# Work from anywhere: inequalities in technology infrastructure distribution for digit workers

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## Abstract

**Purpose** – The COVID-19 pandemic has fuelled the transition in the workplace into the digital era. The purpose of this review paper is to highlight how the pandemic has further exposed the digital divide and the structural inequalities in remote workers' access to home-location technology infrastructure and services. The unified theory of acceptance and use of technology (UTAUT) is adopted to highlight how the pandemic has forced the workforce to accept and use digital technology from home for work purposes.

**Design/methodology/approach** – This desktop-based review paper is drawn from the existing literature. Although both benefits and disadvantages are noted, technology plays a critical role in connecting remote workers to the digital world.

**Findings** – The paper found that remote workers did not necessarily struggle to work remotely from home to undertake their daily work tasks. Still, the critical challenge was the available Information and Communication Technology (ICT) infrastructure in their respective residential areas.

**Practical implications** – The paper seeks to highlight that even though the COVID-19 pandemic and related events have fast-tracked the switch of many work activities into the digital era, the uneven distribution of ICT infrastructure accentuates the barriers to effective home workplaces for many in developing communities. The research found a significant role that the advancement and acceptance of technologies play in the efficacy of remote working from home.

**Originality/value** – The relevance of this paper is in its contribution to the literature in extending knowledge about the UTAUT on remote working during a pandemic. The arguments presented herein may contribute to policy development and the ongoing debate about how the COVID-19 pandemic has accelerated the shift into the digital era on a global basis.

**Keywords** Working from home, In residential areas, Remote workers, COVID-19 pandemic, UTAUT, Technology infrastructure

**Paper type** Literature review

## 1. Introduction and research setting

Technology adoption has led to the automation of some business processes, particularly those involved in services that provide information. Therefore, people from underserviced regions are likely to be disadvantaged in this increasingly digital age. For that reason, there is necessary to know how the uneven distribution of Information and Communication

Technology (ICT) infrastructure can create barriers to effective remote work at home. Furthermore, the COVID-19 pandemic and related events are pushing everyone into the digital era, whether people are ready or not.

The literature review shows that numerous studies suggest that the advances in ICTs and internet connections play an essential role in remote working arrangements (Rizk & Hillier, 2020; Spivack & Desai, 2019). Technology affords knowledge workers the mobility to complete their work tasks regardless of their location (Spivack & Desai, 2019). Donnelly and Johns (2020) provide a similar view to Spivack and Desai (2019) by pointing out that mobility and flexibility in the workplace have far more significant benefits for both the workers and their organisations. Several studies have been published about the impact of the COVID-19 pandemic on the workplace. Workers (particularly knowledge workers) have been forced to accept and use digital technology from their home workplaces. Therefore, it was found useful to apply the UTAUT better to understand this acceptance by workers during the pandemic. More research is emerging, and an increasing body of evidence is growing on the topic. The contribution of this article is threefold. Firstly, this article contributes to the literature and experiences of digital working from home during the COVID-19 pandemic by exploring the relationship between digitalisation, ICT infrastructure and home workplace factors. The second contribution is extending the UTAUT to improve the understanding of remote workers' acceptance and use of technology during the pandemic when many people were forced to work from home because of restrictions on movement (lockdowns). Despite numerous investigations on the use of the Technology Acceptance Model (TAM) and UTAUT in remote working environments, little work has focused on the variety of technologies employed and the types of different users. For example, Dwivedi, Rana, Jeyaraj, Clement, and Williams (2019) point out that technology users' capabilities and attitudes are key limitations in the UTAUT model. Thirdly, there is a need for additional research to add to the body of knowledge regarding how technology infrastructure in the residential areas of remote workers can impact or exacerbate inequalities regarding who has access to high-quality technology to connect and effectively work remotely, particularly during the period of the COVID-19 pandemic and the rapidly expanding digital era. The review article draws on already published content on remote working to address and assess the relationships and components that contribute to structuring a system that is, in turn, influenced by policymakers' actions.

## 2. Technology infrastructure

The digital divide can be traced back to the early 1990s, when it became a topic of interest due to the increase in computing and the internet (Eastin, Cicchirillo, and Mabry, 2015, cited in Scheerder *et al.*, 2017). The digital divide is broadly categorised into three categories: ICT disparities, the gap in ICT access, and unequal exploitation of virtual space (Norris, 2001 cited in Yu, 2006). According to Yu (2006), various terms are used loosely to describe the social divide between those with access to digital technology and those that do not – such as information gap, information divide and information inequality. As pointed out by Scheerder *et al.* (2017), there is a lack of consistency in the use of the term digital divide, especially regarding what the terminology addresses, such as outcomes, skills and their application.

