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## A Use Intention Model for Location-Based Mobile Advertising

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# Factors Influencing the Intention to Use Location-Based Mobile Advertising among Micro-Enterprises in Kenya

Research Paper

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## ABSTRACT

The use of location-based mobile advertising to deliver context specific information from businesses to clients has the potential to help them increase revenues, personalize offerings and reduce marketing costs. However, there is a lack of adoption of this emergent mode of advertising among micro-enterprises. This study examined the underlying reasons for this lack of adoption using an exploratory factor analytic study based on an adaptation of the Technology Acceptance Model with the choice of technology as an additional factor. Data was collected in a survey involving 304 micro-enterprises by means of structured questionnaires and interview schedules. The study findings validate the technology acceptance model and also reveal that the choice of technology is an important factor influencing the intention to use location-based mobile advertising by micro-enterprises.

## Keywords

Micro-enterprises, Location-based Mobile Advertising (LBMA), Technology Acceptance Model (TAM)

## INTRODUCTION

Location-based mobile advertising (LBMA) is the use of mobile devices to provide customers with time and location sensitive, personalized information for the promotion of goods, services and ideas in order to generate value for all stakeholders (Dickinger, Haghirian, Murphy, & Scharl, 2004). LBMA delivers context specific information by first establishing the location of users by means of technologies and services such as Bluetooth, Radio-Frequency Identification (RFID), Near Field Communication (NFC), wireless networks and location-based systems using Global

Positioning Technologies (GPS) technologies (Alexandre et al., 2011); (Kurkovsky & Harihar, 2006) . This location information is then used to identify relevant information which is subsequently sent to the user using text messages, Wireless Application Protocol (WAP) or delivered on mobile applications.

These technologies however used for location determination (RFID, Bluetooth, NFC and GPS) and for the delivery of information (WAP and JAVA applications) are not universally accessible or available on all types of mobile phones. This in effect limits their adoption and use by businesses, such as street vendors, carpenters, tailors, mechanics, taxi operators, electricians and peasant farmers (GDRC, 2008).

These businesses, referred to as micro-enterprises, employ between 1 - 5 people, have small amounts of capital and provide goods and services in their local areas (Adeya, 2003). Their potential in contributing to their respective national economies is often unrealized due to their slow growth and limited scope of operations occasioned by limited knowledge of, and access to technology, (Roberts & Wood, 2002), little use of information systems, lack access to formal financial services, and little or no basic business skills (GDRC, 2008). More importantly they have been found not to undertake any significant marketing activities (Roberts & Wood, 2002), with advertising in particular being singled out as the single most challenging aspect of their operations (Jakic, 2011), (Pharr & Weinrauch, 2007).

There is little evidence of the use of LBMA among micro-enterprises despite their widespread adoption of a number of other mobile based services and applications such as money transfer and mobile banking (Gikenye, 2011). The use of Short Messaging Services (SMS) and Unstructured Supplementary Service Data (USSD) appears to be a common characteristic among the more readily adopted applications such as MPESA (Mobile money transfer service) (Safaricom Ltd, 2011) and MShwari (Mobile money based savings account) (Safaricom Ltd, 2013). These technologies, SMS and USSD, are readily available on all types of phones and network types (Bodic, 2003). However, applications developed to use relatively advanced technologies such as Bluetooth, JAVA and GPS have not found a great appeal and adoption among the populace and specifically among micro-enterprises. This study therefore sought to establish if the choice of delivery technology influences perceived ease of use, as well as the intention to use Location-based mobile advertising among micro-enterprises.

### **Objectives of the Study**

The objectives of this study were therefore:

1. to determine the factors influencing the intention to use location-based mobile advertising among micro-enterprises.
2. to examine the relationship between choice of technology, perceived ease of use and intention to use location-based mobile advertising among micro-enterprises.

### **Research Questions**

The study was guided by the following research question:

What are the factors influencing the intention to use location-based mobile advertising among micro-enterprises?

### **Research Hypothesis**

The following hypothesis was tested in the study:

H<sub>0</sub>: There is a relationship between choice of technology, perceived ease of use and intention to use location-based mobile advertising among micro-enterprises.

## LITERATURE REVIEW

### Kenyan Micro-enterprises.

The Kenyan microenterprise is a business entity that employs between 1 – 5 persons and undertakes a variety of business activities mostly in the informal sector such as taxi services, car hire, plumbing, electrical setup and repairs, motor vehicle repair, towing, carpentry, small scale farming, gardening, painting, tent hire, video recording and photography services among others. These businesses currently account for over 50% of employment in Kenya and have demonstrated significant potential for spurring economic growth (Kenya Institute for Public Policy Research and Analysis (KIPPRA), 2013).

However, these small business face a number of critical challenges such as limited access to information, poor access to markets, high competition, narrow product offerings, weak capacity for e-commerce and high operational costs which limit their contribution to economic growth in the country (Kiveu & Ofafa, 2013a).

A number of interventions in the form of government policy, training and improved access to microfinance facilities continue to be developed and implemented in an effort to address these challenges. In the recent past, the growth of the ICT sector with respect to availability, accessibility and relative affordability of telecommunication services, mobile telephony as well as computer hardware and software has also presented an additional channel for the provision of solutions to this sector (Wamuyu & Maharaj, 2011).

These and other ICT's have been found to have great potential in facilitating communication, providing access to information, in the identification of markets, for the production of innovative products, market research and analysis, accessing international markets, networking, and lowering operational costs (Kiveu & Ofafa, 2013b).

### The use of ICT's among Kenyan Micro-enterprises.

The use of ICT's by microenterprises is gaining popularity in Kenya and are used in a number of ways:

1. microenterprises in urban areas have been making use of e-commerce due to benefits such as simplification of work routines, improved coordination in their value chains, improved customer service, and as a means for venturing into new markets (Wanyoike, Muluku, & Waititu, 2012).
2. microenterprises in Kenya have been observed to make use of ICT's such as personal computers, laptops, printers, photocopiers, mobile phones, the internet, and websites among others mainly for improved office operations (Ongori & Migiro, 2011).
3. mobile money services provided by mobile network service providers are quite popular both as a means-of payment and money transfer among microenterprises. (Kiveu & Ofafa, 2013a)

## Factors influencing the adoption of ICT's among Kenyan Micro-enterprises

The adoption of ICT's among microenterprises is largely driven by internal factors such as the need to increase sales, meeting consumer demands and improving customer service. External factors such as pressure from competitors is also considered as a major driver for adoption of ICT's (Ongori & Migiro, 2011).

