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Article

Bridging the gaps in digital skills: Employer insights on digital skill demands, micro-credentials, and graduate employability

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Abstract: The integration of new technologies and digitalisation causing significant changes in the skills demanded, leading to skills shortages and skills gaps in digital context. Undoubtedly, the employees' digital skills and knowledge need to be aligned with the ongoing technological changes. This study obtains inputs from the employers from professional services sector regarding the demand for digital skills and the existence of gaps in digital skill among the employees. The impact of digital skills and willingness to pay for the micro-credential on the employability was investigate. 308 responses from the employers reside in Klang Valley, Johor and Penang collected via online survey. The five areas of digital skills adopted from Digital Competence 2.0, and the pair-sample *t*-test in SPSS was used to identify the present of skill gaps. Besides, PLS-SEM was used to test the hypotheses with regard to impacts of digital skills and micro credential on employability. The findings indicate that problem-solving and safety skills were ranked as highly demanded digital skills in the future. The skill gaps were found in all areas of digital skills except information and data literacy. The employers agreed that digital skills did affect their decision in hiring the graduate employees and they are willing to pay for micro-credentials to address the skills gaps. Yet, willingness to pay for micro-credentials did not affect the employability directly and indirectly. This study provides insights into the demand of digital skills and the digital skills gaps. Implications of the study from theoretical and practical perspectives are discussed.

Keywords: digital skills; skill gaps; micro-credential; employability; entry-level graduate employees; graduate employability

1. Introduction

In the era of IR 4.0, digital transformation has a profound impact on all aspects of our socioeconomic activities, including the demand for human capital (Khan et al., 2021; Tee et al., 2024a). Automation and digitalisation in the workplace causing significant changes in the employment landscape. As a result, most jobs are becoming more complicated, leading to a widening discrepancy between the skills employees currently possess and the new skills required for their professions (Economic Planning Unit, 2021). In today's digital environment, there is a great demand for digital skills to facilitate innovation and the adoption of technology for economic advancement (Mercer, 2019; Rahmat et al., 2021). However, past studies have shown that today's graduates have shortfalls in the fundamental "digital skills", and the presence of digital skills gaps among graduates poses an increasing concern among educators, industry professionals, and policymakers (Van Laar et al., 2020). Nevertheless, the gaps in digital skills are projected to expand since employers place more emphasis on

digitalisation in a wide range of professions in future job opportunities (Deloitte, 2015; World Economic Forum, 2020).

Undoubtedly, there is a need to enhance the quality and relevancy of skill development among both potential and existing employees for better career opportunities (Tee et al., 2021). Indeed, the employees' digital skills and competencies must be in line with the ongoing technological revolution in the IR 4.0. Consequently, micro-credentials are becoming increasingly relevant for employability due to the growing demand for acquiring new skills and retraining (Hollands and Kazi, 2019; Tee et al., 2024a). Due to the epidemic, learning has shifted online, which has contributed to the development of micro-credentials and given rise to massive open online courses (MOOCs) offered by numerous educational institutions (Oliver, 2019; Wheelahan and Moodie, 2021). Micro-credentials are indeed gaining popularity in the field of human resources development. Despite the grow in popularity and strong demand to equip graduates with practical skills that do not require a degree, the acceptance of micro-credentials, especially by employers, is rather low (Gauthier, 2020). Many companies are actually unaware and disinterested in these programmes. Specifically, they are uncertain about the recognition of micro-credential certificates in the job market and their relevance for future employment. Consequently, they are unwilling to pay for micro credentialing (Tee et al., 2024a). In addition, the accreditation of micro-credentials by the Malaysian Qualifications Agency (MQA, 2019) was initiated in 2019. Given its early adoption in Malaysia, there is a dearth of research on the acceptance of micro-credentials and the views of employers towards micro-credentials. In retrospect, no research examined into how micro-credential increase entry-level graduate employee's employability by closing digital skill gaps. Furthermore, the extent to which employers are willing to pay (WTP) for micro-credential courses, which consider to be essential for enhancing employees' skills and job prospects, remains uncertain.