In the context of this article, most countries in the world are characterised by inequality in the form of the divide between developed, under-developed and developing states. The gap that exists between those with means and support and those with little or no means and support at all (from underprivileged backgrounds) remains a matter of concern. Digital access inequality is a reality that requires a range of stakeholders to work together to ease access and find solutions to equip the underserviced communities, thereby reducing the wide gap in the technology infrastructure divide.

As stated earlier, some developing nations are characterised by a digital divide resulting from the high levels of other social and economic inequalities. Matli (2020) highlighted that the issue of access to quality technology infrastructure and internet connections remains a cause for concern, given the digital divide and the prevalent social structures. Consistent access to high-speed broadband continues to be a challenge in many parts of society, especially in underserviced communities. Remote workers residing in communities with a high-quality internet connection are thus at an advantage over their peers residing in underserviced residential areas. Therefore, the upliftment of the underserviced with regard to access to technology is essential. Otherwise, the inequality gap will continue to widen between those with means and those with little or no means to access information online (Matli & Ngoepe, 2020).

## 3. Theoretical perspective

The TAM, coined by Davis (1989), has been widely adopted and applied in the literature, particularly in the information and technology domain of study. However, the TAM has received both criticism and praise over the years. For example, Pearson and Bailey (1980) assert that the TAM has been censured for focusing on the application of technology and not considering if the technology benefits the user. Urška *et al.* (2020) believe that a technology's apparent value and apparent user-friendliness are critical factors in the TAM. The UTAUT model has essentially contributed to technology usage and acceptance (Chatterjee, Rana, Khorana, Mikalef, & Sharma, 2021). For that reason, researchers saw the necessity to further build on the TAM further to enhance and expand the theory.

Venkatesh *et al.* (2003) argue that the UTAUT model is based on the belief that technology users typically rely on their reasoning and common sense to determine their behaviours. However, the COVID-19 pandemic has enforced the use and acceptance of technology by many workers. It is now well documented that the UTAUT coined by Venkatesh *et al.* (2003) has managed to extend the measurement of the acceptance of and user behaviour around new technology. The UTAUT model has been employed widely in the literature, and as a result, several studies have advocated for the application of the UTAUT across several fields that investigate and measure the adoption of technology. Nevertheless, Etemadi, Hon, Murphy, and Manley (2020) point out that although the UTAUT is a valuable model with a strong explanatory influence, there is still necessary to extend the UTAUT. The extension of the UTAUT can further strengthen the model for application in other varied fields. Venkatesh and Davis (2000) explain that technology acceptance is predominantly about understanding users' mindsets regarding introducing technological services or products and maintaining acceptance behaviour. The advent of the UTAUT resulted from the expansion and blend of other existing models that focused on technology use and acceptance behaviour, such as the TAM, innovation diffusion theory, motivation models and other tools (Venkatesh *et al.*, 2003).

The UTAUT has become a widely applied model in several contexts, including mobile banking (AbuShanab & Pearson, 2007), e-commerce (Kabanda & Brown, 2017; Verkijika, 2018), entrepreneurship (Özsungur, 2019), e-government (Camilleri, 2019; Naranjo-Zolotov, Oliveira, & Casteleyn, 2018); education (Nair, Ali, and Leong, 2015) and searching for information (Abubakari, DiNicola, & Lee, 2020). In the e-government field, Naranjo-Zolotov *et al.* (2018), in their study that applied the UTAUT to citizens' perceptions about e-government participation, found that psychological empowerment influences the intention to use and recommend e-government participation. Similarly, Camilleri (2019) employed the UTAUT in a study that focused on the government's electronic services (e-government) use and acceptance. Other researchers have extended the UTAUT into understanding technology use and acceptance in banking. For example, AbuShanab and Pearson (2007), in their study on internet banking carried out in Jordan, applied the UTAUT and found that

the theory provides a good foundation for future technology acceptance research. Although the UTAUT has been applied in most information systems, other studies have used the theory for research that is being carried out in other fields. For example, in their study, Duasa, Sarif, and Sabian (2019) used the UTAUT in relation to Malaysian firms. They found that the strategies of the unified theory of the firm significantly contributed to the education level of managers. Methodologically, much of the literature indicates that researchers have used several research methods and approaches in their studies that deployed the UTAUT theory. In their quantitative study, Nair *et al.* (2015) used the UTAUT to understand factors affecting student use and acceptance of the university system in Malaysia. Similarly, Özsungur (2019), in a mixed-method study, used the UTAUT to investigate technology acceptance among women entrepreneurs in Turkey.

