

Automated Personal Finance System (Pay App) for College and University Students in Developing Countries. A Case for Egerton University

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Abstract Financial management and budgeting although not seriously taken into consideration as major contributor towards smooth learning for students, is a very crucial element in students' successful completion of their courses in the universities or colleges. This paper presents a research on the need for the proper finance management and discusses a mobile application, "Pay-App", which offers an alternative approach to traditional income spending and seeking to make the otherwise idle/unplanned/misused income more productive by adding useful functionalities that are unique and bespoke to the users. The paper takes a comprehensive look into the revolution of payment and money transfer schemes specifically the use of modern mobile payment platforms offered by the various available mobile and internet service providers. A small survey on where students' income come from, how spent, and the need for a students' financial system. The proposed application uses the concept of accounts (cash boxes) to represent each budget item whereby an income that a person receives is distributed to the various accounts using prescribed formulae. The formulae consider priorities of a budget item, amounts required, period to achieve a target among other parameters. In order to justify the need for such a system in the community (University environment was chosen as a sampling environment), the researchers distributed questionnaires to a target population and observations made. This was to help in finding out if such system would be practical and useful to various individuals earning an income (regularly or irregularly) and fall into various income brackets. After conducting the research, it was observed that a majority of the people preferred to have an automated system of redistributing money into their various budget target entities in an organized and prioritized fashion. The proposed system is unique in its ability to tie its users to a well-managed financial discipline that allows them to avoid reckless spending habits which lead to a common state of financial depression. University environment was chosen as students have a tendency of overspending during the first days of the semester and unable to control any other income they generate within the semester. In the absence of such a financial system, students tend to think that the money they have is a lot and tempts them to experiment with harmful activities like drugs, buying expensive gadgets, and getting involved with other undesired characters. Such financial spending could have been avoided altogether, had a proper cash-management mechanism been adopted. This also would help in training the students in proper money managements and evade various dangerous activities. The same applies to communities with low and irregular income like the "jua kali" sector and other small and medium entrepreneurs (SMEs). When these people gets a pay, they also tend to feel that the money is much and enter celebration mood that leads to misuse of money, inability to take care of their families and in some cases lead to poor health of the individuals. The paper therefore discusses, training of students and low income earners on spending (social) and an innovation in computer application (technical) that helping people become wise spenders.

Keywords: *Personal Income/finance* (This is the financial management which an individual or a family unit is required to do to obtain, budget, save, and spend monetary resources over time, taking into account various financial risks and future life events), *Cash-box* (A term unique to 'Pay-App!' and used to describe an account or container that holds a figure, representative of money), *MPESA* (This is a mobile cash platform used by a Kenyan mobile service provider.), *Mobile Money*: *Mobile* payment, also referred to as *mobile money*, *mobile money* transfer, and *mobile* wallet generally refer to payment services operated under financial regulation and performed from or via a *mobile* device. *Emulator* – (A piece of software whose main purpose is to simulate the actions of other hardware and software.), *HTTP* – HyperText Transfer Protocol, (*DBMS* – DataBase Management System)

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1. Introduction

Personal Income/finance means differently to different communities. Community here means income bracket communities. The target community in this paper is the University/College students. Some people have fixed incomes, mostly from formal employment. For the Case of Students (regular), income may be from parents/guardians, relatives, bursaries, part time jobs etc. Others (part time – evening) may have variable incomes that vary from month to month; these are mostly from the informal sector. Others have a hybrid income partly from formal employment and partly from part time employment and partly from small businesses of projects. The group that have variable income cannot have a fixed budget that they can rely on and accomplish it at the end of a prescribed period. This means that if one intends to do a certain project and incorporate it with other expectations, it is unlikely that one can do it in a planned manner. Saving also becomes a problem especially when one receives some money from an unplanned area e.g. shares, bonuses, financial tokens, overtime payments etc. The question that arose in this research was then: How can IT (Information Technology) assist in automating the expenditure of income that comes unplanned and incorporate it with the regular income and help in achieving once budget goals? Money is normally received in form of Cash, cheque, money transfers, through money grams, mobile money, etc. Such sources of income can be automated as suggested in this paper.