Problem statement

It is apparent that IR4.0 has had a significant impact on the workplace in terms of changes in skills demanded, skill gaps, and employability. Evidently, the future workforce must possess a high level of technological proficiency. In accordance with Malaysia's digitalisation plan, aimed at transforming the country into a sustainable and inclusive economy, several initiatives and policies have been put in place. These include Malaysia Digital Economy Blueprint (EPU, 2021), and the Twelfth Malaysia Plan (RMKe-12), which focus on developing future digital talents and upskilling or reskilling of the current workforce, aim to boost the nation's readiness for embracing the digital economy.

In light with Malaysia's transition to a digital economy, we may question if graduates have a wide range of necessary skills to match with market demand. It is highly advantageous for young graduates to acquire a diverse range of skills, particularly those that are not directly related to their formal degrees. These additional skills help to bridge the gap between what graduates have learned in their educational pursuits and the skills demanded in the labour market (Nair et al., 2019; Tee et al., 2019). Micro-credentials are undoubtedly beneficial for graduates looking to enhance

their employability in addition to their official degree. However, there has been a lack of studies done on the effects of micro-credentials in addressing the gaps in digital skills and employability. Notably, the viewpoints of employers who hire entry-level graduate employees, concerning the significance of digital skills and their willingness to spend in micro-credentials, need further investigation. In order to close these gaps, this study aims to (1) identify the digital skills which employers demand; and (2) investigate the digital skill gaps among entry-level graduate employees. In addition, the effect of digital skills on entry-level graduate employees' employability, and the employers' willingness to pay for the micro-credential course was included as a variable and mediator that intervene the impact of digital skills on entry-level graduate employees' employability.

2. Literature review

Underpinned by human capital theory (Becker, 1993), this study aims to investigate the employers' viewpoints concerning the important of digital skills, skill gaps and their willingness to pay for micro credentials in enhancing employability, in relation to the future recruitment of graduate employees.

2.1. Graduate employability

Graduate employability refers to the ability to find jobs and remain in an employment after graduating. Notably, the knowledge, ability and skills that make graduates attractive to employers and improve their job prospects (Bennett, 2018). As noticed by International Labour Organisation (2020), most of the developing nations are facing issues on unemployment in light with the digital transformation. Similarly, in Malaysia, graduate unemployment has drawn attention in recent years (Tee et al., 2022). In fact, past studies found that graduate employability is contingent upon many external factors, and one of them are change in demands for digital transformation-related skills (Bennett, 2018; Clarke, 2018). In addition, most of the studies related to employability were conducted before the digital age, in which employers' expectations have changed in line with globalisation and evolution of digital technologies. Hence, it is crucial to explore the future skills demand by the employers while identifying digital skills gaps among the entry-level graduate employees from the employers' viewpoints.

2.2. Digital skills and digital skill gaps

Digital skills refer to the abilities and knowledge needed for proficiently utilising digital tools and technology in different areas of life (Galan, 2022; Tomlinson, 2017). The ability to use digital tools and technologies is essential in today's digital age particularly during employment. Past literature consistently highlights possessing digital skills is essential for individuals to succeed in today's workforce (Karacay, 2017; Tee et al., 2024b; Van Laar et al., 2020). Capone (2019) found that today's employers expect the entry-level graduate employees to have basic skills in operating digital technology to complete routine tasks. Van Laar et al. (2020) further emphasises that digital skills was the prerequisites for individuals to thrive in today's workforce. Consistently, Bastian et al. (2021), and Joseph and Khan (2020) suggested that

graduates need to possess these skills in order to effectively deal with the challenges and opportunities in the workplace amid the digital age.

Furthermore, IR 4.0 has led to a notable shift in the skills demand, posing a challenge for entry-level graduate employees to compete with experienced workers. Previous research indicates that graduates lacked digital skills, which should be recognised and remedied to increase their employment prospects (Chen et al., 2018; Kimball, 2021). In fact, most of the scholars (Rahmat et al., 2022; Tee et al., 2024b; Unni, 2016) agreed that developing digital skills is crucial for graduates' employability as they are equally important as technical skills. Particularly, the changes in skill demanded widen the gaps between what the industry expects of graduates and what is taught in universities, which underscores the need to investigate skill gaps to address this issue (Aidah et al., 2019). Indeed, most of the previous studies agreed that skill gaps are the major cause of unemployment and have significant financial implications for a nation's economic growth (Institute of Student Employers, 2018; Rathelot and Van Rens, 2017). This study employs the same methodology used in the past, focused on employers' perspectives to determine presence of digital skill gaps by comparing the importance of various digital skills with employees' competency levels in the skills (Abbasi et al., 2018; Truong et al., 2018). Accordingly, this study intends to explore the demand for digital skills among the employers in future while identify the presence of digital skill gaps to answer the following research questions:

Research question (RQ) 1: What types of digital skills demand by the employers from the entry-level graduate employees?

