



Intersectionality Lens for Smartphone Adoption Among Female Older Adults

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Abstract: Older adults are usually underrepresented in the discourse of smartphone adoption and are often subjected to stereotypes that create negative perceptions of their ability to use the technology. In a gender-stereotyped society, female older adults face even more challenging situations for their technology adoption experiences. Intersectionality has emerged as a dynamic theory that recognises individuals as members of multiple groups can simultaneously experience various forms of privilege, vulnerability, and disadvantages. To examine the adoption of smartphones among female older adults, we adapt the intersectionality lens to explain the adoption or non-adoption issues and factors. The objectives of this study are to explore intersectionality in smartphone usage for female older adults, review their usage and needs through related literature. This review study aims to identify motivating factors and barriers for smartphone technology adoption among female older adults in Malaysia. The findings show that using an intersectionality lens, the study identified how smartphone use by female older adults is influenced by a range of interconnected factors. This study offers valuable insights for scholars conducting similar research and highlights the importance of considering diverse and interconnected factors in technology adoption.


1 INTRODUCTION


The evolving nature of technology implies the necessity of users continually acquiring new technical know-how to use mobile devices, yet this poses a significant challenge for older generations in keeping pace with its new interfaces (UI), applications and interaction modes compared to the younger generations. In the gendered inequality and stereotyped society, especially in the male-dominated field of science and technology (S&T) area, female users of this advanced technology, especially in their older age, are stereotyped as un-skilful users or non-technological users. This user group is perceived negatively on their ability to use technology, and they are underrepresented in the discussions of mobile


technology adoption. In general, most literature focuses on older adults.


This paper aims to study female older adults' adoption of mobile technology such as smartphone apps and services in their everyday lives. The specific Research Objectives (RO) to review the smartphone usage and needs by female older adults through related literature.

The first section of this paper presents a theoretical lens to cover more deeply on technology adoption or non-adoption issues through the complexity of the intersection nature of groups, culture, and demographics attributes that exist in societal issues of technology adoption in the juncture of ageing society and advanced AI-related technological era. The second section is the scoping review, explaining the key findings of reviews. The

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third section is to present the review findings in a Framework and explain the details of the framework.

1.1 Intersectionality Lens as the Theoretical Foundation

Intersectionality, a theoretical lens developed by Kimberlé W. Crenshaw in 1989, originated from the advocacy for the rights of black women in the United States during the 1970s and 1980s (Rodriguez, 2018). Crenshaw contended that the structural systems exhibited a failure to acknowledge the interconnected nature of the oppressive experiences encountered by women of colour. These systems concentrated exclusively on gender and race as separate entities, disregarding their intersectionality (Rodriguez, 2018).

Crenshaw defined intersectionality as a metaphorical representation of a crossroad or traffic at a junction. It signifies the convergence of multiple influences originating from several factors, which collectively shape the interconnected experiences or circumstances of a person or a group (Rodriguez, 2018, p.431). In simple understanding, Crenshaw illustrated intersectionality as:

“The metaphor of a crossroads or traffic at an intersection... arguing that diverse factors flow from different directions and only by looking at the interconnection of these factors is one able to understand the causes, characteristics, and consequences of events that happen at the intersection” (Rodriguez, 2018, p. 431).

The topic of intersectionality has been widely discussed for many years, especially in the field of feminist research (Slowey, 2022). Currently, it is used as a flexible research model that is utilised in different fields such as health research, ageing and technology, and information systems research. It goes beyond the traditional frameworks that focuses on only one aspect (World Health Organisation [WHO], 2020). The statement recognises that individuals own numerous identities, such as age, class, ability, religion, education and migratory status.

As members of multiple groups, individuals can simultaneously experience various forms of privilege, vulnerability, and disadvantages (Rodriguez, 2018; WHO, 2020).

1.2 Intersection and Interconnected Factors

Scholar activists including Crenshaw have used intersectionality to urge for a deeper look at the interconnected factors (based on gender, class, race

and other categories) that determine power, privilege and oppression of a marginalised group (Rodriguez, 2018; Fehrenbacher & Patel, 2020).