When planning personal finances [2,3], the individual would consider the suitability to his or her needs of a range of banking or and insurance products or participation and monitoring of individual - or employer-sponsored retirement plans, social security benefits, and income tax management.

The key component of personal finance is financial planning [1], which is a dynamic process that requires regular monitoring and reevaluation. In general, it involves five steps: These can be summarized as:

- i. **Assessment:** which involves compiling simplified versions of financial statements including balance sheets and income statements.
- ii. **Goal setting:** Having multiple goals is common, including a mix of short- and long-term goals. Goal setting is done with an objective to meet certain financial requirements.
- iii. **Creating a plan:** The financial plan with details on how to accomplish the set goals
- iv. **Execution:** Execution of a financial plan often requires discipline and perseverance. Many people obtain assistance from professionals such as accountants, financial planners, investment advisers, and lawyers.
- v. **Monitoring and reassessment:** As time passes, the financial plan must be monitored for possible adjustments or reassessments.

Typical goals that most adults and young adults have are paying student loan debt, investing for retirement, investing for college costs for children, paying medical expenses, planning for passing on their property to their heirs among other goals. These goals are normally for

working class or people with regular income that can be distributed according to the above goals.

A student's typical budget [10], [questionnaire] will include Food, Airtime/internet bandwidth, entertainments, transport, shopping (clothing, gadgets, etc), rent (for students not accommodated by the university/college), books and stationary, and donations.

Further, the six key areas of personal financial planning, as suggested by the Financial Planning Standards Board [4], are:

- i. **Financial position:** which is concerned with understanding the personal resources available by examining net worth and household cash flow.
- ii. **Adequate protection:** which considers the analysis of how to protect a household from unforeseen risks.
- iii. **Tax planning:** which is typically, the income tax that in most cases is the single largest expense in a household in a developed country.
- iv. **Investment and accumulation goals:** that involved planning how to accumulate enough money for large purchases and life events is what most people consider to be financial planning.
- v. **Retirement planning** is the process of understanding how much it costs to live at retirement and coming up with a plan to distribute assets to meet any income shortfall.
- vi. **Estate planning** involves planning for the disposition of one's assets after death.

Again these areas are not very relevant to a student's financial planning activity but gives an insight on what is to expect in future.

According to the blog [6] "Financial Planning for Everyone", financial planning as a college student usually does not have to be as complicated or comprehensive as that of, say, a business owner, parents with kids, or a soon-to-be-retiree. Without regular earnings or dependents, you do not need life or disability insurance (yet!), and are not yet concerned with the finer points of 401(k) contributions and investments.

The author further suggested four questions to ask when determining financial planning..

- i. What can I do to build a good foundation for my future earnings and long-term wealth?
Most college students have what CPAs term "negative net worth." This means that what you owe—such as student loans, outstanding credit card balances, or a laptop loan—is greater than what you own. What's not counted, however, is your potential for future earnings—presumably one of the reasons you are going to college in the first place. Your focus should be simple: do as much as you can to enhance your earnings potential, such as choosing a major in a field that you not only love, but is in demand by employers.
- ii. How do I manage my debt and build the credit I'll need once I graduate?

Managing your debt and keeping your credit score healthy is imperative for your post-grad plans. Be as conscientious about paying your bills on time as you are about turning in your assignments. Live by a budget, and not by peer pressure: if you haven't planned for a given expense, don't buy it. Work-study and other campus employment help to offset expenses and save,

while offering valuable experience. And living off campus, cooking your own meals and buying used books are all simple ways to make your budget last.

iii. What financial mistakes should I avoid?

This involved borrowing beyond potential earnings. Such borrowing can be in terms of student's loans, bank loans or borrowing from other financiers.

iv. Where can I go for guidance?

