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Sustainable Online Payments by Preventing Payment frauds and Mistakes by Verifying Payment's Beneficiary's Name against Actual Account holder

Johnson Olumuyiwa Dehinbo
Department of Computer Science, Faculty of Information & Communications Technology, Tshwane University of Technology, Soshanguve, Tshwane, 0152, South Africa
Corresponding author: Dehinbooj@tut.ac.za

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Abstract: Towards sustainable development, it is important for any society to continually make progress in their endeavours. Progress in online and mobile banking is an example of important state of development that the whole world is currently enjoying and might want to continue to grow more into. This has ensured developmental progress now to a point when one can do banking transactions at any time of the day and using mobile electronic devices including laptops and mobile phones. But as the world enjoys this state of things in banking, online frauds and fear of mistakes are some of the factors that could be limiting the continued sustainable growth of adoption and use of mobile and online banking. Efforts should be increased to avoid online frauds and fear of mistakes as some of the factors that could be limiting the future sustainable continued growth of adoption and use of mobile and online banking. Imagine the fear of someone being fraudulently tricked into paying into someone's personal account instead of to the account of an organization that one is transacting with? Also, imagine the fear of someone making simple mistake of mistyping a number e.g. 5 instead 6 on an account number. People would fear losing one's money through such simple mistake if there is no likelihood of confirming account holders as one conducts the mobile banking transaction. This can negatively affect sustainable use of developments in the society. An important question then is why banks in South Africa are reluctant to leverage on the use and power on computing to provide such verification of account service that could give their customers peace of mind in using online, internet, or mobile banking transaction. One wonders why South African banks are failing to come to these realizations while those in other less developed countries like Nigeria are doing so freely. Such service could give their clients peace of mind by maximizing the benefits of ICTs for development while minimizing the risks of lack of sustainable continued growth of adoption and use of mobile and online banking due to the fear of online frauds and fear of mistakes when making mobile and online banking payments. This study adopts a qualitative research approach using a systematic literature study of various previous studies that we have done in the past which adopted prototyping research and related methods. More specifically, the multiple methods for the various component studies include literature study, survey, argumentation, prototyping, participatory design and the design science method in the development of various systems we considered necessary to stimulate or leapfrog developing countries into sustainable development. Most of the system development works presented thus serves as prototypes. Argumentations are then often used in reasoning about some aspects of developed prototype systems to justify how those aspects could fulfil certain user objectives. This study therefore proposes a requirements analysis and conceptual modelling with suitable architecture that can be used to develop a system for verifying account details when Internet or mobile banking is used for payments. This could then serve as input to a prototyping study to develop and implement the proposed system. If, and/or when adopted widely in the society, such system could lead to sustainable use of mobile and online banking payments for development in the society.

Keywords: Account Verification Systems, Information Systems Development, In-house development, Mobile Banking, Online payment systems, Sustainable Development.

Introduction

Development has been explained in various studies to refer to a state of improvement that is a desirable state for any society, being connected to the quality of life of the society. An important aspiration of people is to sustain the state of development they might be, and to continue to grow more into further developmental state. An example of important state of development that the whole world is currently enjoying and might want to continue to grow more into involves progresses in online and mobile banking. This has ensured developmental progresses from time when banks have to close by 1pm to be able to finish account reconciliations before end of the day, to time when one has to rush to get to the bank before they close by 4pm, and now to time when one can do banking transactions at any time of the day and using mobile electronic devices including laptops and mobile phones. But as the world enjoys this state of things in banking, online frauds and fear of mistakes are some of the factors that could be limiting the continued growth of adoption and use of mobile and online banking. And given that Brown [1] explains that sustainable development (SD) is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", efforts should be increased to avoid online frauds and fear of mistakes as some of the factors that could be limiting the future sustainable continued growth of adoption and use of mobile and online banking.

Imagine the fear of someone being fraudulently tricked into paying into someone's personal account instead of to the account of an organization that one is transacting with? Fraudsters could easily change an organization's banking details on an invoice to their personal account. People would fear losing one's money through such simple trick if there is no likelihood of confirming account holders as one conducts the mobile banking transaction.

Figure 1 below shows an organization warns customers against acting on fraudulent messages from fraudsters and scammers that could include information stating that the organization's banking details have changed. In such a situation, the fraudsters could easily put or give their own banking details such that subsequent payment by the customer would go into the fraudsters' bank account. SABC [2] in their South African Broadcasting Service Channel 2's Morning life program on 28 March 2023 also talked about R30 million fraud in Ethekweni Municipality that happened due to fraudulent changes to bank accounts.

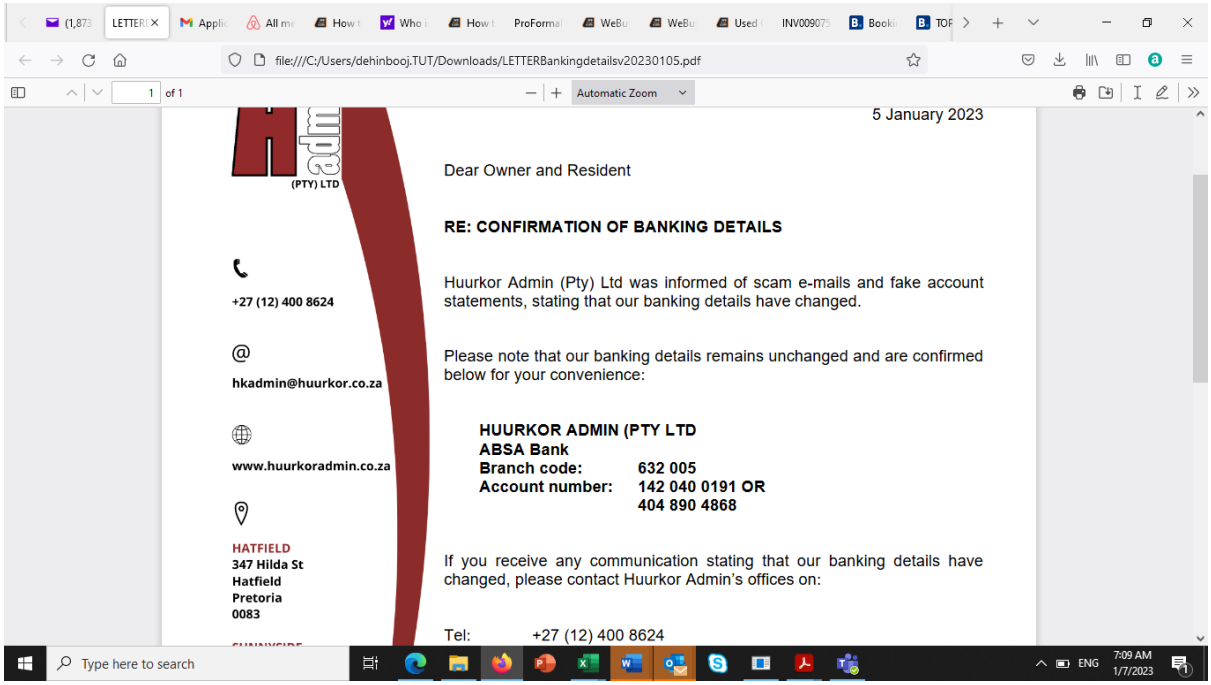

Fig. 1. An organization warns customers against acting on fraudulent messages indicating account changes.

Even if banks fraud protection and insurance units can refund such money lost to such fraud, one still fears the amount of time it would take to resolve such. So, some bank users could simply resolve not to use mobile and online banking but rather go to the bank teller and ask the teller to check the account holder first and then deposit the payment. In this situation, then, first, the bank user has forfeited the freedom of doing banking transactions at any time of the day and using mobile electronic devices including laptops and mobile phones, by constraining oneself to get to the bank during opening hours, paying the cost of time and travel to the bank, paying the extra cost of teller transaction inside the bank etc. This can negatively affect sustainable use of developments in the society.

Again, imagine the fear of someone making simple mistake of mistyping a number e.g. 5 instead 6 on an account number. People would fear losing one's money through such simple mistake if there is no likelihood of confirming account holders as one conducts the mobile banking transaction. Also, even if banks fraud protection and insurance units can refund such money lost to such mistake, one still fears the amount of time it would take to resolve such.

One could not help but ask than why banks do not automatically include such confirmation of account holders as one conducts the online or mobile banking transaction. Some banks rather put a disclaimer on the transaction page that the Beneficiary's Name is not verified against the Actual Account holder. Such is visible on figure 2 below in which Capitec [3] clearly indicate such.

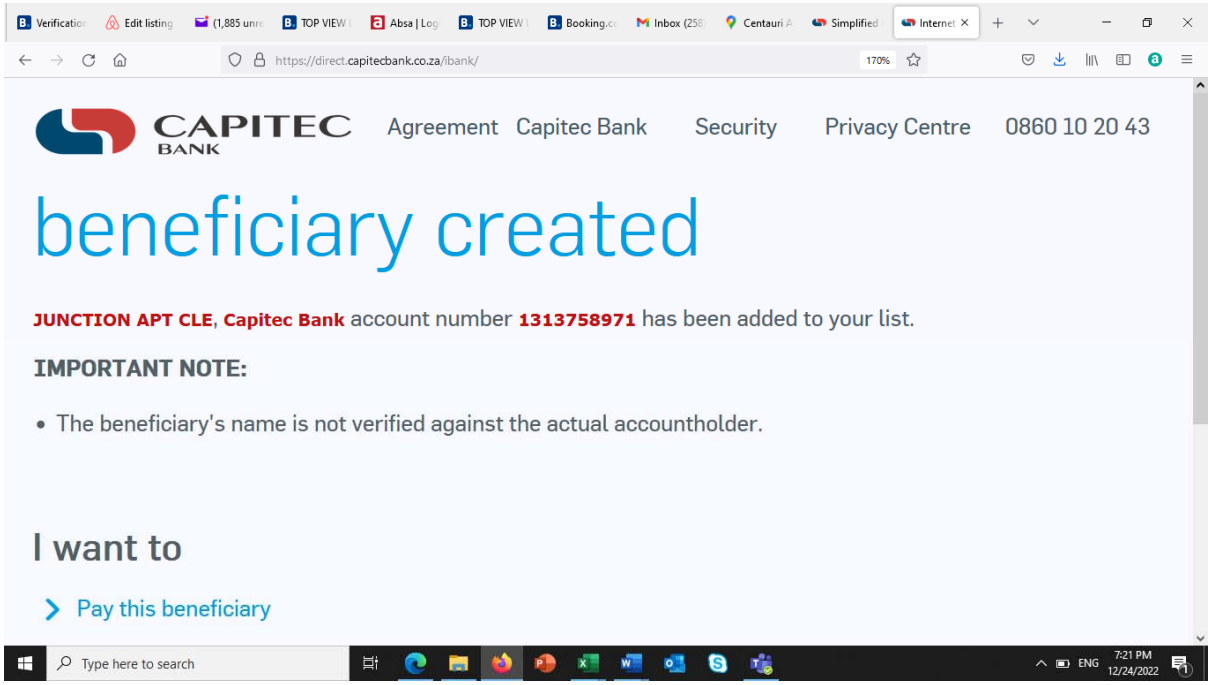

Fig. 2. Capitec Nedbank disclaimer on non-verification against actual account holder

In figure 3 below, Standard bank clearly indicate that payee clients should please ensure that they enter the correct account number and that they are not responsible for payments sent to the wrong recipient. But what if one thinks one is entering the correct account number, but it has been fraudulently changed? That is why account verification could have given the payee client peace of mind.

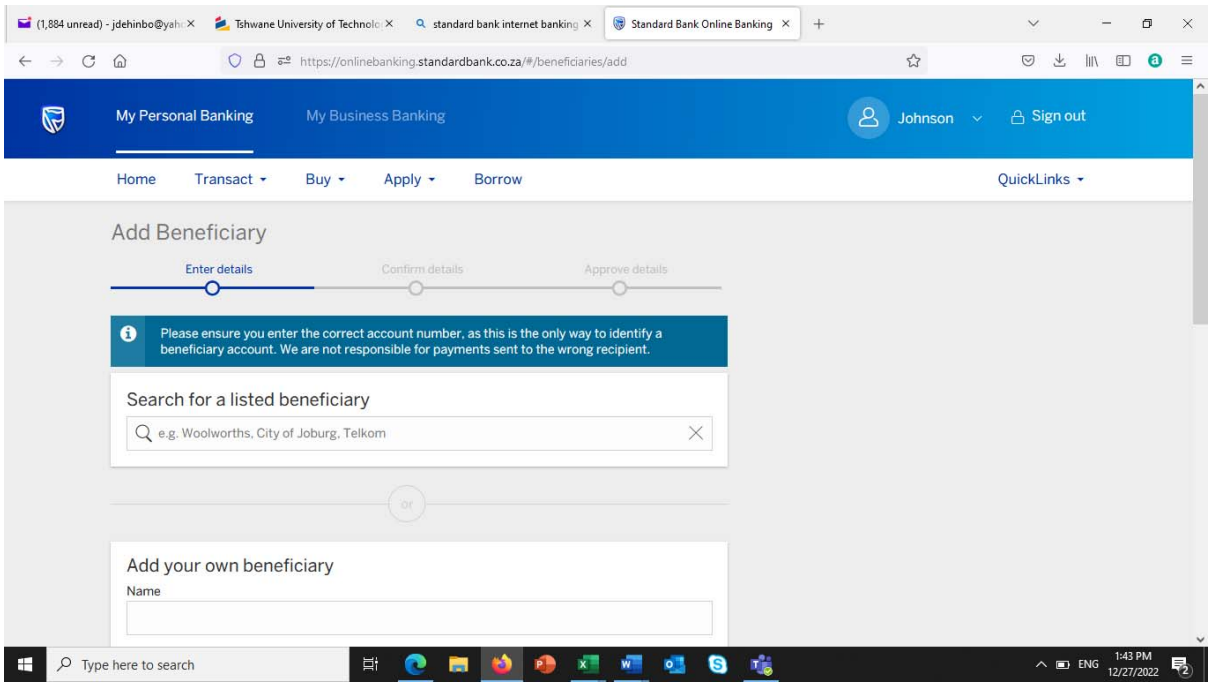

Fig. 3. Standard bank indicates that payee clients should ensure correct account number and that they are not responsible for payments sent to the wrong recipient.

Similarly, in figure 4 below, Nedbank clearly puts a disclaimer on non-verification of account service and indicates that no refund would be made for payments to wrong recipients due to mistakes on the account number. It therefore urges and reminds clients to make sure that their recipients account information is correct.

