



Research Article

The Exclusion of People with Visual Disabilities from Digital Banking Services in the Digitalization Era

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Abstract

The accessibility of bank websites has been a great challenge for people with visual disabilities, especially in developing countries. Egypt is considered a good example for such countries with a population over than 98 million. The low level of staff expertise in dealing with visually disabled clients makes it harder for them. Thus, the research at hand addresses the main challenges that face people with visual disabilities, and the fact that they are mostly prevented from having independent bank accounts; which highly threatens their security. Literature was extensively reviewed to determine the key dimensions that affect the digital banking accessibility, and identify the mediating and moderating factors. A theoretical framework was accordingly developed and proposed. A structured questionnaire is adopted and adapted to survey people with visual disabilities. Focus groups are also conducted to understand their perceptions, and semi-structured interviews are conducted to get a deep insight into decision makers' perception both in the banking sector and the governmental entity. Data collected was statistical and interpretive. The study also conducts an experiment in order to assess the recommended digital banking system. Research findings together with the literature review enabled a set of recommendations that can act as a clear guide to governmental representatives and decision makers at banks.

Keywords: Digital Banking, Visual Disability, Financial Inclusion, Assistive Technologies.

Introduction

People with visual disabilities find many difficulties to perform the most common daily tasks. In such scenarios, technology, far from always providing a solution, sometimes raises the existing barriers. Several reasons and challenges exist, where the main issues refer to a lack of standards with respect to the accessible information and communication technology (ICT) interfaces and the wide diversity of requirements and special needs of potential users. One important challenge faced by visually impaired people is how to preserve their privacy and security in their daily lives. Sighted people are able to monitor their surroundings to protect themselves from privacy threats. For example, when using a mobile device in public, sighted people can hide sight lines between the screen and nosy bystanders. When sharing a photo online, people with visual disabilities cannot view it, to make sure that it does not include a private content before sharing it (Tilse, et al., 2007; Venkatesh and Sykes, 2013).

Approximately, 1.3 billion people live with some form of vision impairment. The number of people living with either moderate or severe vision impairment is higher in developing countries than in developed countries. Internet users in Egypt were reported by the Egyptian ministry of Communication and Information Technology to be over than 37 million users (Hussien, and Abd El-Aziz, 2019; Hussien, and Abd El Aziz, 2017; Raja, 2015; Abood, et al., 2015). DIGITAL banking is rapidly growing, where bank customers are adopting electronic transaction systems in developing countries in general and in Egypt in particular (Llanto, 2015; Poushter, 2016). People with visual disabilities cannot open a bank account or have an online banking because of the Egyptian banking regulations (Abd El Aziz, et al., 2018; Wentz, et al. 2017; Abd El Aziz, 2012); as they mainly depend on their families, friends or third parties to manage their bank accounts. Although Automatic Teller Machines (ATMs) have a great potential, people with visual disabilities in Egypt face many challenges in using ATMs, checking balances, handling bank cards and making online purchases.

Research problem

Being able to manage one's money is an essential part of the day-to-day tasks. For people with visual disabilities, managing finances is very relevant to maintaining an independent living (Tilse, et al., 2007). Although the different banking services are used nowadays for several types of payments, it is considered as an inaccessible solution for people with visual disabilities. Without accessible banking solutions, many people will be excluded from vital services. Privacy might also be adversely affected. For example, users might have to depend on third parties, such as a spouse, children, and friends—or, in some instances, complete strangers—to deal with their banking services such as buying any product, using a credit card or handling an inaccessible ATM; which could expose them to greater security risks.

Despite the existence of technology in Egypt, where almost all banks have launched their websites, and provided digital services via ATMs, payment cards, and even phone banking, many banks' websites and ATMs are not accessible, and their staff has negligible training or expertise to deal with customers with visual disabilities. ATMs are also not equipped with the required technology to be used by people with visual disabilities. Most Egyptian banks reject dealing with people with visual disabilities, making them financially excluded and jeopardizing their privacy. A number of researchers have tackled this digital divide, but still, Egyptian people with visual disabilities have received insignificant attention regarding this matter.

