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Agricultural Market Information Services in Developing Countries: A Review

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Abstract

Access to agricultural markets and marketing information are essential factors in promoting competitive markets and improving agricultural sector development. The agricultural sector employs majorities in developing countries and it contributes greatly to the development of these countries. Unluckily, majorities of the farmers are smallholders living in isolated rural areas and thus lack appropriate access to markets for their products and also they are deprived of agricultural market information. As a lack of these, smallholder farmers are exploited by greedy traders and receive low prices for their agricultural produce. This study has explored the use of agricultural market information services in linking smallholder farmers to markets, especially in sub-Sahara developing countries. Origin of, the needs for, and the current status of agricultural market information services in developing countries are clearly presented. Lastly, the study explored the limitation of the success of most agricultural market information services in sub-Sahara developing countries.

Keywords: *Agricultural market Information, Market Access, Agricultural Market Information Services, Developing Countries, Smallholder Farmers.*

1. Introduction

Developing countries place emphasis upon investing in agriculture as it is the sector that holds the most promise for pro-poor economic growth. Agriculture is a larger contributor of GDP and foreign exchange [1, 2] and generates export earnings, labor, capital and domestic demand to support growth in other sectors. The sector plays a key role in ensuring national food security [3]. In developing countries, majorities of the poor live in rural areas where agriculture is the mainstay of their living and smallholder farming dominates agricultural production, and a large proportion is for subsistence [2, 4, 5]. Improvement in agriculture is emphasized as it has a direct impact on rural growth by improving rural income, livelihoods and even increasing government revenue. Overall, improved agricultural productivity is the principal route to reducing poverty and improving livelihoods in developing countries.

Despite all efforts, agriculture has failed to benefit rural farmers in developing countries. Some failure factors include a long and discontinuous supply chain, inadequate policy support, limited infrastructure for storage, transportation and marketing of agricultural produce, limited opportunities for value addition, and inefficient information and knowledge flows [3]. This failure is associated with fragmented and imperfect marketing situations in non-competitive situation of price formation and policy matters [6]. Other studies [7, 8] noted that smallholder farmers have limited access to physical and financial resources restricting their ability to expand and invest in technologies that increase efficiency and add value to primary production. These smallholders have limited technical skills and poor access to information and training for improving their production practices and also lack bargaining power [8]. Linking smallholder farmers to markets will lead to increased incomes and food security, more rural employment, and sustained agricultural growth [9].

The low returns of agriculture produce to smallholder farmers are associated to lack of market access and the marketing information [5, 10-12]. Due to lack of market information, farmers are failing to negotiate better on the prices of their produces and thus are paid a little. Small size of produce and poor road conditions may discourage farmers to travel to distant markets to search for better price. Lack of market information has also resulted in introduction of middlemen or intermediaries who are better equipped with marketing information.

In order to thrive in global economy, scholars have proposed different mechanisms of empowering rural smallholder farmers. Among different approaches, some studies [9, 12] proposed to improve the marketing system

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to enable smallholder farmers to benefit more from their produce. Marketing information helps farmers and traders plan their marketing strategy and in bargaining with other parties [13]. Reliable market information may also help farmers to decide on where to sell, when to sell, who to sell to and to plan their production [10, 13, 14]. More importantly, farmers may be aware of the types and quality of produce being sought by national, regional, and international customers that may aid the nation to earn more from exports [14].

2. Objective

The objective of this study was to explore the agricultural market information services in developing countries particularly sub-Sahara Africa. The study sought to trace the historical background of AMIS, their evolution, benefits, status and the constraining factors. At last the study depicted the missing links to ensure the AMIS are flourishing in developing countries.

3. Methodology

The methodology adopted by this study was 'Internet Search'. The study consulted different sources on the Internet to establish evidence and facts about the claimed issues. Where possible the websites of the specific resource were visited, for example website of some AMIS. The reviewed literatures are mostly available on the Internet.

4. A Review

4.1 Historical Background of AMIS in Developing Countries

Agricultural marketing in most developing countries historically trace back in 1980s where governments controlled and regulated the major export and strategic food commodities and inputs [15]. There was a common view that private traders were exploitative and that markets could not be trusted with the critical task of feeding the nation [16]. Monopoly and semi-monopoly marketing parastatals were created for handling marketing of agricultural products. Agricultural markets were regulated via input price controls and subsidies, oligopolistic input markets, monopsonistic produce marketing boards, pan-seasonal and pan-territorial administrative commodity pricing, oligopolistic processing industries, and fixed wholesale and retail prices [17]. Government enterprises were given the responsibility of organizing food markets and fixing nationwide prices for farmers and consumers, managing export crop production by providing inputs on credit, fixing their prices, and monopolizing the processing and export of the crops [16, 18, 19]. Commodity prices were generally set below market levels, implicitly taxing producers while subsidizing consumers [17].

