for extracting data, and the methods for analysing the data.

As Seers (2015) stated, the focus of the research performs a vital role in the systematic review to identify the gap and discuss findings based on data (Shaffril et al., 2021). The review processes involve formulating identification, screening, eligibility research issues, systematic searching methodologies, data extraction, and data analysis (Shaffril et al., 2021). Hence, this study focused on the reasons for unemployment in Malaysia and its association with employability skills. This research, therefore, formed research questions based on systematic searching strategies such as identification, screening, and eligibility. During the search process of relevant articles, each article was initially screened based on title, abstract, introduction, methods, and conclusion. Then, the researcher used the screening process to identify and remove irrelevant publications.

Formation of Research Questions

1) Is there any skill mismatch between education and industry?

What are the relevant employability skills for IR4.0 in Malaysia?

Systematic Searching Strategies

A. Identification

The identification process of this study is mainly to find any terms with related meanings, synonymous, and variations of keywords in this study which are employability skills, unemployment and IR4.0. This assists in providing options from the three selected databases, WOS, Scopus, and Google Scholar, to locate significant articles for the review. Table 1 shows the suitable keywords initially used and the identification process. The search process is mainly based on the primary database and main keywords through the advanced search options, such as phrase search and Boolean operators.

B. Screening

This study screened relevant articles based on article selection criteria automatically performed by the available sorting functions in the databases Web of Science (WoS), Scopus and Google Scholar. During the screening process, any article without the sorting function's availability was removed. The review was limited to academic journal articles. The researcher limited the search to the first 60 entries. Also, Google Scholar search was used as support to validate different databases and to detect any additional resources. However, duplicate resources showed in many entries.

To expand the review from the three database searches, key content, journal articles, and book chapters published in English from 2017 to 2022 were also included. This process has excluded 45 articles since they did not meet these inclusion criteria**,** and another 47 articles were used with the eligibility process.

Table 1
Process of excluded articles

Criteria	**Inclusion**	**Exclusion**
Timeline	2017 to 2022	Before 2016
Type of publication	Article, book chapters	Newspaper, review paper, conference proceeding.
Language	English	Non-English

C. Eligibility

Eligibility is the third process of systematic search strategies of reviewing an article in three rounds. The first round involved the author to manually retrieve articles to conform the remaining pieces that met the requirement (Pussegoda et al., 2017). This process begins by reading the article's title—abstract, introduction, and conclusion. In the second round of analysis, the articles were analysed by two reviewers. The selection criteria were based on the research questions and findings in the organized methods. The articles that were not available in the full text were eliminated and for the following process 8 articles were eliminated. The third round involves a single reviewer reviewing the selected articles carefully and deciding whether to proceed with the inclusion process. The researchers excluded articles in which no research was described exploring the process and results of graduate employability-related skill development to satisfy the study's specific research questions.

D. Analysis

According to the procedure by Bardin (2011), the inclusion criteria-based search generated a total of 107 articles. However, based on selection criteria, only 47 publications were found relevant to this study after applying exclusion

criteria (Figure 1). Finally, 8 publications were removed based on the whole text elimination process from 55 articles. The total of 47 publications included quantitative studies (n= 27), qualitative studies which totals 12 results and the mixed method which presents eight results.

