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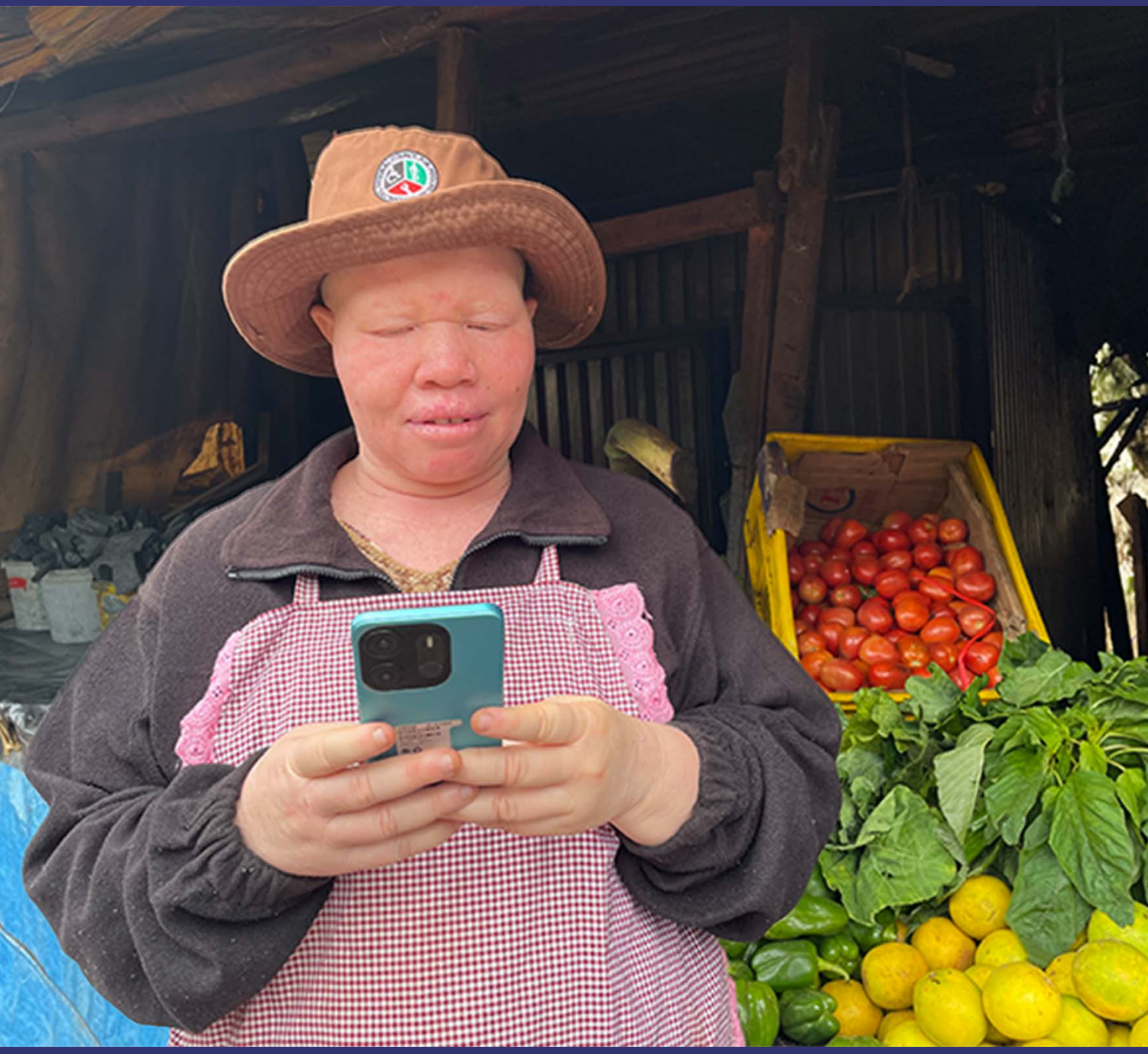
THE FORGOTTEN OR EXCLUDED?

Mobile Money User Experience for Persons with Disabilities in Africa.

A Case Study for Kenya and Nigeria, May 2023



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Abbreviations

PSB Payment service bank
USSD Unstructured Supplementary Service Data
PWDs People with Disabilities
P2P Person to Person

Acknowledgments

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Executive Summary

The accessibility of digital applications is one of the key areas of increasing independence for persons with disabilities. This is even more relevant when conducting financial transactions and using mobile devices to manage money or currency. Africa accounts for some 45 billion mobile transactions out of the 65 billion transactions on mobile devices annually.

Technoprise Global commissioned a user experience study that engaged 50 users with disabilities across Kenya and Nigeria to explore what barriers persons with disabilities using mobile devices experienced when dealing with financial transactions. The study included people with visual impairment, persons with hearing impairment and persons without disabilities. The approach was to introduce them to some basic tasks in selected mobile money applications, in Kenya, and then observe how they use and interact with the mobile applications. This was then followed by a series of user experience questions to further discuss their experiences. For this study we then proceeded to perform the same exercise for a country whose mobile money network was just sprouting. For this study, we selected Nigeria, and we compared their usability experience to the advanced mobile money market in Kenya. In total, two applications were studied in Kenya and two more in Nigeria.

The findings note that across all the four applications included in the study, there were areas where users with disabilities struggled more to utilize the mobile money applications compared to their counterparts without disabilities. The users who were visually impaired struggled the most because of lack of proper structure and use of mobile coding standards and best practices such as using proper labels or in some cases using incorrect labeling of the icons. As a result, some content on the mobile application could not be read by the use of screen readers, which are adaptive tools frequently used by individuals with vision loss. Other challenges included the excessive complexity of mobile money applications. On the user experience feedback, the satisfaction rating by users without disabilities was higher than that of users with disabilities in three of the applications (M-Pesa, Glo Cafe, Airtel Money) except for MyMTN NG App, for which hearing impaired users had the highest rating on their experience compared to the rest of the users.

We make the following suggestions to improve the user experiences and increase the uptake of mobile money applications for persons with disabilities:

1. Adopt Inclusive Design across all applications life-cycles, including mobile money applications, in order to promote consistency of design and greater adoption of best practices.