In the workplace context, there is evidence that the UTAUT has been previously employed by other researchers (Özsungur, 2020; Imran & Gregor, 2018), including e-learning in the workplace (Kapo *et al.*, 2020). For example, Imran and Gregor (2018), in their mixed methods study investigating user mindsets in relation to ICTs in the workplace, found that technology use in the workplace and its components were influenced by an individual's beliefs and innovativeness skills and awareness of technology. Özsungur (2020) applied UTUAT to investigate age and internet acceptance and user behaviour in the workplace and found that ageing does not necessarily affect behavioural use and intention. Doling and Arundel (2020) examined the increasing use of the home as a workplace and found that technology acceptance motivated an increase in the number of people working from home. Doling and Arundel (2020) further state that the increasing trend of working from home also affected the home location choice of workers. Workers would opt to reside in areas with high-speed broadband infrastructure so that they can effectively work from home with little interruption. Therefore, this is becoming a vital aspect of where to live for remote workers. However, not all remote workers have the luxury of choice with respect to home location, and not all remote workers can afford properties in areas well served with ICTs. Governments thus need to ensure that underserviced communities have the necessary ICT infrastructure to support remote workers residing in disadvantaged areas. While the UTAUT has been applied in studies with respect to workplace location, there is little evidence from the literature as yet that the UTAUT has been utilised to investigate how the COVID-19 pandemic has disrupted the workplace. For that reason, this article intends to focus on extending the UTAUT theory to understand better how workers have used and accepted technology during the COVID-19 pandemic.

Similarly, other studies have investigated the field of digitalisation and the workplace utilising other theories. For instance, Farivar and Richardson (2020), in their study on workplace digitalisation, used the spillover theory, mainly because the theory is centred on the work-and-life balance. At the same time, Urick (2020) employed the theory of generations to investigate generational differences in interactions in virtual workplaces. In the same light, this article opts to apply the UTAUT to contribute to the literature on remote working during unforeseen situations. Most research to date has assessed what makes individuals use and accept technology in the workplace. The COVID-19 pandemic, however, has forced people to adapt to various technologies used by their employers. In turn, the pandemic has involuntarily forced employers to install and rely on technology to keep up work productivity during the different periods of lockdown. Technologies used for communication with employees have included Zoom, Teams and WhatsApp. Little research has yet been published directed at technology use and acceptance for remote workers during the emergencies triggered by the pandemic, although new research is undoubtedly now emerging, and an increasing body of evidence is building upon the topic.

Many workers only have easy access to an internet connection and computing and smart devices when they are at their work premises. Most of these workers may have limited or no

access to an internet connection or broadband at home. Several contributing factors to this situation include the high cost of access to an internet connection which may not be a priority for workers with low earnings. ICT infrastructure may be limited where workers reside, meaning poor quality internet connections or no service at all. Furthermore, workers who are intimidated by technology and information systems are left vulnerable or even superfluous to company operations by the COVID-19 pandemic. There was no option but to agree to adopt technology deployed by employers during the pandemic for remote working. Staff was often assumed to be sufficiently technology savvy for organisational operations to continue. The need to adapt has meant some staff may have overcome their previous fear of technology, while the COVID-19 pandemic may have exposed workers who are not adequately equipped or skilled to use digital technology.

Before the COVID-19 pandemic lockdowns, most traditional workplaces used to depend on physical contact to undertake work-related duties. The pandemic forced organisations to introduce digital services and systems to interact, collaborate and communicate remotely with staff and customers – technology-enabled organisations to maintain productivity while workers were not physically in the same place. The pandemic has forced remote workers to use convenient online systems put in place by their employers. The remote workers had to learn and use digital systems to collaborate, communicate and interact with others regardless of how complex the newly adopted technologies were. This placed additional pressure on workers unfamiliar with technologies that were new to them. Workers were expected to accept and start using new technologies without employers understanding the full impact on staff and the business.

