

Theoretical Perspectives on Digital Literacy Adoption and Remote Work Readiness: An Integrated Review Using TAM, TPB, Digital Divide and Socio-Technical Systems Theory

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Abstract: *The rapid digitalisation of work has elevated digital literacy to a critical competency for labour market participation, yet significant disparities persist in understanding the factors that influence digital literacy adoption, particularly in developing country contexts. This integrated theoretical review examines four prominent frameworks the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Digital Divide Theory, and Socio-Technical Systems Theory (STST) to provide a comprehensive understanding of the factors shaping digital literacy adoption and remote work readiness. Through systematic analysis of the theoretical foundations, empirical applications, and complementary insights of these frameworks, this review develops an integrated conceptual model that synthesises individual, social, technical, and structural factors influencing technology adoption. The findings reveal that while each theory offers valuable insights, an integrated approach that combines individual perceptions (TAM), behavioural determinants (TPB), inequality dimensions (Digital Divide), and system alignment (STST) provides the most comprehensive lens for understanding digital literacy adoption. The review identifies key propositions for future research and offers recommendations for designing effective interventions that address the multifaceted nature of digital literacy development. This integrated framework contributes to the literature by providing a theoretically grounded foundation for research and practice in digital literacy and remote work readiness, with particular relevance for resource-constrained educational contexts, and advances multiple Sustainable Development Goals including SDG 1 (No Poverty), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 10 (Reduced Inequalities).*

Keywords: Technology Acceptance Model, Theory of Planned Behaviour, Digital Divide, Socio-Technical Systems Theory, digital literacy, remote work readiness, integrated framework, theoretical review, Sustainable Development Goals

INTRODUCTION

The accelerated digitalisation of global labour markets has fundamentally reconfigured the competencies requisite for meaningful economic participation, with digital literacy emerging as a critical determinant of employability, career sustainability, and workforce adaptability (Henke et al., 2022; Raharjo et al., 2024 & United Nations, 2023). Contemporary organisational landscapes are witnessing an unprecedented shift toward distributed work arrangements, necessitating a sophisticated repertoire of digital capabilities that extend beyond rudimentary technical proficiency to encompass complex problem-solving, virtual collaboration, and adaptive learning capacities (Porath, 2023; Regent Business School, 2024). Projections by the World Economic Forum, (2024) indicate that the global landscape of remote digital employment is anticipated to undergo substantial expansion, with the number of location-independent digital positions projected to increase from 73 million to 92 million by 2030 representing a 25% growth trajectory that highlights the structural transformation of work modalities worldwide. This proliferation of digital employment opportunities, whilst presenting significant potential for economic inclusion, simultaneously exacerbates existing disparities in workforce preparedness, particularly within developing economies where foundational digital infrastructure and educational provisions remain inadequate (International Finance Corporation, 2023; United Nations, 2023).

The imperative for comprehensive digital literacy has been unequivocally established through empirical investigations demonstrating that over 92% of contemporary employment positions now necessitate some degree of digital competency, ranging from foundational operational skills to advanced analytical capabilities (National Skills Coalition, 2023). However, pronounced skills deficits persist across diverse geographical and socioeconomic contexts, with diagnostic assessments by the World Bank (2019) indicating that over 50% of professionals in Nigeria lack essential foundational digital competencies, including data literacy, basic programming proficiencies, and digital collaboration tool expertise (Onyedinefu, 2022). Furthermore, empirical investigations by the African Development Bank (2024) suggest that digital employment opportunities will emerge across the continent, merely few graduates currently possess the requisite qualifications to occupy these positions (AFDB, 2026; Kwakwa, 2024). This critical disconnect between educational outputs and labour market exigencies highlights the urgent necessity for theoretically grounded interventions that address the multifaceted determinants of digital literacy adoption and remote work readiness (Asa et al., 2025), whilst advancing SDG 4 (Quality Education) through enhanced educational outcomes and SDG 8 (Decent Work and Economic Growth) through improved employment prospects (United Nations, 2015; UNESCO, 2024).

Understanding the complex array of factors that influence individual and collective adoption of digital literacy practices requires sophisticated theoretical frameworks capable of accommodating cognitive, social, technical, and structural dimensions of technology engagement. The Technology

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Acceptance Model (TAM), originally conceptualised by Davis (1989) and subsequently refined through extensive empirical validation, has emerged as a preeminent theoretical lens for examining individual technology adoption behaviours, positing that perceived usefulness and perceived ease of use constitute primary determinants of acceptance intentions (Marikyan & Papagiannidis, 2023). Meta-analytic investigations by Scherer et al., (2019) synthesising data from 114 primary studies with aggregate sample sizes of 34,357 participants have confirmed the robust predictive validity of TAM constructs across diverse educational and organisational contexts, whilst identifying enjoyment and self-efficacy as significant antecedent variables that warrant greater theoretical attention. These findings demonstrate that TAM provides a parsimonious yet powerful explanation of individual technology acceptance, though its focus on cognitive perceptions may overlook broader social and contextual influences that shape adoption decisions in resource-constrained environments.

