A Mobile System for Managing Personal Finances Synchronously

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Abstract. Many SMMEs fail within their first year of operation in South Africa mainly because of the lack of proper financial management skills. A number of attempts have been made by way of software applications; however, these attempts fail. This paper intends to design and implement a system that addresses some of the financial management challenges faced by SMMEs. To achieve this, features of similar systems were studies intensively through related work then incorporated into our system design and then implemented. The main objectives of the new system, was to make it possible for SMME owners to have access to their financial information anywhere, have access to real time data, reduce the amount of time needed to enter data in the system and a system that is easy to use. Usability testing was done and the result was a system that was 20% better in keeping records compared to the user's manual accounting system.

Keywords: Financial management · SMMEs · SMEs · Accounting system

1 Introduction

In the last five years, about 440000 SMME businesses closed down in South Africa [1]. Some of the contributing factors to the failures of most of the SMMEs were poor business and financial management competencies [10]. To address the problem of lack of proper business record keeping, much software has been availed over the years to help business owners with their financial management but very few cater for the needs of the SMME owners.

The problem with many of the accounting systems out there could be viewed as complexity, whereby the accounting systems are not different to the manual accounting practiced by any accountant who still writes on a piece of paper. This has led to most of these software's to be only usable to people who have a strong accounting background which most business owners do not have or require the users to have some form of training before using them.

T.F. Bissyande and O. Sie (Eds.): AFRICOMM 2016, LNICST 208, pp. 3–13, 2018.
https://doi.org/10.1007/978-3-319-66742-3_1

This paper seeks to develop an accounting system that will help SMME business owners with their financial management challenges regardless of their accounting background, by making it possible for them to have access to real time data, reduce the time needed to enter data, easy to use the system and make it accessible anywhere. This system was implemented Using PHP and MySQL database. To achieve the objectives mentioned above we automated some of the accounting processes, designed a user interface that is user friendly, did not use accounting jargon in the system instead used simple English for error recovery messages and information. This paper is organized as follows: In Sect. 2, we present related work. In Sect. 3, we present the system design and architecture. In Sect. 4, we present implementation. In Sect. 5, we present testing and results. We conclude the paper in Sect. 6.

2 Related Work

There has been a number of researches and projects done in the field similar to our research, some of these works are discussed in this section. A research was conducted to find out how the new web accounting system could work for SMEs and how these new systems could influence the adoption of International Financial Regularly Standards (IFRS) by SMEs and the factors that might influence the usage of web accounting by SMEs [8].

The product of this research was a system that made it easy for the users to gain access to it everywhere at any time because it was web based. The users did not need to have vast amounts of accounting knowledge just only basic computer skills. The reports design made it possible for the user to edit them in HTML, Excel, XML and some PDF applications. The application was accessible simultaneously by the operator and accountant or management. It was accessible using any computer with IE, Mozilla, and Opera.

This research is similar to our work because the researcher developed a web based accounting application specifically for SMEs with the aim of finding out if these systems could be adopted by the SMEs. The developed system accomplished similar objectives that we wanted to accomplish with our proposed system by making it easy for the users to access to the system everywhere at any time. Its design was in such a way that users did not need to have a vast amount of accounting knowledge just only basic computer skills. However this researcher's work is more of a direct translation of the manual or handwritten accounting, the gap in his work is the introduction of automation in the double entry system and report generation. This allows the user to enter transactions once and the rest happens in the background of the system.

Easy Books [5] developed accounting software that is free to use, but in order to use more of its features users had to pay $30 more to get access to its features. The software's design was to make it easy to use, as it did not require through knowledge of accounting. Reports were auto-generated in a functional layout and could be emailed or

printed from the application. A built in calculator provided, as well as online backups. It provided 29 different types of accounts with accounting jargon names, such as "Accrual". MSEs in the developing world would unlikely use some of these feature. This software was similar to the proposed system because it incorporated some automation in its report generation, but differed when it came to its usage as it contained accounting jargon which we eliminated in our system with simple English to make it user friendly to those that do not have any accounting background.

IXpenselt [3] developed accounting software that enabled the user to keep track of his/her income and expenses; it also had the ability to generate graphical reports in PDF format. This software had some drawbacks which users were not very fond of, they found that entering data into the system was time consuming and the interface was too complex. As with Easy Books, it also offers online backups and monthly overviews of the different accounts. In addition, it included the ability to take a photo of the receipt to capture a transaction. This software is not similar to our proposed system because; its design was not so user friendly to the people who did not know much about accounting. The menu bars changing functions with every screen click and too many items on displayed on every screen made it to be not so user friendly. Users were complaining of the amount of time it took them to enter data into the system, while our system solved that problem by automating some of the processes. However it had some characteristic that we included in our system the printing of reports in pdf format.

