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Unlocking technology acceptance among South African employees: A psychological perspective

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Orientation: The study delves into technological acceptance within South African organisations, identifying psychological factors influencing employees' willingness to adopt technology. Barriers to technology adoption are explored, emphasising the universal relevance of identified psychological constructs.

Research purpose: To understand the psychological barriers influencing successful technological adoption in South African organisations.

Motivations for the study: High failure rates in tech-implementation projects are linked to employee resistance, revealing a crucial gap in understanding psychological dynamics. Recognising human factors as pivotal to technological success, there is a need to transcend technical aspects, exploring individual experiences during organisational transitions.

Research approach/design and method: Using a qualitative approach with non-random snowball sampling, 17 South African employees were interviewed in a semi-structured manner. Thematic analysis revealed specific categories of psychological barriers.

Main findings: Identified barriers proved to be the antithesis of positive psychological constructs, including lack of psychological safety, lack of organisational trust, lack of psychological availability, negative emotions, low self-efficacy and low frustration tolerance. The presence of these barriers, hindering participants' willingness to adopt new technologies.

Practical/managerial implications: Organisations are advised to prioritise fostering a culture of psychological safety and trust, transparent communication and positive emotional experiences during technology adoption at the individual level. Training programmes enhancing self-efficacy and promoting mindfulness practices can mitigate barriers.

Contribution/value-add: This research stresses the significance of the role of psychological factors in inhibiting an employee's technological acceptance, providing practical guidance for industrial psychologists, HR professionals and change managers. The need to consider individual experiences during technological transitions, has universal implications across diverse workplaces.

Keywords: technological acceptance; psychological barriers; technology adoption; organisational trust; psychological safety; negative emotions; self-efficacy; South Africa.

Introduction

The Fourth Industrial Revolution (4IR) is characterised by remarkable technological advancements and innovations (Schwab, 2016; Batra, 2023). During this era, integrating cutting-edge technologies, particularly cloud-based technology, which is referred to under the term technology in this study, emerged as a strategic imperative for contemporary organisations (Yadegaridehkordi et al., 2018). This digital transformation fundamentally reshaped business operations, customer interactions and the development of innovative products and services (Bharadwaj et al., 2013). The ongoing technological disruption places technology adoption at the forefront, enabling organisations to gain competitive advantages, enhance operational efficiencies and foster sustainable growth (Westerman et al., 2014). Notably, this digital transformation trend has accelerated in recent years, with advancements in artificial intelligence, data analytics and cloud computing continuing to reshape industries (McAfee & Brynjolfsson, 2017). These changes are expected to endure globally over time (Brem, Viardot & Nylund, 2021; Vaiman et al., 2021; Kaur et al., 2020).

Understanding and identifying the factors that influence successful technological acceptance and adoption have never been more critical (Nambisan et al., 2019; Roberts et al., 2020). A McKinsey

study revealed that the rate of technological advancement in organisations is expected to increase by 30%–40% by the year 2030 (Hancock et al., 2020). Despite its transformative potential, the 4IR has faced criticism for not adequately addressing a wide range of societal needs. Critics have pointed out its failure to integrate sustainability from a human-centric perspective, considering human preferences and its lack of accommodation for circular economy initiatives aimed at addressing resource-related challenges (Mhlanga, 2022; Ozmen et al., 2023; Rauch et al., 2020). Additionally, the 4IR could potentially widen global inequality among and within countries, posing challenges to inclusive and sustainable economic growth, employment and industrialisation (Korinek et al., 2021).

Studies of technological acceptance models have been scarcely investigated by industrial and organisational psychologists (Erasmus et al., 2015; Molino et al., 2021). Kohnke et al. (2010) have noted that research on technology acceptance has been somewhat abandoned in industrial and organisational psychology. Currently, no psychological study has been found, which examines technological acceptance at the individual level (Bögel & Upham, 2018). There is furthermore a void in the literature investigating technology acceptance in developing countries, with a multi-cultural lens and specifically within South Africa (Averweg, 2008; Erasmus, et al., 2015; Guenther & Weingart, 2016; Kohnke et al., 2010).

Technological innovation resistance and acceptance

While the benefits of technological innovation are evident, the journey towards successful technology acceptance and adoption often presents challenges (Bharadwaj et al., 2013; Davis, 1989; Rogers, 2003; Venkatesh et al., 2003). Organisations worldwide grapple with issues related to resistance to change, employee buy-in and the effective implementation of new technologies (Stratman & Roth, 2002). These challenges are particularly pronounced in diverse and multicultural workforces, where varying perspectives, experiences and expectations intersect (Ruggunan, 2016).

Technological acceptance characterised by the favourable reception of technology leading to an intention to adopt it (Alotumi, 2020) varies among employees (Moon & Kim, 2001; Youngberg et al., 2009), and the role that employees play in adopting technological innovations remains largely understudied (Nguyen & Süß, 2023). Researchers have found that achieving acceptance is crucial for the implementation of any technology as it determines whether it will be utilised (Taherdoost, 2019). Taherdoost (2017) argues that an improved understanding of individual perceptions towards technology will help facilitate implementation. Addressing these challenges necessitates a comprehensive understanding of the psychological factors underlying technology acceptance (Akkaya, 2020; Bharadwaj et al., 2013; Bughin et al., 2020; Hilbert, 2011; Westerman et al., 2014).

International literature has indicated that employee attitudes towards technology adoption vary, with antecedent factors including beliefs and emotions needing consideration when introducing technology (Admiraal & Lockhorst, 2009; Curran & Meuter, 2005; Grindle 2014).