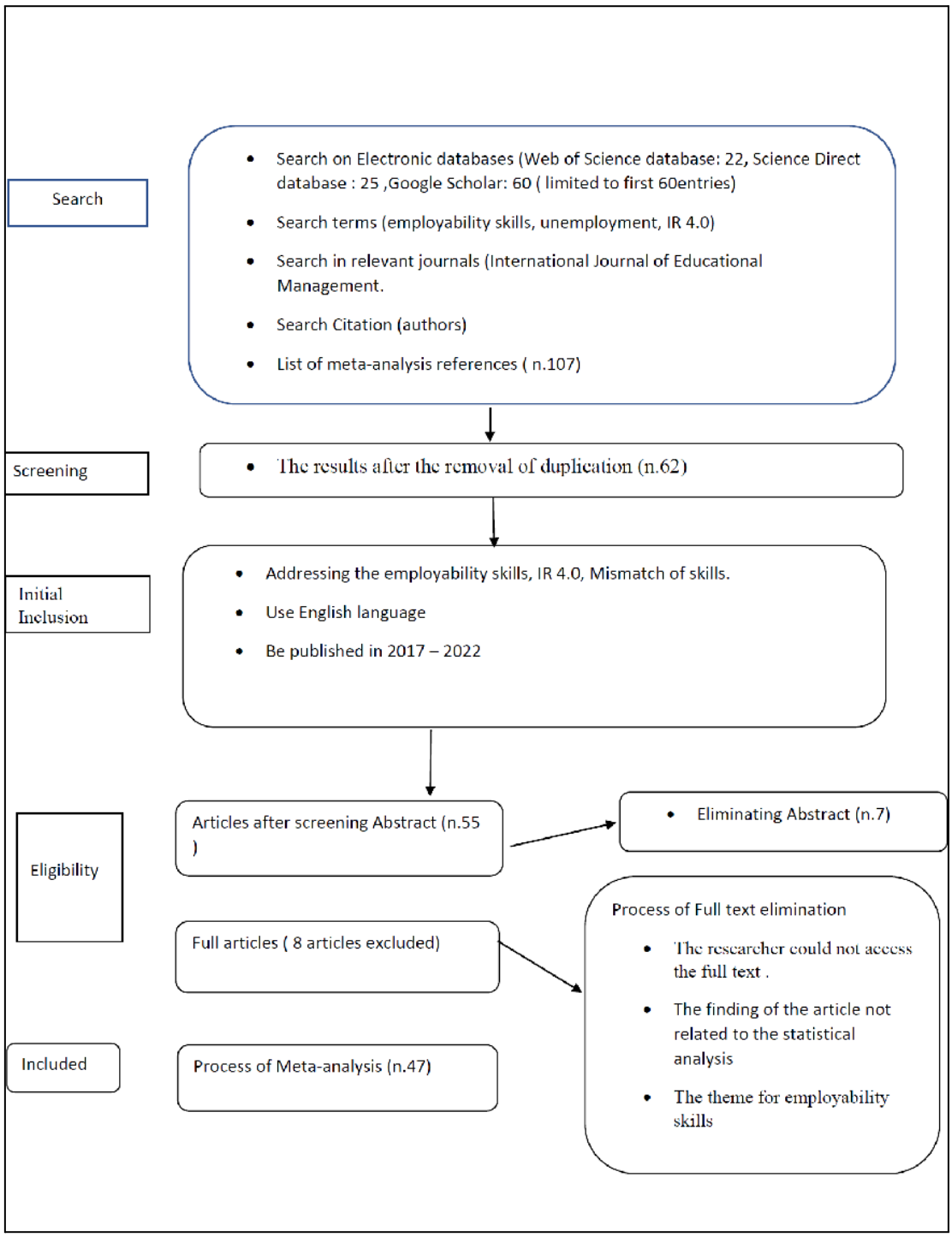

Figure 1: Flow of Diagram on SLR

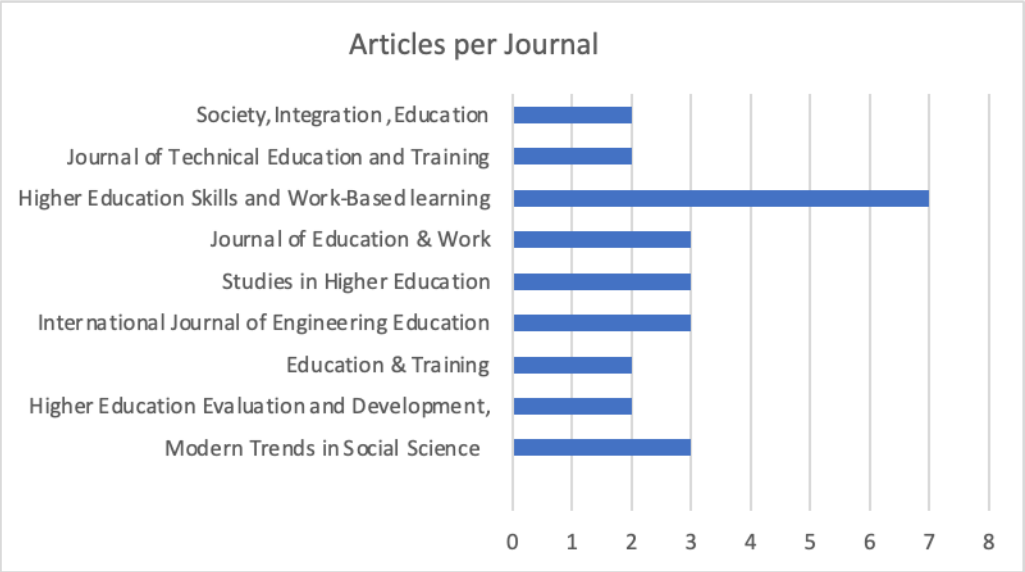

Figure 2: The Number of Papers Published Per Year

In addressing the publications on this topic, many different journals have published on the issue under consideration which demonstrates the theme's increased relevance in diverse research fields. Table 2 shows journals with many articles related to the topic. The primary area of knowledge addressed in published articles are management, accounting, education, marketing, and engineering. In addition to this, English, nursing, vocational education, psychology, pedagogy, information technology and sports are other topics covered in the search process.

Table 2
Number of Articles Per Field of Knowledge

Field of knowledge	**Number of articles**
Accounting, Marketing, Management	N= 11
Engineering	N= 9
Education, Pedagogy, Psychology	N=6
Industry	N=5
English	N=2
Nursing	N=2
Information technology	N=2
Vocational Education	N=1
Sports	N=1
No particular area of knowledge identified	N=16
	55

FINDINGS

The data analysis from the review articles in this research can be discussed under four subtopics; (i) Unemployment in Malaysia and the reasons, (ii) The necessary employability skills for the future industry**,** and (iii) Predicted Skills for IR4.0, its implementation, and challenges and (iv) Role of Higher Education in developing IR4.0 skills.

Unemployment in Malaysia and The Reason (R3, S1, S10, S48, W11, W13, S17, RI, S10, S18, S21)

Unemployment is commonly characterised as a person who is unable to find a job to support themselves (W11). It mainly impacts educated youths; hence, it becomes a burden not only to their family but to society (R3). Although the unemployment rate in Malaysia dropped last year to 15% (43,800) in 2020 from 35% (175,500) in 2017, (W13), it is still high among university graduates (S48). The research that studies graduate employability and competency demonstrated that a percentage of graduates are not only currently unemployed but have never been employed (S17).

