

# Electronic Marketplaces as an Agricultural Value Chain Development Stimulus in Low Income Countries

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## ABSTRACT

Agriculture is an important sector in Kenya with majority of rural population depending on it. Access and linkage to better markets which is a key to empowering smallholder farmers has conventionally been inaccessible in agricultural value chains – as many of them are isolated in remote rural communities, with minimal communication infrastructure. They also face exploitation from middlemen who dictate prices for their produce. In this paper, we look at this important sector of the economy and how Kenyan county governments should play a major role in addressing this problem, with focus on use of ICT to enhance value chain development through promoting market linkage where farmers are linked to variety of markets and are able to dictate the prices for their produce. To-date, use of mobile based electronic market information system services in high and low income countries has benefited smallholder farmers by strengthening their negotiating position, enabled switch to alternative markets, reduced transaction costs and enhanced their critical planting and selling decisions. Hence, presents an opportunity for Kenyan county governments to empower smallholder farmers.

**Keywords:** *Electronic marketplaces, value chain development, smallholder farmers*

## 1. INTRODUCTION

Agriculture is the largest economic sector in African countries and remains the greatest opportunity for economic growth and poverty alleviation, contributing about 17% to the Gross Domestic Product (GDP) and 40% to exports, besides creating employment [1]. Sadly, the sector has been in decline over the past 40 years, and many farmers have largely remained poor with 73% of them thriving in rural areas subsisting on less than a dollar a day [2]. Over 80% of Kenyans live in the rural areas and derive their livelihoods indirectly or directly from agriculture [3].

Unpredictable weather, weak infrastructure, volatile prices, and little support are universal challenges facing smallholder farmers. Despite all these challenges, millions of farmers, traders, service providers and other micro-entrepreneurs still manage to deliver fresh food to urban consumers daily, export produce to distant markets, and stay in business. This reveals resilience, huge entrepreneurial potential and that smallholder farmers do not operate in isolation, but are part of a wider system (value chain) – from the point of production, processing, marketing of a particular product, from inception to the finished product [4].

Market liberalization policies of the 1980s and 1990s in many of the African countries removed some of the barriers to farmer participation in markets and their access to inputs. However, smallholder farmers have continued to miss this window of opportunity. Liberalization and integration of world markets has formed new organizations of supply chains which is an unfamiliar territory for many African smallholder farmers exploited by a small number of powerful transnational companies dominating large parts of the agri-food system [4].

Value chain development (VCD) is a business-oriented approach that aims to capture the best value at all stages of the value chain to the final consumer by improving efficiency and effectiveness of the too often uneconomic production, to market linkages through: orienting supply decisions to market opportunities, overcoming highly fragmented marketing relations/business linkages, building trust among value chain operators, balancing asymmetric distribution of information and power, improving technologies and know-how, improving access to services (information, know-how, technologies, and finances) and creating an enabling environment (policies, legislation, and administrative procedures) [5]. Hence, VCD empowers smallholder farmers.

The transition from the old to new constitution in Kenya presents fear of the unknown, anxiety and apprehension, while on the other hand, hope and enthusiasm [6]. It has led to emergence of county governments, which are being embraced as the new centers of devolved power and resources. Therefore, there is a need to sensitize and prepare county governments for the big role and expectation from the citizens, the central government and the development partners. County governments need to know the challenges facing smallholder farmers in agricultural value chains and the various value chain development approaches that ICT can leverage to empower smallholder farmers. County governments are expected to strive to empower smallholder farmers through various value chain development interventions, among which include facilitating access to better market for their produce - but such interventions may not be known to the county governments due to its new structure. One of the strategies is to utilize ICT in agriculture due to the high penetration of mobile phones in low income countries. In this respect, this paper serves to sensitize the Kenyan County

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governments on the challenges facing smallholder farmers, the need for market information, successes e-marketplaces in provision of real time market prices and market linkages, and challenges facing e-marketplace systems.

