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A Recent Systematic Review of Digital Workplace Adoption: Digital Competencies, Impacts and Challenges

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ABSTRACT

Digital workplaces have emerged as a transformative paradigm in modern organizations, offering promises of higher productivity, employee engagement, and innovation in the Fourth Industrial Revolution (4IR). However, the data reveals that Malaysian enterprises are lagging in adopting digital transformation, and 4IR-readiness among Micro, Small, and Medium Enterprises (MSME) is generally low. This systematic review examined the adoption of digital workplaces, providing insight into the existing knowledge in this field. Although there is increasing interest in adopting digital workplaces, there is limited knowledge of the complete range of competencies, impacts, and challenges that either support or impede this process. This knowledge gap poses a significant obstacle to organizations seeking to harness the full potential of digital workplaces. Addressing this gap is crucial for enhancing organizational efficiency and competitiveness in an increasingly digitalized world. In conducting this systematic review, we followed a rigorous methodology offered by Pre-Recording Systematic Reviews and Meta-Analysis (PRISMA). An advanced searching technique in Scopus, Web of Science (WoS), and Science Direct was conducted, yielding a corpus of peer-reviewed articles published between 2020-2024. We applied strict inclusion and exclusion criteria to select studies, resulting in a final sample size of 36 publications. Our analysis focuses on the digital competencies, impacts, and challenges. The findings from this review can guide organizations in devising effective strategies to foster digital workplace adoption and capitalize on its benefits. Subsequent studies can explore each determinant and their interrelationships deeper and investigate evolving trends in the digital workplace landscape. In conclusion, this systematic review contributes to understanding digital workplace adoption, offering valuable insights for researchers and practitioners.

1. Introduction

Digital workplace adoption is the process of integrating digital technologies and tools into an organization's daily operations and workflows [1]. The adoption requires the incorporation of digital

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platforms, applications, and communication tools as well as automation and Artificial Intelligence (AI) [2, 3] to improve workplace collaboration, productivity, and efficiency [4, 5]. As businesses effort to keep up with the rapid advancement of technology and the changing needs of their employees, the importance of adopting a digital workplace is growing [6]. Organizations can streamline processes, enhance communication, and facilitate remote work by embracing digital transformation [7]. Furthermore, one of the primary advantages of adopting a digital workplace is the ability to eliminate barriers and facilitate collaboration among employees regardless of their physical location [8]. In addition, teams can communicate and collaborate in real-time using digital tools such as video conferencing platforms, instant messaging applications, and project management software, resulting in increased productivity and efficiency [9].

Adopting a digital workplace facilitates the development of new, more efficient work methods [9-11]. By digitizing processes and procedures, organizations can collect and analyse data to gain insights into employee performance, customer behaviour, and market trends [12, 13].This information can then be utilized to drive strategic decision-making and enhance overall business outcomes [14, 15]. Notably, a digital workplace also fosters a culture of innovation and adaptability [13, 14]. By providing employees with the digital tools and resources they need, organizations can empower them to think creatively, experiment with new ideas, and adapt to shifting market conditions [14]. This can lead to increased employee satisfaction and retention and competitive advantage in the marketplace [16].

The readiness of Micro, Small, and Medium Enterprises (MSMEs) in Malaysia for technology adoption, particularly in the context of the Fourth Industrial Revolution (4IR), is generally low [17]. Furthermore, Malaysia faces a substantial deficit in digital talent, prompting the need to recruit 1.5 million foreign digital workers [17]. A pivotal element for businesses initiating their digital transformation journey is the presence of digitally skilled employees [18, 19] . According to the Malaysia Digital Economy Corporation (MDEC) Digital Talent Survey 2021, 85% of companies acknowledge the necessity to reskill and upskill their employees.

The talent readiness gap is attributed to insufficient coverage of 4IR-related education and inadequate upskilling programs [21, 22]. Identified as the top two barriers to acquiring adequate digital talent in Malaysia, skills gaps in the local labour market are a critical concern [20]. A recent digital talent survey conducted by the Strategic Change Management Office (SCMO) and Social and Economic Research Initiative (SERI), 74.5% of respondents highlighted the substantial disparity between entry-level and advanced skills required for tasks [23]. Moreover, 74% of respondents among Small and Medium Enterprises (SMEs) expressed concerns regarding the market's inability to attract specialized talent, as reliance on foreign talent for Information Technology (IT) roles persists. On average, only 4.8% of respondents believed that the existing labour market fully satisfies their digital talent requirements.

Despite the potential of digital workplaces in enhancing productivity, employee engagement, and innovation, there are deficiencies in comprehensive knowledge regarding the digital workplace tools adoption. Existing literature has primarily focused on isolated aspects of digital workplace tools adoption without providing a holistic understanding of the critical factors that either facilitate or hinder this process. This gap hinders organizations' ability to fully leverage digital workplaces for improved efficiency and competitiveness in a digitalized world. Therefore, this article aims to identify the essential digital competencies needed for adopting digital workplace tools, evaluate their impact, and uncover the challenges employees face during implementation. In contrast to prior research that analyse these factors separately, this review offers a comprehensive viewpoint, providing practical insights for organisations seeking to successfully implement digital workplaces.