Research question (RQ) 2: What are the digital skill competencies of entry-level graduate employees in Malaysia?

Research question (RQ) 3: What are the areas of digital skill gaps among the entry-level graduate employees in Malaysia?

2.3. Willingness to pay for micro credentials

As the adoption of digital technologies become more prevalent in the workplace, it becomes more difficult for workers to update their skill sets (digital) to keep up with technological advancements, thereby widening the skill gaps among the employees. Apparently, there is a need for ongoing skill development for the employees' employability and career development (Tee et al., 2021, 2022; Truong et al., 2018). Employers seek for quicker ways to train or reskill their workforce to enhance productivity, while learners looking for faster ways to acquire a skill in order to enter the workforce sooner. Accordingly, micro-credentialing is gaining popularity due to its flexibility and shorter learning periods to acquire new skills and undergo retraining (Wheelahan and Moodie, 2021). Tee et al. (2024a) stated that micro credentials are a skill-based professional learning system mostly conducted online with shorter time frame compared to conventional programme, with a strong focus on professional or vocational skills. As stated by Oliver (2019), micro-credentials complement formal qualifications by providing additional skills to graduates by helping the ready-to-graduate learners to transit smoothly into the job market in matching the demand in employment market. Micro credentialing allows learners to showcase the diverse skills

and knowledge they gain in the courses, going beyond what is typically included in traditional transcripts.

Despite the increasing popularity of micro-credentials, the employers seem to be largely unaware of and disengaged with these programs. According to Harvey et al. (2023), employers have varying opinions about the value of these credentials. Many believe that a person's true potential and productivity are better understood through their track record and work experiences, regardless of their professional qualifications (Gallagher, 2016). As a result, employers often struggle to grasp a candidate's real abilities, relying solely on digital badges or other forms of micro-credential certifications. A survey conducted by the University Professional and Continuing Education Association (UPCEA, 2023) found that nearly half of the surveyed employers (46%) expressed doubts about the quality of micro credentialing, while a similar percentage (42%) questioned the skills and competencies these credentials represent. Additionally, one third of respondents (33%) were unsure about how well these credentials align with the job requirements. Despite these challenges, a majority of employers (74%) reported positive experiences with micro credentials, noting that they've helped address skills gaps within their organisations and improve workforce quality. However, there's still uncertainty about whether employers are willing to support their employees in obtaining micro credentials. Since micro credentialing has been identified as a crucial factor in shaping the graduates' employability in an evolving digital landscape (OECD, 2023; Tee et al., 2024a), this study includes employer willingness to pay for micro credentialing as a mediator that intervenes the link between digital skill gaps and entry-level graduate employee's employability. Hence, the following hypotheses are formed for further investigation.

Hypothesis 1: The demand for digital skills positively related to the entry-level graduate employee's employability.

Hypothesis 2: The demand for digital skills positively related to the employer's willingness to pay for micro-credential for the entry-level graduate's employees.

Hypothesis 3: Employer's willingness to pay for micro-credential positively related to the entry-level graduate employee's employability.

Hypothesis 4: Employer's willingness to pay for micro-credential mediates the relationship between demand for digital skills and the entry-level graduate employee's employability.