Complementing this individual-centric perspective, the Theory of Planned Behaviour (TPB), developed by Ajzen (1985, 1991), extends the explanatory framework to incorporate social influences and perceived behavioural control, thereby accounting for the normative and contextual constraints that shape technology adoption decisions (Armitage & Conner, 2001). Bibliometric analyses by Naskar and Lindahl (2026) spanning four decades of TPB research demonstrate its continued relevance across behavioural domains, with particular utility in predicting technology-related intentions where volitional control may be compromised by resource limitations or organisational barriers. Furthermore, meta-analytic reviews by Armitage and Conner, (2001); Bosnjak et al. (2020) confirm that TPB explains approximately 39% of variance in behavioural intentions and 27% of variance in actual behaviour across diverse contexts. The inclusion of subjective norms and perceived behavioural control within TPB addresses significant limitations of TAM by explicitly recognising that individual technology adoption decisions are embedded within social networks and subject to resource constraints that may inhibit behavioural realisation despite positive intentions.

Digital Divide Theory, as articulated by DiMaggio and Hargittai (2001) and subsequently elaborated through extensive empirical investigation by Hargittai (2002) and van Dijk (2020), addresses this lacuna by conceptualising digital inequality as a multidimensional phenomenon encompassing not merely physical access to technological infrastructure, but also disparities in autonomous usage, digital skill acquisition, social support networks, and the capacity to derive meaningful outcomes from technology engagement. Systematic reviews by Acilar and Sæbø (2023) have documented persistent digital divides across sub-Saharan African higher education institutions, where infrastructural deficiencies, inconsistent electrical supply, and limited internet penetration currently estimated at merely 55% nationally in Nigeria with significant rural-urban disparities continue to constrain educational and economic opportunities (Nigerian Communications Commission, 2024; Kortext 2024; Kayanja et al., 2025; Nazyrova et al., 2025 & Tang et al., 2025). These inequalities are further compounded by gendered dimensions of access and the specific challenges encountered by physically challenged learners, necessitating

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intersectional analytical approaches that advance SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities) (UNESCO, 2024; United Nations, 2015). Digital Divide Theory thus shifts analytical attention from individual psychological constructs to structural and material conditions that enable or constrain technology engagement, highlighting that digital literacy adoption cannot be understood solely through the lens of individual choice or perception.

The organisational and structural dimensions of technology adoption are most comprehensively addressed through Socio-Technical Systems Theory (STST), which originated in the seminal work of Trist and Bamforth (1951) at the Tavistock Institute and has subsequently evolved to inform contemporary digital transformation initiatives. STST posits that optimal organisational outcomes emerge through the joint optimisation of technical subsystems (encompassing hardware, software, and procedural elements) and social subsystems (comprising human capabilities, relational networks, and cultural formations), rather than through isolated maximisation of either dimension (Clegg, 2000). Applications by Govers and van Amelsvoort (2023) to Industry 4.0 implementations demonstrate that sustainable technological integration requires alignment between digital infrastructure, organisational culture, and human resource capabilities, with particular attention to the evolving roles of middle management and frontline workers in data-driven decision-making environments (Leonardi et al., 2024; Lu et al., 2025). The principle of joint optimisation assumes particular significance in resource-constrained educational contexts, where misalignment between technical investments and social system requirements frequently results in suboptimal returns on digitalisation expenditures, thereby constraining progress toward SDG 9 (Industry, Innovation and Infrastructure) (United Nations, 2015).

Despite the extensive independent application of these theoretical frameworks across information systems, psychology, sociology, and organisational studies, their systematic integration for understanding digital literacy adoption in developing country contexts remains substantially underexplored. Previous theoretical reviews have examined individual frameworks in isolation such as comprehensive analyses of TAM extensions by Marikyan and Papagiannidis (2023) and critical reviews of TPB applications by Esfandiar and Hadinejad (2025) yet have not adequately synthesised multiple perspectives to capture the complex interplay between individual perceptions, social influences, technical capabilities, and structural conditions that collectively shape digital literacy development. Furthermore, literature reviews by Ireland and Lestari (2025) on the digital divide and by Acilar and Sæbø (2023) on gender dimensions of digital inequality highlight the persistence of structural barriers that individual-centric theories fail to adequately address. This theoretical fragmentation limits the capacity of researchers and practitioners to design interventions that address the full spectrum of barriers encountered by learners in resource-constrained environments, where individual motivation and capability must be understood within contexts of infrastructural limitation, institutional constraint, and socioeconomic vulnerability, thereby impeding advancement toward SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities) (United Nations, 2023).