## Challenges facing the adoption of ICT's among Kenyan Micro-enterprises

A study among 390 microenterprises in Thika town, Kenya. Mokaya (2012) established that most microenterprises have been unable to make use of ICT's in their operations and it is largely due to the perception that the costs associated with their adoption and use are high.

Additional challenges such as low levels of formal training in the use of ICT's, and high level of application sophistication have also been established as hindrances to the adoption of ICT's among microenterprises (Adeya, 2003).

## Technology Acceptance Model.

The theoretical basis for this study is the Technology Acceptance Model (TAM) originally proposed by Davis et al (1989). The model, whose aim is to predict actual system use, is comprised of three main constructs:

- (i) '*perceived ease of use*', which is the degree to which a person believes that using a system will be free from effort,
- (ii) '*perceived usefulness*', which is the degree to which a person believes that using a system will enhance their job performance, and,
- (iii) '*behavioral intention to use*', which is a combined measure of perceived usefulness and perceived ease of use and is an indicator of whether or not a user intends to use a system.

Figure 1, perceived usefulness and ease of use are the antecedents or predictors of behavioral intention to use which in turn predicts '*actual system use*'. The theory also postulates that perceived usefulness is influenced by the perceived ease of use (F. D. Davis et al., 1989).

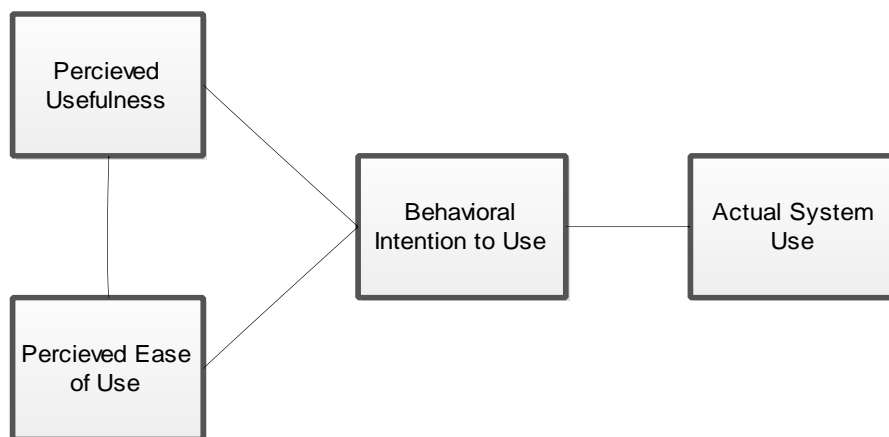


Figure 1: Technology Acceptance Model (F. D. Davis et al., 1989)

The model has been used in various technology acceptance studies such as in the study of consumer acceptance of mobile technology in financial service delivery (Byun & Feinberg, 2007), in the study of gender differences in the use of email (David Gefen & Straub, 1997) and in evaluating e-commerce acceptance (McCloskey, 2004) among other applications.

The model has also been extended in a number of studies to examine the adoption of various mobile and other technologies such as M-payment adoption by Chandra, Srivastava, & Theng (2010), an internet trust attitude model by Aghdaie, Fathi and Pirman (2011), and a technology trust model by Leppanen (2010). Lee, (2008), used the model to study user intention to use online banking services. In addition to validating the influence of the existing TAM constructs the study also identified risk as a factor influencing the intention to use online banking. However the model and its various extensions have not been used in studying user acceptance of location based mobile advertising.

### **(i) Perceived Ease of Use (PEOU).**

*“Perceived ease of use refers to the degree to which the prospective user expects the target system to be free of effort.”* (F. D. Davis et al., 1989).

Previous research has shown that perceived ease of use is a significant influence on user acceptance and usage behavior of information technology (Viswanath Venkatesh, 2000). For instance, perceived ease of use along with perceived usefulness and attitude have been found to be jointly responsible in determining subscriber’s intention to use 3G mobile services (Suki & Suki, 2011).

A 2002 study among 78 first year South African Students established that in a developing country context perceived ease was a better predictor of both perceived usefulness and usage (Brown, 2002). Ramayah and Ignatuis (2005) also established that perceived ease of use, and not perceived usefulness, was one of the two main influencing factors in a consumer’s intention to shop online. Interestingly, perceived ease of use was found to be a significant predictor of perceived usefulness.

The relative importance of perceived ease of use in relation to perceived usefulness is further emphasized by Gefen and Straub (2000) when they assert that even if a user thinks that an IT artifact or system might be useful often times they fail to adopt it if they perceive that the use is difficult. They theorize that PEOU directly affects adoption when it is an integral part of the service or product being sought for by a user. In other words, perceived ease of use is significant when the IT is an end in itself as compared to when it is a means to an end. In their study, ease of learning, flexibility and clarity of the interface are theorized as antecedents to perceived ease of use.

The nature of use, mandatory vs voluntary, has also been found to impact on the PEOU. Jongepier (2011) observes that the original TAM model was designed for professional work settings where technology use was not optional. However, when the use of a technology becomes optional as is the case with using a Smartphone, the PEOU reduces leading to slower or non-adoption of an IT.

### **(ii) Perceived Usefulness.**

Perceived usefulness is the degree to which a person believes that using a particular system will enhance their performance in a given task (D. F. Davis, 1989). Perceived usefulness in combination with convenience have been found to significantly influence subscriber’s

intention to use 3G mobile services (Suki & Suki, 2011). Adams, Nelson and Todd, (1992), further examined the role of perceived usefulness with regards to the intention to use messaging technologies (voice and electronic mail) and software applications (WordPerfect, Lotus 1-2-3 and Harvard Graphics). Their findings indicated that perceived usefulness is an important determinant of system use.

Similar findings with regards to perceived usefulness and adoption of technologies have been found by Wendel, Dellaert, Ronteltap and Van Trijp, (2013), in consumer's intentions to use health recommendation systems, by Farmani, Kimiaee and Fatollahzadeh, (2012), in investigating intention to use technology among librarians by Su, Tsai and Hsu, (2013), in studying the intention to use Telecare Systems.

## **Additional factors influencing the intention to use technology based solutions**

### **(i) Perceived Risk.**

Perceived risk is the degree to which users believe that using a technology will lead to possible loss of privacy, performance, social status, money or time (Lee & Song, 2013) (Rose & Fogarty, 2006).