The UTAUT consists of four elements that focus primarily on the use and intentional behaviour of technology users, and these are performance expectancy (PE), effort expectancy (EE), facilitating conditions (FC) and social influence (SI). These are the factors that influence the users' intentions to use and accept technology. The four UTAUT elements in relation to this article are further described below:

(1) Performance expectancy – focuses on the individual's behavior in the belief that the individual has that technology can perform the work duties to their assumed expectations. Remote workers need to accept that technology will assist them in performing their work duties regardless of their location. Even though there may be certain expectations regarding the use of technology, certain practical constraints can become a barrier to some remote workers' effectiveness.

(2) Effort expectancy – is focused on the extent to which the technology is user-friendly. The employer and the remote workers may use existing technology services that they are familiar with from the office, but new technologies may be introduced for effective remote working. Some of these may be user-friendly and others not, but they had to be accepted and used anyway by remote workers during the pandemic.

(3) Social influence – focuses on the ability of an individual to make a personal judgment or whether they place their judgment based on the general feeling that other people have regarding the use of a particular technology. Employers may also judge some of their remote workers without understanding the technology infrastructure available in their staff's residential areas since access to infrastructure and services vary widely.

(4) Facilitating conditions – focuses on the organisational and social strata that may impact an individual's actual use of technology. For example, the technology supporting infrastructure that an individual requires to use the technology system made available by an employer effectively. Since remote workers' homes served as a

workstation during the COVID-19 pandemic, there was a need to acknowledge that technology infrastructure in residential areas may not always correspond with that found in the office space.

The UTAUT was an appropriate approach to better understand the generational impacts associated with knowledge workers working remotely. Organisations' communication challenges are likely to occur more often between workers of different generations as workplaces transition from office premises to online arrangements (Urick, 2020). Urick (2020) found that organisations struggle with interactions between different generations during online engagements and more generally in the virtual working environment. The more technology has had greater exposure to users in an organisation, the more likely the technology becomes accepted and popular. Then more workers will start to understand the necessity to use and accept the technology. Individuals' perceptions, beliefs and understanding, either from personal experience or other peoples' shared experiences, affect technology acceptance.

## 4. Methods
Comprehensive electronic literature searches were conducted using Emerald Publishing, Science Direct and Taylor and Francis databases to look for relevant papers systematically. The journals housed within the Emerald Publishing, Science Direct and Taylor and Francis databases analysed in this review article are peer-reviewed. Therefore, this implies that the papers have been thoroughly checked and approved by experts for the journals before publishing. This qualitative analysis used 54 journals and 4 documents (policies, special reports and strategies) published between 2001 and 2021. The topic and, in some cases, the abstracts of the papers were read to scrutinise the relevance of the papers to the study and review article. This enabled the researchers to sieve out useful papers from other papers found to be irrelevant. Full-text articles containing original research reporting on remote working were included in the review.

## 5. Results and discussion
### 5.1 Obligation to use and accept technology for remote working during the COVID-19 pandemic
The availability of technology and digital devices in households allows individuals to engage in economic activities without leaving their homes. The internet enables people to stay connected and undertake work activities despite time and distance constraints. As Matli (2020) pointed out, the availability of the internet and computing devices allows individuals to search and access information at ease. ICTs allow people residing in the same household to have varying experiences. Access to an internet connection allows household members to interact with people outside their home premises using a network connection (López-Sintas, Rojas-DeFrancisco, & García-Álvarez, 2017). Similarly, workers have been able to connect with their employers and workplaces over a network connection during the COVID-19 pandemic while working from home.

Most employers provided their knowledge workers during the pandemic with computing devices, such as laptops. However, many organisations have policies that discourage workers from accessing their employers' information using their personal computing devices. For example, some employers may have put controls in place to safeguard the organisations' data. In some cases, employers may be using specific licensed systems integrated into other sub-systems within the organisations and externally with their partners. Nevertheless, one of the benefits that emerged during the COVID-19 pandemic was the gesture from most employers to provide workers with work computing devices like laptops and cover the

associated internet connection costs. Given that most of the workers had to access workplace information via the internet, remote workers were obliged to accept the use of technology to work at home during the pandemic.