Engage persons with disabilities with lived experiences and diverse disabilities as early as possible in the product and service management process. This will ensure more users with disabilities have their reflections included not only in the design but also in the improvement phases of mobile money product designs. This will also promote early adoption and enhance the sign-up process. Tasks such as downloading an app, filling details, and authentication processes should be quicker and easier for all users, including those with disabilities.

2. Improve accessibility, especially for users with low vision or upper limb mobility impairment.

Additional robust screen reader interoperability will allow better recognition of labels and buttons, for ease and independence of maneuvering within the application. The adoption of digital accessibility standards such as the Web Content Accessibility Guidelines (WCAG 2.1 level AA) should be a base for any design. For Kenya, there are Kenya ICT Accessibility Standards that guide the development of accessible digital products.

Financial transactions are very personal in nature and therefore putting emphasis on ensuring as many people as possible, especially users with disabilities, are able to transact independently cannot be overemphasized. The responsibility of addressing the needs of each user lies squarely on mobile money companies who create, develop, and deploy these applications for their products and services. Customers with disabilities make up an important percentage of the population in Kenya, and these customers make up a critical segment of their customer base that requires emphasis.

1 . Introduction

1.1 What is Mobile Money

Mobile money is the use of devices, such as mobile phones or tablets, used to perform financial and banking functions. Some of the common activities undertaken include payments of bills, transfers of money to other people, bartering or exchange of goods and services in lieu of actual currency, purchasing of airtime, and saving money in mobile wallets or bank accounts.

Mobile money facilitates distant payments because the applications are designed to make financial services happen in real-time and come nearer to the targeted customers or users. In most African countries, there is less penetration of physical banking services, coupled with poor infrastructure, transportation and possibly even limited financial literacy. Therefore, mobile money transfers often come in to fill the gap of making finances available to all especially the unbanked, the under served, more remote or rural communities.

The penetration of mobile phones into rural communities has greatly enabled the use of mobile money for many including persons with disabilities or those with low bandwidth. Thankfully, a number of mobile money solutions also have the Unstructured Supplementary Service Data (USSD) options that can be utilized by the low technology feature phone, making the penetration of mobile money faster and more achievable to communities in remote areas.

While the use of mobile money is increasing at a pace never seen before, the threat of theft and fraud is also rapidly increasing. Threats around privacy and confidentiality continue to exist and threaten the adoption of such options especially for persons with disabilities, those living in remote or rural areas and those having lower literacy. There is a need for policy makers to be on the forefront of pushing mobile money providers to promote consumer education, awareness, protection and transparency. However, few in Africa are advocating for accessibility of these products to persons with disabilities (PWDs).

1.2 Why Mobile Money

The adoption of mobile money has been faster in the developing countries because of the ease of use and access. In some of the countries that have been using mobile money solutions for over 15 years, such as Kenya, there has been much progress in terms of enabling the unbanked urban and rural communities to have access to financial products and services. Mobile money has been integrated into formal banking system; banks are leveraging mobile money platforms more and more to increase their services to customers and to reduce the physical branch networks and cost. For Nigeria, the uptake for mobile money is low, and there has been a somewhat shorter existence (since 2018) of the large-scale mobile money. Most suppliers and individuals still prefer either cash or bank transfers using mobile applications with few utilizing mobile money wallets.

During the COVID-19 pandemic restrictions, the growth and use of mobile money expanded as most transactions were conducted using mobile money technology. Governments, such as in Kenya, reduced and even eliminated some of the transaction costs as a measure of encouraging cashless transactions to combat the spread of COVID-19. Governments have continued to encourage the use of mobile money because of the ease of monitoring the country's consumer trends when the transactions are digital and trackable.

Within business circles, mobile money has enabled payments that reduce interaction with cash, thereby minimizing many risks and costs such as theft, loss, pilferage and cash in transit.

At a personal level, mobile money makes major financial transactions (payments, money transfers, savings and investments) possible without physically moving from one point to another. This is indeed the main attraction to the adoption of mobile money. Besides, the difficulties in meeting the needs of one's family based in the rural community (often times the parents and grandparents for those working in the urban centers) has now been addressed by mobile money platforms.

1.3. Persons with disabilities: The forgotten or excluded in mobile money transformation?

Despite the many accolades that have been stated in the previous section about how mobile money has accelerated the inclusion of the marginalized, the poor and vulnerable communities in Africa, and made life more convenient for users, PWDs (especially the hearing and visually impaired) and those who may have low literacy or are neuro-divergent, have been largely left out of this inclusion process.

It has become a common concern that mobile money platforms include inaccessible features, especially for users with vision impairment. And, some applications employ complex language structures which the hearing impaired find difficult to comprehend. Yet more, persons with upper limb mobility impairment may also not be able to use the applications altogether. Hence, some PWDs are compelled to ask for assistance from others to carry out sensitive financial transactions – often times even giving up their passwords, exposing them further to exploitation.

Most mobile money applications rarely include PWDs at the design stage and often address usability and accessibility issues for them as an afterthought. This oversight increases the cost of the re-designing process and also creates resentments on the part of those who may face challenges. Additionally, the redesigned applications are still inadequate in meeting the needs of PWDs using mobile money applications.

In this report, we maintain that despite the existence of digital accessibility standards, best practices and fast-paced evolution and growth of some mobile money platforms, they still remain grossly inaccessible and user unfriendly to PWDs. We use the case of two African countries (Kenya and Nigeria) to bring out the salient usability issues and then focus on Kenya to bring out accessibility challenges for PWDs. We focus on four mobile money companies.

For Nigeria we included:

- My MTN by MTN Nigeria
- Glo Cafe by Globacom

For Kenya we included:

- M-Pesa by Safaricom
- Airtel Money by Airtel.

2. Snapshot of Mobile Money in Africa

2.1 Background – The context of financial and non-financial services in Africa

According to The State of the Industry Report on Mobile Money (2022) report by GSMA, Africa accounts for a staggering 45 billion transactions out of the 65 billion transactions on mobile money annually. These transactions amount to $832 billion out of the total $1.26 trillion, which is about 66%.