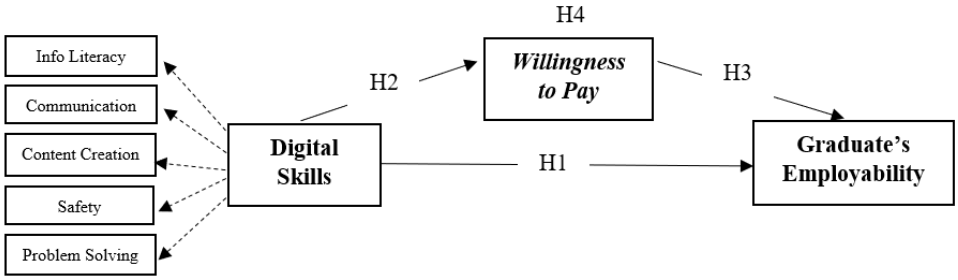

Figure 1. Research framework.

Accordingly, **Figure 1** illustrates the research framework for this study in which, digital skills are assumed to enhance the entry-level graduate employee's

employability. Meantime, employer's willingness to pay for micro credentials is included as a mediating mechanism along the direct paths.

3. Methodology

3.1. Population and sampling

The study population comprises service firms registered with the Malaysian Services Productivity Nexus (MSPC). The list of firms resides in Kuala Lumpur and Selangor (i.e., Klang Valley), Penang and Johor were selected. To avoid the common bias responses, the nature of business of the firms selected are non-digital and non-information technology related. **Table 1** provides summary of the respondent's demographic profiles.

Table 1. Respondents' profile.

Demographic	Frequency (n = 308)	Percentage (%)
State:		
Klang Valley (Selangor & K.L)	188	61
Johor	68	22
Penang	52	17
Service subsector:		
Finance & accounting	129	42
Legal	101	33
Engineering & architecture	56	18
Others	22	7
Position in firm:		
Top level management	170	55
Middle level management	95	31
Supervisory or executive	43	14

In this study, 308 responses collected. The respondents including 188 from Klang Valley (i.e., Selangor and Kuala Lumpur), 68 from Johor, and 52 from Penang. The businesses in which the firms operate are majority in finance and accounting services (42%), legal (33%), engineering and architecture (18%) and other services such as management consultancy and advertising firms (7%). Majority (55%) of the respondents holding top management position (i.e., CEO, Managing Director and General Manager). 31% respondents are from middle level management (i.e., division managers and unit managers) and the rest (14%) are executive levels staffs.

3.2. Research methods and instruments

Seven hundred fifty online questionnaires were distributed randomly, and 308 responses were collected for further investigation. This research is conducted in two phases: First, to identify the digital skills demanded, followed by digital skills competencies and the presence of skills gap among the entry-level graduates in the Malaysian professional services sector (i.e., to answer RQ1, RQ2 and RQ3). Second, this study further investigates the impact of digital skills on the employability of entry-level graduate employees in Malaysia. In addition, employer's willingness to pay for

micro credentialing was included as a mediator that intervenes the link between digital skill gaps and the entry-level graduate employee's employability (i.e., to test hypotheses 1, 2, 3 and 4).

Digital skills were measured in five areas adopted from European Commission's Digital Competence 2.0 (Vuorikari et al., 2016), include nineteen items to reflect the five (5) areas of digital skills; information literacy, communication and collaboration, digital content creation, safety, and problem-solving skills. The employers are asked to rate the important of the five areas of digital skills in future using 5-point Likert scale: "1 = not at all important to 5 = very important". In addition, the employers also rate the employees' competency in these five areas of digital skills using 5-point Likert scale: "1 = very poor to 5 = very good". Five (5) questions adapted from Swarta and Sunintana (2021) are asked to reflect the entry-level graduate employee's digital skills. Three items from Laroche et al.'s (2001) "willingness to pay" was adapted to test on the likelihood of employers to pay for micro credential programme. Lastly, the employers were asked to rank the importance of digital skills when hiring fresh graduates. All items were measured using a 5-point Likert scale: "1 = not at all important to 5 = very important".

3.3. Data analysis

The respondents' demographic profile was interpreted using descriptive analysis, and the mean score was used to gauge the future demand for digital skills. The most significant digital skill with the highest mean score, rank one "1". To determine the presence of digital skill gaps, a paired sample *t*-test was utilised for comparing the mean scores of the employees' digital skill competencies with the demand for digital skills in future. The presence of digital skill gaps is indicated by negative mean scores with a p-value < 0.05, and vice versa. Furthermore, the study's measurement model was validated, and the structural and mediation models were estimated using partial least squares structural equation modelling (PLS-SEM).