In turn, employers had to ensure accessibility to workplace data using various technologies to ensure that workers could keep working from home and maintain productivity during the pandemic. Therefore, both remote workers and employers, and external parties that interact with the employer organisations were forced to rapidly roll out several technology services to continue functioning and carry on with operational duties. In general, employers catered for their workers by ensuring access to computing devices and an internet connection. On the other hand, workers had to transition from using office space to establishing workstations at their homes during the pandemic. This forced workers to accept that they could perform work-related duties while they were at home. Employers had to change their behaviour by accepting that workers can operate remotely at home by accessing confidential workplace information via the internet. In many cases, these arrangements had to occur with little prior and proper planning. The behaviour of acceptance of use of technology for work-related tasks thus had to shift for both employers and workers because of the pandemic.

*5.2 Internet use and cost*
The problems of internet access as well as the coverage and quality of internet connectivity remain significant issues for international debate. Given this backdrop, it is not surprising to find that the issues of internet access and the digital divide are featured in various policies and strategic documents that have been developed in South Africa (National Planning Commission, 2011; DTPS, 2016). In total, 63.3% of South Africans had someone in their families having access to an internet connection, of which 9.1% was from their homes and 63.3% was from anywhere (like work, public Wi-Fi spots, libraries and schools) (Statistics South Africa, 2020). In general, the very high cost of mobile data in South Africa prohibits people from disadvantaged and underprivileged backgrounds from having easy access to an internet connection. In some cases, employers have recognised that it may be costly for their remote workers to afford internet use to perform their work-related tasks, so they covered the required broadband costs. However, internet infrastructure coverage and quality have become a constant challenge for some workers residing in high-density areas in South Africa.

Gillwald, Mothobi, and Rademan (2018) point out that mobile operators in South Africa continue to invest in the necessary infrastructure required to provide quality network coverage, given that the 3G network now covers almost 100% of the country. However, the quality of internet connections remains a concern where the internet is used to work remotely, with connections frequently being lost. This suggests that some remote workers experience poor-quality internet connections because of the sub-optimal technology infrastructure in certain residential areas. On the other hand, remote workers residing in well-serviced communities with adequate technology infrastructure in place are likely to perform their work tasks better and quicker. For instance, Statistics South Africa (2020) report points out that households were generally more likely to access the internet at work than at home. Government investment in ICT infrastructure in South Africa in disadvantaged areas such as rural areas and townships has provided some citizens with access to an internet connection. However, the quality and speed of the internet connections still result in a new type of divide between remote workers who have access to a good quality high-speed internet connection and other remote workers in disadvantaged areas who may be happy to just connect to the world of the internet, but then struggle to perform effectively when working remotely from home, as was required during the COVID-19 pandemic. It is evident that countries, provinces, cities and community areas are not equally serviced when it comes to internet coverage.

Therefore, in many disadvantaged areas, remote workers are faced with high data costs and poor access to the internet.

*5.3 Remote working*

The availability of various ICTs tools in modern society enables individuals to connect to the digital world and work remotely, allowing an improved balance with other life activities. Innovation in digital technology translates into changes to social and economic structures. It is evident that ICTs play an essential role in the effectiveness of remote working. As a result, the world is likely to experience a significant move towards working remotely, especially given that the COVID-19 pandemic has accelerated the piloting of remote working in some organisations. Virtual communities have grown, and their potential contribution to the workplace has been realised during the COVID-19 pandemic. The technology used during remote work goes beyond communicating and collaborating; some technological services also enable communication that extends to external businesses to which organisations provide services.

At first, most organisations have utilised various technological supporting tools and services for communicating in the virtual space. Organisations have been using email communication as a formal way of communicating for some time. The use of emails and the intranet to communicate with remote workers within an organisation is increasing rapidly. It is viewed as a cost-effective way of keeping in contact (Morgan & Symon, 2002). Organisations increasingly rely on controlled access to both intranet and extranet networks to collectively communicate with authorised persons entrusted with access to the organisational network. Most organisations now make use of more than one tool to communicate and collaborate in virtual settings. Other technological virtual services include WhatsApp, Zoom, Hangouts, Skype, Slack, Teams and Google Meet which an employer may opt to use.

Virtual teamwork and communication have been common for some time in the workplace (Braesemann, Lehdonvirta, & Kässi, 2020). However, concerns have been raised regarding the security of some of the applications. For example, the Zoom application shares information with Facebook, and this is flagging both a security and privacy concern (O'Leary, 2020). Apart from security concerns, O'Leary (2020) adds that people have experienced various difficulties with Zoom, such as the difficulty of meeting with a large number of people in the virtual space. Therefore, while both workers and employers have adapted to the use of convenient technology services, especially during the COVID-19 pandemic, there remain issues that have led some organisations to review their decisions to use and accept particular technology services.