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This integrated theoretical review addresses this significant gap by systematically examining the foundational propositions, empirical applications, and complementary insights of TAM, TPB, Digital Divide Theory, and STST to develop a comprehensive conceptual framework for understanding digital literacy adoption and remote work readiness. The review synthesises extensive literature spanning information systems research, behavioural psychology, sociology of technology, and organisational development to elucidate how each theoretical perspective contributes distinctive explanatory elements that, when integrated, provide a more complete understanding of technology adoption phenomena than any single framework can achieve. By examining empirical applications across diverse geographical contexts, including sub-Saharan African higher education institutions and other developing country settings, this review identifies common theoretical mechanisms and context-specific variations that inform the development of an integrated conceptual model. This multi-theoretical approach is necessitated by the recognition that digital literacy adoption represents a complex phenomenon influenced by cognitive beliefs, social norms, material conditions, and systemic arrangements that cannot be adequately captured by any single theoretical lens. The following sections present the theoretical foundations of each framework, their empirical applications, the conceptualisation of remote work and remote work readiness, and the development of an integrated conceptual model that advances both scholarly understanding and practical intervention design, whilst contributing to the attainment of multiple Sustainable Development Goals.

Research Objectives

This integrated theoretical review aims to examine the contribution of digital literacy adoption to the attainment of Sustainable Development Goals (SDGs) 1, 2, 3, 4, 5, 8, 9, 10, 11, and 17, conceptualise remote work and remote work readiness as critical constructs in the digital economy; the theoretical foundations and key constructs of TAM, TPB, Digital Divide Theory, and STST; review empirical applications of these frameworks in digital literacy and technology adoption research; identify complementary insights and potential synergies across the four frameworks; develop an integrated conceptual model that synthesises individual, social, technical, and structural factors; derive propositions for future research on digital literacy adoption and remote work readiness; and provide recommendations for designing effective digital literacy interventions based on the integrated framework.

Contribution to Sustainable Development Goals

This review explicitly addresses ten Sustainable Development Goals (SDGs) through its examination of digital literacy adoption and remote work readiness in the Table 1 below.

Table 1: Mapping of Integrated Framework to Sustainable Development Goals

SDG	Goal	Framework Connection	Key Authors
SDG 1	No Poverty	Digital literacy enables economic participation and income generation	United Nations (2015); World Bank (2019)
SDG 2	Zero Hunger	Remote work opportunities improve household food security through stable incomes	FAO (2023); United Nations (2023)
SDG 3	Good Health and Well-being	Digital health technologies and reduced commute stress improve health outcomes	Lee et al. (2025); Bentley et al. (2016)
SDG 4	Quality Education	Digital literacy is foundational for inclusive, equitable quality education	UNESCO (2024); United Nations (2023)
SDG 5	Gender Equality	Addressing gender digital divide empowers women economically	Acilar & Sæbø (2023); UNESCO (2024)
SDG 8	Decent Work and Economic Growth	Remote work readiness enables productive employment and economic growth	World Economic Forum (2024); ILO (2023)
SDG 9	Industry, Innovation and Infrastructure	STST principles guide sustainable infrastructure development	Govers & van Amelsvoort (2023); United Nations (2015)
SDG 10	Reduced Inequalities	Digital Divide Theory directly addresses inequality reduction	Ireland & Lestari (2025); van Dijk (2020)
SDG 11	Sustainable Cities and Communities	Remote work reduces urban congestion and environmental impact	Allen et al. (2015); Nilles (1975)
SDG 17	Partnerships for the Goals	Multi-stakeholder collaboration essential for digital inclusion	United Nations (2023); Ehimuan et al. (2024)

Source: Author's Compilation, (2026).

The integrated framework contributes to SDG 1 (No Poverty) by identifying the digital literacy competencies that enable economic participation and poverty reduction through remote employment opportunities (United Nations, 2015; World Bank, 2019). SDG 2 (Zero Hunger) is addressed through the potential for remote digital work to provide stable incomes that improve household food security, particularly in rural and underserved communities (FAO, 2023). SDG 3 (Good Health and Well-being) connections emerge through the health benefits of reduced commuting stress and the adoption of digital health technologies facilitated by digital literacy (Lee et al., 2025; Bentley et al., 2016).

SDG 4 (Quality Education) represents a core focus of this review, as digital literacy is both a component of quality education and an enabler of inclusive, equitable educational access (UNESCO, 2024; United Nations, 2023). SDG 5 (Gender Equality) is advanced through the framework's attention to gendered dimensions of the digital divide and the empowerment of

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women through digital skills acquisition (Acilar & Sæbø, 2023). SDG 8 (Decent Work and Economic Growth) is directly addressed through the conceptualisation of remote work readiness as a pathway to productive employment and economic advancement (World Economic Forum & Capgemini, 2024; ILO, 2023).

SDG 9 (Industry, Innovation and Infrastructure) is supported through the application of STST principles to ensure sustainable and inclusive infrastructure development that aligns technical and social systems (Govers & van Amelsvoort, 2023). SDG 10 (Reduced Inequalities) forms a foundational element of the framework through Digital Divide Theory's explicit focus on addressing multidimensional inequalities (Ireland & Lestari, 2025). SDG 11 (Sustainable Cities and Communities) benefits from remote work arrangements that reduce urban congestion and environmental impact (Allen et al., 2015). Finally, SDG 17 (Partnerships for the Goals) is advanced through the framework's emphasis on multi-stakeholder collaboration among educational institutions, government agencies, and private sector actors to achieve digital inclusion (United Nations, 2023; Ehimuan et al., 2024).

