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HOW CAN RURAL ECONOMIES BE REVAMPED THROUGH EMPOWERING SMALLHOLDER FARMERS?: A CASE OF WESTERN KENYA

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ABSTRACT

Agriculture is the backbone of economies of many emerging markets. In Kenya majority of people live in rural areas and derive their primary income from agricultural activities. Majority of farmers practice organic farming. However these smallholder farmers continue to face myriad of challenges in accessing extension services, financial credits and new agricultural technologies. Therefore there production capacities are low and they never produce enough food for themselves.

In this study the author sought to enhance the productivity of smallholder farmers with great focus on women farmers. The objective was to help farmers access productive agricultural resources e.g. land, agricultural technology and financial credits, to enable them produce more products and improve their incomes through the sale of surplus agricultural goods.

The study revealed that smallholder farmers in western Kenya lack adequate access to information, financial credits and modern technology

Increasing access to these basic services would ultimately in the long run develop rural economies through increased production.

Keywords: Rural development, Smallholder farmers, economic growth.

INTRODUCTION

Can agriculture be used as a driver for rural development? Organic agriculture is a farming technique involving crop rotation, mulching, use of manure and biological pest control to achieve high crop yields while ensuring healthy ecosystems. It involves both traditional and modern agricultural practices. It aims at sustaining long term soil fertility and at the same time

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ensuring the farmer uses the available resources thus freeing up farmer's income to buy more farm inputs and take good care of his/her family.

Rural development on the other hand is the process of improving the economic well being of people in rural areas. The process often involves problem analysis, identification of the available resources and effectively utilizing those resources to provide sustainable solutions to those problems. The objectives of rural development initiatives have always been to transform rural households and provide better, secure and sustainable livelihood to the rural communities. Rural families face myriads of challenges ranging from inadequate access to health care, education and food. These are the key challenges rural development seeks to address.

Though rural development may mean something different in developed nations, the bottom line is to improve the economic well being of the people. The concept of rural development was first initiated by World Bank in 1975[1]. This was a strategy aimed at improving the social and economic wellbeing of people in rural areas. Rural development program introduced by World Bank was an idea originally started in India around 1976 to spur and enhance development and ensure sustained growth for the benefit of the rural poor masses which comprises mostly smallholder farmers, landless and minority communities.

The program sought to achieve maximum productivity and socio-economic fairness for improved well being of the greater community. This program performed fairly well though it faced numerous challenges including inadequate access to land by the rural poor.

The major focus of this study is to establish whether organic agriculture can be used as a driver for rural development. This is based on;

- Majority of the rural poor exclusively depends on agriculture for their livelihoods. Agriculture provides income to an estimated 86 percent of rural people in the world and generates job opportunities for 1.3 billion smallholder farmers and peasant workers[2]. Adequate Investment in agriculture can therefore open up jobs for many rural households thus improving their standards of living.
- Farming as a governance tool, recognizes the farmer as the core player in farming processes. It offers him/her decision making role at local level thus enabling him/her to take control of the resources and maintain active participation in the development

[1] World Bank, 1975. *Rural Development Sector Policy Paper,* Washington: World Bank.

[2]World Bank,2013. Agriculture and Poverty Reduction. See http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/0,,contentMDK:21501332~pagePK:478093~piPK:477627~theSitePK:477624,00.html (Accessed on December 13 2015)

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process[3]. Current agricultural practices which segregate and ignore smallholder farmers in favour of large scale farmers, pushes people to abandon rural areas to seek jobs in urban areas. These practises are also depended on a single crop which requires substantial investments in farm inputs which majority of rural smallholder farmers cannot afford.

- Proper investment into agriculture can effectively increase the productivity of agricultural labour and land thus improving farm incomes of farmers leading to improved living standards of the rural poor communities[4].

European Union (EU) rural development plan 2014-2020 puts emphasis on organic farming as an important tool for developing rural areas in EU zone. The plan highlights the importance of fostering competitiveness, knowledge transfer and innovation in agriculture and forestry in rural areas.[5]

How transformation of rural economies has been done globally

There are empirical evidences shown by national initiatives in various countries that have helped them completely transform rural economies and the lives of the rural poor. For example, China's economy before 1949 was worse off than Kenya's economy in terms of constant GDP growth rate. Later in 1970's China established economic reforms whose aims was to diversify rural economies, promotion of living higher standards of the rural poor farmers and expand agriculture through diffusion of agricultural technologies. The table below shows the major agricultural changes in China since 1946.