Of the 781 million registered accounts in Africa, East Africa alone accounts for 390 million registered accounts with 115 million active 30-day accounts; West Africa has 290 million registered accounts with 76 million active 30-day accounts. Further, East Africa made 28 billion transactions amounting to $491.8 billion compared to West Africa's 12 billion transactions worth $277 billion. Southern Africa has only accounted for transactions worth $5.3 billion with North Africa registering $4.7 billion worth of transactions.

Another report, The State of Mobile Money in Southern African Countries (2020) by ICTWORKS, in South Africa, only about 2% of the population use mobile money. On the contrast, among its neighboring countries in the Southern African countries, almost half of the population is registered to a mobile money service. Lesotho and Eswatini, for instance, have 59% and 61% respectively of their population registered for mobile money. The report also places South Africa and Namibia as having more than three quarters of their population with bank accounts (75% and 77% respectively).

In 2022 alone, West Africa registered the highest number of new mobile money accounts Globally, bringing their regional share of mobile money accounts to 33% up from 11% in 2021. Upon the introduction of a payment service bank (PSB) license in Nigeria in 2018 mobile money usage grew steadily. Other services have recently entered the market: 9 and Hope launched in 2020, Airtel launched its Smartcash, while Glo Cafe and MTN launched MoneyMaster and MoMo respectively in 2022.

In Ethiopia, the national bank introduced regulations allowing service providers to launch mobile money. The Country's largest mobile network, Ethio Telecom, launched Telebirr mobile money service in 2021. Mobile money is slowly gaining popularity as more than half (51%) of all registered accounts are active every month. Ethiopia currently is almost at par with Pakistan, which has a more established mobile money market. MTN and Orange mobile money can now accept international remittances via Orange network in Europe.

Even though the average transaction amount for mobile money merchant payments decreased to $14.10, the number of such transactions still went up by 26% from 2021. Currently, most mobile money merchant payments are still proximity payments rather than online. In 2022, in Kenya, 51% of merchant payments were done in the physical shop, with only 12% transacting online, while in Ghana, 20% made a purchase and paid the merchant while in the physical shop with 11% doing so online.

The use of cards for payment has also enabled a wider range of possibilities in the mobile money market. MoMo partnered with Mastercard and made virtual cards available in all its 16 countries in 2021, while Safaricom's M-Pesa launched a partnership with VISA for Global Pay Solutions in 2022.

Mobile to bank transactions also grew significantly compared to bank to mobile, and P2P transactions in 2022 compared to the previous year.

Table 1 : Summary of Mobile Money Usage in Africa

Service Provider	Active Product Users Across Africa (in millions)	Heavy Presence
Orange (Telkom)	70.0	West Africa
MoMo (MTN)	60.7	Nigeria
M-Pesa (Safaricom)	52.4	Kenya
Airtel Money (Airtel)	26.2	East Africa
Glo Café (Globacom)	7.0	Nigeria, Ghana

MTN has over 60.7 million users across Africa who can access mobile money, MoMo, on their network. Majority of these users are in Nigeria. Safaricom, on the other hand, has 52.4 million users registered on its M-Pesa mobile money service, with more than three-quarters of these from Kenya. Airtel, has 26.2 million mobile money users registered on Airtel Money, with majority being in East Africa. Orange/Telkom has 70 million users in Africa. It has a heavy presence in West Africa, especially Ivory Coast. It is also one of the top three mobile money service providers in almost every country in which it is present. Globacom has seven million users across Africa registered on its Glo Café mobile money app.

While the use of mobile money is still on the rise, challenges like fraud are also in urgent need of being addressed. Policy makers are on the forefront pushing for mobile money providers to promote consumer education, awareness, protection and transparency.

2.2 The adoption of mobile money applications/devices for financial services

According to a study1 by Jana S. Hamdan and colleagues (2022), mobile money is an important instrument to improve the degree of financial inclusion, especially in developing countries. However, having a mobile money account does not imply that it is actually used. In their sample, 86% of micro-entrepreneurs own a mobile money account, but only 49% actively use it–the resulting gap indicates unmet opportunities. They estimate that mobile money reaches up to 40% of those without prior access to (semi-) formal financial services, still leaving a substantial group behind in which women and the most disadvantaged are overrepresented. A choice experiment shows that high fees hinder mobile money usage for a significant number of micro-entrepreneurs.

Akinyemi and Mushunje (2020) found that the main determinants of mobile money adoption in rural areas in Africa were ease of use, trustworthiness, convenience and quickness of conveyance. It was also noted that the age, bank account ownership and monthly income influenced the adoption of mobile money. The researchers recommended that operators target young educated rural dwellers, who have some income, if ease of mobile money penetration is to be achieved.

Another study by Murendo and colleagues (2017) on social network effects on mobile money adoption in Uganda found that on average, an additional mobile phone in the household increases the likelihood of mobile money adoption by 23.6% and that contact with mobile-phone-based extension agents increases the probability of adoption. Furthermore, according to their findings, mobile money adoption is positively influenced by the size of the social network with which information is exchanged. They also observed that this effect is particularly pronounced for non-poor households. Thus, while social networks represent an important target for policymakers aiming to promote mobile money technology, the poorest households are likely to be excluded and require more tailored policy programs and assistance.

These studies suggest that while mobile money has the potential to improve financial inclusion in developing countries, there are still barriers such as high fees and lack of access to technology that need to be addressed.

Mobile money applications in Africa have encountered several challenges. One challenge is the preference for cash payments over mobile money in some countries. For example, despite high mobile penetration in Nigeria, only 6%4 of the population uses mobile phones for financial transactions and 60% of Nigerians still do not have bank accounts. Another challenge is opposition from banks and telecoms providers who do not want technology start-ups moving in on their turf.

In addition, there are concerns about the risks associated with mobile money, such as money laundering. Mobile money systems generally sit outside a country's financial reporting system, making it difficult for authorities to monitor mobile money transactions.5 There are also concerns about the security of mobile money transactions and the potential for fraud.

