FLEXIBLE ENVELOPE SYSTEM FOR DETECTING AND REPORTING OVERTSPENDING IN CASHLESS TRANSACTIONS

Odii Juliet N, Odirichukwu Jacinta C, Onukwuha Chinwe G.
Department of Computer Science, Federal University of Technology Owerri, Imo State Polytechnic Umuagwo

ABSTRACT

It is a common phenomenon in a cashless economy for people to over spend. This occurs because there is the tendency for people to easily spend more than what their budget allows when they are not seeing the cash leave their hands. The use of credit cards in a cashless economy creates room for people to spend more rather than save, which leads many individuals and organizations into an untold hardship and indebtedness. This paper explains the flexible system for detecting and reporting an overspending in a cashless economy. It is a software that tracks expenditures and gets reports that reflects possible over spending. It involves separating transactions into different categories called envelopes as though one is separating his money into different envelopes and keeping track of how each is spent. Since Nigeria intends to go cashless, the paper therefore is an eye opener to individuals, institutions or corporate organizations both in Nigeria and in Diaspora on how overspending can be monitored in order to avoid bankruptcy and at the same time ensure economic sustainability. The system is designed using Java with Netbeans IDE and SQL 2008 as the database application software and can be used for personal budgeting as well as for governments and other organizational transactions. With this system it is possible to automatically track transactions as it offers any user the opportunity to know how much has been spent over a period of time, how much that remains, and more so it can enable the user determine how long the budget needs to last.

Keywords: Flexible, Cashless, Transactions, Envelop, Budget.

Introduction

A cashless society is a culture where no one uses cash, all purchases being made are by credit cards, debit cards, cheques, or direct transfers from one account to another through mobile banking and other electronic means. The cashless society envisioned refers to the widespread application of computer technology in the financial system (NSACC, 2012). The problem many people have with cashless options for transactions is overspending. It is very easy to spend more than what your budget allows when you are not counting out the actual cash and seeing the hard earned money leave your hands. The “I will pay it later” is much easier than saving money for the expensive purchase, and most of the time, something comes up that prevents us from paying
it completely when “later” actually arrives. People spend ten to twenty percent more money when using a credit card (or other similar options) than cash (Smith, 2012). Some financial planners have long encouraged people to avoid credit-card purchases as a way to save money. This is because several studies in the past have suggested that less transparent payment forms (such as credit cards) tend to be treated like play money and are hence more easily spent (or parted with),” (LiveScience, 2011). A flexible budget system is the only real way to keep track, and prevent overspending in the cashless transactions. In this paper the conventional envelope budgeting system has been simulated in a software and can be used in a cashless transactions to track and report possible transactions that may lead to overspending. The software developed in this paper will help to eliminate the traditional envelope budgeting system, is capable of keeping track of how transactions are being made in cashless transactions curb overspending in all financial dealings , monitor, detect and report overspending and more so maintain effective handling of budgets.

Review of the Cashless Policy

The payment system plays a very crucial role in any economy, being the channel through which financial resources flow from one segment of the economy to the other. In January 2012, the cashless policy kicked off in Nigeria with a pilot scheme implemented in Lagos State (Sanusi 2012). This Central Bank of Nigeria’s policy to join other developed countries in operating cashless economy was received with so many commendations from both within and outside the country. Then for Nigeria to join the league of cashless economies something inevitable must be done in the direction of checkmating overspending.

Electronic payments have a significant number of economic benefits apart from their convenience and safety. These benefits when maximized can go a long way in contributing immensely to economic development of a nation. Automated electronic payments help deepen bank deposits thereby increasing funds available for commercial loans – a driver of all of overall economic activity. According to (Cobb, 2005), efficient, safe and convenient electronic payments carry with them a significant range of macro-economic benefits, while cash transactions impose a cost on local economies. This is because cash has to be minted, securely transported, counted and reconciled, kept secured and maintained for re-use time and time again. The per-payment cost is also high, and will always remain high whereas the costs of electronic
systems are fixed. Once the infrastructure has been built, the costs per-transaction is very low (Cobb, 2005).