[3] IFOAM,2006. Organic Agriculture and Rural Development,Bonn Germany. see http://infohub.ifoam.bio/sites/default/files/page/files/rural_development_en.pdf

[4] FAO, IFAD and WFP. 2015. *Achieving Zero Hunger: the critical role of investments in social protection and agriculture.* Rome, FAO.p3

[5] EU,2015.Agriculture and Rural Development. Retrieved from http://ec.europa.eu/agriculture/rural-development-2014-2020/index_en.htm (Accessed on December 12 2015)

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Table 1: Major agricultural policy changes in China.

Period	Major agricultural policy
1949-52	• Specialized production
1953-57	• Free market allowed
1958-62	• Compulsory commandism for demand and supply • No free market • Grain self-sufficiency for major agricultural products
1963-65	• Very low prices for agricultural products • Commune system
1966-78	• Policies during 1963-65 similar to those in the early reform period
1979-2000s	• Relatively higher prices for agricultural produce • Free market encouraged • Specialized production encouraged-technology • Abolition of the Commune system • Various kinds of production responsibility, especially household responsibility systems

Source; Adapted from Yao and Colman 1990

The agricultural revolution during 1949-2002s led China to move from position 45th in 2000 to the 2nd largest country in terms of organic certified agricultural land in 2007[6]. This made China to be at the centre stage of global organic agriculture development.

In 1979-2000's the commune systems[7] were abolished giving farmers greater flexibility and choice in farming decisions thus increasing agricultural output and productivity.

During this economic reform period, per capita income of the rural populations greatly increased and significantly reduced rural poverty incidences as shown by the graph below

6 Paull, J. 2007, China's Organic Revolution, Journal of Organic Systems, 2(1), 1-11

[7] Farming system in China in the period between 1963-65 where householdes were organised into teams and each team was further organised into barigades which were responsble for farming decisions and activities.

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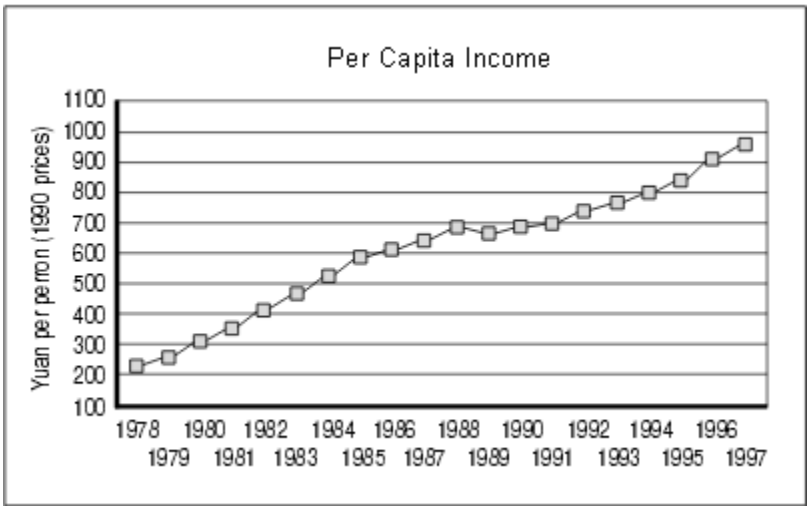

Source; L.X. Zhang

Figure 1: Per Capita Income

It's also prudent to point out that mechanisation of organic farming in China drastically reduced poverty incidences in the rural areas. Improved farming techniques led to increased per capita incomes of farmers steadily between 1978 and 1997[8].

In India, rural development has also centred on agricultural. More than 70% of rural families directly or indirectly depend on agriculture. The sector provides 17% of the total GPD with more than 52% of employment opportunities to Indian citizens[9]. The Indian agriculture policy has supported many smallholder farmers including women resulting to higher incomes and better living standards[10]. India's GDP improved between the years 2008 and 2014 and agricultural exports increased from 9.1 per cent to 14.1 per cent in the same period translating increased value for agricultural farmers in rural households. India is the largest producer of milk with an annual output of 130MT, largest producer of sugar accounting to 14 per cent of the total global output and the 6th largest exporter of sugar accounting for 2.76 per cent of the total global exports[11]. The good performance of agricultural sector accounts for successful reductions of poverty incidences in rural households in India hence a useful tool for rural development.

