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Awareness of Digital Services and their Adoption Among Elderly People in Dhaka, Bangladesh

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Table of Contents

PLAGIARISM DECLARATION	3
INTERNSHIP REPORT APPROVAL FORM.....	4
ACKNOWLEDGEMENT	5
SELF-REFLECTION	6
SUMMARY	7
CHAPTER I INTRODUCTION.....	8
1.1 Background of study	8
1.2 Objectives of the Study.....	10
1.3 Research Question	10
1.4 Significance of the Study	10
CHAPTER II STUDY FRAMEWORKS AND LITERATURE REVIEW	11
2.1 Literature Review.....	12
2.1.1 Adoption of digital services by the elderly.	12
2.1.2 Global Perspectives on Elderly Adoption of Digital Services.	13
2.1.3 South Asian Perspectives on Elderly Adoption of Digital Services.....	14
2.1.4 Bangladesh Perspectives on Elderly Adoption of Digital Services.	15
2.2 Theoretical Framework.....	16
2.2.1 Technology Acceptance Model (TAM).....	16
2.4 Operational Definitions.....	19
2.4.1 Operational definitions of the four TAM constructs.	19
2.4.2 Operationalization in Research	20
2.4.3 Contextual Considerations.	20
2.4.3 Independent variables.	21
2.4.4 Moderating Variables	21
References.....	23

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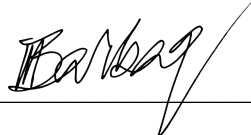
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SELF-REFLECTION

My journey at University of Liberal Arts Bangladesh began as a senior citizen. As such, I opted for the Pathways internship possibility, which enabled me to complete two chapters of my Master's thesis in lieu of organizational placement. This alternative was particularly suitable given my retired status. For an extended period, I felt considerable apprehension regarding the requirement of undertaking an internship. However, a thoughtful and insightful faculty member, Dr. Sajjad Hossain, Professor at department of Media Studies and Journalism, University of Liberal Arts Bangladesh advised that, considering my age, a conventional internship experience would add little academic or professional value. On this basis, he recommended the Pathways route. It proved to be an excellent suggestion, and I immediately enrolled in the courses, approaching them with renewed commitment and enthusiasm. I am very satisfied with the consequences of my decision. All through, my direct and extended family provided tremendous support enabling me to reach the 'unattainable' goal of my academic career. I can now look forward to returning to university any time in the future to continue my higher studies.

SUMMARY

Research is done to expand knowledge, find solutions to problems, and improve existing practices. It allows us to have a clearer understanding of the world, make informed decisions and create a better place to live. Likewise, my research is about the elderlies' situation in Bangladesh with respect to their awareness and use of digital services that are available. The country is going through massive digitalization, but are the elderly being disregarded? If so, how do they (the elderly) perceive the barriers and motivators of digital services and cope with the change?

It is important to understand that with development in the country, there is a gradual cultural shift. The younger generation which used to be relied upon as caregivers for the elderly are opting for overseas education and jobs, distancing themselves from their core 'duties'. Consequently, the elderly are living increasingly lonely lives, and their safety and security are at stake. Therefore, they need to be independent or less dependent on the human factor. Their only recourse is to adopt digital lifestyle.

So, the objective of the study is to find out how aware the elderly are about the digital services available, and whether they use such services or not. In case they decide not to, what are the factors that are preventing them from adopting them. For theoretical or conceptual framework for the study Unified Theory of Acceptance and Use of Technology (UTAUT) will be used. It provides the constructs, which will then be measured by quantitative surveys, and explained through qualitative interviews. The combination of mixed method is expected to result in pragmatic solutions to improve the elderlies' quality of life.

CHAPTER I

INTRODUCTION

1.1 Background of study

The study aims to explore the awareness of digital services their adoption among the urabn elderly population in Bangladesh.

Are the elderly in urban Bangladesh aware of the prevailing digital services? Are they using them? If they are not, what are the reasons behind that? Bangladesh is fast transforming into a digital economy. All sectors of the government are converting into digital platforms. Youth and younger adults are assimilating with the changing scenario equally fast. However, it is the elderly who are taking time to adjust to the changing culture and are being overlooked.

