H

Business, Marketing

h & ^ D d SMS Based Information Systems Pankaj kumar Jaiswal September, 2011 ABSTARCT The Short Message Service (SMS) allows text-based messages to be sent to and from mobile telephones on a GSM network. Each message has a maximum length of 160 characters. The possibility of using SMS in Africa is growing rapidly high. It is mostly used for things such as medicine awareness and warning notifications. In Mozambique health workers can support diagnosis & treatment through Bulk SMS and even in Uganda, Malawi and Benin health education messages are sent by text messages. SMSbased transactional alerts are SMS’s sent each time a change occurs in a bank account, for example, or when your credit card is used then you will get an SMS on your mobile phone. Marketing on a mobile phone has become increasingly popular ever since the rise of SMS in the early 2000s in Europe and some parts of Asia when businesses started to collect mobile phone numbers and send off wanted (or unwanted) content. Many applications need the ability to do real-time notification when events occur. Often the people who need to be kept aware of events are in a remote location. Cell phones have recently started being used in Africa for sending SMS-based information. These simple systems have already had a major impact. The reason why SMS gets through: With the massive growth and inadequate infrastructure in many countries, voice and where available IP are just not feasible unless there is massive investment to bring up the networks. SMS will get through even when the ‘ network is busy’ for hours. Some of the possible services that exist are: car parking systems, M-learning, market information via SMS, automated agricultural answering system and many others. SMS messaging has already shown great potential.

The FAO is using SMS messaging as a data transmission system for field workers wishing to send in agricultural reports. The Zambian farmer’s union uses SMS messages to distribute market prices. The SMS system has been more beneficiary for farmers in some part of African countries where they can send SMS through mobile and get the instant message reply for taking the decision for selling the crops at good price. A local management information system for small farmers and traders gives information on prices, trade volumes, market flows and growing conditions in local language via SMS on mobile phones. In this thesis the main finding is about in which of the respective areas the SMS system is being used and how does it help the human life to be more comfort. CERTIFICATION The undersigned certifies that he has read and hereby recommend for acceptance by the University of Eastern Finland a thesis entitled: SMS-Based Information Systems, in fulfillment of the requirements for the degree of Master of Science (MSC) in University of Eastern Finland. ..... (Supervisor) ..... (Co-Supervisor) ..... Date ..... Date ACKNOWLEGEMENTS I am grateful to University of Eastern Finland for giving the opportunity to participate in the IMPIT program and broaden my vision and experience. I would like to sincerely thank my supervisor Mikko Malinen and co-supervisor, Professor Pasi FrÃ¤nti, for his significant guidance and helpful advices to my research and work. I would also like to thank every member of the computer science department for their kind support and advices during my work. I would like to express my thanks to the service providers (TIGO and ZAIN) and Mosses Nkwendwe at Dar es Salaam Institution of Technology for accepting us and

having a discussion about the study topic. I would like to express my thanks to all of my friends for their support and encouragement for good co-operation for fulfillments of my thesis I would like to denote my deepest love and gratitude to my family for their moral support and especially to my fuancy Neema Thomas laizer for her endless support and help to my studies and life. I truly appreciate all of you. Lastly, I would like to state truthful gratitude to the lecturers who taught me; especially Prof. Alexander kolesnikov, Prof. PÃ¤si, Prof. Erkki, Dr. Mikko Vessinaho for his kind support and research and PhD Fellow Marcus . Table of contents

ICT..... Information and communication technologies FM..... Freqeuncy modulation TCRA..... Tanzania Communication Regulatory authority

IAB..... Interactive Advertising Bureau MMA..... ..... Mobile Marketing Association UGX..... Ugandan shillings AMIS..... ……Agricultural Marketing Information System

UNDP..... United Nations Development Programme MT..... Mobile Terminate MO..... Mobile originate GSM..... Global System for Mobile Communications MMS..... multimedia messaging services IMC..... Integrated marketing communications MACE.....Malawi Agriculture commodity Exchange

HKIED..... Hong Kong Institute of Education NAFIS..... National Farmers Information Service IVR..... Interactive voice response PDA.....Personal digital assistant MCSP..... Multi Channel Service Platform INFSS..... Integrated Nutrition and Food Security Surveillance