Research Aim

In order to reach all potential customers, banks should offer banking services to people with visual disabilities that accommodate their accessibility needs. Banking services may be accessible to the broad range of users, by being inclusively designed, where users' human attributes, skills, competencies and functional capacities are considered when designing any banking service. Yet, challenges that face people with visual disabilities in digital banking remain unexplored (Okonji and Ogwezy, 2018).

Accordingly, the aim of this research is to investigate the spectrum of challenges that face people with visual disabilities when dealing with Egyptian banks, and the reasons behind preventing people with visual disabilities from opening bank accounts independently. The study also seeks to identify the main variables that affect the digital banking accessibility together with the mediating and moderating factors. Finally, the research seeks to develop an accessible prototype digital banking system.

Research Questions

The overall aim of this study can be achieved by answering the following research questions:

1. What are the key challenges facing people with visual disabilities in the banking industry?
2. What are the main dimensions that affect the digital banking accessibility with respect to people with visual disabilities?
3. What are the mediating and moderating factors affecting the digital banking accessibility?

Literature Review

The World Health Organization (WHO) has classified disability into three key definitions that are often used interchangeably but have different meanings: Impairment, Disability and Handicap. 'Impairment' refers to an abnormality in the anatomy, anatomical, physiological, or psychological function. On the other hand, 'Disability' refers to any limitation of an individual's ability to perform an activity in a normal manner. Finally, 'Handicap' refers to a shortcoming for a person due to an impairment or a disability that hinders him/her from fulfilling a normal role on an equal level with a peer group due to physical and social barriers (Lang, 2007).

Visual Disability

Disabilities are divided into Mobility Impairment, Cognitive, Hearing, Speech and Visual Impairment. Visual impairment refers to an impairment in vision that, even with correction, affects the educational

performance. It ranges from low vision impairment to total blindness (Zitkus, et al., 2016). The International Classification of Diseases classifies four levels of visual functions which are: normal vision, moderate visual impairment, severe visual impairment and blindness. People with moderate and severe visual impairments are classified as people with low vision. The last classification is blindness, which is the focus of this research together with the perception of people with visual disabilities towards banking accessibility.

The WHO (2018) estimates that with regards to distance vision, 188.5 million people have mild vision impairments, 217 million have moderate to severe vision impairments and 36 million people are blind, with around 90% living in low-income settings (WHO, 2018). They can be divided into: inability to see images clearly and distinctly, loss of the visual field, inability to detect small changes in brightness, color blindness, and sensitivity to light (Ahmed, et al., 2017).

Due to the negligible attention paid to people with visual disabilities, there are no accurate or updated statistics of the number of people with visual disabilities in Egypt. According to the Egyptian State Information Service (2017), the number of people with disabilities in Egypt is around 10.7 per cent of the total population (SIS, 2017). Egyptian people lack the awareness of how to deal with visually disabled people. Many parents of visually disabled people might deal with a person with low vision as a blind person. Not to mention the lack of computer-based courses in schools which facilitate the educational process for people with visual disabilities (Marshall, et al. 2009).

Electronic Banking Accessibility

Internet accessibility standards are mainly provided by the World Wide Web Consortium (2008) - an international organization that provides a range of recommendations to ensure websites' accessibility to users with disabilities (Wentz, et al., 2015). The World Wide Web Consortium's (W3C) guidelines address the needs of people with disabilities, and usability with assistive technologies (Raja, et al., 2015; Caldwell, et al. 2008). For people

with visual disabilities, accessibility is improved by including options of adjustable fonts, keyboard navigation options, images' descriptions, a structured text suitable to screen readers; and captions for images, in order to maintain a consistent design.

In many western and industrialized countries, there are ethical and commercial justifications for creating business websites that are accessible to users with disabilities. In such countries, a range of drivers are promoting the inclusion of persons with disabilities to accessible financial services.