Bangladesh is experiencing rapid digital transformation, reshaping how individuals access essential services and expanding opportunities beyond traditional barriers of time and distance. As of December 2024, approximately 47.2% of individuals and 61.6% of urban households had Internet access, with urban connectivity significantly outpacing rural areas (The Business Standard, 2024). The Bangladesh Telecommunication Regulatory Commission (BTRC) reported a total of 131 million Internet subscribers at the end of 2023, including over 118 million mobile Internet users (Dhaka Tribune, 2023). Such growth reflects the nation's commitment to technological inclusion.

This transformation, however, intersects with another pressing demographic change: the aging population. Dhaka, like many global cities, is experiencing a demographic transition with a significant rise in the elderly population (Khatun & Halim, 2024). In Bangladesh, individuals aged 60 and above accounted for 9.28% of the population in 2022 -- over 15 million people -- up from 7.47% in 2011. Projections indicate this figure will reach 22 million by 2030 and comprise 22% of the total population by 2050 (United Nations in Bangladesh, 2022; The Business Standard, 2023; SpringerLink, 2023). This demographic shift presents profound economic, social, and cultural challenges, particularly in care, social inclusion, and policy planning.

Traditionally, adult children are socially responsible for the care of elderly parents. However, due to work demands, migration, and transnational settlement, many are unable to fulfill this role, leaving the elderly increasingly reliant on digital services for health, finance, and daily

needs. While digital tools could help address challenges of loneliness and dependency, many elderly individuals face barriers in understanding and navigating digital systems. As a result, the elderly population is compelled to adapt to a digital lifestyle to maintain independence and reduce reliance on direct human support.

Research highlights the role of migration and intergenerational contact in shaping elderly digital adoption. Older adults with migrant children often develop digital expertise as “digital citizens,” motivated by emotional needs for communication (Choolayil & Putran, 2022). In transnational caregiving contexts, Bangladeshi migrants in the United States rely heavily on communication technologies to maintain ties with elderly parents, serving as critical tools of care and stress mediation (Amin & Ingman, 2014). Yet, adoption of mobile health (mHealth) among Bangladeshi elderly remains limited due to performance expectancy, effort expectancy, social influence, technology anxiety, and resistance to change (Hoque & Sorwar, 2017).

Globally, digital adoption studies often focus on younger populations, who are generally quick to embrace technological change. Elderly populations, however, face unique barriers such as cognitive decline, lack of confidence, concerns about privacy, and resistance to change (Seifert & Charness, 2022; Dizon & Ebardo, 2025). Within Bangladesh, while several studies examine digital adoption in domains such as mobile commerce, mHealth, and e-Health (Hoque & Sorwar, 2016, 2017; Salha et al., 2010), little research specifically explores adoption among the elderly in urban Dhaka. This gap underscores the urgent need to understand the awareness, perceptions, and preparedness of elderly populations for adoption of digital services.

1.2 Objectives of the Study

The study seeks to:

1. Explore awareness of digital services among the elderly people in Dhaka.
2. Understand perceptions regarding digital services among the said group in terms of “perceived usefulness” and “perceived ease of use”.
3. Assess digital preparedness of the elderly people in terms of access to technologies, required skills, attitudes toward adopting digital services, and perceived barriers in adoption.

1.3 Research Question

What is the level of awareness, perception, and digital preparedness among elderly people in Dhaka regarding digital services, in terms of their familiarity with the services, perceived usefulness and perceived ease of use, access to technology, digital skills, attitudes toward adoption, and barriers to engagement?

1.4 Significance of the Study

This study contributes both theoretically and practically:

- **Academic Significance:** The research addresses a critical gap in the literature on digital adoption by elderly populations in Bangladesh. It contributes to communication and social science scholarship by exploring perceptions, behaviors, and psychological factors shaping elderly engagement with digital platforms.
- **Policy Significance:** Findings will inform policymakers in designing inclusive digital policies that promote elderly participation in digital society, thereby supporting national development goals related to digital inclusion and aging.
- **Practical Significance:** The study will provide insights into health and caregiving sectors, helping providers redesign services and communication strategies for elderly users. Consumer industries can use the findings to create elderly-friendly digital interfaces and marketing approaches.
- **Global Significance:** Beyond Bangladesh, this research challenges stereotypes of the elderly as digital “laggards,” instead highlighting their potential as active digital participants. It contributes to global knowledge on aging and digital transformation, promoting positive attitudes toward elderly digital inclusion.