Presently, intersectionality has emerged as a dynamic research paradigm that seeks to move beyond the use of traditional ‘single-axis framework’ (one that considers single, rather than the multiple intersecting categories of identity) that shape individuals’ experiences (WHO, 2020). It begins with the idea that individuals have multiple identities (i.e., age, class, ability, religion, education, migration status, etc.), and that as members of more than one ‘group’, they can experience different forms of privilege, vulnerability and (or) disadvantages at the same time (Rodriguez, 2018; WHO, 2020). For example, gender is only one of the social factors that people face in every part of the world. It is still insufficient to address either a dominant or subordinate position (Ceia et al., 2021; Rodriguez, 2018) without taking into consideration other social constructs or categories of identity.

Nevertheless, this study did not adhere to a pure intersectional gender analysis that centres more on the voices of people who are subjected to multiple, simultaneous forms of oppression to understand the complexities of the inequalities and their interconnections, particularly where ‘gender’ is prioritised as the primary entry point into the analysis (UN Women, 2020; WHO, 2020). This study adapted intersectionality in a flexible way to explore how female older adults’ use of smartphones simultaneously embodies multiple elements and characteristics (i.e., age, educational attainment, digital literacy, environmental influence, etc.), rather than being necessarily associated with oppression and discrimination. These grouping social identities and contextual factors would be considered as elements to be explored and reviewed in this study to understand the depths of how Malaysian female older adults use their smartphones in real-life contexts.

1.3 Application of Intersectionality

The use of the intersectionality lens for any service design has emphasised the multiple influences of individuals’ characteristics and social identities (i.e., gender, socioeconomic status, race, age, language ability group, physical ability or disability group, immigrants or non-immigrants, digitally literate and low literate group) which have the nuance influence of the everyday lives of that individual or group (Corus & Saatcioglu, 2015). The author further elaborates that the group or subgroup, if to be analysed deeper, may have a further understanding of

how the identity factors (listed above) affect the quality of life or well-being of a group of people. These influences can lead to stereotyping (grouping) and add complexity to understand the context of how society works.

This theory is useful for discussing how Malaysian female older adults use smartphones to contribute to their family and the community (i.e., role as a family caregiver, in managing household, social participation, etc.), for their personal interests and well-being, as well as their strength in coping with contingency situations (i.e., the impact of the COVID-19), all of which should be acknowledged. The smartphone usage experiences and behaviours among female and male older adult users might also differ. Currently, the use of mobile apps and services have become common: banking, purchasing goods using e-wallet, e-banking and verification of accounts, communication using instant messages, etc. These activities require the use of smart technology and users' interaction with digital interfaces.

The theory of intersectionality has contributed to understanding and improving telecommunication or mobile service design by offering "a holistic look at the co-created nature of services and it can be instrumental in designing tailored and fair services to improve consumer and societal well-being", as mentioned by Corus and Saatcioglu (2015) who explained the complexity of the user's identities and how it comes to affect their usage purpose and behaviours.

1.4 Global Ageing: Patterns, Meanings and Consequences

The world is currently undergoing a notable demographic change known as the "ageing population phenomenon." This shift is mostly caused by causes such as longer life expectancy and decreasing birth rates (UN, 2020). The prevalence of older individuals worldwide has been steadily increasing, resulting in around 9% of the population today being 65 years or older. According to projections from the United Nations (2020), this percentage is expected to double and reach over 16% by 2050.

Nevertheless, the categorisation of 'older adults' differs among nations and regions. Low-and-middle-income countries (LMICs) generally classify those aged 60 and above as older adults, whereas Western countries commonly establish the threshold at 65 and above (UN, 2019; WHO, 2021). In this study, the term 'older adults' will refer to persons from both age

groups, encompassing a wide range of opinions on ageing (APA, n.d.).

In Malaysia, individuals aged 60 years and above are considered 'senior citizens' or 'older adults.' Approximately 7% of the population in Malaysia is 65 years or older, which classifies the country as an 'ageing nation' (World Bank Group, 2020; MyGovernment Portal, 2022). Projections indicate that the percentage will increase twofold to reach 14% by 2040, indicating Malaysia's shift towards being an 'aged nation' (World Bank Group, 2020).