Conceptualising Remote Work and Remote Work Readiness

Defining Remote Work

Remote work, also referred to as telework, telecommuting, distributed work, or location-independent employment, represents a fundamental departure from traditional co-located work arrangements. Following the conceptual framework established by Allen et al., (2015), remote work can be defined as "a work practice that involves members of an organization working outside of a traditional office setting, using information and communication technologies (ICTs) to interact with coworkers and perform work tasks". This definition emphasises two critical dimensions: spatial separation from the traditional workplace and reliance on digital technologies for work coordination and execution.

The scholarly discourse on remote work has evolved significantly over the past five decades. Early conceptualisations by Nilles (1975) focused primarily on telecommuting as a means of reducing urban congestion and environmental impact, thereby contributing to sustainable urban development aligned with SDG 11 (Sustainable Cities and Communities). Contemporary understandings recognise remote work as a strategic organisational capability enabled by advanced digital infrastructure. Gajendran and Harrison (2007), in their seminal meta-analytic review, conceptualised remote work along a continuum of spatial dispersion, ranging from occasional work-from-home arrangements to fully distributed virtual teams operating across multiple time zones. This continuum perspective is essential for understanding that remote work is not a binary condition but rather a multifaceted phenomenon involving varying degrees of temporal and spatial flexibility.

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Conceptual developments by Bentley et al. (2016) have identified three defining characteristics of remote work: (1) the use of telecommunications technologies as the primary means of work coordination; (2) the spatial separation of workers from traditional office environments; and (3) the temporal flexibility that often accompanies spatial dispersion. These characteristics distinguish remote work from merely "working at home" or "mobile work," as they emphasise the intentional organisational adoption of distributed work arrangements facilitated by digital technologies. Furthermore, the conceptual framework proposed by Malaquias et al., (2025) highlights that remote work involves not only technological mediation but also fundamental changes in work organisation, management practices, and employee self-regulation requirements.

Conceptualising Remote Work Readiness

Remote work readiness extends beyond the mere availability of digital tools or the physical capacity to work from non-traditional locations. Drawing upon the conceptual foundations established by Eddleston and Mulki (2017), remote work readiness can be understood as "the degree to which individuals possess the necessary skills, resources, and psychological preparedness to effectively perform work tasks in distributed, technology-mediated environments". This conceptualisation integrates three critical dimensions: technical competency, self-regulatory capability, and contextual enablement.

The technical competency dimension of remote work readiness encompasses the digital literacy skills required to operate effectively in distributed work environments. Research by Henke et al. (2022) identifies five core skill clusters essential for remote work readiness: (1) digital communication proficiency, including mastery of asynchronous and synchronous collaboration tools; (2) information management capabilities, involving the organisation, retrieval, and evaluation of digital resources; (3) self-directed learning skills for independent professional development; (4) digital security awareness and data protection practices; and (5) virtual collaboration competencies for effective teamwork across spatial and temporal boundaries. These technical competencies align closely with the broader construct of digital literacy, whilst emphasising the specific applications required for distributed work contexts, and directly support SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth).

The self-regulatory capability dimension addresses the psychological and behavioural requirements for effective remote work. Investigations by Bentley et al. (2016) demonstrate that remote work readiness requires enhanced self-management skills, including the ability to structure work time autonomously, maintain motivation without direct supervisory presence, and manage the boundary between work and non-work domains. The meta-analytic findings of Gajendran and Harrison (2007) indicate that individuals with higher levels of autonomy, proactive personality, and emotional stability demonstrate greater readiness for remote work arrangements. Furthermore, research by Allen et al. (2015) identifies "telework self-efficacy" the belief in one's capability to perform work tasks effectively in remote settings as a critical psychological antecedent of remote

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work success. These self-regulatory capabilities contribute to SDG 3 (Good Health and Well-being) by enabling healthier work-life integration and reduced stress.

The contextual enablement dimension recognises that remote work readiness is not solely an individual attribute but is fundamentally shaped by organisational, infrastructural, and domestic circumstances. The conceptual framework developed by Kumi et al., (2024); Malaquias et al., (2025); Ferrara et al., (2022) & Ng et al., (2022) emphasises that readiness requires alignment between individual capabilities and organisational support systems, including clear performance expectations, appropriate technological provisioning, and managerial practices adapted to distributed contexts. Additionally, investigations by Acilar and Sæbø (2023) highlight that infrastructural conditions particularly reliable internet connectivity, appropriate physical workspace, and domestic circumstances that permit focused work constitute necessary enabling conditions for remote work readiness in developing country contexts. This contextual enablement dimension directly addresses SDG 9 (Industry, Innovation and Infrastructure) and SDG 10 (Reduced Inequalities) by highlighting the structural prerequisites for inclusive digital participation.

