Evaluating Factors Determining Mobile Payment Adoption in Kenyan Secondary Schools

1 Khanda Zededia Jackson, 2 Gilbert Barasa Mogeni, 3 Waliaro M. Apollo
1Kibabii Diploma Teachers’ College, 2Communications Authority of Kenya, 3Masinde Muliro University of Science and Technology, Kenya

ABSTRACT
Mobile payment is a payment transaction executed on a mobile device. Despite many experts’ predictions of growth in the adoption of mobile payments, mobile payment acceptance is still rated with low percentages in many sectors in Kenya. For instance, some Kenyan institutions of learning including universities, colleges and schools make payments using mobile payment services. However most schools continue to use traditional methods of payment such as money orders, cash and cheques hence subjecting themselves, parents and guardians to modes of payment that are costly, insecure and done at specific places. This study focused on evaluating factors determining mobile payment adoption in Kenyan secondary schools. Data regarding these factors was collected by use of questionnaires that were sent to respondents including school managers and administrators. The study findings reveal that mobile payment mechanisms, perceived ease of use, perceived usefulness, management support, security and financial policy are significant factors influencing adoption of mobile payment in Kenyan secondary schools. However, referents influence was found to be an insignificant influence of mobile payments adoption.

Keywords: Adoption, Kenya, mobile device, mobile payment, secondary schools

1. INTRODUCTION
Mobile service providers (MSP) in Kenya offer Mobile payment solutions to subscribers. Payment of fees, bills, salaries, goods and services are some of the mobile payment services offered by these service providers and done on mobile devices. Unfortunately, various studies show that recent deployments of Mobile payment have led to very few successes worldwide. According to [4] in the survey they carried out among the London population, approximately 15% of Mobile payment initiatives were successful in terms of adoption and usage. In addition, [2] conducted several case studies in developing countries and noted usage of Mobile payment of about 3.0 – 4.5%. This reflects the key challenge of customer adoption. In the survey on Mpesa revolution in Kenya, [8] point out that there is low adoption rate for mobile payment among the Kenyan population.

2. CONCEPTUAL FRAMEWORK
According to review of previous studies, several theories and models have been proposed for the adoption of new technologies. However a few studies investigate about the system of new technology such as mobile payment. Factors of adoption evaluated in this study were drawn from two models proposed by [11][3]. In his study, [11] examined some factors which affect users’ adoption of Mobile payment. These factors are: relative advantage, compatibility, complexity, network externalities, costs, security and trust. [3] in their paper seek to find out if the generic adoption models are sufficient enough to explain factors consumers consider in adopting new payment services. In their research model, they considered the following adoption factors: time benefit, payment habit, trust, security, compatibility, documentation of payment transaction information, ease of use, convenience, social norm, age and mobile phone skill.

As both technological factors and behavioral characteristics are important in adoption of new technologies, choosing adoption factors from these two studies is because [11] focused more on the technological factors that affect adoption of new technology, whereas [3] focused more on behavioral characteristics. The researchers also identified and included more adoption determinant factors in this study which are specific to the area of study (schools) though not included in the two studies. Independent variables for this study were mobile payment mechanisms (Form of payment, mobile payment service, mobile payment methods, Mobile service provider, type of mobile device) and adoption determinant factors (Perceived ease of use, perceived usefulness, security, referents influence, management support and financial policy) while the dependent variable was mobile payment adoption.

Moderating variable is ICT skill level. This was chosen based on the fact that mobile payment is a technology concept and those people with knowledge in using ICT devices including computers and mobile phones are most likely to embrace mobile payment. Perceived usefulness/relative advantage is the value addition expected by users of the technology [10]. Perceived ease of use is the degree to which an innovation is perceived as difficult to understand and use [14]. Security is important consideration in adopting new technology. Key requirements for secure mobile payment transactions in an electronic environment include confidentiality, data integrity, authentication, and non-repudiation [17].

Referents influence is the person’s perception that most people who are important to him think he should or should not perform the behaviour in question [1].
Management support is seen as vital in adopting new technology. Managers do facilitate and approve funding of equipment, software and human resource to handle the installed technologies. Financial policy on mobile money transfer refers to guidelines outlined in law or otherwise by the regulatory body which in Kenya is known as the Central Bank that must be adhered to by organizations, institutions and individuals wishing to offer or use mobile payment services. Figure 1 below shows the conceptual framework for this research.