Comprehending the patterns of ageing worldwide and the diverse criteria for categorising older individuals in different nations is essential for policymakers, researchers, and healthcare practitioners. These changes have important consequences for healthcare, social welfare, and economic policies, emphasising the requirement for comprehensive and age-friendly programmes to tackle the changing demands of older individuals and guarantee their welfare and social integration. Additional study is important to investigate the complex and diverse aspects of ageing and devise efficient approaches to address the difficulties and possibilities linked to worldwide ageing.

1.4.1 Exploring the Complexities of Worldwide Ageing and the Impact of Smartphone Culture: Obstacles and Possibilities

The world is currently experiencing the phenomenon of global ageing and the rapid progress in technology are fundamentally transforming societies around the globe, giving rise to a multitude of obstacles and opportunities in the realm of current events and global matters. There is a notable change in the world's population, with a larger percentage of older adults leading to an increase of the phenomenon of ageing populations (UN, 2019; WHO, 2020). Simultaneously, the widespread use of smartphones and rapid progress in technology is revolutionising the ways in which individuals engage, work and reside (Pew Research Centre, 2021).

1.4.2 Exploring the Phenomenon of Smartphone Culture

Smartphones have become an indispensable part of everyday life, with an estimated 6.4 billion individuals globally utilising these gadgets (Statista Research Department, 2021a, 2021b). These gadgets offer a wide range of features that allow users to remain connected, receive information and

participate in various activities using mobile apps and services (Rao & Troshani, 2007; GSMA, 2020).

1.4.3 Analysing the Patterns of Smartphone Usage in the Older Adults Population

The older adult population has increasingly recognised the significance of smartphones, leading to their designation as "silver surfer adopters of smartphones" (Wong et al., 2020). Several studies have extensively examined the usage of smartphones among the older adult population, providing valuable insights into the diverse and frequently restricted involvement with these technological devices (Rosales & Fernández-Ardèvol, 2019). This question is especially relevant for the older adults' population, a group that may face distinct physical and functional difficulties (Nikou, 2015). The integration of Information and Communication Technology (ICT) has the potential to greatly improve the quality of life for older persons, notwithstanding the presence of digital inequities (Francis, 2019).

According to the Malaysian Communications and Multimedia Commission (MCMC, 2022), there is a growing trend among older people in Malaysia smartphone technology between 2018 and 2021, with more than 80% (online survey with 1916 respondents) of individuals aged 65 and over using smartphones. The main purposes for which older individuals utilise smartphones are communication, socialisation, work, entertainment, and religious activities (Ahmad et al., 2016; Wong et al., 2017).

Although the older adult population is increasingly using smartphones, they still encounter hurdles such as struggling with unfamiliar interfaces and technologies, cost problems, and concerns about cybersecurity (Azuddin et al., 2014; Mohadis & Ali, 2015; Wong et al., 2020). Nevertheless, older individuals also demonstrate favourable perspectives towards smartphones, highlighting the significance of compatibility and the aspiration to acquire and enhance digital proficiencies (Yong, 2016; Wong et al., 2018, 2020).

1.4.4 Digital Divide due to Demographic Factor

The convergence of international ageing patterns and the prevalence of smartphone culture poses both obstacles and prospects for individuals, communities and governments around the globe. Technology can improve the lives of older individuals by making it easier for them to get healthcare and stay connected with others. However, it also brings up worries about some older people being left out and unequal access

to digital resources (Eurostat, 2021; European Commission, 2020).

To effectively navigate the challenges posed by global ageing and smartphone culture, it is crucial to comprehend and tackle the intricate relationship between demographic changes and technological progress. By acknowledging the difficulties and advantages brought about by these occurrences, society might strive towards cultivating inclusive and sustainable communities in an ever-growing digital realm.

2 A REVIEW ON THE ADOPTION OF SMARTPHONES BY FEMALE OLDER ADULTS

The study adopted a scoping review (Munn et al., 2018), specifically to address this research question: To review the smartphone usage and needs by female older adults through some related literature.

Relevant articles were discovered through ScienceDirect, Taylor & Francis, Frontiers and Google Scholar databases, ranging from 2012 to 2023.

Keyword searches included terms such as "smartphones," "mobile technologies," "female/women," "older adults/elderly/senior citizens/ageing," "mobile usage/adoption," and "intersectionality." The review focused on studies examining the adoption of smartphones by female older adults and the factors influencing this adoption. Terms excluded from the search were "male/men older adults smartphone users," "feature phones," "landline phones," and "pre-smartphone era."