This paper focuses on e-marketplaces as a value chain development approach coupled with provision of market price information. A synopsis is that farmers are able to access market prices for products in various markets, set price for their produce and post an offer to sell, consumers bid for the farmers produce, the bids and offers are matched together, and farmers and consumers are given suggestions of where to buy and sell based on the matching. Several proponents claim the extension of ICT applications to rural areas will have a great impact on livelihoods of the rural people especially in assisting farmers [7], as 90% of the world population has access to mobile networks, mobile phone penetration rate in low income countries extended to 68% in 2010 [8].

## 2. THE NEED FOR MARKET INFORMATION BY SMALLHOLDER FARMERS

Over the past years, trading policies of liberalization and integration of markets have benefited farmers but majority in low income countries have seen their incomes drop. Their terms of trade (the price of what they sell compared to what they buy) have declined steadily as prices of agricultural commodities have fallen compared with manufactured goods [4].

Availability of markets and market information gives farmers the potential to bargain, seize market opportunities through the adjustment of production plans and better allocation of production factors, and also to use the information to make choices about marketing in order to improve their income. It also removes the obstacle of middlemen and directly making sales to buyers [7]. At the very least, a smallholder farmer armed with information on current prices has a better chance of negotiating a good deal for his or her produce with passing traders. However, for rural farmers to benefit from such market information services, they need to be aware of their profitability and adopt them.

For development to take place particularly where agriculture is the base industry, various actors in the supply chain must invest in a harmonized way [4] – government investments in rural infrastructure are profitable if farm organizations also invest in increased production, local businesses invest in processing and distribution, service providers invest in new technology, and so on. If these complementary efforts are not well coordinated, equilibrium of underdevelopment will occur, leading to farmers in rural markets operating under conditions of limited and or no information.

The problem still remains, that countries in Eastern Africa aspire to compete in globalized agricultural markets where significant improvements in provision of

market information needs to be. Majority of African farmers are unaware of prices and other market conditions even in their nearest town which puts them in a vulnerable bargaining position with traders who are able to take advantage of their unawareness. Farmers are also unaware of the types and quality of produce being sought by national, regional, and international customers which hinders the entire nation in its efforts to earn more from exports. The lack of market information has the effect of draining resources out of rural areas where most poor people live [9]. While in high income countries, farmers regard market information provision as an essential requirement of their business. For instance, European farmers have access to over 200 Internet sites containing market price information, contact details for buyers and input providers, market news, yield forecasts, quality and packaging requirements, among others. An excess of extra information is available from specialist journals, government agencies, traders, and farmers' unions [9].

## 3. MOBILE PHONE PENETRATION IN KENYA

Information and Communication Technologies (ICT) have proven to be suitable tools for poverty alleviation in low income countries. But the first requirement before implementing ICT projects for development is to build up connectivity. In low income countries, connectivity is currently becoming ever present, and ICT will have the opportunity to unleash its full potential for development. Low income countries have become main drivers of growth of the telecommunication industry.

As recorded by the International Telecommunication Union (ITU) [10], mobile cellular penetration rates have increased continuously from 2001 to 2011 worldwide - from below 20% to 86% per 100 inhabitants (Fig. 1). According to ITU [10], mobile-cellular penetration rates stand at 96% globally, 128% in high income (developed) countries and 89% in low income (developing) countries – per 100 inhabitants (Fig. 2).

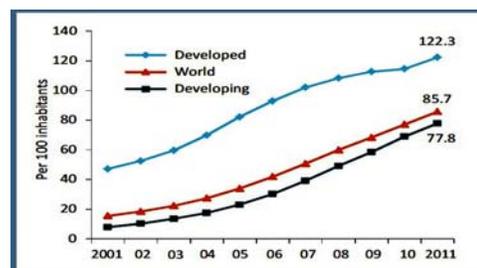
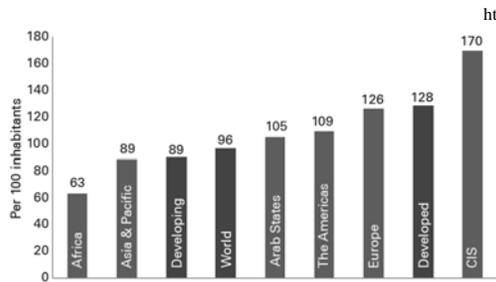