Automatic Teller Machine Accessibility

In Australia, Canada, Turkey, the USA and the UK, many banks have deployed talking ATMs (Ulldemolins, et al., 2012). The talking ATMs provide audible instructions enabling visually impaired persons to independently use the machine (RNIB, 2012). All audible information is delivered privately through a standard headphone jack on the face of the machine, or a separately attached telephone handset. Information is delivered to the customer either through pre-recorded sound files or via a text-to-speech program. In USA, a final ruling on ATM accessibility standards was notified by the American Department of Justice under the Americans with Disability Act. The standards specified by the ruling included the provision of voice guidance systems, braille signs on ATM keys and input controls for people with visual disability. All ATM owners are complying with these guidelines when constructing or altering ATMs. Similarly, the Australian Bankers' Association and the Indian Banks' Association adopted ATM accessibility standards extensively covering the issues of technology and physical accessibility especially for customers with disabilities (Gupta, 2014). Conversely, in many developing countries, business organizations have yet to comply with the W3C guidelines and many people with disabilities continue to grapple with the internet access (Chigona, et al., 2009; Venkatesh and Sykes, 2013).

The Belgium BNP Pariba's case

The BNP Pariba bank developed "An Accessible Bank for All" program for customers with disabilities to carry out their banking transactions in a user-friendly way.

Some accessibility features are included in the software running on their ATM's. They are mainly useful for people with visual disabilities. The voice assisted withdrawal has been available for all the users of the BNP Pariba's ATM's since 2010. This feature is activated when plugging in a standard 3, 5-inch earphone into the jacket of the ATM after which the screen is switched off and the dialog is started up through the ear phones.

The interaction with the machine goes through the numeric keypad, with tactile indications on the buttons: 5 dots on 5, a circle on "OK", a cross on "Cancel" and a vertical bar on "Modify". BNP Paribas Fortis was the first bank in Belgium to offer this feature. In the meantime, a second bank, Belhus, has an equivalent service.

Problems that face people with visual disabilities in banking

People with visual disabilities are marginalized with regards to accessing digital banking (Gallagher, et al., 2012). This is important to tackle; as they are restricted from making electronic payments, so their participation in society is limited. Moreover, they have to pay extra costs due to the additional administrative charges posed by the central bank for physical cash deposits and cash withdrawals. These benefits could not be gained by people with visual disabilities; as they do not have the same access to technology-enhanced platforms for financial transactions (Warren, 2007; Wentz, et al., 2018).

Mobile Payment

Mobile phones have transformed telephony profoundly. They are equipped with functionalities which exceed telephony needs, and which inspire the development of value-added mobile services, mobile phones as access devices and mobile commerce in general. The number of mobile phones in use far exceeds any other technical devices that could be used to market, sell, produce, or deliver products and services to consumers. These developments open beneficial opportunities to merchants and service providers.

Purchased products and services have to be paid for. Initially, fixed-line telephony billing

systems were modified to charge mobile telephony. Later, mobile telephony billing systems were introduced, and used also to charge various mobile services when such services emerged. Yet, payments, based on the billing systems, have several limitations. These include comparatively high payment transaction fees, merchants and service providers' complaints about unfair revenue sharing, and the necessity to provide services to the billing systems (Peirce and O'Mahony, 1999, Tewari and O'Mahony, 2003). In some areas, such as the European Union, credited payment services to third parties require a (limited) credit institution license. The lack of suitable payment instruments has, been regarded as a factor that hampers the development of mobile commerce for a long time.

Mobile payments are payments for goods, services and bills with a mobile device (such as a mobile phone, smart-phone, or a personal digital assistant (PDA)) by taking the advantage of wireless and other communication technologies. Mobile devices can be used in a variety of payment scenarios, such as payment for digital contents (e.g., ring tones, logos, news, music, or games), tickets, parking fees and transport fares, or to access electronic payment services to pay bills and invoices (Dahlberg, et al., 2008). Payments for physical goods are also possible, both at vending and ticketing machines, and at manned point-of-sale (POS) terminals.

A mobile payment is carried out through a mobile payment instrument such as a mobile credit card or a mobile wallet. In addition to pure mobile payment instruments, most electronic and many non-electronic payment instruments have been mobilized. Furthermore, mobile payments, as all other payments, fall broadly into two categories: payments for daily purchases, and payments of bills (credited payments). For the purchases, mobile payments complement or compete with cash, checks, credit cards and debit cards. As for the bills, mobile payments typically provide an access to account-based payment instruments such as money transfers, Internet banking payments, direct debit assignments, or electronic invoice acceptances (MUNOZ-LEIVA, et al., 2017).