4. Results

4.1. Descriptive analysis

Table 2 reported the areas of digital skills demanded in the future, showed all areas of digital skills had mean scores > 3.33 (out of 5), signifying these digital skills are "fairly important" and nearing "extremely important" in the future. The most important digital skills demanded in the future are problem-solving skills (μ = 4.51), followed by safety (μ = 4.36), and skills in collaboration (μ = 4.23). Both digital content creation (μ = 3.54) and information and data literacy (μ = 3.34), perceived as "fairly important" in the future. In term of the digital competencies, the employers rated their employees with "average" competence in most of the digital skills (μ of 3.26 to 3.42), indicate that the employees' digital competencies unable to cope with the future demand for digital skills.

Table 2. Digital skills in demand versus competencies in digital skills.

Categories/Items	Demand		Competence	
	Mean	Rank*	Mean	Rank**
Information and data literacy	**3.34**	1	**3.40**	5
(1) Browsing, searching and filtering information and digital content.	3.33		3.42	
(2) Evaluating data, information and digital content.	3.34		3.40	
(3) Managing data, information and digital content.	3.34		3.39	
Communication and Collaboration	**4.23**	3	**3.35**	4
(1) Interacting through digital technologies.	4.23		3.38	
(2) Sharing through digital technologies.	4.18		3.40	
(3) Engaging in citizenship through digital technologies.	4.24		3.31	
(4) Collaborating through digital technologies.	4.29		3.33	
Digital content creation	**3.54**	2	**3.29**	2
(1) Developing digital content.	3.56		3.32	
(2) Integrating and re-elaborating digital content.	3.51		3.32	
(3) Copyright and licenses.	3.41		3.27	
(4) Programming.	3.69		3.26	
Safety	**4.36**	4	**3.31**	3
(1) Protecting devices.	4.46		3.34	
(2) Protecting personal data and privacy.	4.38		3.29	
(3) Protecting health and well-being.	4.25		3.31	
(4) Protecting the environment.	4.34		3.30	
Problem-solving	**4.51**	5	**3.28**	1
(1) Solving technical problems.	4.54		3.27	
(2) Identifying needs and technological responses.	4.54		3.26	
(3) Creatively using digital technologies.	4.42		3.28	
(4) Identifying digital competence gaps.	4.56		3.33	

Note: * means "1 = not at all important to 5 = very important"; ** means "1 = very poor to 5 = very good".

Table 3. Results for paired sample *t*-test and digital skill gaps.

	Mean	SD	95% CI		*t*-value	Sig.
			Lower	Upper		
Information and data literacy	0.649	0.530	0.005	0.124	2.150	0.02
Communication & collaboration	−0.878	0.568	−0.942	−0.814	−28.117	<0.01
Digital content creation	−0.250	0.492	−0.305	−0.195	−8.930	<0.01
Safety	−1.045	0.479	−1.099	−0.992	−38.294	<0.01
Problem-solving	−1.230	0.397	−1.274	−1.118	−54.360	<0.01

To address the presence of digital skill gaps, a paired sample *t*-test was conducted by comparing the mean scores of competencies against the skills demanded. The negative mean value shown in **Table 3** indicate that the entry-level graduate employees are lacked competence to meet the employer's expectations or demands in

the four areas of digital skills except information and data literacy. Notably, the highest skill gap exists in problem solving ($\mu = -1.230$), followed by safety ($\mu = -1.045$), communication and collaboration ($\mu = -0.878$), and digital content creation ($\mu = -0.250$). In addition, all the p-value < 0.05, signifying that there is a significant gap in the skill demanded against the employees' digital competencies.

4.2. Measurement model assessment

The reliability and validity of the measurement items in this study was addressed using PLS-SEM consists of testing the indicator loadings, composite reliability, average variance extracted (AVE), and discriminant validity. The results for outer loadings showed that all indicators for reflective constructs (DS and WTP) had loadings > 0.60 (0.626 to 0.876) with $t > 1.96$, $p < 0.05$. No indicators were deleted from the constructs since the constructs' AVE met the threshold value > 0.50 (0.504 & 0.749) (Hair et al., 2019). The internal consistency for measurement model was supported as the composite reliability values for digital skills and willingness to pay are 0.722 and 0.899 (> 0.70). Besides, the HTMT values are < 0.90, supporting discriminant validity (Henseler et al., 2015).