![Conceptual framework](image)

**Figure 1: Conceptual framework; source: researchers**

### 3. RESEARCH METHODOLOGY

Qualitative research design was employed to achieve objectives of this study. It was chosen since it describes life situations from the point of view of the people who participate. By so doing it seeks to contribute to a better understanding of social realities and to draw attention to processes, meanings, patterns and structural features [15]. Data collection method is highly influenced by the research methodology chosen [16]. This study used questionnaire method to collect data. This was used since the samples chosen were many and geographically dispersed across Bungoma County.

This method was also deemed appropriate as questionnaires can be used to collect information that is not directly observable since they, among other things, inquire about feelings, motivations, attitudes, accomplishments, as well as an individual’s experiences.

A questionnaire was prepared to collect data from head teachers, their deputies, bursars, accounts clerks, Parents Teachers Association and Board of Management. The questions were designed according to factors mentioned in the conceptual framework. Purposive sampling was applied to select 28 secondary schools in Bungoma County.

#### 3.1 Reliability Test

A pilot study was conducted in three schools which is 10% of the final study size [9][12]. Reliability of constructs was estimated using Chronbach’s coefficient (alpha) values to examine the internal consistency of the reliability measure [13]. Table 1 shows the Chronbach’s alpha values. The values ranged from 0.667 to 0.865 with Perceived Ease of Use constructs having the highest $\alpha=0.865$ followed by Financial Policy constructs $\alpha=0.835$, Security of mobile payments’ constructs $\alpha=0.816$, Perceived Usefulness constructs $\alpha=0.779$, Management Support constructs $\alpha=0.752$ and lastly Referents Influence constructs $\alpha=0.667$.

### 4. DATA ANALYSIS AND FINDINGS

A total of 261 questionnaires were sent to school administrators (head teachers, deputy head teachers, heads of departments, bursars) and managers (Members of parents’ teachers’ association and board of management). 250 questionnaires were returned within the stipulated timelines and represented 96% response rate. Qualitative data was collected to fulfill the research objectives and answer the research questions. Descriptive analysis was used in the analysis process using SPSS software. Frequencies, means, standard deviations, charts and percentages were used because they easily communicate the research findings to readers [7]. The one sample t-test was used to determine the significance of factors on adoption of mobile payment in Kenyan secondary schools.

#### 4.1 Data on Mobile Payment Mechanisms

Figure 2 shows that 39.1% of the schools use cash deposit to bank accounts as a form of payment either to pay or receive payments, 30.5% use cheque, 24.2% use cash while 6.2% use mobile payment.

![Forms of payment](image)

**Figure 2: Forms of payment mostly used in schools**

The study also investigated the type of mobile devices available in schools and which can be used for making payments. The results are as shown in the figure 3 below.

### Table 1: Reliability values N = 19

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. Of items</th>
<th>Chronbach’s alpha $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Ease of Use (PEOU)</td>
<td>3</td>
<td>0.865</td>
</tr>
<tr>
<td>Perceived usefulness (PU)</td>
<td>3</td>
<td>0.779</td>
</tr>
<tr>
<td>Management support</td>
<td>3</td>
<td>0.752</td>
</tr>
<tr>
<td>Security</td>
<td>4</td>
<td>0.816</td>
</tr>
<tr>
<td>Policy</td>
<td>3</td>
<td>0.835</td>
</tr>
<tr>
<td>Referents influence</td>
<td>3</td>
<td>0.667</td>
</tr>
</tbody>
</table>
40% of the respondents’ said their schools own cell phones, 51.4% own smart phones while 8.6% own Personal Digital Assistants (PDAs).

The study further sought to establish the mobile payment services that schools perform on the available mobile devices. The results are displayed in the figure 4.

The results above reveal that the most popular mobile payment service performed in schools is salary payment followed by bill payment, fees payment, payment for goods and services and lastly mobile ticketing. A large number of respondents noted that their schools perform none of the mentioned mobile payment services.

The researchers also sought to know how mobile devices are used in schools to make payments or receive payments. Results obtained from the study shown in Fig 5 reveal that 5% of the respondents said their schools use mobile devices as credit card, 4.2% said mobile devices are used as point of sale machine, 23% said their schools make payments directly from mobile devices while 67.8 noted they their schools don’t use any of the above methods.

The study also sought to establish the proportion of mobile payment access from mobile service providers (MSP) by Kenyan secondary schools. The results obtained are displayed in Figure 6 below. From the results, the most popular mobile service provider in terms of mobile payments is Safaricom at 69.6% followed by Airtel at 25.3%, Orange at 3.1% and Tangaza at 2%.