Employee resistance to technology has proven to have detrimental impacts to the business in terms of expenditure, reduced organisational commitment, delayed productivity, operational efficiency, limiting innovative capabilities, organisational culture, overall business vision as well as sabotages (Barton et al., 2012; Cameron et al., 2006; Davids & Martin, 1992; Gallego-Toledo, 2014; Ghani & Jayabalan, 2000; Kaplan & Norton, 2006; Kusy & Holloway, 2009). Failed technological implementation efforts are largely because of organisations underestimating the importance of employee involvement (Ghani & Jayabalan, 2000). It has been found that 70% of tech-implementation failures are related to a reduced employee motivation to embrace the change (Burnes, & Jackson, 2011). Employee resistance to technology can lead to financial losses and unforeseen expenses resulting from project delays, increased costs and missed opportunities for productivity gains (Benson et al., 2018). Gaynor (1996) noted that when a new technology is introduced, it is expected that an organisation's productivity will initially drop because of the resistance to the technology among employees. Fostering technological acceptance among employees is vital to mitigate the financial losses and unforeseen expenses that can result from resistance to technology adoption. Thus, to ensure that investments in technological innovations fulfil strategic business purposes and reap the intended benefits from implementation, fostering technological acceptance among the workforce right from the inception of technological implementations is paramount (Gupta, 2018; Khaw et al., 2022).

Furthermore, technology can involve potential risks to employees such as negative psychological consequences including, lower levels of motivation, stress, low morale, job insecurity and job dissatisfaction that ultimately influence their performance (Al-Ameri, 2013; Joshi & Lauer, 1998; Kølbjornsrud et al., 2016; Press, 2019). Stamate et al. (2021) have noted that technology can have positive or negative effects on the psychological health of workers, depending on how it is perceived and accepted. The acceptance of technology involves a psychological process that consists of psychological factors that influence technological acceptance (Stamate et al. 2021). Technological innovations within organisations have been associated with negative employee outcomes including risks to the psychological wellbeing of the individual worker (Fernandez, 2006). A possible explanation is attributed to an individual's psychological experiences when faced with a new technology; familiarity provides cognitive comfort to an individual compared with the uncertainty of a new technology (Alas & Sharfi, 2002). Strickland (2003) noted that employees resist change resulting from the implementation of technology because of perceived losses that accompany transitions. These losses include a loss of identity, a loss of belonging and a loss of meaning (Strickland, 2003). There is a need for theories that

denote the effects of emotions on technological acceptance (Bagozzi, 2007). Such an approach may include considering the emotions (Bagozzi et al., 1998) and attitudes (Bagozzi et al., 2004) as anticipated considerations required in achieving or failing to attain successful technological adoption. The long-term success or failure of organisational investments in technological innovations may ultimately depend on an organisation's prioritisation and consideration of their employees' individual experiences with technological change.

User resistance to technology adoption is a common challenge worldwide (Alotumi, 2020; Venkatesh et al., 2003). Employees' resistance may stem from factors such as fear of job displacement, lack of trust in technology and concerns about increased workloads (Davis, 1989; Rogers, 2003).

Within the African context, the perception of technology can differ based on socio-cultural, socio-economic and personal factors (Kolade et al., 2022; Mbarika et al., 2007, Musa, 2006). The digital divide is a significant concern in Africa and can affect how employees view and engage with technology in the workplace (Mutula & Van Brakel, 2006). In South Africa, employee aversion towards technological change remains high, resulting in feelings of fear, uncertainty, reduced levels of trust in management and an increase in resignations (Roberts et al., 2021; Visagie, 2010). The attitudes of South African employees towards technological advancements have been noted to be informed by age, education, access to resources and socio-economic background (Averweg, 2008; Roberts et al., 2021).

Psychological factors

For over the last 20 years and more, literature has identified that there is a persistent lack of technological acceptance within organisations; however, to this day, this issue remains unresolved (Ismail et al., 2023). A possible reason for this may be attributed to a lack of empirical psychological research within technological acceptance literature and a largely understudied area of the psychological variables impacting technological acceptance. It has been increasingly recognised that further explanatory variables are required to grasp an individual's technological acceptance of technological changes (Kulviwat et al., 2014; Samaradiwakara & Gunawardena, 2014; Sohn & Kwon, 2020). Roberts and Flin (2020) noted that to maximise opportunities in the adoption of innovation, the understanding of the psychological variables influencing the acceptance of technology is necessary.

The majority of research on technological acceptance lies within the realm of information technology (IT) (Al-Ameri, 2013; Jiang et al., 2000). Widespread models of technology acceptance originate from the IT field (Davis et al., 1989; Gallivan, 2001; Hart & Porter, 2004; Hwang, 2005; Lee et al., 2003; Mathieson, 1991; Morris & Venkatesh, 2000; Nah et al., 2004; Prescott & Conger, 1995; Rogers, 1976). Additional research is required to further the understanding of complex issues surrounding technological change, its acceptance and implementation (Al-Ameri, 2013; Joshi & Lauer, 1998).

Technological acceptance literature has noted that research might require a methodological repositioning to obtain a deeper understanding of factors, which have been less studied (Sun & Zhang, 2006). The majority of studies utilise quantitative approaches, typically from a positivist point of view (Sun & Zhang, 2006). Qualitative methodology, specifically from an interpretive point of view, is rich in information and can be a valuable alternative that can provide contemporary insights into research (Lee et al., 2003; Sun & Zhang, 2006). Furthermore, developments in technology may involve psychological factors that have scarcely been considered in the past, such as the concept of trust, which is not a classical factor that has been considered to influence an individual's adoption of technology (Liu et al., 2019). Factors, such as optimism, innovativeness, discomfort, insecurity and subjective norms, have been found to have direct positive and negative impacts on people's trust in adopting technology (Illia et al., 2015). Koh et al. (2010) and Chatterjee et al. (2021) have noted that determinants of psychological constructs (such as employee attitude – a psychological antecedent) warrant further investigation in technology acceptance models and that key factors that may impact relevant psychological constructs need to be scrutinised. Utilising a qualitative methodological perspective is key to identifying potential factors inductively. Roberts et al. (2020) maintain that the influence of psychological variables on employees' technological acceptance behaviour has not been satisfactorily explored, and a deeper dive into how these factors are understood is crucial for organisations that aspire to successfully adopt technological innovations.