It has been found to influence intention to use technology such as the Certified e-Document Authority (CeDA) in South Korea, (Lee & Song, 2013), in studying the adoption of self service banking technologies among senior citizens, (Rose & Fogarty, 2006), in examining user intention to use websites, (Belanche, Casaló, & Guinalú, 2011), in studying consumer intentions to use online channels for making purchases in Jordan, (Faqih, 2013), and in investigating the behavioral intentions of tourism organizations to use e-commerce in Algeria (Belkhamza & Wafa, 2009). In all these studies, perceived risk has been found to have a significant effect on user's intentions to adopt new technology.

### **(ii) Choice of Technology.**

The choice of delivery medium for technology enabled services has been found to have a significant impact on user's intention to use. Walker and Johnson, (2006), established that users choose between using the internet and telephone for financial and shopping services based on their sense of personal capacity or capability to use them. In the study by Venkatesh, (1994), the factor loadings on the ease of use items for the two technologies were different indicating that the user interfaces, less friendly on email and better on gopher, had an influence on perception. However, there is scanty literature specifically addressing the impact that the choice of technology has on possible user intention to use a system or service.

## **RESEARCH MODEL.**

Figure 2, modifies the Technology Acceptance Model (TAM) by including the choice of technology and perceived risk as additional factors influencing the intention to use location based mobile advertising.

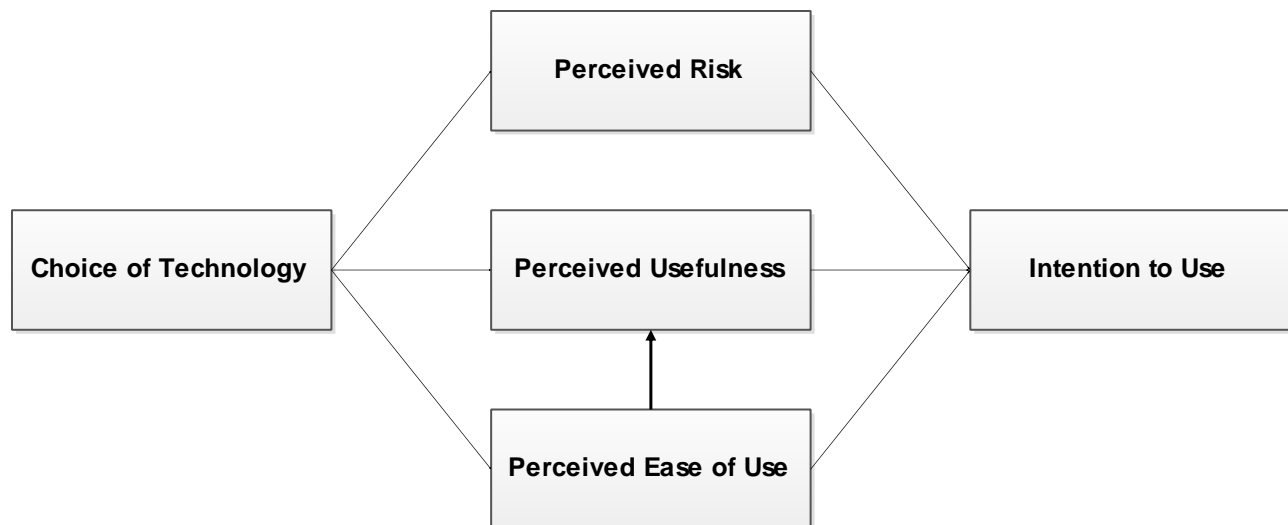


Figure 2: Model for Intention to use location based mobile advertising

The model posits that the choice of technology influences perceived risk, perceived usefulness and perceived ease of use which in turn influence the intention to use location based mobile marketing.

## RESEARCH METHODOLOGY

### Measurement Methodology.

In keeping with previous literature on mobile advertising, technology trust and technology acceptance measurement items for each construct were developed. They were tested using a three point scale (*Yes, Not Sure, No*) and randomized in the instrument in order to avoid bias.

The following brief description of the proposed location-based mobile advertising solution was presented to the respondents in order to delimit the context within which they were expected to use in responding to the questions asked.

*“The proposed location-based mobile advertising system will store your name, mobile phone number, location and service or product that you offer. This information will be accessed by potential clients to access it using an SMS short code service. The business in turn also gets the mobile contacts of the clients making the inquiry”.*



## Data Collection.

**Data Collection Methodology:** A survey was conducted to establish the factors influencing the possible adoption and utilization of location-based mobile advertising among micro-enterprises.

**Population:** The population for the study comprised of microenterprises in Nakuru County, Kenya. Nakuru County is a cosmopolitan county with a population of approximately 1.2M residents 29.7% of whom reside in urban areas with 70.3% residing in rural areas. The rural urban population distribution differs slightly from the national averages of 19.3% and 80.7% respectively (Kenya National Bureau of Statistics, 1999). Its main urban center Nakuru town is the fourth largest urban center in Kenya and is well served by transport and communication networks. The main economic activities conducted in the county are in the agricultural, tourism, hospitality, retail, and transport sectors (Foeken & Owuor, 2000), which are similar to those at the national level (Kenya National Bureau of Statistics, 2013). The county is thus representative of the country.

**Sample Size:** A sample size of 300 individuals was determined following the guidelines by Demo et. al, (2012). Their guidelines indicate that a sample size of at least 300 subjects or a minimum of 5 subjects per item is required for exploratory factor analysis.

**Sampling Procedure:** The quota sampling method was used in this study given that no sampling frame for the microenterprises was available. The subgroups of microenterprises from which the final sample was drawn are listed below.

- |                       |                      |
|-----------------------|----------------------|
| 1. Car hire           | 11. Plumbing         |
| 2. Carpenters         | 12. Hairdressing     |
| 3. Catering services  | 13. Taxi             |
| 4. Motorcycle Taxi    | 14. Transport Hire   |
| 5. Breakdown          | 15. Veterinarian     |
| 6. Electrical Repairs | 16. Health providers |
| 7. Gardening          | 17. Water Suppliers  |
| 8. Mechanic           | 18. Agriculture      |
| 9. Painting           | 19. Fuel Suppliers   |
| 10. Photographs       | 20. Tailor           |

**Sample size allocation:** The number of respondents from each subgroup was computed as shown below.

$$\text{Sample size per subgroup: } = N/H = 300/20 = 15$$

**Sampling method:** The distribution of the microenterprises among the population was assumed to be uniform and random sampling within the subgroups was used to select respondents. The number and percentages of the respondents selected from each of the subgroup is presented in Table 1.