There is basically no formal training that the youth get on financial planning and this leads to the problem in financial planning. Almost everything students know about money is learnt on their own, glean from their parents, or assume to be figured out later—when they actually have some money.

These four questions can be answered by the proposed system.

Finances form a huge part of a person's life. It can determine what he/she can do and where he/she can go. Learning how to manage once money the right way is an important step toward taking control of once life.

Understanding where your money is coming from, where it's going to, and how to make sure that the way you manage your money falls in line with the values that matter most to you.

Mobile money transfer and payment services have become increasingly popular in Kenya and other developing countries with many telecommunication and mobile companies offering various attractive rates to ensure that cash is transferred in an efficient, timely and secure manner.

This Information Technology has revolutionized the way people conduct businesses and various monetary activities. The available mobile money transfer services have proven effective and this paper simply seeks to explore another option that is an improvement on these platforms through the addition of unique and dynamic functionalities.

There exist a number of financial apps in the market today¹, most of which are free and online. Some of the most popular and well-known personal finance apps work on the premise that better money management comes through centralization and visibility. If one can see, at a glance and in one place, where all his/her accounts and spending habits stand, one would be better equipped to make better decisions to stay within budget. Pay-App has so many more incredible features, too, that help you budget your money, get out of debt, and achieve financial goals

There are a number of personal finance tool in the market [5]. Here is a list of some of them obtained from lifelhucker.com:

- Mint, You Need a Budget (YNAB), GNU cash, Money Dance, Budget Simple among others

These systems target the middle class group of earners and may not be suitable for irregular and low income earners.

According to Jennifer Colonia⁵, advices on managing finances for middle income earners include planning and bills automation. PAY APP would be appropriate for these two.

Before starting on the proposed system, an evidence study/survey was done in order to discover whether the implementation of such a system would prove useful in enabling low income earners, specifically students to

establish order in their finances through automated cash management. Questionnaires were developed and given to a target population and the results obtained were used as a basic for developing and deploying the system

The result was a Pay-App mobile application. The system was designed to have a simple and user friendly interface along with an algorithm that facilitates the redistribution of money across the various available cash-boxes (as predetermined by the user) upon every deposit.

The design includes a text box where the user is meant to enter a numeric figure representative of the money they wish to deposit. The money is then redistributed into the various available cash-boxes, according to a pre-set priority order that the user determines upon generation of the cash-boxes.

This allows for consistency and ultimately ties the user to a certain financial discipline. The system was initially developed and tested on Android platform. It can however be exported to other mobile platforms and desktops.

2. Methodology

In order to justify development of the said application, a survey was carried out on a chosen sample of students from Egerton University. Third year and fourth year students group was chosen for as the sample. The reason for choosing third and for the year groups was that these students has been in the university for a while and already know what expenses are incurred by a bonafid student. The system will however be used by all students including newcomers as this will give them the training not given anywhere in schools.

The main method used to gather the required data and information was the distribution of questionnaires to the target population sample consisting of students of different ages within various levels of education.

The information gathered allowed the study to determine which cashboxes will be very crucial, where students get source of funding, frequency of income, approximate income (to justify low income), whether the money they get gets them to the end of the month/semester, and whether students would be interested in adopting an effective financial management tool, if one was made available to them.

It was also meant to determine the technological literacy of the target group as well as their willingness to embrace new and upcoming technology.

Questionnaires were distributed to a sample of 36 individuals of various ages who fall into different income brackets.

This study was inspired by Safaricom's M-PESA money transfer service along with the subsequent launch of the M-SHWARI service. These services seemed similar to banking services at first but their portable nature brought about by their ties to mobile devices, made them unique in nature and significantly fueled their popularity. This make the application suitable to students who may not have bank accounts but can use mobile money as their banks.

The meteoric rise of mobile money transfer services, despite having solved the problem of managing once money on the go, has created the need for a more dynamic and integrated system to complement the already existing

service. This is one of the goals that Pay-App hopes to achieve.

