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Exploring Digital Fluency Skills Among the Business Organizations' Workforce as A Competitive Advantage Tool: Quest for Sustainability

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Abstract

In advancing the sustainability agenda, it is imperative for business organizations to equip their workforce with digital fluency skills in today's digital landscape. The objectives of this paper are: (1) to review the digital fluency skills among the companies' workforce in terms of implementation and challenges; and (2) to explore the role of digital fluency skills as a competitive advantage tool in realizing Sustainable Development Goals using the Resource-based View Theory. This paper highlights several challenges relating to digital fluency skills among personnel in business organizations, including lack of ecosystem, readiness, and awareness. This is among the first papers that conceptualize the digital fluency skills of the workforce as an intangible resource. This paper also proposes a hierarchical model of the digital fluency skills of the workforce to the business, national, and sustainable development goals.

Keywords: Digital fluency skills, Sustainability, Resource-based view theory

1. Introduction

These days, Information and Communication Technology (ICT) has a significant impact on daily life and business all over the world. ICT is a vital component of business strategies that influence various business aspects and, as a result, support the growth, prosperity, and enhancement of the organization (Kokolek, Jakovic & Curlin, 2019). The world is moving toward greater digitalization, with automation replacing manual work in commercial and government settings, politics, medicine, engineering, and education (Chukwurah et al., 2023). The ability to use information technology and digital skills is critical for many industrial sectors to succeed in the ever-changing digital environment (Sutrisno, Kraugusteeliana & Syamsuri, 2024). In today's business environment, it is crucial to have employees with diverse skill sets who can handle complex and collaborative tasks effectively (Kallmuenzer et al., 2024).

Employers are increasingly looking for employees with sophisticated technical abilities to compete in the changing global economy, and the twenty-first century has brought technological innovations that need the learning of new skills to succeed in the job (Le & Pole, 2023). Furthermore, according to Le and Pole (2023), companies and organizations need culturally competent individuals that possess not just oral and written communication abilities but also digital competency and the capacity to use evolving technologies effectively. Digital skills are not just an add-on in this increasingly digitally connected world, but they are also a prerequisite for building a sustainable competitive advantage environment (Sutrisno, Kraugusteeliana & Syamsuri, 2024).

Digital fluency is a comprehensive concept that encompasses an individual's ability to effectively and critically engage with digital technologies across diverse contexts. It includes

elements that incorporate basic digital literacy such as technical proficiency, critical evaluation, creative application, effective communication, and ethical and responsible use (NAMLE, 2016). Digital fluency skills can also be defined as unique abilities and competencies that help an individual achieve total digital fluency. These abilities are the practical components that underpin the larger concept of digital fluency. It includes the components such as technical skills, information literacy, communication skills, problem-solving skills, and security awareness that are essential to Malaysia's economic policies and educational changes. To support the nation's objectives for digital transformation, Malaysia incorporates the idea of digital fluency skills into workforce development plans and educational regulations (Malaysia Digital Economy Blueprint Malaysia, 2021).

The Malaysian government has introduced MyDIGITAL as a national initiative to transform Malaysia into a digitally enabled and technology-driven high-income nation (Malaysia Digital Economy Blueprint, 2021). To achieve the objectives of MyDIGITAL, the Malaysia Digital Economy Blueprint has been formulated so that the country is adequately prepared to embrace digital technology and capitalize on existing opportunities (Malaysia Digital Economy Blueprint 2021). According to the Malaysia Digital Economy Blueprint (2021), the government initiatives aimed at enhancing digital fluency skills for business organizations in Malaysia include improving digital skills and promoting the growth of the digital economy within this strategic plan. In addition, the blueprint outlines initiatives aimed at enhancing digital fluency across all societal levels and emphasizes the importance of having a workforce with digital proficiency. The roadmap emphasizes how critical it is to provide people with the skills they need to thrive in the digital economy.

Bertot et al. (2023) asserted that digital fluency skills can enhance government operations, transparency, and citizen engagement while highlighting the critical role of digital skills in modernizing and improving government functions. As such, digital fluency skills are crucial for achieving the six key thrusts and strategies outlined in the Malaysia Digital Economy Blueprint 2021. First, it can streamline processes by simplifying government procedures, reducing administrative costs, and improving service delivery through the application of automation and digital tools. Second, it enhances accessibility. Digital technology facilitates the creation and maintenance of online platforms, making government services more accessible to the general population, particularly those living in rural or underserved regions. Third, it improves citizen engagement. Effective use of digital resources promotes citizen engagement through social media, online polls, and digital feedback mechanisms, resulting in improved communication and responsiveness. Fourth, transparency and accountability can be increased. Digitalization facilitates the adoption of open data programs and improves the ability to track and report on government activities, hence increasing transparency and accountability. Fifth, digital fluency is significant in terms of cost efficiency. Digital tools and technology allow for more efficient resource use, lowering costs and boosting the overall performance of government initiatives. Six, innovation and adaptability. Digital fluency skills encourage innovation in the development and implementation of new programs, as well as adaptation to evolving challenges and technology.