Type of Business	Number respondents	ofPercent
Car hire	12	4.0
Carpenters	15	4.9
Catering services	15	4.9
Chemist	15	4.9
Motorcycle taxi	13	4.4
Breakdown	5	1.6
Electrical Repairs	15	4.9
Gardening	13	4.4
Mechanic	15	4.9
Painting	15	4.9
Photography	15	4.9
Plumbing	15	4.9
Hairdressing	15	4.9
Taxi	15	4.9
Transport Hire	15	4.9
Veterinarian	15	4.9
Video Recording	6	2.0
Health providers (doctor, herbalist, ambulance)	15	4.9
Water Suppliers	15	4.9
Agriculture (extension, tractor hire)	16	5.4
Fuel Suppliers (cooking gas, charcoal, firewood)	14	4.7
Tailor	15	4.9
<b>Total</b>	<b>304</b>	<b>100.0</b>

Table 1: Micro-enterprises Sampled

## Instruments.

The demographic and mobile application usage data for this survey was collected using a questionnaire that was distributed in hard copy and online using Google forms. They were self-administered or administered by the researcher in instances where the respondents were not able to respond on their own.

### Instrument validation.

The questionnaire used in the study was validated in two stages:

**pretest:** the instrument was submitted to two independent language and communication experts who evaluated it for construct validity and for potential challenges with common method bias. Their task was to ensure that the language used was simple and clear for the intended respondents.

*Construct validity:* the expert review recommended the use of simple vocabulary as well as the provision of more multiple choice questions. The instrument was then edited accordingly based on the input from the reviewers.

*Common method bias:* the expert review recommended that the instrument be used as an interview guide in cases where respondent's level of education was not sufficient to ensure a proper understanding of the questions. It was also recommended that technical terminology relating to location-based mobile advertising be kept to a minimum in order to make the questions more understandable to the respondents. The instrument was edited accordingly.

**Pilot Study:** a pilot study was conducted in order to further test the instrument for reliability. A total of 30 respondents comprising of boda boda operators were sampled in the pilot. The data

collected was used to determine the reliability of the instrument as well as the suitability of the data analysis method proposed for the study.

**Reliability** is a measure of the internal consistency of a research instrument as well as a measure of the degree of homogeneity among the research items in a construct. Its objective is to assess whether the instrument would give consistent results in repeated tests held at different locations, subjects and times (Wamuyu & Maharaj, 2011). The reliability of the instruments and the scales to be used in the study was established using Cronbach's Alpha (Cronbach, 1951). It is a widely accepted measure of internal reliability and consistency that works by identifying items in the instrument that have low correlations in order to exclude them from further analysis. The scale is considered reliable if alpha is close to 0.7 or higher (Bollen, 1989). A reliability coefficient of 0.607 was obtained for the 'intention to use scale'.

The instrument was therefore found to be suitable for collecting the data required for the study. However, a number of items in the instrument were removed while others were modified in order to improve on the reliability of the instrument.

## STUDY FINDINGS.

### Demographics

The respondent's socio demographic information is presented in Table 2.

Item	Category	Frequency	Percentage	Notes
Age	Below 19 years	3	1.0	A majority of respondents sampled fell in the 20 – 39 years age bracket.
	20- 29 years	145	47.7	
	30 – 39 years	135	44.4	
	Above 40 years	21	6.9	
Gender	Male	244	80.3	There were more men sampled than women.
	Female	60	19.7	
Level of Education	Class 8	62	20.4	A majority of the respondents had a Diploma level of education and below.
	Form 4	146	48.0	
	Diploma	60	20.1	
	Degree	31	10.2	
	Masters	4	1.3	
Type of Phone	Basic Phone	148	48.7	Most respondents owned basic and feature phones.
	Feature Phone	148	48.7	
	Smart Phone	8	2.6	

Table 2: Demographics

### Factors Influencing the Intention to Use Location-Based Mobile Advertising among Micro-enterprises.

The study sought to establish the factors influencing the possible adoption of location based mobile advertising among microenterprises in Kenya.

The exploratory factor analysis technique was used to identify the number of constructs and underlying factors in the data collected with regards to the possible adoption intentions of location-based mobile advertising among micro-enterprises. Exploratory factor analysis is used to explore

the underlying structure of a set of related variables without imposing a preconceived structure on the outcome (Child, 2006).

### *Model Fitting.*

The factorability of all 18 items on the scale was examined and it was observed that all items with the exception of one were correlated with a correlation coefficient of at least 0.3 with other items (See Table 9). The uncorrelated item was removed from the scale. The Kaiser-Meyer-Olkin measure of sampling adequacy was .740, above the commonly recommended value of .6, and Bartlett's test of sphericity was significant ( $\chi^2(153) = 1639.578, p < .05$ ) (See Table 10). The diagonals of the anti-image correlation matrix were also all over .5 (See Table 11). The communalities of the items were also above 0.3 indicating that the items shared some common variance with other items (See Table 12). Factor analysis was thus deemed suitable for the remaining 17 items.

A total of 6 factors, with an Eigen value of 1 and above, were extracted initially from the resulting scale by means of the principal component analysis. These factors explained 63% of the variance in the intention to use location-based mobile advertising (See Table 3).

Component	Initial Eigen values		
	Total	% of Variance	Cumulative %
1	3.989	23.467	23.467
2	2.619	15.405	38.871
3	1.797	10.573	49.444
4	1.230	7.235	56.679
5	1.126	6.626	63.305

**Table 3: Initial Extracted Eigen values**

The initial factors and factor loadings extracted are presented in Table 13. All 17 items in the scale had a factor loading of above 0.4. However, items v4, v7 and v10 that loaded strongly on factor 4 and 5 were eliminated from the analysis as they did not achieve the minimum of 3 three items per factor desired for the study and were difficult to interpret (See Table 13).

### *Final Model*

A principal components factor analysis of the remaining 14 items, using varimax rotation was conducted and three factors, presented in Table 4, explaining 56% of the variance, were extracted.

Component	Initial Eigen values		
	Total	% of Variance	Cumulative %
1	3.675	26.254	26.254
2	2.589	18.496	44.750
3	1.637	11.693	56.443

**Table 4: Final extracted Eigen values**

The varimax rotation provided a good factor structure with a majority of items having a primary loading of 0.5 and above. Only one item, No 3, had a cross loading of above 0.4. The factor loading matrix for the final solution is presented in Table 5.