Reasons for Unemployment

Despite introducing several strategies to control unemployment in Malaysia, the situation is worsening daily (W13). S1 studied the main reasons for unemployment among graduates. This research found a lack of employability skills and skill mismatch as the main reasons that create unemployment. Many researchers found a lack of skills as an important reason for unemployment. The companies consider soft skills more than hard skills (S18), however, academic institutions provide training in hard skills more than soft skills. Therefore, the graduates lacked training in soft skills. This creates unemployment which is an objective to construct a prediction model to determine the possibility of attaining high-level employability skills among engineering technology students as the primary reason for unemployment in Malaysia (S48 & S10). The demanding attitude of the graduates is another reason for unemployment (R3).

Skill mismatch **(**RI, S10, S18, S21) is another crucial reason for unemployment. S18 studied the required soft skills in the industry based on employer perception and highlighted skill mismatch between the industry and learning centres. RI research discussed the significant relevance of employability skills in preparing students for career advancement and underlined skill mismatch. RI reviewed selected journal articles on relevant employability skills to the industry from the employer's perspective. This review also found skill mismatch as a significant challenge for job seekers.

Despite the skill mismatch being a crucial factor in unemployment, the situation is not the same in all jobs. According to W10, skill mismatches in the hotel and telecommunication industries is minor while higher in the manufactured and retail sectors. S10 studied the factors that contribute to skills mismatch. This research found that location, time, university activities and research experience are highly influential factors in skill mismatch (S10).

The Necessary Employability Skills for The Future Industry (R2, R5, R7, S7, R10, S16, S14, S15, S19, W2, W12, W14)

Employability skills is considered as the skills that are necessary to find a job in the industry apart from the knowledge in the field of study. As the industry is growing fast, the employees' skills must be changed to cope with the market need. R7 examines the skills demanded by the industry and the way of incorporating them into the learning outcomes of higher education. R5 explored the importance of employable skills in students' careers helping them to get into the industry. It is a reviewed article, and found skills are important skills to find a job in the market (R5). The reviewed article S16 studied the employers' perspective on employability skills and highlighted the significance of communication, teamwork, problem-solving, and technological skills.

S19 listed the skill set required to be employed from the study based on employers' perspectives as essential skills for the professionals who are willing to work in the IT industry (S19). S14, which is research conducted among Malaysian Vocational College (VK) graduates found that communication, thinking, and problem-solving skills are crucial (S14).

RI reviewed the article and identified basic skills, thinking skills, personal qualities, workplace competencies, and entrepreneurship skills necessary for the industry (RI). In addition, decision-making and leadership skills are other skills given second-level priority (RI). The quantitative research (S48) aims at developing a forecasting model to predict the likelihood of engineering technology students in Malaysia acquiring high-level employability skills. S18

studied the required soft skills in the industry and found around 20 soft skills with different priority levels.

Hence, many research articles listed employability skills with different emphases. S7 examines the role of IT skills in the labour market and highlighted its importance to the industry. S20 presented communication skills have evolved into one of the most valuable tools for professionals, serving as a key component of personal development, culture, and autonomy. S15 reviewed previous studies to identify the attributes of communication skills such as the ability to speak with the audience effectively, convey written communication to interact with others, ability to present and express new ideas and provide feedback. Entrepreneurship is another important skill that helps to reduce unemployment. W14 explored the Malaysian government's commitments to promoting entrepreneurship activity among university graduates. W9, which surveyed 400 students at National University Malaysia (UKM) found that graduates' readiness to choose entrepreneurship as a career field is higher than the average mean. W12 studied the variables that motivate and inhibit becoming an entrepreneur among senior entrepreneurs and aspiring senior entrepreneurs.

Transnational Human Capital (THC) is another vital skill that ensures employability. W8 examined the International Branch Campus (IBC) students and graduates' employability in Malaysia. This research found that although IBC alumni are well-equipped with the abilities and characteristics that organizations value the most and are good in regard to soft talents and personal characteristics. Hence, skills that have been discussed in association with jobs in the industry can be summarized as follows:

Table 3
Employability Skills

Article	Skills
S16, S21	communication, teamwork, problem-solving, and technological skills
R2	lack of industrial training, poor English, lack of problem-solving skills, job-hopping, and lack of confidence
S19	learnability, reasoning, reliability, adaptability, flexibility, loyalty, resourceful, proactive, gratitude, interpersonal skills, creative thinking, persuasiveness, networking, job-seeking, business fundamental, and willingness to work
S7	IT skill
S20, S15, S21	Communication skill
S14	communication, thinking, and problem-solving skills
W14, W9, W12	entrepreneurship
W8	The transnational human capital (THC)
RI	basic skills or fundamental skills, thinking skills, personal qualities, workplace competencies and entrepreneurship skills, decision-making, leadership skills
S18	20 soft skills
S21	collaborative skills, communication skills (S21), teamwork skills (S21), problem-solving skills (S21), skills in taking the initiative and effort (entrepreneurship skills) (S21), self-management skills(S21), skills in using technology (IT skills) (S21), skills in learning (S21) and skills in terms of occupational health and safety (S21).
R5	Skills in communication, teamwork, problem-solving, emotional intelligence, self-assessment, leadership, computational skills, interpersonal, entrepreneurial, analytical.
R10	psychological wellness, self-management skill

Predicted Skills for IR4.0, Its Implementation, and Challenges (S2, S4, S5, S8, S11, S12, S21, S22, S23, W2, W5, W6 and W7)

The researchers have discussed skills for IR4.0 in addition to the employability skills mentioned earlier. S23 combined many definitions of IR 4.0 and summarized its main component in six points (i) Identification (RFID systems), (ii) Locating (RTLS), (iii) Sensing or Cyber-physical system, (iv) Networking or Internet of things (IoT), (v) Data collection and analysis (vi) Business Service or Internet of services (IoS). S2 research endorses these findings and emphasizes the development of big data and artificial intelligence. Hence, as S5 described, unemployment will be increased in two ways; artificial intelligence-based machines will take many jobs from human beings, and digital competence that requires the market will cause unemployment (S5).