Frogtek noticed that many of the SMEs did not track their sales or expenses because they do not have funds to procure the needed equipment to do that in their stores, these included things such as a point-of-sale system or a cash register, and those that were tracking them were doing it via note book [2]. Therefore, they then developed an accounting system that would help them in tracking their business dealing. They developed a point-of-sale application for the SMEs that enabled the users to be able to record all their operating expenses and revenues on their mobile phones or tablets. An external bar code connected to the phone via a wireless connection made it possible to record transactions in the system. All these application were compatible with Android smart phones or tablets that had a touch screen and synchronize with their web servers with this innovation from frogtek the users had access to financial reporting, personalize recommendation and improved services. This then enabled the SME owner to realize or be able to calculate their breakeven point and make personalized recommendations to customers.

This system is similar to the researcher study because it allowed the owners to keep track of their business records specifically sales and expenses. The system developed by frogtek still lacked other components needed for business accounting, these are bank transactions, capital investments financiers it only focuses on cash based accounting only. An addition of other components to this system is needed to make it more comprehensive and appropriate for business accounting.

SMEasy developed specifically to help South African small businesses owners who have no knowledge of accounting [9]. They developed an accounting system that

allowed the users to enter their transactions only once and the system could do the double entry system the back end for the user. The accounting system had a simple screen, no complex menus and no accounting language used in it, which made it quite simple for the entrepreneurs and SMEs to understand. Being web-based made it possible for users to access it anytime and anywhere. The system enabled the users to be able to keep track of their business and personal money used in the business. It also allowed the use of company logos when creating quotations invoices, pays lips, and so builds the brand of your business.

It also had features that allowed a third parties such as an accountant to have access to the users' records by exporting the data.

This system is similar to our system, because it is for the South African SMME owners, who have little or no knowledge of accounting, and being hosted in the cloud, helped in making it accessible everywhere and the non-usage of accounting terminology helps in making it user friendly. The systems design meets most of the criteria related to researchers study, but still lacked or needs a better interface and navigation design.

The current model is not easy to navigate through the pages. A standard interface that would allow the switching between windows would make it easy to use, it also needs proper structuring to be more effect by grouping things in a chronological manner and make it easy to switch between windows by making it possible to have multiple windows open at the same time and switching between them.

3 System Design and Architecture

Before embarking on designing the user interface, we first had to design the database of the system. An entity relationship diagram is a graphical representation of an entity-relationship model [7]. The entity diagram shown in Fig. 1 shows the table used to store information in the database.

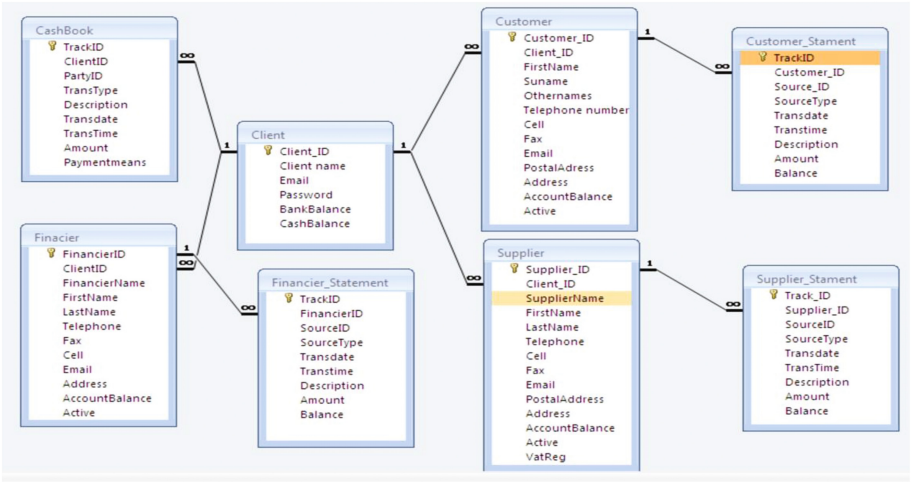

Fig. 1. Entity relationship diagram

The user interface was developed using PHP. The system was designed to have only one user working with the system having automation functions running in the background. Using the Use case diagram shown in Fig. 2, we describe how the user interacts with the system.