UNICEF..... United Nations Children's

Fund SHEMP..... Smallholder Enterprise and Marketing Programme ZNFU..... Zambia National Farmers Union ICTARD..... Information Communication Technology for Africa Rural development M-PESA..... ..... Money Transfer GPRS.....General packet radio service WAP..... Wireless application protocol ESME..... External Short Messaging Entity VPN..... Virtual private network NECTA.....The national examination council of Tanzania CHAPTER ONE: INTRODUCTION 1. 1 Background and Definition Mobile Marketing is a set of practices that enables organizations to communicate and engage with their audience in an interactive and relevant manner through any mobile device or network. Mobile marketing is commonly known as wireless marketing. However wireless is not necessarily mobile. For instance, a consumer's communications with a Web site from a desktop computer at home, with signals carried over a wireless local area network (WLAN) or over a satellite network, would qualify as wireless but not mobile communications. Marketing on a mobile phone has become increasingly popular ever since the rise of Short Message Service (SMS) in the early 2000s in Europe and some parts of Asia when businesses started to collect mobile phone numbers and send off wanted (or unwanted) content [67]. The past decade has witnessed a revolution in the use of ICT in Developing countries. Many people and offices as well as rural farmers own ICT facilities such as personal computers and mobile phones [60]. The

largest increases in the use of ICT has been in mobile telephony where subscriptions in developing countries increased from about 30 percent of the world total in 2000 to more than 50 percent in 2004 and to almost 70 percent in 2007 [1]. While internet use has not increased as rapidly as mobile communication, it increased tenfold in developing countries in the same period [60]. Other ICT facilities such as telecast, radio FM and information centers have also increased remarkably in number during the same period. ICT in 53 African countries were revealed the wide use of ICT in the region with countries such as Algeria, Egypt, South Africa and Botswana leading in ICT use [60]. In East Africa, Rwanda is probably the most advanced country in terms of ICT use with 65% of its population being covered by mobile telephony. The country has also a high level of internet use and access to television and radio broadcasts. In Kenya, Uganda and Burundi the use of ICT is also well advanced, especially for mobile phone subscribers, TV and radio listeners [3]. This high use of ICT is likely to stimulate economic development in developing countries, including the agricultural sector where a high proportion of the African Population derives their livelihoods. Before 1990, ICT use in Tanzania was mainly limited to radio and landline telephones. New ICT started in the mid 1990s, and by 2001 it was estimated that Tanzania’s ICT industry had generated USD 300—350 million per year. There are now a number of ICT development initiatives in the country funded by the government, donor countries and the private sector. Such initiatives range from telecenters and mobile phones in rural Tanzania to e-Government initiatives being implemented in the major cities and towns of Tanzania. Currently, the following ICT providers are in the

market [4]: - Tanzania Telecommunication Company Limited - Internet Service Providers (ISPs) - Web Content Providers (ASPs) - Mobile phone companies (Vodacom, Zain, Tigo and Zantel) - Radio, TV and Newspapers - NGOs By 30th June 2009, about 13. 9 million Tanzanians owned voice telephone lines [61]. Mobile voice telecommunication leads the market by having more subscriptions (98%) than to fixed line services (2%) (TCRA, 2007). The use of the internet is also increasing, especially in cities and towns. Being one of the poorest countries in the world, ICT in Tanzania is acknowledged as having the potential to accelerate the socio-economic development of the country [2]. The cost of such technologies has declined steadily, making it possible for the 21st century farmers in developing countries to own mobile phones, as well as accessing other ICT facilities such as the Internet, radio and television to mention a few [11]. The question, however, is to what extent has this ICT revolution helped rural farmers in Tanzania to access market information for their farm products? Knowing this is important. While the liberalization of agricultural markets has brought many opportunities, nevertheless it has also introduced new challenges to farmers, especially poor smallholder farmers in rural areas. Accessing market information has proved difficult for many. The lack of market information represents a significant impediment to market access, especially for smallholder poor farmers in rural areas; it substantially increases transaction costs and reduces market efficiency. For any one crop, the marketing chain consists of multiple middlemen, each taking a margin at every stage of the chain, and price variations in space and time are often large and erratic [63]. But despite having this ICT revolution in Sub-Saharan

Africa are rural farmers any better at accessing market information and what has been the impact on farm incomes, new technologies and/or the adoption of new crops? Over the past few years SMS has become a legitimate advertising channel in some parts of the world. This is because unlike email over the public Internet, the carriers who police their own networks have set guidelines and best practices for the mobile media industry (including mobile advertising). The IAB (Interactive Advertising Bureau) and the Mobile Marketing Association, as well, have established guidelines and are evangelizing the use of the mobile channel for marketers. While this has been fruitful in developed regions such as North America, Western Europe and some other countries, mobile SPAM messages (SMS sent to mobile subscribers without a legitimate and explicit option by the subscriber) remain an issue in many other parts of the world, partly due to the carriers selling their member databases to third parties. Short codes (also known as short numbers) are special telephone numbers, significantly shorter than full telephone numbers that can be used to address SMS and MMS messages from certain service provider’s mobile phones or fixed phones. There are two types of short codes: dialing and messaging. Short codes are designed to be easier to read and remember than normal telephone numbers. Like telephone numbers, short codes are unique to each operator at the technological level. Even so, providers generally have agreements to avoid overlaps. In some countries, such as the United States, some classes of numbers are interoperator (U. S. inter-operator numbers are called common short codes) [73]. Short codes are widely used for value-added services such as television program voting, ordering ringtones, charity donations and

