BIUST Teaching, Research, & Innovation Symposium 2023 (TRDAIS 2023)
Botswana International University of Science and Technology
Palapye, Botswana, 18 - 19 September 2023
ISSN: 2521-2293

USSDs vs Apps: Understanding the Adoption and Continuous Use of Mobile Applications in Botswana

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***Abstract*— Mobile applications are not only crucial for service delivery, but they also offer users convenience in completing everyday tasks. Consequently, mobile application development in Botswana has risen significantly in the last few years. However, their adoption and use remain low despite their prevalence and usefulness. Currently, there is no research evidence on why Botswana-developed mobile apps have a low adoption rate or what factors inhibit users from using such applications. To address this gap, we present the findings of a case study (n=79 users) exploring the adoption and use of the Mascom mobile app. Our findings highlight performance and usability as the main impediments to adopting and using mobile applications in Botswana. We also found that the need for the internet to use the app, lack of practical usefulness, and low social influence around the use of the app discourage users from downloading and using the app. Based on these findings, we provide design recommendations for entities (i.e., developers and companies) interested in developing a mobile application for the Botswana market. For example, developers should review the functionality of their application and identify features that are most useful to users. Lastly, our study provides building blocks for developers and designers hoping to build mobile applications for Batswana users.**

Keywords—Mobile apps; Mobile app adoption; usability; user study; survey;

I. Introduction

Mobile applications are not only crucial for service delivery, but they also offer users convenience in completing everyday tasks. In the second quarter of 2022, the number of Apple mobile apps was just over 2.1 million [1]. The global revenue from mobile apps (i.e., for Android and Apple) stood at around 318 billion USD in 2020. Statista states that this number is expected to double by 2025 [2]. Despite this growth and prospects, the adoption and use of mobile apps in Botswana remain low. For instance, while the largest mobile service provider in Botswana boasts over 1.5 million subscribers, their android app has just over 10 000 downloads in the Google Play store.

It is usually assumed that people instinctively integrate mobile app use into their lives. However, the factors that motivate such use, especially in developing countries such as Botswana, still need to be studied. While there are efforts [5,6] to bridge this gap in countries neighboring Botswana countries, the factors influencing the adoption and continuous use of mobile apps by Batswana are missing in the literature. Nonetheless, marketing managers and mobile app developers are usually required to understand how consumers decide what apps to use. When these factors are well-understood, app developers can develop better apps that meet users' needs, and marketers can decide better what product or services should be served to customers. Moreover, this is important not only for marketers and developers but also for users. This means users' preferences are considered.

This paper aims to bridge this gap by investigating the factors that inhibit Batswana users from adopting and using mobile apps designed and developed for them. Using Mascom mobile app as a case study, we ask two fundamental questions: (1) what factors inhibit the adoption and continuous use of the Mascom mobile app, and (2) what considerations should be put in place to improve the adoption and continuous use of the Mascom mobile app.

Our findings show that app performance expectancy, unclear app utility, and poor usability may impede adopting and using mobile applications in Botswana. Reliance on the internet for functionality also discourages use and adoption. In summary, our contributions are as follows:

- An in-depth understanding of the factors that hinder the adoption and continuous use of the mobile app in Botswana. Using a qualitative approach, we provide factors hindering Batswana from adopting mobile apps.
- Practical recommendations to improve the adoption and continuous use of the mobile application. Based on the findings, this paper proposes a set of design and general recommendations for improving mobile app adoption and continuous use. These are factors that designers and developers in Botswana need to consider when developing mobile apps that are attractive to mobile app users.

ISSN: 2521-2293

II. Related Work

A. Mobile App Adoption

Mobile app adoption studies are not new; several researchers worldwide have investigated why users adopt and use various mobile applications. When examining the usage of fitness apps, Herrmann and Kim found that effectiveness or usefulness yielded a more positive attitude to the app [11]. After surveying 1435 participants, Frey et al.[3] found that a person's mobile app adoption pattern is strongly influenced by their current life stage. Others, for example, Lu et al.[4] found that perceived usefulness, perceived ease of use, and compatibility are significant antecedents of the intention to use travel apps. This echoes the results of Humbani et al. study conducted in South Africa to explain the adoption and the intention to use mobile payment apps. Humbani et al.[5] found that "Drivers" were better predictors of adoption than "inhibitors", while satisfaction emerged as the strongest predictor of continuance intentions. Another prior effort, similar to our study, was conducted by Oksiutyc and Lubinga, which aimed at identifying factors affecting the adoption and use of mobile safety apps [6]. Their results show that most young people were unaware of safety apps but would use the ones recommended by their friends. Despite these studies, no research has investigated what inhibits Batswana from adopting and using mobile apps.