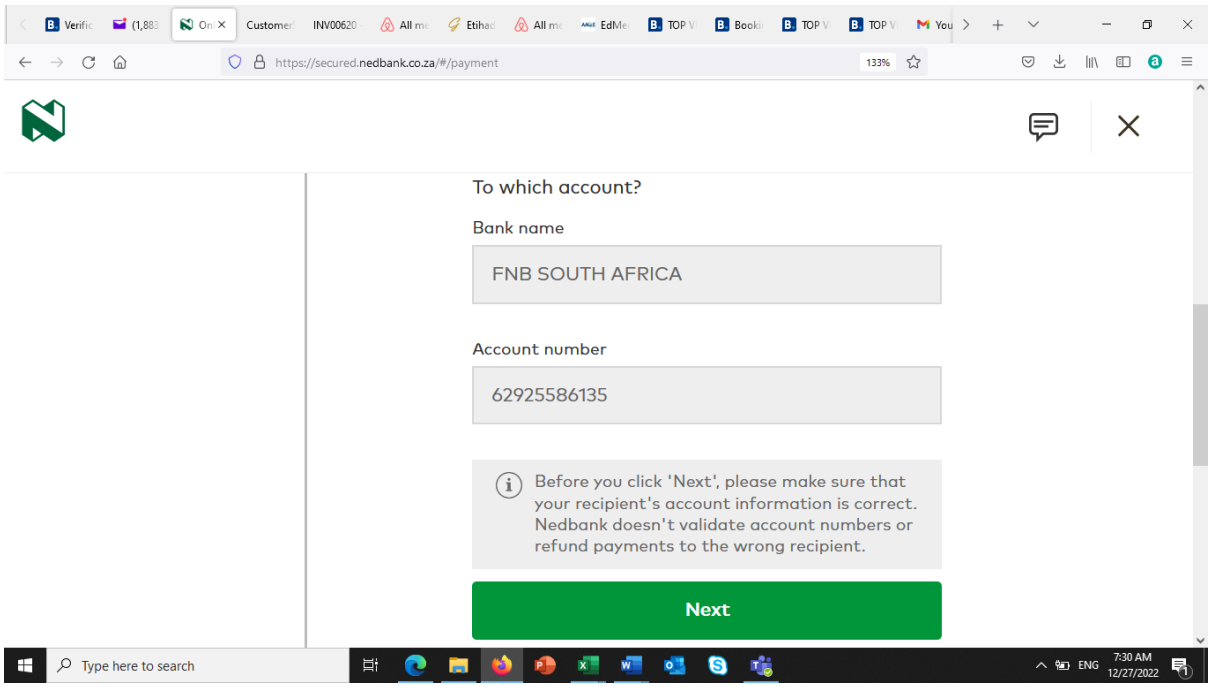

Fig. 4. Nedbank disclaimer on non-verification of account service and no refund for mistakes.

An important question then is why banks in South Africa are reluctant to leverage on the use and power on computing to provide such verification of account service that could give their customers peace of mind in using online, internet, or mobile banking transaction. Some banks however have started to offer such service of *verifying Beneficiary's Name against the Actual Account holder as* an additional service for additional fee.

Banks offering account verification service for additional fee

Some banks would rather offer such service of *verifying Beneficiary's Name against the Actual Account holder as* an additional service for additional fee (eg Standard bank in fig 5, FNB in figure 6 and 7, with ABSA in figure 8). Standard bank in fig 5 indicates that while verifying a Standard bank account number is free, verifying other banks' account number costs R2.

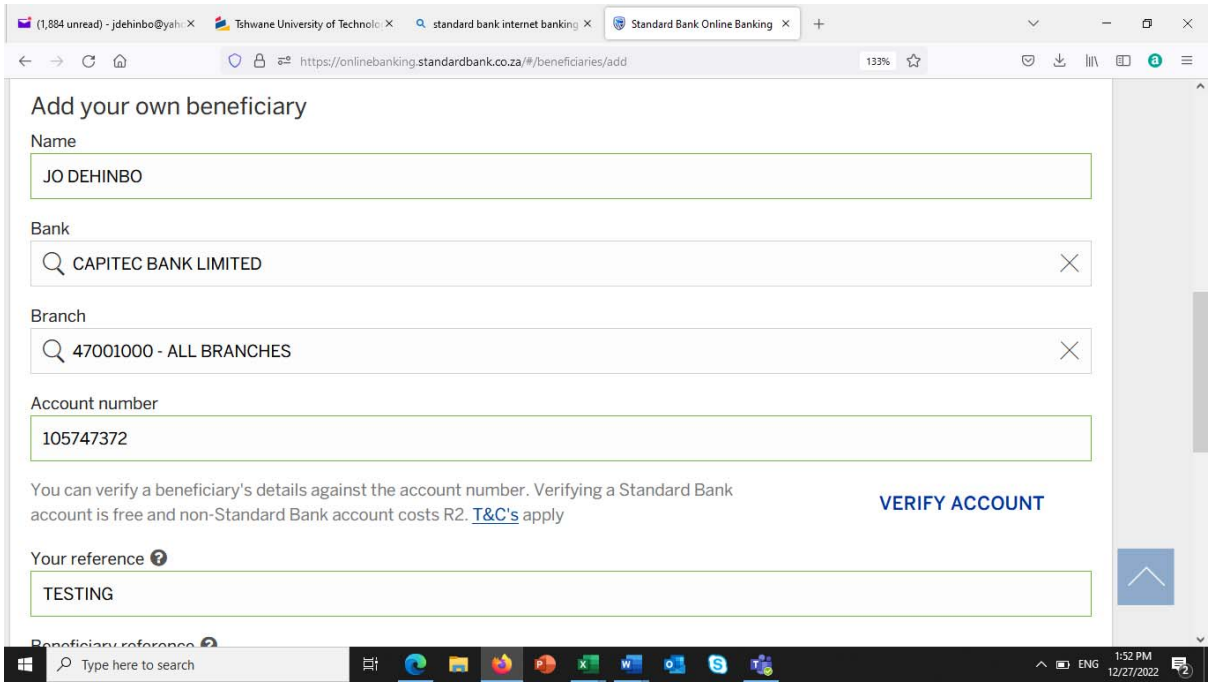

Fig. 5. While verifying a Standard bank account number is free, verifying other banks' account number costs R2.

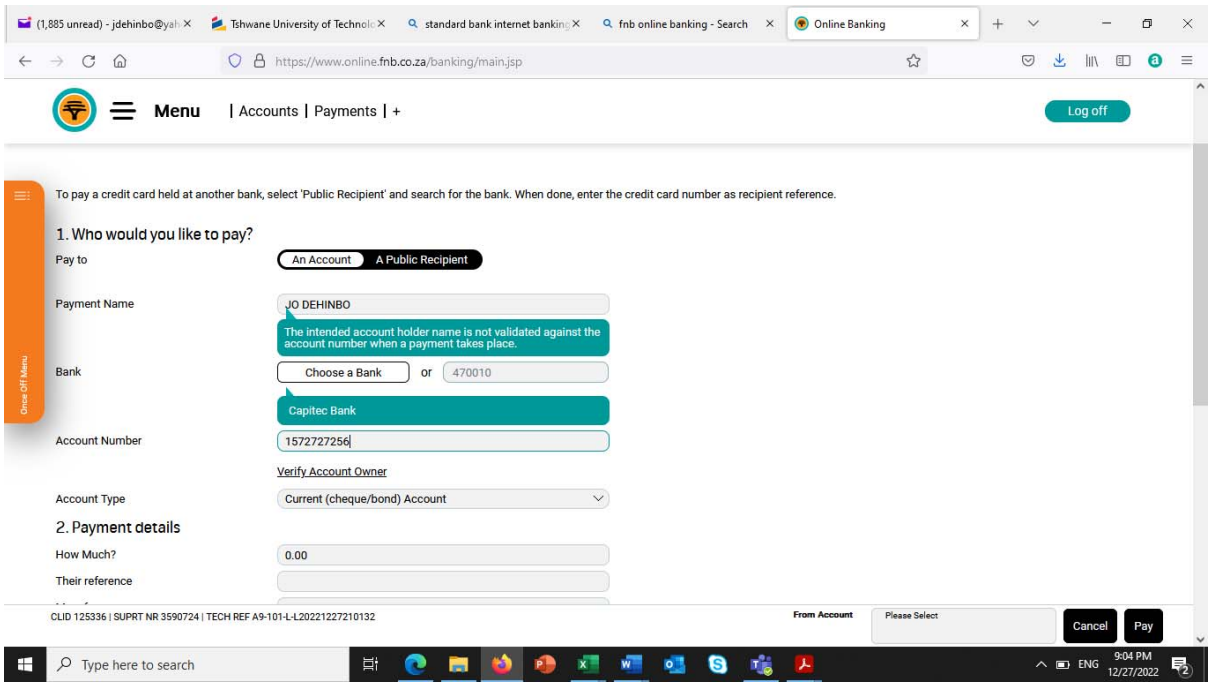

Fig. 6. FNB Account verification service at additional charges

On clicking on the 'Verify Account Owner' link on the FNB website for the FNB Account verification service, the next page in figure 7 appears. This page indicates that there is a fee for the service, but the fee amount is not indicated. Details on such pricing fees are referred to as available on www.fnb.co.za containing the FNB Online Banking Pricing guide [4].

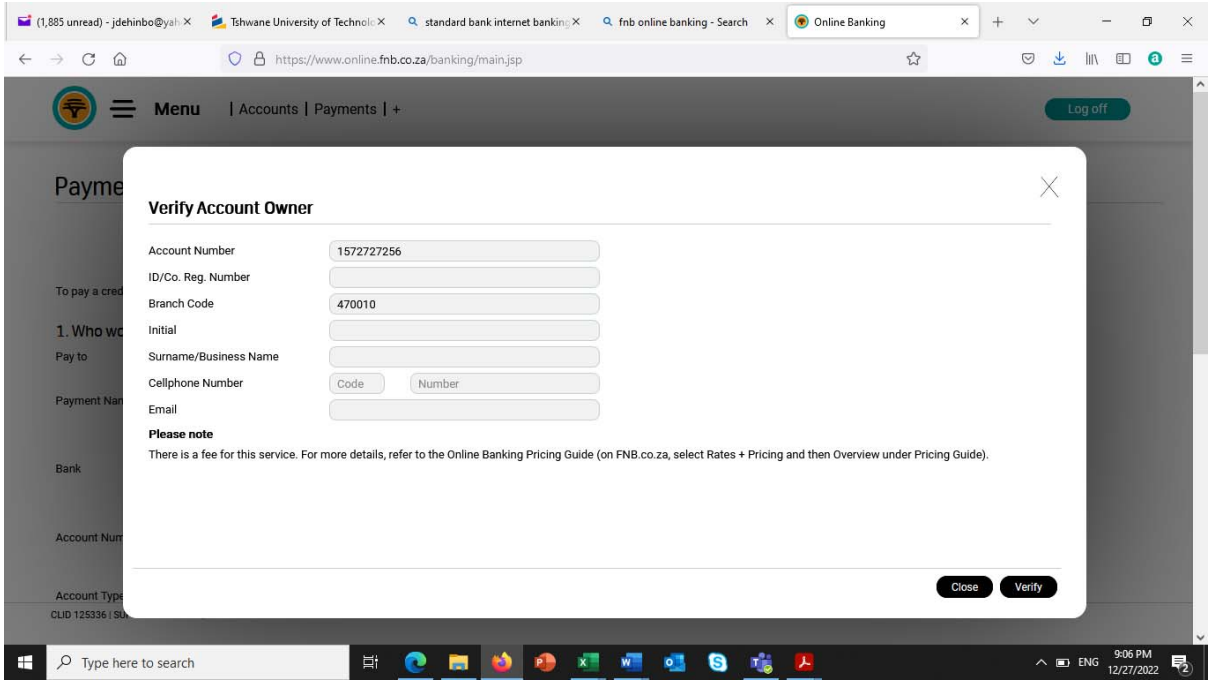

Fig. 7. FNB's statement indicating a fee for the Account Owner Verification service, but the fee amount is not indicated.

Similarly, figure 8 below indicates that the ABSA's Account verification service is charged per account verification. Furthermore, while the additional charge amount is not indicated, the statement explains that the charges will be billed as part of the Internet banking billing cycle.

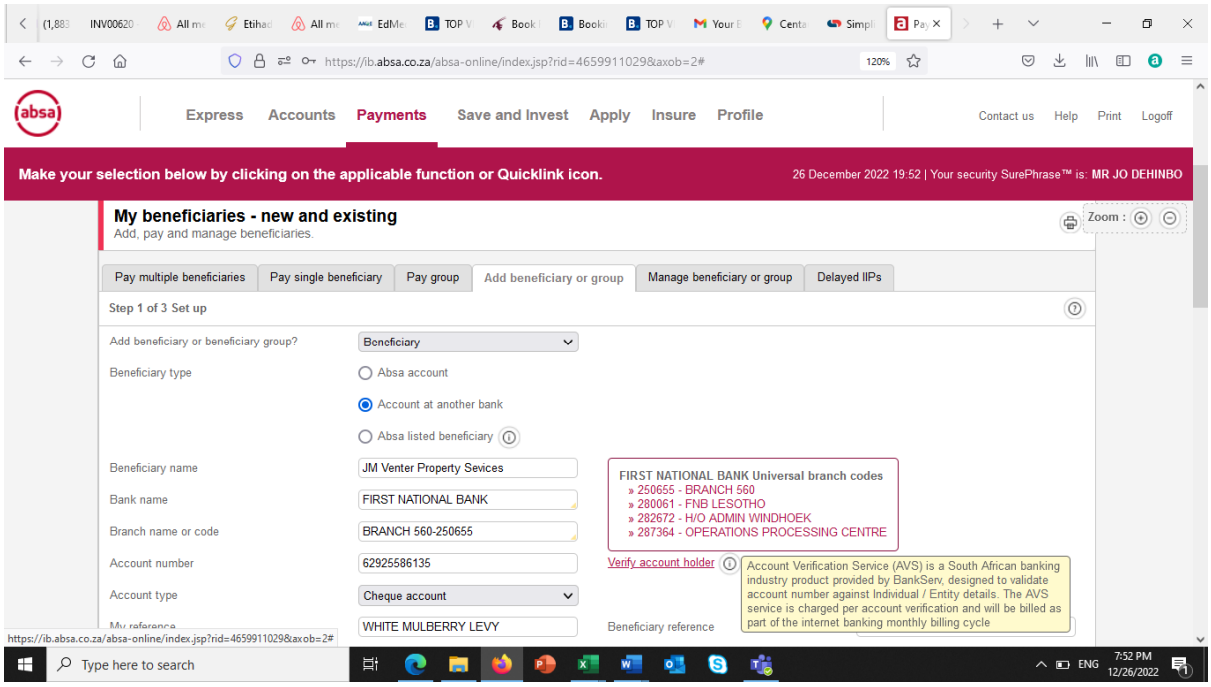

Fig. 8. ABSA Account verification service at additional charges

One could not help but wonder: Is that additional fee worth sacrificing the widening continued growth of adoption and use of mobile and online banking with peace of mind for customers? Even in business, shouldn't we temper profitability with some elements of humanity as enshrined in the "ubuntu" caring philosophy? Is that what capitalism has brought us to or is it ignorance on the part of banking service providers? Do banking service providers realize that such little gain in additional fees cannot be compared to increased revenue that could come from the widening continued growth of adoption and use of mobile and online banking with peace of mind for customers? Especially in a country like South Africa that is supposed to be a leader in business development in Africa, being the most developed country in Africa, one wonders why she is failing to come to these realizations while other less developed countries are.