Despite these challenges, mobile money has been revolutionary for consumer payments in Africa and has helped to improve financial inclusion for previously unbanked populations. For example, according to Findex Database 2021 report by the World Bank, Nigeria has one of the largest unbanked populations in Africa at around 60% compared to Kenya's approximately 12% unbanked population. To address these challenges, regulators are playing a role in mitigating the risks associated with mobile money and ensuring that the benefits of mobile money can be realized while minimizing potential risks.6

3 . Approach and Methodology

3.1. Comparing and contrasting Kenya and Nigeria

This study purposely sampled Kenya and Nigeria as representatives of East and West Africa on issues of mobile money. A summary of the key differences and similarities in these two countries is presented in this section, and is by no means exhaustive.

Table 2.1* : *Summary of similarities of Mobile money in Kenya and Nigeria

Similarities
1. Majority of the population still use cash (spontaneously)
2 . Fraud is also a major problem both countries are dealing with, for digital money services

Table 2.2* : *Summary of differences of Mobile money in Kenya and Nigeria

Differences		
Description	**Kenya**	**Nigeria**
1. Context of digital money	Digital money is very popular in the form of mobile payments. The payments have been utilized since 2007.	Digital money exists mostly in bank accounts and mobile money accounts are very rare. The payments started in 2009 but became more popular from 2018.
2. Digital payment details	Most businesses have adopted M-Pesa and have a Pay Bill / till number	Digital payment is widely common as cash transfer to a bank account number.
3. Locating agents	M-Pesa and Airtel agents are available within every few feet in urban areas.	The agents are not easily available within every square mile.
4. The cash	Hard cash has been recently changed and more features that are disability friendly introduced including different sizes for different notes and tactile features.	The hard cash is difficult to distinguish and all the different denominations are of the same size.

3.2. The Approach and sample sizes

The data was collected through imperial data collection and usability testing and thereafter, a questionnaire was administered. In the usability testing, we reached a total of 50 users (26 users in Kenya and 24 users in Nigeria).

In Kenya, the research design was within-subjects; that is, each user interacted with both of the selected applications in that country, allowing for a direct comparison of the apps. The rationale behind this approach was to determine how well the applications were meeting the needs of the users with a disability, comparing the success/failure rate of each application involved. The participants without a disability served as a control group for comparison, under the assumption that the applications were designed for people without disability.

Table 3 : Reached Users by Gender and Disability in Kenya

Gender	Vision	Hearing	Others	Total by Gender
Male	7	3	4	**14**
Female	5	5	2	**12**
Total by Disability	**12**	**8**	**6**	**26**

From Table 3 above, the following are the number of users with disabilities who participated in the usability testing in Kenya:

- 26 (12 female, 14 male) users from Kenya tested both the M-Pesa App and the Airtel Money App. From this group, 12 were visually impaired, eight were hearing impaired and six did not have any impairment.

The collection of data in Nigeria was also through usability testing. The approach remained the same, and the idea was to compare a matured mobile money market in Kenya to one that was just taking root, in Nigeria. The sample size used was 24. The users were exposed to two mobile money applications from two different providers.

Table 4 : Reached Users by Gender and Disability in Nigeria

Gender	Vision	Hearing	Others	Total by Gender
Male	5	2	2	**9**
Female	4	3	8	**15**
Total by Disability	**9**	**5**	**10**	**24**

From Table 4 above, the following are the number of users with disabilities who participated in the usability testing in Nigeria: 24 (15 female, 9 male) users from Nigeria tested both the MyMTN NG App and the Glo Cafe App. From this group, nine had visual impairment, five were hearing impaired and 10 did not have any impairment.

3.3 Data Collection and Analysis

The usability testing involved having each participant download and transact using each of the two pre-selected apps while the researchers documented the successes and pain points encountered through the processes, and recorded feedback about the specific mobile money application. The exercise was rolled out on three different days for participants (a) with visual impairment; (b) with hearing impairment; and (c) with no disabilities. The approach above was applied for both Kenya and Nigeria. In Kenya, the study took place in December 2022, whereas in Nigeria the study was carried out in April 2023.

Each participant had a chance to go through two mobile money applications: M-Pesa and Airtel Money for Kenya; and Glo Cafe and MyMTN NG for Nigeria. The instructions required the participant to download the respective apps, go through the sign-up process and validate or confirm they have been onboarded, before finally transacting and logging out of the application. At each stage, the outcome of the process was documented as a complete success (where the participant did not receive any assistance), partial success (if the participant had to be assisted) and total failure (where the process could not continue even after being assisted), for example: during the sign-up process, the authentication fails and the message prompt is to visit customer care.

4. Discussion of Findings

4.1 Summary Findings

The following were the key findings from PWDs interactions with mobile money applications in Kenya and Nigeria:

- Having different applications doing the same or similar tasks from the same mobile phone operator is confusing;
- The sign-up process is generally easy for most mobile money operators;
- Transacting using mobile money applications still remains a challenge across the different applications regardless of the country or length of operation of the mobile money platform.

Below are the specific findings across the different tests undertaken by the users in the two countries.

4.2 Sign up Process

4.2.1 Overall Findings

The following were the key findings on the usability of mobile money applications:

(a) Complicated sign-up process especially among persons with disabilities: The sign-up process often involves downloading and installing apps. This is normally a two-step process, that includes getting to a google store or app store, searching for the specific app before clicking to download and install it. However, this was not always the case.

(b) Difficulty in identifying the relevant mobile money applications. MTN for instance, has several (5) separate apps: MyMTN, MyMTN NG, Momo, Momo Agent and Momo Merchant among others, each of which are for different purposes. Identifying the correct one to download was not easy.

- Safaricom has My Safaricom App and M-Pesa App. The two apps come with slightly varying capabilities apart from sharing mobile money transaction functions. The Glo Cafe App is called Glo Cafe which can be confusing.
- Airtel Money app has a simple direct app, that fits all, including mobile money transactions.

(c) Requirement to have data. To verify authentication details, the apps need mobile data to connect to the Internet, verify the SIM card details and send an authentication message to be read by the App and complete validation. This has a cost implication.

(d) Requirement for SIM registration and availability in the phone. To authenticate and be able to use the sim for mobile money it had to be registered. There were varying processes and durations of registering the SIM cards. All the other apps (except Airtel) could not work/ proceed without the relevant SIM card in the device.

- M-Pesa and Airtel Money require that a user registers the SIM card only once. This registration enables the user to access the sim toolkit, and can access the applications directly without re-registering.
- The SIM card applicant for Glo Cafe and MTN Nigeria had to visit a customer center to be set up, resulting in a lot of time taken to register the PSB account and get it ready for use.