[8] L.X. Zhang, Agricultural and Rural Development in China* No date specified. Retrieved from http://pubs.iclarm.net/Pubs/china/pdf/china_agricultural.pdf (accessed on December 112015)

[9] Kekane, M,(2013). Indian Agriculture-Status, Importance and Role in Indian Economy,India.

[10] National policy for farmers,2007.India. Retrieved from http://agricoop.nic.in/imagedefault/policy/NPF2007ENG.pdf (december 22 2015)

[11] IBEFT,2015. Indian Agriculture Industry: an overview.

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Brazil strengthened family farming systems as a tool for developing rural areas. The direct purchase of agricultural products through The Food Acquisition Program (Programa de Aquisição de Alimentos, PAA) from family farmers provided proper incentives for rural farmers[12]. The PAA program (Zero Hunger Program) funded by the Ministry of Agrarian development involved direct purchase of agricultural products from local smallholder farmers thus guaranteeing them stable incomes. Farmers were able to benefit from stable prices and ready markets for their agricultural products[13].

The table below show how family farming grew between 1995 to 2006 in Brazil

Table 2: Growth in Family Farming 1995-2006

	Family farms (thousand)		Family farms: Total (%)		Area family farms: Total (%)		GVP family farms: Total (%)		Average area (ha): per family farm	
	1995/96	2006	1995/96	2006	1995/96	2006	1995/96	2006	1995/96	2006
North-east	2,055	2,187	88,3	93	43,5	47	43,0	52	17	16
Centre-west	162,0	217,5	66,8	75	12,6	14	16,3	17	84	62
North	380,8	413,1	85,4	90	37,5	42	58,3	69	57	53
South-west	633,6	699,9	75,3	77	29,2	29	24,4	24	30	22
South	907,6	849,9	90,5	89	43.8	44	57.1	58	21	20
BRAZIL	4,139	4,367	85.2	88	30.5	31	37.9	40	26	24

Source; França, Del Grossi, Marques (2009) using FAO/INCRA methodology - Brazilian Agri-cultural Census 1995/96 and 2006.

From the table above, family farms have expanded between the period 1995/96 to 2006. The overall area family farms grew from 30.5 per cent to 31 per cent. The 2006 agricultural data census showed that family farming generated about 38% of the gross value of production, employed 74% of the labour force and revenue of around $ 23 billion was generated[14].

The above cases in India, China and Brazil involving organic farming for smallholder farmers, explicitly show how organic agriculture can be a powerful tool for rural development.

[12] Joseph Bateman and Viviane Brochardt,2013.*Brazil's Lessons in Rural Development*.Family Agriculture, Access to Water, and Civic Engagement,p4

[13] Joseph Bateman p4

[14] SERGIOSCHNEIDER- SHIGEO SHIKI- WALTER BELIk.* Rural development in Brazil: overcoming inequalities and building new markets

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REVELANCE OF THE STUDY

This study seeks to analyse the factors that influence the relative competitiveness of smallholder organic farming in western Kenya with special interest to women. Organic agriculture has got the potential to transform livelihood for rural farmers due to its low cost nature. Various studies have indicated that organic farming has got higher likelihood to improve the livelihood of many smallholder farmers.

In a report published by International Fund for Agricultural development (IFAD) in 2003 it was indicated that organic farming yields are significantly higher under unfavourable conditions as compared to conventional methods of farming[15]. Same observations were observed by Gibbon and Bolwig in a research conducted in 2007. A survey conducted on organic cotton farmers in India, involving 125 organic cotton farmers revealed that, at least 95per cent of the farmers recorded increased incomes of about 17 per cent, when they adopted organic farming practises[16]. This was attributable to reduced production and operational farming costs.

The guiding questions for this study are;

a. How can organic farming productivity be increased for the full benefit of the smallholder farmers?
b. How can the conservative low productivity organic farms be changed into relatively high productivity agricultural ventures?
c. Why do smallholder organic farmers defy change and refuse to take up new innovations in their farming activities?
d. Does gender play a role in the poor state of organic farming in Kenya?

