# Hybrid Skills Framework in The IR4.0 and Recruitment Decisions in Hiring Graduates: A Malaysian Employer's Perspective

**Muhamad Khalil Omar[1]*, Idaya Husna Mohd[1], Mohd Zulhafiz Wan Zahari[2], Nurhidayah Azmy[3]**

**[1]Faculty of Business and Management, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia**

**[2]Ahmad Ibrahim Kulliyyah of Laws, International Islamic University Malaysia, Gombak, Kuala Lumpur, Malaysia**

**[3]Faculty of Civil Engineering Technology, Universiti Malaysia Pahang, Pekan, Pahang, Malaysia**

***Corresponding Author**

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## ABSTRACT

This case study paper explores the integration of skills graduates should possess to meet employers' expectations in the IR4.0 era and to what extent the hybrid skills demanded may impact employment. The construction of skills integration later will lead to the development of hybrid skills framework and recruitment decisions in the IR4.0 era for future job demands.

The hybrid skills framework is developed to facilitate graduates' employability in the IR4.0 era and future job demands. A case study approach was adopted to construct a hybrid skills framework based on Malaysian employers' opinions through semi-structured interviews conducted via online digital platforms.

**Design/methodology/approach**– Case study data were collected through interviews with 10 Malaysian employers with extensive experience hiring graduates in the IR4.0 era. The recorded data were transcribed, and the transcripts were subjected to content analysis.

**Findings**- There is consensus on the need for hybrid skills to meet the IR4.0 job demands, which vary depending on the organisation's sectors. The hybrid skills framework was constructed into four components: personal-soft digital, socio-soft digital, method-soft digital and neo-technical skills. The construction of hybrid skills leads to discovering how the hybrid skills influence employers' recruitment decisions, leading to noteworthy findings.

**Research implications**- This study suggests that higher education institutions, policymakers, and employers should reorientate their efforts to assist graduates in developing hybrid skills that promote employability to meet future job demands. This study creates a nexus between human capital investment and an organisation's resources in discovering hybrid talents and their impacts on recruitment.

**Originality/Value**- The study represents a hybrid skills framework that heavily influences Malaysian employers' recruitment decisions. The hybrid skills framework provides a trajectory for stakeholders to recognise and solve the lack of skills issues among the graduates. Moreover, this is the first study that explores the nexus between skills and employers' recruitment strategies in the IR4.0 era in a Malaysian context.

**Keywords**: Graduates skills, recruitment decisions, employability framework, Industry 4.0

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# INTRODUCTION

'IR4.0' shows rapid digital technology development, blurring physical, digital, and biological spheres (Trauth-Goik, 2021). Digital transformation integrated production, processing, and information flows online using Big Data, IoT, AI, Cloud Computing, and devices (Caruso, 2018). In Malaysia, IR4.0 technologies are expected to rise in manufacturing and services, requiring graduates to have the right skills (Hecklau et al., 2016; MITI, 2018). Therefore, the “Hybrid Skills Framework" in the context of the Fourth Industrial (IR4.0) is needed. This framework refers to a structured approach to developing and integrating a combination of technical and non-technical skills essential for thriving in a rapidly evolving technological landscape. IR4.0 is characterized by the fusion of advanced technologies such as artificial intelligence, robotics, the Internet of Things (IoT), and big data analytics, which are transforming industries and creating new job roles that require a blend of diverse skill sets.

The key components of the Hybrid Skills Framework consist of (i) Technical Skills, i.e., Digital Literacy: Understanding and using digital technologies effectively, Data Analytics: Collecting, processing, and interpreting large datasets to inform decisions, Programming and Coding: Writing and understanding code to develop software and algorithms, Cybersecurity: Protecting systems, networks, and data from digital attacks, Artificial Intelligence and Machine Learning: Developing and applying AI and ML models to solve problems and improve processes, and Automation and Robotics: Designing, programming, and managing automated systems and robots, (ii) Non-Technical Skills, i.e., Critical Thinking and Problem-Solving: Analyzing complex problems and developing innovative solutions, Creativity and Innovation: Generating new ideas and approaches to improve products and processes, Communication and Collaboration: Effectively sharing information and working with diverse teams, Emotional Intelligence: Understanding and managing one’s own emotions and those of others to enhance interpersonal relationships, Adaptability and Lifelong Learning: Being flexible and continuously updating skills to keep pace with technological advancements.

Hence, this paper breaks new ground in hybrid skills from employers' perspectives, case studies, and previous literature and practice. The Resource-Based View and Human Capital Theory are the foundation for this study. Investing in skill development forms results in competitive advantage, increasing the likelihood of individuals, especially graduates, finding employment in the IR4.0 setting. The hybrid skills framework helps future researchers develop a strategic policy for employment sustainability in the digital age and supports higher education institutions in mapping current courses with hybrid skills to produce quality graduates.

The framework also allows government institutions to develop graduate execution strategies and negotiate with employers to create long-term programmes that invest in technological facilities to boost IR4.0 development. Hence, hybrid skills framework. This case study paper's structure: Section 2 covers related works and theories. Section 3 covers the study methodology. Section 4 contains case study findings and discussions. Section 5 discusses theoretical, managerial, and practical implications. Section 6 presents conclusions.

### Research Questions

What is the hybrid skills framework for graduates to meet industry expectations for

### IR4.0-related job demands?

How the hybrid skills framework is explored to impact employers’ recruitment decisions in the IR4.0 era?

### Research Objectives

To develop the hybrid skills framework graduates should possess to meet industry

**Expectations for IR4.0-related job demands.**

To explore how the hybrid skills framework impacts employers' recruitment decisions in the IR4.0 era

**Statement of the Problem**

The unemployment rate of graduates is expected to rise to 13.8% due to the pandemic of Covid-19 (Danial Dzulkifly, 2020). A recent news report uncovered employers' eagerness to call for employable graduates with multiple skills, including digital, analytical and creative thinking, rejecting the speculations for only hiring high-skilled workers (New Straits Times, 2021).

A study on career readiness confirmed that Malaysian graduates lack creative thinking, teamwork, and analytical and digital skills (Foong, 2019; Supian et al., 2020). The graduate's lack of skills to adapt to the new digital workplace and the insufficient focus on digital literacy and innovation in education results in graduates' inability to adapt to the digital environment, contributing to unemployment (Lee, 2020; Sani, 2019).

IR4.0 graduates face a challenging job market. It hits differently than ever. The changing job economy is a result of technological advancements. A recent study has found it difficult to capture and integrate the talents sought by companies due to their diversity (Flores et al., 2020; Hecklau et al., 2016).