mobile services. Messages sent to short code can be billed at a higher rate than a standard SMS and may even subscribe a customer to a recurring monthly service that will be added to their mobile phone bill until they text, for example, the word " STOP" to terminate the service. In Europe the first cross-carrier SMS short code campaign was run by Txtbomb in 2001 for an Island Records release, In North America it was the Labatt Brewing Company in 2002. Over the past few years mobile short codes have been increasingly popular as a new channel to communicate to the mobile consumer. Brands have begun to treat the mobile short code as a mobile domain name allowing the consumer to text message the brand at an event [74]. SMS services typically run off a short code, but sending text messages to an email address is another methodology. Short codes are 5 or 6 digit numbers that have been assigned by all the mobile operators in a given country for the use of brand campaign and other consumer services. Due to the high price of short codes of $500-$1000 a month, many small businesses opt to share a short code in order to reduce monthly costs. The mobile operators vet every short code application before provisioning and monitor the service to make sure it does not diverge from its original service description. Another alternative to sending messages by short code or email is to do so through one's own dedicated phone number. Besides short codes, inbound SMS is very often based on long numbers (international number format, e. g. +44 7624 805000), which can be used in place of short codes or premium-rated short messages for SMS reception in several applications, such as product promotions and campaigns. Long numbers are internationally available, as well as enabling businesses to have their own number, rather than short

codes which are usually shared across a number of brands. Additionally, long numbers are non-premium inbound numbers. One key criterion for provisioning is that the consumer opts in to the service. The mobile operators demand a double opt in from the consumer and the ability for the consumer to opt out of the service at any time by sending the word STOP via SMS. These guidelines are established in the MMA (Mobile Marketing Association) Consumer Best Practices Guidelines which are followed by all mobile marketers in the United States. For definition associated with mobile-based advertising, we adopt classification that is derived from general principles of direct marketing, namely the push type and pull type strategies. SMS mobile advertising has typically been considered an application of a push strategy in the mobile environment [62], meaning that information and marketing flow from the producer and to the consumer [62]. In a push campaign, the marketer takes the initiative and send messages directly to the consumer regardless of whether the consumer has agreed to receive the message. Pull strategies involve sending the information that is requested by the consumer. [62]. Historically, push strategies have been associated with efforts to boost sales in the short term. In fact, most early mobile messages were promotional in nature, focusing on including an immediate purchase. At one time in Africa mobile phones were underutilized, heavy and pain to carry around. But today most of the people are having a mobile phone. In Sub-Saharan Africa, has not seen to much infra-structure development for various reasons. For example, only 29 % of roads are paved, 25 % of the population has access to electricity and there are 3 landlines per 100 people, most of them function poorly. But now there are 10 times as many mobile phones as

landlines and 60% of the population has mobile. Especially the farmers in African continent covering the places like Tanzania, Uganda, Kenya and many other places have a large benefit from SMS based market information systems[72]. The earlier method of product selling had the following steps: 1) The farmer was selling his/her agricultural products to the middleman from his/her place at very low price either in received or to be received payments. 2) The middleman was transporting the sold agricultural products to the market and sells them to buying agents in reasonable profit in received or to be received payments. 3) The buying agent could sell the agricultural products either in small amount to consumers in received or to be received payments or to other buying agent in cash in high profit. The deficiencies of this method were to reduce the income to farmer whereas the middleman or buying agent gains a lot in short time. In context of Asian continent, Bangladesh is primarily an agrarian economy, generating export earnings not only from farming but also by an agricultural manufacturing sector. Rural development has become a function of agricultural growth. But as there are many small farmers and less than perfect information for stakeholders in the sector, the market is volatile to manipulation and uninformed actions. Farmers' participation in market and transport management is so poor that most of the time they are being forced to sell their products to local middlemen at dumped prices. Under these circumstances, experts opine that this deprivation on part of the growers may greatly be reduced if they would have been empowered with information. Timely and unbiased agricultural marketing information will help farmers to bargain with the middlemen for a fair price and gain profitable