The concept of technological acceptance holds a pivotal role in the dissemination of technology and its integration into organisations (Carey & Kacmar, 2010; Gong et al., 2004; Holden & Rada, 2011). Addressing the factors that influence this acceptance, researchers have delved deeply into the interplay between technological acceptance and psychological factors (Mahmood et al., 2021; Mirriahi et al., 2012; Musarrat et al., 2013; Roberts & Flin, 2020; Saghafian et al., 2021; Steel & Levy, 2009; Stevens, 2020; Terras & Ramsay, 2015; Venkatesh et al., 2003). For instance, when technology usage is obligatory, as highlighted by Chandler (2012), individuals who are dissatisfied with the technology often find themselves adjusting their mental attitude towards it to alleviate cognitive dissonance, instead of outright rejecting its use. Assessing employee's mental acceptance of technology and their attitudes towards its usage have been highlighted in research as important considerations (Hennemann et al.,2018; Nguyen & Süß, 2023; Paganin & Simbula, 2021; Shamsi et al., 2021). Roberts and Flin (2020) conducted a literature review and through a thematic analysis of research articles, found five psychological factors that influence the adoption of technology in the oil and gas industry; these were: personality (e.g. exploration traits and risk aversion), attitude (e.g. trust and not-invented-here syndrome), social (e.g. social norms), cognition (e.g. risk perception) and psychological factors at an organisational level (leadership and organisational culture). Studies have shown that personality dimensions,

such as innovativeness and optimism, significantly influence technology acceptance and are of major importance when adopting new technology (Godoe & Johansen, 2012; Stevens, 2020). Musarrat et al. (2013) noted that there are specific promoters and obstacles to technology adoption by academics and found that enjoyment, optimism, motivation, interest and preferences served as promoters of technology acceptance, while perceived pressure from authority, time commitment to learn and time commitment to use were the biggest obstacles to technology uptake. Mahmood et al. (2021) identified fear of job losses, lack of advanced and continued education of employees and fear of data loss, as the most prominent psychological barriers to adopting Industry 4.0 technologies in the manufacturing sector of a developing economy.

Within the diverse and dynamic context of South Africa, where myriad backgrounds converge, the understanding of the psychological factors that influence technological acceptance takes on even greater importance. Nonetheless, it is crucial to recognise that the challenges and opportunities surrounding technology acceptance are not limited to South Africa alone. The global digital divide persists, with unequal access to technology and digital resources impacting individuals and communities worldwide (Hilbert, 2011). Bridging this divide is an urgent global concern, and understanding the psychological factors of technology acceptance can contribute to more inclusive and equitable digital transformation efforts (UNESCO, 2019).

Against this backdrop, this research aims to identify the psychological barriers to technological acceptance specifically for South African employees from various socio-cultural backgrounds. By unravelling these intricate dynamics, this study contributes to a more profound understanding of the factors shaping technology acceptance, paving the way for strategic interventions that promote technological adoption across varied workplace environments. The present study thus seeks to address the following research question: What are the psychological barriers to technology acceptance among South African employees?

Technological acceptance models

The theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975) offers a valuable framework for understanding technology adoption. The TRA posits that an individual's intention to adopt a behaviour or course of action is influenced by two main factors: attitude towards the behaviour and subjective norms (Ajzen & Fishbein, 1983). Attitude towards behaviour reflects an individual's assessment of the desirability of adopting a specific behaviour, in this case, using new technology. It involves considering the perceived consequences of adopting or not adopting the technology. This attitude can be either positive or negative, depending on the individual's evaluation (Azjen & Fishbein, 1983).

Subjective norms are related to an individual's perception of whether others approve or disapprove of adopting the technology. It also includes the inclination to conform to what they believe others expect them to do. The TRA underscores the role of social influences in decision-making, highlighting the significance of social norms (Hale et al., 2002).

In the context of employee decision-making regarding technology adoption, social norms play a pivotal role. Extensive research on technological acceptance consistently emphasises the impact of reference groups. These reference groups often comprise individuals with similar socio-economic status, and their choices significantly influence individuals when deciding whether to accept and adopt new technology (Chang & Cheung, 2001; Karahanna & Limayem, 2000).

The technology acceptance model (TAM), developed by Davis (1989), is a widely employed framework to understand user acceptance of new technologies (Erasmus et al., 2015). Building upon the TRA (Fishbein & Ajzen, 1975), TAM provides a straightforward and effective tool for examining user acceptance behaviour (Legris et al., 2003).

Technology acceptance model comprises six key factors: attitude, behavioural intention, perceived usefulness, perceived ease of use and external variables (Davis, 1989). Among these, perceived usefulness and perceived ease of use are central in determining technology acceptance (Davis, 1989; Yucel & Gulbahar, 2003). While TAM has been extensively applied and tested across various global contexts, including Japan, Singapore, the United Kingdom, Europe and the United States (Dulcic et al., 2012; Kahlert et al., 2017; Montargot & Lahouel, 2017; Skoumpopoulou et al., 2018; Wang et al., 2011; Youngberg et al., 2009), its exploration in South Africa and other developing countries remains limited (Erasmus et al., 2015).

In essence, TAM offers a framework to assess technology acceptance by considering factors such as functionality and ease of use. It extends the TRA by proposing that an individual's attitude towards technology is shaped by their perceptions of its benefits and challenges.