Automated electronic payments act as a gateway into the banking sector and as a powerful engine for growth. Such payments draw cash out of circulation and into the bank accounts, providing low cost funds that can be used to support bank loans for investment – a driver of overall economic activity. The process creates greater transparency and accountability, leading to greater efficiency and better economic sustainability (Shaikh, 2005). Hord (2005) further emphasizes the fact that electronic payment lowers costs for businesses. The more payments that is processed electronically, the less money is spent on paper and postage. Offering electronic payment can also help businesses improve customer retention. A customer is more likely to return to the same e-commerce site where his or her information has already been entered and stored. However, the demise of cash and the emergence of a cashless society pose benefits as well as problems for a society. The common problem being encountered in cashless policy is that in most of the transactions done with cashless options, there is potential to overspend. It has been gathered that more than 70% of Nigerians spend more than they earn even now they have not gone completely cashless. Before the end of the month, most salary earners complain that they are already indebted in various transactions they make. This situation is not limited to individuals as both organizations and even government often find out that they have spent more than what they budgeted. As Nigeria moves towards a cashless economy, there is therefore a need for a system capable of tracking every transaction one makes with the aim of curbing overspending in financial dealings of individuals, organizations and government agencies. This is what this paper is meant to achieve.

The Need for a Cashless Policy in Nigeria

The benefits of a cashless society to banks and merchants include larger customer coverage, reduction in cost of operations, international products and services promotion and branding, increase in customer satisfaction and personalized relationship with customers, and easier documentation and transaction tracking. To the government, it aids adequate budgeting and taxation, improves regulatory services, improves administrative processes, and reduces cost of currency administration and management. To individuals, it aids convenience, as it is available 24 hours a day and seven days of the week. It also helps reduce transfer costs and processing
fees; supports multiple payment options; and also facilitates immediate notification of all
transactions on customer’s account platform (Global Press Institute, 2011). In the wider society,
effective implementation of the policy would curb corruption in all forms of transactions. The
expert also expressed optimism that Nigeria would truly move on progressively as a cashless
society (NSACC, 2011).

**Overspending in Cashless Transactions**

When most of the transactions are done with cashless options, there is potential to overspend.
This is because the convenience of debit and credit cards is very tempting. Some cards actually
offer rewards or cash back that makes their use more appealing. The problem with this
convenience is that you can begin to forget the true value of the money you are spending and end
up having trouble staying within your limits. This is what leads to overspending (Vohwinkle,
2011). In cashless economy, all you need do is swipe your credit card like you would a debit
card and the funds are electronically whisked in and out of your account respectively. When you
are not physically handling some money for a purchase, it can almost feel as if you are not
spending money at all.

**The Budgeting System**

A budget is a financial plan showing how much money a person or organization has available
and how it should be spent. The budget is also the financial plan announced by a government
showing how much money they intend to get through taxation and how they intend to spend it
(BBC Dic2005). It is a list of all planned expenses and revenues. It is a plan for saving,
borrowing and spending (www.wikipedia.com, 2012). In fact, budgeting in its general sense is
the act of quantifying objectives in financial terms. There is a direct relationship between
effective budget implementation and national development. With a population of about 150m,
ineffective budget monitoring and implementation still remains the biggest challenge to
Nigeria’s economic and socio-infrastructural rejuvenation. Budgeting culture in Nigeria mostly
begins and end with planning alone (Gwegwe, 2010). It is even more worrisome that most of our
expenditures (in government and private sectors) are now made using cashless options. The issue
therefore is how to track our cashless expenditures and still know how much balance we have
left in the budget. Although, there are several budget management tools, most of these tools are
designed specifically for a particular organization, group of people or purpose. There are several electronic payment solutions and budget management tools within and outside the Nigeria. In Nigeria, several electronic payment solutions such as CashEnvoy and eTranzact have emerged in last few years. While CashEnvoy is basically a web payment platform (Global Press Institute, 2011), eTranzact is a multi-channel electronic payment system that facilitates real time settlement of financial transaction using Internet SMS, WAP, Voice XML and bank outlets (NSACC, 2011). Merely controlling how to use cash is not a budget tool, we need to use a proper budgeting system that will allow us to track our expenditures, and also track and report transaction that may lead to overspending.