S8 reviewed literature that discussed IR4.0-related abilities, competencies, and literacy. This research highlights three findings; (i) IR4.0 abilities competencies include generic soft skills like communication, creativity, and problem-solving (ii) Programming abilities are prominent among the hard skills as IR4.0 skills and (iii) information literacy are under-represented as a skill for IR4.0 (S8).

Hence, S21 examined digital skills such as information, communication, collaboration, critical thinking, creativity, and problem-solving to understand (1) the degree of digital skills in the twenty-first century among knowledge teachers, and (2) the factors that influence the level of these skills (S21). This has been further elaborated in W2. Despite identifying the required skills for IR4.0 and developing modules to educate young people, there are challenges in implementing these models and modules. This research found three challenges mainly in implementing the models and modules: (i) awareness, (ii) readiness and (iii) attitudes.

The quantitative research S11 examined the awareness of IR4.0, the employability skills needed in the future among students, and the industry's expectations from fresh graduates. This study found a lack of awareness of IR4.0 among students and a gap between students' understanding and the labour market (S11). The student's readiness to learn the skills IR4.0 is another vital issue. S4 examined the students' readiness to face IR4.0 in Indonesia. This research identified five types of readiness, namely, (i) competency readiness (knowledge, skills, and attitudes), (ii) personal readiness (self-confidence and mental), (iii) communication readiness (iv) teamwork readiness, (v) technological readiness and the evaluated the level of these readiness to face IR4.0. According to this research finding, students' readiness to face IR4.0 was Good with an average score of 2.86 (71%) (S4).

Students' attitudes posed another challenge in educating young graduates with IR4.0 skills. W7 highlighted the attitude problem among the young generation about IR4.0. Despite realizing the challenges that IR4.0 might bring to the career opportunity and the workplace; they are not bothered about it much. This is a great challenge to implement any initiative to prepare students to face the challenges of IR4.0.

Table 4
Skills for IR 4.0

Article	Summary of the skills for IR4.0
S5	Information analysis, Social and Communication, Creativity, Safety, Problem-solving, Learning, Leadership, Ethics, security and culture, Entrepreneurship, and Collaboration
W5	digital skills, proficiency in using high-impact technology, entrepreneurial mindset, technical skills
S8	(i) skills and competencies attributed to 4IR are generic soft skills such as communication, creativity and problem solving, (ii) The hard skills, and programming skills feature predominantly as the IR4.0 skills and (iii) Information literacy
W2	commitment, integrity, analyse root cause in identifying problem, logical thinking, verbal communication, and ethical responsibility

Role of Higher Education Institutions in developing IR 4.0 skills (S6, R7, W4)

The role of higher education in developing IR4.0 skills is remarkable. S6 investigated jobs in IR 4.0 and believed that education offers training for future jobs from a lifelong perspective. W4 explored the elements influencing the evolution and implementation of IR4.0 in institutions for long-term education. The research argues that academic institutions are unaware of IR4.0 and the changes it might bring to the work industry (W4). For this purpose, this research maintains restructuring the university system with the vision of IR 4.0. based on excellent financial planning, highly skilled personnel, expanded industrial alliances, updated infrastructure, redesigned curricula, and thought-provoking workshops (W4).

W3 research discussed a roadmap for developing IR 4.0 skills by the Department of Skills Development Malaysia in collaboration with the industry and academic institutions. This research found ten strategy plans that the Department of Skills Development can be used as a reference to establish IR 4.0 skills. In brief, IR4.0 requires new knowledge, competencies, and skills to get employment in the industry and sustain the workforce. Therefore, it needs restructuring and transformation of higher education.

DISCUSSION

This review research paper aims to investigate the unemployment associated with employability skills in Malaysia. Unemployment is increasing in Malaysia, similar to any other country despite taking measures to control the trend. As IR 4.0 might change the job profiles, research has predicted a worse unemployment situation in Malaysia as well as other parts of the world (Khan et al., 2021).

Unemployment among university graduates (S48) is high although the general unemployment rate in Malaysia has dropped compared to previous years (Khan et al., 2021). According to the Malaysian Statistics Department, the number of unemployed people decreased by 105,700 from 777,500 in February 2021 (Sofiah, 2022). However, the current unemployment rate of 4.1% (Sofiah, 2022) is higher than the rate before the COVID pandemic. The highest unemployment rate in Malaysia prior to the pandemic was 3.4 % in 2017.

This research found three essential reasons for unemployment: (i) lack of employability skills, (ii) mismatched skills, and (iii) unrealistic salary or high expectations of fresh graduates. Lack of employability skills is a reason for unemployment. Employability is the transferable skills required for an individual to be employable (Gowsalya & Kumar, 2015). Employers seek a set of abilities from employees in addition to topic knowledge and technical expertise. They feel that these abilities enable the employee to fulfil their duties to the best of their abilities. It has been discussed in many research papers with special reference to certain skills. For instance, lack of experience and lack of labour market information is specifically highlighted in research S10 and S48. Employability skills in this research have been discussed from two perspectives; (i) employability skills for the immediate industry needs and (ii) predicted employability skills for IR 4.0.