Digital fluency skills are recognized as valuable assets for business organizations, serving as

a competitive advantage in the 21st-century workplace. In an era where the ability to critically analyze, share knowledge, and collaborate effectively has become essential, these skills are crucial. According to Abidin and Osman (2022), through increased operational effectiveness, innovation, customer interaction, data-driven decision-making, and offering differentiation, digital fluency abilities provide Malaysian corporate enterprises a substantial competitive advantage. Digital fluency is frequently emphasized in the literature (see Vial, 2019) as being crucial for competitive advantage and operational effectiveness, but little is known about how these abilities specifically relate to the implementation processes in Malaysian and the connection with sustainability (Radovanović et al., 2020). The advantages of digital fluency have been emphasized in earlier research (Radovanović et al., 2020), but the subtle obstacles that businesses face when trying to incorporate these abilities into their organizational culture and procedures have not been thoroughly examined.

According to Vial (2019), organizational resistance to change, a lack of leadership skills, and the challenge of integrating digital transformation with current business processes and principles are the main reasons why companies face resistance. Challenges include the requirement for ongoing education, the disturbance of routines, and a lack of cross-departmental cooperation that can impede the effective adoption of digital technology and skills throughout the workforce when firms try to incorporate digital fluency. Implementing digital literacy presents various challenges at each stage. The lack of solutions such as local language digital interfaces, locally relevant material, digital literacy training, and the use of iconography and audio eliminates a huge proportion of illiterate people (Radovanović et al., 2020). Furthermore, according to Radovanović et al. (2020), Internet connection is still regarded as a crucial requirement for sustainable development, and many individuals might more practically engage with technology if they possessed the fundamental skill. Acquiring digital skills is a type of human digital capital that is essential for opportunities, better livelihoods, sustainable development, and lifelong learning (Radovanović et al., 2020). Increasing digital literacy is one of the SDGs' equally significant objectives. Therefore, this paper aims to achieve the following objectives: (1) to review the digital fluency skill used by companies in terms of implementation and challenges; and (2) to explore the role of digital fluency skill as a competitive advantage tool in realizing Sustainable Development Goals (SDGs).

This paper is structured as follows: Section 2 presents a review of related literature; Section 3 details the digital fluency skills, resource-based view theory, and sustainability; and finally, Section 4 presents the way forward.

2. Literature Review

2.1 Definition of Digital Fluency Skills

Digital fluency and digital literacy are often used interchangeably (Cain & Coldwell-Neilson, 2024). However, while these concepts are related, they differ in meaning (Masero, 2023). In the digital realm, being fluent means being able to adapt and innovate, whereas being literate means having a basic understanding and skill in utilizing digital technologies (Masero, 2023; Monahan, 2021; Spante et al., 2018). Digital literacy generally denotes the fundamental

capacity to comprehend and use digital instruments such as Google Workspace and the Microsoft Office Suite, as well as standard commands on a computer, tablet, or other device (Koehler, 2021). Globally, the 2030 Agenda for Sustainable Development has recognized digital literacy as a crucial skill for achieving the United Nations' Sustainable Development Goals (IFLA, 2024). Essentially, being 'digitally literate' entails learning how to build and construct meaning while also selecting appropriate technology. On the other hand, being fluent necessitates competences and abilities that extend beyond the skill level (Spencer, 2024). Therefore, to become digitally fluent, digital literacy is essential (Koehler, 2021).

Digital fluency includes being adaptable to new technologies, accepting continual learning, and incorporating new information into problem resolution. This idea also includes the capacity to confidently and ethically apply digital abilities to unknown contexts and developing technology (Fleming et al., 2021). Strong information literacy abilities are a component of digital fluency, enabling people to evaluate digital content critically for relevance, dependability, and authenticity. People who are information literate can traverse digital environments and distinguish trustworthy sources from potentially false information among the abundance of data (Valtonen et al., 2019; Trixa & Kaspar, 2024). Therefore, digital fluency goes beyond fundamental technological abilities to include information literacy, media literacy, and algorithmic literacy, which equip individuals for successful digital citizenship by promoting ethical and informed use of technology (Wang et al., 2013; Niessen, 2013; JISC, 2015; Janssen et al., 2013). Of primary significance, digital fluency involves using technology in innovative ways beyond its intended purposes, understanding how various digital tools function, and applying that knowledge across different systems (Koehler, 2021). It also includes being able to work with the newest digital technologies to improve the workflow (Monahan, 2021) and the capacity to navigate between online and offline and be proficient in the online environment (Park, 2017). In essence, Cain and Coldwell-Neilson (2024) characterized digital fluency as contextualized, knowledge-based behaviors that facilitate successful and adaptable participation in changing digital environments and maintaining an ongoing and meaningful interaction with digital cultures.