decisions in the short term with regard to what price to produce and what price to expect [63]. In addition to farmers this information is also important to the wholesellers, retailers, consumers, ministry of agriculture, researchers and policy makers. Like farmers, wholesalers may have the opportunity to locate their profitable market whereas retailers can buy and sell their products at market prices from the wholesellers and to the customers respectively. In the light of the above, the Government of Bangladesh has taken a number of steps in order to disseminate agricultural market information to the concerned stakeholders, specifically farmers, traders, policy makers and the media. However, progress has been scarce as technology used has been over the top and as local organization for information capture and input has been problematic. SMS system will improve that as mobile technology is readily accessible in rural Bangladesh, and as the Village phone organization also provides expertise in use. While mobile technology is generously available in rural Bangladesh, as in many other developing countries, innovations in its use for commercial applications have been surprisingly slow to materialize. The designed system used actual agricultural data and took into account both the low literacy levels of farmers as well as the limitations of the mobile screens and text capacities. The system provides full awareness of all parties of prevailing market prices and provides farmers with timely and reliable information. In Uganda, the market information service provides the real time, concise and trusted information to the users or the marketers to make the business decision. The user gets SMS text of reliable market intelligence generated from the network of their trade agents, buyers and sellers and plus a contact person to follow up for

more information. Their network allows them to be at the front of the moving market on user behalf and keep the user informed in time. They provide today's market price for commodities they want to sell to or buy from the market. It provides selected market prices of your choice for 3-5 commodities that interest you three times a week. Even it provides information whenever somebody is buying or selling the commodities you are interested in and what price they offer through SMS. It provides the trade alerts you want from our network of trusted trade agents, buyers and sellers of commodities you are interested in as and when they occur. Even the marketers make their product or service known to potential customers throughout Uganda or only in particular regions through SMS systems. It provides SMS advertisement push for the product or service to wide network of trusted trade agents, buyers and sellers making product or service known to many through information boards at shops and market places. There is some subscription rate like 300 UGX per SMS for Ugandans to send message. In figure 1 there is a diagram of an SMS based market information system. & ^ Z ^ kariakoo tom 50TSH Temeki tom 60TSH Tandale tom 70 TSH ^D^ d ^D^ ^D^ ^D^ ' d d^, < ^ d d d h d^, d Location crop price kariakoo tom 50TSH Temeki tom 60TSH Tandale tom 70 TSH d^, Figure 1 . Diagram of an SMS-based market information system There should be price porter from each market he/she can use SMS to update the database let say Tom 60 TSH, the system should be able to recognized the validity and source of SMS for updating the price information. For example in this case Tom 60 TSH should update only Kariakoo price information, the same applies to other cases. The farmer should send a commodity name using 3 initial letters to a

certain code e. g. Tom to 1005 and get price information for tomatoes from different markets. SMSC: SMSC is the Short Message Service Center that is available in each service provider to pass the user SMS for the required service. SMS Gateway: A SMS gateway would receive and process incoming SMS from users, extracting the data required to take the appropriate action, and sending the response message back to the user. Kannel as an open SMS gateway- for sending/receiving SMS can be more preferable to use because of its strongest and free software. Database: Database can be attached to service provider or can be located some where else also and connected to the service provider 1. 2 Statement of the problem This study investigates the problem that faces smallholder farmers in price setting of their products in Tanzania and also other African countries, to investigate the best option for establishment of SMS-based market information system that would help the farmers to know the market price and hence increase their negotiation power to get the right price. 1. 3 Benefit of SMS based marketing systems Modern societies have established different market information systems such as Mobile application and Web-based applications. Marketing of products is a big challenge to many small scale farmers. There is information service company, MFarm which offers an SMS based solution for selling their products in Kenya and it uses a module for price information service which runs on code 3535. The farmers rely on the system to get information on price for their produce. This enables the farmers to get the real time market price information, and so they don’t have to deal with the shrewd middleman. Through this, farmer can compare the price of products at various markets and make up their minds on where their produce will fetch

the best price. Later on with the growing popularity of this SMS service, the farmers were facilitated with two other components that allow farmers to come together and buy inputs in bulk. With higher volumes, famers can buy in bulk and transport costs are lower. In this component, farmers send SMS specifying the input needed quantity and location. M-Farm identifies the companies that deal with the stated input. If the farmers like the offered price, they place an order. Farmers can also sell in bulk. Already, farmers are using the services. They have some SMS format for price enquiry: SMS Format: SMS: Price Tomatoes Nairobi SEND TO: 3535 The SMS is not case sensitive and crop name can either be in Kiswahili or English. One may for example write mahindi instead of maize. 1. 4 Objectives of establishing and networking of agricultural market intelligence through SMS The main purpose of Agricultural Marketing Information System (AMIS) is to disseminate accurate and timely marketing information so as to support in marketing decision making and marketing efforts of entrepreneurs, farmers, government and development organizations. To disseminate timely, comprehensive, current and future price intelligence on agricultural commodities for better scientific decision-making by farming community, traders, firms and researchers. More specifically, providing price forecasts well in advance of sowing of major commodities and during harvesting helps the farmers in taking better sowing and selling decisions; Objectives may be listed as follows: - Providing other market intelligence such as product qualities, high price markets for the different commodities. - Dissemination of the above market intelligence through different mass media like news papers in regional languages, English, Television, Radio, agricultural