Skill mismatch is another vital reason for unemployment. Mismatch skills refer to various types of imbalances between skills offered and skills needed (Sparreboom & Tarvid, 2014). According to this definition, the employees have skills; however, these skills are not suitable for available jobs in the industry. In this research, articles like RI, S10, S18, and S21 have discussed this issue in detail. S10 discussed the reason for skills mismatch including location, time, research experience and student exposure, contributing to this situation. For example, a skill given top priority in Malaysia might not be important in another place in Sri Lanka (Succi & Canovi, 2020). It is because the priority of skill changes based on the place and the market demand, and the market demand is always not the same everywhere. Similarly, a skill that was given great concern two years back might not be much more critical now (Lisá & Newman, 2019). Again, it is because the market keeps on changing. Communication, for instance, was an essential skill in the market a few years back; however, it is not much important now as there are translation apps. Hence, continued research and a strong connection with the industry are needed to identify the set of skills and its priorities. High expectations is another reason for unemployment (R3). This has been further elaborated in other research like (S1), (R3) and (S1).

Among these three reasons, skill mismatch is the most significant. It is because other reasons like employability skills and graduates' high expectations are easier to address compared to skill mismatch. Therefore, only two research articles (S10 and S48) out of 47 have discussed the lack of employability skills while S1 and R3 have highlighted employees' higher expectations in association with unemployment. However, S10, S48, R1, W10 and many others highlighted mismatched skills. Furthermore, students and the institutions sometimes experience frustration and self-management due to mismatched skills (Shevchuk, 2019). Hence, skill mismatch is a significant challenge for employers.

As far as the industry and its' demands are changing for many reasons, the skills and its priorities also change accordingly (Kenayathulla, 2019). The gap between the expected skills and the skills gained by employees creates a skill mismatch (ILO, 2020). Hence, skill discrepancy in the era of IR4.0 might be a crucial reason for unemployment (RI).

The work environment alters job profiles and necessitates employees with a diverse set of skills. Today, digital inclusion is more dependent on competences than on access to tools (Khan, 2021). It is expected that most children entering primary school today may find themselves working in jobs which do not even exist (Kenayathulla, 2021). This change will have a significant impact on a person's career and will create a skill mismatch. Furthermore, one-third of today's employment will be obsolete by 2025 as a result of technological advancements in intelligence, which will have a significant impact on an individual's career (Pauceanu & Moustafa, 2020). Hence, new skill sets are required for IR 4.0 (Saari et al., 2021).

The emergence of IR 4.0 necessitates more activity in recognising trends in the industry, job demands, and opportunities that may emerge concurrently with this revolution, significantly improving the potential for skills development in line with 4IR. According to Muktiarni et al. (2019), and Halili and Sulaiman (2021), all fields including education and the growth of the IR4.0 as well as a new technological pattern will have an impact on the industry. This research discussed the relevant employability skills for IR4.0 in Malaysia. As far as IR4.0 era is described as the era of information technology communication or a cyber-physical system in combination of communication, big data, and physical system *(*Sohimi et al., 2019), the skills of the employees need upgrading (Caruso, 2018). It means the employees must be prepared for an era of automation, decentralization, system integration, and cyber-physical systems (Mian et al., 2020).

Today, digital inclusion is more dependent on competencies than access to tools (Khan, 2021). It is expected that the majority of today's school students may end up working in jobs that do not yet exist (Kenayathulla, 2021). Hence, there would be different work environments and needs. Job profiles are influenced by changes in the work environment. As a result, it necessitates people with a diverse set of skills. Furthermore, one-third of today's employment will be obsolete by 2025 as a result of technological advancements in intelligence (Pauceanu & Moustafa, 2020). Hence, new skill sets are required for IR4.0 (Saari et al., 2021). This research found four skill sets have been predicted in research to meet the challenges of IR4.0 namely, (i) Soft skills (S8), creativity (S8), problem-solving (S5), Safety (S5), Learning(S5), Leadership(S5), Ethics(S5), security and culture(S5), Entrepreneurship and Collaboration (S5), logical thinking, (ii) hard skills such as programming skills (S8), digital skills (W5), technical skills (W5), (iii) Information literacy such as Information analysis (S8) and (iv) Attitudes such as commitment (W2), integrity (W2), analyse root cause in identifying a problem (W2), and ethical responsibility (W2).

Although employability skills and a predicted set of skills for IR4.0 are ready, the workforce cannot reap the benefits from these skills unless the universities include these in curriculum and training. Hence, the role of higher education in developing these skills is necessary (Schroth, 2019). As Muktiarni et al. (2019) predicted, education should be adaptable to this change immediately. For this purpose, the universities need fundamental changes and restructuring (W4).

This study employed PRISMA methodology, and researchers attempted to examine as many relevant previous papers as feasible. The researchers expanded databases and search phrases as well as actively discussed any discrepancies to find a solution. The validity of the papers included in the evaluation was ensured by limiting our search to three databases known for their quality and contributions to research with the goal of providing this analysis from a global perspective. This study chose to focus on the quality of the papers rather than the depth of the study. However, this resulted in the selection of 47 publications with particular reference to Malaysia. However, the researcher could expand this study by incorporating additional databases, more studies from a broader range of nations, and generalizing the results.

CONCLUSION

This research is interested to investigate the unemployment trend in Malaysia due to skill mismatch. For this purpose, researchers reviewed 47 published articles in academic journals on unemployment, employability skills, and IR 4.0. This research revealed a significant contribution of skill mismatch to unemployment. From the reviewed literature, this research developed employability skills in two perspectives; (i) employability skills for the immediate industry needs and (ii) predicted employability skills for IR 4.0. Under the first category, this research mentioned 15 skills, while the second category discussed soft skills, hard skills, information literacy, and attitudes.