What businesses seek and what graduates can deliver are in conflict. Due to digital technology, the organisation has trouble managing a talent pool with the required competencies to react to changing business ecosystems (Bag et al., 2018). Economists and labour market specialists found a grey area in defining the correct balance of skills particular jobs will need in the digital age (Weaver, 2017). Burning Glass Technologies (2019) described hybrid talents as combining technological and non-technical skills.

While the term hybrid skills are relatively new, the phenomenon is not. Hybrid skills combine human and intelligent technology to perform tasks. IR4.0 requires non-technical skills, knowledge of IT, modern interfaces, and IT security (Gehrke, 2015; Lorenz et al., 2015). Even before digital technology changed jobs, researchers found vast skill sets. As the technology evolved, non-technical skills were needed to perform IR4.0 tasks. Researchers have stressed the importance of combining non-technical and technical skills (Cicek et al., 2019; Hecklau et al., 2016; Kazancoglu& Ozkan-Ozen, 2018; Lee, 2019; Raybould & Sheedy, 2005).

## RESEARCH METHODOLOGY AND DESIGN

This paper employs a single case study. A case study is employed when there are no clear findings for the intervention (Yin, 2009). A case is a single thing with study limits (Merriam, 1998). Case studies can analyse an individual, group, organisation, programme, project, or community (Merriam, 1998). This study focused on experienced hiring professionals who work with IR4.0-enabled businesses. Therefore, selecting a case study as a study method is deemed relevant.

This study will begin by focusing on the manufacturing and service industries as they relate to the growth of IR4.0.

The selection of industries or sectors was gathered from MITI's official websites, which provide information on the sectors actively advancing toward IR4.0 technology implementation. Ten hiring professionals representing ten organisations that implement at least one of the IR4.0 technology features participated in these studies.

Two participants work in manufacturing sectors serving the construction and food manufacturing industries. In

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contrast, the remaining eight professionals perform in the service sectors, operating in various industries, including consultation, construction, legislation, finance technology, transportation, and telecommunications. The organisation's background and participant information are listed in Table I and Table II below.

**Table 1**: Organisation's background

| **Organisation** | **Industry/Sector** | **Technology Adoption** |
|---|---|---|
| ZYG | Manufacturing/Construction | • Additive Manufacturing |
| | | • Internet of Things (IoT) |
| | | • Big Data and analytics |
| HG | Services/Finance Technology | • Internet of Things (IoT) |
| | | • Big Data and analytics |
| | | • Cloud Computing |
| | | • Cybersecurity |
| AK | Services/Airline Services | • Internet of Things (IoT) |
| | | • Cybersecurity |
| | | • Cloud Computing |
| | | • Simulation |
| OD | Services/ Airline Services | • Internet of Things (IoT) |
| | | • Cybersecurity |
| | | • Cloud Computing |
| | | • Simulation |
| RKV | Manufacturing/Food Emulsifier | • Autonomous Robots |
| | | • Additive Manufacturing |
| CG | Services/ Cloud Technology | • Internet of Things (IoT) |
| | | • Big Data and analytics |
| | | • Cloud Computing |
| | | • Cybersecurity |

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| | | |
|---|---|---|
| THC | Services/Legislative | • Internet of Things |
| | | • Cloud Computing |
| | | • Information Media |
| NYC | Services/Legislative | • Internet of Things |
| | | • Cloud Computing |
| | | • Information Media |
| SJV | Services/Construction | • Internet of Things |
| | | • Cloud Computing |
| | | • 3D printing |
| ZLT | Services/Construction | • Internet of Things |
| | | • Cloud Computing |
| | | • 3D printing |

The profiles of the industries interested in engaging in this study are summarised in Table I. This survey revealed that all organisations utilise at least two IR4.0 pillars to support their business operations. This study invited eighty-five respected organisations to participate. Ten organisations reacted positively and expressed interest in participating in this study. The remaining eighty-nine possible participants declined the invitation for various reasons, including scheduling constraints and last-minute cancellations due to coronavirus infection. The person in charge was laid off due to the organisation's financial situation.

Participants with substantial expertise in the hiring workforce and directly involved in hiring choices were asked to participate in a virtual interview session with organisations that met the inclusion requirements. In this study, selecting participants from among the hiring professionals is deemed relevant.

**Table 2**: Participant's background

| **Organisation** | **Position** | **Working Experiences** | **Industry/Sectors** |
|---|---|---|---|
| Participant 1 | Head of Department, Human Resource | 5 years | Manufacturing/Construction |
| Participant 2 | Chief Executive Officer | 3 years | Services/Finance Technology |
| Participant 3 | Assistant Manager | 5 years | Services/Airline Services |
| Participant 4 | Human Resource Executive | 3 years | Services/ Airline Services |
| Participant 5 | Material Planning Manager | 13 years | Manufacturing/Food Emulsifier |
| Participant 6 | Human Resource Executive | 4 years | Services/ Cloud Technology |

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| | | | |
|---|---|---|---|
| Participant 7 | Chief Executive Officer | 10 years | Services/Legislative |
| Participant 8 | Managing Partner/Human Resource Manager | 15 years | Services/Legislative |
| Participant 9 | Human Resource Manager | 12 years | Services/Construction |
| Participant 10 | Chief Executive Officer | 10 years | Services/Construction |

The IR4.0 industry's personnel are summarised in Table II above. As a result of listening to their experiences and participation in sharing sessions, their thoughts on the present employment trend of graduates offered a new perspective on enhancing graduates' employability. The selection of interview informants replicates the process utilised by (Jonbekova, 2015), which involves the selection of employers participating in recruiting and selection. Employers were selected in a manner that enabled the discovery of disparities in the occurrence, types, and causes of skills mismatch by industry, institution type, and location. This study utilised the authors' criterion about the experience of employers in recruitment and selection.

**Interview Protocol**

The interviews were carried out in a virtual format using digital platforms. The virtual interview took place between January and April of 2022. During the first phase, the study obtains data about the following potential participants, including position and personal contact information. In the first to the third week of January, the study made phone calls to eighty-five potential study participants to inform them of the intention to interview them. During this time, the researchers were responsible for collecting relevant information, such as the official working email address, for giving study-related details and attachments. After the phone session, an invitation email for a virtual interview was given to the participants. This stage is essential for providing potential participants with information about the study topic and allowing employers to participate in the interview sessions.

The study begins this interview technique by defining the primary issue categories to be investigated. Each topic domain yields 'lead-in' questions that are anticipated to become 'follow-up' queries. The follow-up questions aid the study in gaining a deeper understanding of the actual phenomenon without explicitly asking the participants about the primary focus. To prevent bias and discomfort, Carspecken's model indicated that interview questions should be referenced indirectly.