Finally, 11 articles were selected, and their key findings are discussed in the following sections.

2.1 Intersecting Factors Identified from Female Older Adults on Smartphone Usage or Adoption

Technology adoption is not just adopting the hardware, but also the software and its application services. How technology is adopted by older adults, must be observed from their needs and personal attributes, especially the motivation to learn and use it. Internal and external factors of "push and pull" are the motivational factors for older adults and their gender roles to influence the use of smartphones. The equality of access to technology and the issue of the technology divide can be explained through the lens of intersectionality.

Our previous work conducted a study on smartphone usage and experience of female older adults (Tan et al. 2022). The study involved a group of smartphone users in the Central City area around Kuala Lumpur- Klang area (cities or townships area), where the use of smartphones is quite vibrant and active for all age group users, including older adults. Many older adults have some forms of experience using smartphones. Their experiences are also unique, which is worth exploring. Two were recruited in a pilot study, and seven were recruited in the main study, to explore what-these female older adults did with their smartphones and how they perceived their male counterparts (spouse, friends or peers) in using smartphones.

The findings showed several intersecting factors that influenced the relationship between female older adults and their smartphone intimacy as illustrated in Figure 1. These factors have surfaced positively contributing to the usage of smartphones. We showed how the relationship was established through evidence of usage and experience sharing in the verbatim form mentioned by the research participants.

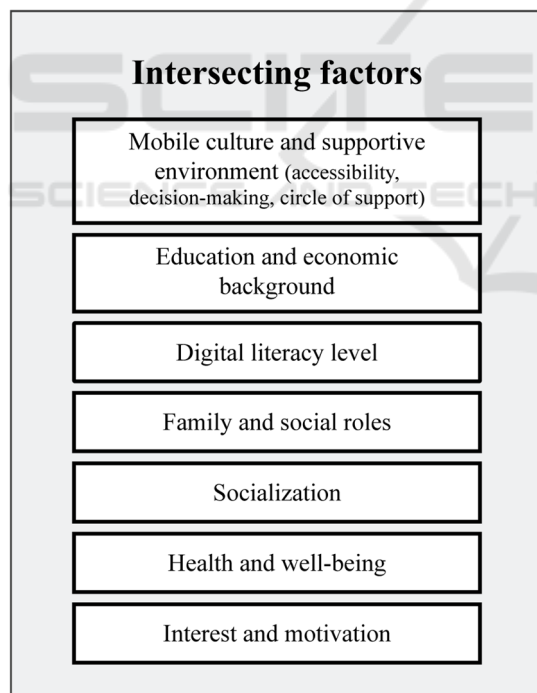


Figure 1: Intersecting factors that influence the relationships (positively) between female older adults and their smartphone usage (Tan et al., 2022, p. 1292).

“These factors identified are the general trends of findings based on this group of participants only. The intersections of gender grouping, or variables (male

and female) have shown the differences in mobile usage and experiences. The intergenerational group (elderly and young people) has shown differences in perception toward each other’s free time and ability to help troubleshoot on mobile phones. The culture or ethnicity attribute did not show much difference in general, but the socio-economic (i.e., mobile expenditure, self-investment in digital skill class), educational background, and supportive environment possessed significant impacts on mobile phone usage and experiences” (Tan et al., 2022, p. 1294).

environmental factors such as infrastructure, and mobile phone usage and culture are also considered the key factors to encourage or discourage the usage of smartphones.

2.2 Female Older Adults’ Adoption of Mobile and Smartphone Technology

Research (Cajamarca & Herskovic, 2022; Ganito, 2018; Hardill & Olphert, 2012) has shown that daily use of mobile phones by female older adults has become more comfortable, particularly because it increases their sense of safety, mobility, flexibility and independence. Apart from communication, more female older adults are discovered to use ICT (i.e., smartphones, computers, applications, assistive technologies) for various purposes, including online shopping, entertainment, health-related and work purposes (Cajamarca & Herskovic, 2022; Ganito, 2018).