Fig 1: Mobile subscriptions, 2001-2011 [10]

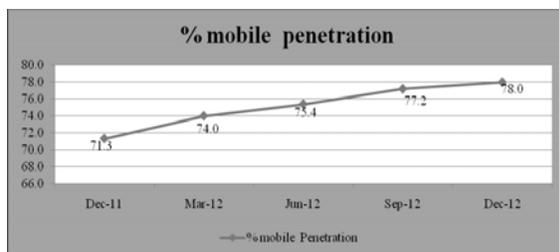


**Fig 2:** Mobile cellular penetration, 2013 [10]

Low income countries (developing) have had a continued increase in mobile penetration rates (Fig.2), with an 11% increment from 2011 (78%) to 2013 (89%). This depicts a high chance of continued mobile adoption. Kenya is among the low income countries.

As recorded by the Communications Commission of Kenya [11], Fig. 2 shows that mobile penetration in Kenya has continued to record a positive growth between December 2011 and December 2012. In this regard, mobile penetration increased from 77.2% (in September 2012) to 78% per 100 inhabitants in December 2012, with a total of 30.7 million registered subscribers. This represents a continued quarterly increase of mobile penetration rates.

During the Oct-Dec 2012 period, mobile traffic increased by 4.9% to stand at 7.3 billion minutes up from 7 billion minutes as recorded in the previous quarter (Jul – Sept 2012). A 9.6% increase was recorded, compared to the same period of the previous year. The Minutes of Use (MoU) per subscriber per month grew by 3.9% to reach 79.7 minutes from 76.9 minutes recorded during the previous quarter. Similarly, the total number of short message service (SMS) was recorded at 3.6 billion up from 1 billion as recorded in the previous quarter, representing a three-fold increase during the Oct – Dec 2012 quarter (Fig. 3). Hence, each subscriber sent an average of 40 SMS per month during the period [11].



**Fig 3:** Mobile penetration in Kenya between dec 2011 and dec 2012 [11]

During the Oct – Dec 2012 quarter, the Internet/data market segment also recorded an 11.5% increase in number of subscriptions from 8.5 million (during the Jul-Sept 2013 quarter) to reach 9.4 million [11]. Compared to the same period of the previous year, there was a 75.1% increase. Mobile data/internet

continued to dominate the internet market contributing 99.0% of the total Internet/data subscriptions. The total estimated number of users was recorded at 16.2 million up from 14.5 million as recorded in the previous quarter, representing an 11.6% increase during the period. Internet penetration went up by 4.3% points to reach 41.1% up from 36.8% during the Jul – Sept 2013 quarter [11].

There has been a notable growth in the ICT sector in Kenya driven largely by mobile voice, SMSs and data services as demonstrated by the growing number of subscribers and mobile phone traffic. The data/internet market has grown both in subscriptions and the number of internet users with the mobile data/internet segment posting the largest share. This is the sub-sector that provides the greatest opportunity to service providers considering the relatively low subscriber levels which promises a much more substantial growth rate compared to voice.

Hence, the formation of county governments and expected economic growth at the devolved levels should increase ICT use and subsequent utilization of available capacity. Therefore, promotion of mobile phone usage in e-agriculture is likely to see a phenomenal growth in agricultural activities with focus on utilization of mobile voice, SMSs and internet/data services.

#### 4. SUCCESS OF E-MARKETPLACES

Information and communication technology (ICT) is increasingly being adopted by organizations. Use of ICT enables businesses to electronically collect, generate, store, analyze, disseminate, or otherwise utilize information. Through the Internet, e-commerce provides new opportunities and challenges for businesses around the world. E-Commerce has resulted in “new business relationships and enabled new markets, new business, and new marketing paradigms” [12]. “E-commerce provides the capability of buying and selling products and information on the Internet and other online services.” [13]

An e-marketplace “is an inter-organizational information system that allows the participating buyer and sellers to exchange information about prices and product offerings” [14]. It is a “web-based systems that link multiple businesses together for the purposes of trading or collaboration” [15]. E-marketplaces have been established on the Internet since 1999, with over 750 in existence in the first quarter of 2000 [16]. However, the e-marketplace concept dates back to 1940s when an e-marketplace system, called Selevison was used to remote-market Florida citrus fruit [17]. Subsequent e-marketplace developments started in the late 1970s when the first computer-based e-marketplace pilot project was initiated [16]. Through innovations and inventions, e-marketplaces have evolved from analogue telephone systems to digital computer networks and the internet.