There are several ways to budget; these include line item budget, envelope budget, percentage budget, cash budget, capital budget, event budget and category budget. One of the easiest budgeting systems is the envelope system It is an “active” process that works by assigning income to various virtual “containers.” (Kulicki, 2012). In this paper our aim is to make this envelop system more flexible so that it will be an effective tool in tracking and reporting suspicious transactions that may lead to fraud and overspending. Envelope budgeting has traditionally been one of the simplest yet most effective budgeting methods. Here cash is divided among separate envelopes designated for specific spending categories. Purchases in those categories are paid for using the correlating envelopes. With this method it is very easy to track where money is going, how much is left, and how long it needed to last. It is analogous to the traditional envelop we use to put our money every day. But this time around in computerized form. Whereas the traditional envelop system will not restrict one from taking funds from any envelop when any one runs out, this software places some restrictions on spending money on something for which the envelop is not meant for, thereby checkmating reckless expenditures or over expenditures. One of the biggest advantages of the envelope system is that it is a tool that helps to check and prevent overspending. It restricts how much you can spend from both an individual category perspective (each envelope) and a monthly total perspective (all the envelopes). When an envelope runs out, you can pull funds from another envelope but with some restrictions, which limits how much you can spend each month. Even with the significant advantages of the envelope budgeting system, it is only as good as determination to use it. Meticulous tracking will only prove successful if you are prepared to guide your spending
decisions based on the information the envelope system provides. Success will ultimately come from your commitment to spend less than you make.

**Steps to Successful Envelope System**

The success cycle is made up of four steps as shown in the figure below.

![Figure 1.0 Envelope Budgeting](image)

**Types of Envelope Budgeting System**

There are four basic types of envelope budgeting systems namely:

1) **Cash-Based Envelope System:** The most basic approach to implementing the envelope principles is using a cash-based system. Income allocation and tracking spending is both very straightforward with cash. For instance, if you have N500 in your feeding envelope and make a N150 purchase, it is easy to see that you only have N350 left. However, because it is more difficult and inconvenient to make all payments with cash, many people combine a cash-based envelope system with a system that can handle the management of non-cash transactions.
2) **Paper Ledger or Computer Spreadsheet:** Using a paper ledger or computer spreadsheet system allows you to track all types of spending. This approach functions similarly to the cash-based envelope system, with a few adjustments. Instead of allocating actual cash to spending envelopes, you will be creating spending accounts that are essentially virtual envelopes. Your cash will stay in your bank account, but you will allocate it to your spending accounts for the purpose of tracking your spending and determining the balance remaining in each spending account on a daily basis.

3) **Computer-Based Envelope System:** Perhaps the easiest envelope system for most is a computer-based or online system. This system will automatically track your transactions. For example that was used in cash-based system above; you simply assign the transaction to your clothing account. The system will automatically update the balance remaining in that account for you. You will know exactly how much you have spent, how much you have left to spend and how long it needs to last.

**The Proposed System.**

In this paper, we propose to develop an algorithm that can be integrated in any budgeting application for tracking and reporting reckless transactions that may lead to overspending. This algorithm will make the envelope system more flexible because it includes components that address the shortcomings of the other envelope systems while still retaining its advantages for use in cashless transactions. For example, the major drawback of other envelope budgeting is that they don’t track our expenditure, by default. This problem has been addressed in this work by making sure that once an amount has been assigned to an envelope, any amount deducted from that envelope is assigned a unique ID to ensure proper monitoring and tracking of the expenditure. In its implementation, the database that supports this system allows the handling of as many envelopes as requires. From implementation standpoint, the flexible envelope system will be anchored on three major components to track and report overspending- Use of a checking account, Use of a pretend envelope, and Use of a running balance. This flexible envelope system can be built in two perspectives: as a SOA-based system and as a conventional web-based system.
**SOA- Based System** In this paper we developed a flexible envelope system as a service-oriented architecture based system. Service Oriented Architectures (SOA) is a way of developing distributed systems where the components of these systems are stand-alone services (Sommerville, 2007). SOA is a flexible set of design principles used during the phases of systems development and integration in computing. System based on a SOA has a package of functionality as a suite of interoperable services that can be used within multiple separate systems from several business domains.