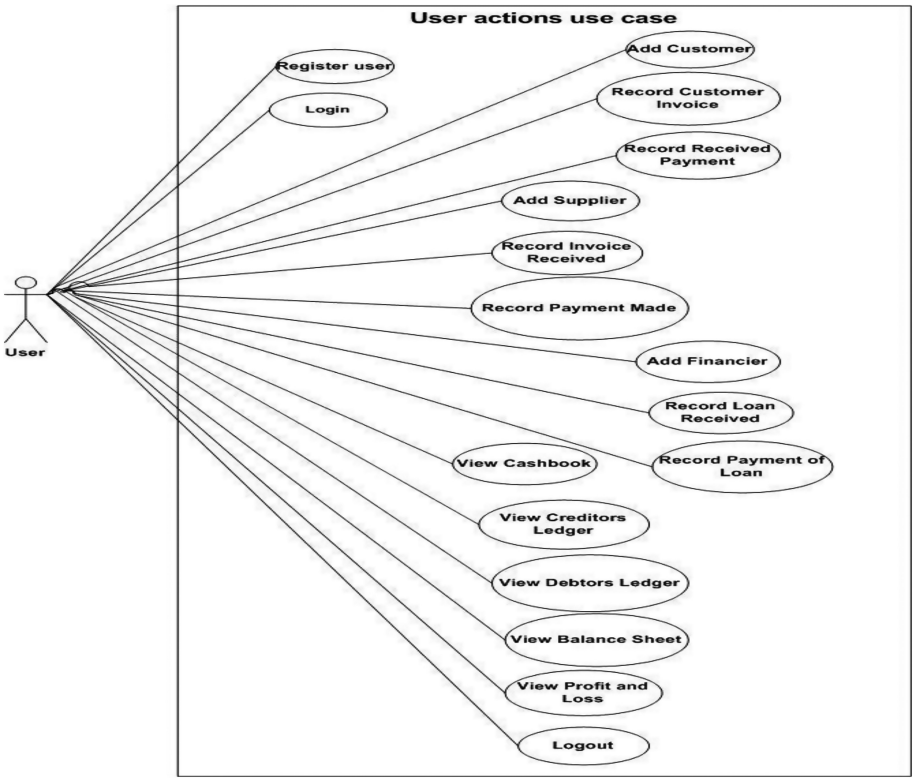

Fig. 2. User activities use case diagram

The interaction of the system with information that has been entered by the user is done through automation; the different automation processes of information are shown using the systems use case diagram presented in Fig. 3.

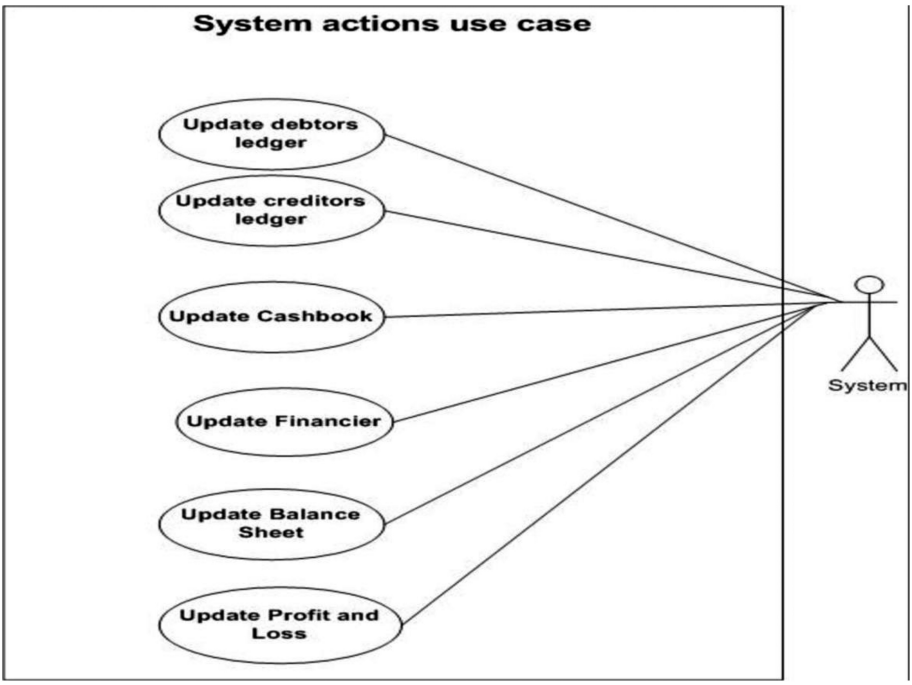

Fig. 3. System activities use case diagram

3.1 System Architecture

System architecture interprets the logical design of a system to the actual system; architecture has the following component hardware, software, network support, processing method and the security [4]. The system architecture diagram, of the developed system is presented in Fig. 4.