Spencer (2024) and Cain and Coldwell-Neilson (2024) concluded that digital fluency is the result of combining the following skills: (1) digital literacy, or cognitive or intellectual competencies, which include the ability to read, create, evaluate, make decisions, and apply technical skills while doing so; (2) social competence, or dispositional knowledge, which is the capacity to relate to people and communicate with them effectively; and (3) digital proficiency, or technical proficiency: the capacity to comprehend, choose, and use the technologies and technological systems. Succinctly, Monahan (2021) revealed four unique patterns that depict the personas of digitally fluent workers: (1) The remote work collaborator: engaged, experienced, enthusiastic; (2) The adaptive team player: flexible, emerging talent, personable; (3) The relentless innovator: smart, seasoned, exploratory; and (4) The disciplined achiever: participatory, helpful, eager to learn.

2.2 The Need for and Importance of Digital Fluency Skills

The networked and mobile features of the Internet have revolutionized communication and

information retrieval (White, 2013). Modern workers demand more than simply computer literacy. They require digital fluency, which is the ability to grasp technology sufficiently to easily navigate platforms, detect beneficial online resources, and transfer information from one platform to another (knowledgeCity, n.d.), express ideas, find new meanings, or build entirely new things (Koehler, 2021). Using technology with fluency provides online safety and allows for full engagement in possibilities such as job applications, money management, and community involvement (Spencer, 2024). Therefore, in the fast-changing digital scene of today, digital fluency is becoming widely acknowledged as a critical competency.

Koehler (2021) identified two reasons for gaining digital fluency. First, technology is ever evolving. Knowing the previous standard when new features emerge improves one's ability to think more thoroughly and creatively about what has been done and why. Second, digital fluency is a marketable skill in which today's employers are searching for candidates who can become quickly used to their systems. Additionally, as more and more companies make use of remote and work-from-home options, being tech-aware in the workplace is essential for a range of businesses.

To maximize the beneficial impacts of ICT, digital fluency and literacy are crucial (Niessen, 2013). Though technology has made it possible to learn, connect, collaborate, create, and enjoy other people's creations in engaging, timely ways that have never been possible before, there are a number of issues related to Internet technology that can be addressed through improved digital fluency and skills (Niessen, 2013). Given the technical advancements in today's market, the essential skill still revolves around the ability to engage in continuous learning. This includes knowing how to apply knowledge and using technological tools to optimize time, resources, and efficiency in tasks. Therefore, it is necessary to understand how to interact effectively by adopting various technology-assisted methods of communication (Tanabe & Kobayashi, 2013).

Digital fluency has become a sought-after skill and an indispensable asset for organizations (Barth, 2024). A survey conducted by CompTIA in 2024 revealed that approximately 70% of the respondents affirmed that digital fluency has, undeniably, increased in importance within their organizations. Digitally fluent workforces who possess the capability to learn new software quickly, adapt to changing technologies, and identify and recommend effective tools for specific business goals are vital resources for organizations (CompTIA, 2024). Moreover, employees possessing a high level of digital fluency can establish extensive social networks and adeptly utilize a wider array of technologies compared to those with lower digital fluency (Wei et al., 2020). For example, mastery in applying algorithms enables businesses to deliver customized solutions that meet specific needs, while the strategic use of big data analytics not only drives essential improvements but also establishes a powerful competitive advantage in the market (Murawski & Bick, 2017). Hence, digital fluency skills at the workplace play a crucial role in a company's ability to digitally transform (Barth, 2024). Conversely, lack of strategic understanding in delivering business transformation increases the risk of losing relevance and competitiveness in the digital landscape (Khanom, 2023).

Mohanan (2021) revealed that an adaptive team player needs flexible, emerging talent and

personable investment. Investment in a digitally fluent workforce is essential for the future survival and growth of companies (Barth, 2024). This is attributable to the fact that digital fluency cultivates a culture of innovation by enabling employees to explore new technologies and solutions. For that reason, digitally operated companies were found to perform better than traditionally operated ones (Ahmad et al., 2022). A survey by Gallup Inc. in 2023 revealed that employers who rely heavily on advanced digital skills and workforce and digital technology in the Asia Pacific region reported higher levels of revenue, growth, and innovation. In Malaysia, such investments have specifically contributed an estimated MYR170.2 billion to the annual gross domestic product (Gallup Inc., 2023). The findings suggested that possessing a digitally fluent workforce and leveraging digital technologies are essential to support innovations, enhance operational capabilities, understand customer demands, and remain competitive in a digital-centric environment, consistent with assertions made by Khanom (2023).