A country like Nigeria is less developed than South Africa and just started using mobile phones and computerized banking including using Automated Teller Machines (ATM) and mobile banking about at least 10 years after South Africa. In the BankservAfrica and PASA [5, p. 1] reports, the international comparison covers payment systems in 10 countries namely Australia, Brazil, Canada, European Union (Euro area), India, Mexico, Nigeria, **South Africa,** United Kingdom, United States. South Africa falls in the mid-range for GDP per capita in USD (2015) of 7,601.51 while Nigeria has 2548.17 with USA on 51,522.53.

BankServ Africa & PASA [5, p. 12] also indicate that as at 2017, bank accounts penetration in South Africa is 77% while that of Nigeria is 29.7%. Yet, the banking systemin Nigeria is able to implement such system that automatically includes the service of verifying Beneficiary's Name against the Actual Account holder without additional fee. And as a cherry on top, these services are available from any bank in Nigeria and irrespective of the recipient's bank. For example, if one is using the Polaris Bank or the United Bank for Africa (UBA) Internet or Mobile to pay a person banking with First Bank by entering the First Bank account number, the Polaris Bank or the UBA system will display the name of that First Bank recipient. That implies the presence of a collaborative service among all banks in the country for the benefits of all bank clients. Examples are given in figures below.

In figure 9 below, a First Bank account payer enters the Account number of a Polaris Bank account recipient.

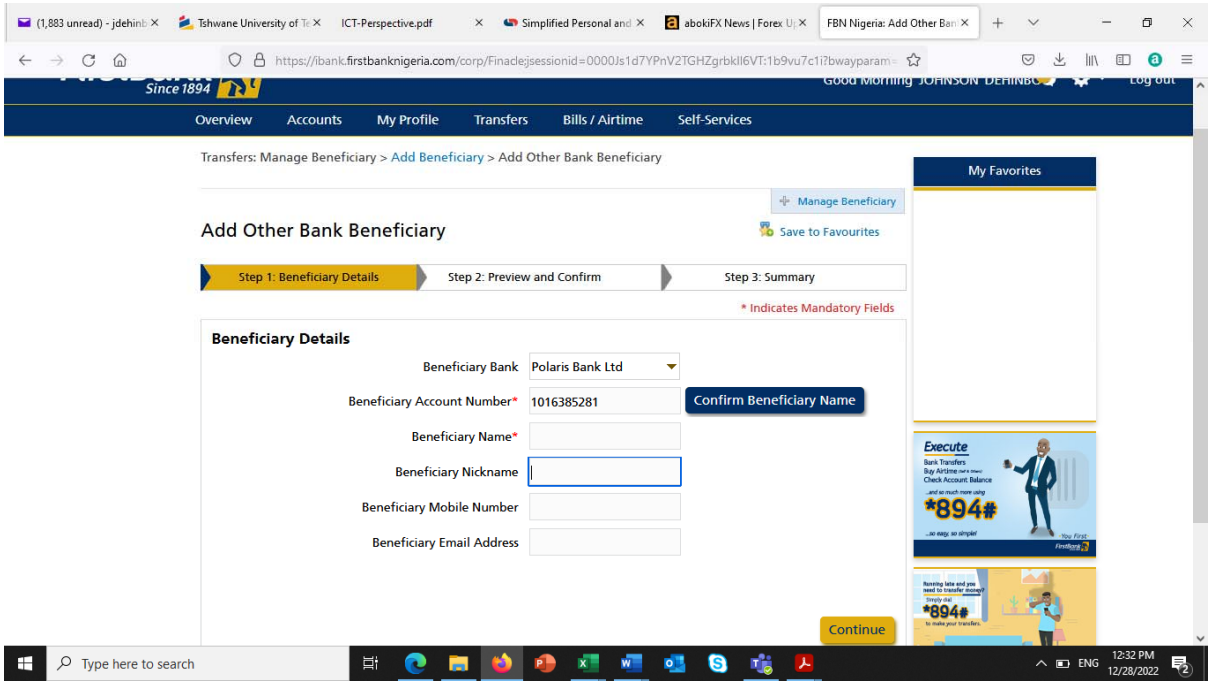

Fig. 9. A First Bank account payer enters the Account number of a Polaris Bank account recipient.

On clicking the 'Confirm Beneficiary Name' button in figure 9, First Bank system brings out and display the name of that recipient with the Polaris Bank account number. This is shown in in figure 10 below.

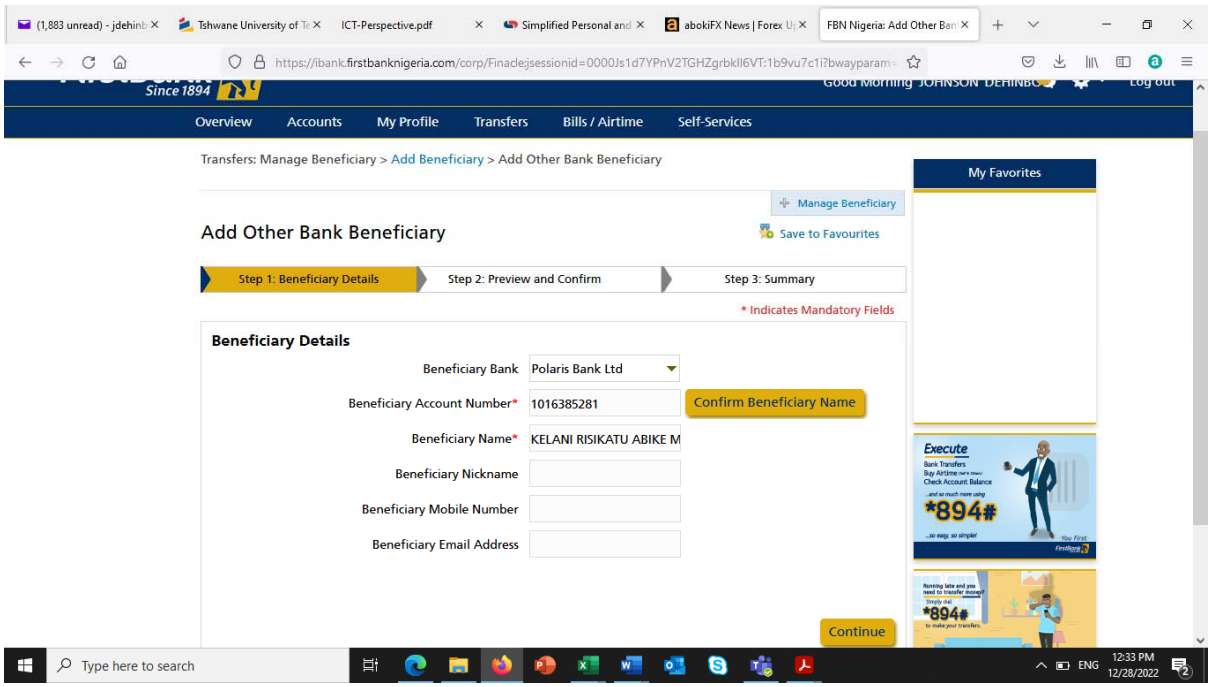

Fig. 10. First Bank system brings out and display the name of that recipient with the Polaris Bank account number.

The First Bank payer can then proceed to enter other optional details such as the nickname, phone number or email for the recipient. This is followed by clicking the 'Continue' button upon which figure 11 is displayed.

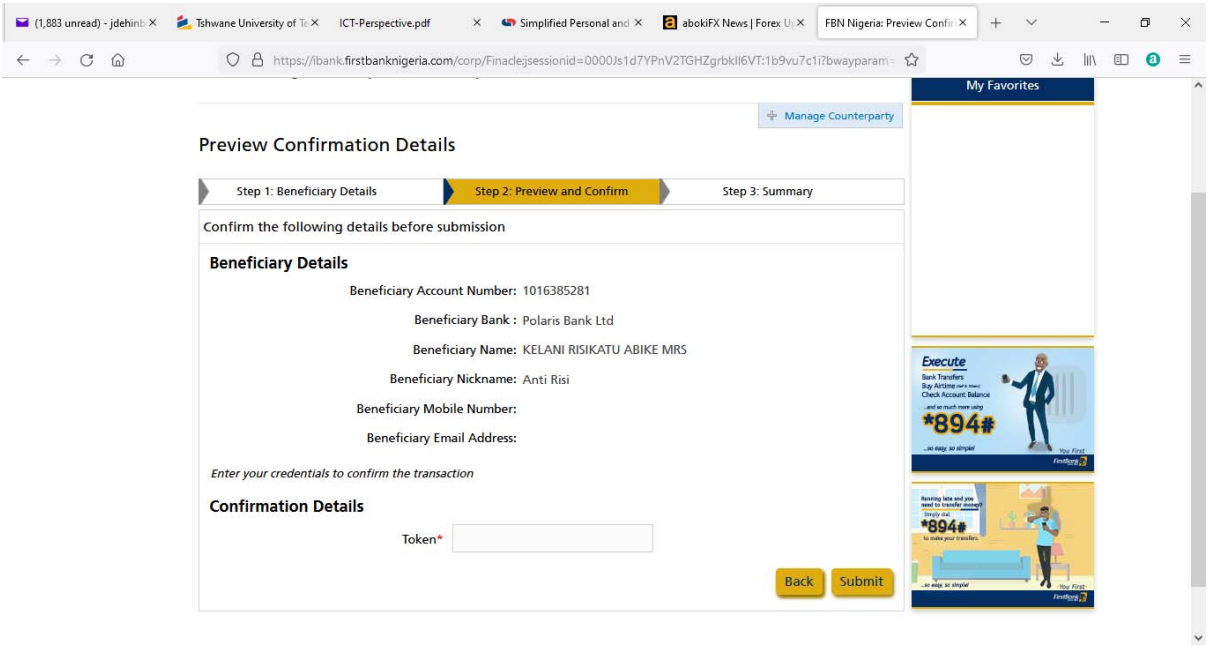

Fig. 11. The First Bank system displays other optional details such as the nickname for the Polaris recipient.

Similarly, figure 12 below shows a payer on UBA Internet or Mobile banking system entering the beneficiary's account number at another bank namely, Access bank for the inter-bank transaction.

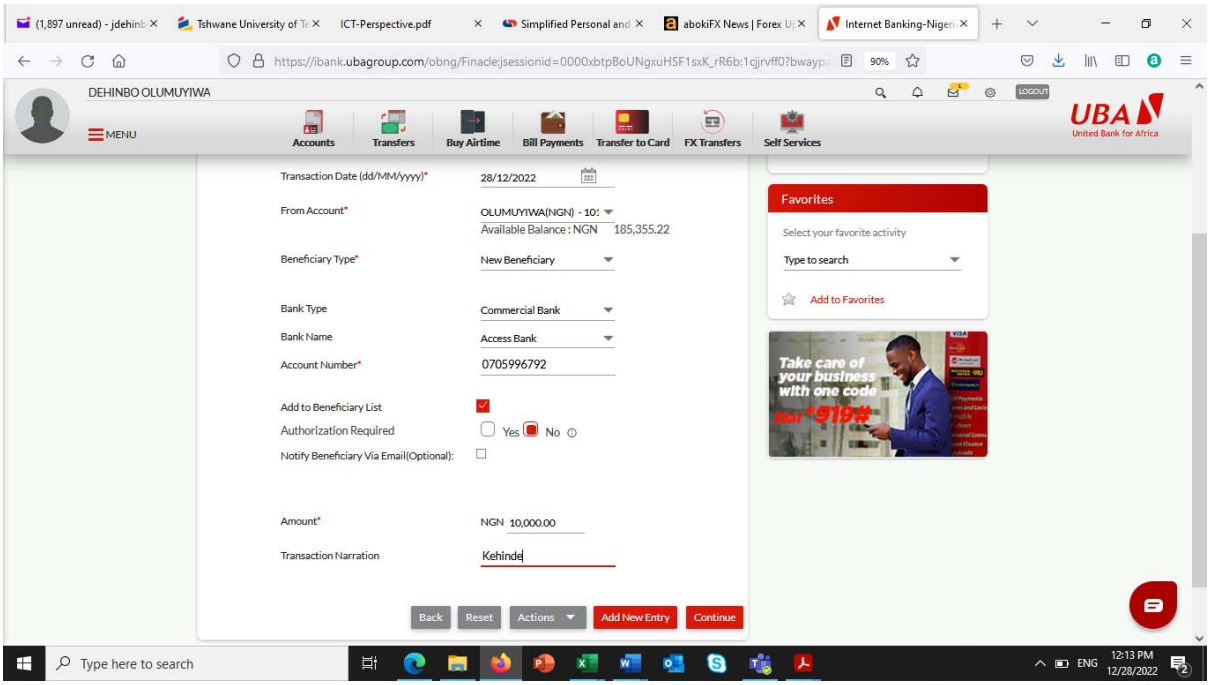

Fig. 12. Payer on UBA Internet banking system entering the beneficiary's account number at Access bank.

Figure 13 below confirms and display the name of the Access bank recipient. Also, figure 14 and 15 below confirm and display the name of another recipient at another.

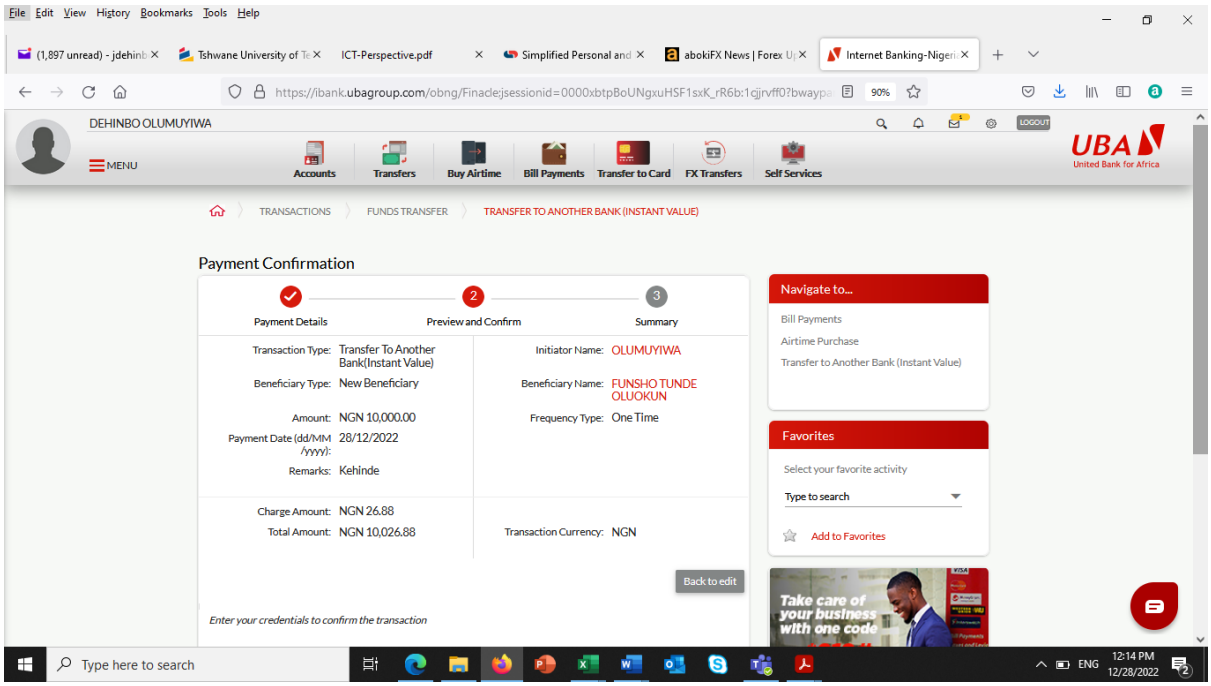

Fig. 13. UBA Internet or Mobile banking system confirms and display the name of the recipient at another bank.