Evaluation studies have proved that government controlled markets perform poorly. Farmers were exploited due to low prices offered to them after taxes due to high costs the enterprises incurred and delayed payments [16, 20]. Marketing channels were typically very inefficient, with centralized storage and processing facilities [17]. They could not provide any services to the overwhelming majority of the farmers who possessed small landholdings and produce crops beyond the mandate of marketing parastatals [9]. Government intervention strategy aggravated farmers' problems instead of helping them to bargain for better prices for their produce. Moreover, larger crop producers became the main beneficiaries instead of the target group of small producers [21]. Due to the failure of interventionist policies, there emerged parallel or black markets and cross-border smuggling in many African developing countries [16, 17]. Generally, these interventions led to low agricultural prices and production, which later required major market reforms and external assistance [18].

History reveals that during the government intervention and control era, in some developing countries there were initiatives of providing Agricultural Market Information Services (AMIS). The government of Tanzania for example, established the Marketing Development Bureau (MDB) in 1970 with financial support from UNDP and FAO [19]. MDB provided advice to the government on marketing policy; provided training; established regular market news service; set consumer prices; carried out research on costs of crop production; and recommended producer prices for staples and major cash crops [19]. In Indonesian, the marketing information system was established in the late 1950s as a price monitoring system to collect weekly producer and wholesale prices for all food crops [22]. The Nepalese government, in 1960s established the Agriculture Economics Section (AES) for collecting retail prices of some agricultural commodities [23].

Between 1980s and 1990s most governments adopted economic reforms in agricultural market liberalization [16, 17] promoted by multilateral and national aid agencies, in particular the World Bank and the International Monetary

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Fund [24]. The reforms intended to reduce the bias against agriculture and open the sector to market forces and thus promote private-sector activities and fostering competitive markets. Under the reforms, most governments retained regulatory and public support functions. Advocates of food market reforms encouraged liberalization as a means to reduce costs in the marketing system, thereby raising and stabilizing farm incomes, promoting farmers' incentives to use productivity-enhancing inputs, and reducing poor households' dependence on food aid for their survival [25].

There was a concern that market liberalization might result in less transparent marketing and loss of market power by farmers and thus the need for a performing market information system (MIS) then came up [26]. Thus MIS in sub-Sahara Africa (SSA) emerged as a result of economic liberalization policies and structural adjustment, when governments stopped intervening directly in the markets [26]. These MIS were intended to correct the asymmetries created by economic liberalization, giving more bargaining power to farmers, creating a more transparent, open trading environment and fostering more efficient market systems for all stakeholders [26]. They also provided market information to government officials in order to monitor the economic liberalization process [26]. Most MIS were initiated and established with funds from donors.

Some AMIS initiatives in African developing countries took place in 1990s. In 1993, Zambia established an Agricultural Marketing Information Centre (AMIC) as part of the policy of market liberalization to collect, analyze and disseminate market information on agricultural produces and inputs [27]. In 1992, the Ethiopian government established the Ethiopian Grain Trading Enterprise (EGTE) after downsizing the Agricultural Marketing Corporation [25]. The role of EGTE was to stabilize producer and consumer prices and maintain buffer stocks; and (EGTE) played only a minor role in the grain marketing system. The Malian government established the Agricultural Market Observatory (OMA) in 1989 to oversee the proper functioning of the data collection, transmission and diffusion of data and information i.e. the prices and the quantities of both agricultural products and inputs [28]. Prior to establishment of OMA, during the liberalization, the Malian government had the Programme de Restructuration du Marché Céréalier (PRMC) which among other functions, provided market information to consumers, farmers, and others in the private and public sectors [29]. In 1991, Mozambique started Agricultural Market Information System (SIMA) to provide agricultural market information including data on agricultural prices of the main crops cultivated in the country, input supply and seed availability, and information on production and demand estimates [30].

Access to marketing information was very limited during this era. Different media were involved in the provision of marketing information such as radio and TVs broadcasts, newspapers, word of mouth and bulletin boards at selected markets. Visiting the markets and radio broadcasts were essential in creating awareness. Marketing information was generally disseminated periodically and for selected markets and produces. In this way, market information was limited to small number of markets and to a few individuals. Radio broadcasts could not cover large areas and information communicated was not timely. Great costs were involved in collecting information which was actually not disseminated. In this way, remote farmers, traders, and consumers were not favoured and could not participate in marketing activities effectively.