Research methodology

This research employs a qualitative approach rooted in a constructivist epistemological tradition (Berger & Luckmann, 2006) and embraces the interpretive paradigm. This paradigm is well suited for exploring the subjective experiences and meanings surrounding technology adoption in the diverse South African context. Additionally, a hermeneutical phenomenological research approach (Husserl, 1992) is integrated to explore employees' subjective encounters with technology and provide insightful interpretations of the findings (Clarke & Hogget, 2009; Creswell, 2013; Hassan & Ghauri, 2014).

Sample and sampling

This study was conducted within eight South African organisations known for their adoption of technology and

innovative work practices spanning across various sectors, including education, technology, software development, engineering, law, private medical practice, management consulting and IT consulting. All of these organisations were located in Johannesburg. The participants were selected using sampling in a natural context (Denzin & Lincold, 2017).

Sampling was conducted to explore the psychological barriers influencing technological acceptance among South African employees. Seventeen participants from various backgrounds were engaged in semi-structured interviews, allowing for a comprehensive understanding of their perceptions and experiences related to technology adoption.

The sampling process aimed at ensuring a diverse and representative group of participants, as shown in Table 1.

The determination of the sample size was guided by the principle of theoretical saturation, which involves collecting data until no new categories or insights emerge from the analysis, thus ensuring qualitative criteria are met (Guest et al., 2006). The selection criteria included Sargeant's (2012) specifications of individuals being from diverse job titles, educational levels and work experiences, with exposure to the subject matter, event or phenomenon being explored in the study. This criterion aimed to ensure that participants had sufficient familiarity with the subject matter to provide meaningful insights into their experiences and perceptions related to technological acceptance.

Ethical considerations

Ethical clearance (code IPPM-2022-606 D) for the study was obtained to ensure that research involving human participants adhered to ethical guidelines. Participants' informed consent was obtained before the interviews. The study utilised the ethical framework based on the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1979) and adhered to key ethical principles as outlined in the Declaration of Helsinki (World Medical Association, 2013). Prior to conducting interviews, participants were thoroughly briefed on ethical considerations and potential risks involved. These considerations included explanations regarding the guarantees of confidentiality and protection of personal identity. Anonymity was addressed by representing each participant with a numerical value. Additionally, written informed consent forms detailing these ethical aspects and requesting permission for audio recording were obtained from all participants prior to the commencement of all interviews.

TABLE 1: Overview of participant characteristics.

P	Gender	Ethnicity	Age range (years)	Cloud-based technology used at work
1	Female	White peron	26–41	Blackboard Learn, Mendeley, MS 365, Google suite
2	Female	Indian peron	26–41	SharePoint, Canva
3	Male	Indian peron	42-57	MS Azure, AWS
4	Female	Black peron	18–25	Slack, Salesforce, Google Suite
5	Male	Black peron	42–57	Forcepoint, DocuSign, LastPass
6	Female	White peron	26–41	Google Drive, Monday.com, myQNAP
7	Male	Mixed-race peron	26–41	Time Doctor, Trello, HubSpot
8	Male	White peron	18–25	Meta, Monday.com, Events Spark, Salesforce
9	Female	Mixed-race peron	42–57	Canva, Dropbox, Zoom, Slack
10	Male	Indian peron	26–41	MS Teams, Trello, Monday.com, Slack, Adobe Creative Suite, Salesforce
11	Female	Black peron	26–41	YouTube, Microsoft 365, Sage
12	Female	Indian peron	26–41	Google Drive, Monday.com, Slack
13	Male	White peron	26–41	Salesforce
14	Female	Black peron	26–41	Health Bridge, Time Doctor
15	Female	Mixed-race peron	42–57	Salesforce, TeamHub, CMS
16	Female	Black peron	18–25	LinkedIn, Twitter, Google Suite
17	Female	White peron	26–41	MS Azure, Xero, QuickBooks

P, Participant; MS, Microsoft; AWS, Amazon Web Services; myQNAPcloud, Cloud file Sharing service for Network-attached storage; CMS, Content management systems.

Data collection and analysis

Both purposive and convenience sampling methods were utilised to identify and recruit participants for this study. Participants comprised diverse South African employees working in profit-driven organisations who regularly engaged with cloud-based technology as part of their daily work responsibilities. Data collection was achieved through 60-min semi-structured interviews (Jamshed, 2014), incorporating predetermined open-ended questions that delved into technological acceptance and the potential psychological barriers influencing it. The interviews took place online via the Microsoft teams video meeting platform. Sample questions included, for example 'What would make you not want to use technology?', and 'What do you believe makes someone "good" or have a knack for technology?'

Data recording involved both audio recordings and written notes taken during the interviews. Audio recordings were transcribed verbatim. Data were stored securely and accessible only to authorised personnel.

The data analysis followed a five-step content analysis process as outlined by Terre Blanche et al. (2006), involving familiarisation, induction of categories, coding, elaboration and interpretation. The collected data were analysed using ATLAS.ti, a software for qualitative analysis.

Abductive reasoning allowed for the synthesis of data-driven insights from the interview content with theory-driven concepts derived from the literature review (Peirce, 1931). This methodological triangulation ensured a comprehensive understanding of the data, enriching the analysis with both emergent themes and theoretical underpinnings (Denzin & Lincoln, 2017).

The categories reported were recorded based on frequencies. For the purposes of this article and for the intention of remaining succinct, only the highest and lowest occurring categories were analysed in depth (Braun & Clarke, 2021; Mayer, 2011).

Data quality criteria

To ensure the quality of this study, the following criteria and strategies were applied (Lincoln & Guba, 1985). Credibility was established by ensuring that the research findings accurately represented the participants' original data and correctly reflected their perspectives. This was achieved through in-depth interviews, intersubjectivity approval and prolonged engagement with participants to develop a deep understanding of their experiences and viewpoints.

To enhance transferability, the research has provided thick descriptions of the research context, participants and data collection procedures. Dependability was maintained by conducting an audit trail, which involved documenting and preserving records of the entire research process.