4.2 Data Analysis on Factors of Adoption

The means were calculated for each of the 19 questionnaire items depending on the responses from school administrators and managers. The questions were based on a five-point likert scale ranging from 1(strongly disagree) to 5(strongly agree). The overall mean ratings are tabulated in table 2 below. Perceived Ease of Use (PEOU) had a higher mean of 4.31, followed by Perceived Usefulness 4.06, Management Support 3.75, Security 3.77, Policy 3.61 and lastly Referents Influence 2.71.
Table 2: Descriptive values

<table>
<thead>
<tr>
<th>Factor</th>
<th>Respondents’ mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU</td>
<td>4.31</td>
<td>0.507</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>4.06</td>
<td>1.258</td>
</tr>
<tr>
<td>Management support</td>
<td>3.75</td>
<td>1.204</td>
</tr>
<tr>
<td>Security</td>
<td>3.77</td>
<td>1.144</td>
</tr>
<tr>
<td>Policy</td>
<td>3.61</td>
<td>1.167</td>
</tr>
<tr>
<td>Referents influence</td>
<td>2.75</td>
<td>1.300</td>
</tr>
</tbody>
</table>

One-sample t-test was performed to test the hypothesis that the score mean of the respondents on factor constructs is either equal to, less than or greater than the hypothesized value 3 which is the neutral point (no idea) of the likert scale ranging from 1 to 5. The purpose of the one sample t-test was to determine whether there is sufficient evidence to conclude that the mean of the population from which the sample is taken is different from the specified value [6]. This study tested the following hypothesis;

H₀: μ ≤ 3 (the population mean is equal to or less than the hypothesized value 3 which is the scale average)

H₁: μ > 3 (The population mean is greater than hypothesized value 3 which is the scale average)

As displayed in figure 7, the histograms of the school administrators’ and managers’ score mean show reasonably normal distribution. This is also supported by the examination of the normal probability plots (Normal Q-Q Plot) (Figure 8). A reasonably straight line suggests a normal distribution. The test of normality reveals that the data is normally distributed.

Applying one sample t-test, the mean school administrators’ and managers’ score (mean=4.00, SD=0.381, N=16) was significantly different from the hypothesized value of 3, t (15) = 11.414, p=0.00. The results agree with tests above. Table 3 and 4 shows the results of the t-test.

Table 3: One-sample statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q Mean</td>
<td>16</td>
<td>4.00</td>
<td>.381</td>
<td>.088</td>
</tr>
</tbody>
</table>

Table 4: One sample t-test

<table>
<thead>
<tr>
<th>Test Value = 3</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q Mean</td>
<td>11.414</td>
<td>15</td>
<td>.000</td>
<td>.999</td>
<td>.82 to 1.18</td>
</tr>
</tbody>
</table>

Table 3 shows that at 95% confidence interval on the school administrators’ and managers’ score mean using t-distribution with 18 degrees of freedom is (3.84,4.17). Since this interval does not contain the test value 3, there is significant evidence that the school administrators’ and managers’ mean is greater than 3. Also the p-value is less than 0.05 and t-value is positive which reject the null hypothesis and accepts the alternate hypothesis.

4.3 Findings of the Study

Findings of this research study are derived from the data presented and analyzed in the previous section as well as responses given to structured questions by the respondents. The researchers discuss both findings on mobile payment mechanisms and adoption determinant factors in this section.

4.3.1 Mobile Payment Mechanisms

The most frequently used form of payment in Kenyan secondary schools is cash deposit to bank accounts, cheque payment, cash payment and then mobile payment respectively. This is attributed to the fact that most secondary schools operate a bank account hence most of the payments especially fees to the school are made through the bank account.

The most preferred mobile devices owned by schools according views of school administrators and managers are cell phones, smart phones and then PDAs respectively. Most of the respondents said the reason this is so is because smart phones and the PDAs are very expensive and complex to operate.

The most performed mobile payment service by schools on mobile devices is salary payment, bill payment, fee payment, goods and services and mobile ticketing respectively. The main reason for the choice is because Safaricom has partnered with other firms offering...
different services to schools such as Kenya power through the Lipa na M-pesa initiative hence bills can be paid through mobile devices. It is also important to note that a large number of administrators said their schools don’t perform any of the specified M-payment services.