This flexible envelope system makes it easy for people to track their spending and prevent overspending. As a result, the system is interoperable and flexible. Other added features that improve the system include tracking overspending, computing balance, creating and charging items to a checking account as shown in the architecture below:

**Figure 2.0 The Conceptual Architecture of a Service-Oriented Architecture**

The system is basically a layered architecture. The above shows the conceptual diagram of the system as a set of fundamental services for tracking and reporting overspending in
Cashless transactions. The services in the internal structure are organized in a set of four (4) layers which consist of - the User Interface layer, Budget services layer, Overspending Tracking Services layer, and Repository Services layer. The overspending tracking services layer contains a set of services that work together to support the control and track overspending in cashless transactions. The group of common budget services (outside the internal structure) is a set of services that may be found in any budget system or any other system that has budgeting functionality. The Repository services layer (local and external) contains the various data sources that provide the resources that are being accessed. The Tracker service acts as an adviser. It also advises and coordinates the operation of other services and also helps to search for content either in the local or external repository. The User Interface layer provides a flexible platform for connecting with the overspending tracking services. The modules of the overspending tracking service are charge item, create checking account, track overspending, check running balance and feedback provision (for personal, private and public organizations). This architecture will provide a good foundation for a system that needs services for use in tracking and reporting overspending. This architecture makes sharing and exchanging of services that prevent overspending easily. As a result, the system is interoperable and flexible. Other services can be easily implemented in the system and they are flexible to be used by other authorized services or systems.

**Technique for Tracking Overspending:**

The system checks overspending by computing what we call the running balance of each envelope once the expenditure details have been entered into the system. Assuming a user intends to spend N700 on item1 which falls under an envelope1. Envelope1 has N500 balance. The running balance which is -200 is less than zero (that is 500-700). When this happens, the system halts expenditure on that particular envelope whose running balance is less than zero, and then notifies the administrator or the authorities about an attempt to over spend. Thereafter, the system presents two options to the user to proceed with the transaction. Explaining with a simple example, when using the first option, the user has to review the expenditure details by bringing down the amount to spend on item1 or re-enter details for a fresh item whose running
balance will be less than zero. In using the second option, the user has to charge an item to a special checking account. This is done by creating a unique ID for a checking account and a charged item. This accountID is tied to a specific chargeditemID. The checking account maintains the actual amount of the item to charge, the current account balance of the account and the envelopeID from which the item was charged from. The item is then charged from each envelope in the budget to the checking account until the Account balance is greater than or equal to ActualAmt. Once this is done, item can now be spent in the normal way. It should also be noted that this second option ordinarily is the one which a user can choose from if he/she decides to charge the item to a special checking account.

Conclusion

A flexible envelope system as proposed in this paper has been designed in such a way that it keeps track of the various transactions made by different individuals or organizations, and at the same time helps to curb overspending. It is also capable of detecting and reporting any action that may lead to overspending and other fraudulent activities in all financial dealings of the individuals and corporate users. Merely controlling how to use cash is not a budget tool, we need to use a proper budgeting system that will allow us to track our expenditures, and also track and report transaction that may lead to overspending. Whereas the traditional envelop system will not restrict one from taking funds from any envelop when any one runs out, this software places some restrictions on spending money on something for which the envelop is not meant for, thereby checkmating reckless expenditures or over expenditures. A flexible budget system is the only real way to keep track, and prevent overspending in the cashless transactions.

REFERENCES


http://www.voiceofnigeria.org/Nigeria/Cashless_Policy_enabler
of_Economic_growth_Sanusi.html