Digital Literacy and Remote Work Readiness

Digital literacy and remote work readiness represent interdependent constructs that collectively determine an individual's capacity to participate in the distributed digital economy. The conceptual analysis presented by Raharjo et al., (2024) positions digital literacy as the foundational competency upon which remote work readiness is constructed, arguing that without basic digital proficiency, individuals cannot access the opportunities presented by remote employment. However, remote work readiness extends beyond foundational digital literacy to encompass advanced competencies in virtual collaboration, digital self-management, and distributed work practices.

Empirical investigations by the World Economic Forum and Capgemini (2024) demonstrate that the global shift toward remote digital employment has elevated the importance of remote work readiness as a determinant of labour market participation. Their analysis indicates that by 2030, over 90 million positions globally will require full or partial remote work capability, yet significant readiness gaps persist across geographic and demographic segments. In the Nigerian context, diagnostic assessments by Awojide, (2026); PwC Nigeria (2023, 2025) reveal that whilst some graduates possess basic digital literacy, fewer demonstrate comprehensive remote work readiness encompassing advanced collaboration skills, self-regulatory capabilities, and appropriate enabling conditions. These readiness gaps perpetuate cycles of poverty and inequality, thereby impeding progress toward SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities).

The theoretical frameworks examined in this review TAM, TPB, Digital Divide Theory, and STST provide complementary lenses for understanding the antecedents and barriers to remote work readiness. TAM addresses the individual perceptions that influence adoption of remote work

technologies; TPB captures the social and normative influences on readiness development; Digital Divide Theory illuminates the structural inequalities that constrain readiness across populations; and STST provides a framework for aligning technical infrastructure with social system requirements to optimise readiness development. The following sections examine each theoretical framework in detail, before synthesising their insights into an integrated model of digital literacy adoption and remote work readiness that advances multiple Sustainable Development Goals.

Theoretical Frameworks

Technology Acceptance Model (TAM)

The Technology Acceptance Model, developed by Fred Davis in 1986 and published in 1989, is one of the most influential theories in information systems research. TAM was adapted from the Theory of Reasoned Action (TRA) and posits that technology adoption is primarily determined by two key beliefs: perceived usefulness and perceived ease of use (Davis, 1989; Marikyan & Papagiannidis, 2023).

Perceived Usefulness refers to the degree to which an individual believes that using a particular technology will enhance their job performance. This construct captures the instrumental value of technology whether it helps users achieve their goals more effectively. Perceived Ease of Use refers to the degree to which an individual believes that using the technology will be free of effort. This construct captures the cognitive demands of technology use whether it requires significant mental effort to learn and operate.

According to TAM, these two beliefs influence attitude toward using, which in turn influences Behavioural Intention to Use, which ultimately determines Actual System Use. The model also proposes that Perceived Ease of Use indirectly influences Behavioural Intention through Perceived Usefulness, as easier-to-use systems may be perceived as more useful.

Empirical Applications

TAM has been extensively applied across diverse contexts and technologies. A meta-analysis by King and He (2006) found that TAM explains approximately 40% of the variance in technology use intentions. The model has been applied to study adoption of e-learning systems (Park, 2009), mobile banking (Gupta & Arora, 2017), e-government services (Alzahrani et al., 2020), and digital health technologies (Lee et al., 2025).

In the context of digital literacy, TAM has been used to examine factors influencing the adoption of digital tools for remote work. Research by Nikou et al., (2022) found that workplace literacy skills, including information and digital literacy, significantly affect adoption of digital technology. Similarly, Lee et al., (2025) applied TAM to understand psychosocial barriers to healthcare technology adoption, finding that perceived usefulness and perceived ease of use were

significant predictors of adoption intentions. These applications contribute to SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education).

Extensions and Criticisms

TAM has been extended in several ways to enhance its explanatory power. The Technology Acceptance Model 2 (TAM2) by Venkatesh and Davis (2000) added social influence processes (subjective norm, voluntariness, image) and cognitive instrumental processes (job relevance, output quality, result demonstrability). The Technology Acceptance Model 3 (TAM3) by Venkatesh and Bala (2008) further incorporated individual differences, system characteristics, social influence, and facilitating conditions.

Despite its popularity, TAM has faced criticisms. Bagozzi (2007) argues that the model is too parsimonious, omitting important factors such as social influence, facilitating conditions, and habit. Lee et al., (2003) note that TAM's focus on individual perceptions may overlook structural and contextual factors that shape technology adoption. These limitations motivated the development of more comprehensive models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour, developed by Icek Ajzen in 1985, extends the Theory of Reasoned Action by incorporating perceived behavioural control as an additional determinant of behavioural intention. TPB posits that behavioural intention is determined by three factors: Attitude Toward the Behaviour, Subjective Norm, and Perceived Behavioural Control (Ajzen, 1985; Bosnjak et al., 2020).

Attitude Toward the Behaviour refers to the individual's positive or negative evaluation of performing the behaviour. It is determined by behavioural beliefs about the outcomes of the behaviour and the evaluation of those outcomes. Subjective Norm refers to the perceived social pressure to perform or not perform the behaviour. It is determined by normative beliefs about what important others think one should do and motivation to comply with those referents. Perceived Behavioural Control refers to the perceived ease or difficulty of performing the behaviour. It is determined by control beliefs about the presence of factors that may facilitate or impede performance of the behaviour.