### *Factor Interpretation.*

#### ***Factor 1:***

This factor accounted for 26% of the variance in the intention to use location-based mobile advertising among micro-enterprises. It appears to be a composite factor that comprises items related to convenience, benefits and risk.

- (i) **Convenience:** Respondents indicated that they would be willing to use the proposed application if they would not be required to learn about new technologies, change mobile service providers or have their privacy interfered with.
- (ii) **Risk:** The fear of being called and not getting the business from a client as well as the desire to get a deposit before going out to meet a client imply that micro-enterprises are concerned about the risk associated with using the proposed service.
- (iii) **Benefits:** Micro-enterprises expressed interest if the proposed application could help them increase their profits and not interfere with service delivery to the existing clients.

These items and the factor were collectively labeled '**Perceived Usefulness**'.

#### ***Factor 2:***

This factor accounted for 18% of the variance and it clearly captured the items related to perceived ease of use of the proposed location-based mobile advertising solution. Respondents indicated that they would consider using the application if it did not look complicated, if it was based on a simple technology like SMS and if it worked on technologies that they were familiar with. This factor was labeled '**Perceived Ease of Use**'

#### ***Factor 3:***

This factor accounted for slightly over 11% of the variance and it relates to the choice of delivery medium. The items in this factor related to the use of various technologies such as `JAVA, Android, USSD and the Internet for the delivery of the proposed solution. Additionally the aspect of risk also emerged in the concern that contact details might be revealed to unknown clients. This factor was labeled '**Choice of Technology**'.

Item	Factor		
	1	2	3
I fear that some clients might call and not give me business.	0.811	-0.044	-0.067
I would prefer to get paid a deposit before going out to meet a client.	0.714	-0.056	-0.349
Getting calls from new clients might interfere with my performance with the existing ones.	0.637	0.066	0.420
I would prefer to use the system if I do not need to learn about new technologies	0.551	0.300	0.372
I would use the application if I do not have to change mobile providers	0.547	0.266	0.360
Getting calls from clients at odd hours might interfere with my privacy.	0.523	0.175	0.384
The application can help me increase my profits	-0.612	-0.021	-0.096
I will only try using the application if it does not look complicated	0.050	0.824	-0.082
I would prefer to use the application if it is based on a simple technology like SMS	0.168	0.768	0.024
I would use the application if it works on the technologies I am already familiar with.	0.069	0.728	0.217
I would use it if it was a JAVA or Android based mobile applications	0.076	-0.064	0.779
I would use it if it was USSD based.	0.146	-0.363	0.707
Giving out my personal details to unknown clients is risky.	0.027	0.188	0.570
I would use it if it required internet access	0.084	-0.628	0.479

**Table 5: Final rotated factor solution**

### Scale Reliability.

The internal consistency of the overall scale and the individual factors was examined using Chronbach's alpha. A score of 0.669 was obtained for the final scale comprising of 14 items. A score of 0.680 was obtained for perceived usefulness, 0.751 for ease of use and 0.648 for choice of technology. No increases in the alpha values for any of the factors could have been obtained by deleting any of the items from the respective scales (See Table 6).

	No. of items	M (SD)	Skewness	Kurtosis	Cronbach's $\alpha$
<b>Perceived usefulness</b>	7	10.79(2.72)	1.692	2.413	0.680
<b>Perceived ease of use</b>	3	6.03(2.51)	-0.019	-1.492	0.751
<b>Choice of technology</b>	4	5.54(2.04)	0.233	-1.165	0.648

**Table 6: Descriptive statistics for the Intention to use location-based mobile advertising scale (n=304)**

### Tests of Normality.

The skewness and Kurtosis scores for the computed scores with the exception of the Kurtosis for perceived usefulness were within the acceptable limits of +/- 2 for the assumption of normality (See Table 6).

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Choice of Technology	.153	304	.000	.898	304	.000
Perceived Usefulness	.318	304	.000	.714	304	.000
Perceived Ease of Use	.222	304	.000	.822	304	.000

a. Lilliefors Significance Correction

Table 7: Tests for Normality

The Shapiro-Wilk and Kolmogorov-Smirnov tests for normality also confirm that the composite scores were normally distributed and thus suitable for parametric statistical analysis (See Table 7).

### Relationship between Choice of Technology, Perceived Ease of Use and Intention to Use Location-Based Mobile Advertising among Micro-enterprises.

Significant positive correlations were found to exist between choice of technology and intention to use (.490,  $\alpha = 0.01$ ), choice of technology and perceived usefulness (0.253,  $\alpha = 0.05$ ), and perceived usefulness and perceived ease of use (0.268,  $\alpha = 0.05$ ). Intention to use and perceived ease of use had a significant weak negative correlation (-.134,  $\alpha = 0.05$ ). The same applied for the relationship between choice of technology and perceived ease of use (-0.173,  $\alpha = 0.05$ ). The relationship between perceived usefulness and intention to use was not significant (See Table 8).

		Intention to use	Choice of Technology	Perceived Ease of use	Perceived Usefulness
<b>Intention to use</b>	Correlation	1	.490**	-.134*	-0.074
	P value		0	0.019	0.199
<b>Choice of Technology</b>	Correlation	.490**	1	-.173**	.253**
	P value	0		0.002	0
<b>Perceived Ease of use</b>	Correlation	-.134*	-.173**	1	.268**
	P value	0.019	0.002		0
<b>Perceived Usefulness</b>	Correlation	-0.074	.253**	.268**	1
	P value	0.199	0	0	

\*\**. Correlation is significant at the 0.01 level (2-tailed).*

\**. Correlation is significant at the 0.05 level (2-tailed).*

Table 8: Factor score correlations

## DISCUSSION

### Factors Influencing the Intention to Use Location-Based Mobile Advertising among Micro-enterprises.

Results from the exploratory factor analysis revealed that there are three main factors influencing the intention to use location-based mobile advertising among micro-enterprises; : choice of

technology, perceived ease of use and perceived usefulness. However, risk, as proposed in the research model did not emerge as a standalone factor but rather was significantly correlated with convenience (0.349,  $\alpha = 0.01$ ) and benefits (0.186,  $\alpha = 0.01$ ). This could imply that the subjects were willing to take higher levels of risk if the convenience and benefits were significant enough (See Table 14).