Since the early 2000s, mobile payment services have become a hot topic even after the burst of the Internet hype. Hundreds of mobile payment services, including access to electronic payments and Internet banking, were introduced all over the world. Strikingly, many of these efforts failed. For example, most, if not all, of the dozens of mobile payment services available in EU countries and listed in the ePSO database in 2002 (Carat, 2002) have been discontinued. To facilitate the development of better mobile payment services, it is important to understand the lessons of this history by learning what previous studies have discovered about mobile payments and mobile payment services markets, as well as what issues have remained unanswered.

Assistive Technologies for Financial Inclusion

The Technology Related Assistance to Individuals with Disabilities Act of 1988 described an assistive technology device as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities." The purpose of the assistive technologies is to support people with disabilities to carry out their daily activities including using computers, mobiles and the web without which they would find it impossible or difficult to do. Examples of these technologies for people with visual disabilities are: screen readers, refreshable braille displays, an optical character recognition software, a speech recognition software and talking browsers. Assistive technology is used to assist people with visual disabilities to access computers, internet and information technology (Suwannee, 2013).

When designing an electronic banking channel, designers should ensure that the digital banking channel can be accessed by everyone regardless of their disabilities. In the banking sector, customers with visual disabilities can use computer screen readers to access the internet banking websites. Also, they can use mobile screen readers to access mobile banking applications. ICT-enabled banking can be made accessible and inclusive of users with varying needs and

preferences. Some effective practices from the report are shared below (G3ict 2015):

- ATMs can be equipped with voice outputs, touch screen navigations, Braille and tactile letterings, audio and visual feedback and cues, and graphic icons for navigation which can benefit persons with varying disabilities, as well as individuals with low literacy and language limitations.
- Accessible internet banking through websites and web portals allow persons with disabilities and others to operate their finances when a physical visit to a Bank branch is difficult for them.
- Financial institutions can offer multiple ways to contact their customer service including email, IVR systems, SMS, telephone relay and video conferencing.

Screen Readers

A screen reader is a software which interrogates the content of the screen on a computer and turns it into a non-visual form. This can be presented in a synthetic speech using speakers, or braille using braille display devices, or both. It allows blind users to hear what sighted users see on their computer monitors (Edwards and Launikonis, 2008). Regarding using the internet, screen readers parse the HTML of each page visited and read aloud what is presented on the page (Mankoff, et al., 2005). Screen readers do much more than just reading the web pages; they can be used with any software running on the computer. Therefore, there must be a keyboard compatible with that software.

Optical characters recognition software (OCR)

This software converts any scanned paper using the desktop scanner, which is scanned as a picture, into an electronic document. Therefore, people with visual disabilities can read and edit it either through the OCR software itself or convert it into any accessible document format such as Microsoft word document file (.doc/docx file). Moreover, this converted file can be printed out in Braille form (BHATIA, 2014).

This software allows people with visual disabilities to access books or any printed documents without the need of a sighted

person to read it for them. Unfortunately, most OCR software do not support the recognition of papers written in Arabic, except for one software produced by Sakha Company, which supports the Arabic language but unfortunately its recognition accuracy is very low and it is discontinued. Examples of OCR softwares are Kurzweil 1000 by Kurzweil Educational Systems Company and Read iris software by I.R.I.S. Company (Bhatia, 2014).

Research Methodology

The research methodology refers to all the techniques that are used to conduct the research, collect the required data for the research, and answer the research questions. This section will discuss the way to achieve the research aim through using the research strategy. The research approach will also be discussed together with the research methods used to collect data.

This research is mainly conducted to identify the challenges that face Egyptian people with visual disabilities in the banking sector, and the main dimensions that affect the digital banking accessibility together with the mediating and moderating factors with regards to people with visual disabilities. The research also seeks to develop an accessible prototype digital banking system.