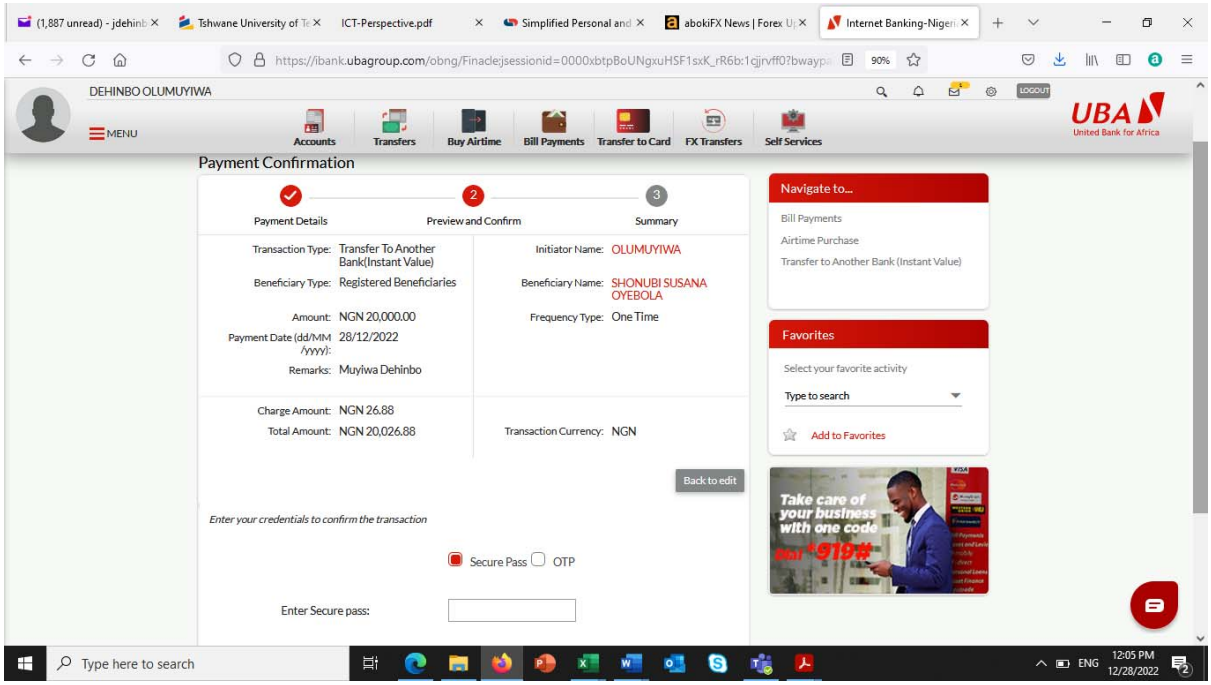

Fig. 14. UBA Internet or Mobile banking system confirms and display the name of the recipient at another bank.

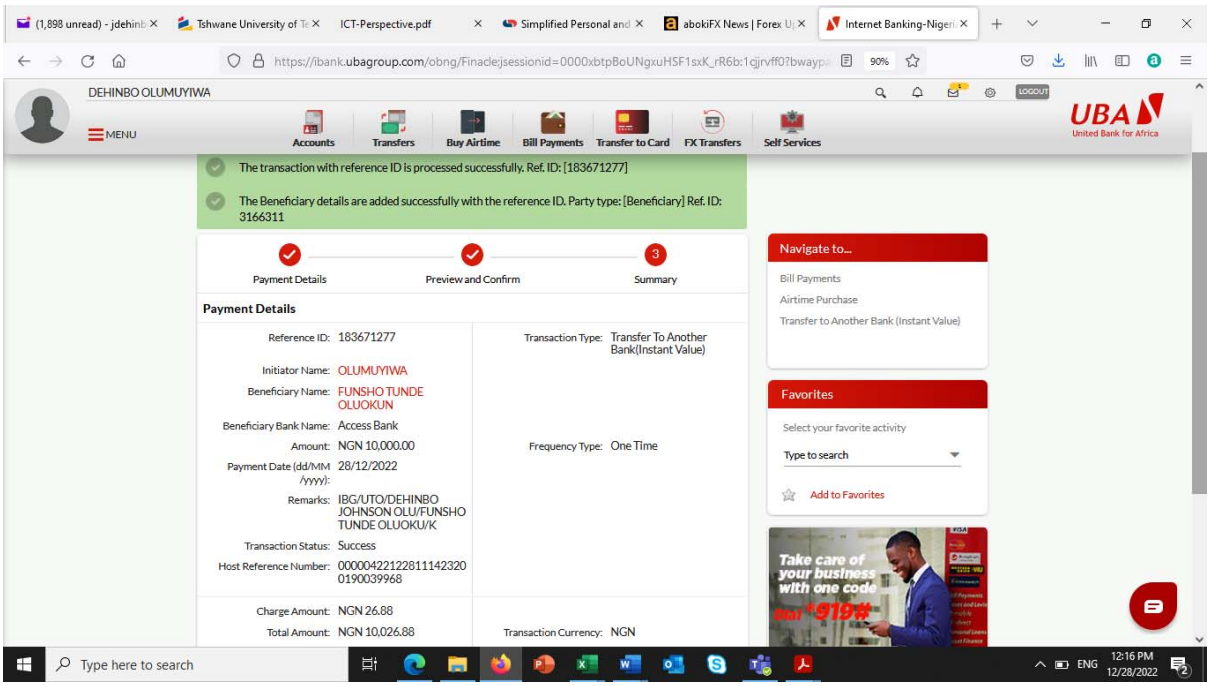

Fig. 15. UBA Internet or Mobile banking system confirms and display the name of another recipient at another bank.

Like the Nigerian banks above, an important question then is why are South African banks not collectively taking appropriate measures to give their clients peace of mind by verifying account details when Internet or mobile banking are used for payments? Mansell and Wehn [6, p. 11) ask: Are the stakeholders in developing countries taking appropriate measures to maximize the benefits of ICTs for development? Are the stakeholders in developing countries taking appropriate measures to minimise the risks of social and economic exclusion that could be associated with these revolutionary technologies? One of such risks is lack of sustainable continued growth of adoption and use of mobile and online banking due to the fear of online frauds and fear of mistakes when making mobile and online banking payments.

Alcaraz and Bell [7] explains that sustainability includes social, ecological, and economic principles, which are connected to the quality of life of society, ecological and social justice, and economic opportunities. Quality of life of society refers to human development, social and ecological justice, as well as welfare economics. In this sense, it is vital that new products and services introduced to society should cover a social, ecological, and economic benefit for users. New products and services introduced to society enabled by technology and innovation have benefits related to quality of life through the development of knowledge enabling such products, and services. But what quality of life could one have in a society where one may have to resort to an old and ineffective way of banking and fearful of new and innovative solutions such as Internet and mobile or online banking payments due to the fear of online frauds and fear of mistakes when making mobile and online banking payments coupled with unwillingness of the banking service providers to provide peace of mind in their offerings bearing in mind that such will lead to more adoption that would increase their profits in the long term future?

Dehinbo [8] observes in a previous work that enormous knowledge has been expended and gained over the years since the introduction of computers, enabling miniaturization of computer facilities while increasing the scope of services enabled by computers. Much progress has been made in the computerization of different aspects of life today. This is based on the potential that technological development and innovation in computerization bring automation to the society overcoming human limitations such as fatigue, consistency, reliability etc.

The resulting effect is that of the ability of people to delegate more tasks to the computerization process while enabling them to have time to do other important things in life. Recall sometimes about 3 decades ago when you have to take time off work and rush to the bank before they close around 1pm so that the bank can have time to do daily bank reconciliations. This involves losing productive time at work and thus possibly loosing income also. It also involves expending costs in driving to the bank, as well as environmental degradation due to fuel consumption as well

as car emissions. Today, you can use internet banking to complete such banking task in seconds, saving such remaining time to have time to do other important things in life. But if there are certain risks that could bring the society backwards from previous gains, then it needs to be attended to as a matter of urgency.

So, if there is the risk or fear of someone being fraudulently tricked into paying into someone's personal account instead of to the account of an organization that one is transacting with, or the fear of someone making simple mistake of mistyping a number? And so, if some bank users could therefore resolve not to use mobile and online banking but rather go to the bank teller and ask the teller to check the account holder first and then deposit the payment. And thus, the bank user has forfeited the freedom of doing banking transactions at any time of the day and using mobile electronic devices including laptops and mobile phones, by constraining oneself to get to the bank during opening hours, paying the cost of time and travel to the bank, paying the extra cost teller transaction inside the bank etc. This can negatively affect sustainable use of developments in the society. And that could bring the society backwards from previous gains. Then such countries are at risk of being excluded from knowledge-based development. That is why studies like this one that seeks to attend to the problem as a matter of urgency deserves attention.

This could be why Mansell and Wehn [6, p. 9] explain that the least developed countries are at risk of being excluded from knowledge-based development. Failure to address such problems as this confirms the statement that many developing countries are yet to tap into the benefits offered by the creation and diffusion of scientific knowledge and technologies such as Information Systems.

And as indicated earlier, country like Nigeria is less developed than South Africa and just started using mobile phones and computerized banking including using Automated Teller Machines (ATM) and mobile banking about at least 10 years after South Africa. Yet, the banking system in Nigeria is able to implement such system that automatically includes the service of verifying Beneficiary's Name against the Actual Account holder without additional fee. Then the time has come for research in South Africa in this direction.

Few SA Banks offering account verification service for additional fee also requires recipient's Identity number

So, for the creation and diffusion of scientific knowledge and technologies to have relevant implications for socio-ecological systems, Mansell and Wehn [6, p. 11] observe that developing countries are at very different starting positions in the task of building innovative and distinctive `knowledge societies' and in using their national information infrastructures to support their development objectives and efforts. National information infrastructures to support the development objectives and efforts in this regard includes the national Identity systems that has been in place for decades in South Africa. Nigeria merely adopted using Bank Verification Number system about 5 years ago. And when that does not seem as effective as the national Identity systems, Punch [9] indicates that Nigeria just started rolling out the National Identity Number (NIM) system in 2021 or about 2 years ago and it's just about 92 million out of 250 million citizens (less than 37% of citizens) that have got the National Identity Number at the end of the year 2022.

The National information infrastructures to support the development objectives and efforts in this regard also includes the well-established mobile phones and computerized banking system. And as indicated earlier, Nigeria is less developed than South Africa and just started using mobile phones and computerized banking including using Automated Teller Machines (ATM) and mobile banking about at least 10 years after South Africa.

We have noted earlier that there has been some sketchy implementation of the account verification system by some banks in South Africa, even though some are offering the service for additional fee. However, we observe that most of such banks requires users to supply the Identity number of the payment beneficiary in order to do the verification. An example of this is illustrated in the figure 16 below.

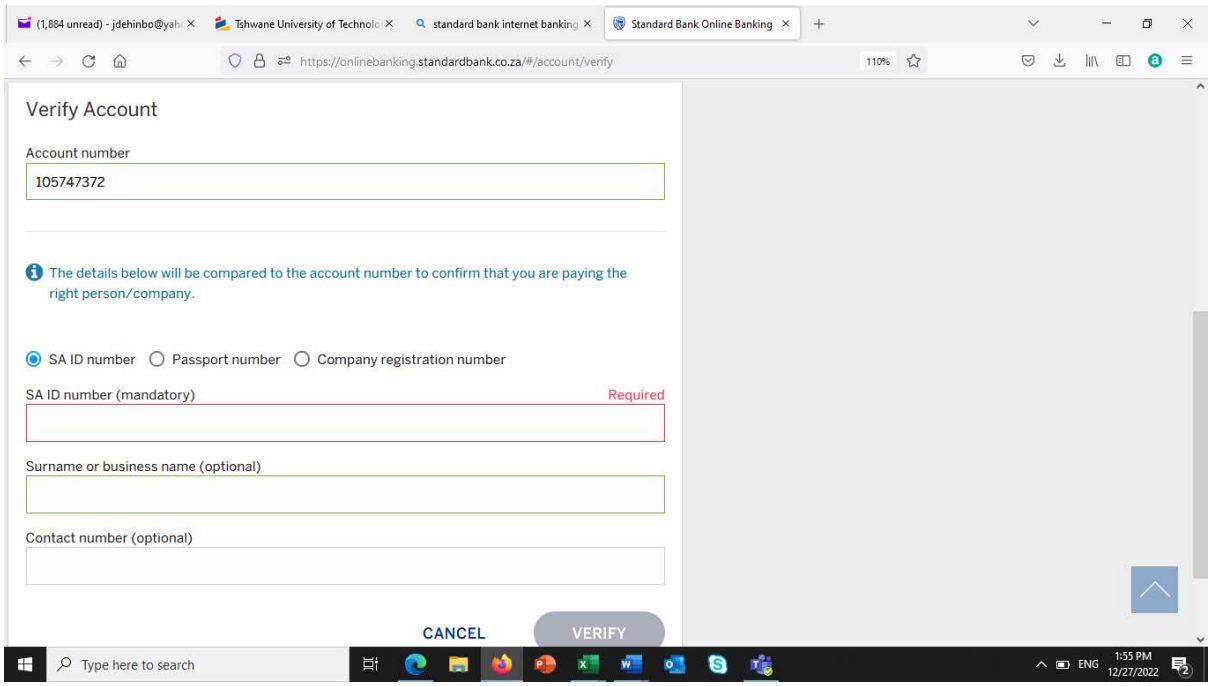

Fig. 16. Standard bank webpage requiring Identity number of the payment beneficiary in order to do the verification.

However, even though the Identity number would play vital role in the implementation of the verification system, it seems absurd to expect payees to be requesting the Identity number of the recipients (payment beneficiary) along with their banking details. That is contrary to security recommendations for privacy considerations. And with regard to these privacy considerations, the next section discusses developments at various banks all over the world.

Banks offering account payment using cell phone number

Payments without using bank account details enables addressing security considerations by avoiding possible situations such as hacking into specific bank accounts. Also avoids money laundering in which fraudsters can knowingly deposit illicit money into someone's account and then blackmail or threaten the person to forward the payment to them. Using cell phone number instead of the account number ensures the privacy of the account details. Capitec bank in South Africa offers account payment using cell phone number only so that you don't need to use the recipient's bank account number. Figure 17 below gives the steps of how to pay people using cell phone number on the Capitec app platform.