(e) Lengthy SIM registration duration. The duration between SIM registration and authentication was long for some applications. In certain applications (Glo Cafe App), the One Time Password (OTP) took so long (the longest being 3 hours) that the users ended up making several requests leading to the SIM card being blocked.

(f) Size of the application. Storage space for the App was different for the apps with some as large as 82MB, and others as small as 4MB. For instance, the MTN apps size ranged from 4-65MB; Safaricom App, 36MB; M-Pesa App, 82MB; Airtel App, 11MB; and Glo Cafe 8MB

Reflection on these findings reveals that they added a layer of complexity and frustration on the part of PWDs, to an unfortunate point of opting out to using the mobile money applications. For instance:

- Users who were visually impaired found it totally difficult to identify the relevant mobile money application because they were too many available options (MyMTN, MyMTN NG, Momo, Momo Agent and Momo Merchant). Although Safaricom Apps (M-Pesa, My Safaricom, Business) contained an element of the mobile money functions, users, particularly of lower education levels were still confused regarding them.
- The requirement to have data bundles is discouraging for PWDs whose financial obligations are often higher. Therefore, applications that require resources become less attractive, regardless of their ultimate benefits. Majority of the users indicated that data bundles or airtime was a major challenge in the use of the applications.
- Applications that require SIM registration which then takes long to complete often times result in users opting out before the completion of the process. It was also noted that for visually impaired users, there were no audible notifications of the progress of the process and this left them bewildered on where the process was. To say that this is frustrating for the user is an understatement.

4.2.2 Detailed Findings on the Sign-up Process

This involved accessing the webpage and app store to download the app, filling in the required details, authenticating and validating and being able to log out and back in. It is the process of setting up the app to be ready for use.

All except two respondents with disabilities had used the M-Pesa App before, while none of them had ever used Airtel Money App. The findings discussed below are for the users who were NOT able to successfully undertake the specified task. For the four mobile money applications, there were varying failure rates.

In this report, we take an approach where we focus on the frustrations of persons with disabilities in using selected mobile money applications in two African countries. This is because, often times for persons with disabilities, if the application has a feature that is not usable or accessible, then this has a negative impact on the whole user experience. For financial applications such as mobile money applications, this forces the persons with disabilities to disclose their financial information as they seek assistance from other persons.

For this report the color coding reflects the failure rates of the applications thus:

- **Green** indicating the proportions of users that **slightly failed** that task (ranging from 0% - 20%);
- **Yellow** indicating those that had **failed moderately** (ranging from 21% to 40%); and
- **Red** indicating those that **highly failed** (ranging from 41% - 100%).

(a) Accessing the webpage/download app: The users were asked to independently access the web version and/or the mobile phone version of the application and download the application. The following are the findings:

- **There was no failure with Glo Cafe users on downloading the application:** All the persons were able to download Glo Cafe without assistance and therefore there was no (0%) failure rate on the download.
- **There was a generally high failure rate with users downloading MyMTN:** Nearly 6 out of 10 (56%) of the visually impaired respondents failed to download the correct app for MyMTN and had to be assisted.
- T**here was some failure rate with users downloading M-Pesa and Airtel money:** About 3 out of 10 (33%-36%) of the visually impaired users who tested M-Pesa and Airtel money failed to access the webpage or download the application.

Table 5 : Access the webpage/download app

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	33% *	36% *	0%	56% **
Hearing	0%	0%	0%	40% **
None	0%	0%	0%	80% **

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

Downloading the application is the pre-requisite to any other tasks that are undertaken with the application and therefore failure to download has a major implication on the usability of the app.

(b) Filling in the required sign-up details: The users who had either successfully downloaded or been assisted in downloading the applications were asked to fill in the sign-up details.

- Visually impaired users had the most challenges in signing up: For the two applications tested in Kenya, the failure rate for filling in required sign-up details was lower for M-Pesa compared to Airtel Money. One in four (25%) of M-Pesa users with visual impairment could not execute this task successfully. Airtel Money registered 36% of the visually impaired who failed to complete the process, with 64% doing it without assistance. 29% of the hearing impaired failed to execute this task, while none of those without any disability (0%) failed. Similarly, regarding the two applications from Nigeria, there were 33% and 44% of the visually impaired users who had challenges in filling in the required details in Glo Cafe and MyMTN respectively.

Table6 : Fill in the required details

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	25% *	36% *	33% *	44% **
Hearing	0%	29% *	0%	0%
None	0%	0%	40% **	10%

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

The types of details required in the process of signing up have an influence on the completion of the sign-up processes. The applications that are complicated in sign up are likely to be less user friendly and the failure rate higher.

(c) Finishing the sign-up validation process: As part of the sign-up process, the different mobile money applications had different validation processes as a final step of the sign up. It was found that:

- The sign-up validation is a challenge across the different mobile money platforms. Regardless of the disability, it was noted that there was generally some level of failure rate in validation of the mobile money application. For instance, Airtel Money had a low success rate at the point of the validation of the app. This was replicated for the Nigeria mobile money applications where the failure rate was high (up to 100% for Glo Cafe) across all forms of disabilities. Additionally, MTN had more than half of the users with hearing impairment, and half of those without impairment not able to get through the validation.

Table 7: Finish the validation process

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	0% **	58% **	100% **	44% **
Hearing	50% *	62% **	40% *	60% **
None	0%	17%	100% **	50% **

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

The validation is the final process before a user starts to engage with the features of the mobile money applications. Other than M-Pesa, which had a 50% failure rate for the users with hearing-impairment, the other mobile money applications had generally higher failure rates.

(d) Logging out and in: As part of the process, the users were required to log out (after successful validation) and log back in to check if they were now able to start using the application. It was realized that:

- More users with disability are able to access the application after sign up and validation. This time, one in every three persons with visual impairment failed to log in successfully on either M-Pesa or Airtel Money. Some 62% of the users with hearing impairment completely failed to log in successfully on Airtel Money. A similar situation was noted in the Glo Cafe application which is used in Nigeria with 67% of the users who had visual impairment and 40% of users with hearing impairment failing to log back in. For MyMTN, only 22% of the visually impaired, and 20% of the hearing impaired failed to log in while 30% of those without any impairment had a challenge in login in.