2. Literature Review

Digitalization has expanded the definition of the workplace. The digital workplace enables us to complete work tasks outside the office and in various locations [24]. It encompasses a transformative environment where organizations integrate advanced technologies, innovative leadership practices, and psychological empowerment strategies to facilitate work processes, collaboration, and communication among employees [25-27]. This environment becomes vital for maintaining competitiveness, attracting talent, and meeting the evolving needs of employees and customers [28]. Utilizing cutting-edge technologies such as AI, chatbots, and digital communication platforms to streamline workflows, enhance productivity, and facilitate seamless collaboration [25, 30]. Key components of the digital workplace include collaboration tools, virtual workspaces, cloud computing, mobile technologies, digital security, analytics, and insights. Businesses are faced with digital challenges and require employees with the necessary skills to function effectively in the digital workplace [18, 40]. Findings from previous studies demonstrated that an entrepreneurial mindset, digitally responsible thought, digital literacy, transformative skills, personal development skills, communication skills, community management skills, data analytic skills, and web development skills are essential in the digital workplace [7].

Organizations increasingly adopt digital workplace solutions to modernize traditional business processes and workflows, improving operational efficiency and employee engagement [30]. Research by Harteis et al. [29] highlighted that the digitalization of work introduces new quality tasks and tools by integrating workers and machines into digital networks. Notably, digitalization impacts work processes and necessitates a change in workplace learning and how tasks are conceptualized. A study by Meske et al. [32] explored the elicitation of employees' support towards digital workplace transformation, emphasizing the importance of understanding and fostering employee buy-in for successful digital workplace initiatives. Other studies discussed the learnings from digital transformation efforts, highlighting the unconventional activities facilitated by digital technologies, such as crowdsourcing legal solutions via social media [25]. Raković et al. [12] explored the advantages and challenges of the digital workplace, highlighting the transformation of physical workspaces by integrating digital tools. The adoption of E-tendering among the potential practitioners in Malaysia can improve the efficiency in construction projects tendering process [33]. Meanwhile, Hashim et al. [34] proposed a conceptual framework for understanding the determinants of digital workplace adoption, incorporating Personal Knowledge Management as a moderator to assess workers' proficiency in using digital tools.

One crucial aspect of the digital workplace is the adoption of enterprise social media platforms and digital fluency to enhance employee agility and knowledge sharing [28, 35]. These platforms facilitate employee communication, collaboration, and knowledge dissemination, contributing to a more connected and informed workforce. The digital workplace extends beyond technology adoption to address challenges related to sociotechnical systems within organizations [27]. Organizations must navigate these challenges to implement digital workplace solutions and drive organizational transformation effectively.

Furthermore, the digital workplace requires organizations to develop digital competencies among employees to navigate digital transformation [35, 36]. Information and digital literacy skills are essential for employees to leverage digital technologies and contribute to organizational success [2]. HR competency models are also evolving to include entrepreneurship and digital competencies to support employees in adapting to technology-intensive business environments [38]. Ashaari et al. [10] indicates the importance role of effective training in e-marketing. Hence, HR professionals are

crucial in leading employees through the transition to digital workplaces and fostering a culture of continuous learning and adaptation.

Several theories have been developed to comprehend the adoption of digital workplaces such as Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovations (DOI) Theory, Institutional Theory, Social Cognitive Theory (SCT) and Socio-Technical Systems (STS) Theory. These theories provide a comprehensive framework for understanding digital workplace adoption in an organization.

TAM, one of the most significant models for predicting user acceptance of technology was introduced by Davis in 1989. Perceived usefulness and perceived ease of use was suggested to determine an individual's intention to use a technology, which in turn affects actual usage. This model has been extensively applied and extended in various digital workplace studies to understand how employees perceive and adopt new technologies. Venkatesh et al. [39] developed the UTAUT model, which integrates elements from several earlier models, including TAM. Four key constructs were identified in UTAUT: performance expectancy, effort expectancy, social influence, and facilitating conditions. This model has been particularly useful in predicting technology adoption in organizational settings, including digital workplaces [40, 41]. Rogers' DOI theory has been applied to study the spread of digital workplace technologies and their acceptance among employees [42]. The theory explains how, why, and at what rate new ideas and technology spread through cultures. Relative advantage, compatibility, complexity, trialability, and observability was identified as critical to the adoption process.

Institutional theory has been used to understand the adoption of digital workplaces by considering how organizational norms and regulations influence technology adoption [5]. The theory focuses on the deeper and more resilient aspects of social structure. It considers the processes by which structures, including schemas, rules, norms, and routines, become established as authoritative guidelines for social behaviour. Other theory such as Bandura's SCT emphasizes the role of observational learning, imitation, and modelling in behaviour adoption. In the context of digital workplace adoption, SCT suggests that employees' beliefs in their capabilities to perform tasks using digital tools (self-efficacy) and their observations of peers using these tools successfully can significantly influence their own adoption behaviour [43]. Meanwhile, STS theory has been applied to understand how the introduction of digital tools affects work processes, organizational structures, and employee roles, and how these elements must be aligned for successful adoption [44]. This theory suggests that the interaction between people and technology in workplaces should be optimized together, rather than separately.

UTAUT has been applied by many researchers to study the digital workplace adoption in SMEs such as accounting information system [45]; cloud computing technology [46]; e-commerce [47, 48]; electronic procurement [49]; digital advertising [50]; enterprise system [51]; social media [52]; smart manufacturing technology [53]; big data [54]; Internet technology [55]; and business application [42].

In UTAUT, Performance Expectancy (PE) is described as the degree to which an individual believes that using the system will help a person to attain gains in job performance. Other models such as TPB, TAM/TAM2 revealed that PE is a strong predictor of behavioural intention to adopt and use of information technology. PE are significant predictors of cloud computing adoption [46]. Akinnuwesi et al. [56] revealed that PE has the strongest significant impact on user’s behaviour intention and has the highest eigenvalue (0.7851) with a p-value (0.004). A study in Malaysia by Soong et al. [57] uncovered that performance expectancy influences usage of public electronic procurement among Malaysian’s SMEs. PE had a direct effect on the adoption of electronic government procurement in the private sector [49].