These findings concur with those of Forsythe, Liu, Shannon and Gardner, (2006), and Lee, (2008), with regards to the tradeoff between perceived benefits and risk in the adoption of various technologies. The low correlation between risk and benefits can also be attributed to the inverse relationship between the two factors as established by Slovic and Alhakami, (1994) and

### **The Relationship between Choice of Technology, Perceived Ease of Use and Intention to Use Location-Based Mobile Advertising among Micro-enterprises.**

Correlation analysis conducted between the scores of the items in the various factors revealed that:

- choice of technology had the highest significant correlation with the intention to use the proposed location-based mobile advertising solution.
- significant correlations were also found to be present between the choice of technology and perceived usefulness, as well as perceived usefulness and perceived ease of use.
- the relationships between choice of technology and perceived ease, and that between intention to use and perceived ease of use were negative.
- there was no significant relationship between the perceived usefulness and the intention to use in this study.

The significant correlation between the choice of technology and the intention to use the location-based mobile advertising service confirmed the hypothesis that choice of technology is a factor influencing the intention to use a service or product.

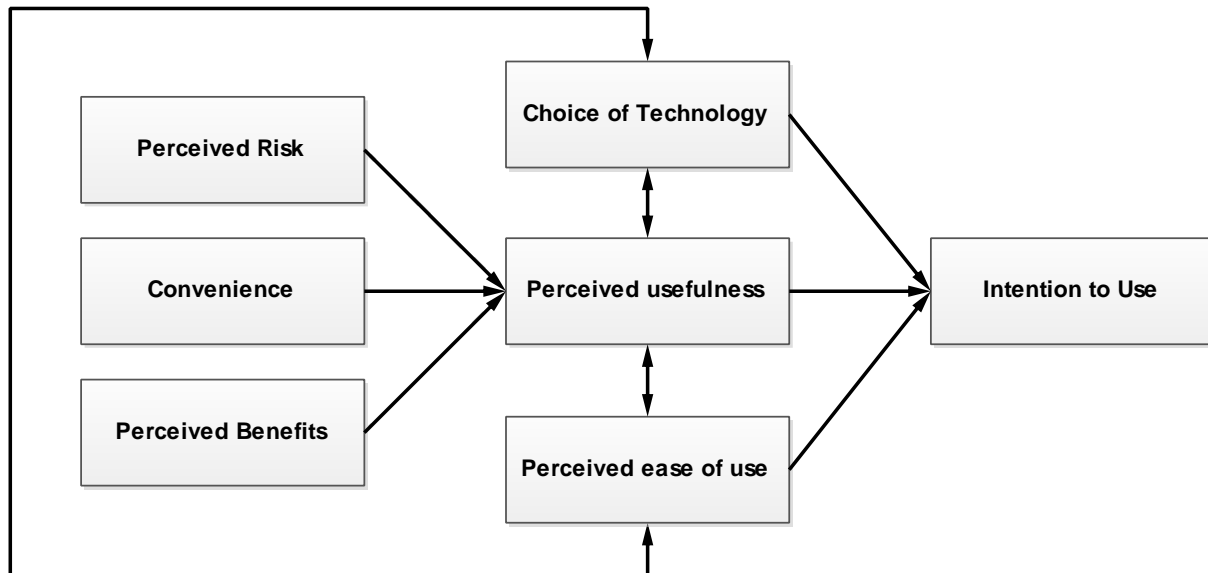
The lack of a significant correlation between perceived usefulness and the intention to use is significant and warrants an explanation or a hypothesis. The subjects in the study were only given a description of the proposed system. The questions that followed were mainly testing if they would like to try using the application. With this in mind, they only expressed their desire to investigate or consider if the said application could be useful to them. It is possible that their perception of usefulness could not be fully formed in the absence of an actual use of the system.

A stronger relationship between the perceived ease of use and intention to use as opposed to that between perceived usefulness and intention to use implies that perceived ease of use is a better determinant of the intention to use a system. This finding concurs with that of Ramayah and Ignatuis (2005) who established that perceived ease of use, and not perceived usefulness, is a better determinant of intention to use. The relative importance of perceived ease of use in relation to perceived usefulness is further emphasized by Gefen and Straub (2000) when they assert that even if a user thinks that an IT artifact or system might be useful often times they fail to adopt it if they perceive that the use is difficult. Rose and Fogarty (2006); also found that the relationship between perceived usefulness and intention to use were not significantly related with respect to the adoption of self service banking services.



## USE INTENTION MODEL FOR LOCATION-MOBILE ADVERTISING

Based on the findings from the study the initial research model was refined and the ‘Location Based Mobile Advertising Use Intention Model’, incorporating choice of technology, is thus proposed.



**Figure 3: Use Intention Model for Location-Based Mobile Advertising**

The model posits that the intention to use location based mobile advertising among microenterprises is influenced by the choice of technology, the perceived ease of use of the solution and its perceived usefulness. The perceived usefulness is in turn a factor of the perceived risk, convenience and possible benefits likely to be associated with using the solution.

## CONCLUSION

The findings of the study lead to two main conclusions;

1. The intention to use location-based mobile advertising among micro-enterprises is directly influenced by the choice of technology, perceived ease of use and to a smaller extent, the perceived usefulness of the service.
2. The choice of technology is a significant factor in the intention to use location-based mobile advertising services among micro-enterprises.

## AREAS FOR FURTHER STUDY

In the study it was established that the respondents were willing to take higher levels of risk if the convenience and benefits were significant enough. There is need to further investigate the relationship between the risk involved in using a service or system in relation to the convenience and perceived benefits that can be gained from it. This is a useful direction for further exploration.

In the study only a hypothetical system was described to the respondents. The findings indicated that there was no significant relationship between the perceived usefulness of the system and their intention to use it. It is possible that perceptions of usefulness were not adequately formed based on the description. It is thus important to empirically establish whether or not perceptions of usefulness are significantly influenced by an actual system demonstration as opposed to a pure description.

There was a negative correlation between the choice of technology and perceived ease of use. This is worth investigating further to establish which technologies and possible user socio-economic characteristics contribute to this relationship.