As reported in **Table 4**, the results met all the evaluation criteria and thus justifying the reliability and validity of the measurement model in which the model is fit for structural model estimation.

Table 4. Summary of reflective model assessment results.

Latent Variable	Item	Convergent Validity		Internal Consistency Reliability		Discriminant Validity
		Outer Loading	AVE	Composite Reliability	Cronbach Alpha	HTMT values < 0.90
Digital Skills (DS)	DS1	0.666	0.504	0.722	0.701	Yes
	DS2	0.626				
	DS3	0.676				
	DS4	0.701				
	DS5	0.708				
Willingness to Pay (WTP)	WTP1	0.876	0.749	0.899	0.832	Yes
	WTP2	0.865				
	WTP3	0.855				

4.3. Structural model assessment

PLS-SEM was utilised to assess the study's structural model's fit, and bootstrapping was used to estimate the construct's causal paths and to test the hypothesised relationships. The results show in **Table 5** confirmed employers' view that digital skills significantly influence graduate employee's employability ($\beta = 0.176$, $t > 1.96$) and their willingness to pay for micro credentialing ($\beta = 0.389$, $t > 1.96$). However, willingness to pay was unrelated to graduate employees' employability ($\beta = 0.116$, $t < 1.96$). The model explained only 5.9% of the variance in graduate employability, and 15.1% of employers' willingness to pay for micro-credential courses.

Table 5. Results of structural model assessment and hypothesis testing.

Hypothesis	Path	Std. Beta	Std. Error	*t*-value	Decision	R^2	f^2
H1	DS → GE	0.176	0.065	2.648	Confirmed	0.059	0.057
H3	WTP → GE	0.116	0.066	1.784	Not confirmed	-	0.012
H2	DS → WTP	0.389	0.052	7.544	Confirmed	0.151	0.178

Note: DS = Digital skills, WTP = Willingness to pay, GE = Graduate employability.

In addition to the above, the mediation effect of the employers' willingness to pay for micro credential programme, as highlighted in Hypotheses 4, was addressed using the bias-corrected bootstrapping technique on 5000 bootstrap samples. The results of the mediation test as presented in **Table 6**, shows a non-significant indirect effect between digital skills and graduate employability (β = 0.046, t < 1.96) via willingness to pay, with a 95% BCa bootstrapped confidence interval (−0.003 to 0.016), in which zero is straddle in between. Since willingness to pay also has no significant direct effect on graduate employability, this concludes the insignificant mediating effect of willingness to pay. Thus, H4 was not supported.

Table 6. Results of mediation model assessment and hypothesis testing.

Hypothesis	Mediation Path	Specific Indirect Effect	Total Effect	95% Confidence Interval	Decision
H4	DS → WTP → GE	0.046	0.046	(−0.003; 0.016)	Not Confirmed

Note: DS = Digital skills, WTP = Willingness to pay, GE = Graduate employability.

5. Discussion

There are few significant findings emerged from this study. In the Phase I of the study, the findings affirmed the important of digital skills as one of the criteria in hiring entry-level graduates, which in line with the past studies with regards the high demand of digital skills in Malaysia (Khan et al., 2021; Rahmat et al., 2022). Furthermore, this study provides insight into the areas of digital skills that are highly demanded, particularly utilising digital tools in problem solving and data protection (safety). Problem-solving skills are highly valued in the digital era. While employers do not expect entry-level graduates to possess extensive expertise upon entering the workforce, they do expect them to tackle technical challenges when operating digital devices. Graduates who can think critically and creatively while leveraging digital tools to solve problems within digital contexts gain a competitive edge (Jewell et al., 2020; Aidah et al., 2019). Furthermore, new technologies increase the complexities associated with digitalisation of the company's operation in which elevates the important of digital problem-solving skills as a differentiator in the workforce. Consistent with the past studies (Jewell et al., 2020; Suarta and Suwintana, 2021), most employers addressed the importance of digital problem-solving skills in harnessing the potential of digital innovations while mitigating the risks in utilising digital technologies. Along with problem-solving skills, safety skills such as ability to protect the company's devices, data and privacy also highly demanded in the future digital landscape. Along the digital transformation process, companies are exposed to higher risks of data exposure when integrating internal systems with external interfaces. Hence, the ability to protect and create a safe digital environment in the

workplace is highly appreciated by most of the employers (Tee et al., 2024b; Tomczyk, 2019).