E-marketplaces have three main functions [18]:

- Matching buyers and sellers offers/bids

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- Facilitating the exchange of goods, services, information and payments
- Providing institutional infrastructure (legal and regulatory framework) that facilitate efficient functioning of the market

#### 4.1 Tradenet System in Sri-Lanka

Sri-Lanka's mobile service provider (Dialog) launched Tradenet in 2009 to provide timely agricultural market prices information and an online trade platform, via mobile phones. This content is supported by Govi Gnana Seva (GGS) organization, which collects and disseminates this information. Farmers can access Tradenet services via SMS, Unstructured Supplementary Service Data (USSD), and the Internet. SMS service is offered in English, Sinhala, and Tamil languages. Farmers can receive up to five price alerts for up to five fruits and vegetables from each of the three markets covered by GGS, including the Sri Lanka's largest wholesale market (Dambulla Dedicated Economic Centre).

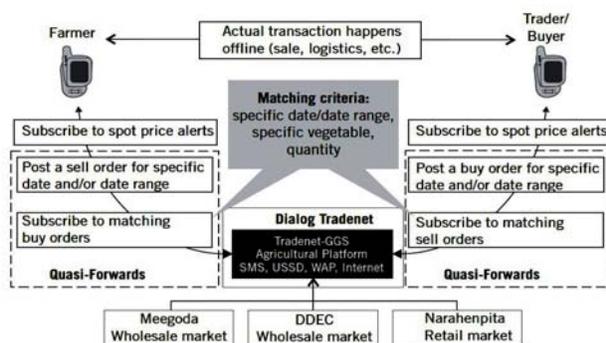


Fig 4: The tradenet platform [19]

The online trade platform offers opportunities for efficient and inclusive trade. Buyers and sellers have to be registered in the tradenet system to be able to utilize its services. The tradenet platform allows for trading of agricultural commodities. Buyers and sellers post their buy and sell offers on the platform which will match demand (buyer) and supply (farmer). They then receive SMS alerts once the orders and demands have been matched. The SMS contains contact details for the respective trading partners with an aim of facilitating market linkage and offline interaction. The platform also allows farmers to trade agricultural products they plan to harvest in the future for a fixed price. This enables farmers have a degree of certainty concerning the amount of products they will be able to sell. This enables the Tradenet system to “function as a quasi-forward market exchange for agricultural produce” [19]. Buyers and sellers are able to search for all available sell orders and buy orders respectively, for a specific commodity on a specific date.

Farmers used tradenet services to plan harvest and market entry times. Accurate, real-time price information has allowed farmers to minimize the sunk costs associated with entering the market at non-optimal

times due to transport costs. Tradenet has reduced information arbitrage and enabled farmers obtain better prices for their produce and, hence, higher incomes. Farmers were also aware of more traders dealing in their specific produce revealing increased interactions with other traders hence opening up new markets. Farmers were able to get “LKR 5–10 (USD0.045–0.09) per kg higher for their produce by leveraging the new service to increase their knowledge of price trends as well as to figure out when to enter the market” [19].