4.2 The Need for Provision of Market Information

Establishing market information services is seen as a means of increasing efficiency of marketing systems and promoting improved price formation [31-34]. Market information products include market news (e.g., information on prices, quantities, market conditions, and business contacts), market analytical reports (e.g., reports that analyze factors that cause changes in market conditions and their effects on stakeholders), and business reports (e.g., providing information that can help stakeholders identify reliable trade partners). Researchers [34] clearly stated that market information is a public good according to economists theories. Other studies [32] supported this concept by stipulating that the preconditions for a market economy is that correct information on market conditions must be available and accessible to public. Market information in most developing countries is considered as a public good service provided by the government agencies [31]. Leaving the whole task of providing marketing information to the private sector might not be beneficial as anticipated. The cost of investing in the provision of timely market information services by a private agent may exceed the return that is perceived to be received. The cost of collecting market information may be greater as individual traders may repeatedly collect the same information [34].

Market information services usually involve the regular collection of commodity prices from major markets and supply conditions, processing and storing them, and disseminating the information to different stakeholders using one or more channels [35]. Dissemination of price

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information and market news is usually achieved through various media such as radio, magazines, televisions, email, internet, telephone and mobile phone calls etc. This information is usually intended to different beneficiaries like farmers, traders, consumers, policy makers, governments, development agencies, scholars and researchers. Accordingly, information for use in marketing systems can be categorized as either up-to-date, current information or information compiled over time, usually several years, referred to as historical information [32]. Current information facilitates efficient bargaining while historical information is used for production planning, storage decisions, government planning and Early Warning system for food security.

Access to timely market information services and analyses has benefits to market participants [31-33]. Improved information enables farmers plan their production more in line with market demand; schedule their harvests at the most profitable times; and decide to which markets they should send their produce and negotiate on a more even footing with traders. Other benefits have been seen for traders. Improved information enables traders to move produce profitably from a surplus to a deficit market; and make decisions about the viability of carrying out storage, where technically possible. The Système d'Information sur le Marché (SIM) (monitoring 13 markets within the capital city of Mali, Bamako), for example enabled consumers in Bamako, Mali, to find the markets with the lowest prices within the city [36]. Access to market information encourages also long-distant trade by giving traders reliable information about the conditions in distant markets.

Market information services provide transparency by creating awareness of all parties of prevailing market prices and other relevant information [32]. By improving transparency of the marketing system, reducing the riskiness of participating in the markets, and transmitting market signals more effectively to farmers and traders, they are encouraged to produce more for the markets [36]. Thus market participants can decide when and where to sell their produces or even store and sell them later to take advantage of expected higher prices. Improved market information services facilitate efficient allocation of productive resources and improve the bargaining position of farmers with traders. Farmers with access to timely and reliable market information can decide to which market they should send their produce to maximize returns. Improved market information strengthens both the availability of and access to food [36]. Retailers in Bamako cited this as major benefits of access to market information because the transaction costs of taking and transferring ownership of cereals were reduced [36].

Lack of access to timely and reliable market information is an entry barrier to both production and trade. Well informed farmers may shift the cropping pattern to higher value produce. A trader may find it very difficult to begin trading without information. Lacking in market information services reduces competition within markets. Absence of public market information services may lead to market participants to invest in gathering information themselves, thus duplicating costs. Traders without market information may accept the risks of uncertainty involved in going to market without knowledge of prices, an option which is socially inefficient and inequitable.

4.3 Nature of Markets

A variety of market agents are involved in moving produces from farms to rural and urban consumers and markets. These include farmers who produce, sell and buy; traders, including retailers, intermediaries, semi-wholesalers, and wholesalers; and transporters. Farmers may sell their production to intermediaries, who sell directly to wholesalers in local markets. Wholesalers are primarily responsible for inter-regional trade, selling the commodity to other wholesalers, retailers, or consumers. Four types of markets can be identified [5], which act as the key role for transactions namely village markets, regional markets, national markets and export markets. Traders buy and sell commodities on a system of traditional markets which are held on a weekly basis. A village may have its own market; or a market may be organized that serves a number of villages. The geographical location of the market affects its density. Movement of produce and traders from one market to another is associated with market information which improves market performance by enabling transparency, competitiveness and efficiency and increase the welfare of farmers [32]. The agricultural markets are unorganized, are seasonal, and there are inadequate market centers. These markets are further dominated by middleman, there is fluctuation of price, variation in measuring units and thus it is difficult to create trust and good will.