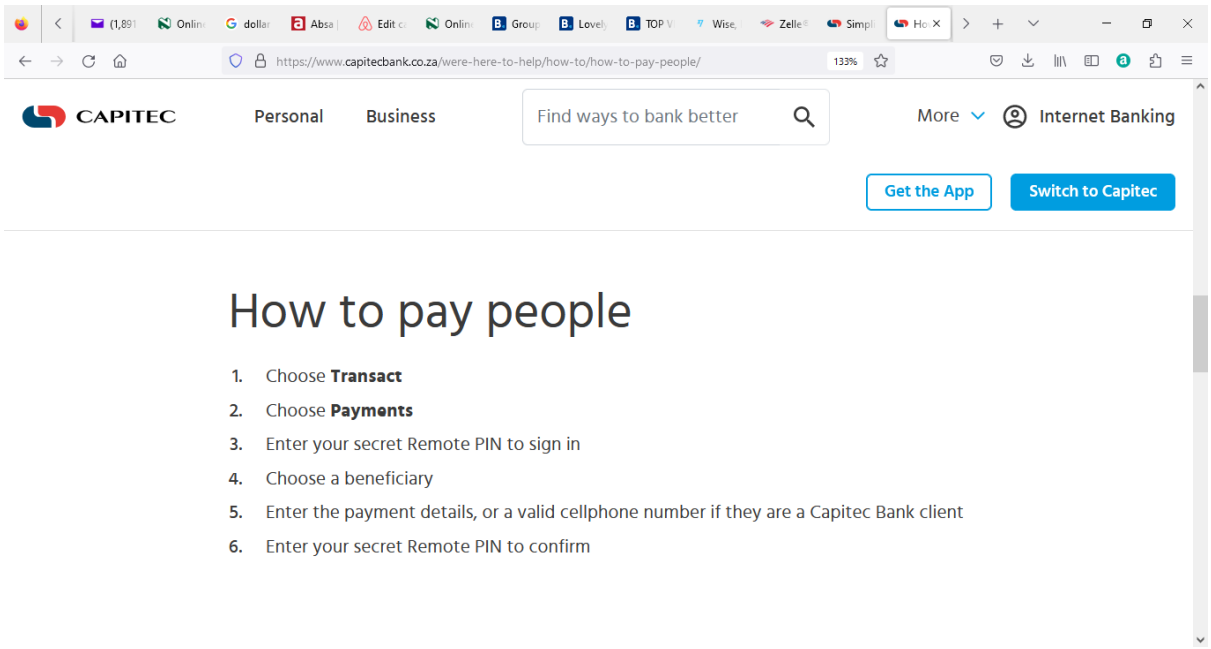

Fig. 17. Steps of how to pay people using cell phone number on the Capitec app platform.

However, please note that this service is only limited to accounts in Capitec bank only. So, one cannot use it to pay clients at other banks. Also, this service is available on the Mobile app only and not yet available on the Internet banking platform.

International Banks offering account payment using Zelle via cell phone number or email address

As in the case of using cell phone number instead of the account number to ensure the privacy of the account details, some International Banks offer account payment using Zelle via cell phone number or email address. For example, the Bank of America [10] in figure 18 and 19 below enables sending and receiving money using Zelle via cell phone number or email address withing minutes into other bank accounts irrespective of where they bank.

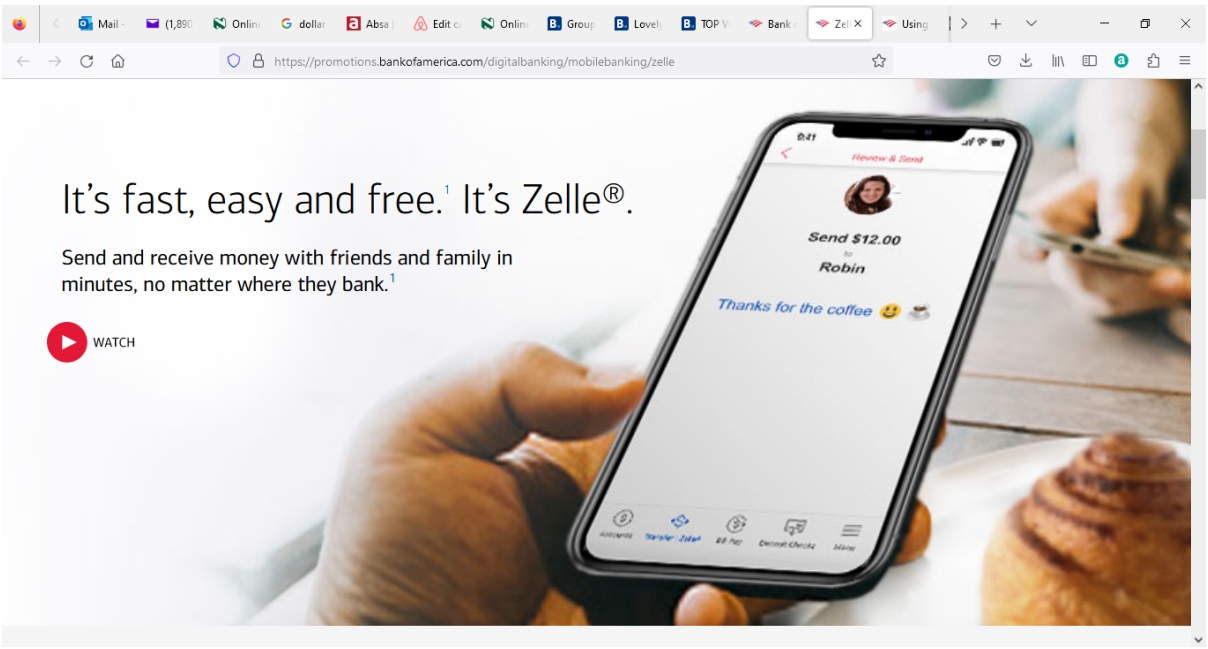

Fig. 18. Sending and receiving money using Zelle via cell phone number or email address.

To use this service, one has to first enrol cell phone number or email as indicated in figure 19 and 20 below on the Zelle [11] program available in some banks. If the recipient is also enrolled, the money is deposited in the bank account within minutes irrespective of where they bank. If the recipient is not also enrolled, steps will be given on how to enrol and get the transferred money.

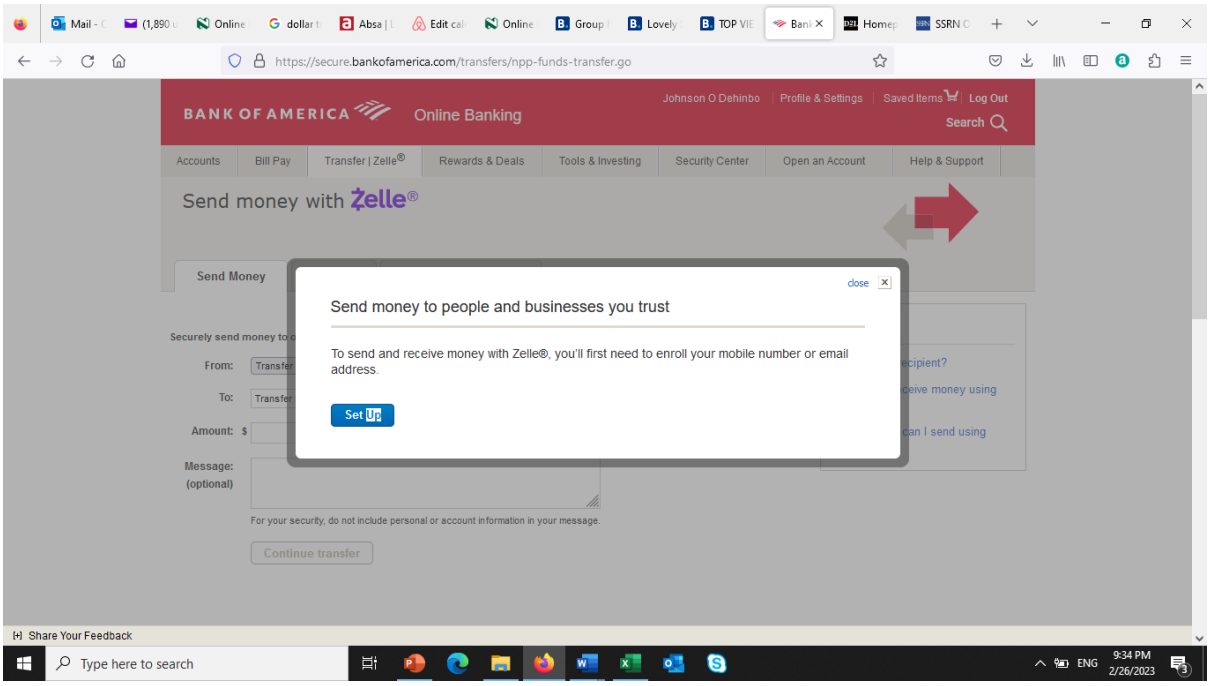

Fig. 19. Sending and receiving money using Zelle first need enrolling cell phone number or email address.

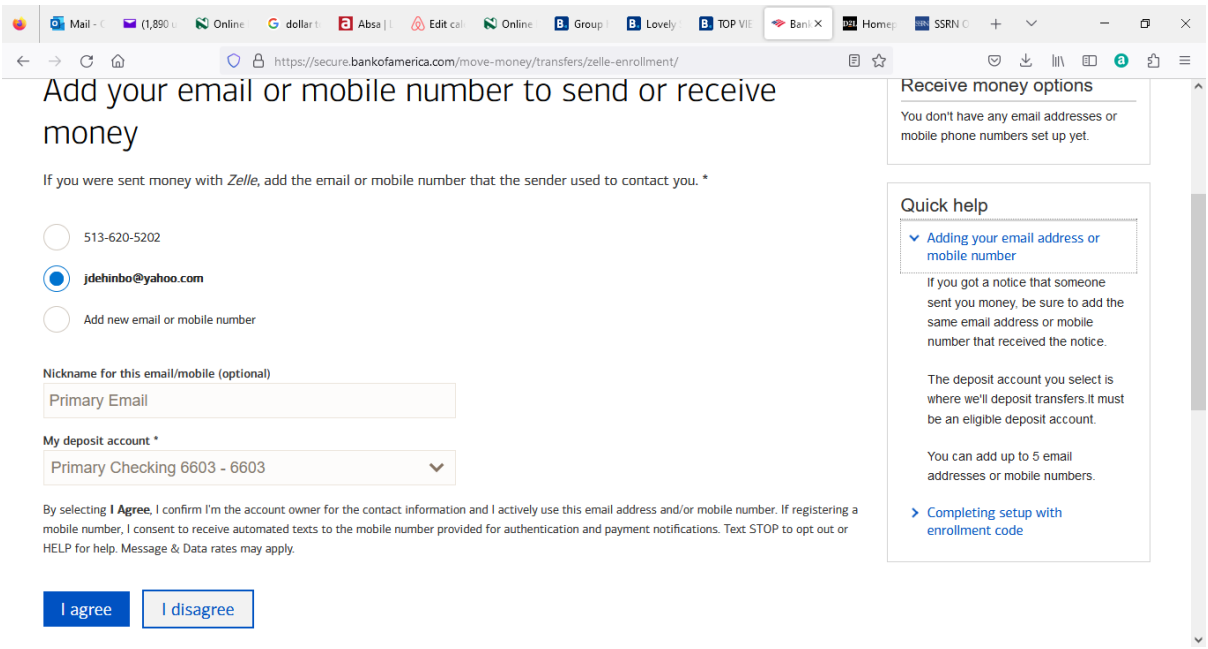

Fig. 20. Example enrolling cell phone number or email address.

This Zelle service is different from the service where you receive codes via cell phone number or email address and then go to collect the money at the banks' Automated Teller Machines (ATM). What if you find endless queues at the ATMs? Will one be willing to spend time and fuel to go to the ATM and then spend hours to receive the money? What if one is mugged or robbed after receiving such money at the ATM? That is why the Zelle service enables receiving directly into bank accounts.

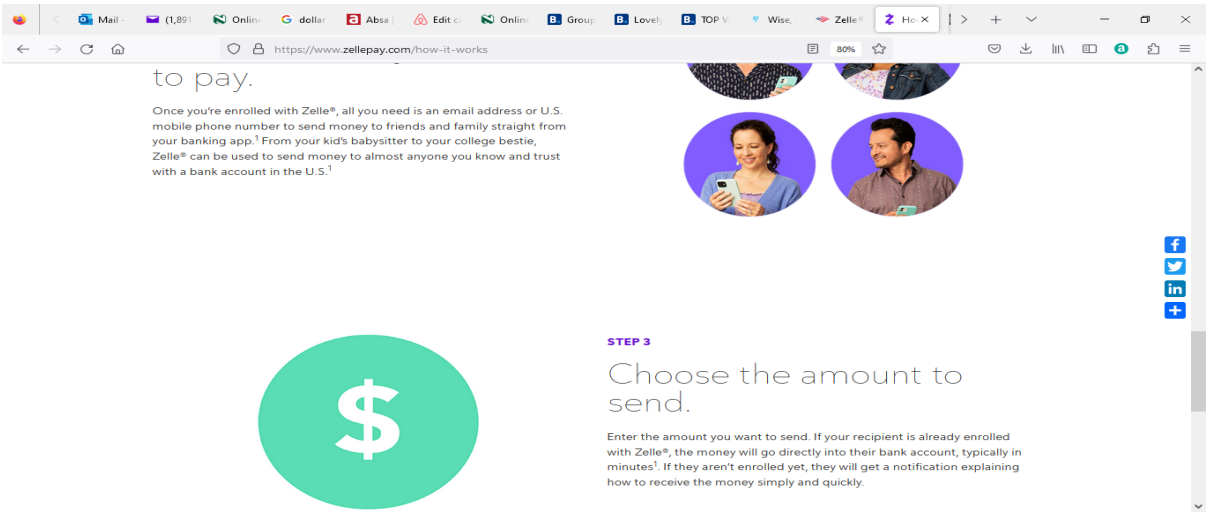

Figure 21. Indication that Zelle service is only available to bank accounts in the United States of America.

However, figure 21 above explains that this service is only available to bank accounts in the United States of America. Another limitation however is that the enrolled email address or phone number in the Zelle system is linked to one bank account only. If one has say for example, 5 or more bank accounts at different participating banks, do the person now have to also create 5 or more email addresses and phone numbers? This limitation is

currently being addressed in a new banking system called "Payshap" recently launched on participating South African banking platforms [12] in March 2023. The is presented in the next section.

Recent related "Payshap" system in the mobile and online banking systems in South Africa

While busy writing up this article on 16 March 2023, an email is received on a recent related developments in the mobile and online banking systems in South Africa. This is known as Payshap [12] illustrated in figures 22, 23 to 26 below.