The employers will have diverse viewpoints regarding this inquiry, depending on the industry in which each participant operates. Thus, it is essential to have a systematic framework for conducting the interview that matches the primary objectives. This study employed semi-structured interviews for this purpose. Based on Carspecken, semi-structured interview questions will be constructed (1996). The framework developed by Carspecken gives a complete guideline applicable to numerous fields, including the social sciences. Carspecken established a rigorous qualitative study technique that emphasises designing study projects by developing semi-structured interview questions based on social science data collection protocols and building questions mapped to study questions and objectives. A semi-structured interview is a set of predetermined questions on a specific topic that guides the interviewer to ask questions chronologically (Lune & Berg, 2017). It allows the interviewer to probe for more answers and clarifications. A semi-structured interview elicits participant perspectives on a study topic (Guion et al., 2011). Semi-structured interviews were chosen as the study instrument because they provide answers aligned with the study's objective, question, and the relationship between events and actions (Lune & Berg, 2017).

**Content Analysis of Transcripts**

This study has employed a content analysis making this study unique from previous studies. Definition of qualitative content analysis is a research method for the subjective interpretation of text data content through

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the systematic classification process of coding and identifying themes or patterns (Hsieh & Shannon, 2005). Researchers regard content analysis as a versatile method for analysing text data (Cavanagh, 1997). The term "content analysis" refers to a group of analytic approaches that range from impressionistic, intuitive, and interpretive analyses to systematic, strict textual analyses (Rosengren, 1981). The specific content analysis approaches a researcher chooses depends on the researcher's theoretical and substantive interests and the problem being studied (Weber, 1990). Although the flexibility of content analysis has made it useful for a wide range of researchers, the lack of a firm definition and procedures has potentially limited its application (Tesch, 1990).

Since the definition of content analysis always involves classifying it as primarily a qualitative versus quantitative research method, Hsieh and Shannon (2005) identified three distinct approaches: conventional, directed, and summative. In this study, the researcher uses conventional content analysis to extract specific categories during data analysis. Conventional content analysis is typically used with a study design to describe a phenomenon (Hsieh & Shannon, 2005). This study intends to explore the real phenomenon and better understand hybrid skills and how these skills impact an employer's recruitment strategy. Therefore, conventional content analysis deems relevant for this study. In conventional content analysis, categories are created during data analysis from the data (Hsieh & Shannon, 2005). Instead of using rigid categories (Kondracki & Wellman, 2002), researchers let the categories and their names emerge from the data. Researchers immerse themselves in data to allow for the emergence of new insights (Kondracki & Wellman, 2002), also known as inductive category development (Mayring, 2000).

The chosen content analysis model for the transcripts was created in response to the conventional, inductive content analysis described by Hsieh and Shannon (2005) and Zhang and Wildemuth (2009). Inductive content analysis is characterised as follows:

1. Qualitative content analysis entails a procedure designed to categorise or identify themes from raw data based on valid inference and interpretation. Using inductive reasoning, themes and categories emerge from the data because of the researcher's careful examination and constant comparison Zhang and Wildemuth (2009)

The conventional content analysis approach described by Hsieh and Shannon was utilised to inform the model of questioning during data collection, thereby facilitating the inductive content analysis of the collected data. Utilising the Hsieh and Shannon method, a two-stage content analysis was developed for this study. The basic procedure can be described as follows:

2. If information is gathered through interviews, open-ended questions will be utilised. In addition, questions are frequently open-ended or tailored to the participants' comments rather than a predetermined theory. For instance, "can you tell me more?". As one would with a novel, data analysis begins with repeated data reading to achieve immersion and obtain a sense of the whole (Tesch, 1990).

3. To derive codes, data are read word-by-word (Miles and Huberman, 1994; Morgan, 1993; Morse and Field, 1995) by first highlighting the exact words from the text and making notes of their initial impressions, thoughts, and analysis. As this procedure progresses, labels for codes emerge that reflect more than one central idea. These frequently originate directly from the text and become the basis for the initial coding scheme (Hsieh and Shannon, 2005)

Based on the models adapted from Zhang and Wildemuth and Hsieh and Shannon, this study conducted a content analysis of the transcripts, where themes were identified from the recorded interviews. Next, the researchers conducted coding analysis from the identified themes using the aid of technology, which is NVivo 12 software.

In qualitative data analysis, technology will steer the study on a particular path (Bassett, 2004). Using

technology to analyse qualitative data will expedite and simplify the management of data analysis according to a specific subject, enhancing the overall picture of the study. Computer-Aided Qualitative Data Analysis Software (CAQDAS) 'NVivo' version 12 is used to manage textual data as the principal tool for direct transcription of interview recordings. However, data analysis will also require particular processes to determine the major themes, which will require human inspection of textual material by the study (Nowell et al., 2017). Consequently, a thematic analysis is added to evaluate qualitative data by acquainting the results by creating codes and themes and eventually tying these themes to a bigger picture within the literature (Nowell et al., 2017; Riggs, 2015).

### Trustworthiness in Qualitative Research

Four criteria must be met to create trustworthiness in qualitative research: credibility, dependability, conformability, and audit trails (Nowell et al., 2017). The first is about the legitimacy of doing a qualitative study. This is emphasised in determining whether the participants believe the study is acceptable based on their experience (Lincoln & Guba, 1986). Prolonged participant engagement, divergent case analysis, and triangulation can all lead to a believable conclusion. Three factors were used to determine credibility in this study. First, this research will ask questions about the organization's history and the nature of the business. This is done to ensure that the criteria and research objectives are met.

Second, questions on participants' roles in their organisations will be used in this study. To respond to all research questions, comments, and experience from recruitment professionals to play a critical role in discovering the talents that meet the employment market.

Third, by debriefing the questions through the participants, this study ensures credibility by confirming whether the interview questions correspond with the nature of the study and current scenario. Validity occurs when the researcher's interests, biases, objectives, or viewpoints only base the study conclusions on uninvolved or influenced participant experiences (Lincoln & Guba, 1986). The validity, on the other hand, validates the phenomenon's presence in their experience. Validity can be assessed during the auditing process by delivering a report of the results and supporting evidence. This study demonstrates the validity of peer debriefing, as proposed by Lincoln and Guba (1986). The researcher verifies the interview transcript and solicits comments from non-researching professionals. This study demonstrates the validity by soliciting information from a prominent university's HR specialist and qualitative researcher.