As the digital landscape expands, the risk of data breaches and cyberattacks increases (Akter et al., 2022). Vignieri and Zeinali (2023) stressed that the emergence of artificial intelligence has given rise to significant ethical and behavioral challenges. Such transition heightened the urgent demands for the development of competencies that facilitate the alignment of technological advancements with the core principles (Bracci, 2022). By the same token, business clients are voicing growing concerns about the security and privacy of their personal information. The Australian Cyber Security Centre (ACSC) reported a total of 67,500 cybercrimes for the 2020-2021 fiscal year, an increase of 13 percent year-over-year. Ninety percent (90%) of cyber leaders who attended the Annual Meeting on Cybersecurity raised concerns about the inequity within the cybersecurity ecosystem, which requires urgent action (World Economic Forum, 2024). Miller and Bartlett (2012) emphasized that non-astute individuals are more susceptible to the traps of deception and fraud. Hence, a digitally skilled workforce is necessary to understand the need for data protection and to adhere to best practices for safeguarding client data. This, in turn, allows companies to cultivate trust and showcase their dedication to protecting the security of client information (Aldboush & Ferdous, 2023). Digital fluency aids in understanding regulatory requirements related to data privacy (Susanto et al., 2021; Elrayah & Jamil, 2023), cybersecurity (Elrayah & Jamil, 2023), ethical and responsible use of technology (Susanto et al., 2021), and respecting copyright laws (Elrayah & Jamil, 2023). These aspects reduce legal and reputational risk and potential fines (Kamiya et al., 2021).

2.3 Challenges of DFS Implementation in Malaysian Companies

During the period spanning from 2023 to 2024, a total of 21,591 small and medium enterprises (SMEs) in Malaysia embraced digitalization through programs facilitated by Malaysia Digital Economy Corp. (MDEC). The CEO of MDEC, Mahadhir Aziz, underscored that SMEs turned to digital solutions as a means of navigating lockdowns and social distancing measures during the COVID-19 pandemic. Nonetheless, Malaysian SMEs face challenges in implementing digital solutions due to various reasons, which include high initial investment costs, limited digital literacy, resistance to change, and lack of awareness and clear digitalization strategies (Azuar & Nehru, 2024). Though a strategic plan has been

formulated to expedite digital adoption, there are still pressing concerns about its effectiveness and initiatives led by accountable agencies (Azuar & Nehru, 2024).

Digital fluency skills must be in place to facilitate and accelerate digital adoptions (Barth, 2024). However, companies may encounter various challenges in putting digital fluency skills into practice. In this regard, organizations and their ecosystems must exhibit readiness to embrace digital transformation. Lack of preparedness could impact the mismatched skill set in the workforce (Daniel et al., 2024) and failed systematic implementation (Vignieri & Zeinali, 2023). Agostino and Costantini (2022) identified several key dimensions of digital readiness, being resources, processes, users, strategy, and investment. Notably, the "people" dimension emphasizes the necessity of appropriate digital skills. In the context of Malaysia, the Ministry of International Trade and Industry (MITI), Malaysia has identified several setbacks that hinder manufacturing sectors from moving towards Industry 4.0. From the aspect of the readiness of the companies and their ecosystem, MITI has acknowledged several impediments, such as a lack of awareness of the concept and benefits of Industry 4.0; no clear comprehensive policy and coordination on Industry 4.0; a gap in the digital infrastructure and ecosystem; and a lack of standards in integrating different systems. The self-efficacy towards readiness for digital transformation and its relationship with digital organizational culture and attitude towards digital transformation have been supported (Ling et al., 2023).

Digital complacency and resistance to change mindset affect the competitiveness of businesses (Ahmad, 2022; Neely & Leonardi, 2022). Hence, companies that do not or are slow to invest in digital skills are at risk of losing relevance in a digital-driven economy. Ahmad et al. (2018) maintained that the slow adoption of ICT among SMEs in Malaysia is due to misapprehension that ICT is difficult to implement and hence would rather choose the manual system. Ab Wahid and Zulkifli (2021) further supported that Malaysian SMEs are accustomed to conventional methods and reluctant to digitize their operations. Therefore, it comes as no surprise when digital adoption among Malaysian SMEs significantly lags behind larger companies, as reported by the World Bank in 2022. Consequently, one of the drawbacks of not prioritizing digital skills within a company is the difficulty in attracting and retaining digitally skilled workforces due to limited career prospects (Karaboga et al., 2020).