THEORETICAL ANALYSIS

Basic concepts on rural development

Rural development concerns improving standards living for the poor in rural and sub urban areas. This involves initiating development programs targeting the poor and marginalised communities. Integrated rural development seeks to combine multiple development initiatives or projects to improve the welfare of the poor people in rural areas[17]. To achieve optimal results

[15] IFAD,2003.Annual Report.
[16] Macdonald,M,2008. Reshaping Global Agricultural Production. Kansas City, Missouri

[17] Honadle, G.; Morss, E.; VanSant J.; and Gow, D., Integrated Rural Development: Making It Work? AID Project 936-5300, Development Alternatives, Inc., Washington, D.C., July 1980

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from rural development programs an integrated approach to complement inputs and achieve maximum synergies is required. Therefore optimization of one input depends on the quantity and availability of other factors of production in question. Integration tends to increase efficiency by reducing wastage of resources which are often scarce in rural areas. This concept is quite useful especially in agricultural projects in rural areas where maximum yields are often the targets owing to available scarce resources. Capacity building, full participation of all relevant stakeholders and proper information and knowledge management is paramount for the successful integration process. Integrated rural development seeks to ensure that the smallholder farmers have a direct and easy access to inputs, information and services that enable them to improve their livelihoods through increased agricultural production. The concept integrates administrative, research, resource allocation, pricing policies and investment decisions for the interests of the smallholder farmer[18].

Evidence from countries like Vietnam which is among the world's leading rice supplier, shows that supporting and focusing on smallholder farmers to produce more can effectively contribute to a country's economic development hence rural development[19].

Rural development programs in most cases focuses on the rural poor masses leaving out the component of the urban population. The urban population provides a large market for agriculturally produced goods from rural areas[20]. Development programs for rural areas must therefore be harmonised to address both smallholder farmers in rural areas as well as the urban population.

In the next section, the author introduces the conceptual framework clearly elaborating the technology capabilities, framework conditions and relevant actors necessary for improved productivity of smallholder farmers.

CONCEPTUAL FRAMEWORK

Technological capability determines the competitiveness and economic performance of any sector.[21] Raghavendra and Subrahmanya in 2006, define technological capabilities as the stock of technological knowledge an organisation accumulates over a given period. Technology capabilities help farmers to respond to industry changes and maintain a competitive edge in the

[18] Overseas Development Institute,1979:Intergrated Rural Development,London

[19] Båge, L. (2008). Unleash the potential of the world's poor farmers. IFAD web article , www.ifad.org/events/op/2008/globe_mail.htm.

[20] McCathy,M,2004: The Process of Rural-Urban Migration in Emerging markets, Ottawa.

[21] Aderemi,H,2009. Development of a measure for technological capability in the information and communications technology industry in Nigeria, p3.

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agricultural sector due to frequent innovations. The idea of technological capability is associated with theories and models of knowledge, organisational and technological learning, technological change, diffusion, production capacity and innovation[22]. Technological capabilities include the extra and unique resources required to produce and manage change including farmers' knowledge, skills and experiences. The potential of growth of agricultural sector is directly pegged to the technological capabilities of the farmers.

The difference in output between smallholder farmers in developed countries and those in developing nations is the level of technological investment into agricultural sector.
The variation can be attributed to the differences in the level of investment in activities that bring about technical change[23].
Smallholder farmers from developing nations will only catch up with their counterparts in developed nations through accumulation of technological and innovation capabilities or establishing new technological trajectories[24]. Catch-up or convergence theories as defined by Franco Malerba and Richard Nelson, states that the per capita income growth for developing economies are deemed to grow faster and eventually catch up with developed ones[25]. Though the concept was initially used to describe emerging economies, it has been applied to this study to connote the convergence of the inefficient agricultural practises in emerging nations with those efficient ones in developed nations.

Similarly, the study of Kristinsson and Rao underscores the importance of developing innovations locally. They found out that the major driver of growth in the Indian wind power industry was the enhancement of local capabilities through supportive innovation system and participative learning[26]. Both India and China emphasized on acquiring technology through indigenous methods hence they were successful in transferring knowledge and technology from abroad.

Similarly as suggested by Lall's taxonomy, in -house or indigenous technology capabilities right from investment through production and linkages is a key determinant to the success of firm's knowledge and technology transfer activities[27].