Access to markets and market information has positive impacts on the welfare of farmers. A study on the impact of Market information to rural maize farmers in Uganda [33], found that access to market information resulted in higher farm-gate prices and improves farmers' relative bargaining position vis-à-vis local traders. Another study in Niger [2], found that access to market price information through mobile phone coverage reduced agricultural price dispersion across markets by 10 percent. A study to develop an efficient grain marketing system in Ethiopia [34], noted that improving farmers and traders

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awareness of prices in various markets throughout the country promoted grain system efficiency by encouraging grain flows from relatively surplus to relatively deficit areas, thus helping stabilize prices over space; improving farmers' decisions and confidence regarding what to plant, how much to invest, and where and when to market their produce; and promoting a more competitive marketing system, which will benefit both producers and consumers. Access to timely and up-to-date information may also benefit governments to effectively address the food insecurity problems. Food price increase may signal food supply shortfalls in certain areas, and give an early warning of the possible need for food relief or other government interventions in these areas. Due to this, a large number of countries in developing countries have or are establishing market information services.

4.4 Media of Disseminating Information

The recent development of technology changes has witnessed the utilization ICT in collecting, storing and disseminating information in developing countries. Some studies [31, 32] noted that agricultural market information are more or less present in most developing countries and their qualities vary depending on technology used for collection, time of capturing, and their management. Initiatives, both public and private, are in place to linking markets and markets participants. Use of radios, telephone calls, newspapers, noticeboards at markets, TVs is common in dissemination market information in developing countries [37]. Still majority of small holder farmers rely more on word-of-mouth information from other farmers and traders [38]. Such market information is usually disseminated or broadcasted periodically e.g. once a week. Sometimes market information may be disseminated through word of mouth from others and even visiting the markets or through agricultural extension officers. This means of disseminating information pause great challenges to market participants. In this way, information becomes limited to urban areas where these applications are widely available and accessed. Rural people find it difficult to access newspapers and make calls and thus this limits their access to information. The information provide in this way may not be up-to-date as prices in the markets are changing frequently. Poverty may also limit rural people in accessing information due to cost involved. Information provided in this way is limited to a very small number of market participants due to communication costs involved, poor and remote farmers, traders, and consumers may be unable to access information in these ways, contributing to unequal and inequitable distribution of information [34].

Use of e-mails and Internet services are spreading rapidly in developing countries, and in some cases are providing marketing information. In Zambia, for example, market information is available on Zamnet through the web site of the National Farmers Union [39]. Of all the media available radio is still by far one of the most effective ways of communicating with small farmers in many developing countries. A survey done in some parts of Uganda revealed that majority of small-scale farmers, traders, and farmer groups accessed FoodNet market information through radios and the field technicians and fewer respondents gained access to the information via newspapers and the recently introduced cellular mobile telephone network which provides the SMS [14]. Scholars have claimed that broadcasting market information through the radio or announcing prices through newspapers or bulletin boards may have no immediacy. These problems were prevalent in Zambia, Ethiopia and Lesotho where prices were broadcasted at wrong times when most traders were in the markets or farmers were in their fields [32]. Radio broadcasts in local language may also benefit many farmers and traders. Again, in Guinea Bissau, price broadcasts in Portuguese did not benefit farmers and traders as it had been in their local language of Creole [32].

4.5 The Need for Agricultural Market Information

Scholars who consider agriculture market information as a public good [31, 34], are stressing the governments and their agencies to take the responsibilities of the provision of such service. They argue, if left to private companies, they (companies) may keep that information secret to them which may lead to repetition of data collection and waste of time and money. Also, private companies may not recover the investment costs as the sold information might spread easily to people who do not pay for it to provider. Again, a study on improving information and performance in grain marketing [34], showed that the social benefits providing accurate and timely market information exceeds the returns that a private company would receive from investing in such activity. Thus, a number of initiatives both by governments and private sectors are in place to ensure provision of market information to smallhodler farmers. Farmer organizations also find ICT better in providing services to their members. SMS systems enable farmers to compare prices in different markets and to take a stronger negotiating position when selling their produce. For example, Zambia's National Farmer Union (ZNFU) is utilizing SMS systems to provide marketing information to its members, likewise Burkina Faso Farmers use ICTs to

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share new production, processing, and marketing Skills [40].