One of the primary challenges organizations face in the scaling of digital transformation is the shortage of necessary technical, managerial, and transformational capacities (De Boer et al., 2020; Sony & MeKoth, 2022; Nikou, De Reuver & Kanafi, 2022). This indicates that the human factor warrants urgent attention to meet the demand for the modern workplace. Similarly, the shortage of digitally skilled workers to support digital transformation in Malaysia has been highlighted by the World Bank (2022). Another study conducted by Gallup Inc. in 2023 revealed that a significant 78% of Malaysian employers are actively searching for applicants with digital skills; however, a staggering 85% find it challenging to secure the talent they need. In addition, the workforce in the digital age must have the ability to adapt to changing and evolving digital requirements (Nikou, De Reuver & Kanafi, 2022). This is due to continuous transitions under digital advancement, wherein digital tools change frequently and rapidly, which necessitates evolving skill sets. Hence, employees' agility and

digital mindset are crucial for organizational agility (Wei et al., 2020; Neely & Leonardi, 2022). Consequently, companies grapple with increased adoption costs and prolonged capital tie-ups, leading to significant financial strains (Tong & Gong, 2020). This poses a significant challenge to the agility of most SMEs (Karaboga et al., 2020; Neely & Leonardi, 2022; Ahmad et al., 2022).

2.4 Resource-based View Theory and Digital Fluency Skills

The Resource-based View Theory (RBVT) is a theory that emphasizes the importance of a firm's resources when creating a competitive advantage. The Resource-based View theory integrates the study of the internal and external environments of the organization. The three categories of resources are organizational capabilities, intangible resources, and tangible resources. Assets that can be physically identified are known as tangible resources. Examples include physical assets, financial resources, organizational resources, and technological resources. The assets that cannot be physically defined but are nevertheless part of a company's operations, such as its reputation and human capital, are known as intangible resources. Trust, experience, staff talent, managerial aptitude, and the effectiveness of work teams are all aspects of human resources. Technical and scientific knowledge, concepts, and innovative capabilities are resources for innovation. Brand names, good standing with suppliers, and consistent product quality with customers are examples of reputation resources. Organizational capabilities are the skills and aptitudes a business uses to transform input into outputs, such as the ability to hire, manage, and retain a workforce (Dess et al., 2016).

A resource must possess four essential qualities to gain a competitive edge: it must be valued, rare, imperfectly imitated, and non-substitutable (Barney, 1991). A scenario is valuable when the company's resources can take advantage of an outside opportunity or reduce an outside threat (Hesterly & Barney, 2010). In the meantime, a company's resources are unique when there are few of its competitors who have comparable resources. Imperfectly imitable is another characteristic of a resource's sustainable competitive advantage (Barney, 1991). Due to physical uniqueness, path dependency, causal ambiguity, or social complexity, the firm's resources become too expensive for competitors to imitate (Dess et al., 2016). The last characteristic of a company's sustainable competitive advantage is non-substitutable, meaning there are no tactically equivalent beneficial resources that are either singular or unmatched on their own.

In this paper, digital fluency skills are perceived as an essential intangible resource. Consistent with the RBVT, it is put forward that digital fluency skills are vital to creating a sustainable competitive advantage. Relevant constructs that highlight the strategic importance of intangible resources in achieving competitive advantage, thereby establishing the foundational role of digital fluency skills in organizational success are further discussed. Organizations must ensure their strategies and action plans incorporate four attributes of competitive advantage: value, rarity, imperfect imitability, and non-substitutability. The RBVT is mainly built around developing abilities to utilize resources to achieve competitive advantage (Barney, 1991; Delen & Zolbanin, 2018; Gunasekaran et al., 2017), and some companies are more successful than others in resource accumulation and resource

deployment to create distinct capabilities (Peppard & Ward, 2016). Sustainable competitive advantage can be achieved through these distinctive capabilities; resources should be valuable, rare, inimitable, and non-substitutable -VRIN (Gunasekaran et al., 2017).

(a) Value: Digital fluency skills embrace important values for organizations in today's digital age. Staff expertise in digital tools and technologies could play a role in various aspects of the business, for example innovation and customer engagement. Employees' ability to leverage digital platforms effectively provides benefits such as cost savings, process improvements, and revenue generation (Verhoef et al., 2021). Consequently, digital fluency skills are favorably appreciated as they allow organizations to exploit opportunities and alleviate risks in the digital setting (Kraus et al., 2021).

(b) Rarity: Even though digital fluency skills turn out to be more and more imperative, they are not commonly owned by all individuals or organizations. There is frequently a discrepancy in digital literacy levels among staff (Tegegne et al., 2023). Organizations that capitalize in training and development programs to improve digital fluency among their personnel gain a competitive advantage by having a rare asset that places them separately from competitors (Juliadi et al., 2023).