CHAPTER II

STUDY FRAMEWORKS AND LITERATURE REVIEW

This chapter reviews the scholarly and policy literature relevant to the adoption of digital services by older adults and positions the present study within that body of work. The review has four purposes. First, it synthesizes global evidence on how older adults engage with digital services across domains such as health, finance, and government. Second, it examines South Asian research to surface cultural, linguistic, and infrastructural dynamics that shape adoption in contexts similar to Bangladesh. Third, it consolidates Bangladesh-specific findings and statistics to identify who is included in, and who is left out of, current digital transformation efforts. Fourth, it establishes the Technology Acceptance Model (TAM) as the study's theoretical lens and derives a context-appropriate conceptual framework for elderly users in urban Dhaka.

The chapter is organized to move from broad to specific and from description to explanation. It begins by outlining the benefits and barriers commonly reported for older users, including physical, cognitive, and usability constraints; language and literacy issues; and concerns about trust, privacy, and security. It then narrows to South Asia to consider how intergenerational roles, affordability, infrastructure reliability, and mediation by family members condition technology use. The Bangladesh section focuses on recent patterns of connectivity, service design features, and the limited attention given to users aged 60 and above in prior studies. Together, these sections reveal consistent gaps: a concentration on younger cohorts, limited measurement of ease-of-use and trust constructs for seniors, and scarce evidence on sustained, independent use rather than one-time exposure.

Building on these gaps, the chapter introduces TAM as a parsimonious framework for explaining intention and actual use through perceived usefulness and perceived ease of use. It also considers complementary antecedents that are particularly salient for older users in Dhaka, such as facilitating conditions, language fit, interface accessibility, self-efficacy, prior experience, trust, and perceived risk. From this synthesis, the chapter proposes a conceptual framework that links these antecedents to TAM constructs and specifies how they lead to intention and sustained use. Finally, the chapter defines the study variables operationally and indicates how each will be observed and measured in the Dhaka context.

2.1 Literature Review

2.1.1 Adoption of digital services by the elderly. The adoption and acceptance of digital technologies among elderly populations has become a growing area of scholarly interest worldwide. Studies consistently emphasize that digital platforms, such as e-health services, online banking, and mobile applications, can enhance independence, social connectivity, and access to essential resources for older adults (Peek et al., 2021). At the same time, research shows that elderly users must often overcome barriers including declining physical ability, limited digital literacy, and anxiety about technology use (Chen & Chan, 2020; Venkatesh et al., 2021).

Globally, evidence highlights a persistent gap in adoption. Although some older adults integrate technology into their daily routines, many continue to face challenges due to structural and psychological factors. For example, reduced eyesight, hearing difficulties, and motor impairments can hinder interactions with interfaces designed primarily for younger users (Chen & Chan, 2020; Charness & Boot, 2022). Age-related cognitive decline may also reduce confidence, creating anxiety that leads to avoidance of digital services (Vaportzis, Clausen, & Gow, 2017).

Regional studies in South Asia indicate that additional layers of cultural and socioeconomic dynamics shape adoption patterns. Intergenerational dependence, affordability concerns, and language diversity frequently limit elderly engagement with digital platforms. For example, research from India and Sri Lanka notes that smartphone penetration is rising but elderly adoption remains restricted due to device cost, lack of localized language support, and a preference for traditional face-to-face communication (Khan & Siddiqui, 2021; Perera & Abeysekara, 2020).

In Bangladesh, these issues are magnified by uneven digital inclusion. Although the country has experienced rapid growth in internet connectivity under the government's "Digital Bangladesh" initiative, with substantial expansion in urban areas (Bangladesh Telecommunication Regulatory Commission [BTRC], 2024), the elderly remain largely overlooked in scholarly and policy discussions. Most prior studies focus on youth or working-age adults, with very limited attention to older populations, their awareness of available services, or their actual adoption patterns (Rahman & Sharma, 2021; Palas, Rahman, & Sarker, 2022).

To respond to this gap, the review proceeds in three stages. Section 2.2.1 examines global perspectives on elderly adoption of digital services, emphasizing universal barriers and motivators. Section 2.2.2 turns to South Asia, where sociocultural and infrastructural determinants condition adoption differently. Section 2.2.3 focuses specifically on Bangladesh, consolidating available evidence on elderly digital inclusion and identifying critical challenges. Together, these subsections provide the foundation for introducing the Technology Acceptance Model (TAM) in Section 2.3 as the theoretical framework underpinning this study.