Developing and utilizing ICT applications in delivering agricultural information are constrained by a number of factors. Some of these challenges are related to market access and infrastructure, other to ICT infrastructure and the mode of delivery of information. A study to develop market information in East Africa [14], found that agricultural markets are characterized by a long chain of transactions between farmer gates and consumers, lack of competitiveness between traders, and poor access to appropriate market information. Smallholder farmers are restricted to market access due to lack of information. Due to lack of or asymmetric nature of information, excess price dispersion across markets is common [2]. A report on reviewing information on marketing of agricultural commodities in Uganda [41], revealed that organic coffee growers were paid the prices of non-organic coffee. Due to poor functioning markets, traders and processors in Uganda complained of lack of access to timely information to facilitate marketing of agricultural goods [14].

Poor roads may also limit access to markets and market information by rural farmers. Ugandan farmers received less prices than they could have achieved if they had means of transporting their produces to the markets [14, 41]. Lack of supporting policies, clear legal and regulatory framework may also lead to exploitation of smallholder farmers by other market participants. Single buyers for certain commodities have been a problem due to lack of competition. The problems of low prices due to single buyer, delayed payment and selling commodities on credit have discouraged coffee growers in Northern Tanzania and thus are opting for planting cereals.

4.6 Status of AMIS in Developing Countries

AMIS operated by governments often function poorly or do not function at all in many developing countries [43]. A survey conducted in 120 developing countries by FAO in 1995-96 found that only 53 governments operated functioning AMIS [32]. The majority of these systems focused on data gathering (done poorly) and failed to translate data into commercially useful information for farmers and traders. The survey found that only thirteen countries have daily transmissions of price information. Some reasons for such failure were budgetary constraints and inadequate financing [26], data collectors lacked transportation and training, delays in processing and disseminating market data often resulting in outdated information that was of little value to farmers and traders [32]. Furthermore, traders were reluctant to divulge information for fear of being taxed [26]. MIS planners have tended to 'overdesign' services, paying little attention to the capacity of the organization providing the service to continue to do so on a reliable basis [32]. Overall, some of these systems are growing well while others are stalled pilots.

Despite all the constraints, developing countries are witnessing the flourishing of market information systems for handling agricultural related matters. These systems are either public or private owned. Still, majority of these systems are donor funded and thus their sustainability raises questions after their withdraw. Initiatives are there in Sub-Sahara developing countries to provide agricultural market information services, preferably to farmers and traders. This provision employs the recent technology of ICTs. This initiative has been slow due to low rate of penetration of ICTs to rural areas. This may be attributed by poor access to ICTs and the associated illiteracy, and constraining infrastructure like electricity. Mostly, ICTs involved include Internet through websites and mobile phones. A number of programs aimed at improving farmers' access to agricultural market information in low income and transient economies had been skyrocketing in the last 10 years and a 2009 joint CIRAD-MSU survey identified 49 MIS initiatives in 19 Sub-Saharan African countries [35]. AMIS created between 1989 and 2000 by states in Sub-Sahara developing countries were mainly focused on price reporting. Since mid-2000s different models of AMIS have emerged, governmental projects, private efforts or public/private partnerships. Most focus on a particular country or set of commodities, while a few provide information on regional markets [42]. Some AMIS operated by farmers organizations primarily focus on providing farmers with information on agriculture and agriculture marketing. The information typically includes availability of inputs, markets and prices at different markets. Some examples of these are Observatoire du Marché Agricole (OMA) in Mali, Economic Information System of Vegetables in Madagascar, and ZNFU.

Private-operated AMIS offer the promise of financial sustainability through the sale of information to users, permitting advertising and providing fee-based additional services [42]. Subscribed users usually get access to various updated information about agriculture and agriculture marketing. Examples of these are Esoko (based in Ghana and active in 16 countries), Infotrade in Uganda, and Manobi. The recent development has witnessed the evolution of agricultural commodity exchange services (ACE) which are MIS that combine market price information with a commodity exchange information service. With this innovation, agricultural

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commodities are exchanged with cash, and delivered on spot without engaging the appointed brokers and without taking ownership of the produce being exchanged [26]. More African countries have launched exchanges since 2004, including Malawi Agricultural Commodity Exchange (MACE) in 2004, Zimbabwe Agricultural Commodity Exchange (ZIMACE), Ethiopia Commodity Exchange (ECX) in 2008, and Zambia Agricultural Commodities Exchange (ZAMACE) in 2007 [43]. Others include the Kenya Agricultural Commodity Exchange (KACE).