In terms of negative experiences, female older adult users reported fear while interacting with more complex features and functions (i.e., online banking), and have expressed concern about becoming overly reliant on technology use (Cajamarca & Herskovic, 2022). Research (Hardill & Olphert, 2012; Kim et al., 2016; Xue et al., 2012) also found that age-related barriers (severe decline in physical and cognitive abilities) were the primary cause of female older adults’ limited phone access. It has somehow impacted their abilities and needs to use phones, especially for socialising. However, most of these perspectives are primarily from Westernised or developed countries (i.e., UK, US, Portugal), and their findings may not directly apply to older women in the context of developing countries like Malaysia.

In Malaysia, recent studies from 2022 have shed light on digital technology adoption among the Malaysian female older adults. Lee et al. (2022) investigated the spending patterns on telecommunications within Malaysian households in 2019, utilising microdata on income and

expenditures. The study revealed that households headed by older adults, particularly female older adults or those solely comprised of older adults, exhibited lower monthly telecommunications spending, attributed to reduced household incomes. This lower expenditure suggested that a significant number of Malaysian older adults acquire smartphones either as gifts or second-hand devices from family members. The research also pointed out a noticeable disparity in telecommunications spending among households led by female older adults, which limited their access to telemedicine, online communication, and economic services such as e-wallets.

Additionally, Liew et al. (2022) undertook a qualitative study of smartphone usage among lower-income (B40) older women residing in rural areas of Malaysia. The study identified physical, cognitive, psychological, and usability challenges in smartphone usage, emphasising the necessity for a supportive environment, in-person guidance and age-friendly app interfaces to enhance learning and usability for this demographic.

Nevertheless, most existing studies in Malaysia that focused on gender about usage behaviour and adoption of ICT technologies have mainly investigated the interests of younger age groups (< 50 years old) or all age groups in general (Ahmad et al., 2019; Aziz & Aziz, 2020; Maon et al., 2021). The literature review reveals a significant gap in research centred on ageing and gender in Malaysia, particularly ones that explore female older adult users' perspectives, experiences, and issues regarding their adoption of mobile technologies (i.e., smartphones, computers, app software etc.). Additionally, there is a lack of an in-depth and multidimensional view that considers the spectrum of users such as age, gender, socioeconomic status, ethnicity, abilities and so on which can influence individuals' or groups' experiences of smartphone use.

To address the research objective of reviewing smartphone usage and needs among female older adults through related literature, with a particular focus on Malaysian research, a scoping review was conducted. This review highlights a notable gap in research centred on ageing and gender in Malaysia, particularly on exploring the perspectives, experiences, and issues of older female users regarding their use of smartphone apps and services.

The literature review identified three main topics: "Global Ageing: Patterns, Meanings, and Consequences," which analyses the overall trends and effects of ageing on a global scale; "Exploring the

Complexities of Worldwide Ageing and the Impact of Smartphone Culture: Obstacles and Possibilities," which investigates the challenges and potential benefits of smartphone usage among older adults; and "Mobile Technology Use and Intersectionality," which examines how elements such as age, gender, socioeconomic status, ethnicity, and abilities shape the experiences (and trends) of individuals and groups about smartphone use. These concerns emphasise the importance of using a comprehensive approach to understand the specific challenges and requirements of older women in relation to mobile technology, especially in Malaysia (Tan et al., 2022).

2.3 Stereotype on Smartphone Usage: Age and Gender Context

It is imperative to recognise that age and gender stereotypes in relation to technology persist, and these stereotypes often have negative impacts on female older adults' representation and use of digital technology (Balsamo, 2014, as cited in Gales & Hubner, 2020). These stereotypes can also result in biased perceptions regarding one's abilities and interests, as well as those of others. Previous studies (Comunello et al., 2016; Gales & Hubner, 2020) have uncovered gender-related interests in technology usage, where women's use of mobile phones was typically associated with an interest in communication (depicted as being 'chatterboxes'), caregiving or online shopping. Such stereotypes, however, do not apply to men. Meanwhile, men were perceived by women to have more interest in STEM areas, which was attributed to their masculine nature (physical strength and competency) (Gales & Hubner, 2020). When relating gender and technology competence, the masculine assumption collectively shapes the negative stereotype that women are 'less skilled or competent users,' and 'less interested in ICT', while men are perceived positively as 'tech-savvy' and 'having higher competence' when it comes to technology adoption and usage performance (Comunello et al., 2016; Gales & Hubner, 2020). The negative stereotypes are thereby even more pronounced for female older adult users. The assumption regarding their technology usage is not only based on gender but also their age, as there is also the biased perception that older individuals are less competent than younger ones when it comes to the adoption of mobile phones (Comunello et al., 2016).