Below is a graphical description of the overall infrastructure of the system along with its interactions with external entities.

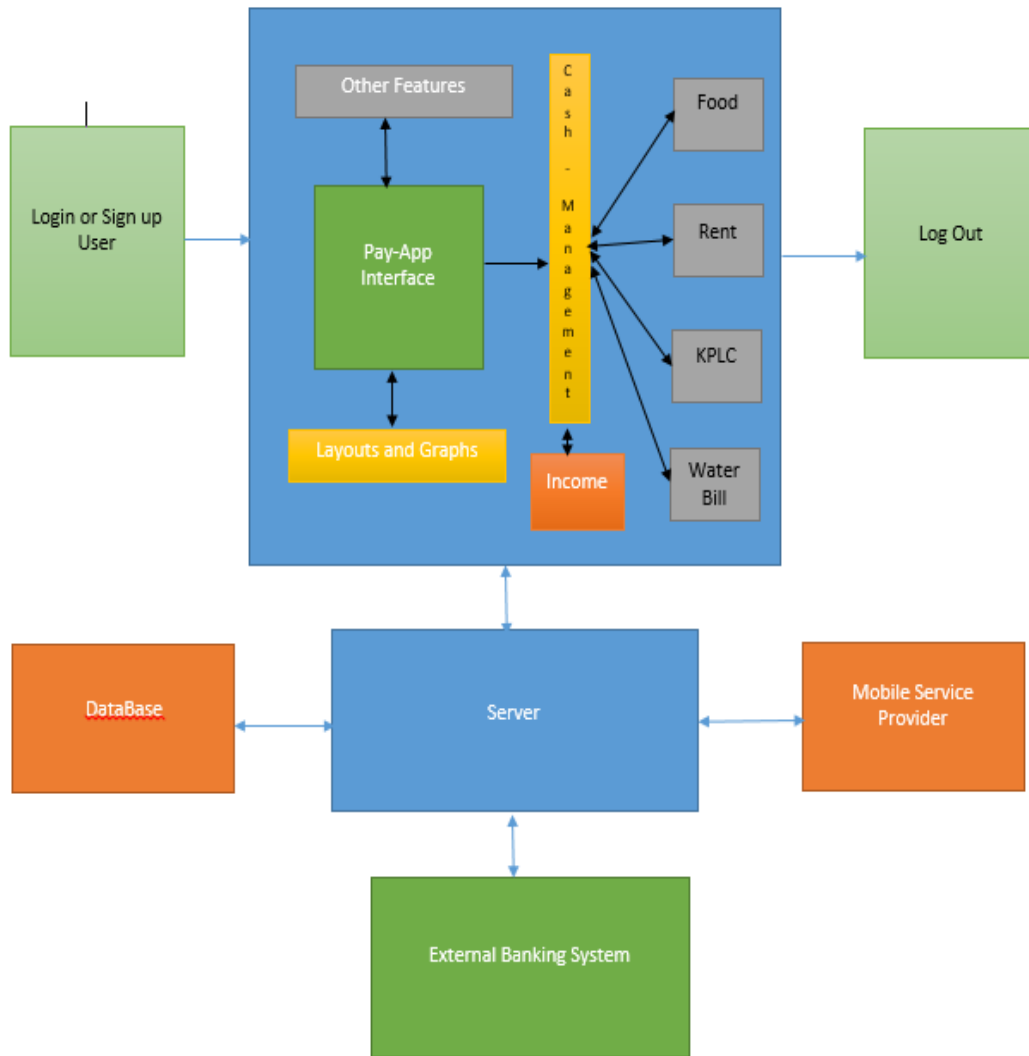


Figure 1. Overall infrastructure of the system

3. Results

This section shows the conclusive findings of the initial research conducted in order to determine the viability of the Pay-App mobile application proposed in this paper and the successful results of the proposed system.

The questionnaires were divided into two classes: Students and Workers in the University. 50 questionnaires were prepared for workers and 150 questionnaires for students. Although the app targeted students, it was thought good to find out if workers could also benefit from the app.