*5.4 Digitalisation of the workplace*

The ongoing technological advances being rolled out in the digital era are drastically changing the way of life for many households (Mulcahy, Letheren, McAndrew, Glavas, & Russell-Bennett, 2019). As ICT thrives and the internet penetrates and extends to most parts of the world, the necessity to work from the office is no longer required for many knowledge workers. The mobility of knowledge workers is increasing because of these technological advances (Spivack & Desai, 2019). O'Leary (2020) claims that after the COVID-19 pandemic, most organisations have fewer people working from their offices, as many now prefer to work remotely from their homes.

The use of technology in the workplace and at home makes knowledge workers able to adjust their working arrangements, making them increasingly mobile (Spivack & Desai, 2019). The advancement of technology in the workplace has allowed knowledge workers to perform their work duties from various locations. Workers can access their work at any time

and from any place if they have access to computing devices and an internet connection (Charalampous, Grant, Tramontano, & Michailidis, 2019). Advances in ICTs are transforming the workplace in terms of how and where workers perform their daily tasks, and the management process must adapt to where work is performed outside the workstation premises (Donnelly & Johns, 2020). While remote working may result in greater flexibility in terms of working arrangements, there are emerging concerns around managing knowledge workers who have to decide what place in the home is best suited for them to be productive with minor disturbance.

Digitalisation plays a significant role in the workplace as it allows workers and managers to operate smarter (Donnelly & Johns, 2020). Software systems allow multiple users to work together and help managers standardise performance frequency (Donnelly & Johns, 2020). The software enables all stakeholders to facilitate, share and collaborate to accomplish specific work-related tasks; therefore, investment in ICT computing devices, software applications and other digital tools to allow remote workers to operate easily has become extremely important.

## 6. Way forward and insights from the review

The results from the literature review point out that for some jobs, workers, particularly those posts occupied by knowledge-based workers, no longer need be office-bound to perform their duties. The COVID-19 pandemic has resulted in many organisations migrating to a remote working environment to maintain operations. Given that specific tasks in organisations are now carried out electronically, some organisations were slow to adapt to these new ways of working during the COVID-19 pandemic. In contrast, some ICT-savvy organisations transitioned more easily. Therefore, it will be important for most employers to assess the productivity effects of remote working as a result of the COVID-19 pandemic (O'Leary, 2020).

It is apparent from the literature that ICT infrastructure has not yet reached all parts of the world. As a result, inequalities are created or accentuated regarding who has access to the internet and at what speed and quality. And this raises further concerns about a growing digital divide, as many people are still excluded from full access to communication services and networks. For instance, Statistics South Africa (2020) report points out that only 63.3% of South African households had internet access, generally at work than at home. Although the issue of access to an internet connection has been widely documented across various research fields internationally, recent developments in this regard remain a cause for concern, more so for those in underserviced or disadvantaged communities. Remote workers live in various communities; some reside in affluent serviced communities while others live in poorly serviced developing communities. Those remote workers living in areas with poor quality ICT infrastructure can experience frequent interruptions in their internet connections during the execution of virtual tasks and during conversations. Virtual collaboration is, nevertheless, becoming more common among remote workers to harness the benefits of instant communication and collaboration.

Using technology advances to work remotely effectively is likely to become a permanent feature of daily life for most knowledge workers in various organisations. The use of multiple technology services and products enables specific tasks within organisations to be accomplished remotely. This emphasises the strong linkages between knowledge workers and advances in technologies to communicate better and collaborate effectively. Technological advances afford remote workers the ability to work from anywhere at any time using ICTs and internet connection points. Remote working is increasingly becoming inevitable because of these trends. These changes are primarily driven by advances in ICT but were accelerated during the COVID-19 lockdowns that forced people to stay at home. Organisations that are more privileged and resourced are likely to adjust more easily to

remote working conditions because of the advantages they hold in responding to the digitalisation of the workplace. As mentioned in the literature reviewed, some organisations do not have the trained workforce or resources to rapidly transform and adopt the new technologies available on the market. Furthermore, it is essential to study and analyse the impact of the available technologies on the organisational processes in organisations as they might not necessarily result in the perceived benefits but rather highlight inherent weaknesses the organisations must address. However, well-managed interventions can transform remote working, inspire innovation and improve worker productivity, as found during the COVID-19 pandemic.