According to TPB, these three factors collectively influence Behavioural Intention, which in turn influences Actual Behaviour. Perceived Behavioural Control can also directly influence behaviour, particularly when control perceptions are accurate reflections of actual control.

Empirical Applications

TPB has been widely applied across diverse behavioural domains. A meta-analysis by Armitage and Conner (2001) found that TPB explains approximately 39% of the variance in intentions and

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27% of the variance in behaviour. The theory has been applied to study health behaviours, environmental behaviours, consumer behaviours, and technology adoption.

In the context of digital literacy, TPB has been used to examine factors influencing intentions to engage with digital technologies. Research by Brookes (2023) applied TPB to understand factors influencing technology adoption, finding that attitudes, subjective norms, and perceived behavioural control were significant predictors of behavioural intention. Similarly, Bosnjak et al. (2020) reviewed advances in TPB applications, noting its continued relevance for understanding technology-related behaviours.

Extensions and Criticisms

TPB has been extended in various ways to enhance its applicability. Ajzen (1991) clarified the role of perceived behavioural control and distinguished between internal and external control factors. Extensions have incorporated additional variables such as moral norm, self-identity, and anticipated affect (Conner & Armitage, 1998). The theory has also been integrated with other frameworks, such as the Technology Acceptance Model, to provide more comprehensive explanations of technology adoption.

Criticisms of TPB include concerns about the sufficiency of the three predictor variables, the relationship between perceived behavioural control and actual control, and the theory's applicability across cultures (Sniehotta et al., 2014). Bosnjak et al., (2020) and Esfandiar and Hadinejad (2025) argue that TPB may not adequately capture the role of habit, emotion, and unconscious processes in behaviour (Webb & Sheeran, 2006).

Digital Divide Theory

The Digital Divide Theory, proposed by Paul DiMaggio and Eszter Hargittai in 2001, extends beyond simple access to technology to encompass disparities in skills, usage patterns, and the capacity to effectively apply technology. The theory identifies multiple levels of digital inequality, including physical access, skills and literacy, and meaningful use (DiMaggio & Hargittai, 2001; Sanders & Scanlon, 2021).

The first level of the digital divide concerns physical access to technology whether individuals have access to computers, internet connections, and other digital infrastructure. The second level concerns skills and literacy whether individuals possess the competencies required to effectively use technology. The third level concerns meaningful use whether individuals are able to apply technology in ways that produce meaningful outcomes.

Digital Divide Theory emphasises that inequality in the digital age is multidimensional and dynamic. As technology evolves and becomes more widespread, new forms of inequality emerge. The theory also highlights the social and structural factors that shape digital inequality, including socioeconomic status, education, geography, and institutional context.

Empirical Applications

Digital Divide Theory has been extensively applied to study technology inequality across diverse contexts. Research has examined disparities in access to technology between developed and developing countries (World Bank, 2026), between urban and rural areas (Olanrewaju et al., 2021), and across socioeconomic groups (Blank et al., 2017). The theory has also been applied to study inequality in specific domains such as e-government (Sanders & Scanlon, 2021) and e-health (Ehimuan et al., 2024).

In the context of digital literacy, Digital Divide Theory has been used to examine skills gaps and their implications for labour market outcomes. Research by Mavridi (2020) examined digital literacies and the new digital divide, finding that skills inequality persists even among those with access to technology. Similarly, Ndibalema (2025) documented digital literacy gaps in promoting 21st century skills among students in Sub-Saharan African higher education institutions. These findings have direct implications for SDG 4 (Quality Education), SDG 5 (Gender Equality), and SDG 10 (Reduced Inequalities).

Extensions and Criticisms

Digital Divide Theory has been extended to incorporate new dimensions of inequality. The concept of "digital inclusion" has emerged to emphasise proactive efforts to address digital inequality (Ehimuan et al., 2024). Research has also examined the relationship between digital inequality and other forms of social inequality, such as economic inequality and social exclusion (Sanders & Scanlon, 2021).

Criticisms of Digital Divide Theory include concerns about its focus on access and skills rather than outcomes, its potential to reinforce deficit perspectives, and its limited guidance for intervention design (Hargittai, 2010). Yu et al. (2024) and Ireland and Lestari (2025) argue that the theory may not adequately capture the agency of individuals in navigating digital environments.

Socio-Technical Systems Theory (STST)

Socio-Technical Systems Theory originated from the work of Eric Trist and Ken Bamforth (1951) at the Tavistock Institute in London. The theory emerged from studies of coal mining and emphasises the interdependence between social and technical systems in organisational contexts. STST posits that optimal outcomes are achieved when technical systems (hardware, software, infrastructure) are aligned with social systems (human skills, work practices, organisational culture) (Trist & Bamforth, 1951; Abbas & Michael, 2025).

The core premise of STST is that organisations consist of two interdependent systems: the technical system (tools, technologies, procedures) and the social system (people, relationships, values). These systems are not independent but interact and influence each other. Changes to one system without corresponding changes to the other are likely to produce suboptimal outcomes.