The survey strategy is a systematic strategy for gathering and analyzing data from the target population about their opinion towards something. In this research, the survey strategy will be used, where a simple random sample will be selected to represent the research population; namely, people with visual disabilities in Egypt. This strategy is considered suitable because it enables fast data collection and finding significant answers easily (Punch, 2003; Creswell, 2012).

The research uses the mixed methods approach, where both quantitative and qualitative methods are used in order to benefit from the strengths of both approaches (Johnson, et al. 2007; Sekaran & BOUGIE, 2016; Onwuegbuzie and Leech, 2004). On one hand, a qualitative research helps in gaining a deeper and detailed

understanding of the problem. On the other hand, a quantitative research allows the generalisation of conclusions and the flexibility in the treatment of data. The suitable methods for addressing the research questions include: structured questionnaires, semi-structured interviews, focus groups and experimentation.

Structured questionnaires are considered suitable for surveying a relatively large number of people who are visually impaired, and collecting data which can be statistically analyzed (Creswell, 2002) using a structured equation modelling. Focus groups are also useful to obtain detailed information about the group's feelings, perceptions and opinions. On the other hand, semi-structured interviews are appropriate for the research, as they allow a deeper knowledge of decision makers' perspective in Egyptian banks and governmental representatives. Data collected can be interpretively analyzed in order to know more about the governmental rules, laws and projects that will be conducted for people with visual disabilities (Sekaran and Bougie, 2016; Jackson and Bazeley, 2019).

Although literature reveals that testing users via experiments on evaluating the web accessibility is very expensive and time consuming, experiments are considered the most successful method to detect accessibility problems (Mankoff, 2005; Jay, et al., 2008; Brajnik, et al., 2010). Accordingly, the underlying research utilizes the experiment method on evaluating the developed and proposed digital banking system in order to gain reliable results. Finally, based on the statistical and interpretive analysis together with the reviewed literature, derived conclusions and recommendations are made regarding the digital banking accessibility.

The research variables

Efficiency

Regarding DIGITAL Banking, users believe that using this service will result in changing the nature of banking, navigation patterns, number of site visits and number of transactions executed (Dwivedi, et al. 2017; Bhatiasevi, 2016; Martins, et al., 2014; Zhou

et al., 2010). Furthermore, based on UTAUT, both Bhatiasevi (2016) and Zhou, et al. (2010) concluded that Efficiency significantly influences the continuous use of DIGITAL Banking.

Ease of Use

Users feel connected to technologies that are convenient and simple to use (Alalwan, et al., 2017; Ozturk, et al., 2016; Shareef, et al., 2017). The easy accessibility of a technology tends to motivate users, making them highly inclined to adopt the technology (Dwivedi, et al., 2017; Oliveira, et al., 2014; PIKKARAINEN, et al., 2004). Thus, when updating a given technological service automatically, users should not experience difficulty or complexity in using the technology; otherwise, their usage will plummet significantly (Yu, 2012, Liebana-Cabanillas, et al., 2017; Yiu, et al., 2007).

Facilitating conditions (FC)

FC is "the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system" (Venkatesh, et al., 2003). A number of studies have indicated the positive influence of FC on the level of usage among users (e.g. (Dwivedi, et al., 2017A; Dwivedi, et al., 2017B; Rana, et al., 2016; Shaikh and Karjaluo, 2015; Yu, 2012; Zhou, et al., 2010). The capacity to log in to personal accounts, the ability to transfer money from one account to another and the high level of compatibility supports the use of M-Banking (Shaikh and Karjaluo, 2015).

Price value (PV)

PV is defined as "the consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them" (Venkatesh, et al., 2012). During the course of using a technological service, users tend to compare the prices they paid for the technology and the discounts they might get from the continuous use of the technology (Alalwan, Dwivedi, et al., 2014; Al-Sukkar, 2005; Baabdullah, 2018; Laukkanen and Lauronen, 2005). Thus, users will tend to increase their level of usage when they are rewarded by discounts (Laukkanen and Lauronen, 2005). However, in the context of Internet banking and M-Banking, consumers will radically become

reluctant to continue using a technology when the providers of the service increase its price (Njenga and Ndlovu, 2012). In such circumstances, the users of the technology tend to switch their usage to a competing service (SCHIERHOLZ and Laukkanen, 2007; Raleting and Nel, 2011).