Table 8 : Login/ logout

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	33% *	33% *	67% **	22% *
Hearing	12%	62% **	40% *	20%
None	0%	17%	20%	30% *

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

The log out – log in process was used to test the capability of the mobile money application to be operated independently after the registration/validation process.

4.3 Transacting

(a) Sending money/Receiving money. The users were given actual financial transactions to send money. The following are some of the findings:

- The users with disabilities, especially those with visual impairment struggled to make financial transactions regardless of the country. For instance, in Kenya, half of the users with visual impairments were unable to send money without assistance through M-Pesa. On airtel Money, three quarters of the users with visual impairment were unable to send money. Only users without any impairment were successful in this area, with all of them being able to send money on M-Pesa and only one failure in six on Airtel Money.

Table 9 : Sending money/ Receiving money

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	50% **	75% **	78% **	89% **
Hearing	12.5%	62% **	80% **	40% *
None	0%	17%	60%	50%

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

In general, fewer people were able to transact on Glo Cafe and Airtel compared to the other two apps. In Nigeria, users with visual impairments had a higher failure rate in sending money across both apps compared to the other categories. There was a 40% failure among the visually impaired users for MTN.

(b) Using Pay Bill. The users were given a task to transact through a Pay Bill or specific account.

- There was a disparity between the different mobile money applications on using Pay Bill payment option. In Kenya, there was a great disparity between M-Pesa and Airtel Money in completing a Pay Bill transaction type. None of the users with visual impairment were able to pay a bill successfully on Airtel Money, while all the non-impaired users made successful transactions using M-Pesa. Similar challenges were experienced with Glo Cafe and MyMTN mobile money platforms.

Table 10 : Transacting using Pay Bill

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	42% *	100% **	78% **	78% **
Hearing	12%	87% **	60% **	60% **
None	0%	33% *	60% **	50% **

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

Pay Bill payment option is often used to make payments by companies and vendors that receive bulk payments.

(C) Notifications for transactions. After each transaction, the users were asked to track the notifications confirming the conclusion of the transactions. It was noted that:

- There were major challenges with users receiving confirmation messages. Most of the users of Airtel Money, Glo Cafe and My MTN across all disabilities and those without disabilities failed to receive confirmation messages. Only Mpesa users had better notifications for their financial transactions with 42% of the visually impaired users failing to acknowledge receipt compared to 12% of the hearing impaired and none of those without disability.

Table 11 : Notifications for transactions

Types of Impairments	Kenya		Nigeria	
	M-Pesa	Airtel	Glo Cafe	MyMTN
Visual	42%*	58% **	67% **	0%
Hearing	12%	62% **	40% *	20%
None	0%	17%	20%	10%

[Green (slightly failed=0%-20%); Yellow * (moderately failed=21%-40%); Red ** (highly failed = 41% - 100%)]

4.4 User Experience Feedback

After concluding the usability testing, the users were asked a set of ten questions so that they share their overall experience with the mobile applications. The questions were in form of a Likert scale rated from 1 – totally disagree to 5 – totally agree. Some of the questions were also reverse coded. Table 10 (Kenya) and Table 11 (Nigeria) summarizes the user experience feedback.

Table 12 : Kenya: Usability Index from the users experiences for selected mobile money apps

Usability Index	Airtel			M-Pesa		
	Visual	Hearing	None	Visual	Hearing	None
Would like to use the app	2.67 *	3.00 *	4.00	4.00	4.38	4.67
Found app not complex	2.67 *	3.67 *	3.60 *	3.36 *	2.88 *	4.17
Easy to use	2.67 *	4.33	4.60	3.36 *	4.13	4.83
Would not need the support of a tech person	3.08 *	3.00 *	5.00	3.09 *	2.13	5.00
Functions well integrated	2.67 *	2.67 *	3.60 *	3.18 *	4.00	4.50
Less Inconsistency	3.55 *	2.33 **	4.60	3.09 *	3.38 *	5.00
Easy to learn	3.18 *	3.67	4.00	3.64 *	3.25 *	3.83
Non-Cumbersome	2.91 *	2.00 **	4.60	3.36 *	3.75 *	4.33
Confidence in using app	3.64 *	4.00	4.20	3.82 *	4.50	4.67
Need NOT to learn a lot of things first	3.09 *	2.33 **	4.80	2.55 *	2.50 *	5.00
Average Rating	**3.01** *	**3.10** *	**4.30**	**3.35** *	**3.49** *	**4.60**

[Green (High usability index = 4 - 5); Yellow * (Medium usability index = 2.5 to less than 4); Red ** (Low usability index 1-2.5)]

In general, users in Kenya preferred the M-Pesa App compared to Airtel Money app, but by a small margin. Majority of persons with visual impairment felt they needed to learn a lot of things on M-Pesa before they could get going with it. They also felt that Airtel Money had fewer inconsistencies. On the other hand, they rated the M-Pesa App as easier to use, found it less complex and would like to use it more than they would the Airtel Money App. Users with hearing impairment found M-Pesa less cumbersome, by a great margin, had its functions well integrated and would also like to use it, more than Airtel Money. The sighted, non-impaired respondents rated Airtel Money as easier to learn compared to M-Pesa.

In Nigeria, Glo Cafe was highly rated by the visually impaired and the respondents without disability. For the hearing impaired, they rated MTN higher. Also, majority of the persons whose authentication failed for Glo Cafe were hearing impaired users. Glo Cafe was rated as having less inconsistency, functions were well integrated, and not cumbersome to use.