This review article demonstrates that economies worldwide are shifting from an industrial and manufacturing focus into knowledge economies. A significant number of knowledge workers are now working remotely, given that the knowledge economy favours remote working settings. Therefore, this suggests that the employment prospects for knowledge workers will increase while the workforce in the manufacturing and industrial economy will decrease simultaneously. For organisations, this means they will need to invest in technology to enhance remote working and productivity. This also means that the government must invest in technology infrastructure to support remote working in disadvantaged communities and expand job opportunities for knowledge workers and allow increased participation in the knowledge economy. Government and employers must provide a supportive environment and structures encouraging remote work. As the world continues to embrace the use of ICTs to support remote working arrangements, developing countries like South Africa need to ensure that their citizens' socio-economic environment and status do not hinder people from disadvantaged backgrounds from actively participating in and taking advantage of the opportunities for remote working in the knowledge economy. In this regard, workers and employers need to have a growth mindset, a positive attitude and a willingness towards lifelong learning for business and labour to thrive in the future world of work. Workers should also hone their skills to make them more relevant in the digital and knowledge economy (Table 1).

Guidelines for technology use and acceptance derived from the literature review about remote working include:

## 7. Conclusions

The purpose of this review article was to provide insights into the difficulties encountered by remote workers, particularly in relation to the provision of technology infrastructure and services during the COVID-19 pandemic. Organisations have capitalised on recent technological advances for effective remote working and enhanced productivity brought on by the COVID-19 pandemic. The literature consulted in supporting this review article provided an overarching perspective about various technological tools and services that have been used to extend communication and collaboration in the virtual space for remote workers while identifying the benefits and possible pitfalls. The findings highlight that most remote workers could work and communicate effectively using the various available formal and informal communication channels. But the literature also suggests mixed feelings about the remote working experience, given that there are unevenly distributed benefits and disadvantages associated with remote working arrangements.

Although there has been progress in providing internet connection infrastructure in developing nations, the major concern remains that poorer communities continue to be underserviced regarding ICT infrastructure. Despite the increase in the number of people acquiring access to the internet, the quality and speed of internet connections vary and exacerbate the existing digital divide where people residing in well-serviced regions generally receive better ICT services and quality in internet connections. The limitations of this review

| Enablers and supportive forces | Key guiding points |
|---|---|
| Organisational support for remote-working workers | • Establish a baseline assessment for the operational functions, costs and deliverables associated with remote working<br>• Tailor the applicability of technology use to the organisation and its environment<br>• Understand the capabilities of workers and assess technology adaptability and flexibility to the current operations in the organisation<br>• Determine the technical skills required to operate with emerging technologies within the organisation that would assist in delivering optimum results<br>• Establish current workers' skills, knowledge, proficiency and technical capabilities to work in a remote setting<br>• The organisation would expect workers to respect client confidentiality – not share or expose client and organisational confidential data and information. Training in this regard may be required |
| Creating and maintaining a productive remote working setting | • Ensure managers are trained and supported to have a positive attitude towards remote working<br>• Explore the ability of emerging and new ICTs to handle and support the organisation to improve productivity and deliver the outputs required<br>• The managers need to have regular communication, either formal or informal, with remote workers to better understand the benefits and disadvantages of ICTs<br>• Managers need to create a formal way of communicating and raising matters within their respective teams and to create an environment where workers are free to voice their views |
| Policies to address societal inequalities in technology infrastructure distribution that favours remote working | • Establish viable and affordable ICT services and applications that support remote working<br>• Understand the current available ICT infrastructure and products that are required to support remote work settings<br>• Consider the quality of internet connections, scalability and the growth in workers opting to work remotely<br>• Policies that support the provision of digital remote economy |

**Table 1.**
Key factors for
supporting digit
workers

are twofold: firstly, even though several research studies have now been published about the impact of the COVID-19 pandemic on the workplace, there are as yet few studies that have employed the UTAUT better to understand the experience of remote working during the pandemic; secondly, the relationships between the UTAUT, the COVID-19 pandemic, remote working and the increasingly digitised world is yet to be fully explored in the literature. The review also acknowledges the limitations in concluding using secondary data. More comparative studies need to be conducted on a larger scale and more in-depth studies using interviews. It is evident from the review that remote workers did not struggle in general to work from home. Still, key challenges exist regarding the availability, quality and costs of ICT infrastructure in poorer residential areas. Remote working is only one element in an increasingly digital world, and other aspects like precarious work and data costs also need to be addressed.

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