## LITERATURE REVIEW

### Related Works

The growing demand for digital skills requires a combination of talents. Van Laar et al. (2017) found that digital technology-related tasks require non-technical skills like creative thinking, problem-solving, critical thinking, and information. Numerous studies have emphasised the importance of combining non-technical and technical skills from an employer's perspective (Cicek et al., 2019; Hecklau et al., 2016; Kazancoglu & Ozkan-Ozen, 2018; Lee, 2019; Raybould & Sheedy, 2005). IR4.0 requires a high level of adaptation and knowledge acquisition to manage complex technologies (Kipper et al., 2021)

Hecklau et al. (2016) created a competence model to map professionals' upskilling and retention skills. Hecklau et al. (2016) identified technical, methodological, social, and personal talents. This model helps HRM match employees' competencies and qualifications in the industrial sector to retain manufacturing employees in the IR4.0 workplace. Even though this article identified IR4.0 competencies, it does not address the hybridising skills needed to complete jobs in a digital environment, such as cloud computing and IoT. This is

likely because the organisation prioritises non-technical skills over technical ones.

Hernandez-de-Menendez et al. (2020) adopted Hecklau et al. (2016) study to create assessment models to

evaluate industrial competencies for training, allowing managers to assess employees' IR4.0 system operating skills. The authors emphasised competency evaluations, such as the Microsoft Digital Literacy Test, evaluating employees' proficiency with information and communication technologies, such as computer fundamentals and computer security. However, the exact IR4.0 skills are unknown (Hernandez-de-Menendez et al., 2020). In recent years, there's been more interest in examining the roles of employees, employers, higher education, and educators in promoting graduate employability (Alshare, 2018; Ismail & Hassan, 2013; Okolie et al., 2019; Whysall et al., 2019). To align with the current industrial revolution, it is essential to investigate the new mechanism to boost graduates' employability by analysing future employers' options.

### Hybrid Skills and Recruitment Decisions

HRM's most difficult hiring practice is finding applicants with the required hybrid skills (Oswal et al., 2021). Subpar recruitment costs money and time (Hmoud, 2019; Oswal et al., 2021). IR4.0 has brought massive changes and difficulties for employers, forcing them to reduce staff and replace human expertise with technology (Agarwal et al., 2021). Even if IR4.0 employers can thrive by ignoring digital technology in recruiting and selection, the organisation must reinvent its hiring tactics to hire talented individuals compatible with its digital technology (Agarwal et al., 2021)

Whysall et al. (2019) emphasised talent development over fresh talent recruitment. However, current employment requirements are incompatible with existing workforce skills. Employers who embrace digitised manufacturing are surprisingly open to hiring young, talented, multiskilled workers (Ghobakhloo & Fathi, 2020). A study found that most industry players are satisfied with interns and will likely hire them after graduation (Feijoo et al., 2019).

Firms save time and money during hiring (Hollister et al., 2017; Lepisto & Ihantola, 2018). An internship alone won't develop many talents, including personal skills (Feijoo et al., 2019). Study shows that a candidate's CV affects interview prospects. Lepisto and Ihantola (2018) found that the hiring process begins with shortlisting applicants by screening and classifying their cover letters and CVs. In IR4.0, AI replaces traditional recruitment and selection procedures. Massive data analysis and machine learning are the heart of AI. In HR, AI chat-box technology is used to arrange interviews and filter candidates using robots with predictive algorithms (Samarasinghe & Medis, 2020). A recent UAE study found that AI improves the organisation on multiple levels, including cost and time savings in candidate screening, effective decision-making, and enhanced recruitment and selection (Oswal et al., 2020). Companies evaluate personal skills during recruitment and selection (Kazancoglu & Ozkan-Ozen, 2018). Hmoud (2019) acknowledges the human touch in recruitment decisions.

## FINDINGS AND DISCUSSIONS

### Hybrid Skills that Employers Need

Initial coding results in the development of hybrid skills. This part is focused on hybridising abilities, including social, technical, methodological, personal, and digital skills of a different organisation (Hecklau et al., 2016). This section addresses the initial study topic regarding the hybrid skills of employees in the IR4.0 era. This section will categorise the findings according to the experience of employers in employing graduates. It was found that the objectives of the Hybrid Skills Framework involves (i) Bridging Skill Gaps: Addressing the gap between current workforce capabilities and the demands of new job roles created by IR4.0, (ii) Enhancing Employability: Equipping individuals with a versatile skill set that enhances their employability and career prospects, (iii) Promoting Innovation: Encouraging the development of innovative solutions and practices that leverage new technologies, (iv) Supporting Organizational Transformation: Helping organizations transition smoothly into the digital era by ensuring their workforce is proficient in both technical and non-technical skills, and (v) Fostering Lifelong Learning: Instilling a culture of continuous learning and skill development to keep up with technological progress. Figure 1 delineated the hybrid skill echoed mainly by employers in recruiting graduates in the IR4.0 era.