Despite widespread stereotypes about older women and technology use, existing literature has provided significant insights (see Section 2.2) into

their adoption of technologies as the digital landscape evolves.

2.3.1 Female Older Adults' Perception of Oneself and Others regarding Smartphones/ Technology Usage

Gales and Hubner (2020) conducted qualitative in-depth interviews with female older adults (aged 65-75) in Germany to gather insights on their self-perceptions and perceptions of others (i.e., their peers) regarding technology usage (smartphones, computers etc.). Older women in the context of Gales and Hubner's study view their interest in technology as stemming from individual preferences rather than societal influences. This suggests that internal motivations and personal experiences play a significant role in their technology adoption. When assessing others, these women rely on societal stereotypes, believing men are naturally more inclined towards technology, especially in mechanical and technical aspects. In contrast, these women associate women's interest in technology more with social and communicative purposes, such as using smartphones for chatting or video calls. This dichotomy between self-perception and group perception highlights a psychological barrier where individuals may feel competent personally but perceive their group as generally less competent. Furthermore, the same study found that older women often use age to justify their perceived lack of technological competence, which can serve as a significant psychological barrier (Gales & Hubner, 2020). They rationalise their difficulties with technology as an inevitable part of ageing, they not only perceive themselves as less competent but also perceive their peers, especially those older than themselves, as even less competent.

The concept of the bias blind spot (Pronin et al., 2002, as cited in Gales & Hubner, 2020), where individuals perceive themselves as less biased than others, is evident in the findings. This creates a psychological barrier that prevents them from recognising their own biases in avoiding adopting certain technologies.

The study highlights the intricate intersection of gender, age, and technology stereotypes, showing that older women's self-perceptions and their views of others are shaped by deeply ingrained societal norms. To empower older women in the digital age, it is essential to address these stereotypes and promote a more inclusive approach to technology design and education (Gales & Hubner, 2020).

3 DISCUSSIONS

The study emphasises the enduring prejudices associated with age and gender in connection to technology, and how these stereotypes significantly influence the way female older adults acquire and use smartphones. The prevalence of these prejudices frequently results in biased perceptions regarding the technical aptitude of older women, reinforcing negative assumptions, despite evidence indicating their growing ease and competency in using mobile devices. Research emphasises that older women may have a positive personal interest in technology, but societal preconceptions affect their perception of others' ability. This division generates a mental obstacle where individuals feel capable on an individual level but view their group as less capable, intensified by age-related explanations for perceived difficulties with technology.

The intersectionality framework provides a comprehensive and detailed comprehension of how aspects such as age, gender, socioeconomic status, and supportive contexts influence the experiences of female older adults using smartphones. This method emphasises notable discrepancies in the availability of resources, knowledge of mobile technologies, and social assistance systems among individuals belonging to this specific group. To tackle these problems, it is necessary to implement concrete actions such as customised training programmes, enhanced accessibility features in smartphone design, and the promotion of optimistic stories to counter prejudices and empower older women in their utilisation of mobile technology. Addressing these intricacies is crucial for improving the involvement, autonomy, and general welfare of older women in the digital era.

4 CONCLUSIONS

The findings of this study contribute to several important research areas, including geron-technology which is an interdisciplinary field that combines gerontology (ageing) and technology (Teh et al., 2015), and women's perspectives by exploring female older adults' experiences and behaviours in using smartphones. The lens of intersectionality can be utilised in the research of technology adoption, which is a good move, where the nuance of the experiences of different sub-group users is to be considered too. It is to encourage scholars to design research that is sensitive to such complexities and

interdependent disadvantages that play a key role in the construction of experiences and value in technology adoption research by the disadvantaged groups. Any policy or promotion of technology usage should emphasise the use of qualitative research with consideration of better theories to guide research to be more inclusive like what the current theory can offer to researchers and policymakers. Awareness of theories should be encouraged in research. In sum, the intersectionality lens offers considerable potential in understanding complex and multi-dimensional technology adoption to all ages/ groups and subgroups. This study offers valuable insights for scholars conducting similar research and highlights the importance of considering diverse and interconnected factors in technology adoption.

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