2.1.2 Global Perspectives on Elderly Adoption of Digital Services. Globally, digital services have become increasingly central to the lives of older adults, providing opportunities for independent living, continued social participation, and improved access to healthcare and financial resources. Despite this potential, adoption among those aged 60 and above remains uneven. Earlier studies reported that only a minority of older adults consistently demonstrate acceptance and enthusiasm toward new technologies (Czaja et al., 2001). More recent scholarship emphasizes that while many older adults recognize the potential value of digital services, their perceptions, hesitations, and reservations vary widely and are shaped by individual characteristics such as prior exposure, competence, and personality traits (Busch et al., 2021; Iqbal et al., 2021).

Empirical studies on smartphone adoption among the elderly reveal both barriers and conditional acceptance. Older individuals are frequently underrepresented in technological innovation research and are often stereotyped as “non-technological.” Nevertheless, older adults do adopt new technologies when these directly align with their daily needs, though they rarely integrate them as seamlessly as younger generations do (Busch et al., 2021).

Awareness and acceptance of these services also remain uneven due to both structural and psychological barriers. Age is one of the most significant factors influencing adoption. Older individuals often experience physical challenges such as declining eyesight, hearing loss, or reduced motor skills, which affect their ability to interact with digital platforms designed for younger users (Chen & Chan, 2020; Charness & Boot, 2022). Furthermore, age-related cognitive decline can reduce confidence and lead to anxiety around technology use, often resulting in avoidance of digital services altogether (Vaportzis et al., 2017).

Language is another crucial barrier, especially in multilingual societies. Elderly populations frequently encounter difficulties when digital services are designed in dominant or global languages, leaving local or native language support underdeveloped. Research from Europe and Asia indicates that older users are more likely to adopt services that are available in their first language and supported by culturally relevant content (Peek et al., 2021).

Trust, privacy, and security are consistently cited as deterrents to adoption. Elderly individuals are more vulnerable to digital scams and misinformation, heightening their reluctance to engage with online banking, government portals, and health applications (Marston et al., 2020). A cross-national study by Venkatesh et al. (2021) found that trust in service providers was a stronger predictor of behavioral intention among older adults than ease of use, suggesting that secure and transparent systems are essential to build confidence.

The user-friendliness of interfaces also directly affects adoption. Complex layouts, excessive information, and small fonts discourage elderly users from engaging with services that might otherwise improve their well-being (Charness & Boot, 2022). In contrast, platforms designed with senior-friendly features, such as simplified navigation, larger icons, and voice-enabled commands, show higher adoption rates among older populations (Khosravi et al., 2016).

Despite these barriers, several motivators encourage elderly engagement with digital services. Social interaction is among the most powerful. Digital platforms such as messaging applications and social media provide older adults with avenues to maintain contact with family and friends, thereby alleviating loneliness and reducing social isolation (Seifert et al., 2020). Prior experience with technology is another facilitator; elderly individuals who had exposure to computers or mobile phones earlier in life display greater confidence and willingness to experiment with new digital services (Vaportzis et al., 2017). Additionally, the desire to preserve independence and avoid dependence on caregivers has been identified as a strong motivator for adopting health and government-related digital platforms (Peek et al., 2021).

2.1.3 South Asian Perspectives on Elderly Adoption of Digital Services. In South Asia, the adoption of digital services by older adults is influenced not only by technological barriers but also by distinctive cultural, social, and economic conditions. Across countries such as India, Sri Lanka, Nepal, and Pakistan, elderly users report challenges similar to those observed globally, including limited digital literacy, age-related physical decline, and anxiety about navigating complex platforms (Bhatnagar & Ghosh, 2021; Perera & Abeysekara, 2020). These difficulties are further compounded by structural issues such as the affordability of smart devices, inconsistent digital infrastructure, and language diversity, all of which restrict awareness and acceptance of digital services (Khan & Siddiqui, 2021; Madan & Yadav, 2018).

Language barriers remain especially critical in South Asia, where many platforms default to English or dominant national languages. For elderly individuals with limited formal education, the lack of localized content in vernacular languages excludes them from essential services,

including online healthcare and banking (Madan & Yadav, 2018). Literacy gaps—both general and digital—exacerbate these challenges, particularly among older women, who continue to experience lower literacy levels across the region (UNESCO, 2022).