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## APPENDIX ONE

### RESULTS

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	v17	v18
v1	1.00	0.63	0.19	0.08	-0.10	0.47	-0.03	-0.19	0.07	0.04	0.20	0.08	0.05	0.15	-0.05	-0.45	0.08	-0.25
v2	0.63	1.00	0.25	0.24	-0.10	0.41	-0.12	-0.21	0.08	0.15	0.08	0.08	0.12	0.22	0.03	-0.33	0.00	-0.17
v3	0.19	0.25	1.00	0.66	-0.15	0.30	-0.33	-0.18	0.14	0.43	0.07	0.15	0.30	0.37	0.19	0.06	-0.05	0.22
v4	0.08	0.24	0.66	1.00	-0.10	0.31	-0.23	-0.21	0.14	0.40	0.09	0.18	0.34	0.37	0.23	0.02	-0.15	0.21
v5	-0.10	-0.10	-0.15	-0.10	1.00	-0.01	0.27	0.23	-0.10	-0.36	-0.07	-0.17	-0.18	-0.19	-0.06	0.04	0.08	-0.06
v6	0.47	0.41	0.30	0.31	-0.01	1.00	-0.07	-0.25	0.21	0.16	0.04	0.02	0.04	0.18	0.12	-0.29	0.01	-0.10
v7	-0.03	-0.12	-0.33	-0.23	0.27	-0.07	1.00	0.27	-0.12	-0.44	-0.07	-0.26	-0.33	-0.31	-0.10	-0.04	0.14	-0.12
v8	-0.19	-0.21	-0.18	-0.21	0.23	-0.25	0.27	1.00	-0.20	-0.12	-0.21	0.02	-0.04	-0.47	-0.18	-0.06	0.03	-0.14
v9	0.07	0.08	0.14	0.14	-0.10	0.21	-0.12	-0.20	1.00	0.30	-0.13	-0.06	0.04	0.27	0.33	0.10	-0.08	0.18
v10	0.04	0.15	0.43	0.40	-0.36	0.16	-0.44	-0.12	0.30	1.00	0.06	0.24	0.43	0.43	0.32	0.10	-0.04	0.35
v11	0.20	0.08	0.07	0.09	-0.07	0.04	-0.07	-0.21	-0.13	0.06	1.00	0.30	0.15	0.20	-0.16	-0.01	0.12	0.03
v12	0.08	0.08	0.15	0.18	-0.17	0.02	-0.26	0.02	-0.06	0.24	0.30	1.00	0.55	0.19	-0.08	-0.01	-0.02	-0.10
v13	0.05	0.12	0.30	0.34	-0.18	0.04	-0.33	-0.04	0.04	0.43	0.15	0.55	1.00	0.35	0.09	0.06	-0.11	0.12
v14	0.15	0.22	0.37	0.37	-0.19	0.18	-0.31	-0.47	0.27	0.43	0.20	0.19	0.35	1.00	0.26	0.15	-0.12	0.20
v15	-0.05	0.03	0.19	0.23	-0.06	0.12	-0.10	-0.18	0.33	0.32	-0.16	-0.08	0.09	0.26	1.00	0.38	-0.03	0.53
v16	-0.45	-0.33	0.06	0.02	0.04	-0.29	-0.04	-0.06	0.10	0.10	-0.01	-0.01	0.06	0.15	0.38	1.00	-0.05	0.50
v17	0.08	0.00	-0.05	-0.15	0.08	0.01	0.14	0.03	-0.08	-0.04	0.12	-0.02	-0.11	-0.12	-0.03	-0.05	1.00	-0.06
v18	-0.25	-0.17	0.22	0.21	-0.06	-0.10	-0.12	-0.14	0.18	0.35	0.03	-0.10	0.12	0.20	0.53	0.50	-0.06	1.00

Table 9: Inter Item Correlations

**Key:**

	<b>Item</b>
v1	I will only try using the application if it does not look complicated
v2	I would prefer to use the application if it is based on a simple technology like SMS
v3	I would prefer to use the system if I do not need to learn about new technologies
v4	I would use the application if I do not have to change mobile providers
v5	I would use the application if it takes a short while to learn.
v6	I would use the application if it works on the technologies I am already familiar with.
v7	The application can help me increase my profits
v8	The application can make it easier to get clients.
v9	Giving out my personal details to unknown clients is risky.
v10	Getting calls from new clients might interfere with my performance with the existing ones.
v11	Being listed on such a service might associate me with illegal activities or crime if it is misused.
v12	I would prefer to get paid a deposit before going out to meet a client.
v13	I fear that some clients might call and not give me business.
v14	Getting calls from clients at odd hours might interfere with my privacy.
v15	I would use it if it was a JAVA or Android based mobile applications
v16	I would use it if it required internet access
v17	I would use it if it was SMS based
v18	I would use it if it was USSD based.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.740
	Approx. Chi-Square	1639.578
Bartlett's Test of Sphericity	df	136
	Sig.	.000

**Table 10: Initial KMO and Bartlett's Test**

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	v17
v1	.670 <sup>a</sup>	-.491	-.162	.206	.053	-.238	-.077	.029	-.054	.066	-.221	-.009	-.026	-.040	-.086	.274	.068
v2	-.491	.775 <sup>a</sup>	-.013	-.112	-.010	-.059	.034	.053	.050	-.055	.072	.018	-.020	-.057	-.053	.073	.081
v3	-.162	-.013	.758 <sup>a</sup>	-.543	.024	-.106	.172	-.082	.037	-.099	.064	.030	.000	-.089	.096	-.128	-.100
v4	.206	-.112	-.543	.742 <sup>a</sup>	-.056	-.143	-.089	.084	.021	-.065	-.051	-.035	-.135	-.060	-.093	.114	-.031
v5	.053	-.010	.024	-.056	.715 <sup>a</sup>	-.123	-.060	-.215	-.004	.289	-.029	.088	-.012	-.052	-.007	-.060	-.029
v6	-.238	-.059	-.106	-.143	-.123	.803 <sup>a</sup>	-.048	.158	-.121	-.077	.023	-.014	.066	.050	-.113	.154	.091
v7	-.077	.034	.172	-.089	-.060	-.048	.804 <sup>a</sup>	-.246	-.012	.253	-.052	.119	.091	-.007	-.031	-.032	-.025
v8	.029	.053	-.082	.084	-.215	.158	-.246	.632 <sup>a</sup>	.072	-.231	.184	-.122	-.089	.383	.051	.042	.071
v9	-.054	.050	.037	.021	-.004	-.121	-.012	.072	.789 <sup>a</sup>	-.189	.150	.039	.054	-.129	-.154	-.035	.016
v10	.066	-.055	-.099	-.065	.289	-.077	.253	-.231	-.189	.787 <sup>a</sup>	-.036	-.029	-.172	-.200	-.094	.084	-.225
v11	-.221	.072	.064	-.051	-.029	.023	-.052	.184	.150	-.036	.528 <sup>a</sup>	-.259	.038	-.095	.233	-.066	-.160
v12	-.009	.018	.030	-.035	.088	-.014	.119	-.122	.039	-.029	-.259	.652 <sup>a</sup>	-.447	-.012	.001	-.079	.192
v13	-.026	-.020	.000	-.135	-.012	.066	.091	-.089	.054	-.172	.038	-.447	.772 <sup>a</sup>	-.164	.013	.004	-.052
v14	-.040	-.057	-.089	-.060	-.052	.050	-.007	.383	-.129	-.200	-.095	-.012	-.164	.822 <sup>a</sup>	-.051	-.122	.068
v15	-.086	-.053	.096	-.093	-.007	-.113	-.031	.051	-.154	-.094	.233	.001	.013	-.051	.731 <sup>a</sup>	-.242	-.373
v16	.274	.073	-.128	.114	-.060	.154	-.032	.042	-.035	.084	-.066	-.079	.004	-.122	-.242	.737 <sup>a</sup>	-.267
v17	.068	.081	-.100	-.031	-.029	.091	-.025	.071	.016	-.225	-.160	.192	-.052	.068	-.373	-.267	.728 <sup>a</sup>