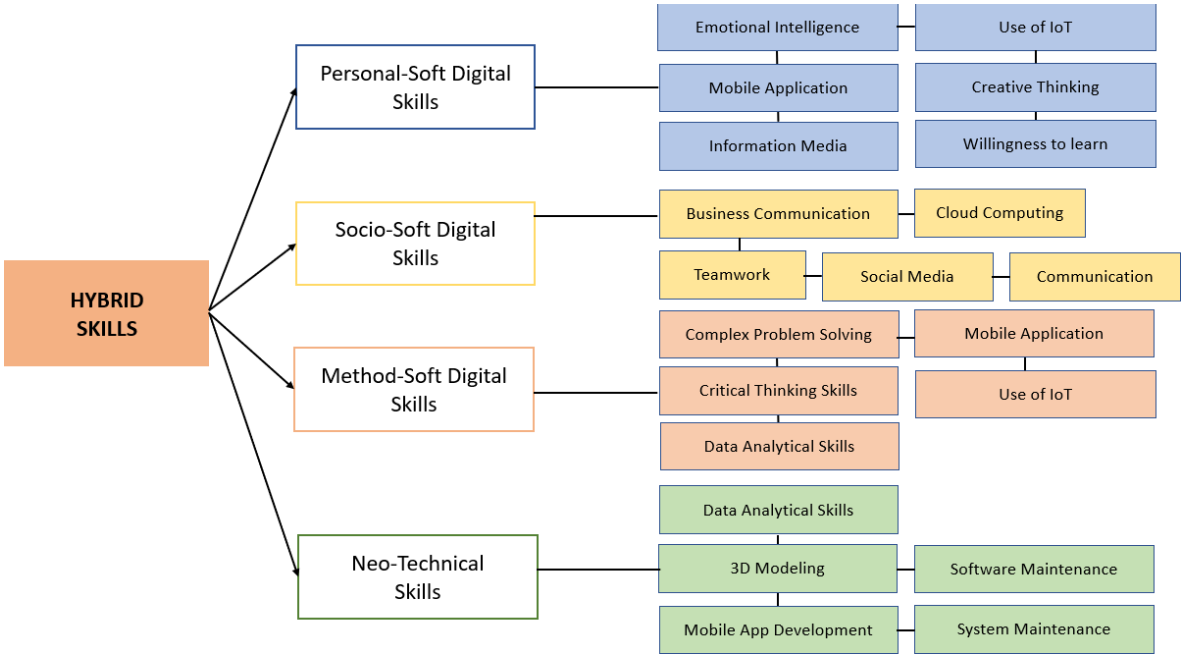


**Figure 1**: Hybrid Skills Framework

**Personal-Soft Digital Skills**

The first theme of hybrid skills is personal-soft digital skills. From the employer's viewpoint, personal skills are a prerequisite for the individual. This study found six sub-themes that lead to the construction of personal-soft digital skills. Interestingly, personal-soft digital skills are in accord with recent studies indicating that individuals who possess digital skills with excellent personal characteristics often receive exclusive benefits in the workplace (Bokek-Cohen, 2018). This result may be explained by the fact that the combination of the hybrid skills is highly valued by employers and a good investment in increasing human capital values to gain higher income.

In this study, a coding analysis, as portrayed in Figure 1,revealed that working in a high-pressure situation, having high emotional intelligence, and being eager to learn were significant predictors of success, complementing candidates' adaptability to digital technologies such as the use of Internet of Things and cloud computing. The personal-soft digital skills frequently involve completing activities in a positive emotional state and extensive knowledge of how to use digital programmes to handle general technical challenges.

**Table 3**: Personal-Soft Digital Codes

| Component | Codes | Frequency |
|---|---|---|
| Personal-Soft Digital Skills | Product familiarisation in digital applications | 6 |
| | Know how technology works and learn independently | 72 |
| | Assist clients in using digital technology | 23 |
| | Handle emotions in dealing with complex technology | 8 |
| | Cope with unstable emotions in handling reluctant clients | 20 |
| | Able to work under pressure in performing a technical task | 9 |

This study found that personal-soft digital skills are essential when dealing with other people's emotions and behaviours, especially clients, whether corporate clients or customers. Employers view personal-soft digital skills as crucial, even though they were just added to the hybrid skills framework. In addition to IoT and Big

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Data, the employer values Digital Literacy in mobile apps and Information Media skills. Such structures are logical for a company's reputation and customer retention.

"We often face issues of passengers not familiar with the flight booking in our mobile applications, and we received massive complaints and disputes." (Employer 3)

"…the willingness to learn more, do more, accept more. Willing to learn and don't take many orders as a burden, we want them to take as the opportunity." (Employer 7)

Generally, personal-soft digital skills combine personal talents with an understanding how digital technologies function. Personal-soft digital skills are essential when dealing with emotionally sensitive topics. Therefore, the power of future graduates to recognise other people's emotions and demonstrate appropriate responses to those emotions will be of increasing value.

**Socio-Soft Digital Skills**

The second theme is socio-soft digital skills. Soft-digital skills integrate social skills and soft-digital skills in executing the work. Based on the analysis of coded data, this study discovered that social-soft digital skills as the primary theme are closely related to utilising social skills such as communication, language, teamwork, and negotiation. The coding examination also coded social media, IoT, and Big Data into the soft-digital category, which frequently corresponded to social skills. Socio-soft digital skills involve the capacity to communicate while utilising digital technologies to complete a specified goal. The previous study has proven, as demonstrated by the present findings, that graduates' digital skills substantially impact their social skills (McDougall et al., 2018). This may be because graduates with sophisticated digital skills may be more confident in expressing their thoughts and applying skills throughout the employment process. Table IV below entails the frequent codes often echoed by employers when asked about integrating social and digital skills.

**Table 4**: Socio-Soft Digital Codes

| Component | Codes | Frequency |
|---|---|---|
| Socio-Soft Digital Skills | Maintaining big data and presenting the data | 10 |
| | Communicate with digital application | 47 |
| | Basic technical knowledge to secure sales | 8 |
| | Basic understanding of products and negotiation skills | 5 |
| | Manage social media and secure sales | 42 |
| | Basic knowledge of cloud computing and communication skills | 75 |
| | Communicate through a digital platform | 92 |
| | Understand the job roles to perform a specific task | 46 |
| | Understand digital system | 16 |
| | Technology and social connection | 64 |
| | Digital technology to connect customers and potential client | 84 |

Organisations in the IR4.0 environment, whether in the early stages of development or with a significant reliance on technology, pay particular attention to aligning these two skills with business strategy and organisational objectives. An organisation needs to have plentiful internal resources, such as technological

advancements and a significant personnel pool, to have a competitive advantage. In addition, the operation of the high technology system requires human talent. As a result, the employer needed candidates to be adept with digital technology and possess remarkable social skills to communicate with business clients and the team.

"We need people with basic knowledge of cloud computing and web development with good communication skills to convince our business client." (Employer 6)

"When we have her, all the social media content becomes easier because she has many followers, and she tells the followers what she does." (Employer 8)

As a lawyer, I believe we need a revolution. We look at someone who can, as an officer and a lawyer, we will interact with people a lot. So, we need to have social media and technology, savvy people." (Employer 7)

Nevertheless, the IR4.0 revolution brings about a radical transformation in job performance. According to the participants' comments, it is evident that companies want job prospects to execute numerous activities. Changes in a job inevitably affect how we operate, necessitating a comprehensive set of skills. For instance, a corporate legal firm, employer 7 and 8, shifted its focus to hiring chambering students who can make social media content and concurrently manage court matters for upskilling and developing future career-ready lawyers.I n conclusion, socio-soft digital skills blend social skills with the organisation's digital technologies. The organisation transitioning to digital technology appears to use a digital platform to ensure system integration is linked with the internal system and customer interface so that business operations function efficiently. The development of Socio-soft digital skills allows graduates to enhance their soft-technical capacity, but social growth is also required.

**Method-Soft Digital Skills**

The third theme is method-soft digital skills. Individuals with method-soft digital skills can analyse, interpret, and extract critical data from massive datasets. Digital skills develop new strategies, forecasts, schedules, and business models. Digital tasks require critical and creative thinking. Flores et al. (2020) found that method-soft digital skills are in demand. Digital technology's complexity requires more customer service and interaction. Extensive data management may explain these results. Employers seek people who can understand complex technologies to deliver information to clients.