Trust and privacy concerns also play a heightened role in discouraging adoption. A study in India found that many older adults were reluctant to engage with digital financial services due to fears of fraud and exploitation, preferring face-to-face transactions despite the convenience of online alternatives (Khatun & Ahmed, 2020). Similarly, reluctance to share health data online reflects broader concerns about privacy violations, which reduces participation in telemedicine platforms (Bhatnagar & Ghosh, 2021).

At the same time, several motivators encourage digital service adoption among South Asia's elderly. Social interaction is a powerful driver of engagement, particularly through messaging apps and video calls that help families maintain contact across borders in the context of widespread labor migration (Sharma & Singh, 2021). Prior exposure to technology—such as using computers in the workplace or basic mobile phones—also increases confidence and willingness to experiment with new digital platforms (Perera & Abeysekara, 2020).

Another consistent motivator is the desire for independence. Research in India and Sri Lanka shows that elderly individuals adopt services such as telemedicine, e-commerce, and e-governance to reduce reliance on younger relatives and preserve agency in everyday decision-making (Khan & Siddiqui, 2021). However, adoption is often mediated by family members—particularly adult children and grandchildren—who act as gatekeepers by introducing, teaching, and supporting elderly users in their engagement with digital technologies (Sharma & Singh, 2021).

2.1.4 Bangladesh Perspectives on Elderly Adoption of Digital Services. Bangladesh's rapid transition toward a digital economy under the national "Digital Bangladesh" agenda has expanded access to internet-based services in healthcare, banking, government administration, and commerce. Recent reports indicate that as of December 2024, 61.6% of urban households had internet connectivity, with penetration rates in urban areas far surpassing those in rural regions (Bangladesh Telecommunication Regulatory Commission [BTRC], 2024). This infrastructural progress suggests considerable potential for older adults' engagement with digital platforms, particularly in urban centers such as Dhaka.

However, research indicates that the elderly population remains largely marginalized in the digital transformation process. Most studies in Bangladesh have focused on youth, students, or working-age populations, often overlooking the unique challenges faced by older adults

(Rahman & Sharma, 2021; Nisha, Azad, & Islam, 2022). The limited body of work that does examine elderly users highlights several barriers. First, age-related limitations, such as reduced eyesight and dexterity, make interaction with small-screen devices difficult. Second, language barriers persist, as many services remain available only in English or formal Bangla, which can be difficult for less formally educated elderly citizens (Islam, Rahman, & Sultana, 2022). Third, concerns about trust, privacy, and security are widespread: older adults are often wary of fraud, phishing, and data misuse, especially when engaging in digital banking and online transactions (Khatun & Ahmed, 2020). Finally, usability issues, such as crowded interfaces and complex navigation, further discourage adoption among seniors (Palas, Rahman, & Sarker, 2022).

Despite these challenges, several motivators encourage adoption. Digital services allow elderly individuals to sustain social connections with family members abroad through smartphones and social media, which helps to reduce isolation and maintain relational ties (Islam, Kabir, & Sultana, 2022). Prior exposure to mobile phones has also increased confidence for some older adults, making them more willing to experiment with newer services (Rahman & Sharma, 2021). Furthermore, the desire for independence, particularly as traditional caregiving structures are eroded by the migration of adult children, encourages older adults to consider telemedicine, e-governance, and e-commerce platforms as means of maintaining autonomy (Nisha et al., 2022).

2.2 Theoretical Framework

2.2.1 Technology Acceptance Model (TAM)

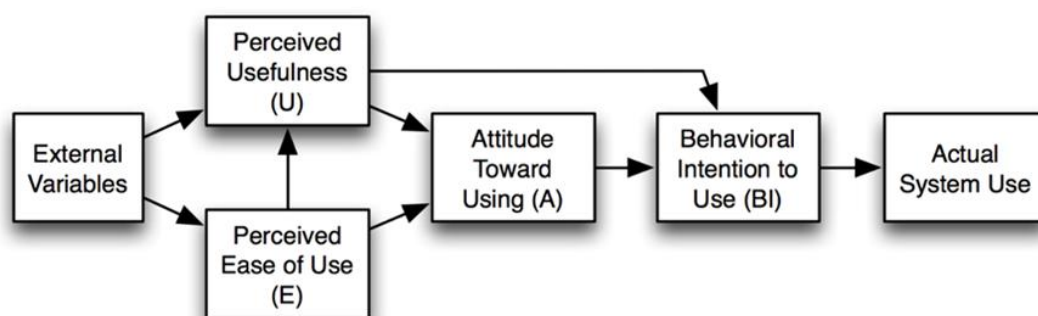


Figure 1. Technology Acceptance Model (Davis, 1989)