For the workers, Out of the 45 people approached and asked to volunteer to fill the Questionnaire, 40 agreed. Out of the 40 people who agreed to fill in the questionnaires, 36 filled them and returned them. Of the 36 who filled the questionnaire, 15 (41.67%) were female and 21 (58.33%) were male.

For the case of the students, Out of the 150 students approached and asked to volunteer to fill the Questionnaire, 120 agreed. Out of the 120 people who agreed to fill in the questionnaires, 115 filled them and

returned them. Of the 115 who filled the questionnaire, 47 (41.67%) were female and 68 (58.33%) were male.

The table below (Table 1) shows percentages of students that spend on the budgets listed for students at Egerton University.

Table 1. typical budget for a third year student at Egerton University

Item	Expense	Percentage of students
1	Food	87
2	Airtime/Internet	73
3	Entertainment	67
4	Transport	40
5	Shopping (not food)	47
6	House Rent	33
7	Business maintenance	6
8	Donations	12
9	Credit cards	6
10	Saving	0

From the findings of the questionnaire, 2% of the students get money from, bursaries, another 2% from well wishers, a 2% from part time and 92% from parents or guardians. This shows that the university environment is

not very conducive for part time or small business for students.

The following observations were also drawn related to the sample study's income by sampled worker (Figure 2):

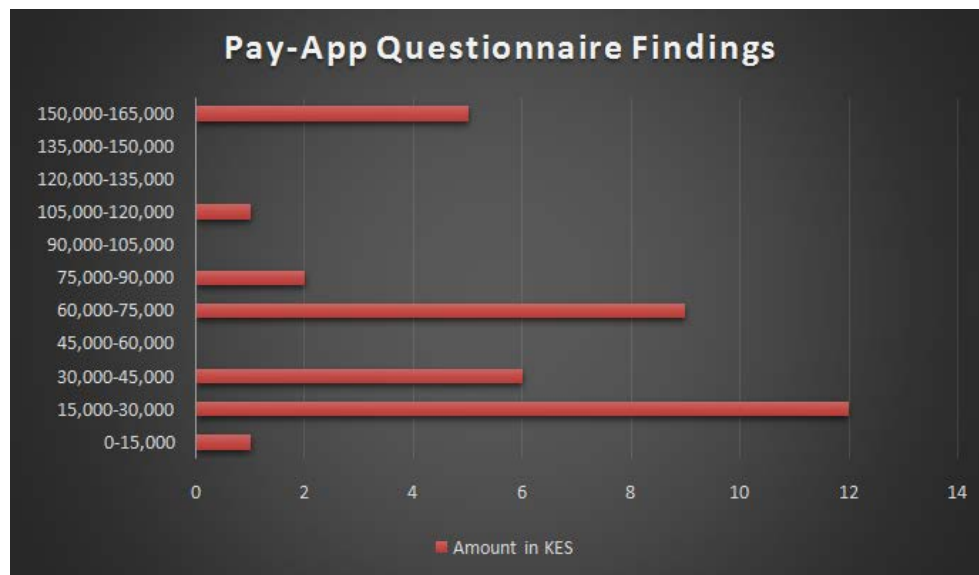


Figure 2. Income for workers in the University

Note: The figures collected are representative of the participants' net income.

- 12 (33.33%) fell into the KES 15,000-30,000 income bracket
- 9 (25%) fell into the KES 60,000 -75,000 income bracket
- 6 (16.67%) fell into the KES 30,000 - 45,000 income bracket
- 5 (13.89%) fell into the KES 150,000-165,000 income bracket
- 2 (5.56%) fell into the KES 75,000-90,000 income bracket
- 1 (2.78%) fell into the KES 105,000-120,000 income bracket
- 1 (2.78%) fell into the KES 0-15,000 income bracket

32 (88.89%) of the 36 individuals who participated in the study earned a basic salary. While about 12% were casual laborers. 14 (38.89%) of the study sample answered that they were able to make their monthly payments on time while about 61% were not. All the participants responded that they used a combination of manual, banking and mobile transactions to make their monthly payments.