As indicated by Alalwan, et al. (2017), when the PV level is higher, customers become more enthusiastic about continuing to use a technology. It should be ensured that the benefits derived from the technology use are greater than the monetary costs paid by the customers for continuing to use the technology (Lee, et al., 2012). Accordingly, users who are unable to pay the required money for continuing the use of an upgraded technology (such as M-Banking) show no interest in a continuous use of it.

Reliability

Customers feel highly motivated to adopt and use systems that can provide the maximum reliability (Peters, et al., 2016; Upadhyay and Jahanyan, 2016). In the case of DIGITAL Banking, the benefits that the customers will get by using the facility will make them interested in it, and thus the propensity to use the technology will increase due to the sensitivity of using online financial services (Zhou, 2011). This sensitivity demands the highest degrees of reliability in the provided technology.

Security/Privacy

Security and privacy in the context of digital banking defined as “a potential loss due to fraud or a hacker compromising the security of an online bank user” (Lee, 2009; Liao, et al., 2011). Financial transactions using IT devices are a great threat to customers as criminal acts can be done quickly without any physical interaction (Cheung and Lee, 2006). As a result, most of the customers are reluctant to adopt digital banking services due to their security and privacy concerns (Lee, 2009; Lee and Turban, 2001; Yousafzai, et al., 2009; Poon, 2007). Today, a number of banking services are offered through the Internet and smart devices, thus customers are more concerned about serious security issues. Privacy/security issues have been proven as barriers, hence, customers keep their eyes on what kind of

data is collected, for what purpose, how long these data are stored and for what purpose their data is processed (Yoon and Steege, 2013).

Drawing on the various studies in literature, the issues of security and privacy were found to be the most important determinant factor which obstruct customers' adoption of Internet banking (Koskosas, 2011; Yoon and Steege, 2013). Moreover, the information privacy and security issues were identified as serious limiting factors that hinder the adoption and use of digital banking applications (Khalfan and Alshawaf, 2004). Accordingly, security and privacy are widely considered as the most important factor which hinders the acceptance of Internet banking among banking customers.

Digital banking Accessibility

According to Barnes and Vidgen (2002), accessibility is concerned with how to access and interact with a system, in terms of: easy navigation, appropriate design and how a user focuses on the design principles to improve the website accessibility. The purpose of an aesthetic design is to create an accessible digital banking system (Ahmad and Al-Zu'bi, 2011; Alam and Yasin, 2010; Shergill and Chen, 2005). Website accessibility/usability, includes perceived usefulness (PU) and perceived ease of use (PEU) as factors that positively influence customer's perception towards digital banking (Yoon and Steege 2013). In literature, accessibility has been found and perceived to be the significant factor in determining customers' interaction in digital banking (Casalo, et al., 2008; Hasbullah, et al., 2016; Shergill and Chen, 2005; Yoon and Steege, 2013).

Moderators: Demographics and Technology Literacy

There is quite a number of factors used as a moderator to study users' acceptance of the technology. For instance; Sun and Zhang (2006) classified moderators into three groups; organizational, technological and individual factors, in which age and gender lay in the third group, and suggested that research on the moderating factors add a great value. Prior studies have suggested that gender plays an important role in

explaining the behavioral intention in information system research (Sun and Zhang, 2006; Tarhini, et al., 2014; Venkatesh, et al., 2003). For customers' acceptance or rejection decision in the Internet and mobile banking, gender and age significantly influenced the decision in Finland (Laukkanen, 2016). Moreover, the study of Yousafzai and Yani-de-Soriano (2012) revealed that technology readiness, age and gender moderate the attitude intention among Internet banking users in the UK. In this study, technology Literacy, age and gender were used as moderators in customer's usage determinant factors.