Commodity exchanges facilitate market transparency and price discovery through centralizing trade in certain commodities. This reduces transaction costs associated with identifying market outlets, physically inspecting product quality, and finding buyers or sellers [43]. Transaction costs decline in terms of the average number of intermediaries each trader uses, average number of people to consult and involve to make a transaction per market day, and time required per transaction [44]. This reduction in transaction costs accompanied by enhanced information flow can improve returns to market agents while reducing short-term price variability and spatial price dispersion [43]. Most commodity exchanges in Africa have not been able to attract sizeable trade volumes and have limited their roles in providing price information. South Africa has been able to make its exchange sustainable [43].

Public AMISs are usually sponsored by the governments through the responsible ministries e.g. the Ministry of Agriculture. Examples of public AMIS include SIARM in Senegal, the Agricultural Market Information Center in Zambia (AMIC), the Agricultural Market Information System in Mozambique (SIMA), Agricultural Marketing Information Services (AMIS) in Cameroon, and the Livestock Market Information System (LMIS) in Tanzania, Ethiopia and Kenya. AMISs run by governments are independent and thus likely to be unbiased, they offer information over several years and they provide information that can be used to help farmers get better prices and plan for production, such as what to plant or when out-of-season production can be advantageous [38]. On the other hand, some studies were skeptical that government run AMIS may not always reach the smaller farmers, information provided may not be up-to-date and available too late to be of any use and with little analysis [38].

Due to increasingly regional nature of agricultural markets [42], there are emerging regional market information systems that provide regional access to agricultural and marketing information. The Regional Agricultural Input Market Information and Transparency System (AMITSA) operating in Kenya, Uganda, Tanzania, Rwanda, Burundi, Malawi, Zambia and Mozambique has the objectives of improving access to timely data and information on agricultural input markets, establishing business linkages in value chain, reducing input procurement costs, increasing the use of inputs and increasing agricultural productivity. Regional Agriculture Trade Intelligence Network (RATIN) provides market intelligence online and through SMS for the agriculture markets in Kenya, Uganda, Tanzania, Rwanda, and Burundi.

5. The Missing Links

Despite the importance of AMIS in providing information to intended users, a clear study needs to be conducted to determine their usefulness and their real impacts. Impact evaluation of AMIS can determine the market efficiency effects, the reductions in transaction costs and the improved market integration that have undoubtedly occurred. Impact evaluation may determine whether poor farmers obtain better market access and are gaining better prices for their produce. To ensure the AMIS collect and disseminate updated timely information, a clear business model that allow for their financial sustainability and scalability need to be thought of. Provision of such services in rural areas will highly be influenced by the availability of enabling environments like improved roads, electricity and ICT gadgets.

6. Conclusion

Based on the reviewed literatures, it is evident that access to markets and agricultural information is essential for agricultural growth. Information enables smallholder farmers to decide what to plant, when and where to sale, and to negotiate better for the prices of their agricultural produces. This agricultural growth can be translated to individual growth, rural growth and national growth as well.

This improvement can only be achieved if different stakeholders play their roles as expected. The governments can ensure that enabling infrastructures are established to enable for transporting agricultural commodities from rural areas to markets in urban areas or elsewhere markets can be found. The infrastructure may comprise improvements in roads, providing electricity in rural areas and developing policies that ensure smallholder farmers are not exploited in the markets. The infrastructure can also ensure that the provision of

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agricultural market information is possible which may involve set-up of ICT based systems.

Another very important issue is the support of provision of agricultural market information services. As it is proved by literatures, most AMIS in developing countries suffer financial instability once donor supports have been withdrawn. Policy makers in developing countries can develop policies which explicitly state the role of the governments in the provision of agricultural information. Though, the success of this will depend on the political willingness and commitment as politicians are motivated by services that have short term impacts. Before establishing the financial model that will ensure the sustainability of the provision of such services, agricultural information may be provided free i.e. considered as public services and for creating awareness. Once users i.e. smallholders farmers and traders are well acquainted with the importance of agricultural market information, then they can be charged for such a service.

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References

[1] Aina, L. O. (2007). Globalisation and Small-Scale Farming in Africa: What Roles for Information Centres? Durban. *In: World Library and Information Congress: Seventy-third IFLA General Conference and Council*. Durban, South Africa, pp. 19-23.

[2] Aker, J. C. (2010). Information from Markets Near and Far: Mobile Phones and Agricultural Markets in Niger. *American Economic Journal: Applied Economics*. **2** (3): 46-59.