From the architecture diagram, we show the different components that make the system work these are; software services running in the server to make it possible for the users to interact with the application and the database. The database server is where the storage and processing of the users information occurs. Since the application is web based, users have to be connected the internet first before they can be able to use the application using the different browsers available that is Chrome, internet explorer, Firefox, etc.

A client may be a computer such as a desktops, laptops, note books which requires additional hardware or WiFi connection in order to connect to the internet. A mobile device is a device that can be carried by the user and is always connect to some network and does not require additional hardware to connect to the internet; these include smart phones and tables.

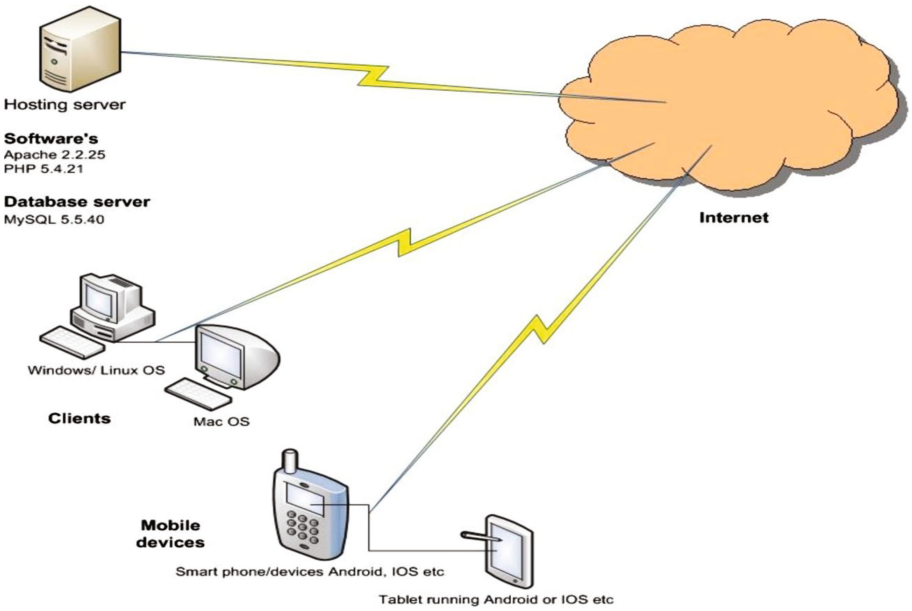

Fig. 4. System architecture

4 Implementation

The online mobile accounting management system was implemented using PHP scripting language. This system was connected to a database designed using MySQL to enable the users to save and retrieve data from the user interface.

The implementation of the system was separated into two parts these are as follows:

- Database- we used MySQL database found in XAMMP which is a free and open source cross platform web server solution stack package consisting mainly of the Apache HTTP Server.
- Interface- we used PHP to develop the interface because there are no costs of using PHP, and there are no licenses restrictions, it is 100% for free to use by anyone.

4.1 Database

To retrieve or save information in the “moneyb” database a connection string was created on the user interface this is shown in the database connection code.

```
session_start();
include("database.php");
//Get the date and adjust it by an hour
$systemDate = date("Y-m-d H:i:s");
$newTransDate = strtotime($systemDate." + 2 hours");
$transDate = date("Y-m-d", $newTransDate);

if($_REQUEST['SubmitBtn'] == "Login")
login.php?userT=$email&passT=$password&SubmitBtn=Login");
if($userName != "" && $password != "")//&& $clientName != "")
//verify info is filled in
{$dblink = openBase('moneyb');
$result = mysql_query("Select * from `client` where Email = '$userName' and
Password = '$password'", $dblink)
or die (mysql_error()."<p><a href='index.php'>Back to Logon Page</a>");
if($row = mysql_fetch_array($result))
{//include :"home.php");    //fopen("home.php");//$loggedOn = true;//$task
= "mess";
          $_SESSION['names'] = $row['ClientName'];
          $_SESSION['enter'] = $password;
          $_SESSION['clientId'] = $row['ClientID'];
          $_SESSION['clientTrackID'] = $row['TrackId'];
          $_SESSION['func'] = " ".$row['Functions'];
          $_SESSION['isLoggedOn'] = true;
          //echo "<tr>
 //<td>".$_SESSION['clientId']."
".$_SESSION['names']."".$_SESSION['clientId']."
".$_SESSION['names']."</d></tr>";
//update the last logon time
mysql_query("update `customer` set LoginDate = '".date('Y-m-d',
$newTransDate)."', LoginTime = '".date('H:i:s', $newTransDate)."' where
ClientId = '$userName'", $dblink);
mysql_close($dblink);
header("Location: home.php");
exit;
```