(c) Imperfect Imitability: Digital fluency skills could be demanding for rivals to emulate due to several factors. First, the acquisition of digital fluency takes time, energy, and resources for training and education, causing it hard for competitors to imitate instantaneously. Second, individual digital fluency levels are affected by factors that are not certainly transmissible or imitable, for example, experience, ability, and learning agility. In addition, the incorporation of digital fluency into organizational values and practices enhances an additional level of difficulty, as it necessitates support with strategic objectives and leadership commitment (Cheng et al., 2024). Thus, while rivals could try to mimic digital fluency, the distinctive combination of skills, capabilities, and organizational setting makes it imperfectly imitable.

(d) Non-substitutability: Digital fluency skills are not easy to alternate with substitute resources that suggest comparable advantages. Despite the fact that organizations could capitalize on technology and tools to automate specific jobs, the human aspect of digital fluency continues inimitable. Digital fluency includes not only technical proficiency other than critical thinking, problem-solving, creativity, and adaptability, which are integral to human understanding and hard to imitate with technology only. Additionally, the incorporation of digital fluency with domain knowledge, industry expertise, and organizational culture (Ahmed et al., 2024) forms a distinctive competitive advantage that cannot be copied or replaced by competitors.

3. Methodology

There are several steps undertaken in developing the hierarchical model illustrating the association of digital fluency skills and sustainability. Firstly, the justification for the association between digital fluency skills and sustainability is provided. The reference is made to the global indicator framework for Sustainable Development Goals, developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed upon at the

48th session of the United Nations Statistical Commission held in March 2017 (United Nations Statistics Division Development Data and Outreach Branch, n.d.). Secondly, the explanation of each SDG representing a specific area of focus in sustainability is presented. These goals often require innovative approaches and solutions, many of which rely on digital technologies. Thirdly, the specific indicator under an SDG measures progress toward achieving that goal is identified. Understanding these indicators is crucial for assessing the effectiveness of various initiatives and strategies aimed at sustainability. Finally, the hierarchical model illustrating the association of digital fluency skills and sustainability is presented. Each component of the model was carefully articulated to illustrate the relationships between digital fluency skills, organizational transformation, economic development, and the attainment of SDGs, providing a coherent narrative that reflects the underlying principles of the Resource-based View theory.

4. Findings

The subsequent discussion elaborates on the conceptualization of digital fluency skills and sustainability (see Joseph et al., 2022 & Joseph et al., 2024). Digital fluency skills, as an intangible resource, play a pivotal role in advancing the UN Sustainable Development Goals agenda. The reference was made to several past studies to establish the relationship between digital fluency skills and sustainability indicators (for example, IFLA, 2024). Table 1 illustrates the nexus between digital fluency skills and sustainability indicators.

Table 1. The connection between Digital Fluency Skills and Sustainability

SDG	Indicators explanation	Connection
Industry, Innovation and Infrastructure (SDG 9)	Target 9.1 Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.	Digital fluency skills drive innovation and digital transformation within organizations, leading to the development of new products, services, and business models. Companies that leverage digital technologies, such as cloud computing, data analytics, and artificial intelligence, can streamline operations, improve efficiency, and enhance competitiveness. Furthermore, by investing in digital infrastructure and R&D initiatives, organizations contribute to advancing technological capabilities and fostering industry innovation, thereby supporting SDG 9's goal of building resilient infrastructure and promoting sustainable industrialization.
Quality Education (SDG 4)	Target 4.4 Substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship by 2030.	Within an organization, digital fluency skills enable employees to access quality training and development opportunities, fostering a culture of continuous learning. By investing in digital learning platforms, online courses, and skill-building programs, companies can enhance employee competencies, improve job performance, and promote career advancement.
Decent Work and Economic Growth (SDG 8)	Target 8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity,	Digital fluency skills are essential for employees to thrive in the digital economy and contribute meaningfully to the organization's success. By equipping employees with digital

	and innovation, and encourage the formalization and growth of micro-, small-, and medium-sized enterprises, including through access to financial services.	skills relevant to their roles, organizations can enhance productivity, creativity, and innovation. Moreover, companies that prioritize digital upskilling and reskilling initiatives demonstrate a commitment to employee development and job satisfaction, aligning with SDG 8's objective of promoting inclusive and sustainable economic growth.
Reduced Inequalities (SDG 10)	Target 10.4 Adopt policies, especially fiscal, wage, and social protection policies, and progressively achieve greater equality.	Digital fluency skills play a crucial role in promoting diversity, equity, and inclusion within organizations. By providing equal access to digital training and career development opportunities, companies can empower employees from diverse backgrounds to excel and advance in their careers. Moreover, organizations that prioritize digital inclusion initiatives, such as accessibility features in digital tools and accommodations for employees with disabilities, create a more inclusive workplace environment, aligning with SDG 10's aim of reducing inequalities within and among countries.