The research aimed to establish confirmability by ensuring that the findings and interpretations were derived directly from the data rather than being influenced by the researcher's biases or preconceptions. This was achieved through a systematic and transparent data analysis and by allowing the research supervisors to review the research process and findings. Finally, reflexivity was practised by the researcher through critical self-reflection.

Findings

The study's findings are organised into six emerging categories, identified as the psychological barriers that influence the adoption of new technology in the workplace. These barriers represent the antithesis of positive psychological constructs and are divided into specific categories. The categories were revealed through thematic analysis of the interview transcripts, whereby similar viewpoints were grouped using an abductive approach. because of word limit constraints and the need for efficiency, this article focuses exclusively on analysing the highest and lowest occurring categories, ensuring a concentrated exploration that provides the most valuable insights for practical application.

Psychological barriers

A total of 17 interviewees commented on the participant's psychological barriers theme, as presented in Table 2.

Lack of psychological safety

Fifteen participants noted a lack of psychological safety as a barrier. When participants fear retribution for voicing opinions, making mistakes or taking risks, they become resistant to embracing new technologies. Participants discussed how the absence of psychological safety hindered technology adoption:

> '… thethe thought of using technology on a day-to-day basis can be daunting because you could make mistakes and that's going to make you a poor work performer and impact your job security.' (P13)

TABLE 2: Overview of participants commenting on psychological barriers theme.

Category	Frequency	Participant numbers
Lack of psychological safety	15	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17
Lack of organisational trust	14	1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 15, 16, 17
Lack of psychological availability	14	1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 17
Negative emotions	17	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Lack of self-efficacy	10	1, 2, 4, 5, 6, 7, 9, 11, 13, 15
Low frustration tolerance	12	1, 2, 3, 5, 6, 8, 10, 11, 12, 13, 15, 17

The participant attributed making errors at work to adverse consequences, specifically noting the risk it entails, which involves being labelled a poor work performer and the pursuant job insecurity that may stem from this. Participant 8, a white male stated:

> '… there's a prevailing belief that you need to be self-sufficient, so we don't want to ask for help.' (P8)

The participant spoke to norms and expectations in his company, and how deviating from these expectations could negatively impact the way the participant is perceived.

This category highlights how a lack of psychological safety, where participants fear retribution for mistakes or voicing opinions, can impede technology adoption. Participants expressed concerns about making errors, being labelled as poor performers and facing job insecurity when dealing with new technologies. This fear of negative consequences stifles innovation and experimentation, creating resistance to change and impedes technological acceptance.

Lack of organisational trust

Insufficient organisational trust was cited as a significant barrier among 14 participants. Participants who doubt their organisation's intention and particularly their commitment to their wellbeing are hesitant to embrace technological changes. One participant stated:

> '… tech adoption is going to suffer when staff are suspicious of management.' (P10)

The participant linked negative perceptions of management's intentions to the lack of adoption to technology, suggesting that distrust of management will involve a distrust of all initiatives that are carried out by management including technological implementations. Another explained:

> 'Technology can be used in the wrong ways, especially in the workplace, people can be over monitored, your privacy can be invaded or you can be expected to be available all the time.' (P15)

The participants mentioned that insufficient trust in their organisations and management's intentions can be a significant barrier to technology adoption. Distrust of management's decisions, intentions and transparency can lead participants to resist all initiatives, including technological changes. This lack of trust in the organisation's motives can create reluctance to embrace new technologies.

Lack of psychological availability

Low levels of psychological availability impeded technology adoption among 14 participants. Participants who struggled to give attention to and focus on new information during technological changes found it challenging to adapt. A lack of psychological availability thus prevents participants from fully engaging with new technologies, impacting their ability to adopt it effectively:

> 'It's got to come easy. If it's not easy, I'm not interested because then it's just an impediment to my work, I don't have the time to figure tech out. I don't want something that becomes more work for me.' (P6)

> 'It's a situation of not knowing and not having the time to figure it out. I have an interest in using new tools but mentally I am just spread too thin and in reality I don't end up using it as much as I should or in the most effective way.' (P2)

Low levels of psychological availability hinder technology adoption, with participants citing distractions and time constraints as major barriers. These participants express that there is an unwillingness to learn because of their current demands and lack of resources resulting in them feeling overstretched. If training is perceived as challenging or is a deviation from what they are used to then they are more likely to reject the activity. Taking time to learn the tool is seen as a distraction and disruption to their work. These participants have noted that they are too busy to pay attention and focus on getting accustomed to a new tech tool and are not comfortable with change. This speaks to the concept of 'mental bandwidth', which refers to the cognitive resources available for processing information and making decisions, which can be depleted because of factors such as stress, fatigue or cognitive overload affecting an individual's ability to engage fully in tasks or interactions and thus becoming less psychologically available. The demands of their current workload and lack of mental bandwidth make it challenging for participants to focus on learning new technologies. If training is perceived as time-consuming or difficult, it can deter participants from fully engaging with new tools.

Negative emotions

All 17 participants indicated that experiencing negative emotions was a significant psychological barrier. When participants experienced negative emotions towards new technology, they did not perceive it favourably and were less motivated to explore and successfully adopt it.

> '… when there is new technology introduced or a new process I'm like "oh dear". Yeah, here we go again. What a pain.' (P6)

> 'if it makes me feel overwhelmed trying to understand it, I'll get anxious and immediately close off to the idea of using it and have a mental block for learning it.' (P11)

The participants all expressed that undergoing unpleasant feelings, including discomfort, worry, anxiety and frustration act as significant psychological barriers to technology adoption and inhibit the participant from fully engaging with the technology. These emotions were often associated with the complexity of new technology or the fear of making mistakes. Negative emotions create resistance to change and discourage the exploration of new tools.