Effort expectancy is the degree of ease associated with the use of the system. Effort expectancy are significant predictors of cloud computing adoption [46]. A study in Malaysia by Soong et al. [57] revealed that effort expectancy influences usage of public electronic procurement among Malaysian's SMEs. Meanwhile, effort expectancy contributed to e-commerce adoption [47, 48]. Effort expectancy also had a direct effect on the adoption of electronic government procurement in the private sector [49].

Facilitating Conditions refers to the extent to which individuals believe that the necessary resources, technical support, and organizational infrastructure are available to support the use of a particular technology. Lutfi [45] reported that facilitating condition have a positive effect on the continuance intention of accountants to use Accounting Information System (AIS). Other authors claimed facilitating conditions contributed to e-commerce adoption [47, 48].

Social Influence refers to the impact of social factors and the influence of others on an individual's decision to adopt a technology. Social influence is influencing usage of public electronic procurement among Malaysian's SMEs [57]; positively affect behavioural intention to use social media for online advertisement [52] and significantly influenced intention to use big data [54, 58].

The digital workplace also presents opportunities for individuals with diverse needs, such as employees with autism spectrum disorders, by leveraging virtual reality and integrated learning systems [59]. These technologies can create inclusive work environments that cater to the specific requirements of different employee groups, promoting diversity and equity in the workplace. Additionally, the digital workplace plays a significant role in reshaping work environments to enhance the well-being of employees, including those working remotely [60]. Ambient workspaces at home and smart workplace transformations offer new possibilities for creating conducive work environments that support employee well-being and productivity. Ahmad et al. [8] explored how implementing Corporate Social Responsibility (CSR) through digitization might improve the sustained competitive performance of SMEs, highlighting the wider societal advantages of digital workplace projects. On the other hand, Marsh et al. [5] emphasized the drawbacks of the digital workplace in their comprehensive analysis, addressing the potential disadvantages of a digital workplace.

The embracing of digital workplace tools marks a turning point in the evolution of contemporary workplaces. From the introduction of computers in the 1990s to the proliferation of e-commerce in the 2000s, workplaces have historically continuously adapted to technological advancements. These revolutionary changes have reshaped work dynamics from the physical office to the virtual world. Digital workplaces have emerged as a transformative force in recent years, providing organizations with unprecedented opportunities for agility, productivity, and innovation [46, 61]. Before the digital and collaborative economies were established, pre-digital organizations were formed. In response to the new economy, they are implementing organizational transformation projects that substantially change tasks, working conditions, and employee well-being. Notably, positive emotions can facilitate these digital transformations [24, 26, 62]. Accordingly, organizations' dynamic capabilities play a significant role in enabling workplace transformation [63].

Adopting the digital workplace requires leaders to embrace digitalization and foster a culture of innovation, continuous learning, and psychological empowerment [6]. Considering the opportunities and challenges presented by digital transformation, it is imperative that organizations allocate resources toward cultivating human qualities [6, 31]. This includes adaptability, resilience, and competencies. In contemporary organizational settings, the digital workplace holds significant benefits. These include developing digital competencies, positive impacts on employee well-being, improved organizational performance, facilitating knowledge transfer, fostering innovation, and promoting collaboration across hierarchies. Moreover, effective digital leadership and the integration of digital tools positively influence organizational outcomes [64, 65].

In a nutshell, the digital workplace represents a paradigm shift in how work is conducted, emphasizing integrating digital technologies, employee well-being, and organizational transformation to drive success in the digital age.

3. Methodology

This paper seeks to investigate and explore the digital competencies, impacts and challenges in the adoption of digital workplace technologies. This research employs the Pre-Recording Systematic Reviews and Meta-Analysis (PRISMA) method, an acknowledged standard for conducting a systematic literature review. In essence, publication rules were developed to aid authors in determining the accuracy of a review by supplying pertinent and necessary information.

3.1 Identification

In choosing several appropriate papers for this report, the systematic review process consists of three main phases. The first step is keyword recognition and the quest for linked, similar terms based on the thesaurus, dictionaries, encyclopaedia, and previous studies. Accordingly, after all the relevant keywords were decided, search strings on Scopus, Web of Science (WoS), and Science Direct databases were created. In the first step of the systematic review process, the present research work successfully retrieved 428 papers from all databases.

3.2 Screening

During the initial screening stage, it is imperative to exclude duplicated papers. At this stage, a total of 320 publications were excluded. However, in the subsequent phase, 108 papers were evaluated using specific inclusion and exclusion criteria devised by the researchers. The initial criterion for selection was literature in the form of research articles, as it serves as the primary source of practical information. Additionally, the present investigation incorporates the omission of publications. This includes systematic reviews, reviews, meta-analyses, meta-syntheses, book series, books, chapters, and conference proceedings. Furthermore, the review focused exclusively on scholarly articles produced in English. It is essential to acknowledge that articles were selected for a period of three years, specifically from 2020 to 2024.

3.3 Eligibility

For the third step, known as eligibility, a total of 48 articles have been prepared. All articles' titles and key content were thoroughly reviewed to ensure that the inclusion requirements were fulfilled and fit into the present study with the current research aims. Therefore, eight articles were omitted since they were out-of-field articles based on empirical evidence. Finally, only 36 articles are available for review.