Table 1: Farmers assessment on impact of tradenet system [19]

Sl no.	Statement	Average score	Variance
1.	Tradenet has helped me get a better idea of price fluctuations at the market	4.44	0.37
2.	Tradenet has helped me better decide when to cultivate my crops	4.12	0.77
3.	Tradenet has helped me better decide when to harvest my crops	4.19	0.86
4.	Tradenet has helped me better decide when to take my crops to the market to sell	4.25	0.22
5.	Tradenet has helped me get a better market price for my produce	4.23	0.89
6.	Tradenet has helped me to increase my bargaining power with traders	4.08	0.94
7.	Tradenet has helped me to figure out what crops to grow in the future	4.04	0.79
8.	I now have more knowledge about which traders I can use to sell my crops	4.13	0.91
9.	I now approach more traders when selling my crops	4.08	0.87

\* Farmers were asked on a scale of 1–5 how much they disagreed or agreed with each of the statements above where 1 was 'strongly disagreed' and 5 was 'strongly agreed'

#### 4.2 Kenya Agriculture Commodity Exchange (KACE)

Since 1997, KACE has developed marketing information and linkage system (MILS) designed to support competitive and efficient trade in agricultural commodities and services. Through MILS, the KACE Headquarters Central Hub collects, updates, analyses and provides reliable and timely marketing information on a variety of crop and livestock commodities, targeting actors in agricultural value chains, with particular attention to smallholder farmers and small scale agribusinesses. This information includes daily wholesale buying prices for various crop and livestock products in selected main markets in the country. KACE also links farmers and agribusinesses to markets through matching commodity offers and bids [20].

KACE services are disseminated via SMS, interactive voice response services (IVRS), internet based electronic database and a mailing list, and market resource centers (MRCs)/information kiosks in rural markets. Farmers and traders visit MRCs to obtain information which is often available on bulletin boards, or to place offers and bids on trading boards for matching. MRCs broker a range of community based demand driven services such as transport, storage, input supply, product

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bulking, quality control and e-services including Internet and electronic money transfers [20].

KACE operates an e-marketplace radio program called Soko Hewani. Soko hewani services are accessed through the KACE Market Call Centre (operated at the KACE headquarters) to enable clients sell or buy, lease or rent agricultural and other commodities, properties and services anywhere in Kenya. Soko hewani is used to match offers to sell or lease, or bids to buy or rent. The market call center is equipped with ICT technologies to enable KACE agents receive and process a large number of calls and amount of data. These bid and offers information can also be accessed through the KACE website [20].

The bargaining power of the smallholder farmer in the market place for better prices has been enhanced through utilization of KACE. During the 2003/4 season, farmers who sold maize via KACE MIS achieved a higher average price of Ksh 1,219 per 90-kg bag (US\$181 per MT) as compared to those who did not at Ksh 1,000 per bag (US\$ 148 per MT) (22% more). In addition, during the maize harvesting season, the average price of maize at Ksh 1,000 was 150% higher compared to lows of Ksh 400 per bag (US\$ 59 per MT) during previous harvest seasons [21].

KACE is facing challenges which have led to limitations in ICT use and market access by farmers and increased their transaction costs. These include: high costs of mobile phone calls, SMS and IVRS to users, ICT illiteracy among smallholder farmers and limited KACE human and financial capacity to scale-out and scale-up the KACE MILS [20]. Unreliable mobile phone network availability in remote rural areas where a majority of smallholder farmers live is also a major challenge [21].

Sri-Lanka's mobile service provider (Dialog) launched Tradenet in 2009 to provide timely agricultural market prices information and an online trade platform, via mobile phones. This content is supported by Govi Gnana Seva (GGS) organization, which collects and disseminates this information. Farmers can access Tradenet services via SMS, Unstructured Supplementary Service Data (USSD), and the Internet. SMS service is offered in English, Sinhala, and Tamil languages. Farmers can receive up to five price alerts for up to five fruits and vegetables from each of the three markets covered by GGS, including the Sri Lanka's largest wholesale market (Dambulla Dedicated Economic Centre).

#### 4.3 E-soko System in Rwanda

E-Soko MIS provides its users with real-time market prices alerts, commodity availabilities, buy/sell contacts and call center services. Prior to adoption of e-Soko, farmers were usually oblivious of market prices and this lack of information reduced their bargaining powers amongst buyers and buyer agents that took their produce to the markets and consumers.