Lack of self-efficacy

Ten participants revealed a lack of self-efficacy as a barrier. Participants who lacked confidence in their technological abilities were less likely to embrace new tools:

> 'I don't have the skills and confidence with technology so I might make detrimental mistakes to my work, or even break things and that makes me switch off from the outset.' (P6)

> 'I always worry that I'll mess something up or not be able to figure it out. I just don't pick it up easily.' (P11)

> 'Sometimes I feel really good on tech, but that is only after fighting that inner voice that says "Oh I'm useless" I often doubt my ability to learn and adapt to new tech. It can make me feel inadequate and unsure of myself.' (P1)

> 'all you know is all you know and people who lack confidence in their technological abilities may feel inadequate or disadvantaged because they believe they can't meet this minimum requirement.' (P5)

These participants have noted that they are not secure in their ability to navigate technology effectively and do not believe that they are competent or capable of learning the new skill required by the technology. Participants who lacked confidence in their technological abilities were less likely to embrace new tools. Feelings of inadequacy and uncertainty about their ability to learn and adapt to new technology hindered their willingness to adopt new tools. Insecurity in one's technological skills delays technology adoption as participants hesitate to embrace new technologies.

Low frustration tolerance

Limited frustration tolerance was identified as a significant challenge among 12 participants. Participants with low frustration tolerance struggle to persevere and find solutions, which can lead them to capitulate in the face of challenges.

Participants admitted that their inability to persevere or have patience during the process of utilising technology inhibits them from being open to the technology and adopting it. Frustration and impatience were significant obstacles, leading some individuals to give up easily when technology did not work as expected. Insufficient frustration tolerance can lead participants to fail to adopt new technologies if they perceive them as too disruptive to their established routines:

> 'There are times where I get frustrated very easily with technology so I don't have a lot of patience when it comes to it. So if it's not working right or if it's taking too long to load things like that, I'll just be easily annoyed. A slow system makes me rage and then im like ok "Im done, I don't want to use you anymore".' (P2)

Similarly,

> 'I get irritated when things don't function the way I want them to so I end up giving up quite easily.' (P12)

Regarding cultural background and gender, it is interesting to note that participants from diverse backgrounds expressed similar sentiments on these psychological barriers. Regardless of cultural or gender differences, these psychological barriers appeared to be universally important. The findings suggest that creating a workplace culture that minimises these psychological barriers can lead to more successful technology adoption, irrespective of participants' backgrounds.

Surprisingly, the study did not reveal significant variations in the importance of these barriers based on cultural or gender differences. This suggests that organisations should focus on eradicating these psychological barriers as part of their technology adoption strategies without assuming that certain groups may inherently possess or lack them. It highlights the importance of creating a workplace culture of organisational trust, psychological safety and positive emotions to facilitate technology adoption. Additionally, psychological availability, self-efficacy and frustration tolerance are personal traits that contribute significantly to an individual's readiness to embrace and master new technologies.

The findings related to the identified psychological barriers provide valuable insights into the challenges employees face when it comes to adopting new technologies in the workplace. The cultural background appears to influence the emphasis placed on trust, particularly in terms of trust in management's intentions and transparency. Participants from diverse backgrounds highlighted the importance of trust in their organisations and the role it plays in their willingness to adopt new technology. It is not surprising that a lack of psychological safety and low self-efficacy can hinder technology adoption. However, the strong emphasis on the role of negative emotions, low frustration tolerance and the importance of psychological availability in hindering technology adoption is noteworthy. These factors highlight the need for organisations to consider employees' emotional wellbeing and mental bandwidth when introducing new technologies. Additionally, the impact of distrust in management's intentions on technology adoption denotes the necessity of transparent communication and involving employees in decision-making processes.

Discussion

Barriers to technological acceptance: Psychological factors

The study identified specific psychological barriers that hinder the adoption of new technology among South African employees. These barriers included the lack of psychological safety, organisational trust and psychological availability, as well as the experience of negative emotions, low self-efficacy and low frustration tolerance.

The absence of psychological safety and organisational trust emerged as significant barriers. Participants who feared negative consequences for taking risks or voicing opinions were hesitant to embrace new technologies. This aligned with research on resistance to change, emphasising that employees' perceptions of potential negative consequences can lead to avoidance behaviours (Straatmann et al., 2016). Additionally, a lack of trust in the organisation's intentions and benefits of new technology hindered adoption. Resistance to change has been linked to organisational distrust (Yue et al., 2019), highlighting the importance of transparent communication and creating an environment of trust.

Low levels of psychological availability hindered technology adoption, preventing participants from fully engaging with new tools. Negative emotions, including frustration and anxiety, were also barriers to successful adoption. Zheng and Motargot (2022) indicate that employees' negative emotions (anger and fear) have negative and significant effects on their perceptions of adopting a new technology. Participants who experienced negative emotions towards technology were less motivated to explore and adopt new tools. Low self-efficacy further exacerbated these challenges, leading to insecurity in participant's technological abilities. These findings aligned with the self-determination theory (Deci & Ryan, 1985), suggesting that feelings of competence and autonomy are crucial for intrinsic motivation and engagement. Addressing psychological availability, managing negative emotions and fostering self-efficacy are vital strategies to overcome these barriers.

This research significantly broadens the scope of understanding surrounding technology acceptance within organisational contexts. By delving into the intricate realm of psychological factors not only reinforces existing findings but also sheds light on critical aspects often overlooked in traditional discussions.

The identification and exploration of psychological barriers stress the complex interplay between individual experiences and organisational dynamics in shaping attitudes towards technology adoption. Particularly, the prominence of psychological barriers within employees unveils a crucial dimension that organisations cannot afford to ignore when implementing technological innovations in the workplace.