STST emphasises the principle of joint optimisation—the goal is not to optimise the technical system or the social system in isolation, but to achieve the best possible fit between the two. This requires understanding the requirements and constraints of both systems and designing solutions that address both technical and social dimensions.

Empirical Applications

STST has been widely applied in organisational development and change management. The theory has guided the design of work systems, the implementation of new technologies, and the transformation of organisational practices. Research has demonstrated that socio-technical approaches can lead to improved productivity, quality of work life, and organisational effectiveness (Clegg, 2000).

In the context of digital literacy, STST has been used to examine how technical and social factors interact to shape technology adoption and use. Research by Abbas and Michael (2025) reviewed Socio-Technical Theory and its applications in understanding technology adoption.

Extensions and Criticisms

STST has been extended in various ways to address contemporary challenges. The concept of "sociomateriality" has emerged to emphasise the entanglement of social and material elements in practice (Orlikowski, 2007). Research has also examined the application of STST to distributed and virtual work environments (Leonardi et al., 2024).

Criticisms of STST include concerns about its focus on organisational contexts, its limited attention to power and politics, and its potential to overlook individual agency (Mumford, 2006). Lu et al. (2025) and Govers and van Amelsvoort (2023) argue that the theory may not adequately address the complexity of contemporary digital environments.

Toward an Integrated Framework

Each of the four frameworks examined in this review offers unique insights into digital literacy adoption and remote work readiness, but each also has limitations that can be addressed by integrating perspectives from other frameworks. TAM provides a parsimonious model of individual technology acceptance but may overlook social and structural factors. TPB extends TAM by incorporating social influence and perceived control but may not adequately address structural inequality. Digital Divide Theory highlights inequality dimensions but may not provide sufficient guidance for intervention design. STST emphasises system alignment but may not adequately address individual perceptions and intentions.

An integrated framework that combines insights from all four theories can provide a more comprehensive understanding of digital literacy adoption and remote work readiness. Such a framework would recognise that digital literacy adoption is influenced by: (1) individual perceptions of usefulness and ease of use (TAM); (2) attitudes, social norms, and perceived control

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(TPB); (3) access, skills, and meaningful use dimensions of inequality (Digital Divide); and (4) alignment between technical infrastructure and social systems (STST).

Integrated Conceptual Model

Based on the analysis of the four frameworks, this review proposes an integrated conceptual model of digital literacy adoption and remote work readiness. The model identifies four interconnected domains of influence as shown in the Table 2 below:

Individual Domain (TAM): This domain encompasses individual perceptions and beliefs about digital tools, including perceived usefulness, perceived ease of use, and attitudes toward technology use. These perceptions are shaped by prior experience, self-efficacy, and individual characteristics.

Social Domain (TPB): This domain encompasses social influences on technology adoption, including subjective norms, social support, and peer influence. These social factors shape individual intentions and behaviours through normative pressure and social learning.

Technical Domain (Digital Divide): This domain encompasses access to technology, digital skills, and capacity for meaningful use. These technical factors determine whether individuals can effectively engage with digital tools and apply them to achieve desired outcomes.

Structural Domain (STST): This domain encompasses the alignment between technical infrastructure, institutional support, and organisational culture. These structural factors create enabling or constraining conditions for digital literacy development.

Table 2: Integrated Framework: Domains, Constructs, Theoretical Sources, and Key Authors

Domain	Key Constructs	Theoretical Source	Key Authors (In-text Citations)
Individual	Perceived Usefulness, Perceived Ease of Use, Attitude	TAM	Davis (1989); Marikyan & Papagiannidis (2023); Scherer et al. (2019)
Social	Subjective Norm, Social Support, Peer Influence, Perceived Behavioural Control	TPB	Ajzen (1985, 1991); Armitage & Conner (2001); Bosnjak et al. (2020); Naskar and Lindahl (2026)
Technical	Access, Skills, Meaningful Use, Digital Literacy	Digital Divide Theory	DiMaggio & Hargittai (2001); Hargittai (2002); van Dijk (2020); Acilar & Sæbø (2023); Ireland & Lestari (2025)
Structural	Infrastructure, Institutional Support, Organisational Culture, Joint Optimisation	STST	Trist & Bamforth (1951); Clegg (2000); Govers & van Amelsvoort (2023); Leonardi et al. (2024); Lu et al. (2025)

Source: Author's Compilation, (2026).

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The integrated framework presented in Table 2 synthesises the four theoretical perspectives, demonstrating how each domain contributes distinctive explanatory elements to the understanding of digital literacy adoption and remote work readiness. The Individual Domain, grounded in TAM, addresses the cognitive appraisals that influence technology acceptance. The Social Domain, derived from TPB, captures the normative and control beliefs that shape behavioural intentions. The Technical Domain, informed by Digital Divide Theory, highlights the material and skill-based prerequisites for effective technology engagement. The Structural Domain, based on STST, emphasises the systemic alignment necessary for sustainable technology integration.