The explanation of the hierarchical model is provided in the following:

(a) Digital Fluency Skills Improve Innovation in Organizations

The foundation of the model is the contention that improved digital fluency skills among employees steer superior innovation in organizations (Dilek et al., 2021). These abilities allow people to use technology productively, developing fresh viewpoints that steer organizational growth.

(b) Digital Transformation at the Organizational Level

When innovation grows, organizations are well placed to experience digital transformation. This transformation includes implementing new technologies, processes, and business models that increase competency (Kraus et al., 2021). Thus, improved innovation promotes organizational transformation.

(c) Achievement of a Digital-driven Economy at the Country Level by 2030

The digital transformation affects individual organizations and the wider economy. When more organizations transform digitally, this mutually heightens the economic setting, heading to the formation of a digital-driven economy (Kraus et al., 2021). This advancement supports national goals and policies intended to achieve an important economic target by 2030.

(d) Assistance in Achieving UN SDGs

The result of these processes — improved innovation, digital transformation, and the emergence of a digital-driven economy — offers the essential foundation for realizing the UN Sustainable Development Goals (UNDP, 2023). A succeeding digital economy could support

multiple SDGs, such as economic growth (SDG 8), industry innovation (SDG 9), quality education (SDG 4), and reduced inequalities (SDG 10).

The individual level of the hierarchy develops upon the preceding one, establishing a clear path from personal skills to organizational effects and eventually to national economic development and sustainability. The model visually exemplifies this cascading outcome, demonstrating how investments in digital fluency skills are foundational for attaining wider shared goals.

Figure 1 proposes a hierarchical model of the contribution of digital fluency skills to the business, national, and sustainable development goals.

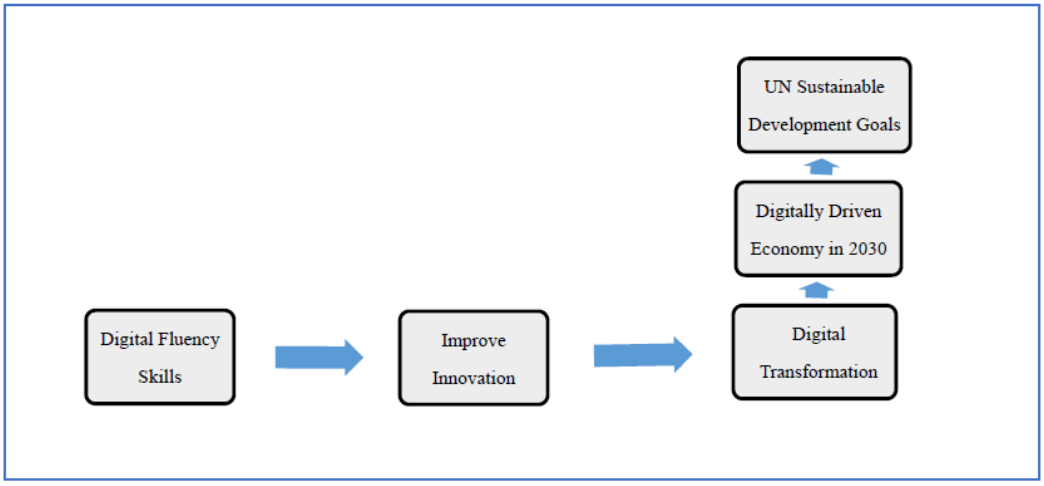

Figure 1. Hierarchical model of digital fluency skills to the business, national, and sustainable development goals

5. Way Forward

Increasing digital fluency skills within Malaysian business organizations can boost productivity, encourage creativity, and boost competitiveness. It is recommended that business organizations prioritize digital fluency, particularly as a means to gain a competitive edge, and this can be performed in several ways. Business organizations should develop a comprehensive digital strategy that provides a strategic plan that details their digital priorities, goals, and projects in relation to their organization's overall objectives, namely digital fluency skills. This is because digital efforts are guaranteed to serve the organization's overarching goals and objectives when a well-designed digital strategy is in place. Prioritizing digital projects that directly help achieve important business outcomes, like higher revenue, expanded market share, or improved operational efficiency, is made easier with this alignment. Apart from that, business organizations should invest in employee training and development. They should create and carry out courses that cover the digital competencies required for various positions in the company and promote continual professional growth by offering seminars, online classes, and certifications in pertinent digital skills. Also, business organizations should embrace and use cutting-edge technology to

achieve competitive advantages in promoting digital fluency skills. This is because automation tools can boost productivity and simplify repetitive tasks, while data analytics can enhance decision-making and provide valuable insights into the organization's operations, making investment in data analytics solutions beneficial.