4.2 Interface

The use of PHP to develop the interface of the system has many advantages some of these are because, it is not platform specific it can run on any OS that is Linux, Mac OS, Windows and UNIX. Applications built on PHP are easy to scale up, which makes scalability easy when working with PHP. Hosting applications developed in

PHP is very easy since a lot of hosts do support PHP. Applications that are developed with PHP do not have any problems in terms of losing their speeds. Since it is a language that has been around for years it is a stable language that can be trusted.

4.3 Reports

To reduce the amount of work needed to enter data into the system, we automated some of the processes and these included posting to the cashbook, balance sheet, summary sales report, summary purchases report and the Profit and loss.

5 Testing and Results

After the successful implementation of the system, we set upon conducting a system and usability testing. In these tests, we did functional and non-functional testing on the system.

For the functional testing 40 individuals tested the system by performing certain tasks in it system then answered two questionnaires these are pre-test and post-test questionnaires. We wanted to get the following information from the tests:

1. If it was easy to learn and use
2. If it met the users financial information needs
3. If the users made many errors while using the system and if they would recommend it to others to try it out or not.

In one of the questions, we wanted them to compare the system with their manual bookkeeping method. Using Fig. 5, we present a diagram showing how the system rated against the user's manual system on a scale of 1–10.

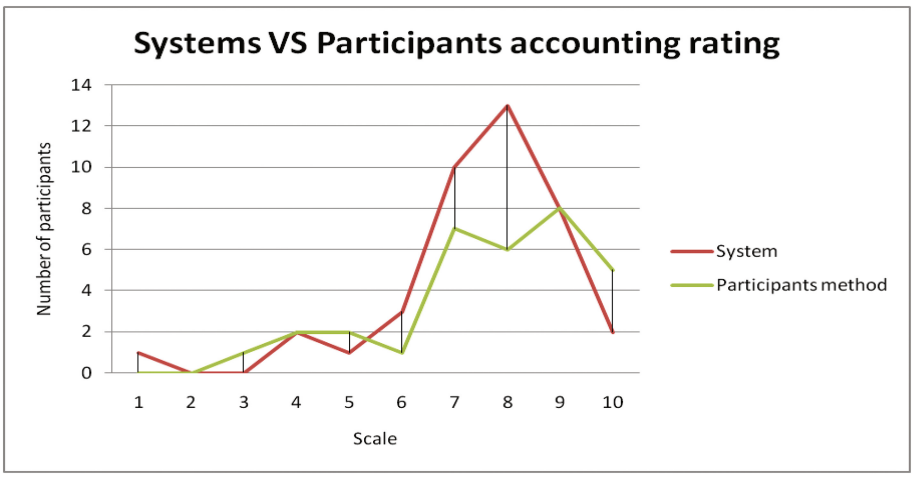

Fig. 5. Effectiveness of system vs. manual system

Unlike the functional testing whereby there was no specific selection criteria used to select or approach the testers, with this kind of testing, we needed people that have a programming background since we needed to test the system not just for its functionality but also to see if it met certain standards.

There are ten rules of system interaction, which are called heuristics because they are not specific to usability guideline [6]. When conducting the system testing we used Nielsen's 10 usability heuristics to develop the testing questions that were to be used for testing the system. The testers were given a case to complete in the system, and then answer questions paused to them on the questionnaire. The results of the tests that were carried on the system are shown in the Table 1.