The skills that were identified as necessary to face the challenges of IR4.0 are major concerns of higher learning institutions. There are criticisms among academicians and scholars about universities' roles in preparing future workforce. If universities do not consider these skills and did not include a mechanism to develop these skills among students through curriculum and co-curriculum, the education and students' preparation will not be relevant to IR 4.0.

Hence, this research recommends that educational institutions consider the skills discussed in this research and to update the curriculum and instructional technologies in line with the vision of IR 4.0. This is the only way to address the issue of IR 4.0 and face its challenges.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the Ministry of Higher Education Malaysia for the financial support through the Fundamental Research Grant Scheme (FRGS) FP024-2018A (FRGS/1/2018/SSI09/UM/02/3).

REFERENCES

Abd Majid, M. Z., Hussin, M., Norman, M. H., & Kasavan, S. (2020). The employability skills among students of Public Higher Education Institution in Malaysia. *Geografia*, *16*(1).

Abelha, M., Fernandes, S., Mesquita, D., Seabra, F., & Ferreira-Oliveira, A. T. (2020). Graduate employability and competence development in higher education—a systematic literature review using PRISMA. *Sustainability*, *12*(15), 5900

Abdullah, Q. A., Humaidi, N., & Shahrom, M. (2020). Industry revolution 4.0: the readiness of graduates of higher education institutions for fulfilling job demands. *Romanian Journal of Information Technology and Automatic Control*, *30*(2), 15-26.

Adhisti, Mita. (2018). *Employers' Perspectives On Diploma Supplement to Enhance Graduate Employability*. Paper presented in AIMC 2017-Asia International Multidisciplinary Conference 40, pp.1170-1179 1170-1179. 10.15405/epsbs.2018.05.91.

Al-Jezeera (2022). Global employment won't recover before 2023: UN Labour body. Al-Jezeera. Retrieved from: https://www.aljazeera.com/economy/2022/1/17/global-employment-not-to-recover-before-2023-unlabour body#:~:text=The%20global%20unemployment%20rate%20is,above%205.4%20percent%20in%202019.

Ali, M. (2021). Vocational students' perception and readiness in facing globalization, industry revolution 4.0 and

society 5.0. In *Journal of Physics: Conference Series* (Vol. 1833, No. 1, p. 012050). IOP Publishing.

Al-Jubari, I., & Mosbah, A. (2021). Senior entrepreneurship in Malaysia: Motivations and barriers. *The Journal of Asian Finance, Economics and Business*, *8*(6), 277-285.

Ang, M.C.H. (2015). Graduate Employability Awareness: A Gendered Perspective. *Procedia-Social and Behavioral Sciences*, 211, 192-198.

Atasoy, H., Banker, R. D., & Pavlou, P. A. (2021). Information technology skills and labor market outcomes for workers. *Information Systems Research*, *32*(2), 437-461.

Azmi, I. A. G., Hashim, R. C., & Yusoff, Y. M. (2018). The employability skills of Malaysian university students. *International Journal of Modern Trends in Social Sciences*, *1*(3), 1-14.

Bardin, L. Análise de Conteúdo; Edições 70: São Paulo, Brazil, 2011; ISBN 978-85-62938-04-7.

Belderbos, T. (2019). The employability of international branch campus graduates: evidence from Malaysia. *Higher Education, Skills and Work-Based Learning*.

Belwal, R., Priyadarshi, P., Fazari, M. H. Al. (2017). Graduate attributes and employability skills. *International Journal of Educational Management*, 31(6), 814–827. https://doi.org/10.1108/IJEM-05-2016-0122.

Caruso L (2018) Digital innovation and the fourth industrial revolution: Epochal social changes? *Ai & Society* 33(3): 379–392

Chaka, C. (2020). Skills, competencies and literacies attributed to 4IR/Industry 4.0: Scoping review. *IFLA Journal*, *46*(4), 369-399.

Chen, K. W., & Guat, C. L. (2019, December). Unemployment insurance: A case study in Malaysia. In *AIP Conference Proceedings* (Vol. 2184, No. 1, p. 050038). AIP Publishing LLC.

Chan, S. W., Ahmad, M. F., Zaman, I., & Ko, W. S. (2018). Employers' perception on important employability skills in the manufacturing industry. *International Journal of Engineering & Technology*, *7*(2.29), 170-175.

D'Rozario, P., & Mishra, S. K. (2020). Contemporary Tibetan Literature in English: Witnessing Exile. *International Journal of English Literature and Social Sciences ISSN*, 2456-7620.

Fajaryati, N., & Akhyar, M. (2020). The employability skills needed to face the demands of work in the future: Systematic literature reviews. *Open Engineering*, *10*(1), 595-603

Field, R. (2019). Teaching resilience and self-management skills: Fostering student psychological wellbeing for future employability. In *Education for Employability (Volume 2)* (pp. 237-246). Brill.

Gowsalya, G., & Kumar, M. (2015). Employability skill: A literature review. *International Journal of Advanced Research in Computer Science and Management Studies*, *3*(3), 73-80.

Halili, S.H., Sulaiman, S., Hamidah, S., & Rafiza, R.. (2021). Embracing industrial revolution 4.0 in universities, IOP Conference Series: *Materials Science and Engineering, 1088*(1), 1-8.