magazines, voice SMS, so as to reach the maximum number of farmers; - Training the farmers and agricultural extension officials in the state regarding use of the above intelligence; - Studying different market intelligence aspects being made available to farmers in different countries and explore possibilities of replicating the same in India; and - Developing commodity market outlook for selected commodities at state level besides providing commodity market research reports. 1. 5 ICT, market access and its implications for rural farmers The importance of the role of market information in terms of economic efficiency and performance as well as equity is widely acknowledged. It was observed in [61] that accurate and timely market information enhances market performance by improving the knowledge of market actors. An equal balance of knowledge provides a more equal distribution of the gains from efficient market price formation. [6] Access to ICT can help farmers in a number of ways. Traditional media and new ICT have played a major role in diffusing information to rural communities and now have much more potential [4]. The pre-paid credit has enabled mobile phone users to send relatively cheap SMS text messages across distances that would otherwise take days to travel, hence changing life for the better [61]. By using mobile phones and messaging technology, farmers get access to valuable market data [5]. Studies in Pakistan show that widely available information on prevailing market prices for seed cotton strengthened farmer’s position when bargaining with traders [66]. The availability of market information also enables farmers to check on the prices they receive vis-Ã -vis the prevailing market prices. In Indonesia, for example, vegetable farmers fixed prices following the rate that was being

broadcast by their local radios and lower prices than that broadcast were not accepted by these farmers [35]. The broadcast prices were subsequently used as a starting point in negotiating with traders the following day. Studies in Chile show that an internet network among farmer organizations has dramatically increased farmers' incomes by providing information about crop status, weather, global market prices and training (UNDP, 2001). 1. 6 Issues concerning SMS-based systems The Short Message Service (SMS) allows text-based messages to be sent to and from mobile telephones on a GSM network. Each message has a maximum length of 160 characters. SMS messages are divided into two categories: Mobile Terminate (MT where the SMS message originates from the network provider) and Mobile Originate (MO where the consumer can send messages to other consumers). In the context of MO and MT messages, the consumer refers to the end-user, the person with a cell phone. Typically, SMS messages are sent and received by cellular consumers using cellular telephone handsets. Cell phones have the ability to send and receive SMS messages. Here we are try to interface a computer with the GSM network. Anything that is capable of talking to a GSM network, in theory, has the ability to send and receive SMS messages and not only the device which has capability to connect [71]. The internet-enabled mobile phone has spread rapidly in many markets. Following the first release of wireless application protocol (WAP) in 1998, firms began to send the SMS alerts and location—sensitive ads to mobile users. Because of the very personal nature of mobile phone the use of short message services and multimedia messaging services (MMS) for marketing purposes has drastically changed in many parts of the world. For example, a report issued

by portion research indicates that the annual sales revenue of the SMS market will reach $50 billion worldwide by 2010, with some 2. 38 trillion text messages sent [5]. According to the recent survey, 36 % of marketers operating in Europe have used SMS advertising for more than one year. Some of them are taking advantage of this growth by incorporating SMS advertising as a part of an integrated marketing communications (IMC) strategy [6]. The rapid growth of mobile devices has made the mobile phone ubiquitous in nearly all parts of the world. The majority of the mobile devices are still simple mobile phones that use SMS for search (searching the information through by mobile by texting in the query into Google short code like 4664), so the global market for SMS search is growing. SMS based search imposes interesting constraints on the problem. First bandwidth is extremely limited; it is not beneficiary to user and even tedious to find the market information. Especially in the context of African environment the farmers are using the mobile which does not need to be powerful smart phones with different features but in fact having the facility of sending the message to the server database from where they can get information back regarding the price of different commodities in market. The unavailability of the mobile phone network can affect the availability of the market price information. Still mobile phone technology is relatively more available in Tanzania. The awareness of the farmers is needed during the use of market information system so that farmers can benefit from it. With the intention of multinational corporation operating in Europe there is great implementation of SMS service in marketing or advertising. This medium is related to four factors (1) the ability to build brand image (2) the ability to use location