3.4 Data Abstraction and Analysis

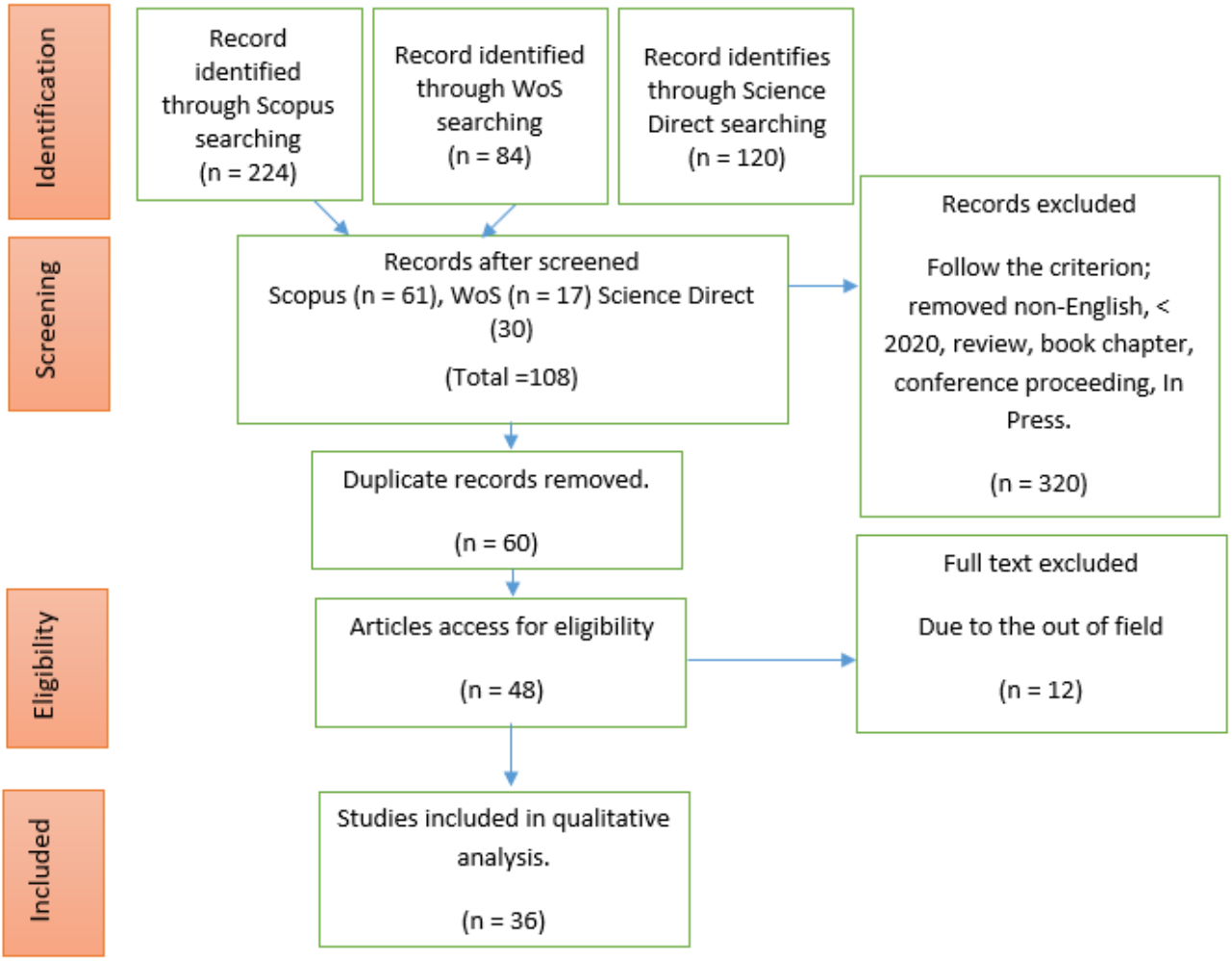

Fig. 1. Flow diagram of the proposed search study

4. Result and Finding

The advent of the digital workplace has introduced novel challenges stemming from the utilization of technology and the convenient accessibility of information across various platforms. Accordingly, 36 articles were extracted and analysed using the search technique. All papers were classified into three categories: digital competencies, impacts, and challenges.

4.1 Digital competencies

The evolving demands of Industry 4.0 highlight the need for multidisciplinary digital competencies among employees, ranging from basic digital literacy to multidisciplinary knowledge and entrepreneurship abilities. Digital competencies encompass a variety of abilities related to utilizing digital tools, technologies, and platforms to enhance productivity, communication, and problem-solving in the workplace [36, 37]. Moreover, these competencies are crucial for employees to adapt to the increasing integration of technology in business operations and to ensure a smooth transition to a technology-intensive work environment.