It's interesting to learn that both data literacy and digital content creation are perceived as fairly important by employers due to the widely adoption of digital technology in the workplace, the demand for information and digital literacy has been normalised. Browsing and searching information online, analysing, and retrieving data using digital tools are considered the basic digital skills should be acquired by the employees. Similarly, Jewell et al. (2020) and Saunders (2018) found that skills related to "browsing and searching for information" and "locating data" are considered lower-order skills tend to be performed by clerical staff rather than graduate employees.

The findings indicate that the entry-level graduate employees need more competence in digital skills to meet their employers' expectations. Digital skill gaps were found in all categories of digital skills except information and data literacy. This can be explained that the new generations are inherently tech-savvy, and well adapt to new digital tools and technologies (Helsper and Eynon, 2010; Kennedy et al., 2009). Indeed, information and data literacy, and content creation have become a foundational skill, similar to basic reading and writing skills among the young generation. Conversely, the highest digital skill gaps were found in digital problem-solving and digital safety skills. Yet, these digital skills are increasing important in future employment, which consonance with the past studies. Nevertheless, the graduate employees seem lacking these non-technical skills in navigating into the future working environment (Suleman and Laranjeiro, 2018). Verma et al. (2018) studied the graduate work-readiness in Malaysia, also found the present university curriculum unable to cope with the skills needed in the workplace, caused students lack in critical thinking and problem-solving skills. In general, the competence levels of graduates do not meet the employers' expectations and skills gaps exist in most areas of digital skills.

Phase II of the study provides evidence of the impact of digital skills and micro-credential on graduate employees' employability. The study confirmed the impact of digital skills on employability. Despite the competencies of entry-level graduate employees do not meet employers' demand, the study provides evidence that Malaysian employers are still willing to invested in enhancing the digital skills via micro credentialing aiming to close the digital skills gaps. This is in line with human capital theory posits that increase in employee's skills is positively related to higher performance and productive (Becker, 1993). Likewise, Barney (1991) suggested the training and development able to add value on the human resources in matching employees' skill with their job responsibilities, and competitive advantage.

Despite the increase popularity of micro-credentials in addressing the skill shortages, evidence on the value and impact of micro-credentials remains scarce, limiting commitment on the part of stakeholders (Castaño-Muñoz and Rodrigues, 2021; OECD, 2023). This study refuted the direct and the mediating impacts of willingness to pay for micro credentials on employability. Notably, micro-credentials are not a standardised education or training offer where employers unsure about how well these credentials align with the job requirements to justify the employee's employability (Hollands and Kazi, 2019; Tee et al., 2024b). Furthermore, there is a debate on the employability paradox (De Cuyper and De Witte, 2011; Tee et al., 2021)

questioning developing employees' skills might increase the employees' perceptions of external employability leading to higher turnover intention. Thus, employers are not willing to invest in micro-credentials specifically for the new employees in which their value contributed to organisation are unjustifiable. Indeed, employers are more willing to enhance job-specific (technical) skills instead of generic (non-technical) digital skills among the mature workers (Akkermans et al., 2019). Aside from that, the present study validated the employer's perceived value and willingness to pay for micro credentialing in closing the gaps in digital skills.

Implications of the study

This study is practically relevance underscored by the shifts in technology and skillset demands in the new industrial epoch (IR 4.0) (Caruso, 2018). Aligned with the governmental vision to propel Malaysia into a digitally empowered and technologically progressive nation within a digital economy framework, the study's findings serve to guide stakeholders, including higher education institutions and governmental bodies, in formulating effective strategies by elucidating the essential digital skills conducive to improved employability particularly among the fresh graduates. The discernible shift in the demand for digital skills in the workplace offers direction for the evolution of curricular frameworks within higher education. This entails the incorporation of modules embedding non-technical or soft skills in digital context, aiming to equip graduates more effectively in meeting industry standards (Ellahi et al., 2019). Indeed, collaboration between education institutions and industry serves as a bridge between theoretical knowledge and practical business demands. By aligning curriculum with industry needs, universities can equip students with relevant skills. Additionally, policymakers such as the Ministry of Education (MOE), Human Resources Development Foundation (HRDF), and training providers can use the empirical findings from this study to inform policies and strategies for effective study/training curricula.