B. USSDs

While many mobile apps offer services, some users still prefer USSD technology. The most appealing aspect of USSD transactions is that they do not require an internet connection [3], making them ideal in a relatively emerging country with unreliable data [7]. However, USSDs suffer usability issues, and knowing multiple USSDs for different services can be a hustle. In Botswana, no study has investigated whether the use of USSDs impacts the adoption and use of mobile apps.

C. Technology adoption theories

Prior research [8,9,10] has proposed several frameworks to understand what influences technology adoption and use. One of the most often utilized theories is the Theory of Reasonable Action [11], which focuses on one aspect that defines a person's behavioural purpose and attitudes about that behaviour. Attitudes are intuitive and are formed by a set of ideas about the object of behaviour (e.g., using an application is more convenient than USSD). Another framework is Technology Acceptance Model (TAM). The TAM Model was characterized as an information system theory that analyses users [9] to see if they accept the use of technology in their field of expertise. Other frameworks focus on information flow (i.e., diffusion of innovation (DOI)), or subjective matters as norms and attitudes (e.g., theory of planned behaviour (TPB)). The framework used in this study is the Adoption and continuous use framework; it is based on literature and theoretical models on technology adoption [9]. This framework focuses on various constructs that influence the use of an application. Moreover, it not only focuses on adoption but also on why users continue to use an application.

III. Methodology

To understand what inhibits users from adopting Botswana-developed mobile apps, we conducted a qualitative survey based on the Adoption and Continuous use framework [9] using the Mascom mobile app as a case study. The Adoption and Continuous use framework aims to understand what factors influence mobile app adoption and continuous use. These factors include performance expectancy, ease of use, social influence, enjoyment, incentives, facilitating conditions, aesthetics and trust.

D. Ethical considerations

While the study did not undergo an ethics review process, we did not collect personal information. Participants were made aware of the study's purpose and asked for consent before participation. Participation was entirely voluntary and anonymous.

E. Study Design

Participants. Our study was targeted at students who were active mobile users owning or had previously owned a Mascom Simcard. We also targeted students who had owned and used smartphones for over three years and had installed several Botswana-developed mobile apps. One of the reasons for selecting students as a target group for our research is that students represent the age group of the population that spends the most time using mobile apps. They tend to use mobile apps not only for their private needs but also for their education. Moreover, students are a very social and interconnected segment of the population that actively uses social media and is widely exposed to various social influences.

To understand the deters and the influencers, we were interested in users and non-users of the Mascom mobile app. We defined a user as a respondent who owned Mascom Simcard and was using the Mascom app, while a non-user was any respondent who had never downloaded or used the mobile app or had previously downloaded the app but no longer used or had the app. We hypothesised that users would give us factors behind their adoption and use while non-users would reveal hindering factors.

Over four weeks, we recruited participants through our existing social and professional networks in and outside BIUST using social media and word-of-mouth. Interested participants were given a link that they could use to complete the survey. No compensation was given to participants.

Materials. Using the Adoption and Continuous use framework, we elicited a mixture of Likert and open-ended questions for each of the eight framework constructs. In addition, the survey also included questions on demographic background and experience with using mobile applications. In the end, the survey questionnaire had 17 questions for users and 19 for non-users.

Data analysis. We analyzed the questionnaire results using basic statistics for Likert questions and thematic analysis (for open-ended questions) to build a codebook [5]. First, the two researchers independently analyzed the first three responses to

ISSN: 2521-2293

build the codebook. Then, they met and discussed the codebook, clearing the disagreements to produce the final codebook, which was then used to analyze all the remaining responses. For the mobile app users' questionnaire, saturation was reached after 8 participants and 23 non-users.

IV. FINDINGS

This study investigates what factors inhibit the adoption and continuous use of mobile applications in Botswana. In this section, we discuss the findings of our study. We first begin with discussing the factors that impede the adoption and continuous use of the Mascom app from respondents (i.e., users) who have installed and have the app in their phones, then for non-users in the light of the adoption and continuous model constructs. Fig 1 summarises the findings of our study. We conclude this section by presenting factors that may encourage users to download and use the Mascom mobile app.

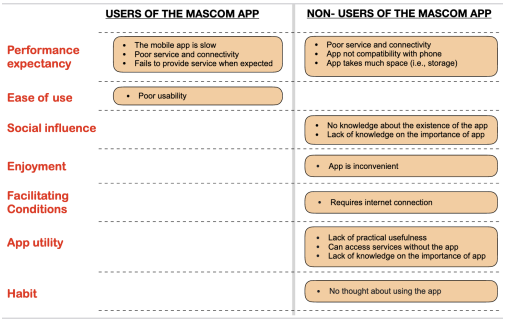

Figure 1. Summary of the results.