Table 13 : Nigeria: Usability index from users' experiences of selected mobile money apps

Usability Index	Glo Cafe			MyMTN		
	Visual	Hearing	None	Visual	Hearing	None
Would like to use the app	3.40 *	3.50 *	4.50	3.56 *	4.25	4.78
Found app not complex	3.80 *	4.25	4.50	2.67 *	4.50	3.89 *
Easy to use	3.60 *	4.33	4.50	2.78 *	4.00	3.89 *
Would not need the support of a tech person	3.20 *	3.00 *	4.50	2.33 **	3.75 *	3.89 *
Functions well integrated	3.60 *	4.33	4.25	2.00 **	4.25	3.67 *
Less Inconsistency	4.00	4.33	4.25	1.67 **	4.50	3.44 *
Easy to learn	3.60 *	3.33 *	4.75	1.67 **	4.25	4.56
Non-Cumbersome	4.20	4.33	4.50	2.22 **	4.25	3.44 *
Confidence in using app	3.20 *	3.67 *	4.50	2.22 **	4.25	3.89 *
Need NOT to learn a lot of things first	3.00 *	3.33 *	4.50	1.78 **	2.50 *	3.67 *
Average Rating	**3.56**	**3.84**	**4.48**	**2.39** **	**2.39**	**3.91**

[Green (High usability index = 4 - 5); Yellow * (Medium usability index = 2.5 to less than 4); Red ** (Low usability index 1-2.5)]

4.5 Summary of Usability Issues from the tested Mobile Applications

The following is a summary of the major issues for each of the mobile money application tested by the users

4.5.1 Airtel Money App Usability Summary

- **Sign up Process: The issues included:** (i) the App was generally hanging especially for older versions of Android; (ii) the App failed to verify details (more so for those with newly registered Airtel sim cards) and the OTP was mostly delayed; (iii) the clear/ delete button while entering details during sign up is not labeled to be read by the screen readers.
- **Transacting with the App:** The issues included: (i) wrong labeling or unlabeled instructions: for instance, the area marked/labeled 'input' as read by the screen reader/talkback does not coincide with input. The input button does not coincide with its labeling. The error message associated with the input field was not read by the screen reader/talk-back. The checkout button after putting the Pay Bill was also not labeled and therefore not a single visually impaired person would complete a Pay Bill transaction on their own as the screen reader/talk back could not read the checkout button; (ii) when paying bills, there was a repeated failure for several users, and the App, after hanging for several seconds would return an error on the screen, 'Bad Request'; (iii) there were no notifications explaining what type of error it was and why it would not go through with the transaction.

User experience feedback: All the users found the Airtel Money App complex and functions not well integrated. Specifically, the users with disabilities found Airtel Money App user experience slightly above average (about 3.1 out of 5) compared to those without disabilities who found the experience very good (about 4.3 out of 5). Those with visual impairment were not too sure about using the Airtel Money App again, the found it to be complex as it was not easy to use and the functions were not well integrated. Those with hearing impairment found the app cumbersome. They needed to learn a lot of things first before using the app and there were some inconsistencies.

4.5.2 Glo Cafe Mobile Money App Usability Summary

- Sign up process: Glo Cafe app sign up process took the shortest time to download, and the longest to set up. Here, the OTP was delayed on several occasions. At least three participants had their SIM cards blocked after trying frantically to acquire an OTP/ authenticate their details. The process also required first activating Glo Cafe mobile money account using a 5-digit PIN which was also another stage where the majority of the users could not get through. In some cases, we skipped using the PSB account, and used card details to transact within the app. During start up, the app pops up several continuous ads, most of which are not labeled for screen reader users. These pop ups needed to be closed to get to the home page.

- **Transacting with the App:** The transaction menu is not properly labelled when using a screen reader/talkback, and so majority of the visually impaired users had to guess. The sighted were able to go through the homepage until they identified the app that was required. For paying bills, it was mostly utilized for buying airtime option from the PSB account, or using a funds transfer to a bank account.

User experience feedback: The overall experience was above average to very good among all the users of Glo Cafe App, although slightly fewer users with visual impairment felt that they needed to learn a lot of things to use the Glo Cafe App. It seems a similar sentiment was shared with users with hearing impairment whose rating compared to other ratings indicated they would somewhat require technical support to use the application.

4.5.3 M-Pesa App Usability Summary

- **The sign-up process**: The issues were: (i) Wrong or no labeling for screen reader users - when filling in the details, the delete button is wrongly labeled and is read by the screen reader as "close". The wrong pin error notification was not read by the talkback/ screen reader. When taking the profile picture, the capture button was unlabeled, and the screen reader did not read it for the persons with visual impairment. The log in was not accessible/readable when talkback was on. Finding the log out button was a problem for most of the visually impaired, since it was unlabeled. The menu button also did not have a descriptive accessible name. (ii) For dual-sim phones, the app would not automatically pick the Safaricom SIM at start up.

- **Transacting with M-Pesa App:** The talkback could not properly read the payment confirmation details when paying a bill. Most visually impaired persons had to be assisted to find the Pay Bill button. The struggle for those who managed on their own was that if they hesitated even a little (such as while looking for the button), the app locks up too quickly, requiring the user to input the PIN to unlock it before starting over again. Fortunately, the app accepted registration and using biometrics to login, which reduced the frustration associated with re-entering the PIN or password

The User experience feedback: Generally, the users rated the M-Pesa application highly with different disabilities indicating challenges on different issues. For instance, users with visual impairment indicated that they found the application a bit complex and needed to learn a lot of things first as part of engaging with the app. They also needed support from a technical person (3rd party) which is an invasion of privacy.

4.5.4 MyMTN NG Mobile Money App Usability Summary

- Sign Up process: This was the slowest app to download. It would occasionally abort downloading and the user had to restart the process. It also had several ads and icons for mini apps within the homepage that were not properly labelled. Filling in the details was simple, but the final authentication also required that the user visits a customer care centre, for assistance to authenticate the PSB account.

- **Transacting with the MyMTN NG App:** The app was more adaptable because without a ready PSB account, the app would allow the user to add bank card details and proceed to carry out a transaction. The issue of unlabeled icons was still a challenge. The transactions button at the bottom of the homepage was also not labelled. It read as 'icon add'. On the main homepage, there are a number of mini apps like DStv and Jumia, which are not labelled. There were almost ten additional apps that a user needed to scroll to and these were not labelled making it difficult for screen reader users to know where they were on the page.

User experience feedback: The app was very challenging to users with visual impairments and had the relatively lower scores on areas such as consistency and users required to learn more things before using it. It was cumbersome. On the other hand, users with hearing impairment and those without disabilities had a better user experience on this app compared to other users.