The Technology Acceptance Model (TAM), originally developed by Davis (1986, 1989), remains one of the most widely applied frameworks for explaining user acceptance of new

technologies. Rooted in the Theory of Reasoned Action, TAM posits that two key constructs, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), directly shape a user's Attitude Toward Use (ATU), which in turn influences Behavioral Intention (BI) and ultimately Actual Use (AU) of a system (Davis et al., 1989; Bagozzi, 2007; Venkatesh & Bala, 2008).

Global research shows that older adults are less likely to adopt digital services unless they perceive tangible benefits such as improved health management, financial independence, or enhanced communication with family members (Choudrie et al., 2020; He & Huang, 2021). At the same time, ease of use remains critical, since older users frequently encounter barriers including small text, complex navigation, and language-related difficulties (Marangunić & Granić, 2015).

Within urban Bangladesh, these TAM constructs are highly applicable. Perceived Usefulness (PU) is central for older adults in Dhaka, especially those aged 70 and above, who value digital services that provide practical benefits such as easier access to healthcare consultations, secure mobile banking, and timely communication with relatives abroad. Evidence from local studies confirms that perceived usefulness strongly drives adoption intentions among elderly users of mHealth and digital financial platforms (Palas et al., 2022; Rahman & Sharma, 2021).

Perceived Ease of Use (PEOU) is equally significant, though its effect is sometimes indirect. For many older adults, difficulties with English-dominated interfaces, small fonts, and complicated menus reduce ease of use, which in turn influences perceptions of usefulness and overall trust in digital systems. Research among elderly women in Bangladesh revealed that simplified designs, Bangla-language support, and guided tutorials can enhance ease of use and thereby strengthen acceptance (Nisha et al., 2022).

Together, PU and PEOU shape Attitude Toward Use (ATU). A favorable attitude arises when digital services are perceived as both useful and manageable, reducing technology-related anxiety and fostering confidence. South Asian studies, including those in India and Sri Lanka, demonstrate that culturally relevant design and supportive environments further reinforce positive attitudes (Khan & Siddiqui, 2021; Sharma & Singh, 2021).

Finally, Actual Use (AU) depends on whether older adults consistently engage with digital services. Among those aged 70 and above in Dhaka, sustained adoption often hinges on habit formation, service reliability, and trust. Empirical evidence suggests that once older adults experience repeated success, such as making a mobile payment or booking an online healthcare appointment, their confidence grows, leading to regular and independent use (Islam, Kabir, & Sultana, 2022).