[3] Rao, N. H. (2007). A framework for implementing information and communication technologies in agricultural development in India. *Technological Forecasting & Social Change*. 74: 491-518.

[4] Adam, C., Bevan, D., Gollin, D., et al. (2012). Transportation Costs, Food Markets and Structural Transformation: The Case of Tanzania, www.qeh.ox.ac.uk/research/projectDetails?res_id=346, Accessed on September 20, 2012.

[5] Eskola, E. (2005). Agricultural Marketing and Supply Chain Management in Tanzania: A Case Study, *Working Paper Series No. 16*, ESRF Study on Globalisation and East Africa Economies, http://tanzaniagateway.org/docs/agriculturalmarketingandsupplychainmanagementintanzania.pdf, Accessed on May 12, 2012.

[6] Pokhrel, D. M. (2010). Comparison of Farm Production and Marketing Cost and Benefit among Selected Vegetable Pockets in Nepal. *The Journal of Agriculture and Environment*. 11: 10-25.

[7] Devaux, A., Horton, D., Velasco, C., *et al.* (2009). Collective action for market chain innovation in the Andes. *Food Policy*. 34 (1): 31-38.

[8] Kruijssen, F., Keizer, M. and Giuliani, A. (2009). Collective action for small-scale producers of agricultural biodiversity products. *Food Policy*. 34 (1): 46-52.

[9] Dorward, A., Kydd, J., Morrison, J., *et al.* (2004). A policy agenda for pro-poor agricultural growth. *World Development*. 32 (1): 73-89.

[10] Kindness, H. and Gordon, A. (2001). Agricultural Marketing in Developing Countries: The Role of NGOs and CBOs. Natural Resources Institute, University of Greenwich. 45 pp.

[11] Lightfoot, C. and Scheuermeier, U. (2007). Organizing the learning for rural marketing through Linking Local Learners: How to improve small holder farmers' links to markets. *Rural Development News*. 2: 30-34.

[12] Roy, M. (2012). Agricultural Marketing: New Challenges. *International Journal of Humanities and Applied Sciences*. 1 (2): 54-57.

[13] Kleih, U., Onumah, G., Temu, F., *et al.* (2006). Training Manual on Market Information System for Coffee and Cotton Sub-Sectors in Tanzania. United Nations Offices for Project Services. 47 pp.

[14] Ferris, S. and Robbins, P. (2004). Developing Marketing Information Services in Eastern Africa: The FOODNET experience. Local, National and Regional market information services. ASARECA regional Marketing Network. 86 pp.

[15] Kherallah, M., Christopher, D., Eleni, G.-M., *et al.* (2000). *Reforming Agricultural Markets in Africa.*

[16] Kherallah, M., Delgado, C., Gabre-Madhin, E., *et al.* (2010). The Road Half Traveled: Agricultural Market Reform in Sub-Saharan Africa. WASHINGTON, D.C.: Food Policy Report, International Food Policy Research Institute.

[17] Barrett, C. B. and Mutambatsere, E. (2005). Agricultural Markets in Developing Countries. , , Lawrence E. Blume, Steven N. Durlauf, eds., . Available at SSRN:, *THE NEW PALGRAVE DICTIONARY OF ECONOMICS, 2nd Edition (London: Palgrave Macmillan, Forthcoming)*, http://ssrn.com/abstract=1142518.

[18] Kilima, F. T. M., Chung, C., Kenkel, P., *et al.* (2008). Impacts of Market Reform on Spatial Volatility of Maize Prices in Tanzania. *Journal of Agricultural Economics*. 59 (2): 257-270.

[19] Mbiha, E. R., Ashimogo, G. C., Temu, A. A., *et al.* (2001). A Review of Agricultural Market Information Service in Tanzania: The Changing Role of Market Information System. FOODNET Project. 12 pp.

[20] Pokhrel, D. M. and Thapa, G. B. (2007). Are marketing intermediaries exploiting mountain farmers in Nepal? A study based on market price, marketing margin and income distribution analyses. *Agricultural Systems*. 94: 151-164.

[21] Lantican, J. M. (1997). Market Prospects for Upland Crops in The Philippines, *Working Papers Series 22*, The CGPRT Centre, http://ageconsearch.umn.edu/bitstream/32708/1/wp970022.pdf, Accessed on August 11, 2012.

[22] Shepherd, A. W. and Schalke, A. J. F. (1995). An Assessment of the Indonesian Horticultural Market Information Service. Marketing and Rural Finance Service, Agricultural Support Systems Division, FAO, UN. 42 pp.