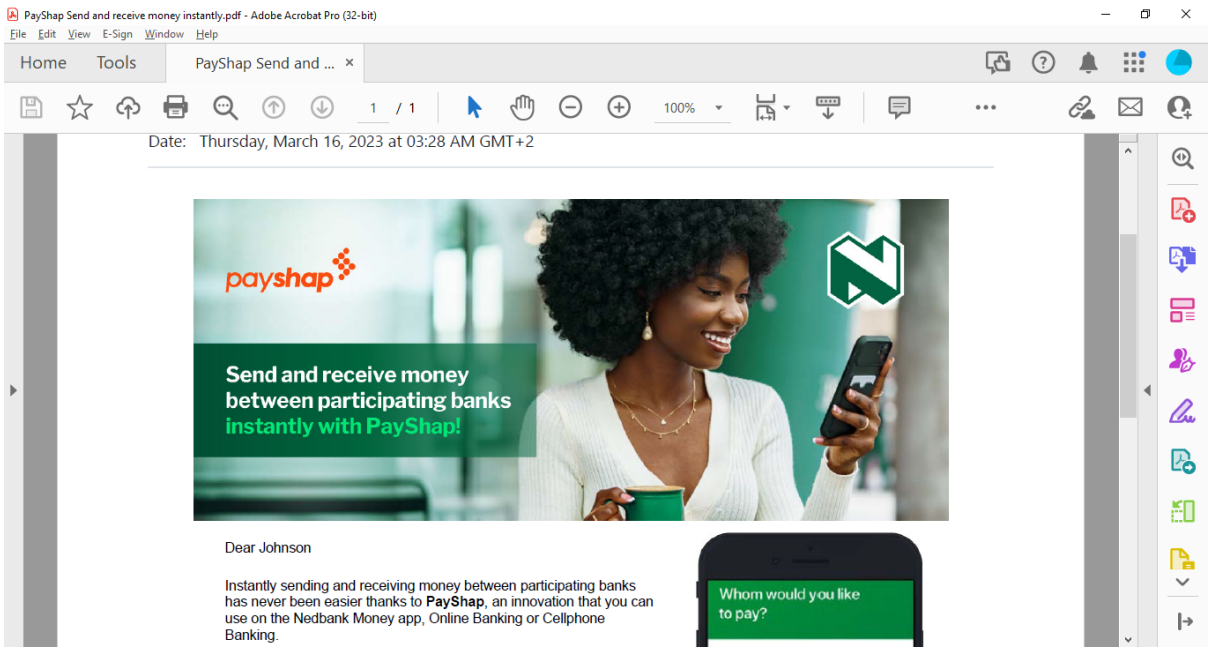

Fig. 22. Nedbank email introducing the new banking system called "Payshap" in South Africa.

Subsequent search show that the "Payshap" system was launched in South Africa on 13 March 2023 as given in figure 24 below. The system was commissioned by the South African Reserve Bank (SARB) equivalent of Central banks in other countries, BankServe Africa and four other prominent banks namely First National Bank (FNB), Nedbank, Absa Bank and Standard Bank.

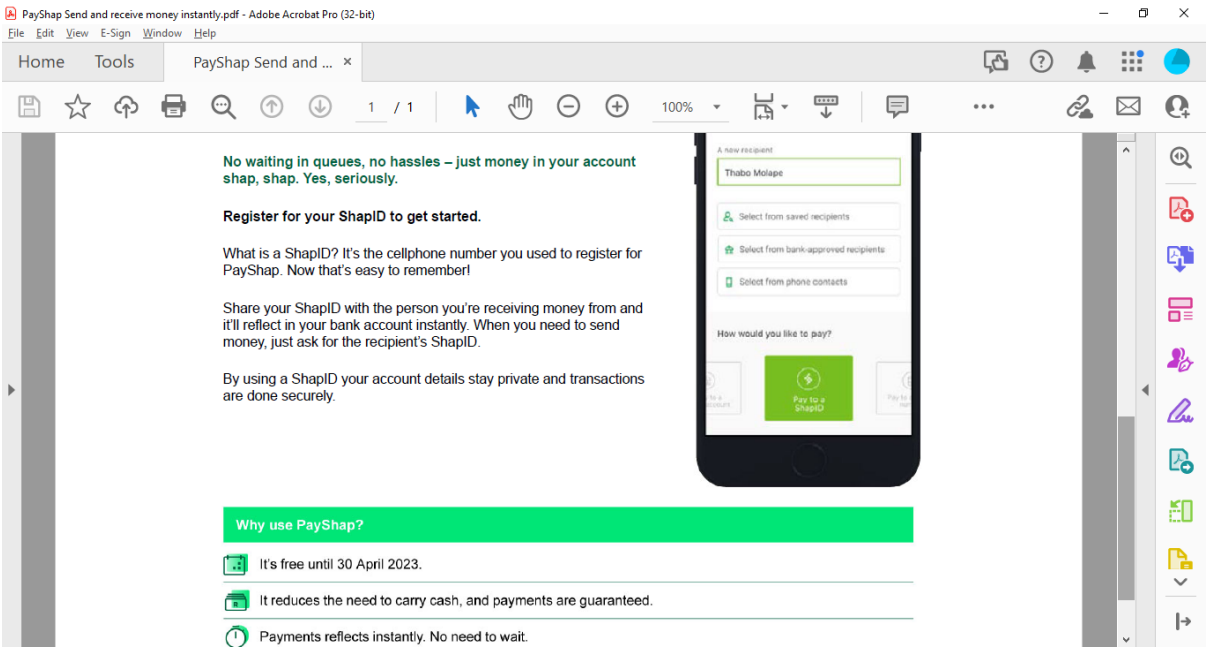

Fig. 23. Continuation of Nedbank email introducing the new banking system called "Payshap" in South Africa.

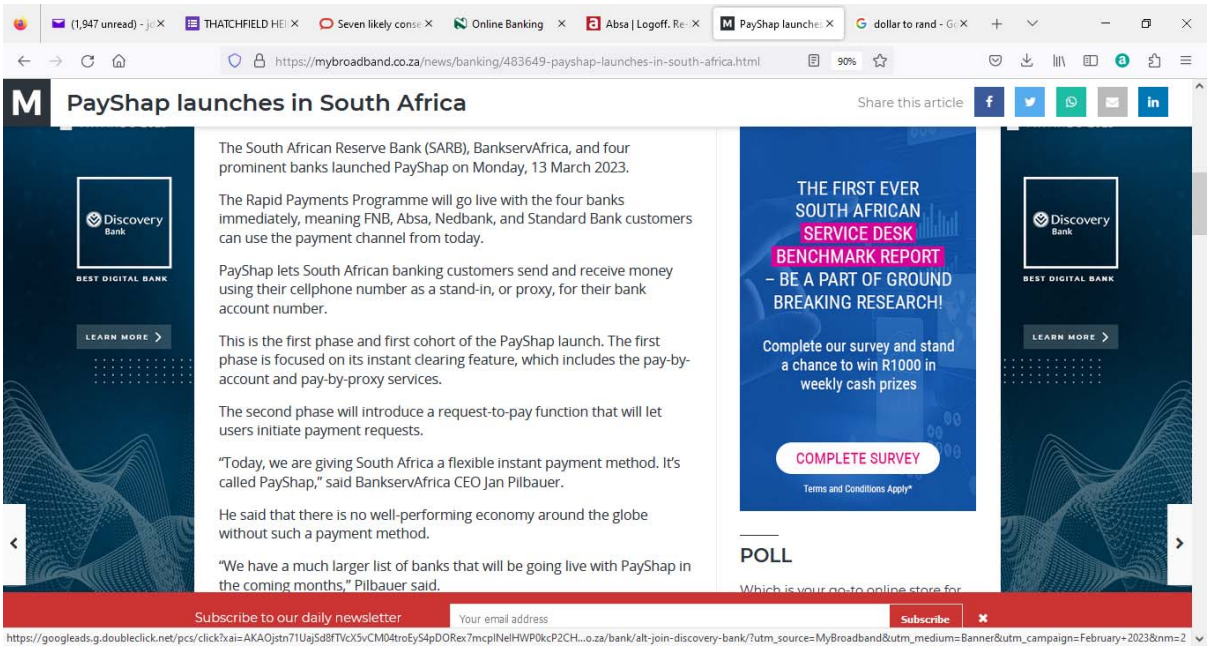

Fig. 24. The launched of the Payshap" system in South Africa on 13 March 2023.

According to the Payshap document in figure 24 above, in this first phase of the payshap system, only the four prominent banks namely First National Bank (FNB), Nedbank, Absa Bank and Standard Bank are participating. Furthermore, a larger list of banks including Capitec will be going live with the payshap system in coming months.

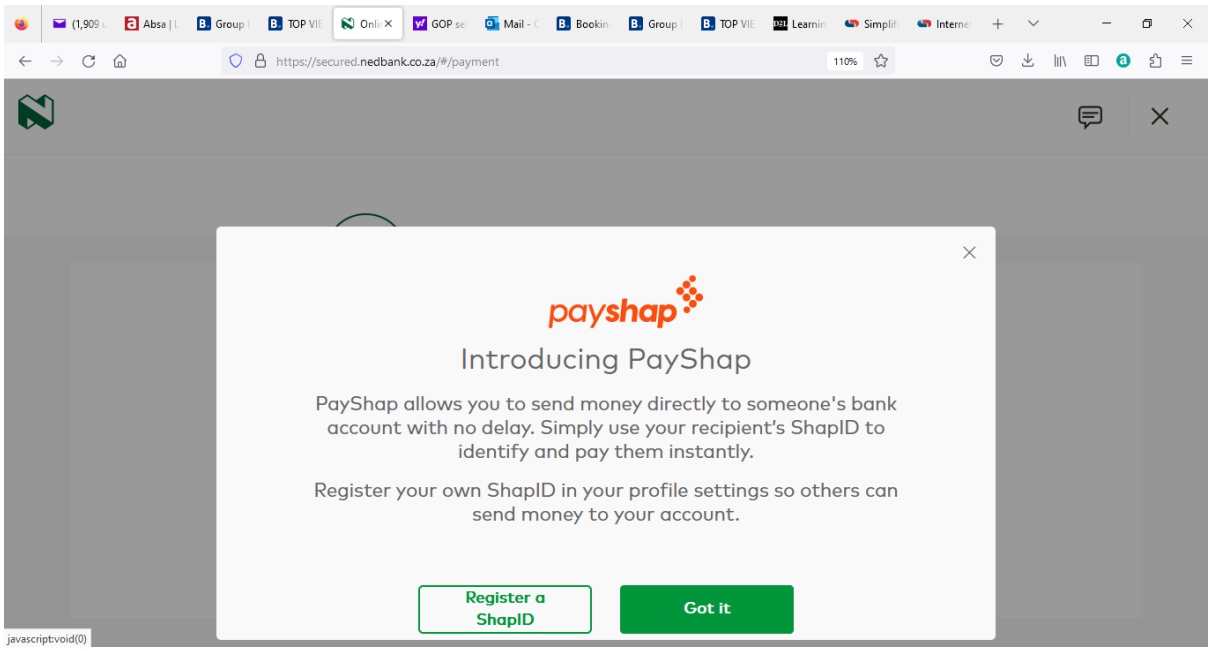

Fig. 25. Nedbank website for registering "SharpID" on the "Payshap" system in South Africa.

The payshap [12] system allows sending and receiving money into someone's bank account instantly using the recipients' ShapID instead of their bank account number. The ShapID can be set to be a phone number of any alphanumeric name. Users register their ShapID in their profile at participating banks such as for Nedbank in figure 25 above. The ShapID offers the advantage of possibly being set to be easy to remember than the account number while also offering the security advantage of not giving out user's bank account number, thereby avoiding possible compromise of such account details. In figure 26 below, a phone number is registered as the ShapID. This is similar to the Zelle system explained above.

Interestingly however, to address the limitation of the Zelle program in which the enrolled email address or phone number in the Zelle system is linked to one bank account only, such that someone having say for example, 5 or more bank accounts at different participating banks, do not have to also create 5 or more email addresses and phone numbers, the "payshap" system allows registering any text identification instead of just using email and phone numbers only.

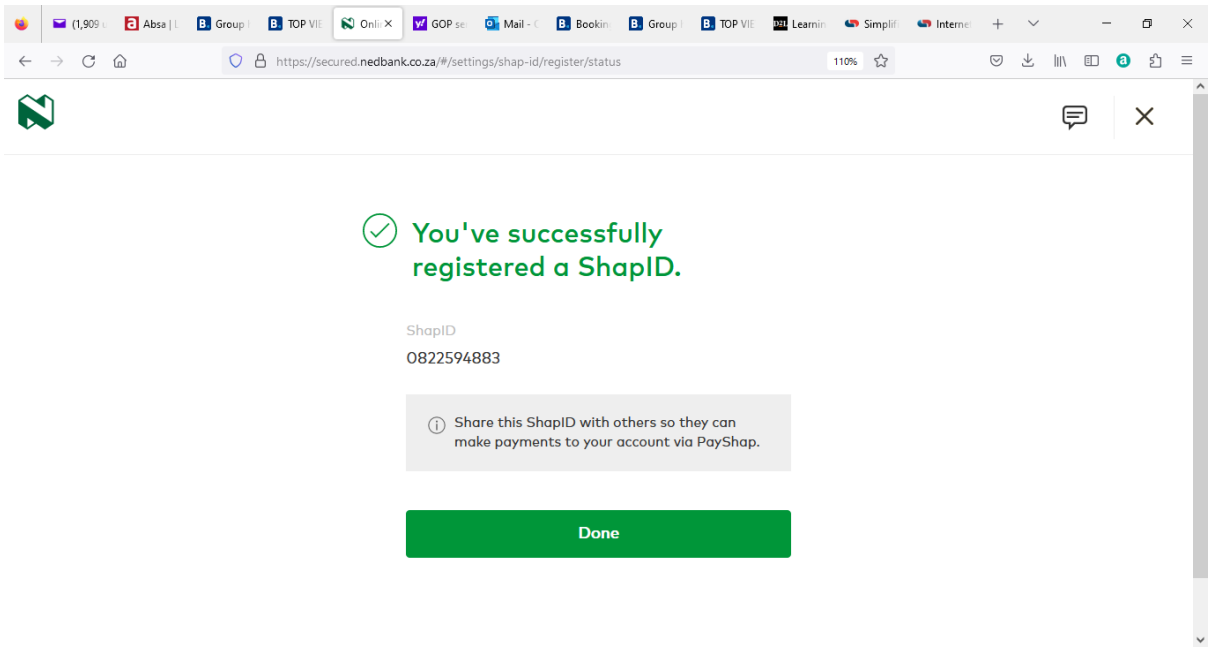

Fig. 26. Illustrating a phone number 0822594883 as registered as a ShapID.

Thus, if one still wants to reflect one's email address or phone number (that recipients can easily associate with the payer) one can append the email address or phone number to the name of the bank where the account is held for example. We can thus have "sharpids" like 0822594883@nedbank, 0822594883@absa, 0822594883@fnb, 0822594883@standardbank, 0822594883@capitecbank etc.