E-soko users have to register their profile with E-soko system. Esoko delivers market price alerts, weather alerts and matching bids & offers alerts via automated SMS alerts, website and mobile applications. Users can upload a bid to buy or offer to sell onto Esoko e-marketplace system. This is done through E-soko java mobile phone applications, via e-soko website or by using SMS (SMS syntax i.e. 'buy 10mt maize'). Offers are posted onto the user's network space and flagged as pending. The network manager reviews the offers for approval to remove a pending status. Smallholder farmers can aggregate produce at the farm level and notify markets that they have availability while posting their offer to sell. Buyers can broadcast exactly what they are looking for in their offer to sell. The E-soko e-marketplace consists of a matchmaking service that helps connect people. Using automated alerts, users are notified by SMS whenever an offer to sell or bid to buy has been posted and matches their specific criteria (eg commodity, location, size). Farmers are able to receive market prices which enable them set prices for their commodities that they offer to sell on the e-soko marketplace [22].

The benefits of e-Soko utilization include [22]: increased trade through access to markets that ultimately result in increased commerce activities; information gathered and distributed by E-soko empowers smallholder farmers by improving their ability to negotiate; and reduced transport costs in search for market prices.

E-Soko is faced by a major challenge [23]: ownership and adaptation of the e-Soko system has been slow due to lack of proper sensitization and training on use of e-Soko, illiteracy among smallholder farmers who are unable to effectively utilize SMS services, lack of adequate access to electricity to charge mobile phones, high costs of acquisition and maintenance of mobile phones, lack of infrastructure for internet connectivity in the rural areas, language barrier, resistance to change and lack of women participation in use of technology yet they are the backbone of farming activities, among others. There are limited numbers of commodities and markets listed in the e-Soko system and overdependence of the interactive voice recognition and the mobile application on telecommunication services (MTN) and mobile adoption/penetration [23].

#### 4.4 E-choupal Kiosk in India

ITC Limited is an Indian conglomerate which operates E-choupal (internet) kiosks. Since 2000, ITC Limited provides Indian farmers agribusiness information services via 6,500 e-Choupal kiosks. It operates in over 40,000 Indian villages to reach approximately 4 million farmers. E-Choupal tackles the challenges posed by Indian agriculture, characterized by fragmented farms, weak infrastructure and the involvement of middlemen. ITC earns its revenues from marketing of agricultural input supplies and commodity transactions at the kiosks (Kumar n.d.).

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E-choupal kiosks are equipped with computers connected to the internet. These are located in rural areas across several agricultural regions in India where they serve as a social gathering place for exchange of information and as an e-commerce hub, where smallholder farmers can directly negotiate sale of their produce with ITC Limited. Online access enables farmers to obtain free information on good farming practices, market prices, and to place orders for agricultural inputs like seeds and fertilizers [24]. This helps farmers improve the quality of their products. A local farmer acting as a coordinator is trained to use the service and e-Choupal kiosk is located in his house. ICT also incorporates a local collaborator in the system to provide logistical support [25]. Each e-Choupal kiosk serves an average of 600 farmers in the surrounding villages within about a 5 km radius. The trained farmer bears some operating cost but in return earns a service fee for the e-transactions done and status recognition in the village.

Since inception of e-Choupal kiosks, income levels for farmers have risen, improved yields or quality of output, and a fall in transaction costs. Despite their physical distance from markets, farmers get real-time information. E-Choupal faces a number of challenges: radical shifts in computing access could fundamentally alter community based business model, e-choupal coordinators adding additional payments, and managing many e-Choupal kiosks by ITC is also a challenge. [25]