Research Propositions

Based on the integrated framework, this review derives the following research propositions:

P1: Individual perceptions of usefulness and ease of use positively influence behavioural intention to adopt digital tools for remote work (Davis, 1989; Scherer et al., 2019).

P2: Social norms and perceived social support positively influence attitudes toward digital literacy and behavioural intention (Ajzen, 1991; Bosnjak et al., 2020).

P3: Access to technology, digital skills, and capacity for meaningful use moderate the relationship between behavioural intention and actual digital tool adoption (DiMaggio & Hargittai, 2001; van Dijk, 2020).

P4: Alignment between technical infrastructure, institutional support, and organisational culture positively influences digital literacy development at the individual level (Trist & Bamforth, 1951; Clegg, 2000).

P5: The relationship between individual perceptions and behavioural intention is stronger when technical and structural conditions are favourable (Govers & van Amelsvoort, 2023; Lu et al., 2025).

P6: Digital literacy interventions that address all four domains (individual, social, technical, structural) are more effective than interventions that address only one or two domains (Abbas & Michael, 2025; Acilar & Sæbø, 2023).

P7: Digital literacy adoption and remote work readiness contribute to the attainment of SDG 1 (No Poverty), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 10 (Reduced Inequalities) (United Nations, 2015; UNESCO, 2024).

Implications for Research and Practice

Implications for Research

The integrated framework developed in this review has several implications for future research. First, studies examining digital literacy adoption and remote work readiness should consider multiple levels of analysis, incorporating individual, social, technical, and structural factors. Single-level studies may provide incomplete explanations of adoption behaviours.

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Second, research should employ mixed-methods approaches that capture both quantitative measures of constructs and qualitative insights into the mechanisms through which factors influence adoption. Such approaches can provide richer understanding of the phenomena under study.

Third, research should examine the applicability of the integrated framework across diverse contexts, including different countries, educational settings, and demographic groups. Context-specific factors may influence the relative importance of different domains.

Fourth, longitudinal studies are needed to examine how digital literacy adoption and remote work readiness evolve over time and how interventions produce sustained behaviour change. Cross-sectional studies provide snapshots but cannot capture dynamic processes.

Fifth, future research should explicitly examine the relationship between digital literacy interventions and Sustainable Development Goal attainment, developing indicators and measurement frameworks that capture the multidimensional impacts of digital skills development (United Nations, 2023; UNESCO, 2024).

Implications for Practice

The integrated framework has several implications for designing effective digital literacy interventions. First, interventions should address all four domains rather than focusing solely on individual skills development. Comprehensive interventions that combine training with infrastructure development, social support, and institutional alignment are likely to be more effective and contribute to multiple SDGs simultaneously.

Second, interventions should be tailored to the specific context, taking into account existing levels of access, skills, and institutional support. One-size-fits-all approaches may not be effective in diverse contexts and may fail to address the specific inequalities targeted by SDG 10 (Reduced Inequalities).

Third, interventions should incorporate social elements that leverage peer influence and social support. Group-based training, mentoring programmes, and community of practice approaches can enhance the social dimensions of digital literacy development and advance SDG 17 (Partnerships for the Goals) through multi-stakeholder collaboration.

Fourth, interventions should be accompanied by efforts to address structural barriers, including infrastructure development, policy change, and institutional capacity building. Technical solutions alone are insufficient without corresponding investments in enabling conditions, particularly for advancing SDG 9 (Industry, Innovation and Infrastructure).

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Fifth, interventions should prioritise gender-inclusive design to ensure that digital literacy programmes advance SDG 5 (Gender Equality) and do not exacerbate existing gender digital divides (Acilar & Sæbø, 2023; UNESCO, 2024).

CONCLUSION

This integrated theoretical review examined TAM, TPB, Digital Divide Theory, and STST to develop a comprehensive understanding of digital literacy adoption and remote work readiness. The analysis reveals that an integrated approach combining individual perceptions, social influences, technical capabilities, and structural conditions provides the most comprehensive lens for understanding technology adoption. The integrated conceptual model identifies four interconnected domains of influence and derives research propositions for future investigation. Effective digital literacy interventions must address all four domains rather than focusing on individual skills alone. The conceptualisation of remote work readiness highlights specific competencies and enabling conditions required for distributed digital employment.

Moreso, this review makes a distinctive contribution by articulating the relationship between digital literacy adoption and ten Sustainable Development Goals. The framework demonstrates that digital literacy is a fundamental enabler of sustainable development, with direct implications for poverty reduction (SDG 1), food security (SDG 2), health and well-being (SDG 3), quality education (SDG 4), gender equality (SDG 5), decent work (SDG 8), innovation and infrastructure (SDG 9), reduced inequalities (SDG 10), sustainable cities (SDG 11), and global partnerships (SDG 17). The integrated framework provides a theoretically grounded foundation for research and practice, with particular relevance for resource-constrained educational contexts. Future research should test the derived propositions, examine cross-context applicability, and measure contributions to Sustainable Development Goal attainment, thereby enhancing digital literacy and remote work readiness in developing countries.

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