Halili, S. H., & Sulaiman, S. (2021). Students' perception to integrate education 4.0 in Science program. *Multidisciplinary Journal for Education Social and Technological Sciences, 8*(1), 45-57

Haron, M. A., Hussain, M. A. M., Zulkifli, R. M., Nashir, I. M., & Ma'arof, N. N. I. (2019). Employability Skills Needed by Vocational College graduates: Feedback from the Industry. *Journal of Technical Education and Training*, *11*(4), 33-45.

Hanapi, Z., & Nordin, M.S. (2014). Unemployment Among Malaysia graduates: Graduates' attributes, Lecturers' Competency and Quality of Education. *Procedia - Social and Behavioral Sciences, 112*, 1056 – 1063

Hossain, M. I., Yagamaran, K. S. A., Afrin, T., Limon, N., Nasiruzzaman, M., & Karim, A. M. (2018). Factors influencing unemployment among fresh graduates: A case study in Klang Valley, Malaysia. *International Journal of Academic Research in Business and Social Sciences*, *8*(9), 1494-1507.

Hirschi, A. (2018). The fourth industrial revolution: Issues and implications for career research and practice. *The career development quarterly*, *66*(3), 192-204

Idkhan, A. M., Syam, H., Sunardi, S., & Hasim, A. H. (2021). The Employability Skills of Engineering Students': Assessment at the University. *International Journal of Instruction*, *14*(4), 119-134.

ILO (2020) What is skills mismatch and why should we care? International Labor Organization Website. Retrieved from: https://www.ilo.org/skills/Whatsnew/WCMS_740388/lang--en/index.htm

Ideen, A. I. G., Abumalloh, R. A., George, R. P., & Aldossary, D. A. (2018). Evaluation of graduate students employability from employer perspective: Review of the literature. *International Journal of Engineering &*

Technology, *7*(2.29), 961-966.

Ismail, R., Yusof, I., & Lai, W. S. (2011). Employers' perceptions on graduates in Malaysian service sector. *International Business Management, 5*(3), 84–193.

Jamaludin, S., Said, R., Ismail, N. W., & Nor, N. M. (2021). Are Jobs Available in the Market? A Perspective from the Supply Side. *Sustainability*, *13*(4), 1-18.

Jamaludin, K. A., Alias, N., DeWitt, D., Kenayathulla, H. B., & Razzaq, A. R. A. (2019). Employability skills valued by employers in malaysia. *JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik*, *7*(2), 30-37

Kadir, J. M. A., Naghavi, N., & Subramaniam, G. (2020). Unemployment among graduates-Is there a mismatch? *International Journal of Asian Social Science*, *10*(10), 583-592.

Khan, N., Khan, S., Tan, B. C., & Loon, C. H. (2021, February). Driving digital competency model towards IR 4.0 in Malaysia. In *Journal of Physics: Conference Series* (Vol. 1793, No. 1, p. 012049). IOP Publishing.

Karim, Z. I. A., & Maat, S. M. (2019). Employability skills model for engineering technology students. *Journal of Technical Education and Training*, *11*(2),79-87.

Kenayathulla, H. B., Ahmad, N. A., & Idris, A. R. (2019). Gaps between competence and importance of employability skills: evidence from Malaysia. *Higher Education Evaluation and Development*, *13*(2), 97-112.

Lim, Y-M, Teck, H.L., Ching, S.Y., & Chui, C.L. (2016). Employability skills, personal qualities, and early employment problems of entry-level auditors: Perspectives from employers, lecturers, auditors, and students. *Journal of Education for Business*, *91*(4), 185–192.

Lim, H-E. (2008). Feasibility of early identification of low employability graduates in Malaysia. *Malaysian Journal of Economic Studies*, *45*, 2, 95.

Lisá, E., Hennelová, K., & Newman, D. (2019). Comparison between Employers' and Students' Expectations in Respect of Employability Skills of University Graduates. *International Journal of Work-Integrated Learning*, *20*(1), 71-82.

Lizut, J., Marzano, G., & Grewinski, M. (2018, May). Educating for Future Jobs. In *Society. Integration. Education. Proceedings of the International Scientific Conference* (Vol. 5, pp. 338-347).

Majid, F.A (2019). GPA, IR4. 0 and graduate employability from the lens of the academics. *Asian Journal of University Education,15*(3), 245-256

Malaysian Qualifications Agency (MQA) (2017). Malaysian qualifications framework (MQF) version 2.0 draft:stakeholders' consultation. Retrieved from http://www.mqa.gov.my/PortalMQAv3/dokumen/maklum%20balas/MQF%20V2%20DRAFT3.pdf.

Mian, S. H., Salah, B., Ameen, W., Moiduddin, K., & Alkhalefah, H. (2020). Adapting universities for sustainability education in industry 4.0: Channel of challenges and opportunities. *Sustainability*, *12*(15), 1-31.

Misra, R. K., & Khurana, K. (2018). Analysis of employability skill gap in information technology professionals. *International Journal of Human Capital and Information Technology Professionals (IJHCITP)*, *9*(3), 53-69.

Mohd, K, F., Hamid, R., Mutalib, A. A., & Rasul, M. S. (2020). Communication skills attributes for IR 4.0 for engineering graduates. *European Journal of Molecular & Clinical Medicine*, *7*(08), 1-18.

Mohamed, M. (2018). Challenges and benefits of industry 4.0: An overview. *International Journal of Supply and Operations Management*, *5*(3), 256-265.

Muktiarni, M., Widiaty, I., Abdullah, A. G., Ana, A., & Yulia, C. (2019, December). Digitalisation trend in education during industry 4.0. In *Journal of Physics: Conference Series* (Vol. 1402, No. 7, p. 077070). IOP Publishing.