In addition, these insights can be leveraged by employers and human resource practitioners to refine their recruitment and talent development strategies, particularly through the design and implementation of targeted training initiatives aimed at bridging identified skills gaps. A holistic approach to skill development beyond the formal education, with a more vocational-focused learning is required, given the future emphasis on non-technical skills such as communications skills, problem-solving and safety skills in a digital context. (Pollard and Vincent, 2022). The interesting discovery is that employers are willing to pay for the micro credential in addressing the skill shortages, nonetheless they have varying opinions about the value and acceptance of these credentials. As a result, it is critical for the governmental bodies and educational institutions to foster heightened awareness and acceptance of micro-credential certificates within the labour market. It is incumbent upon the Malaysian government and educational institutions to engage in collaborative efforts to ensure the effective implementation and accreditation of micro-credentials since the micro-credential movement in Malaysia is still in its nascent stages. In addition, awarding digital credentials for the short-term programmes that specifically describe the skills, competencies, and achievements of the learners (i.e., employees) will be able to

effectively demonstrate the value of micro credential programmes to potential employers.

Theoretically, this study underpinned by the human capital theory and resource base view (RBV). This research is one of only a few that propose to investigate the demand for digital skills and skills gaps, while testifying the role of micro-credentials in addressing the skills gaps and employability. The theoretical relevance of human capital theory and RBV in the context of this study lies in the acknowledgment that firms with unique resources and capabilities, including digital skills, are instrumental in forecasting and adapting to evolving organisational demands, thereby fostering sustained competitive advantage. This underscores the notion that digital skills, regarded as resources and capabilities within firms, are positively correlated with organisational performance. Moreover, Phase II of the study has contributed empirical evidence to augment human capital theory. The results suggest that employers' view micro credentials able to enhance employees' proficiency in areas of non-technical (digital) skills to better tackle future challenges. Indeed, firms should consider investing in non-technical skills which have been ignored in the human capital theory. In similar vein, this study in light with RBV suggests that firms should always be agile in assessing the business environment to recognise new market demands against their current resources and capabilities (Barney et al., 2001). These findings have implications that due to the changes (digitalisation) in the workplace, new (digital) skills required from the workforce to stay competitive. As a results, digital skills should be considered as firm's valuable resources, which may influence employers' hiring decisions in the IR 4.0. To conclude, this study contributes to the theoretical relevance of human capital theory and RBV that firms should possess digital skills as resources and capabilities which are associated with better performance.

6. Conclusion

In view of the rising importance of digital skills in modern society, this research provides a pivotal perspective on the digital skills demanded and the skills gaps present in the context of IR 4.0. Amongst the five areas digital skills, problem-solving skills are highly valued in the digital era, follows by safety, and communication and collaboration using digital technologies. The findings uncovered the presence of digital skill gaps in all categories of digital skills among the entry-level graduate employees. Thus, the entry-level graduates need more competence in digital skills to meet their employers' expectations. In addition, this study confirms the impact of digital skills and micro-credential on entry-level graduate employees' employability. Despite the competencies of entry-level graduate employees do not meet employers' demand, the study provides evidence that Malaysian employers are still willing to invest in enhancing the digital skills via micro credentialing aiming to close the digital skills gaps. However, this results in this study refuted the mediating impacts of willingness to pay for micro credentials on employability. Notably, micro-credentials are not a standardised education or training offer where employers unsure about how well these credentials align with the job requirements to justify the employee's employability. Aside from that, the present study validated the roles of micro credentialing in closing the gaps in digital skills. The model presented herein seek to

define metrics for evaluating digital skills that enhance employability in Malaysia. Subsequent to this investigation, further research will delve into additional areas of digital skills that exert influence on graduate employability within Malaysia.

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