2.2.2 Conceptual Framework

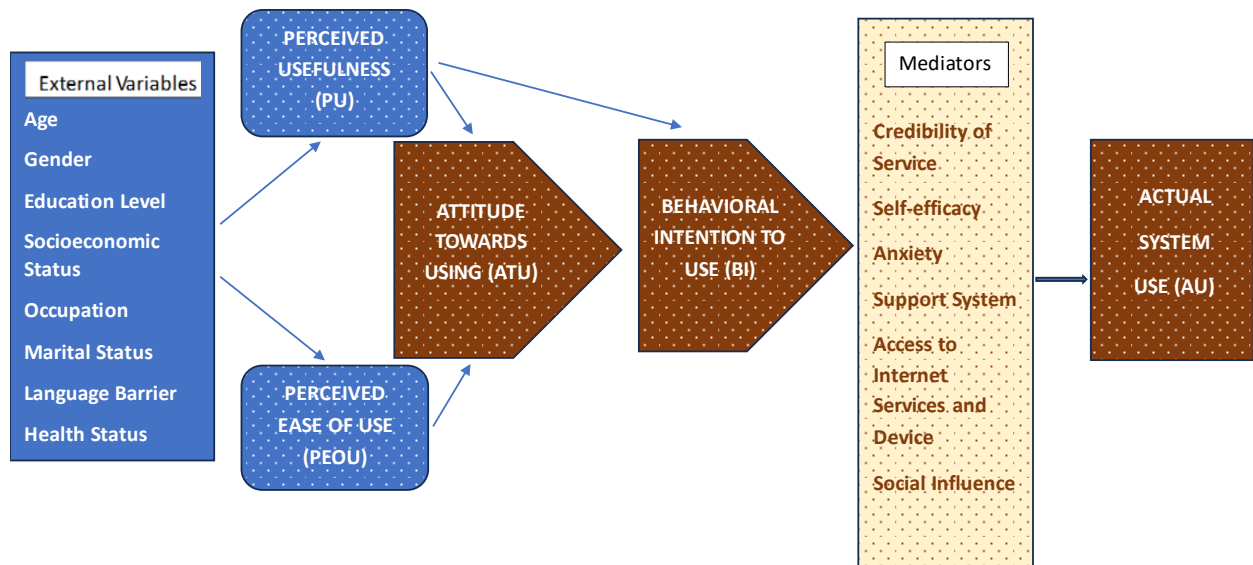


Figure 2. Conceptual Framework of the Study (adopted from Davis, 1986)

This study adopts the Technology Acceptance Model (TAM) (Davis, 1986; Davis et al., 1989) as the theoretical foundation to examine and conceptualize the barriers and motivators affecting the adoption of digital services among older adults (60 years and above) in urban Dhaka. In this adapted framework, the two core constructs of TAM, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), are positioned as key determinants of Behavioral Intention (BI) to use digital services, which in turn predicts Actual Use (AU) (Venkatesh & Davis, 2000). TAM also posits that PEOU influences PU, meaning that simpler and more intuitive designs not only reduce barriers but also increase perceived utility (Venkatesh & Bala, 2008).

- **Perceived Ease of Use (PEOU):** The extent to which older adults perceive using digital services as effortless and understandable, given varying levels of digital literacy and confidence. Barriers such as low digital literacy, complex interfaces, poor design, and physical or cognitive limitations may reduce PEOU, while motivators such as training, family assistance, simplified design, and supportive infrastructure may enhance it.
- **Perceived Usefulness (PU):** The degree to which older individuals believe that using a digital service (e.g., mobile banking, e-government, or telehealth) will enhance daily life, such as saving time, improving convenience, or strengthening social connections. Motivators such as convenience, time-saving, access to health or financial services, and improved family communication can strengthen PU, whereas mistrust, irrelevance of services, or perceived risks may undermine it.

- Behavioral Intention (BI): The readiness or willingness of older adults to adopt digital services, shaped by both PU and PEOU.
- Actual Use (AU): The real-world adoption of digital services in daily life, such as mobile banking, online health consultations, or e-government transactions.

External socio-contextual factors, such as education, income, access to devices, family encouragement, and trust in technology, function as antecedents that influence both PU and PEOU (Gefen & Straub, 2000; Venkatesh & Bala, 2008). In the Dhaka context, barriers include low digital literacy (reduces PEOU), mistrust in technology (undermines PU), poor facilitating conditions (e.g., limited device access or support), and health or cognitive challenges. Motivators include clear perceived benefits (enhancing PU), family encouragement, training, simplified designs, and supportive infrastructure, which strengthen both PEOU and PU, thereby influencing BI and AU.

By integrating TAM with these contextual antecedents, this study systematically identifies which factors act as barriers (reducing PU and PEOU) and which act as motivators (enhancing PU and PEOU) in elderly adoption of digital services. This combined approach clarifies the psychological drivers of adoption while also highlighting where interventions, such as training, interface simplification, or trust-building, can strengthen digital inclusion for older adults in urban Dhaka.

2.4 Operational Definitions

According to American Psychological Association, operational definition is basically a definition of anything that considers the methods (actions, procedures, or processes) that allow it to be monitored and measured. The operational definitions of this research paper have been stated below.

2.4.1 Operational definitions of the four TAM constructs. The Technology Acceptance Model (TAM) comprises four primary constructs: perceived usefulness, perceived ease of use, attitude toward use, and behavioral intention to use. Below are operational definitions tailored to this population and context, based on relevant research.

2.4.1.1 Perceived Usefulness. The degree to which elderly individuals in urban Dhaka believe that using digital services (such as mHealth, e-government, or online financial services) will enhance their ability to access information, communicate, or manage daily tasks more effectively and independently, thereby improving their quality of life (Alam & Khanam, 2023; Ahmad et al., 2020; Palas et al., 2022).