Most of the workers (31 out of 36 [86.11%]) found the mobile money transfer to be more convenient.

All the participants responded in the affirmative to the question of whether or not they have a savings account.

However, only 30.6% (11 out of 36 participants) responded that they deposit money regularly into their savings accounts. This is a clear indication that there is a desire in most individuals to establish best practice mechanisms when it comes to their finances in order to fully enjoy their income.

Table 2. income ranges for students

Item	Income range	No of students
1	Over ksh 50,000	3
2	Between 30,000 and 50000	8
3	Between 10,000 and 30,000	10
4	Between 5,000 and 10,000	34
5	Below 5,000	70

For students, only about 9% earned/received between ksh 10,000 and ksh 30,000. 30% earned between ksh 5,000 and ksh 10,000 while about 50% earned less than ksh 5000 (this was disturbing).

Among all the students that responded 47% indicated that they were able to scale their money to the end of the semester while 53% indicated that they could not.

Table 3. Need for Financial management system

Response	No of students	%
Needs a financial System	71	62%
Don't need a financial system	38	33%
No response	6	5%

All the workers indicated that they would indeed like to have a system that does all the cash management on their behalf and subsequently prompts them to make the payments once the respective cash-boxes have been filled, which is what Pay-App does. Some students were however adamant mostly because they were not earning much to justify a system. However 62 percent of them indicated that they needed it. Most students and workers wanted the application on their mobile phones.

The application that was developed was demonstrated and posted on YouTube [9] https://www.youtube.com/watch?v=sEbvRbATgNA&feature=youtube_gdata_player.

4. Discussion

From the above results it is evident that the most important cashboxes would be Food, Airtime, Entertainment, bill, House Rent, Transport and Shopping. Other cashboxes can be added as needed.

In order to fully understand the impact of these findings on the overall research, it is important to bear in mind some statistics on mobile money transfer services in Kenya, more specifically, M-PESA. According to a recent article by venture capital for Africa (VC4Africa) [7], one of Africa's largest online community of venture capitalists

and entrepreneurs, the economist places the number of Kenyans subscribed to and actively using M-PESA at 17 Million, which is about 70% of the adult population in Kenya. About 25% of Kenya's gross national product flows through M-PESA. These are incredible statistics which put emphasis on the overall national importance of mobile money transfer services in Kenya. The app was therefore developed to work with M-PESA as one of the possible Channels for receiving income.

The results highlighted that majority of workers in the university earn less than ksh 30,000. These would be classified as low income earners. Majority of students earned less than ksh 30,000, most of them earning less than ksh 5,000. This was a disturbing figure which indicated that students have very little to spend.

Majority of the students were not able to make it to the end of the semester. This is very true given that the majority earn less than ksh 5,000. Most of them indicated that they were not able to scale the money to the end of the semester. The PAY APP comes in handy to offer a solution.

5. Conclusions

This paper analyzed the needs for financial management for low to medium level earners where it considered a sample of workers and students in a university and offers a solution to poor financial management. The solution is the Pay-App.

From the analysis, the research found out that students and low income earners in general need to a system that can help them improve on saving culture in order to acquire better financial management skills and achieve financial freedom.

The paper concludes that it is prudent to establish an efficient and functional system of automated cash management so as to ensure that people are trained and natured in financial discipline and management in order to

achieve financial goals. This would make the youth better managers on their own finances and assist workers achieve their natural goals.

This system would also help uplift livelihoods of people as they spend their earnings on important issues thus uplifting their standards of living and the economy at large.

6. Futrure Work

The second phase of the research will be implementing the findings on the targeted people and establish improvements on finance management and ability to achieve targeted goals. It will also establish whether the system can contribute to change of spending culture of the youth and the population at large. The next step will be an analysis of security features and threats of existing systems and improve on the same.

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