Table 11:Initial anti-image Matrices



Key:

	Item
v1	I will only try using the application if it does not look complicated
v2	I would prefer to use the application if it is based on a simple technology like SMS
v3	I would prefer to use the system if I do not need to learn about new technologies
v4	I would use the application if I do not have to change mobile providers
v5	I would use the application if it takes a short while to learn.
v6	I would use the application if it works on the technologies I am already familiar with.
v7	The application can help me increase my profits
v8	The application can make it easier to get clients.
v9	Giving out my personal details to unknown clients is risky.
v10	Getting calls from new clients might interfere with my performance with the existing ones.
v11	Being listed on such a service might associate me with illegal activities or crime if it is misused.
v12	I would prefer to get paid a deposit before going out to meet a client.
v13	I fear that some clients might call and not give me business.
v14	Getting calls from clients at odd hours might interfere with my privacy.
v15	I would use it if it was a JAVA or Android based mobile applications
v16	I would use it if it required internet access
v17	I would use it if it was USSD based.

	Initial	Extraction
I will only try using the application if it does not look complicated	1.000	.696
I would prefer to use the application if it is based on a simple technology like SMS	1.000	.608
I would prefer to use the system if I do not need to learn about new technologies	1.000	.662
I would use the application if I do not have to change mobile providers	1.000	.691
I would use the application if it takes a short while to learn.	1.000	.595
I would use the application if it works on the technologies I am already familiar with.	1.000	.601
The application can help me increase my profits	1.000	.482
The application can make it easier to get clients.	1.000	.722
Giving out my personal details to unknown clients is risky.	1.000	.487
Getting calls from new clients might interfere with my performance with the existing ones.	1.000	.678

Being listed on such a service might associate me with illegal activities or crime if it is misused.	1.000	.721
I would prefer to get paid a deposit before going out to meet a client.	1.000	.637
I fear that some clients might call and not give me business.	1.000	.651
Getting calls from clients at odd hours might interfere with my privacy.	1.000	.588
I would use it if it was a JAVA or Android based mobile applications	1.000	.605
I would use it if it required internet access	1.000	.684
I would use it if it was USSD based.	1.000	.654
<i>Extraction Method: Principal Component Analysis.</i>		

**Table 12: Initial communalities**

		Component				
		1	2	3	4	5
V1	I will only try using the application if it does not look complicated	.300	-.743	.217	-.083	.028
V2	I would prefer to use the application if it is based on a simple technology like SMS	.410	-.621	.229	.040	.008
V3	I would prefer to use the system if I do not need to learn about new technologies	.695	-.019	.044	.350	.234
V4	I would use the application if I do not have to change mobile providers	.675	.000	.032	.363	.320
V5	I would use the application if it takes a short while to learn.	-.387	.017	.187	.275	.578
V6	I would use the application if it works on the technologies I am already familiar with.	.408	-.485	.410	.139	.106
V7	The application can help me increase my profits	-.555	-.060	.251	.086	.316
V8	The application can make it easier to get clients.	-.478	.066	-.248	.649	-.079
V9	Giving out my personal details to unknown clients is risky.	.370	.163	.448	-.023	-.349
V10	Getting calls from new clients might interfere with my performance with the existing ones.	.723	.205	-.107	.159	-.277
V11	Being listed on such a service might associate me with illegal activities or crime if it is misused.	.221	-.204	-.389	-.505	.473
V12	I would prefer to get paid a deposit before going out to meet a client.	.358	-.123	-.699	.066	.014
V13	I fear that some clients might call and not give me business.	.561	.038	-.536	.218	-.011
V14	Getting calls from clients at odd hours might interfere with my privacy.	.698	.064	.025	-.292	.099
V15	I would use it if it was a JAVA or Android based mobile applications	.416	.487	.439	.048	.001
V16	I would use it if it required internet access	.091	.777	-.007	-.143	.225
V17	I would use it if it was USSD based.	.344	.682	.184	-.045	.185
<i>Extraction Method: Principal Component Analysis.</i>						

**Table 13: Initial factor loadings based on a principal components analysis for 17 items of the intention to use location-based mobile advertising scale (n=304)**

	Initial	Extraction
I will only try using the application if it does not look complicated	1.000	.688
I would prefer to use the application if it is based on a simple technology like SMS	1.000	.618
I would prefer to use the system if I do not need to learn about new technologies	1.000	.532
I would use the application if I do not have to change mobile providers	1.000	.500
I would use the application if it works on the technologies I am already familiar with.	1.000	.581
The application can help me increase my profits	1.000	.384
Giving out my personal details to unknown clients is risky.	1.000	.361
Getting calls from new clients might interfere with my performance with the existing ones.	1.000	.587
I would prefer to get paid a deposit before going out to meet a client.	1.000	.635
I fear that some clients might call and not give me business.	1.000	.665
Getting calls from clients at odd hours might interfere with my privacy.	1.000	.451
I would use it if it was a JAVA or Android based mobile applications	1.000	.616
I would use it if it required internet access	1.000	.630
I would use it if it was USSD based.	1.000	.653

*Extraction Method: Principal Component Analysis.*

**Table 14: Final Communalities**