based marketing (3) the perception of how the consumers accept SMS advertising ; and (4) the perception of technological infrastructure . The Europeans have responded positively to receiving to SMS advertising messages. The acceptance of SMS advertising is beginning to grow and may have potential to become an important new model of interactive marketing communication. Some issues concerning SMS-based systems are: 1) Branding building effect 2) Privacy/security concerns 3) Location based marketing 4) technological condition Branding building effect: The mobile advertising has considerable potential to contribute to brand building. Research on the Internet's has shown that the perceived level of interactivity is a major determinant of a user's attitude towards a website, and is more important than the number of features on a particular site. The Internet's most studding features is its ability to build brands with customers and prospects. As with the internet, SMS advertising can introduce shopping in a specific store, or driving in close proximity to a retail outlet. Because of this potential, we can predict that the ability to use location-specific messaging will also drive firm's intention to engage in mobile advertising. This prediction holds for firms based on European Union, Japan, and United States. Privacy/security concerns: As several studies observes, the potential of mobile devices is growing throughout much of the developed world. However, the ownership of these devices does not guarantee that the consumers will readily accept mobile advertising. Clearly, consumer's privacy concerns are an important issue to be taken into account. High levels of enthusiasm for SMS advertising and the consumers consents to receive the message [66]. So I am hypothesizing that firm's intention to use mobile

advertising is negatively associated with perception of privacy and security concerns of mobile messaging. Location-based marketing: Location-based services, such as the ability to provide features like weather forecast, restaurants guides, hotels maps, address finders, and traffic update have been cited as consumer friendly features of new media. Technological condition: A related idea is the extent to which a country’s technological environment allows a sufficient high volume of consumers to adopt the technologies that would allow them to be reached by SMS advertising messages. So clearly, appropriate technology is more available in some countries than in others, a fact that is often determined by level of economic development. 1. 7 SMS Advertising One of the first mobile communication technologies to be applied in marketing, SMS is a new technology buzzword for transmitting business-to-customer message. SMS advertising is now a substantial source of revenue for many operators, particularly because it has been incorporated in the instant messaging culture among different group of people. One key advantage of SMS is that it can capitalize on the “ always on" trend, in which people have access to the internet virtually the entire day. SMS also allows for more interactive communication with the consumer than traditional media: many firms deliver alerts, news update, traffic information, or promotional coupons via SMS. In the future, global positioning system may also incorporated in SMS advertising for those who seek timely information at the right place. For example, in Japan, agencies are conducting experimental transmission of locationbased restaurant information to public transport users Direct marketing and contract farming can also be other good strategies. For example, farmers may also be able to

supply direct hotels and restaurants. Taking advantage of such opportunities is often easier if farmers work as a group, since this makes it easier to guarantee availability and delivery of products at exact time when it is needed the importance of empowering farmers, both through provision of information and by working as a group. With the rapid spread of mobile phone network and growing frequency of farmer's organization, both of these are now realistic options of Africa's rural small-scale farmers. Information and communication technologies (ICTs), in particular mobile phones, email and the Internet, are transforming how marketing is carried out in some part of Africa. One example are Internet-supported market information systems, which collect and distribute information about market prices and enables sellers and buyers to make contact. ' Market spies' are another innovation. These people base themselves in agriculture markets and work on behalf of farmers, using mobile phones to inform them of prices and to make deal with traders. Market information system may also work to link farmers and buyers. For example in Malawi Agriculture commodity Exchange (MACE) farmers and buyers are linked through SMS messaging. Some approaches such as use of Internet or newspaper-based market information, may only be accessible to farmers who are literature in English. The network for farmers Groups in Tanzania, has found that using mobile phones is the best approach for those who cannot read English. In Kenya progress has been made towards the development and deployment of an agriculture information system using the SMS-based system using the English as well as borrowed Kiswahili language. Identifying the farming as the sector where it would be easiest to make a direct impact on Kenyan

society, since as much as 75% of the population is involved in farming in some way. A recent UN survey of e-agriculture has identified information exchange and communication processes as critical, highlighting among other things the following areas: - Enhancing farmers and producers access to market and information on farming techniques and practices. - Improving dissemination of and access to scientific and technical information. SMS based mobile marketing benefits: Consumers all over the world have come to rely on their mobile phone as an essential communications tool. They personalize it, take it everywhere they go, and many cannot imagine living without it. According to international researches, with over 1 billion SMS exchanged per month worldwide, 81% of enterprises surveyed identified SMS as key to satisfying customer needs. SMS messaging is a powerful tool because: - Instant upgrade of one’s market - SMS messages can be sent and read at any time. - SMS messages can be sent to an offline mobile phone. - SMS messaging is not intrusive. - 100% of GSM mobile phones support SMS messages. - Two —way SMS messages allows customers to reply to messages. CHAPTER TWO: LITERATURE REVIEW 2. 1 Mobile Marketing Many scholars have investigated SMS based systems and their use in real time. They have found that there are different usage of these SMS systems according to the needs of the users in different environments and necessities. A review explains how the SMS system was introduced, what was the need of it, how it was advantageous in different environments for different users [46]. According to [47] “ Marketing management is the process of planning and executing the conception, pricing, promotion and distribution of goods, services, and ideas to create exchange that satisfy