2.4.1.2 Perceived Ease of Use. The extent to which elderly users in urban Dhaka perceive digital services as free from effort, meaning that they find these technologies simple to learn, operate, and integrate into their daily routines without significant cognitive or physical strain (Alam & Khanam, 2023; Ahmad et al., 2020; Palas et al., 2022).

2.4.1.3 Attitude Toward Use. The overall positive or negative feelings that elderly individuals in urban Dhaka hold toward using digital services, shaped by their experiences, beliefs about benefits, and perceived challenges or anxieties related to technology (Kim, 2024; Alam & Khanam, 2023).

2.4.1.4 Behavioral Intention to Use. The strength of an elderly person's intention or willingness in urban Dhaka to engage with digital services in the near future, as indicated by their expressed plans, readiness, or likelihood to adopt and regularly use such technologies (Ahmad et al., 2020; Palas et al., 2022; Alam & Khanam, 2023).

2.4.2 Operationalization in Research

- **Perceived usefulness** is often measured by asking if users believe digital services help them accomplish tasks or improve their well-being.
- **Perceived ease of use** is assessed by questions about the simplicity and clarity of digital service interfaces.
- **Attitude toward use** is gauged through statements reflecting positive or negative feelings about technology.
- **Behavioral intention to use** is measured by the likelihood or plans to use digital services soon.

2.4.3 Contextual Considerations. Studies in Bangladesh and similar settings highlight that these constructs are influenced by factors such as technology anxiety, social influence, perceived reliability, and price value, which may be particularly salient for the elderly in urban Dhaka (Alam & Khanam, 2023; Ahmad et al., 2020; Palas et al., 2022).

2.4.3 Independent variables. Below are operational definitions for each variable relevant to the study, tailored to the context of elderly residents in urban Dhaka and their awareness and acceptance of digital services, with recent supporting references.

2.4.3.1 Sociodemographic Variables. The self-reported or objectively measured income, education, and occupation level of elderly individuals, which shapes their ability to afford devices, internet access, and digital services, and influences their perceived value and intention to adopt such technologies (Palas et al., 2022; Jokisch et al., 2022).

2.4.3.2 Language Barrier. The extent to which limited proficiency in the language(s) used by digital services (e.g., English or non-native Bangla) impedes elderly users' ability to understand, navigate, and benefit from digital platforms, thus affecting perceived ease of use and adoption (Kim, 2024).

2.4.3.3 Health Status. The self-assessed or clinically determined physical and cognitive health of elderly individuals, which affects their perceived usefulness and ability to engage with digital services, especially for health-related applications (Jokisch et al., 2022; Kim, 2024).

2.4.4 Moderating Variables

2.4.4.1 Trust, Privacy, Security. The degree to which elderly users believe digital services are reliable, protect their personal information, and are safe from misuse or unauthorized access, directly impacting their willingness to use and continue using these services (Omar et al., 2023; Liu et al., 2023; Jokisch et al., 2022; Kim, 2024).

2.4.4.2 Social Influence. The perceived pressure or encouragement from family, friends, peers, or community members that affects the elderly's intention to use digital services, often by shaping attitudes and perceived norms (Ahmad et al., 2020; Palas et al., 2022; Jokisch et al., 2022).

2.4.4.3 Access to Internet and Services, and Device. The availability and quality of internet connectivity and digital infrastructure (devices, network coverage) accessible to the elderly, which determines their actual ability to use digital services (Palas et al., 2022; Jokisch et al., 2022).

2.4.4.4 Experience. The prior exposure to and familiarity with digital technologies, which influences confidence, perceived ease of use, and likelihood of adopting new digital services (Jokisch et al., 2022; Kim, 2024).

2.4.4.5 Digital Literacy. The level of knowledge, skills, and self-efficacy the elderly possess to effectively operate digital devices and navigate online services, which is a key determinant of perceived ease of use and adoption (Jokisch et al., 2022; Kim, 2024).

2.4.4.6 Government Initiatives. The presence and effectiveness of policies, programs, or campaigns by government bodies aimed at increasing digital inclusion, awareness, and support for elderly users, thereby facilitating adoption and sustained use (Liu et al., 2023; Palas et al., 2022).

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