Business organizations should encourage a culture of digitalization in realizing SDG. They should provide leadership advocacy and motivate top management to support digital projects and cultivate an innovative and digital culture. They can encourage employee experimentation with new technologies and sharing of their digital breakthroughs by providing chances for employee engagement. Besides that, increasing awareness of cybersecurity through security training is indeed crucial. They should provide staff with frequent cybersecurity training to guide them through proper practices and how to spot any risks. As for security policies, they should create and implement strict cybersecurity guidelines and procedures. They should develop a communication plan, namely, to create a detailed communication plan that addresses staff concerns and explains the advantages of digital efforts and support systems, namely to give staff members the tools and assistance they need to adjust to new workflows and technology.

The government's MyDIGITAL initiative aims to propel Malaysia towards becoming a high-income, digitally driven nation and a regional leader in the digital economy. Therefore, it is crucial to provide this initiative with the necessary resources and authority to achieve its objectives. Enhancing digital fluency is essential to accelerate digital adoption and empower businesses with innovative ideas. Although Malaysia has made progress in improving its key digital infrastructure, developing an agile and digitally fluent workforce remains a challenge due to rapid changes in technologies. Continuous efforts must be made to nurture the digital mindset of the workforce through initiatives such as upskilling, reskilling programs, and talent development. Prioritizing investment in digital fluency skills is essential for several reasons: to attract and retain a highly skilled workforce, respond to rapid technological changes, and support current and future innovations to gain a competitive advantage.

Collaboration between the government and industries is pivotal in the establishment of a comprehensive framework for enhancing the digital skill set. The OECD framework can be adapted to devise, mobilize, and deploy digital fluency skills. This approach should consider the diversity across industries and the varying scales of businesses. Additionally, a rigorous assessment and refinement of programs is advised to address the persistent issue of mismatched supply and demand of digital skill sets. Furthermore, it is imperative to customize training workshops and upskilling initiatives to align with the requirements for digital fluency skills across diverse domains. In addition, leadership should not be overlooked. Efforts must be dedicated to foster digital management among leaders and equip them with a better understanding for the need of digital fluency skills.

Despite the government's multiple initiatives to stimulate the digital economy, it has fallen short of expectations due to a lack of awareness (Tong & Gong, 2020). Consequently, promotional effort is essential, particularly aimed at SMEs, where cost is often cited as the primary challenge. Moreover, it is imperative for the government to collaborate with

technology solution providers to mitigate the costs associated with digitization. When investment in current technologies and upskilling programs is put on hold due to high costs, the digital fluency skills of workforces become less relevant.

By focusing on these areas, Malaysian businesses can enhance their digital fluency, drive innovation, and achieve greater efficiency and competitiveness in the global marketplace. Businesses that embrace innovation and digital trends more quickly than their competitors typically find themselves at a competitive disadvantage (Kallmuenzer et al., 2024). Although numerous digital technologies are accessible for business usage in SMEs, managers frequently miss out on the possibility of benefiting from using these tools. Therefore, it is critical to prioritize the development of digital skills among and for employees (Kallmuenzer et al., 2024). Conducting comprehensive research that not only highlights the unique implementation issues faced by Malaysian businesses in adopting digital fluency but also looks at how these abilities may be successfully incorporated into their organizational structures is crucial to closing this gap. By concentrating on the obstacles and enablers of digital fluency, this study will offer important insights into developing a nurturing atmosphere that promotes these abilities. With this knowledge, Malaysian businesses will eventually be able to use digital fluency as a strategic tool to improve their competitive edge and help accomplish the Sustainable Development Goals (SDGs).

6. Limitations and Theoretical Implications

As in any hierarchical model design, no model is without its flaws and limitations. The assumption of designing the model may have its shortcomings in practice. However, we have undertaken an extensive approach by doing comprehensive reviews of literature to design the hierarchical model. In addition, the Resource-based View theory was used to support the hierarchical model for digital fluency skills.

The hierarchical model of digital fluency skills presents a valuable opportunity to advance business, national, and sustainable development goals, particularly through the initiatives of the Malaysia Digital Economy Corporation. By fostering enhanced digital fluency among employees, organizations can unlock greater innovation, positioning them to effectively navigate digital transformation and thrive in a digital-driven economy. This proactive approach creates a solid foundation for the attainment of the UN Sustainable Development Goals (SDGs). A flourishing digital economy can effectively support various SDGs, such as promoting economic growth (SDG 8), driving industry innovation (SDG 9), and reducing inequalities (SDG 10). Embracing these skills not only benefits individual organizations but also contributes to a more equitable and sustainable future.

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Authors' contributions

Corina was in charge of the draft manuscript. Mariam, Susan, Saifulrizan and Tina revise all parts of this article. All authors are responsible for data collection. All authors read and approved of the final manuscript. All authors declare that they contributed equally to this study, with each author participating in all aspects of the research process, from conceptualization to manuscript preparation.

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