"The data analyst must understand the data and present the data to the managerial staff for future planning…" (Employer 4)

"We want graduates that can bring new ideas to our team. You don't need programming skills to be creative; contributing an idea to the team is already fascinating." (Employer 2)

**Table 5**: Method-Soft Digital Codes

| Component | Codes | Frequency |
|---|---|---|
| Method-Soft Digital Skills | Solve technical issues in a real-time manner | 5 |
| | Quick thinker and able to make decisions | 36 |
| | Create alternative solutions for digital disruptions | 2 |
| | Provide ideas for the organisation's development | 12 |
| | Solve issues with the use of digital applications | 8 |
| | Provide after-sales service to business clients | 4 |

This study found that most employers value individuals who can analyse and make decisions from the

interpreted data during the analysis. Interestingly, employers also value people that can analyse the data and generate creative ideas to develop new business strategies.

"At the site, you must go through the technical procedures and experiences. Only you can have technical skills. Then, only come into the non-technical. The decision making, the solving problem at the site." (Employer 9)

In conclusion, method-soft digital skills affect job satisfaction, commitment, motivation, performance, and decision-making. Method-soft digital skills can help individuals deal with uncertainty and obstacles, leading to greater personal and professional success. Creating a positive work environment will strengthen internal resources and change company structures to promote individual knowledge and learning by combining human and technological intelligence.

**Neo-Technical Skills**

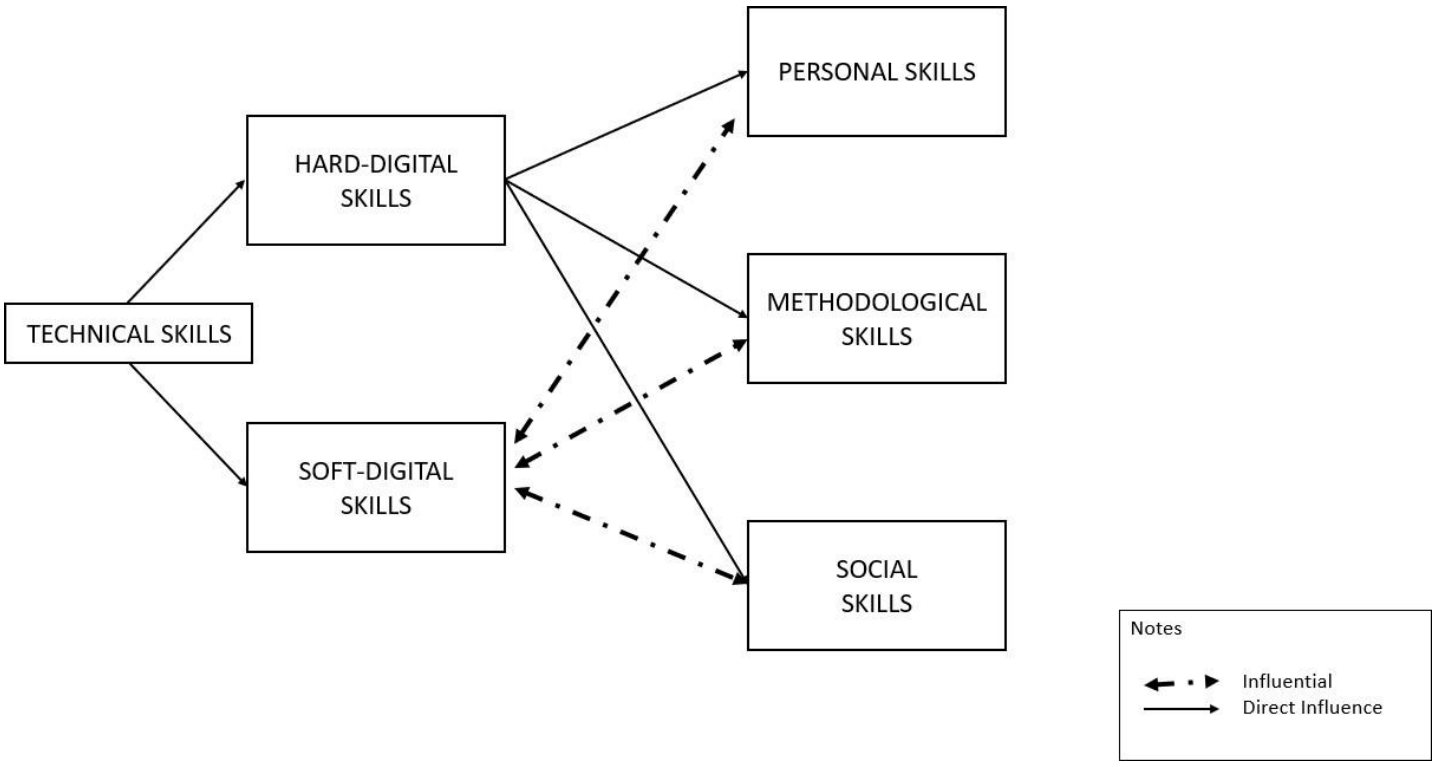


**Figure 2**: Neo Technical Skills Construct

Figure 2 depicts the anticipated transition from a job-specific foundation to the new techno-digital flows. The constructs represent one-of-a-kind interactions for digital professionals relevant to various IR4.0 sectors. Digital professionals require unique skills compared to non-technical workers. The technical skills frequently relate to developing and maintaining digital technologies such as IoT, and the IR4.0 landscape focuses on ensuring that the individual can efficiently manage and develop the technology. The statement is supported by

Flores et al. (2020), who state that technical skills are also considered digital skills in the IR4.0 environment.

This study will therefore divide technical skills into two subthemes: Hard-digital skills and Soft-digital skills. The researcher discovered differences in the technical skill requirements based on the interview. It can be concluded that the technical skills of the digital age can be divided between 'developer' and 'user'. The developer possesses extensive digital expertise and is responsible for deploying technology for end-user use. However, the 'end user' must have soft digital skills to use digital technology to complete the task.

"To understand the technical drawing, you must be able to process and interpret the drawing. You need to go

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through the process and procedure; then and only then can you acquire the technical skills." (Employer 9)

"We use 3D printing technology. The drawing itself is from software on how to develop the drawing." (Employer 10)

Hard digital skills involve job-specific tasks that require specialised qualifications and experience. Zaheer et al. (2021) found that technical skills focus on job-specific tasks. Soft-digital skills focus on the 'user' of digital technology, not software development or system maintenance.

Data analysts may not have the skills to maintain important data. Big data analysis requires digital expertise. Digital professionals need non-technical skills to interact with the internal workforce network. Flores et al. (2020) noted that technical skills are not limited to a single skill. Employers believe the digital age's technical workforce needs non-technical skills. They value human and technical intelligence equally.