individual and organizational goals". The American marketing Association suggest sequential marketing stages as well as temporal and spatial separation of buyers and sellers. Mobile devices blur these boundaries and distinctions by extending traditional marketing’s time-space paradigm. Text messaging in UK or short message service (SMS) in other European countries, the US and Australia, lets user send and receive text message via cell phones. According to Global system for mobile management, users send more than 10 billion SMS messages each month. This makes SMS the most popular mobile data application [48]. In 2002, 580. 2 million mobile messaging users sent 430. 8 billion SMS’s [49]. Current technologies limit each message to a maximum of 160 characters. With SMS as a best effort service, all messages are delivered as long as there is not enough free capacity in the network. If the mobile phone is off, the message arrives when the user turns the mobile on. Cell phones let users of all ages easily maintain business and social contact. A key mobile marketing use is advertising, in a push or pull model. 2. 1. 1 Example of SMS services The car parking technique is being implemented using the SMS services on cellular phone in Vienna (Austria). We describe how useful these advanced car parking system are in providing drivers with information about the structure of the car park systems and the space available for them to park their cars. The availability of the vacant parking space is calculated by means of sensors installed in the parking areas, which count the number of cars that enter to and exit from the parking areas. Also, the number of parking tickets issued at the tickets counter can be used to calculate the vacant spaces. All this information from the sensors and tickets counters is used to update a central

database which stores all the information about the areas of the parking space which is vacant or occupied. The advanced parking system also provides advanced, electronic payment options for the customers. The idea behind this electronic payment option is to prevent the customer for having to wait in long queues to buy a ticket. Queues can cause congestion in areas within and outside of parking facilities [50]. Under this m-parking technology, customers initially register their mobile number, the license plate number of the car and their credit card number with the car park authorities, to create what is called a virtual parking ticket account. This completes the initial, one-time registration process. Whenever the customer needs to park, they send an SMS text message to the number provided by the car park authorities. The SMS message consists of the license plate number of the car, the location code of the parking area where they want to park and the time duration (in minutes) for which the customer wants to park. In return, the customer would then receive a text message from the car park message centre, with the confirmation and the expiry time of their electronic parking ticket. The customer would be sent a reminder SMS, 10 minutes before the parking time expires. The bill for the parking ticket would come up on the customer’s mobile bill. The bill is paid by both credit card and from mobile bill as well. There has been an increasing interest in academic institutions using mobile devices to support teaching and learning. Different mobile devices can be used in mobile learning. The most ubiquitous and stable mobile technologies namely Short Message Service (SMS) texting [13] on cellular phones has great potential in education. For the last 10 years, many SMS projects for teaching and learning were reported in the literature. These

projects are categorized into (a) communication and administrative support, and (b) teaching and learning support, as described below: 2. 1. 2 Communication and Administrative Support (Administrative communication in higher education) According to [52] from the University of Birmingham reported that an e-mail to text message service called Study Link is employed to support Administrative communication in higher education. Text messaging can be “ effectively integrated into both the student and staff experience". Administrative staff members were able to integrate the service into their current means of communicating with students while students were able to effectively receive and act on text messages. Message types include notices of changes and cancellations (e. g., class cancellations), reminders to submit and collect assignments, notices of relevant lectures/activities, individual administration (e. g., warning messages to absentees), instructional messages (e. g., instructions for submitting assignments), and greeting/courteous messages. According to the [53] development of education services based on short message services. The education information such as the enrollment information, grade release, university announcement, and internship opportunity can be retrieved and/or sent by the students via SMS through a login system. This research points out that administrative support to students via short message services is ideal. 2. 1. 3 Library Applications Library services can be improved through SMS-based administrative support. Libraries can reach out and serve students ubiquitously by sending and receiving SMS-based library information. There are a number of areas in library services for which SMS-based messages can be helpful. Basic information alerts such as notices of