In terms of how schools use mobile devices to make payments, the study revealed that most of them make payments directly from their mobile device, some use mobile device as a credit card and a smaller number as a point of sale machine. A majority said their schools do not use any of the mentioned procedures of making payments.

The most popular service provider in schools as far as the respondents are concerned is Safaricom followed by Airtel. This is attributed to the fact that Safaricom has a well established mobile payment system called M-Pesa while Airtel has the Airtel money.

Whereas the two service providers offer these services to the school administrators, the Safaricom services are convenient, readily available and easily accessible countrywide.

4.3.2 Adoption Determinant Factors

From the results obtained in table 4, perceived usefulness constructs (mean = 4.06, SD = 1.258) indicate that school administrators and managers agreed that using mobile payment methods enhances payment effectiveness for Kenyan secondary schools. They also agreed that using mobile payment service enables one to make payments without much travelling. They further agreed that it is faster to make payments using mobile devices. This reveals that the school administrators have a positive perception towards the usefulness of Mobile payments in secondary school.

Based on security constructs (mean = 3.77, SD = 1.14), school administrators and managers agreed that mobile payment methods have security controls to recover data in the event of data failure. They also attested to the accuracy of mobile payment methods. They were also in agreement that mobile payment methods have security controls to prevent fraud but responded negatively to the fact mobile payment methods produce documentation for performed transactions.

When asked if the registration procedures for mobile payments are complicated the school administrators and managers disagreed but they agreed that mobile payment platform is user friendly and that mobile payment applications are easy to use. This is as indicated by perceived ease of use constructs with (mean = 4.31, SD = 0.507)

School administrators and managers agreed that information on mobile payment is available through adverts but they disagreed on the facts that people may want a national school to use Mobile payment to match its’ status and that the perception people have towards a given school determines how management operations are carried out. This factor had (mean = 2.75, SD = 1.300), an indicator that respondents do not approve of it as a significant factor of mobile payment adoption.

Regarding whether Mobile payment adoption in Kenyan secondary schools can succeed if Board of Management allocates funds to facilitate its’ implementation, respondents agreed to it. They further concurred that Board of Management is empowered to make critical decisions regarding the form of payment a school adopts. They also agreed that mobile payment can be incorporated in school policies with support from school administration. These constructs of management support had (mean = 3.75, SD = 1.204).

As indicated in table 4, policy constructs had (mean = 3.61, SD = 1.167) hence school administrators and managers disagreed that national financial policy on mobile money transfer is available to Kenyan secondary schools but agreed that provisions of the financial policy on mobile money transfer can motivate schools to adopt mobile payment. They also concurred that if school managers and administrators are accessible to national policy, they can be able to effectively guide their schools in adopting mobile payment.

5. DISCUSSION OF FINDINGS

In this section, the researchers discuss findings on mobile payment mechanisms and adoption determinant factors and their influence on mobile payment adoption in Kenyan secondary schools.

5.1 Preferred Mobile Device

Mobile payment requires the use of a mobile device to enable the transactions with the service providers. The mobile device will vary from one individual user to the other based on the affordability and preferences. Therefore the implementers of mobile payment systems in schools should put into account the fact that the users of the system require to use their preferred mobile device. The device should be affordable and easy to use. Most users for instance prefer using cellular phones, smart phones and a few use PDAs.

5.2 Preferred form of Payment

Most payments made by schools or to schools are through deposits to bank accounts. Use of mobile payment services is not popular. This information is very vital to the mobile payment system developers. They need to formulate a way of increasing the popularity of mobile payment as a form of payment in secondary schools. This includes having a partnership agreement with reliable mobile service providers such as Safaricom with a strong and reliable network. A well-structured mobile payment-marketing plan should be designed to ensure that more people switch to mobile payment as their preferred form of payment.
5.3 Popular Mobile Payment Service

From the findings, the most performed mobile payment service is salary payment, bill payment, fee payment respectively. If more mobile payment services are to be adopted in Kenyan secondary schools then they should be made popular by mobile service providers. This will require the implementers to also have an elaborate security system as a guarantee to the users that their payments are not subjected to fraud.

5.4 Preferred Mobile Service Provider

The findings of this research study reveal that Safaricom is the most popular mobile service provider in Kenyan secondary schools. This is attributed to the fact that the service provider has a well established, strong and distributed network across the country. Some respondents also pointed out that they would have wished to consider other networks such as Airtel, Orange and Tangaza due to their low costing on mobile services but unfortunately they are not readily available to them. It’s therefore vital for service providers to make their services available to consumers if mobile payment adoption in Kenyan secondary schools is to succeed.