Table 1
Summary of Digital Competencies

Authors	Title	Methodology	Findings
[7]	Hey Leaders, It's Time to Train the Workforce: Critical Skills in the Digital Workplace	A qualitative study was conducted. With the help of a cross-case analysis of nine multinational corporations, a skillset is provided for leaders on how to train the workforce in the digital workplace.	Entrepreneurial mindset, digital responsible thinking, digital literacy, transformative skills, personal development skills, communication skills, community management skills, data analytic skills, and web development skills are critical in the digital workplace.
[26]	Who fits into the digital workplace? Mapping digital self-efficacy and agility into psychological traits	This study proposed and evaluated such a model by conducting two studies at international (Study 1, N = 309) and French (Study 2, N = 1,025) publicly traded organizations.	Personality dimensions, openness to experience, emotional stability, and investigative and realistic vocational interests are predispositions for developing digital self-efficacy. Furthermore, they discovered corroborative evidence for digital self-efficacy to facilitate workforce agility.
[14]	Individual Dexterity and Psychological Empowering Leadership for Digital Workplace	One hundred fifty respondents who work in creative industries and use IT-based communication tools to finish their daily jobs were involved in this research. Data were collected using a questionnaire and analysed using SmartPLS.	Individual dexterity can predict the performance of individuals who work in a digital environment. In addition, psychologically empowering leadership and individual readiness to change play significant roles as triggers to the formation of individual dexterity, increasing individual performance.
[1]	Digital workplace transformation (DWT): Subtraction logic as deinstitutionalizing the taken-for-granted.	Adopting the concept of deinstitutionalization, the rationale for and the process of how an organization abandons workplace routine that conflicts with its intended DWT is examined.	The gaze is shifted from the dominant addition logic, which advocates for appropriating new digital technologies, to the equally important value of subtraction, i.e., removing existing workplace technologies (or inscribed institutional rules) to abandon workplace routines that conflict with the intended DWT. The study highlighted the oft-ignored subtraction logic in DWT.
[3]	Designing trust: The formation of employees' trust in conversational AI in the digital workplace	A case study of a global organization.	AI chatbot users experience three types of trust: emotional, cognitive, and organizational.
[66]	Smart Workplaces for older adults: coping 'ethically' with technology pervasiveness	The SmartFrameWorK methodology was applied to a case study.	Personalized digital services could elicit trust in users through a well-defined framework. Ethics compliance is a dynamic process ranging from participant engagement to data management.
[67]	Managing digital workplace communications to maximize knowledge transfer: a collaborator's perspective	A quantitative exploratory study uses an online survey completed by 123 collaborators at different service, manufacturing, and retail companies.	The findings indicated the motivations that employees have when using several digital tools in the workplace - information transfer, social interaction, convenience, immediacy, and surveillance.

[68]	"Am I supposed to call them?" Relearning interactions in the digital workplace."	A multiple, longitudinal case study of knowledge-based workers in three firms located in Sweden has been conducted. In total, 89 interviews with 32 employees in three knowledge-based firms have been collected.	The study suggested how the intricate interaction between rules and norms for interaction and work must be renegotiated as well as un- and relearned when the physical work environment no longer frames the work context.
[24]	Hope, tolerance, and empathy: employees' emotions when using an AI-enabled chatbot in a digitalized workplace	An interpretive case study approach and an inductive analysis were adopted for this study. Data were collected through interviews, document review, and observation of use.	Employee appraisals of chatbots were influenced by the form and functional design of the AI chatbot technology and organizational and social context, resulting in a wider repertoire of appraisals and multiple emotions. The existence of multiple emotions can encourage the continued use of an AI chatbot.
[64]	From conventional to digital leadership: exploring digitalization of leadership and innovative work behaviour	Data were collected from 320 Turkish department managers in the Textile Industry through digital leadership and innovative work behaviour scales. The hypotheses were tested using path analysis. The analyses were conducted using SPSS and AMOS package programs.	The employees' perceptions of digital leadership have a positive and significant effect on all dimensions of an employee's innovative work behaviour. The employees perceived the leaders with high digital skills positively, who tend to adopt innovative behaviours when they have digitally skilled leaders.
[27]	A psychological perspective on the sociotechnical enablers of knowledge worker digital creativity	The data was collected from platform knowledge workers (N = 159) using partial least squares structural equation modelling (PLS-SEM).	Organizational support positively relates to digital creativity. The sense of virtual community moderated the effect of organizational support for digital creativity. Technology's ease of use facilitated a sense of virtual community.
[31]	Companies on Thin Ice Due to Digital Transformation: The Role of Digital Skills and Human Characteristics;	The online questionnaire was completed by managers and white-collar workers of Hungarian manufacturing companies in spring 2021 (n = 489). Descriptive statistics and relationship tests are used to analyse the results.	(1) The digital transformation reduced the demand for human labour, the workforce has basic digital skills used in a few parts of companies, and the digital transformation has increased the challenge in the lack of digital skills of the workforce. (2) Human characteristics are essential in the impact of digital transformation. (3) The size of the companies influenced human characteristics, which have changed due to digital transformation.
[69]	The acceptance of chatbots in an enterprise context – A survey study	This paper derives a research model based on the decomposed Theory of Planned Behaviour, which is tested in a survey with 198 participants.	Intrinsic motivation strongly influences the intention to use Enterprise Bots, whereas external influences demonstrated smaller effects. Employees are convinced of the usefulness of a tool for themselves.
[70]	Digital workplace transformation in the financial service sector: Investigating the relationship between employees' expectations and intentions	The research sample consisted of 79 financial institutions, banks, and insurance companies in B&H. The questionnaire was sent to the managers of those financial institutions via e-mail, and they were asked to distribute the survey to all employees.	Interpersonal relatedness in a digital work environment significantly influences employees' performance and well-being. This, in turn, increased employees' intentions to support digital workplace transformation.

4.2 Impacts

The adoption of digital workplace technologies has a significant impact on organizations and employees. Research indicates that various factors at different levels influence digital transformation in the workplace. At the individual level, factors such as technology adoption, perceptions towards technological change, skills and training, workplace resilience, and work-related well-being play crucial roles in effective digital transformation [16, 37, 44]. Moreover, adopting digital technologies in the workplace has been associated with increased productivity, corporate culture changes, and improved employee outcomes [71]. Digital workplace adoption is also linked to improvements in employee performance and productivity [16]. However, it is essential to consider potential challenges such as technostress, interdependence, and work-life balance issues that may arise from the increasing presence of digital technologies in the workplace [72].