One limitation of the payshap system is that not all banks are currently participating in the system. This is unlike the Nigerian Interbank system that automatically covers all banks in the country. And also, after a sharpid has been registered, it doesn't do a real-time check of verifying the sharpid against name of the recipient. So, aside from using easy to remember names, it becomes similar to simply storing recipient's details on the banking system. What if few weeks after, a recipient closes his or her account while you still think you have the person's banking details or sharpid due to recent usage?

On a recent radio program on FM702 [13] financial program by Bruce Whitfield by 6pm on 22 March 2023, it was discussed that some banks recycle account numbers after an account has been closed. Standard bank was for example was said to recycle account number after 3 years of closure. What if one thinks one has a person's banking details or sharpid due to finding it stored on banking recipients' profile while the account owner has changed? Therefore, the proposed system is still unique in doing real-time check of verifying the name of the recipient.

So, the goal for this study here is that one should be able to pay into recipients' bank account with peace of mind by verifying the recipients' account ownership without extra charges so as not to discourage continued us of online banking, without requesting the beneficiary's private information like Identification number. And towards further ensuring beneficiary's privacy, then we should have the option of using either the beneficiary's account number or preferably cell phone number or email address or an identifying text using alphanumeric characters such as appending phone number to the bank name as done by the "payshap" system, instead of just using the account number only. And in all cases, the account details are verified to give peace of mind, and the money still goes directly to the recipient's or beneficiary's bank account number rather than receiving such money at the ATM (which has already been addressed by most banks especially to cater for those without bank accounts).

Summary of the desired enhancement to the mobile and online banking system

In line with the problem identified and the various attempts towards understanding and reasoning into possible solutions based on experiences in other countries, the following are the concise statements and constraints of the desired solution.

- One should be able to pay into recipients' bank account with peace of mind by verifying the recipients' account ownership

-The tab to add other bank beneficiaries should automatically involve verifying the recipients' account ownership

even if payment is not intended immediately.

- Verifying the recipients' account ownership should be without extra charges so as not to discourage continued us of online banking

- The verification service should be done across various banks in the country

- The verification service should be done without requesting the beneficiary's private information like Identification number.

- And towards further ensuring beneficiary's privacy, one should have the option of using either the beneficiary's account number or preferably cell phone number or email address of instead of the account number

- More preferably an identifying text using alphanumeric characters should be usable such as appending phone number to the bank name as done by the "payshap" system, instead of just using the account number only.

-while in all cases, the account details are verified to give peace of mind

- And the money should still go directly to the recipient's or beneficiary's bank account number rather than receiving such money at the ATM (which has already been addressed by most banks, especially to cater for those without bank accounts).

And towards accurately specifying the requirements and conducting modelling towards reasoning into possible solutions, it is important to present the System Analysis and Requirements Specification for the proposed system. The is addressed in the next section.

System Analysis and Requirements Specification for the proposed system

The core task of a systems analyst involves studying or listening to the problems of end users who desire positive changes to improve the way some operations are done. In some cases, the users may want to improve from using manual processes into computerized or automated processes. In some other cases, the users may want to enhance a computerized or automated processes into a form that could give more satisfaction, peace of mind, reliability, productivity or even future sustainable prospects and profitability. The systems analyst would then specify the problems given by the users into a form that the developers of the proposed system (or its enhancement) can understand unambiguously. This also involves the systems analyst using background knowledge, experience and study of existing solutions and their attendant problems in defining in detail what the proposed information systems needs to accomplish to provide the organisation with the desired benefits as well as various constraints to be satisfied such that the proposed system (or its enhancement) can be successfully implemented and maintained.

Therefore, we carefully study the problem identified as well at the attempts towards understanding and reasoning into possible solutions based on experiences in other countries. Then, we complete the various activities as the system analyst and use suitable tables and diagrams such as UML Activity diagrams, Entity Relationship diagram etc. where necessary to enhance the specification and documentation of the problem and the derivation of the plan that the system developers would work on. These are addressed in the next sections.

Use Case Modelling

We begin by using any applicable technique we find suitable to identify the use cases and actors while provide evidence of how we arrived at the use cases.

Given the need for bank payee to be able to pay into recipients' bank account by verifying the recipients' account ownership, one can identify at least three actors such as payee, recipients, bank account. We can develop user stories to capture their goals.

Given that use cases should be a combination of verbs and nouns, use cases that can be identified includes:

Use Case:- Add other bank beneficiary

The detailed Use Case Description is given in the table 1 below.

Table 1. The detailed Use Case Description for the "Add other bank beneficiary" Use Case

Use case name:	Add other bank beneficiary.
Scenario:	Add other bank beneficiary account.
Triggering event:	An account holder wants to add other bank beneficiary online or a new recipient account.
Brief Description:	An account holder wants to add other bank beneficiary online or a new recipient account and without making a mistake on the details to be provided.
Actors:	Account Holder. Beneficiary.
Related Use Cases:	Confirm Beneficiary name. Add Beneficiary mobile number.
Stakeholders:	Banks. Bank account holders.
Preconditions:	Add beneficiary subsystem must be available. Beneficiary's bank must be selected. Beneficiary's account number should be entered. Confirm if the account number is verified.
Post conditions:	If account is verified, beneficiary's name must be displayed. Disclaimer must pop if the account number is not verified. Account holder must add the beneficiary's mobile number.
Exception conditions:	1. Basic beneficiary data is not complete. 2. The account number does not verify against the actual account handler.

Below, we develop activity diagram for the identified "Add other bank beneficiary" Use Case.

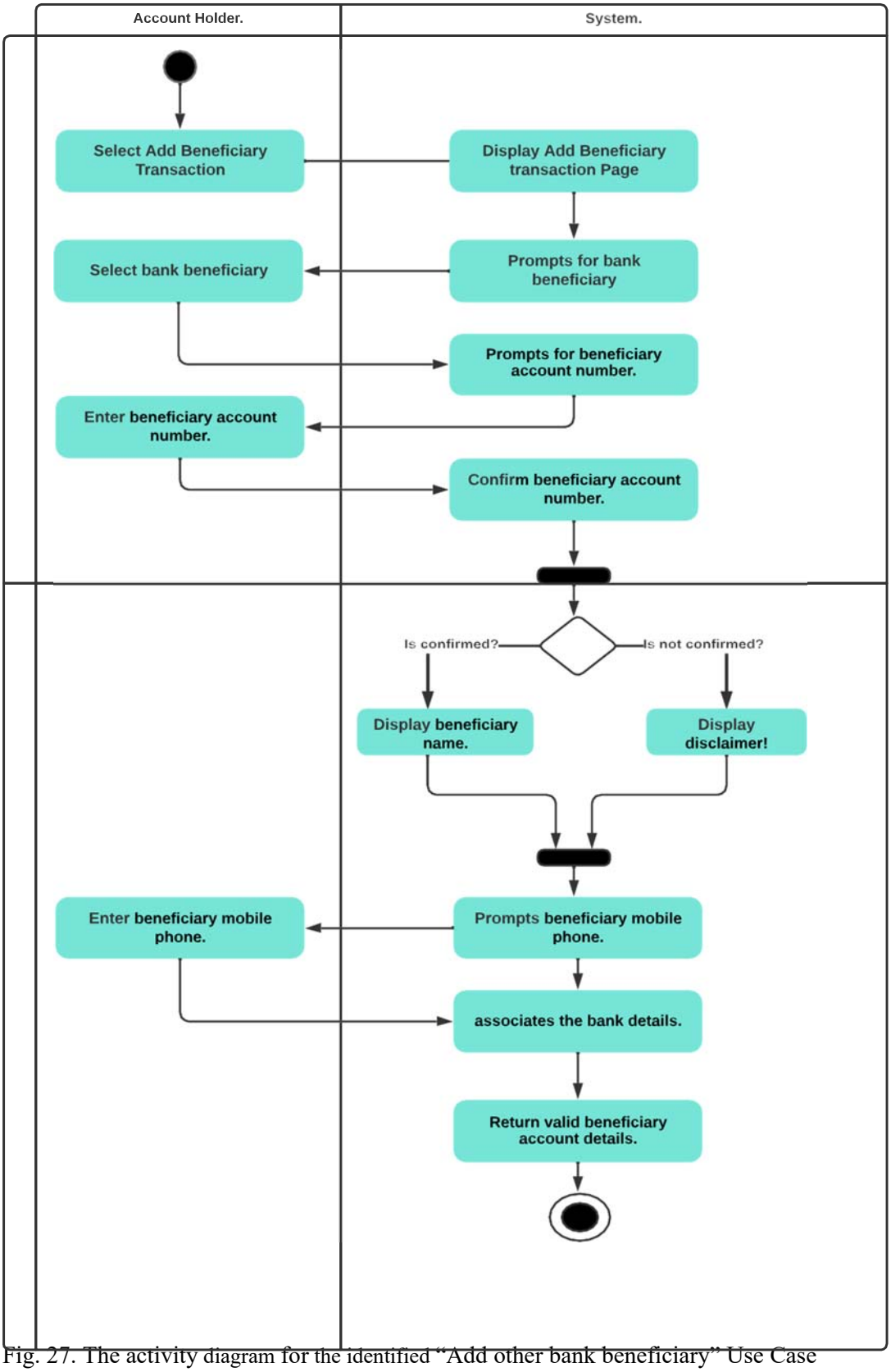

Fig. 27. The activity diagram for the identified "Add other bank beneficiary" Use Case

The activity diagram for the identified "Add other bank beneficiary" Use Case in figure 27 shows the flow of information between the account holder (payee) and the online/mobile banking system.

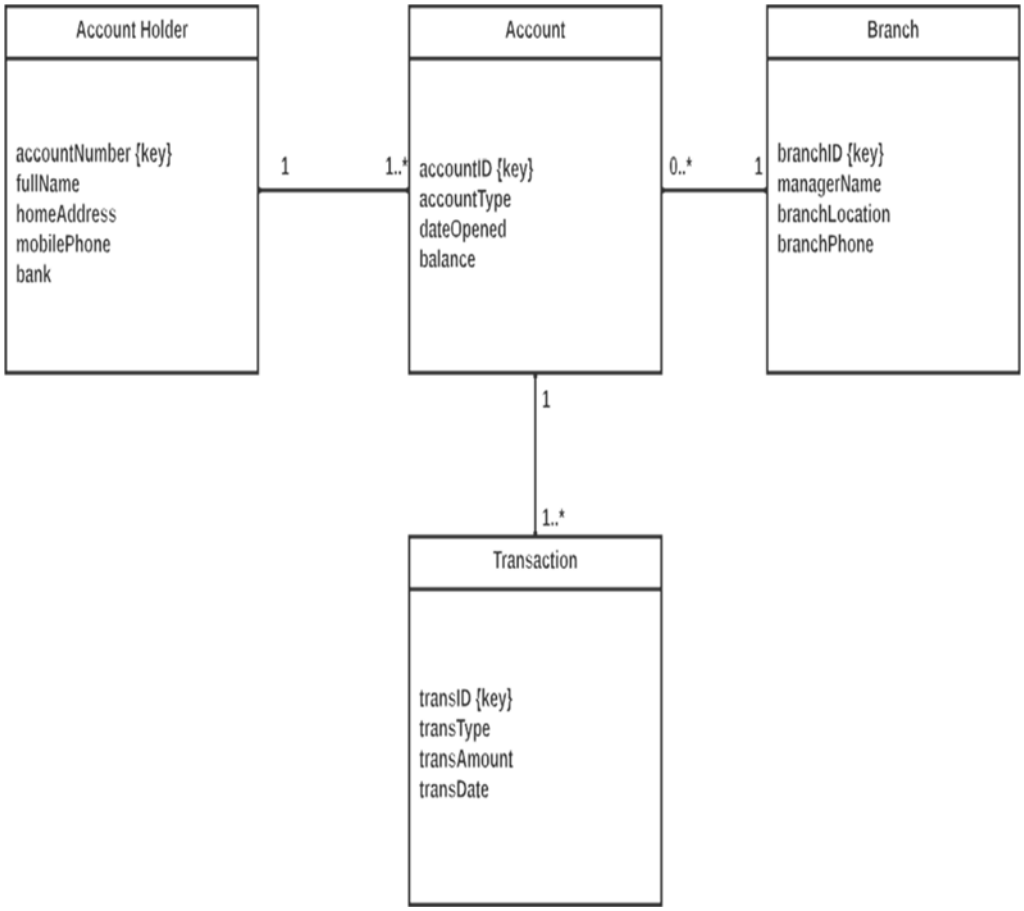

Fig. 28. The domain model class diagram showing the multiplicity of relationships possible [13,p.105].

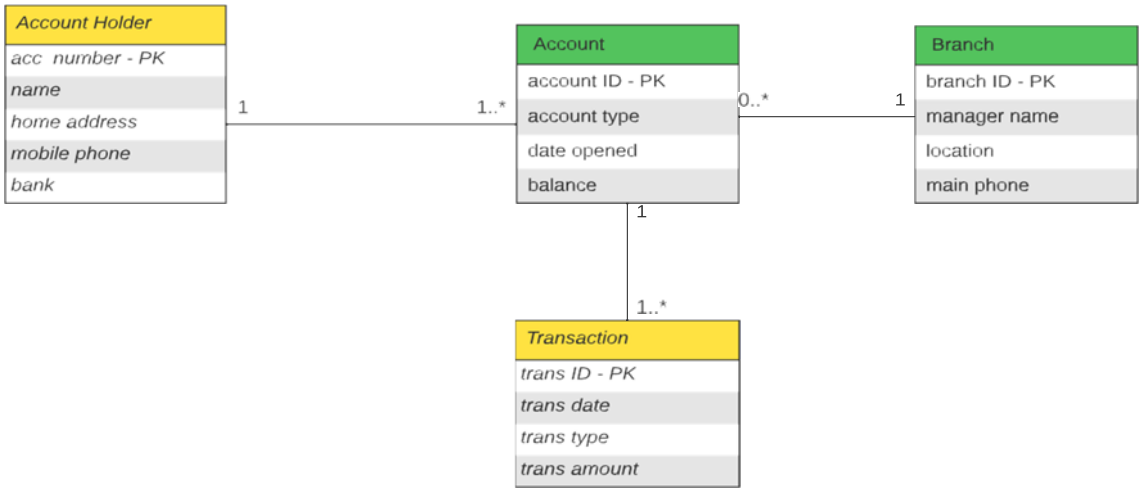

Fig. 29. Entity Relationship Diagram (ERD) for the proposed system adapted from Satzinger [14,p.102]

The domain model class diagram is given in figure 28. This shows the multiplicity of relationships possible between the account holder (payee), the bank account, the bank branch and the online/mobile banking transaction possible. An account holder (payee) can open 1 or more bank accounts from which to pay from. A bank branch can have 0 or more bank accounts. And one or more transactions that occurred could stem from one bank account. This is equally translated into the Entity Relationship Diagram (ERD) in figure 29. And figure 30 gives the Unified Modelling Language (UML) Activity Diagram for the proposed system.