5.5 Mobile Device Use Procedure

A majority of respondents (67.8%) said their schools don’t apply any of the mentioned mobile device use procedure. This is attributed to the fact that mobile payment is yet to be embraced by schools as a form of payment. Business establishments will have to install necessary machines that support mobile payment through procedures such as credit cards and point of sale terminals.

5.6 Perceived Ease of Use (PEOU)

Consumers of a mobile payment system should be able to build a mental picture of the procedures used to complete a mobile payment transaction [5]. This research study revealed that some respondents had problems in operating mobile payment applications which they felt took too long to complete. It is therefore vital that before coming up with a new technology, the innovators should always consider the perception of end users on how easy the technology can be used. Based on this fact, the policy makers will always be faced with the challenge of assessing the perceptions of end users including parents, teachers, school administrators and managers on the ease of using the mobile payment systems.

5.7 Security Considerations

Security of mobile payment solutions is perceived to be a very sensitive issue among school administrators and managers. Security is of high importance in mobile payment systems because of the spatial and temporal separation between buyers and sellers and when buyers are required to give out delicate personal information to sellers [11]. Mobile payment involves making payments using mobile devices. This comes at a time when fraudulent incidences are on the increase in Kenya. Therefore, any secondary school planning to implement mobile payment should consider using a mobile solution with high security mechanisms that will prevent users from falling victims of the fraudulent activities. This can be achieved by putting in place mobile payment security controls to prevent fraud, to recover data in case of system failure and having mobile payment method that produce documentation for performed transactions. Finally, the broader issues of confidentiality, data integrity, authentication and non repudiation should be addressed fully by mobile service providers.

5.8 Perceived Usefulness (PU)

The mobile payment end users will embrace the idea of making payments using mobile devices if and only if they understand the usefulness and the benefits accrued from this mode of payment. If the benefits supersede those of the bank then they will switch to it. This therefore means that the mobile service providers should create awareness on the usefulness of mobile payment that gives it an advantage over other modes of payment. For instance if advantages of mobile payment supersedes the service offered at the banks then the end users are most likely to adopt it.

5.9 Management Support and Financial Policy

Support from board of management is vital in ensuring the success of mobile payment system. By liaising with school administrators, Board of Management members can offer support in terms of ideas, finances and structuring of the mobile payment system will see the success of the system to be implemented. School managers and administrators should advocate for awareness of quality assurance in the school’s payment system, financial policy and national mobile payment policy, which the stakeholders in schools need to be informed of adequately.

6. CONCLUSION

This study evaluated factors determining mobile payment adoption in Kenyan secondary schools. Among the factors evaluated: Mobile payment mechanisms, Perceived ease of use, Perceived usefulness, Security, management support, financial policy were found to be significant contributors to mobile payment while referents influence was insignificant.

Limitations are an inherent part of any given piece of research work. The main limitation of this study is generalization of research findings. The research was done in a smaller area covering selected secondary schools in Bungoma County. Generalization of results to a whole population of Kenyan secondary schools may not be rational. However, the study reveals factors to be considered by those who wish to implement mobile payment in Kenyan secondary schools.

In essence, mobile payment adoption by Kenyan secondary schools is going to be realized gradually. Stakeholders (Mobile Service Providers, Phone Vendors, Communications Authority of Kenya, Central Bank of Kenya) together with the school management and
administration will have to work together on the need to have significant factors of adoption addressed. Significant factors of adoption will be vital in determining the adoption, use and sustainability of a mobile payment system in Kenyan secondary schools.

REFERENCES


AUTHORS’ PROFILE
Khanda Zedekia Jackson has a wealth of experience spanning over 10 years in teaching Information Technology (IT) courses. He previously taught Computer Studies at St. Brigids Girls High School-Kiminini before moving to Kibabii Diploma Teachers’ College, Bungoma, Kenya where he works in the ICT department. He is currently a Masters Student at Masinde Muliro University of Science and Technology studying IT.

Dr. Gilbert Barasa Mugeni works with Communications Authority of Kenya, Nairobi, Kenya. He is in the Frequency Spectrum Management Department. He earned his PhD. In Information Technology from Masinde Muliro University of Science and Technology in 2013.

Waliaro M. Apollo is a lecturer in the Department of Computer Science at Masinde Muliro University of Science and Technology. He currently serves as the ICT director in the same institution.