5. Accessibility

5.1 Accessibility Testing of M-Pesa and Airtel Mobile Money apps in Kenya

The study further took a deep dive on the applications in Kenya by undertaking an accessibility testing of the M-Pesa and Airtel Money applications. This accessibility evaluation supplemented the usability evaluation described above. Note that in the case of accessibility, the assessment was done first by experts based on Web Content Accessibility Guideline (WCAG 2.1 AA), and next by users with disabilities

Below is the accessibility assessment report summary for the different scenarios:

(a) Log in Process

In this scenario, we were testing if the users were able to access the app and sign in.

Issue: There are no roles defined for the “enter pin digits (1,2,...)”, “welcome to M-Pesa...”, “manage your...” and the “Pay faster and send money...” interactive elements. They rely on the hint “double-tap to activate” to communicate interactive functionality.

- **Impact:** When interactive elements do not have an appropriate accessible role, this may particularly disadvantage users that interface with the accessibility properties of elements, such as screen reader and voice recognition users. When the role has not been programmatically determined, it may confuse or mislead users.

Issue: There are interactive buttons above the “sign in” button that do not have accessible names. This also occurs in the “back arrow” at the top and the delete(x) button on the “Enter M-Pesa pin” interface.

- **Impact:** Screen reader users such as the visually impaired get confused in understanding the interfaces that they navigate through.

Issue: The informative app logo image is marked up as a decorative image.

- **Impact:** Non-text content must have appropriate alternatives. This is required for the content to be understood by all users. Images, icons and so on may otherwise be miscommunicated by assistive technology.

Issue: Mobile number on the "request OTP" page read as a whole number

- **Impact:** When a mobile number is announced as a whole number, it could be confusing for some users who may find it difficult to understand the information. For example: Phone number 0715725070 was read as “Seven hundred and fifteen million, two hundred and fifty thousand and seventy”.

Issue: The status message after requesting OTP is not announced by the screen reader.

- **Impact:** When content is added on the screen after the user performs an task, the user needs to be informed that the content has been added by determining the added content. This may particularly disadvantage users that interface with the accessibility properties of elements, such as screen reader and voice recognition users because updates are not indeterminable. This may lead to the users missing out on important information that is needed to complete the process.

(b) Transaction Process

This process tested the processes of transacting.

Issue: The "cancel(x)" button that appears when typing the contact on the text input field does not have an accessible name.

- **Impact:** Screen reader users such as the visually impaired get confused in understanding the interfaces that they navigate through.

Issue: The error message provided upon inputting an invalid phone number does not indicate how the error can be remedied or provide an error suggestion.

- **Impact:** There are vague errors. Users cannot be reasonably expected to identify the nature of the problem or how to solve it. This may particularly disadvantage users who find navigating the web cognitively challenging. Users may struggle to identify and remediate the errors. The vague error messages may confuse or misguide users.

(c) Log out from the portal

There were no common bugs/issue under this use case; the bugs reported are all unique.

5.2 Summary and Conclusions

- **Labeling –** most of the icons in the MyMTN NG were not properly labeled. The screen readers kept reading icon1, icon2, icon3… and so on. This made it difficult for persons with visual impairment to navigate through the app.
- **Instructions/ Prompts –** Airtel takes time to start up during the first-time installation. When opening for the first time, it displays a red screen and does not give any prompt/ instruction. Glo Cafe has a problem with delayed authentication and getting through to start.

5.3 Key suggestions to improve accessibility and usability for PWDs

As Technoprise Global, we suggest that mobile money corporations consider adopting inclusive design so that persons with disabilities can form a critical target group at the design stage in order for the solutions to capture their user requirements. This will enable these applications to improve the set-up process and make them more user-friendly. Processes such as downloading an app, filling details and authentication should be quicker and easier.

To also improve the accessibility of these applications, we recommend that a clear labeling of all the interactive elements on the mobile money applications to be read by screen readers. This would improve the experience of visually impaired users.

There should be active engagement of the marginalized and unbanked communities and people groups (especially the persons with disabilities who often experience discrimination more openly. The following are some of the quick wins

- Ensure that any new products in the market follow the international standards for developing accessible application.
- Promote participation of persons of disabilities in the design process from start as an integral part of the design team or approach. This will identify the issues early and ensure the design process is less expensive. It is much more effective to identify the gaps during development as opposed to at the point of product improvement.

5.4 Conclusion

We believe that financial transactions are very personal in nature and therefore putting emphasis to ensure as many people as possible are able to transact privately, securely and independently without reliance on 3rd parties is crucial. Mobile money companies have the responsibility of addressing the needs of each of their user who have diverse needs. The customers with disabilities are a critical segment of their customer base that requires emphasis

6. Conclusion

Financial transactions are very personal, and it is therefore crucial to ensure as many people as possible can transact privately, securely, and independently without reliance on 3rd parties. Mobile money companies have the responsibility to address the needs of each of their user, who have diverse needs.

Following a comprehensive study of the usability and accessibility of several representative mobile money applications in Kenya and Nigeria, our findings show that there were areas where users with disabilities struggled more to utilize the mobile money applications compared to their counterparts without disabilities. The users who were visually impaired struggled the most because of lack of proper structure and lack of use of mobile coding standards and best practices.

Technoprise Global makes the following suggestions to improve the user experiences and increase the uptake of mobile money applications for persons with disabilities:

1. Adopt Inclusive Design across all applications lifecycles, including mobile money applications, in order to promote consistency of design and greater adoption of best practices.

Engage persons with disabilities with lived experiences and diverse disabilities as early as possible in the product and service management process. This will ensure more users with disabilities have their reflections included not only in the design but also in the improvement phases of mobile money product designs. This will also promote early adoption and enhance the sign-up process. Tasks such as downloading an app, filling details, and authentication processes should be quicker and easier for all users, including those with disabilities.

2. Improve accessibility, especially for users with low vision or upper limb mobility impairment.

Additional robust screen reader interoperability will allow better recognition of labels and buttons, for ease and independence of maneuvering within the application. The adoption of digital accessibility standards such as the Web Content Accessibility Guidelines (WCAG 2.1 level AA) should be a base for any design. For Kenya, there are Kenya ICT Accessibility Standards that guide the development of accessible digital products.

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