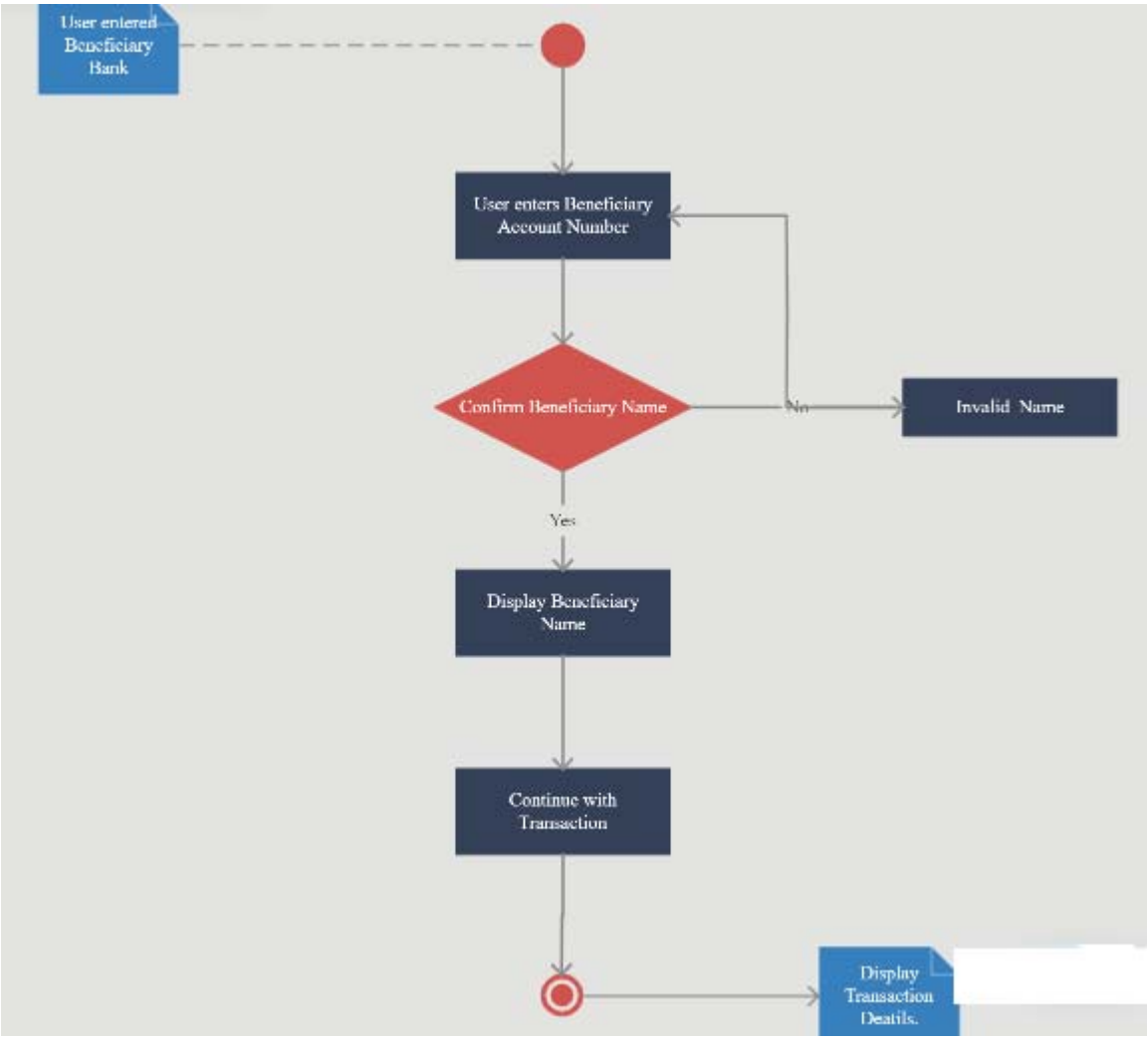

Fig. 30. UML Activity Diagram for the proposed system

Proposed System Architecture and further studies on development and implementation

After detailed requirements and system analysis with various modelling techniques given above, the stage is set for the proposed system architecture. This is given in the figure 31 below adapted from Satzinger [14, p.200]. There are 3 major layers given as follows: the view layer, the domain layer and the data layer. The view layer would contain the format screens and reports. These are real-time interactive flow of information between the user and the system. The domain layer contains the web application layer. This layer will implement the business rules in line with requests from the view layer and the corresponding results obtained from the data layer. The data layer is obviously the backbone of the system that contains and implements the data modelling that links the data entities and implements server requests in the form of Structured Query Languages (SQL). It is very important to stress that a distinguishing

feature of this proposed data model is that it would cater for interbank information rather than merely intrabank information. This distinguishing feature overcomes the limitation on the Capitec bank which provides the account verification system for Capitec bank account holders only but could not do so for recipients' accounts in other banks.

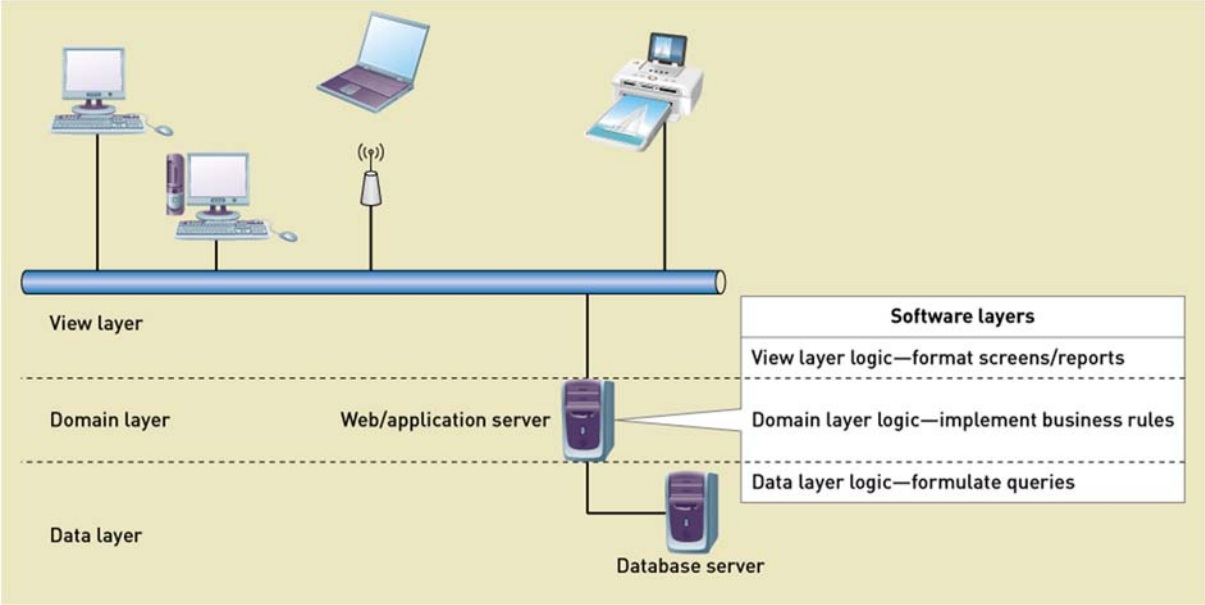

Fig. 31. Proposed 3-layer System Architecture adapted from Satzinger [14, p.200].

Development of the actual system to implement the system architecture proposed above could be accomplished using various programming and database management platforms including Hypertext Markup Language (HTML), Java Servlets and Java Server Pages, PHP Hypertext processor, Microsoft's Active Server Pages (ASP), Database Management Systems (DBMS) such as Oracle, Microsoft Access, and MySQL. The system development of the actual artifact to implement the system is a magnificent effort on its own. This could be a subject of future study that can be presented in another paper.

Conclusion

Development is important for any society. Progress in online and mobile banking is an example of important state of development that the whole world is currently enjoying and might want to continue to grow more into. This has ensured developmental progress from time when banks have to close by 1pm to be able to finish account reconciliations before end of the day, to time when one has to rush to get to the bank before they close by 4pm, and now to time when one can do banking transactions at any time of the day and using mobile electronic devices including laptops and mobile phones. But as the world enjoys this state of things in banking, online frauds and fear of mistakes are some of the factors that could be limiting the continued growth of adoption and use of mobile and online banking. And given that Brown [1] explains that sustainable development (SD) is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", efforts should be increased to avoid online frauds and fear of mistakes as some of the factors that could be limiting the future sustainable continued growth of adoption and use of mobile and online banking.

Imagine the fear of someone being fraudulently tricked into paying into someone's personal account instead of to the account of an organization that one is transacting with? Fraudsters could easily change an organization's banking details on an invoice to their personal account. People would fear losing one's money through such simple trick if there is no likelihood of confirming account holders as one conducts the mobile banking transaction.

Even if banks fraud protection and insurance units can refund such money lost to such fraud, one still fears the amount of time it would take to resolve such. So, some bank users could simply resolve not to use mobile and online banking but rather go to the bank teller and ask the teller to check the account holder first and then deposit the payment. In this situation, then, first, the bank user has forfeited the freedom of doing banking transactions at any time of the day and using mobile electronic devices including laptops and mobile phones, by constraining oneself to get to

the bank during opening hours, paying the cost of time and travel to the bank, paying the extra cost of teller transaction inside the bank etc. This can negatively affect sustainable use of developments in the society.

Also, imagine the fear of someone making simple mistake of mistyping a number e.g. 5 instead 6 on an account number. People would fear losing one's money through such simple mistake if there is no likelihood of confirming account holders as one conducts the mobile banking transaction. Also, even if banks fraud protection and insurance units can refund such money lost to such mistake, one still fears the amount of time it would take to resolve such.

One could not help but ask than why banks do not automatically include such confirmation of account holders as one conducts the online or mobile banking transaction. Some banks rather put a disclaimer on the transaction page that the Beneficiary's Name is not verified against the Actual Account holder.

An important question then is why banks in South Africa are reluctant to leverage on the use and power on computing to provide such verification of account service that could give their customers peace of mind in using online, internet, or mobile banking transaction. Some banks however have started to offer such service of *verifying Beneficiary's Name against the Actual Account holder as* an additional service for additional fee.

We argue that such additional fee is not worth sacrificing the widening continued growth of adoption and use of mobile and online banking with peace of mind for customers. And we ask that even in business, shouldn't we temper profitability with some elements of humanity as enshrined in the "ubuntu" caring philosophy? And we wonder if that is what capitalism has brought us to or is it ignorance on the part of banking service providers? We concur that the banking service providers should realize that such little gain in additional fees cannot be compared to increased revenue that could come from the widening continued growth of adoption and use of mobile and online banking with peace of mind for customers. Especially in a country like South Africa that is supposed to be a leader in business development in Africa, being the most developed country in Africa, one wonders why she is failing to come to these realizations while other less developed countries are.

A country like Nigeria is less developed than South Africa and just started using mobile phones and computerized banking including using Automated Teller Machines (ATM) and mobile banking about at least 10 years after South Africa. Yet, the banking systemin Nigeria is able to implement such system that automatically includes the service of verifying Beneficiary's Name against the Actual Account holder without additional fee. And as a cherry on top, these services are available from any bank in Nigeria and irrespective of the recipient's bank. For example, if one is using the Polaris Bank or the United Bank for Africa (UBA) Internet or Mobile to pay a person banking with First Bank by entering the First Bank account number, the Polaris Bank or the UBA system will display the name of that First Bank recipient. That implies the presence of a collaborative service among all banks in the country for the benefits of all bank clients. And as another cherry on top, payment from any bank to another in Nigeria reflects instantly unlike in South Africa where it reflects next day, and one has to pay extra charges of between R7 to R50 (depending on the bank) for payments to reflect instantly.

Like the Nigerian banks above, an important question then is why are South African banks not collectively taking appropriate measures to give their clients peace of mind by verifying account details when Internet or mobile banking is used for payments? This study therefore proposes a requirements analysis and conceptual modelling with suitable architecture that can be used to develop a system for verifying account details for recipients at any bank when Internet or mobile banking is used for payments. Hirschheim and Klein [15] indicate this as a form of evolutionary learning from interaction with partial implementations as a way in which technology becomes embedded into the social perception and sense-making process. This way, as stakeholders in developing countries, we seek taking appropriate measures to maximize the benefits of ICTs for development, and taking appropriate measures to minimise the risks of social and economic exclusion that could lead to lack of sustainable continued growth of adoption and use of mobile and online banking due to the fear of online frauds and fear of mistakes when making mobile and online banking payments.

Therefore, if, and/or when such systems become adopted widely in the society, it could lead to sustainable use of mobile and online banking payments for development in the society. And as indicated by Xiong [16], ethical and sustainable business practices are good for people, the planet and business. Giving clients peace of mind in using one's business platform without charging undue extra that can discourage such use seem both ethical and sustainable. Embracing such values can help businesses attract and retain talent, grow customer loyalty, economic well-being and market growth, increase business efficiency, agility and productivity [16], and most importantly gives peace of mind

to clients. A happy and satisfied client will likely patronise the business again and continued cumulative patronage could lead to a sustainable service to the society.

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About the author:

Name: Johnson Dehinbo

Brief description about affiliation and work.
Johnson Dehinbo is currently a senior lecturer in the Department of Computer Science, Faculty of Information and Communications Technology, Tshwane University of Technology, Soshanguve, Pretoria, South Africa. Mr Dehinbo joined the university (previously named Technikon Northern Gauteng) as a lecturer in 1997. Mr Dehinbo has previously worked as a Computer Programmer/Analyst at the International Institute of Tropical Agriculture, Ibadan, Nigeria from 1991 to 1996, and as a Graduate Assistant at the Ogun State University, Ago-Iwoye, Nigeria from 1990 to 1991 and Federal University of Technology, Yola, Nigeria from 1989 to 1990.

He obtained B.Sc. degree in Computer Science & Statistics from Ogun State University, Ago-Iwoye, Nigeria in 1989, and B.Sc. Honours degree in Information Systems from University of South Africa (UNISA) in 2000. He then obtained two Masters' degree namely, an M.Sc. degree in Information Systems from UNISA in 2006 and also an M.Phil. Informatics degree from the University of Pretoria (UP) in 2011. He is currently busy with his doctoral studies.

His area of research interests includes Information systems and web-based application development, software engineering, e-learning, e-commerce and their impact on educational systems and on the society. He is currently lecturing the following courses or subjects such as: Web Applications development with ASP.NET using C# and VB; Web Applications development using PHP, Java servlet and Java Server Pages (JSP); Developing Client-Server Applications using Borland C++ Builder; Graphical User Interface Design, Development and Implementation; Research Methodology & Research Project 4; Client applications using HTML5, Cascading Style Sheets (CSS) and Javascript as well mathematical subjects like Discrete structures.

Mailing address: Department of Computer Science, Faculty of Information and Communications Technology, Tshwane University of Technology, Soshanguve, 0152, Tshwane, South Africa.

Tel: +27-12-382-9219
Fax:
e-mail : Dehinbooj@tut.ac.za