book reservations, and renewals and overdue reminders are well tailored with this communication medium. One example is the SMS alert services offered by the Hong Kong Institute of Education. Further library services can also be provided via SMSbased systems. For example, extended text messaging reference can send SMS messages to and receive answers from librarians as reported in research at Southeastern Louisiana University as a way to further enhance the quality of services provided by libraries in higher education [64]. 2. 1. 4 Teaching and Learning Support (Classroom interaction and discussion) A SMS-based classroom interaction system is presented in [65]. They called this the TXT-2-LRN system. The system allows students to send questions or comments to the instructor’s laptop via SMS. The instructor can read the messages on the screen and decide to respond immediately or wait for later action. The instructor can also provide a quiz to the students and collect results. Students can look at the projector’s screen in real-time graphics showing the results. Short message services encourage interactivity in the classroom [51]. 2. 1. 5 Mobile Ticketing The mobile ticketing is implemented on smart machine in United Kingdom. The smart machine is a machine which monitors and controls multiple processes utilizing special service providers, delivering to any destination network, independent from the mobile operator. Thus, we can optimize value for money, depending on the content that is provided (e. g. high quality routing for tickets, standard routing for text messages with mere information). This system enables the user to buy ticket for major events like rock concerts and football matches from his mobile phones. The ticketing technology was successfully tried for the first time at the Aston Villa v West Bromwich Albion

match on April 10th, 2005. With the help of this technology, consumers can send an SMS to order their tickets via mobile phone. They then receive a return SMS which has an image with a 2dimensional matrix-code. This SMS contains details such as the ticket number, the mobile phone number and the seat number. On entering the stadium, the consumers have to hold their mobile phone with this image SMS open, in front of the scanners installed by Smart machine systems at the venue of the event. These scanners validate the users and allow them to enter inside the venue. The consumers are charged for their tickets by the mobile service provider once the 2-D code is scanned at the scanning machines. Figure 1 shows what the 2-D code looks like. Figure 2. Example of 2-D BAR code 2. 1. 6 E-parking system An on-going E-parking project being funded by multinational companies in five countries of the European Union, to help drivers buy parking tickets using their mobile phones [13]. Once the project is complete, it will allow drivers to pay for the parking space in advance, using their mobile phones. After the payment has been made, an access code will be sent back to the driver which will act as a validation code when he enters the car park. On reaching the car park, the driver sends the validation code to the main database server using the Bluetooth technology and is granted access to the parking area. Figure 2 shows how the whole system has been integrated and is expected to work. Figure 3. E-parking system In this section we describe the various mobile communication tools along with mobile technology generation; these tools are used as communication channels in different type mobile marketing campaigns. The review of mobile technology generations also indicates research interest for mobile marketing in different stages. 2. 1. 7 M-Learning

system M-learning systems, which are subset of e-learning systems designed to be used from mobile devices, have thus the opportunity to become deeply penetrated in the market due to the huge popularity of mobile devices. Probably the oldest and most widely used push technology is email. Given the ubiquitous nature of mobile phones, a likely alternative to pushed emails [32] is the use of their messaging services, i. e. SMS and MMS. The most common and frequently used mobile service and form of message communication is Short Message Service (SMS), which is present in every kind of mobile device and offers the possibility of reaching all mobile users. Text messaging seems to provide an opportunity for intimate personal contacts while at the same time offers the detachment necessary to manage self-presentation and involvement [27]. These two reasons have made SMS extremely popular. SMS-based applications are suitable for all user terminals and SMS scenarios; as they do not require extended handset functionality, they can perhaps provide the simplest form of m-learning. The primary advantage of the use of mobile phones and the SMS language is that teaching and learning can take place also outside a classroom situation. In fact, previous research [28] shows that it is possible to take mobile phone users on a complex " journey", implying situations where a series of interactive SMS exchanges may be required to achieve the completion of a task or goal. There exist examples of prototype systems allowing students to do their work (i. e. to study) using an SMS-based interaction, with courses composed of SMS " pills" — i. e. short textual learning objects — together with multiple-choice tests delivered by the same SMS service [29]. The learner can answer the tests by simply replying to the test SMS question with

a corresponding SMS containing the answer. The system tracks the answer, verifies the results and replies her/him with a new SMS containing the test results along with possible suggested improvements. This approach allows learners with the least sophisticated mobile phones to take part in some mobile learning and can be a useful and entertaining addition to any kind of classroom lesson or e-learning. SMS has also been tested in language learning systems for mobile phones [31] as part of English language courses, where students were sent frequent vocabulary messages also acting as reminders to be revised. Similar mlearning Systems are developed for SMS-based Italian language courses. Both described systems provide ubiquitous just-in-time SMS-based knowledge, including also an SMS searchable database. SMS is also used in m-learning systems for healthcare, where users can query specific subject knowledge bases through a content specia