Table 1. Usability testing results

Heuristic	Responses from questionnaires	Result
1. Visibility of system status	Agree 67%, Strongly agree 0%, Neither Agree or Disagree 0%, Disagree 33%, Strongly disagree 0%	Improvement
2. Consistency standards of the system	Agree 17%, Strongly agree 83%, Neither Agree or Disagree 0%, Disagree 0%, Strongly disagree 0%	Pass
3. Error prevention	Agree 0%, strongly agree 0%, Neither Agree or Disagree 83%, Strongly disagree 0%, Disagree 17%	Fail
4. User control and Freedom	Agree 0%, Strongly Agree 100%, Neither Agree or Disagree 0%, Disagree 0%, Strongly disagree 0%	Pass
5. Flexibility and efficiency	Strongly Agree 67%, Agree 33%, Neither Agree or Disagree 0%, Disagree 0%, Strongly disagree 0%	Pass
6. Recognition rather than recall	Agree 0%, Strongly Agree 67%, Neither Agree or Disagree 0%, Disagree 33%, Strongly disagree 0%	Improvement
7. Aesthetic and minimal design	Agree 0%, Strongly agree 0%, Neither Agree or Disagree 0%, Strongly disagree 67%, Disagree 33%	Pass
8. Help users recover from errors	Agree 0%, Strongly agree 0%, Neither agree or disagree 100%, Disagree 0%, Strongly disagree 0%	Fail
9. Help and documentation	Agree 0%, Strongly agree 0%, Neither agree or disagree 67%, Disagree 33%, Strongly disagree 0%	Fail
10. Match between system and real world	Agree 0%, Strongly agree 100%, Neither agree or disagree 0%, Disagree 0%, Strongly disagree 0%	Pass

On the results obtained from the non-functional testing, we found that the system failed in three categories these are error prevention, help users recover from errors and lack of help and documentation features on the system. To address these failures, we implemented error handling and validation in the system which was previous left out, we also compiled a user manual to help users through the system. They also found that it needed some improvement in other aspects and these are visibility of system status and recognition than recall. However, it passed in five other categories these are Consistency standards of the system, User control and Freedom, Flexibility and efficiency, Aesthetic and minimal design and Match between system and real world.

Based on the results obtained in the functional testing we concluded that the system is more effective in keeping records when compared to the participants' manual systems. 93% or 37 of the participants found the system to be more efficient as they rated it to be on 5 and above on a scale of 1–10 and that is a 20% improvement from the participants' manual accounting system.

6 Conclusion

In this paper, we first introduced the study by describing the challenges faced by SMMEs and the attempts that have been made to try and address the problems faced by SMMEs, we then discussed why they were not successful with their attempts. We then presented our system design to address some of the financial challenges face by SMMEs. Once the design was complete we started implementing the solution, here we used PHP and MySQL. To test the effectiveness of the solution we used questionnaires. These questionnaires were used to evaluate the system to see if it met its intended objectives through Functional and Non-Functional testing.

The final result of this testing proved that automating some of the system processes and hosting the system on the cloud helped the SMME owners in their financial management by reducing the amount of work needed for re-entering data, making data available in real time and making it simple to use even for those with little or no accounting skills this can be attested for by the results obtained from the tests. The results showed that the system was 20% better in keeping records when compared to the user's manual accounting system.

References

1. Fatoki, O.: The causes of the failure of new small and medium enterprises in South Africa. Mediterr. J. Soc. Sci. **5**(20), 922 (2014)
2. Products. http://frogtek.org/products
3. iXpenselt. http://www.fyimobileware.com/ixpenseit.html
4. Shelly, G.B., Cashman, T.J., Rosenblatt, H.J.: Systems Analysis and Design. Thomson course Technology, Boston (2006)
5. Easy Books. http://easybooksapp.com
6. Nielsen, J.: 10 Usability heuristics for user interface design (1995). https://www.nngroup.com/articles/ten-usability-heuristics/
7. Hoffer, J.A., Prescott, M.B., Macfadden, F.R.: Modern Database Management. Prentice Hall, New Jersey (2007)
8. Florien, M., Groza, C., Aldescu (Iacob), E.-O.: Using web technology to improve the accounting of small and medium enterprises: an academic approach to implementation of IFRS. Annales Universitatis Apulensis Series Oeconomica **13**(2), 280–289 (2011)
9. Product profile. www.tdh.co.za/pdf/SMEasy%20Product%20Profile.pdf
10. Naqvi, S.W.H.: Critical success and failure factors of entrepreneurial organizations: study of SMEs in Bahawalp. Eur. J. Bus. Manage. **3**(4), 98 (2011)