Table 2
Summary of Digital Workplace Impacts

Authors	Title	Methodology	Findings
[65]	Digital workplace and organization performance: Moderating role of digital leadership capability	A research model was validated using the PLS-SEM technique on a sample of 335 respondents from different types of organizations that have embarked on the digital transformation journey.	The dynamic capabilities have a significant and positive influence on digital transformation, improving the employees' work-life balance, resulting in better employee performance and superior organizational performance. Digital leadership plays a significant role in the digital transformation of the workplace.
[73]	Digital workplace health promotion (DWHP): a pilot study during the SARS-CoV-2 pandemic in Germany	An online pilot study was conducted in Germany in June 2021. The study is representative of age, gender, and education. The user perspective on DWHP was investigated using 12 quantitative and two qualitative items.	Most 690 participants perceived DWHP as a valid long-term addition to regular workplace health promotion. Nearly 55.7% use DWHP when available; however, most (65.4%) do not use these offers more than regular ones. Spontaneous participation is relevant for about 55%. Problems occur due to technical equipment (29.4%) and premises (36.3%). Open remarks highlight specifics in offer design, such as data security issues.
[62]	When Companies Make Your Day: Happiness Management and Digital Workplace Transformation	Using a multiple case study method, it illustrates how happiness management practices are enacted in three French pre-digital organizations from different industries.	Characteristics of happiness management are mobilized differently by each organization. Some combinations of these characteristics and employees' control perceptions led to a positive emotional climate, affecting the success of digital workplace transformations.
[74]	Working from Home with Flexible and Permeable Boundaries: Exploring the Role of Digital Workplace Tools for Job Satisfaction	An online survey was completed by 202 information workers.	The findings partially confirmed the existing theory that more work flexibility increased job satisfaction while more work permeability decreased job satisfaction. However, depending on the flexibility and permeability of their work-home boundaries, the frequency with which information workers use digital workplace tools has cross-over effects on job satisfaction.

[75]	Lessons for and from Digital Workplace Transformation in Times of Crisis	Case study	The study identified four transformation phases and respective management practices that enabled them to gradually align their digital tools, cultural assets, and physical office spaces. A roadmap from these three cases suggests management actions for preparing workplace-related responses to future crises and designing workplaces in the post-COVID-19 era.
[76]	The Digital Work Environment and Workers' Health	The hypothetical-deductive method was primarily adopted with qualitative research.	Workers' health is identified as an environmental good, based on the characteristics of a common use good of the people and an essential good for a healthy quality of life. The employer is responsible for taking the necessary measures to reduce environmental risks that can be extracted from the protection norms, including the provisions of the arts.
[72]	How to prevent technostress at the digital workplace: a Delphi study	A set of 24 technostress prevention measures from technostress inhibitor literature and other technostress literature were based on qualitative and quantitative contributions from a Delphi study.	A list of 24 technostress prevention measures is identified; 17 measures can be categorized as primary technostress prevention and seven as secondary technostress prevention measures.
[77]	Staff scientist perspectives on onboarding and professional development: A case study	Interviews with a subset of scientists informed the survey development and identified COVID-19-related impacts on daily work.	Results indicated the need for targeted orientation resources specific to staff scientists, accurate and timely information and resources to support scientists' supervisors, and professional development for scientists in leadership and management-related skills. Remote work associated with COVID-19 accentuated the need for managerial skills, including team development in digital work environments.
[78]	Posttraumatic stress disorder in digital work environment: A case report	A male patient who developed classic symptoms of posttraumatic stress disorder after work-related exposure to digital presentation of physical and sexual violence against animals and human beings as a social media content moderator.	The potential risks for mental health due to digital impressions during work and related socio-medical and actuarial consequences.
[32]	Bridging formal barriers in digital work environments – Investigating technology-enabled interactions across organizational hierarchies	Based on a Skype for Business dataset with over 22,000 users and over 8 million conversations from six countries.	The insignificance of the country's cultural factors, the essential focus on the middle levels of hierarchy, and the influence of staff responsibility on the vertical access to information and knowledge.

4.3 Challenges

Digital workplace adoption presents various challenges that organizations must address to optimize the implementation of digital technologies. To ensure successful digital workplace transformation, it is vital to explore and secure employees' support for such changes [32]. However, it is noted that studies often concentrate on the advantages of digital workplaces while neglecting the challenges linked to their implementation [12]. Moreover, challenges and opportunities for digital self-tracking in the workplace underscore the necessity of addressing ambiguity and control issues related to digital technologies [79].

Table 3
Summary of Digital Workplace Challenges

Authors	Title	Methodology	Findings
[80]	Challenges to learning and leading the digital workplace.	Qualitative exploratory study.	A sole focus on information systems as new technology and training and education on their functionality is insufficient. New competencies in the workplace called for understanding learning practices in everyday digital work and leading the transition toward a digital workplace required learning new leadership practices.
[81]	Cyber Security Challenges Faced by Employees in the Digital Workplace of Saudi Arabia's Digital Nature Organization	Qualitative research methods and semi-structured interviews were used to collect data from 20 individuals representing various organizational divisions. The data were analysed using thematic analysis, which revealed five significant themes: lack of knowledge and training, insider risks, social engineering attacks, insufficient passwords and authentication, and bring-your-own-device (BYOD).	The organization must employ robust cyber security measures and awareness programs to address these challenges effectively.
[82]	Role of Cyber Security on Employees' Digital Workplace Performance: Exploring the Effects of Employees' Digital Awareness and Organizational Support Intricate	Using survey questionnaires. The researcher gathered primary data from personnel of private organizations. SPSS-AMOS is used to validate the data and examine the relationship between the constructs.	Critical infrastructure and cloud security positively correlate with digital workplaces. Digital awareness and organizational support moderate substantially between critical infrastructure security, cloud security, and the digital workplace.
[83]	Digital Workplaces and Information Security Behaviour of Business Employees: An Empirical Study of Saudi Arabia	A quantitative study was conducted. The key factors chosen for the model were password management, infrastructure security management, e-mail management, organizational security policy, organizational support and training, and the perception of the level of security. SEM was used to identify the most relevant factors based on the respondents' feedback.	The respondents did not perceive all the constructs of the model as relevant security factors, which can potentially result in security lapses. This indicated that more security-related measures should be implemented and that business employees should be updated periodically about potential security threats. Security measures should be implemented at organizational and individual levels.