Moreover, this study serves as a clarion call to organisational leaders, highlighting the imperative of recognising and addressing employees' emotional experiences throughout the technology implementation process. By acknowledging the significance of these psychological barrier categories, organisations can proactively mitigate resistance and foster a conducive environment for technology adoption.

Furthermore, this research elucidates the underlying reasons behind the variable rates of technology acceptance observed across different organisational settings. It emphasises the necessity for organisations to move beyond surface-level strategies and delve into the intricacies of employees' emotional terrains to effectively manage change and maximise the benefits of technological advancements.

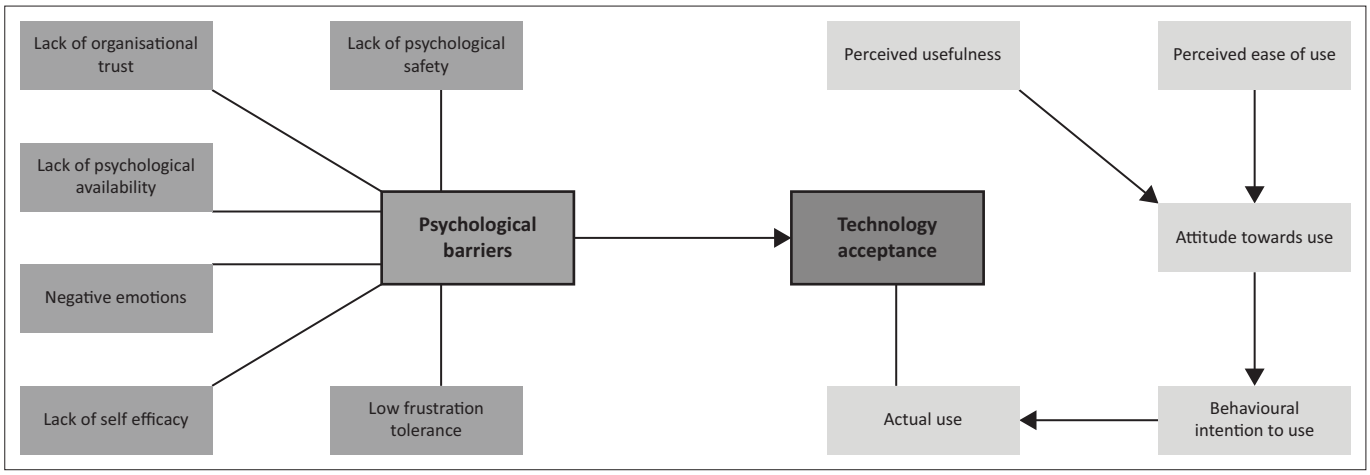

FIGURE 1: Psychological barriers to technological acceptance.

By reframing technology acceptance as a psychological process influenced by multifaceted factors, this study introduces a paradigm shift in organisational change management. It emphasises the need for a comprehensive approach that integrates insights from psychology, sociology and organisational behaviour to navigate the complexities of technological adoption successfully.

In essence, this research not only contributes to theoretical advancements but also offers practical implications for organisational leaders. By recognising the intricate interplay of psychological factors and technology acceptance, organisations can pave the way for smoother transitions, minimise resistance and harness the full potential of technological innovations to achieve strategic objectives. Figure 1 illustrates the identified psychological barriers added to the TAM.

Contextualising the findings

The findings of this study align with prior research on technological acceptance and its psychological determinants. The theoretical foundation provided by the TRA and the TAM has been pivotal in understanding the factors that drive individuals' intention to adopt technology (Fishbein & Ajzen, 1975; Davis, 1989). Our findings resonate with TRA's emphasis on attitude, subjective norms and perceived behavioural control as determinants of technology adoption. Similarly, TAM's focus on perceived usefulness and perceived ease of use (Ajzen & Fishbein, 1983; Davis, 1989) as key factors influencing acceptance finds support in the psychological barriers identified in this study. Furthermore, our findings provide further evidence of the identified need to focus on the individual employee perspective as noted by Nguyen and Süß (2023:3), 'there is a lack of sufficient insight into the individual employee perspective regarding technology acceptance'.

To enhance the likelihood for successful technology adoption among employees, a focus on individual perceptions is pertinent. Psychological constructs such as psychological safety, organisational trust and self-efficacy have been explored in organisational psychology literature as contributors to employee performance and wellbeing (Bandura, 1997; Edmondson, 2019; Mayer & Davis, 2019). However, this study extends this knowledge by demonstrating their crucial role in shaping employees' willingness to embrace technological changes. The universality of these barriers, transcending demographic differences, stresses their significance in promoting technology adoption across diverse workplace environments. Interestingly, the lack of psychological safety emerged as the highest-ranked barrier to technology acceptance within this study. This stresses the importance of prioritising employees' perspectives at the individual level, and by doing so, organisations are advised to give precedence to address barriers such as psychological safety and create environments where employees feel comfortable experimenting with new technologies, providing feedback and expressing concerns. This approach acknowledges that successful technology adoption is not solely about implementing the latest tools and systems but also about ensuring that employees feel supported, valued and secure in their work environment.

It has been noted that industrial and organisational (I-O) psychologists are required to play a pivotal role in the current and future world of work (Coetzee & Veldsman, 2022; Oosthuizen, 2022). As Richards (2017) noted, the rapid rise of technological advancements poses the risk of isolating groups with 'limited wisdom'. Under the I-O psychologists' guidance, organisations may ensure that technology adoption remains inclusive and considerate of all employees' needs and perspectives. Waghmare (2019) emphasises the significance of strategic intelligence in decision-making and its reliance on information. Industrial and organisational psychologists, in their role, can contribute to this by aligning organisational strategies with the psychological factors identified in our study. Strategic intelligence, as suggested by Abdullah (2012), can help organisations adapt to the dynamic 4IR environment. Industrial psychologists, with their expertise in understanding human behaviour, can assist in developing strategic leadership that not only drives success but also shapes a positive organisational culture.