[22] Aderemi,p3
[23] Aderemi, p4
[24] Aderemi ,p20
[25] Franco,M et al,2010. Catching up in different sectoral systems: Evidence from six industries, p4

[26] **Kristinsson and Rao, 2008,Interactive Learning or Technology Transfer as a Way to Catch-Up?: Analysing the Wind Energy Industry in Denmark and India**

[27] Costa Ionara and Robles Reis de Queiroz Srgio (2002), "Foreign direct investment and technological capabilities in Brazilian industry" Research Policy 31 pp. 1431-1443.

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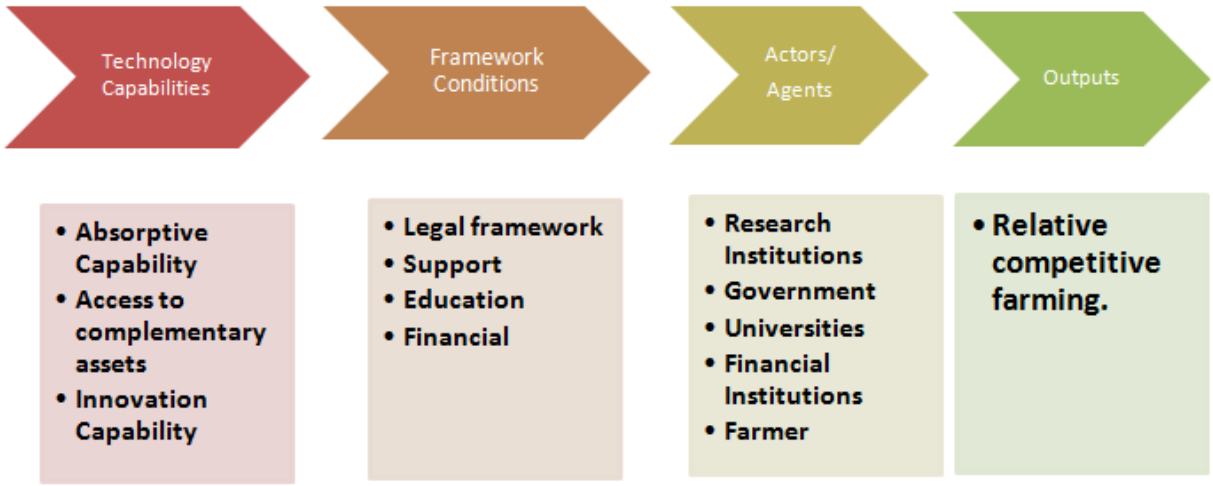

Source; Author (2017).

Figure 2: Conceptual framework for the analysis of smallholder farmers competitiveness

In this study, the conceptual framework has got four elements. They include the technology capabilities, framework conditions, the knowledge transfer actors and the intended outcomes. The first three elements harmoniously and concurrently have to work together to achieve the intended outcomes i.e. improved agricultural productivity for farmers.

Building smallholder farmers' technological capabilities requires time and therefore calls for stronger networking and close interaction between the elements, a concept supported by Meyer in 1994[28]. Below is a diagram showing the conceptual framework.

DISCUSSIONS AND RECOMMENDATIONS

Agriculture in Kenya

Agricultural is the backbone of Kenya's economy. It is the primary source of household incomes to more than 80 per cent of Kenyans[29]. Nearly one quarter of Kenya's GDP is derived from agriculture. 65 percent of total exports and 18 percent of formal employment is derived from agriculture. Small scale agriculture and pastrolism combined contributes nearly 42 per cent of

[28] Meyer,J.1994: Strengthening Technological Capability in Emerging markets. See http://www.meyer-stamer.de/pillars.html

[29] FAO (Food and Agriculture Organization of the UN).(2010). Agricultural Policy Frameworks in Kenya. Food and Agriculture Policy Decision Analysis. Retrieved from:

http://www.fao.org/fileadmin/templates/fapda/Kenya-Policy_Report.pdf

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total employment in Kenya[30].Agriculture in Kenya is generally on small scale basis and smallholder farmers produce over 70 percent of maize, 65 percent of coffee, 50 percent of tea, 80 percent of milk, 85 percent of fish and 70 percent of beef and related products[31].

Smallholder farming accounts for more than 75 percent of total agricultural output[32]. Agricultural sector is identified as one of the major pillars for the ambitious vision 2030 established by the Kenyan government in the year 2007[33]. The vision targets an annual growth rate of 10 per cent to enable Kenya be a middle level economy.