Research Framework and Hypotheses

This section presents the research framework as well as the research hypotheses developed from the model. The framework consists of nine variables. Efficiency, Ease of Use, Facilitating Conditions, Price and Reliability are five constructs that are considered as the main dimensions affecting the digital banking accessibility in Egypt, and they are mediated by Security, and moderated by Technology Literacy and User's Demographics. Thus, the research hypotheses could be developed as follows:

H1: There is a significant impact of the Research Variables on the digital banking Accessibility

H2: There is a significant impact of the Research Variables on Security

H3: There is a significant impact of Security on the digital banking Accessibility

H4: Security mediates the relationship between the Research variables and the digital banking Accessibility

H5: Technology Literacy moderates the relationship between the Research variables and the digital banking Accessibility

H5: User's Demographics moderate the relationship between the Research variables and the digital banking Accessibility

Conclusion

People with visual disabilities have been facing many challenges in a variety of

industries. The banking sector, in particular, has been posing many challenges to those with visual impairments. This research investigates the challenges these people face and the reasons behind preventing them from opening bank accounts independently. The study also identifies the main constructs that affect the digital banking accessibility together with the mediating and moderating factors. Then, the research develops an accessible prototype digital banking system.

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Appendix

1. Do you have a bank account?
2. Do you have digital banking account?
3. Do you use digital banking services?
4. How long have you been using digital banking?
5. How frequently do you use digital banking?
6. When do you most frequently use digital banking?
7. The website is clearly structured and traceable.
8. The website does not contain too many pop-ups and banner advertisements.
9. The website is graphically appealing and attractive.
10. The website menu design is easy to understand.
11. The website is easy to use, login and navigate.
12. The website functions properly.
13. I think that learning to use Internet banking would be easy for me.
14. I think that the interaction with Internet banking would be clear and understandable.
15. I think that using Internet banking does not require a lot of mental effort.
16. I think that doing what I want via Internet banking would be easy.
17. It is easy for me to become skillful at using Internet banking service.
18. I find Internet banking easy to use.
19. Learning to use Internet banking is easy for me.
20. My interaction with Internet banking is clear and understandable.
21. It is easy for me to remember how to perform task with Internet banking
22. It is easy to get Internet banking to do what I want it to do.
23. Overall, I think that using Internet banking would be easy.
24. I trust that transaction conducted through Internet banking is secure and private.
25. I trust that payments made through Internet banking channel will be processed securely.
26. I believe my personal information on Internet banking will be kept confidential.
27. I have the resources necessary to use Internet banking.
28. I have the knowledge necessary to use Internet banking.
29. Internet banking is not compatible with other systems I use.
30. My living environment supports me to use internet banking.
31. My working environment supports me to use Internet banking.
32. Using Internet banking is compatible with my life.
33. Help is available when I have a problem in using Internet banking.
34. The website is always available.
35. The website performance is satisfactory.
36. The website information is accurate.
37. The website information content is well organized and easy to understand.
38. The website presents its security certificate and policy explicitly.
39. The website keeps my credit card information secure.
40. The website does not share personal information with other sites.
41. The website gives me confidence when doing digital banking transactions.
42. It protects information about my Web-shopping behavior.
43. It does not share my personal information with other sites.
44. This site protects information about my credit card.
45. The website makes it easy to find what I need.
46. The website offers banking products at a low cost.
47. The website provides a variety of packages and offers that suits my needs.
48. The website makes it easy to find what I need.
49. It makes it easy to get anywhere on the site.
50. It enables me to complete a transaction quickly.
51. Information at this site is well organized.
52. It loads its pages fast.
53. The website is simple to use.
54. The website enables me to get on to it quickly.
55. The website is well organized.
56. Internet banking services are reasonably priced.
57. Internet banking is a good value for the money.
58. At the current price, Internet banking provides a good value.
59. I think Internet banking services are expensive to use.

60.I think Internet banking enabled handsets are expensive.

61.I think the subscription fee to use Internet banking is expensive for me.

62.I believe my Internet banking transaction information will not be lost during an online session.

63.I believe my Internet banking transaction information will only reach the target bank account.

64.I feel comfortable using devices to conduct Internet banking operations.

65.I am comfortable in conducting Internet banking operations.