[84]	Cybersecurity Determinants in Iraq's Digital Workplace: Attitude, Policy, and Compliance Roles.	This study used a quantitative survey questionnaire approach for data collection and analysed the data collected through primary research software SPSS and Amos.	Organizational cybersecurity is significant in the digital workplace. Yet, the mediators (policy compliance of the organization and attitudes of employees towards cybersecurity) have reflected the insignificant impact on the digital workplace.
[85]	Working in a bubble: techno-isolation as an emerging techno-stressor in teleworkers	In-depth semi-structured interviews with 36 professionals were performed to obtain qualitative data to explore emerging techno-stressors.	The authors identified a previously unreported techno-stressor, Techno-Isolation (TIS), which arises from a heavy dependence on information communication technologies for professional social interactions.
[86]	Do emotions matter in a digitized workplace? Technostress and employees' emotional well-being during the pandemic	Data were collected from frontline hotel employees in Turkey. Online data were collected through Amazon Mechanical Turk services. A total of 250 questionnaires were distributed. Only 204 questionnaires with valid responses were usable for analysis through PLS-SEM.	Financial, social gaze, and technology caused workplace stress, resulting in aggression. Aggression subsequently affects the employees' emotional outcomes, impacting their emotional well-being. Technostress insignificantly moderated workplace stress and aggression.
[87]	Psychological and behavioural outcomes of social media-induced fear of missing out at the workplace	Grounded in the stressor-strain-outcomes (SSO) framework, the hypothesized associations were tested by a path analysis of 312 responses from individuals working in the United States.	The results confirmed significant relationships between individual tendencies, Fear of Missing Out (FoMO), and psychological and behavioural outcomes.
[88]	Associations of techno-stressors at work with burnout symptoms and chronic low-grade inflammation: a cross-sectional analysis in hospital employees	N = 173 (74.6% women, M age = 31.0 years) university hospital employees participated in a cross-sectional study. Self-report questionnaires assessed general psychosocial working conditions (work overload, job control, social climate), various techno-stressors, burnout symptoms, and relevant confounders. Participants provided capillary blood samples, and high-sensitivity C-reactive protein (hs-CRP) as an inflammatory biomarker was analysed from dried blood spots.	Based on a factor analysis, four underlying dimensions of techno-stressors were identified: techno-and-information overload, techno-complexity, interruptions, and multitasking, as well as usability and technical support. In multivariate linear regressions, information overload and techno-complexity were associated with core (exhaustion, mental distance) and secondary (psychosomatic complaints) symptoms of burnout. Techno-/information overload significantly predicted burnout core symptoms, even when general work overload was controlled for. The techno-stressors were not associated with hs-CRP.
[89]	Credibility and trust of information privacy at the workplace in Slovakia. The use of intuition	Data was collected from 230 employees in Slovakia using a survey questionnaire. Quantitative analysis using SPSS was conducted to describe employees' thinking preferences when judging the credibility of information privacy in their organizations.	The survey participants revealed their perceived credibility and trust in personal data protection and thinking preferences. Unconscious thinking is the type of effort reduction often reported by participants who perceive high credibility and trust in personal data protection.

[90]	Managing Generational Tensions Toward Digital Transformation: A Micro Foundational Perspective	A case study was conducted using 25 semi-structured interviews among managers and field observations at a Dutch multinational enterprise.	Generational differences between Generations X and Y managers necessitate efficient coordination to cope with organizational tensions and successfully pursue the digital transformation of workplaces.
[18]	Role of Emerging Job Skills for Adjusting to Digital Work-Life Challenges	A sequential mixed method approach is employed to conduct the study. In the first phase, an in-depth qualitative inquiry was conducted to explore digital work-life challenges through interviews conducted with practicing managers in the IT industry from North India. In the study's second phase, an empirical model was developed to validate the specific job skills that impact digital work-life challenges using structural equation modelling (SEM).	The empirically tested model indicated that stress tolerance and communication prowess were the two most important predictors of managing digital work-life challenges. On the other hand, the ability to adjust emerged as a mediating factor between uncertainty management and communication prowess.

5. Discussion

Digital competencies and human characteristics are critical enablers for navigating the complexities of digital workplace environments [16, 25]. Effective leadership practices empower employees to adapt to digital transformations, cultivate digital self-efficacy, and embrace agile work practices [12]. Meanwhile, psychological traits such as self-efficacy, agility, and creativity are pivotal in shaping employees' readiness for the digital workplace [91]. Therefore, organizations need to cultivate individual dexterity, psychological empowerment, and digital self-efficacy to thrive in digital environments [37, 38]. Moreover, an entrepreneurial mindset, digital responsible thinking, personal development, communication, community management, data analytics, and web development skills are critical [7, 38].

The development of digital self-efficacy can be attributed to personality factors such as openness to experience and emotional stability, as well as career interests in investigative and realistic domains [92]. There is evidence that digital self-efficacy facilitates workforce agility [26]. The research provides new perspectives on the specific psychological characteristics that promote adaptability within a workforce. This enables it to effectively navigate the demands of dynamic digital business environments both presently and in the coming years [29]. In other study, webinar such as International Linkage Entrepreneur and Youngster program has a positive impact and helps the knowledge of entrepreneurship and digital skills embellishment [93].