[23] Awasthi, B. D. (2007). Relevance of Market Information System to Environment Protection. *Journal of Agriculture and Environment*. 8: 46-54.

[24] Tollens, E. F. and Gilbert, C. L. (2003). Does Market Liberalization Jeopardize Export Quality?: Cameroonian Cocoa, 1995-2000. *Journal of African Economies*. 12 (3): 303-342.

[25] Negassa, A. and Jayne, T. S. (1997). Grain Market Research Project: The Response of Ethiopian Grain Markets to Liberalization. Ministry of Economic Development and Cooperation Addis Ababa.

[26] Tollens, E. (2006). Market Information Systems in Sub-Sahara Africa: Challenges and Opportunities. *In: 2006 Annual Meeting, August 12-18, 2006, Queensland, Australia*.

[27] Mwanaumo, A. (1999). Agricultural Marketing Policy Reforms in Zambia. *Paper Prepared for the Agricultural Transformation in Africa Workshop*. Nairobi, Kenya, June 27-30, 1999.

[28] Zoltner, J. and Steffen, M. (2013). An Assessment of Market Information Systems in East Africa, *Briefing Paper*, USAID, https://communities.usaidallnet.gov/ictforag/node/406, Accessed on August 20, 2013.

[29] Dembélé, N. N. and Staatz, J. M. (2002). The Impact on Market Reform on Agricultural Transformation in Mali.

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Perspectives on Agricultural Transformation: A View from Africa.

[30] Pimentel, P. and Francisco, S. M. M. (2009). Initiatives for Development of Agricultural Information Management to Policy Makers: a Case Study from Mozambique. *Paper presented at the Pre-Conference Workshop on "Opening Access to Agricultural Information and Knowledge: sharing the experience of the NARS".* Accra, Ghana. 12-17 July, 2009.

[31] Ferris, S., Engoru, P. and Kaganzi, E. (2008). Making Market Information Services Work Better for the Poor in Uganda. *In: Research Workshop on Collective Action and Market Access for Smallholders.* Cali, Colombia.

[32] Shepherd, A. W. (1997). *Market Information Services: Theory and Practice,*. FAO Rome

[33] Svensson, J. and Yanagizawa, D. (2009). Getting Prices Right: The Impact of the Market Information Service in Uganda. *Journal of the European Economic Association.* **7** (2-3): 435-445.

[34] Tschirley, T., Diskin, P., Molla, D., *et al.* (1995). Improving Information and Performance in Grain Marketing: An Assessment of Current Market Information Systems, and Recommendations for Developing a Public Grain MIS. Food Security Research Project, Working Paper 1.

[35] Staatz, J. M., Kizito, A. M., Weber, M. T., *et al.* (2011). Evaluating the Impact on Market Performance of Investments in Market Information Systems: Methodological Challenges. (No. 108184). Michigan State University, Department of Agricultural, Food, and Resource Economics.

[36] Staatz, J., Dembele, N. and Aldridge, K. (1992). The Role of Market Information Systems in Strengthening Food Security: Lessons from Mali. Department of Agricultural Economics Staff Paper No. 92-60, Michigan State University, July.

[37] Chomba, G., Mbozi, G., Mundia, D., *et al.* (2002). Improving The Transfer And Use Of Agricultural Market Information In Zambia: A User Needs Assessment. Food Security Research Project, Working Paper No. 6.

[38] Shepherd, A. W. (2011). Understanding and using Market Information, *Marketing Extension Guide 2*, FAO, Rome.

[39] Van Crowder, L. (1997). Marketing information systems for small-scale farmers. *Information Development.* 13 (4): 179-183.

[40] Harrod, J. and Jamsen, P. (2011). Module 8: Farmer Organizations Work Better With ICT. *in ICT IN AGRICULTURE: Connecting Smallholders to Knowledge, Networks, and Institutions.* The World Bank.

[41] Bibangambah, J. R. (2002). Review of Information on Marketing, Processing and Storage of Uganda's Agricultural Commodities. Final report for PMA sub-committee on agro-processing and marketing.

[42] USAID. (2013). An Assessment of Market Information Systems in East Africa, https://communities.usaidallnet.gov/ictforag/node/406.

[43] Rashid, S., Winter-Nelson, A. and Garcia, P. (2010). Purpose and Potential for Commodity Exchanges in African Economies, *IFPRI Discussion Paper 01035*.

[44] Mezui, C. A. M., Rutten, L., Sekioua, S., *et al.* (2013). Guidebook on African Commodity and Derivatives Exchanges. African Development Bank

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