**Table 6**: Neo-Technical Codes

| Component | Codes | Frequency |
|---|---|---|
| Neo-Technical Skills | System developer | 6 |
| | Maintain big data and security of the information | 12 |
| | Handle data from security attacks | 2 |
| | Technical professionals must interact with other people | 2 |
| | Minimum interaction with people | 12 |
| | The technical team and internal connection | 28 |
| | The non-technical team must understand the technical term | 32 |
| | Focus on the operation and maintenance of data | 6 |
| | Work in a team to develop great technology | 27 |
| | The ability to use AutoCAD technology | 8 |
| | Able to read and analyse the 3D drawings and printing | 10 |
| | Able to map 3D printing with on-site visuals | 4 |

As shown in Table VI, an individual's ability to learn new knowledge plays a vital role in convincing employers to get hired. While the data analysis yielded the thematic finding of hybrid skills, it was surprising that employers emphasised graduates' skills to link all the highlighted skills to the actual working environment. Digital technology alone is insufficient. During the coding analysis, the study discovered that most employers frequently echoed the importance of working in a team and having basic digital technology and operating

system knowledge to complete a task. It is anticipated that digital technology will aid in resolving complex problems and decision-making.

"…for coding, we want someone who can do programming to develop the financial apps and work in a team. You have to be able to multitask to perform the job at one time and work with people in your team."
(Employer 2)

In addition, there is a growing demand for neo-technical skills in companies with a high technological reliance. Investing in new technology will yield substantial returns and contribute to the competitive advantage of large businesses. Surprisingly, few organisations have begun to establish a department that specialises in digital development and is responsible for developing homegrown systems and digital infrastructure for increased efficiency and the organisation's reputation.

"Our IT specialist must have technical skills and also communication skills. The technical team usually are the 'back-end' team. Communication is needed to communicate with the colleague to solve internal issues."
(Employer 6)

According to the interviews, the employer values technical professionals with multiple skills for a single task. Technical professionals in the digital era must have non-technical qualities for improved working relationships. The technical job requires specialised knowledge, critical thinking, and the ability to communicate simply. Employers will require more coordinated, organised, and strategic talent from qualified candidates because of IR4.0.

**Hybrid Skills and the Impact on Recruitments**

The researcher concludes all study questions by discussing how hybrid skills affect employers' hiring decisions, as presented in Figure IV. This study found that the hybrid skills possessed by the graduates heavily impact employers' recruitment decisions. The first component is identifying the hybrid skills needed in the IR4.0 era.

Based on their thoughts and carefully selecting relevant themes, this study identified four significant themes that will affect employers' decisions to hire graduates: personal-soft digital, socio-soft digital, method-soft digital, and neo-technical skills. Completing soft-digital jobs requires basic or intermediate knowledge and understanding of digital technology, as well as non-technical skills, such as social, personal, and methodological talents, which graduates must possess to boost their career chances. Interestingly, an additional theme was discovered: Neo-technical skills.

Neo-technical skills are unique since hard technical skills depend on other non-technical skills. The nexus between human intelligence and technology allows employers to strengthen their internal resources, such as talent and technology.

Therefore, the graduates must invest in human capital by possessing hybrid skills to 'invest' in hiring capable talent. There is a need for graduates to invest in upskilling, which will secure employment and salaries. The use of two theories, Human Capital Theory and Resource-Based View Theory, also supports the hybrid skills framework constructed.

The final construct is employers' hiring decisions. The findings indicate that the development of hybrid skills can be validated through four major themes with nine sub-themes, including digital CV, online assessment, interview performance and social networking. Intriguingly, the graduates' ability to maintain professional networks may increase their likelihood of securing employment.

The job offer can be performed via social networks that have experience working with prospective candidates. Conclusively, the recruitment decisions by considering Digital CV, Online Assessment, Interview Performance and Social networks are consistent with the recent study found inAdeosun et al. (2020),where utilisation of

social media, traditional media, online interviews, and in-person interviews has been shown as the proper mechanism to recruit qualified talent.

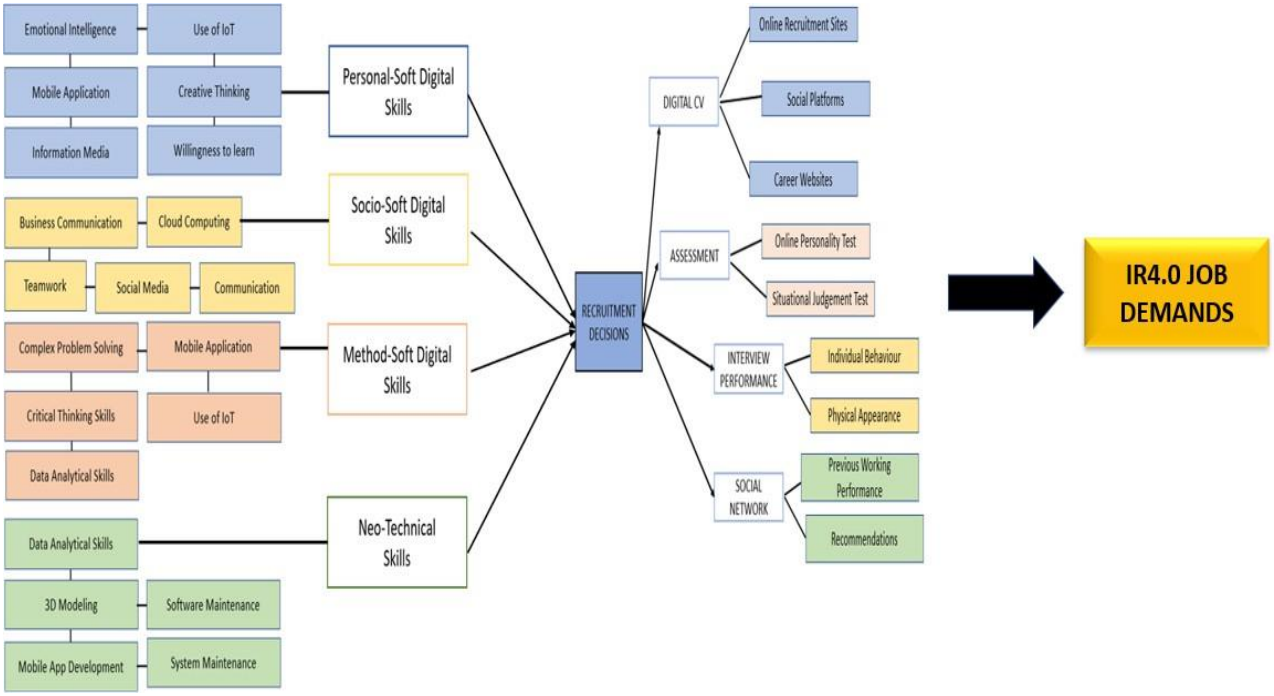


**Figure 3**: Hybrid skills framework

Comparing the previous studies by Santoso et al. (2021) reveals a similar pattern in integrating personal, social, and technological skills. As displayed in Figure 3, this study investigated the new construction of hybrid skills, including personal-soft digital, socio-soft digital, method-soft digital, and neo-technical skills. According to Santoso et al. (2021), technological adoption significantly impacts social and personal skills.