F. Participants' Demographics.

Eighty-six (86) respondents completed our survey. However, seven were removed because they either straight-lined or provided responses that did not make sense. In the end, we had 79 respondents, 46 males, 32 who identified as female, and one who did not disclose their gender. Of the 79, 66 were 18 - 23, 2 were older than 30, while the rest were between 24 and 30.

Twenty-six (26) owned just one Simcard, a Mascom Simcard, while 44 owned two simcards, either a Mascom and Orange sim, or Mascom and BeMobile simcards. Only 9 owned all three simcards. Fig x summarises these numbers.

Regarding Mascom app download, sixty-four (64) had never downloaded the app, eleven (11) had used the app, and four (4) downloaded it and then uninstalled it. In summary, 68 respondents were classified as non-users of the app.

G. Users of the Mobile App

In consideration of the adoption and continuous use model, performance expectancy and usability were the topmost cited constructs perceived as the top impediments to continuous use.

Performance expectancy. Most participants revealed that the mobile app was generally slow (e.g., P7 "The app is extremely slow"), and they usually experienced poor connection, particularly in rural areas. P3 explained, "It takes ages to connect… poor network connection in rural areas". Participants reasoned that these performance issues affected their intention to use the app and encouraged them to seek other alternatives to get the same services. Other respondents explained that they did not have a full understanding of how the app could help them achieve their goals, "I Don't really know what it can do apart from showing my balance, be it airtime or data balance." P10

Usability. Other users raised concerns about the usability of the mobile app. They explained that it is sometimes hard to find the services they want to use. For example, P5 highlighted that the app had so many categories: "There are many categories, and it can be hard to find the service I'm looking for, a search option would be nice." Other participants explained that the consistent requirement of login credentials (i.e., effort) sometimes discouraged them from getting the service through the app.

H. Non-users of the Mobile App

Our analysis revealed that the most common factors impeding adoption and continuous use were performance expectancy, social influence, app utility, facilitating conditions, and habit.

Performance Expectancy. Non-users also cited a lack of reliable network connection or poor service for not using the mobile app. Further analysis showed that non-users, particularly those without knowledge of the app, believed there were no benefits. They explained they could still access services without using the app, P23 "I can access most of the services freely without the use of the mobile app."

Social influence. Almost half of the non-users did not know about the existence of the app or its uses. The majority of them did not know or seen anyone use the app. Some respondents further explained that none of their close friends used the app, hence their lack of awareness. P54 reported: "I do not know about it and its uses… no one I know has that app."

App utility. Some participants cited the app's lack of practical use as their main reason for not using it. They reported that they mostly download and use apps because of their functionality. For example, P50 declared, "Not sure what the benefits of using [the app] are… what can I do with it?"

Facilitating conditions. Most non-users reported that they did not use the app because of the cost and the resources needed. They mostly highlighted that the app needed the internet function, a condition they struggled to meet. Participants explained they did not always have an internet connection or afford to subscribe to Mascom data bundles. P23 "The mobile app requires internet connectivity, so I don't have that privilege…" Other respondents further explained that this is defeating because this is the same app they need to buy calling credit (i.e., airtime) or even subscribe to the internet. P61

"it's not convenient for me as it requires internet to use it, so I can't use it to get airtime or maybe subscribe for the internet because I need those two to use the app." We also found that three respondents were not using the app because their mobile phones did not meet the requirement of the app, for example, P25 "my phone is old… I can't update it… I can't have the app"

ISSN: 2521-2293

Habit. Other respondents explained that they did not use the app out of habit; they are used to accessing the Mascom services through other means, for example, USSD codes or quick codes. P7 explained it is easier and more convenient to use codes than the app, "I am just used to using codes, I can check my balance, I can do everything… I am not used to using the app."

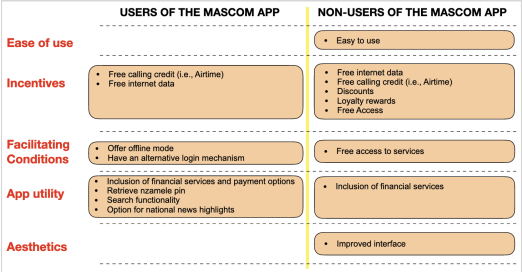

Figure 2: Users' desires for the app

V. Factors that may encourage users to use the app

As part of our survey, we also asked all the respondents what factors would encourage them to use the application. Respondents explained that incentives, app utility, usability and internet-free services would encourage them to use the app. Fig 2 shows the summary of the results.