The study, in particular, calls for an additional necessary step that I-O psychologists should employ in order to enhance human-technology dynamics and strengthen the success of technological advancements, implementations and changes in the workplace. Understanding and deleveraging the psychological barriers to technology acceptance is instrumental in the successful implementation of technology. By recognising these elements, practitioners can assess the readiness of employees to embrace new technologies, a crucial step in the change management process.

Research limitations

Several limitations should be acknowledged in interpreting the findings of this study. Firstly, the sample size was relatively small, comprising only 17 individuals, predominantly females with ages ranging from 18 to 57 and possessing high educational backgrounds and professional occupations, potentially limiting the generalisability of the results. Secondly, the study was confined to eight organisations located solely in Johannesburg, South Africa, thus restricting the broader applicability of the findings to a single regional context. Thirdly, methodologically, the reliance solely on semi-structured interviews without additional data collection methods such as observations or focus groups may have limited the depth of insights gained. Fourthly, the study primarily focused on identifying barriers to technology acceptance, without delving deeper into potential facilitators or exploring alternative theoretical perspectives. Lastly, inherent biases may have influenced the research process, given that all researchers were women from a predominantly Western background, potentially shaping the interpretation and framing of the data within a specific cultural and gendered context.

Conclusion and recommendations

This study explored the complex realm of technological acceptance and its associated psychological barriers within the South African organisational context. The findings reveal the powerful role of attending to psychological factors when facilitating the adoption of new technology in the workplace. Lack of psychological safety, organisational trust and psychological availability, as well as experiencing negative emotions, low self-efficacy and low frustration tolerance emerged as psychological barriers to technology acceptance, inhibiting participants' willingness to learn and accept new technologies.

Understanding and addressing these factors should be integrated into organisational strategies to mitigate barriers and promote a culture of technological acceptance. As organisations increasingly embrace technological innovations, cultivating positive psychological resources becomes imperative to ensure successful adoption and integration, ultimately driving organisational growth and success.

It is necessary to collaborate with organisations to foster an optimal environment by promoting open communication, encouraging feedback and addressing concerns without fear of reprisal at the individual level. This will require a combined effort consisting of creating psychologically safe environments with positive reinforcement such as adding praise or incentivising employees for resilience shown and for conquering fear and hesitance. To improve confidence in technological abilities, practitioners can design training programmes and provide coaching to boost employees' self-efficacy, encompassing skill development, goal setting and feedback mechanisms. In order to manage negative emotions that may arise during this process, it is important to concurrently implement strategies such as stress management techniques, emotional intelligence training and creating a supportive work environment.

For the South African context, this study's findings hold substantial implications for fostering technology adoption and addressing the psychological barriers that hinder it. To effectively promote the adoption of new technologies, organisations should consider the following recommendations:

Organisations should prioritise the establishment of a workplace culture that fosters psychological safety and trust among employees. This involves creating an environment where employees feel secure in taking risks, voicing opinions and experimenting with new technologies. Encouraging open communication channels and providing assurances that employees will not face negative consequences for their actions can contribute significantly to building this culture.

Transparent communication is paramount in addressing the lack of trust and psychological safety. Organisations should engage in open and honest dialogues with employees about technological changes, their intentions and the expected benefits. Involving employees in decision-making processes related to technology adoption can further enhance their trust and commitment to these changes.

Recognising that self-efficacy plays a pivotal role in technology acceptance, South African organisations should invest in training and skill development programmes. These initiatives should aim to enhance employees' technological capabilities and their confidence in using new tools. Providing employees with the resources and support necessary for acquiring new skills can lead to higher levels of self-efficacy.

Organisations should focus on creating a positive emotional experience during technology adoption. Encouraging curiosity, excitement and a sense of accomplishment can motivate employees to explore and embrace new technologies willingly. Recognising and celebrating small victories and successful technology adoption stories can contribute to this positive emotional climate.

Given the importance of psychological availability and frustration tolerance, organisations should promote mindfulness practices and resilience-building strategies. Mindfulness can help employees stay present and engaged during technological changes, reducing distractions and enhancing their ability to

adapt. Resilience-building programmes can equip employees with the tools to persevere through challenges and setbacks related to technology adoption.

Cultural diversity within the South African context should be acknowledged and respected when implementing technology adoption strategies. Recognising that cultural backgrounds influence the emphasis on trust, organisations should tailor their approaches to accommodate different cultural perspectives. Cultural sensitivity and inclusivity should be integral components of technology adoption initiatives.

The findings of this study carry implications not only for South African organisations but also for global studies in the field of technology adoption. There is a universality of these psychological factors that transcend geographical and cultural boundaries. Organisations worldwide can benefit from similar strategies to promote technology adoption, as the core psychological drivers of acceptance appear to be consistent. However, it is crucial to consider the specific cultural nuances and organisational contexts of each region when tailoring interventions effectively.

Building upon the insights provided by this study, several avenues for future research emerge. Firstly, investigating the role of cultural differences in influencing the relevance of psychological barriers can provide a nuanced understanding. Secondly, exploring the impact of interventions such as training programmes, mindfulness practices and mentorship initiatives on enhancing technology acceptance would contribute to practical strategies for organisations. Thirdly, longitudinal studies tracking employees' technological adoption journeys over time could reveal the long-term effects of positive psychological constructs. Lastly, a comparative analysis across industries and sectors could uncover sector-specific challenges and opportunities for technology adoption.

Overall, the findings of this study contribute to the evolving understanding of technology acceptance within organisational contexts and offer actionable insights for practitioners, HR professionals and change managers seeking to facilitate successful technological transitions. As organisations continue to navigate the dynamic landscape of technological innovation, the integration of positive psychological factors emerges as a key strategy to foster a culture of adaptability, growth and sustainable success.

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