Nisha, S. M., & Rajasekaran, V. (2018). Employability skills: A review. *IUP Journal of Soft Skills*, *12*(1), 29-37.

Pussegoda, K.; Turner, L.; Garritty, C.; Mayhew, A.; Skidmore, B.; Stevens, A.; Boutron, I.; Sarkis-Onofre, R.;Bjerre, L.M.; Hróbjartsson, A. (2017). Systematic review adherence to methodological or reporting quality. *Syst. Rev., 6,* 131-142.

Pauceanu, A. M., Rabie, N., & Moustafa, A. (2020). Employability under the fourth industrial revolution. *Economics & Sociology*, *13*(3), 269-283.

Rahmat, M., Ahmad, K., Idris, S. & Zainal, N.F.A. (2012). Relationship Between Employability and Graduates' Skill. *Procedia - Social and Behavioral Sciences*, *59*, 591- 597.

Saari, A., Rasul, M. S., Yasin, R. M., Rauf, R. A. A., Ashari, Z. H. M., & Pranita, D. (2021). Skills sets for workforce in the 4th industrial revolution: Expectation from authorities and industrial players. *Journal of Technical*

Education and Training, *13*(2), 1-9.

Safrankova, J. M., Sikyr, M., & Skypalova, R. (2020). Innovations in workforce management: Challenges in the Fourth Industrial Revolution. *Marketing and Management of Innovations, 2*, 85-94.

Sani, A., & Jamil, H. (2022). Entrepreneurship curriculum practice in Malaysian universities: successes and challenges. *International Journal of Applied Management Science*, *14*(2), 160-170.

Schroth, H. (2019). Are you ready for Gen Z in the workplace? *California Management Review*, *61*(3), 5-18.

Seers, K. (2015). Qualitative systematic reviews: their importance for our understanding of research relevant to pain. *British journal of pain*, *9*(1), 36-40.

Shevchuk, A., Strebkov, D., & Davis, S. N. (2019). Skill mismatch and work-life conflict: The mediating role of job satisfaction. *Journal of Education and Work*, *32*(2), 181-195.

Shaffril, H. A. M., Samah, A. A., & Kamarudin, S. (2021). Speaking of the devil: a systematic literature review on community preparedness for earthquakes. *Natural Hazards*, 1-27.

Shafie, L.A. & Nayan, S. (2010). Employability Awareness Among Malaysian Undergraduates. *International Journal of Business and Management*, *5*(8), 119-123.

Sofiah, A. (2022). "Continued growth in number of employed persons in Feb 2022: DOSM", Human Resource Online. Retrieved from:https://www.humanresourcesonline.net/continued-growth-in-number-of-employed-persons-in-feb-2022 dosm#:~:text=Unemployment%20rate%20dropped%20to%204.1%25&text=Accordingly%2C%20February's%20unemployment%20rate%20edged,500%20thousand%20in%20February%202021.

Sohimi, N. E., Affandi, H. M., Rasul, M. S., Yasin, R. M., Nordin, N., & Adam, S. (2019). Malaysian industrial collaborations for skills development in 4th industrial revolution. *Journal of Technical Education and Training*, *11*(3), 63-72.

Succi, C., & Canovi, M. (2020). Soft skills to enhance graduate employability: comparing students and employers' perceptions. *Studies in higher education*, *45*(9), 1834-1847.

Sum, S. M., Ramli, Z., & Sabri, N. S. M. (2021). Kesediaan graduan memilih keusahawanan sebagai bidang kerjaya. *Georgrafia-Malaysian Journal of Society & Space, 17*(4) 17-29

Suarta, I. M., Suwintana, I. K., Sudhana, I. F. P., & Hariyanti, N. K. D. (2017). Employability skills required by the 21st-century workplace: A literature review of labour market demand. *Advances in Social Science, Education and Humanities Research*, *102*(58), 337-342.

Sparreboom, T., & Tarvid, A. (2014). Skills Mismatch in Europe: statistics brief. *International Labour Office, Department of Statistics. Geneva*. Retrieved from: https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---migrant/documents/publication/wcms_548911.pdf.org)

Teng, W., Ma, C., Pahlevansharif, S., & Turner, J. J. (2019). Graduate readiness for the employment market of the 4th industrial revolution: The development of soft employability skills. *Education+ Training*, *61*(5), 590-604.

Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2019). Determinants of 21st-century digital skills: A large-scale survey among working professionals. *Computers in human behavior*, *100*, 93-104.

Verma, P., Nankervis, A., Burgess, K., & Dhakal, S.P. (2019). Conceptualising Graduate Work-Readiness: Theories, Concepts and Implications for Practice and Research. In The Transition from Graduation to Work Challenges and Strategies in the Twenty-First Century Asia Pacific and Beyond, 15-29. Singapore: Springer.

Woya, A. A. (2019). Employability among statistics graduates: Graduates' attributes, competence, and quality of education. *Education Research International*, *2019*.

Yüceol, N. (2021). The Steps to be Taken in Higher Education for Successful Adaptation to Industry 4.0. *Yükseköğretim Dergisi*, *11*(3), 563-577.

Zaman, D. S. (2021). The roots of 21st century Malay anger: When young men and women come to the fore. *International Journal of Interreligious and Intercultural Studies*, *4*(2), 66-74.

Zuhairi, F. F. M., Ibrahim, C. K. I. C., & Belayutham, S. (2018). Analysis of employability skills for future civil engineers in the Malaysian construction industry. *International Journal of Continuing Engineering Education and Life-Long Learning*, *28*(3-4), 310-336.