Incentives. Both users and non-users cited the need to incentive the use of the app. The majority explained that they needed to see the benefits of using the app, P31 "I should be given extra airtime for using the app to buy airtime." Others explained that incentives could be in the form of free internet data and discounts for some services.

Facilitating conditions. Respondents reported that accessing the services through the app should be free. They mentioned that they used to be allowed to access Facebook and Wikipedia for free though those services were internet-based. For example, P47 said, "Why can we just be allowed to use the app without a data subscription? It should be free." Moreover, other app users also suggested that the app should provide an alternative login mechanism and should refrain from repeatedly signing them out from using the app.

App utility. The majority of participants desired improvement in the services provided by the app, and they requested more features. For instance, all the app users asked for search functionality and the inclusion of financial services. P8 said, "More payment options for shopping and utilities," while P5 added, "A search bar to easily find services under different categories."

Usability and aesthetics. Some respondents reported that improvement in the aesthetics and usability could encourage them to use the app. One participant explained that having to provide a username and password all the time to use the app was tiring and annoying. They suggested the app should consider an alternative login mechanism, P9 "biometric log in [would help]."

VI. Discussion

I. Discussion of the results

While the study did not undergo an ethics review process, we did not collect personal information. Participants were made aware of the study's purpose and asked for consent before participation. Participation was entirely voluntary and anonymous.

App utility. Our results show that many non-users needed help understanding the app's purpose or the services offered. This was also alluded to by the app users, who wondered whether the features they had were even useful. For the app to be adopted, the purpose of the app should be clear. Our results suggest that developers or app owners should design apps that have apparent use and functionality. This may also explain why most consumers use USSDs.

Facilitating conditions. Users and non-users of the mobile app explained that they do not always afford the internet service to use the app. Arguably, this may be the reason why most respondents do not use the app to access services. This is also possible since the internet connection in Botswana is still scares, which may affect any use of mobile applications because they mostly rely on the internet. App developers and owners should ensure that their mobile apps can offer services offline where possible.

Usability and aesthetics. Our results suggest that users are not using the app because of its usability and aesthetics issues. Prior studies [12] have cited usability as an important factor in technology adoption. Our results suggest the Mascom app is not an exception; some users stopped using the app because it took more work to use. Developers and app owners should invest in including users in their design process to ensure aesthetics and usability are ensured.

Social influence. Most non-users reported that they were only aware of the existence of the app after the survey. This may be due to a lack of app marketing or user conversations about the app. This finding suggests that app owners should invest in advertising their applications. It is a common practice to advertise mobile apps on social media, particularly the services that users can get through the app.

Based on the findings, to engender adoption and continuous use of the mobile app, mobile app owners in Botswana should:

- Review their apps' functionality and identify features that are most useful to users. Common features and services should be easy to access.
- Offer users alternative ways of accessing the app (e.g., biometric login) to create an easier way into the app, which may eventually create the habit of using the app.
- Invest in advertising services the app offers and offer incentives (i.e., loyalty bonuses) to help raise awareness and value for using the app.

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- Offer some services offline. Where possible, users should be able to access services without an internet connection or mobile data subscriptions.
- Improve performance and usability of their apps. Apps should go through proper testing phases with various versions of mobile phones and should have less dependency on third-party libraries to reduce loading and delayed connectivity.

J. *Limtations of the study*

Since this is the first study to explore the adoption and continuous use of mobile apps in Botswana, there was no empirical research to compare and contrast our findings.

Our study investigates the adoption and continuous use of one mobile app; users may have different perceptions about other apps (e.g., apps from other mobile service providers). Nonetheless, our findings provide critical insights into the perception of locally developed apps in Botswana.

Notably, therefore, the thematic analysis of participants' responses does not expose any evidence that the issues they mentioned are as they describe them in the Mascom mobile app; their opinions may have been influenced or be based on what they expected from mobile applications developed in Botswana.

Lastly, our survey was written in English, which could have affected participants who are more confident responding in Setswana. Notwithstanding, our sample is primarily young adults studying at the university level.

VII. CONCLUSION

This is the first study in Botswana to explore what factors inhibit mobile app adoption and continuous use. Using the Mascom app as a case study, our results suggest that app performance expectancy, utility, and usability may be the main impediments to adopting and using mobile applications in Botswana. Reliance on the internet for functionality also impedes use. These findings provide a foundation for what app owners should consider when building future mobile applications. This study focused on the Mascom app; future studies should investigate whether these factors are the same for other mobile applications, particularly those in the same category. Moreover, this study calls for more usability studies around mobile apps.

ACKNOWLEDGMENT

We would like to thank all the participants who took part in our study, and the feedback from colleagues and friends around Botswana International University of Science and Technology.

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