The hybrid skills are consistent with the current IR4.0 job demands, which employ automated machines and digital technology and emerge indirectly in most organisations (Schwab, 2016). This article revealed significant findings.

"I would say, bar council portal and in some circumstances, Jobstreet. We do use Instagram, what do we call, instafamous? She applied for the job, and she found us from the social media." (Employer 8)

"Jobstreet and also Bar council website." (Employer 7)

Interestingly, employers have changed the way they select candidates. Most employers prefer to choose candidates through digital CVs sent by job seekers via multiple digital platforms, including professional network platforms including social media platforms. CV. Most employers found that a digital CV available online on various platforms will increase the chance of the candidates being employed compared to the traditional CV.

The graduates must create coherent narrative shows to influence and convince the employer that they possess the right skills to fit the organisation's culture and goals. In other words, future graduates who can develop and portray the requisite skills during the interview are more likely to experience employability upon graduation. Therefore, the graduates must portray the right personality and behaviour during the interview sessions. Employers expressed their perspectiveson the young graduates who attended their interviews.

"...he came in and provided us with L shape files and wore a t-shirt. It was an awkward situation." (Employer 9)

"...they seem to have everything on their CV, but what they say during the interview does not match with the job performance." (Employer 10)

When the interviewer asks questions on the other criteria they will consider in the recruitment process, most employers expect the graduates to have a good personality and professional working behaviour, which the graduates must investigate. Interestingly, other than the Digital CV, Online assessment and Interview Performance, another criterion influencing employers' recruitment decisions is social networking. The ability of the graduates to create social connections with people around them surprisingly increases the chance of being employed.

"…they will ask us if there is any person you can recommend for a particular project. Or within the managers, the JVC staff are also here, so they will hire among their people as well, so whichever that is available, we will release for the new project." (Employer 9)

"We have the technology, we have a live interview, we assess them during that, and we assess them." (Employer 8)

Because for the employers, the first option, we ask around first, because in our firm, we want someone that we can trust, someone I know could recommend, because I need someone that I can trust to work in the company." (Employer 7)

**Implications of Study**

This study aims to close the knowledge gap on graduates' employability in the IR4.0 environment. This study shows how graduates can meet skill requirements by identifying job-market skills. Even though some employers say graduates lack hybrid skills, most participants applaud their efforts. Changing skills requires performing multiple tasks and using various skills to complete one. This study highlighted the most critical aspect of hybrid skills development. This study identifies digital skills that complement non-technical skills. Socio-soft digital and personal soft-digital is the new IR4.0 hybrid skills that highly influence employers' hiring decisions, followed by neo-technical skills. The shift from traditional to hybrid skills shows stakeholders and graduates that hybrid skills are relevant to IR4.0 and future job demands.

This study is expected to impact continuous learning in HEIs. The study highlights the importance of graduates' hybrid skills in communication, digital technology, and personality development for their employability in Malaysia and their inability to link what they learn to the natural working environment. This study also serves as a wake-up call for policymakers to develop an effective execution plan for graduates. Policymakers must negotiate with HEIs and industry stakeholders to build a digitally based, long-term programme with digital infrastructure to meet future technological demands. With the findings, employers can develop effective strategies to increase resource capacity. In the long term, hiring graduates with hybrid skills improves competitiveness. It is vital to strengthen internal resources like facilities that support the evolution of digital technology and learning factories for graduates, which promote real-world experiential learning.

The study highlights the importance of practical application training for university graduates' future lives and careers. The study showed that graduates aren't responsible for their skills. HEIs, employers, and government agencies have partnered to increase graduates' employability.

Therefore, the following implementation strategies are proposed in applying the hybrid skills framework in the context of the Fourth Industrial Revolution (IR4.0):

1. Educational Reforms: Updating curricula to include both technical and non-technical skills training from early education through higher education.

2. Training Programs: Offering targeted training programs, workshops, and online courses for current employees to upgrade their skills.

3. Public-Private Partnerships: Collaborating between government, industry, and educational institutions to develop and promote hybrid skills initiatives.

4. Certification and Credentialing: Providing certifications for proficiency in hybrid skills to validate and recognize individuals' competencies.

In summary, the Hybrid Skills Framework in the context of IR4.0 emphasizes the necessity of combining technical proficiency with soft skills to prepare individuals for the challenges and opportunities presented by the Fourth Industrial Revolution. This integrated approach aims to create a workforce capable of navigating and thriving in a dynamic and technologically advanced environment.

## CONCLUSION

The hybrid skills highlighted in this study highlight the need to recognise the correct hybridisation of skills to address graduate unemployment caused by a lack of skills related to IR4.0 job requirements. Personal-soft and socio-soft digital skills are Malaysian employers' most sought-after hybrid skills. It is anticipated that neo-technical skills will be exclusive, as specific technical jobs will require professionals to develop, maintain, and operate the digital system and technology associated with IR4.0.

Intriguingly, the identification of hybrid skills was validated by the digital platforms obtained from the online digital CV, Online assessment, interview performance and social networking. Employers utilise AI technology to filter qualified candidates with the appropriate hybrid skills and assess these skills. Intriguingly, the personality displayed during the job interview will influence employers' hiring decisions. Arobust social network is a plus point for the graduates to be recognised by potential employers. Surprisingly, the ability of the graduates to have a significant social connection with people they have been working with in previous companies and recommendations from family and friends heavily influence employers' hiring decisions.

The study framework is the blueprint for the dissertation investigation, and this study answered all three study questions effectively. This study identified four themes of hybrid skills with 19 types of sub-themes that require hybridisation for graduates to obtain employment opportunities. The opinions and experiences of Malaysian employers shed light on the grey area of unidentified hybrid skills. Based on the framework, this study discovered that the technological disruptions caused by IR4.0 affected the development of hybrid skills. Nonetheless, the IR4.0 technology disruptions allow employers to streamline the recruitment and selection process, resulting in more informed hiring decisions for qualified candidates. The study framework examining employers' perspectives and experiences in hiring graduates for the IR4.0 job market will impact employers and the organisation.

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