Adhiatma et al. [14] conducted a study on individual dexterity and its impact on enhancing individual performance within the context of the digital workplace. The findings indicated a significant relationship between an individual's dexterity and performance in a digital work setting. Furthermore, psychologically empowering leadership and individual openness to change are of considerable importance in facilitating individual dexterity, ultimately leading to performance [3]. Gkinko and Elbanna [24] revealed the significance of emotional and organizational trust in supplementing cognitive trust and the essential design characteristics that enhance trust in utilizing AI chatbots. Trust in AI technologies and ethical compliance are crucial for building trust and reinforcing workability and well-being [3]. Meanwhile, adherence to ethical standards is a continuously evolving procedure encompassing participants' active involvement and the effective handling of data. Establishing ethical determinants is crucial in fostering trust and enhancing the effectiveness and welfare of older employees [66].

Organizational transformation encompasses substantial modifications in job responsibilities, working environments, and the employee's well-being. Notably, the impact of an organization's dynamic capabilities on the digital transformation of the workplace is noteworthy, as it enhances employees' work-life balance [15] . This, ultimately, leads to improved employee performance and superior organizational performance. The research also emphasized the substantial impact of digital leadership on the digitalization process within the organizational setting [68].

Digital workplace health promotion can improve health initiatives by promoting participation rates, outcomes, and costs [73]. The digital workplace can also enhance job satisfaction and engagement by providing employees with the necessary tools and flexibility. Studies have proven that more work flexibility increases job satisfaction while more work permeability decreases it [74]. The study conducted by Margariti et al. [60] partially supports the existing theoretical framework, suggesting that greater work flexibility is associated with increased job satisfaction. In contrast, increased work permeability is linked to decreased job satisfaction. Moreover, the complexity of digital workplaces requires an understanding of learning practices and new leadership practices [79].

Sundermeier [75] classified workers' health as an environmental good due to its attributes as a commonly utilized resource by individuals and a fundamental requirement for maintaining a high standard of well-being. In another research, Dudezert et al. [62] has identified several features pertaining to the management of happiness that are implemented in varying ways across different organizations. Notably, certain combinations of these traits and employees' feelings of control are associated with a favourable emotional climate, which subsequently impacts the effectiveness of digital workplace transformations.

Despite its benefits, the digital workplace presents various challenges, including information security concerns, cyber threats, techno-isolation, and technostress. Technostress can potentially result in significant negative consequences for both persons and organizations [86]. Furthermore, the rapid integration of technology in the workplace can lead to technostress, which arises from the inability to cope with modern technologies and their constant updates [72]. Studies also highlight the impact of the digital workplace on employee health, stress levels, and job satisfaction. Effective digital workplace strategies can mitigate technostress and enhance job satisfaction. Nevertheless, inadequate measures may lead to negative impacts on mental health and work-life balance [72 - 74]. Therefore, organizations must mitigate employees' excessive technostress for moral, legal, and economic reasons. The proactive prevention of technostress during its developmental stages is of utmost importance. According to Duan et al. [15], digital workplace health promotion holds significant promise in enhancing workplace health efforts, particularly in participation rates, outcomes, and costs. Additionally, techno-isolation, a form of social isolation resulting from excessive reliance on digital tools, poses challenges to employee well-being and productivity [85].

The digitized workplace also brings other challenges related to employees' emotional well-being. Fear of Missing Out (FOMO) induced by social media, credibility and trust issues, and the psychological and behavioural outcomes of social media usage at work are some of the challenges affecting employees' emotional health [86, 87]. The digital transformation of the workplace often requires employees to adapt to emerging job skills and technologies. However, managing generational tensions and adjusting to digital work-life challenges can be daunting, necessitating effective management strategies and skill development initiatives [18].

Cybersecurity risks have become a major concern, and businesses must be aware of potential threats related to digital infrastructure [82]. Therefore, organizations must employ robust cybersecurity measures and awareness programs [81]. Organizational transformation involves significant changes in tasks, working conditions, and employee well-being, positively influencing work-life balance and employee performance. In his study, Saeed [83] indicated that more security-

related measures should be implemented and that business employees should be updated periodically about potential security threats. Moreover, security measures should be implemented at organizational and individual levels.

Alternatively, Nazem et al. [84] discovered that the participants did not consider certain components, such as security policy, organizational support and training, and the perception of the level of security of the model as significant variables in relation to security. Lack of recognition may lead to potential security breaches. This study also suggests enhanced security measures and regular updates to corporate employees regarding potential security dangers. In Saudi Arabia, a study by Muthuswamy [81] identified five key challenges that arise while implementing the digital workplace. These challenges pertain to deficiencies in knowledge and training, insider risks, social engineering attacks, inadequate passwords, authentication measures, and the adoption of Bring-Your-Own-Device (BYOD) policies. Therefore, by comprehending these challenges and effectively utilizing digital tools, organizations can navigate the complexities of digital transformation in the workplace to drive success and enhance employee engagement and inclusivity.

6. Conclusion

In conclusion, the digital workplace has created new potential for organizational agility, productivity, and creativity. Employees need digital competencies, information management, cybersecurity awareness, communication, teamwork, problem-solving, and data literacy to succeed in this technology-driven economy. An entrepreneurial attitude, digital responsible thinking, personal development, communication, community management, data analytics, and web development abilities are essential. However, the digital workplace presents many problems organizations must overcome to foster productivity and well-being. Hence, future research should focus more on cybersecurity, digital literacy and awareness, a healthy working culture, tools and training for skill development, and technology change adaptability, which can lessen the challenges of digital workplace adoption.

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