## 5. DISCUSSION & CONCLUSION

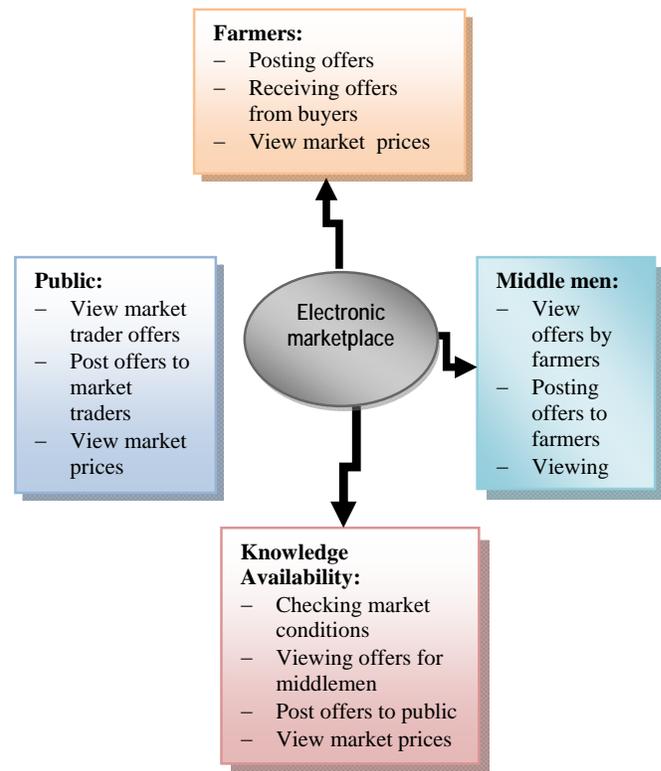
This paper discussed utilization of e-market place systems in Kenya, India, Rwanda and Sri-Lanka. It reveals that e-marketplaces utilize mobile phone services, radio, information kiosks and websites to provide service. Apart from providing market prices to users, ability to post bids and offers, e-marketplaces systems consist of a matchmaking feature to match user's bids and offers for commodities. This paper further reveals that providing such information to users contributes to:

- Improved negotiation power - Farmers' increase their power to negotiate with middlemen, based on their ability to understand pricing in multiple markets
- Sophisticated marketing plans based on price information - farmers can modify the date of marketing and switch to alternate markets
- Access to better and a variety markets – farmers access variety of markets hence avoiding exploitation by middlemen
- Reduced logistics and transportation costs - Farmers obtain the latest information via mobile phones instead of making a long trip to a market. They can coordinate with other local farmers to use one large truck rather than several smaller ones to deliver their products.

Mobile phone adoption is high even in low income countries hence pose as an opportunity for Kenyan

county governments to empower smallholder farmers via ICTs.

In fig. 6 below, a model to address the services provided to relevant actors in the e-marketplace. The e-marketplace should be designed to capture market price information, bids and offers for commodities from buyers and sellers. The e-marketplace should be able to provide market price for various commodities to various actors (especially smallholder farmers) to enable them determine price for their commodities which can be posted to the e-marketplace as an offer. It should be able to match bids and offers then availing the information to relevant actors.



**Fig 5:** ICT Solution Architecture for e-marketplace

E-marketplaces are faced with challenges. Ownership and adaptation is a major issue as farmers need more time to learn the system, which is mostly faced by illiteracy among farmers. Illiteracy is also a major challenge faced that has inhibited scale up and scale out of KACE. High cost of acquisition is also a major challenge facing e-Soko in Rwanda. Also, high costs of mobile phone calls, SMS and IVRS is a major challenge to users. Unreliable mobile phone network availability and lack of infrastructure for internet connectivity in remote rural areas where a majority of smallholder farmers live is also a major challenge for farmers utilizing e-marketplace systems. Language barrier is also a challenge facing e-Soko users in Rwanda and e-Choupal kiosk users in India.

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- [1] Munya, H. ICTs and small-scale agriculture in Africa: A Scoping Study. International Development Research Centre (IDRC), 2007.
- [2] Campaigne, T., and T. Rausch. "Bundling Development Services with Agricultural Finance: The Experience of DrumNet." 2020 Vision for Food, Agriculture and Environment Series." In Innovations in Rural Agriculture Finance (Focus 18). Washington DC: International Food Policy Research Institute (IFPRI), 2010.
- [3] Alila, P., and R. Atieno. "Agricultural Policy in Kenya: Issues and Processes." Food for Agriculture. 2006.  
<ftp://ftp.fao.org/TC/CPF/Countries/Kenya/Agricultural%20Policy%20in%20Kenya%20Issues%20and%20Processes.pdf> (accessed January 12, 2014).
- [4] KIT, Faida, and IIRR. Chain Empowerment: supporting African farmers to develop markets (Amsterdam: KIT Royal Tropical Institute, 2006).
- [5] Will, M. . Promoting value chains of neglected and underutilized species for pro-poor growth and biodiversity conservation: Guidelines and good practices. Rome: Global Facilitation Unit for Underutilized Species ISBN: 978-92-9043-775-8, 2008.
- [6] Burugu, J. The County: Understanding Devolution and Governance in Kenya. Nairobi: Lecor, 2010.
- [7] Kirkman, G., J. Sachs, K. Schwab, and P. Cornelius. Global Information Technology Report 2001-2002. Oxford: Oxford University Press, 2002.
- [8] International Telecommunication Union (ITU). "The World in 2010: Factos and Figures." ITU. 2010. <http://www.itu.int/en/ITU-D/ict/material/FactsFigures2010.pdf> (accessed October 12, 2013).
- [9] Shaun, F., and P. Robbins. Developing market information services in Eastern Africa. Ibadan: ASARECA, 2004.
- [10] International Telecommunication Union (ITU). [Online] <http://www.itu.int/en>
- [11] CCK. "Quarterly Sector Statistics Report 3 Quarter Oct-Dec 2012/2013." CCK. 2013. from <http://www.cck.go.ke>. (accessed September 14, 2013).
- [12] Barua, A., R. Chcllappa, and A. Whinston. "The design and development of internet and intranet-based collaboratories." International Journal of Electronic Commerce, 1996: 32-58.
- [13] Kalakota, R., & Robinson, M. (2001). E-business 2.0: Roadmap for success. Boston, MA: Addison-Wesley Longman.
- [14] Bakos, J. Y. "A Strategic Analysis of Electronic Marketplaces." MIS Quarterly, Vol.45 No.3, 1991: 295-310.
- [15] Howard, M., R. Vidgen, and P. Powell. "Journal of Strategic Information Systems 15 (1)." Automotive e-hubs: exploring motivations and barriers to collaboration and interaction. , 2006: 51-75.
- [16] Grieger M. Electronic marketplaces: A literature review and a call for supply chain management research. European Journal of Operational Research 144 (2003) 280–294
- [17] Henderson, D.R "Electronic marketing in principle and practice." American Journal of Agriculture Economics 66 (5), 1984, 848–853.
- [18] Zwass, V. "Electronic Commerce and Organizational Innovation: Aspects and Opportunities." International Journal of Electronic Commerce, 7, no.3, 2003.
- [19] Lokanathan, S., H. Silva, and I. Fernando. "Price transparency in agricultural produce markets: Sri Lanka." In Strengthening Rural Livelihoods, by D. Grimshaw and S. Kala, 15-32. Rugby-Warwickshire: Practical Action Publishing Ltd, 2011.
- [20] Kenya Agricultural Comodity Exchange (KACE). The KACE Market Information and Linkage System. 2013. <http://www.kacekenya.co.ke/section.asp?ID=64> (accessed December 12, 2013).
- [21] Mukhebi, A. "Reaching the Poor in Rural Kenya with Market Information: A Case Study of a Market Information System." CTA Seminar 2004 on Role of Information Tools in Food Security, November 8-12, 2004. Maputo, 2004. 8-12.
- [22] E-soko. E-soko features. 2013. [www.esoko.com](http://www.esoko.com) (accessed April 14, 2013).
- [23] Uwajeneza, C., and E. Kabahizi. Development of a framework for the strengthening of market information systems in Rwanda, Part of the One UN Funded Project: Enhancing National Market's Potential and linkages to EAC and CEPGL frameworks. Kigali, 2010.
- [24] Goyal, A. "Information, Direct Access to Farmers, and Rural Market Performance in Central India." American Economic Journal: Applied Economics, Vol. 2, No. 3, 2011: 22 – 45.



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<http://www.cisjournal.org>

- [25] Rawat, S., and R. Singh. "Emergence of E-Choupal in Indian Agriculture Business." VSRD International Journal of Business and Management Research, Vol. 3 No. 6 June 2013, 2013: 199-210.

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