To achieve this target it would be necessary to help smallholder subsistence farmers access productive agricultural resources for improved productivity. The figure below shows the contributions of agricultural subsectors to the total GDP and export value in the year 2008

[30] Government of Kenya (GoK). (2011a). Medium-Term Expenditure Framework 2011/12 – 2013/14, Report for the agriculture and rural development sector. Nairobi: Government Printers.

[31] GOK,(2009),Agricultural sector development startegy 2009-2020.

[32] UNEP(United Nations Environment Programme). (2014). Green Economy Assessment Report: Kenya.Retrieved from: http://www.unep.org/greeneconomy/portals/88/documents/KenyaGEassessment.pdf

[33] GoK (Government of Kenya).(2007). Kenya Vision 2030. Nairobi. Nairobi: Government Printers. Retrieved from:http://www.vision2030.go.ke/cms/vds/Popular_Version.pdf

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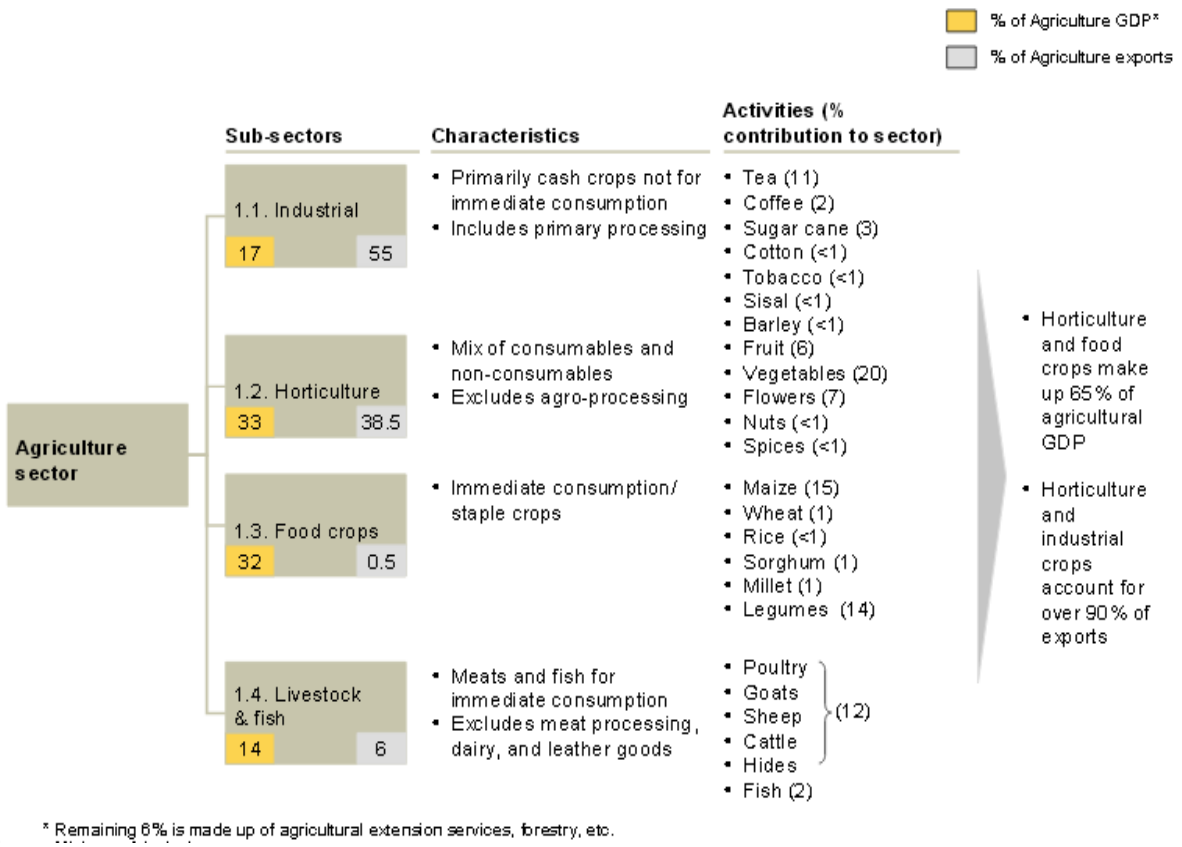

Source; Gok, (2008).

Figure 3: Agricultural contributions to GDP and Export

From the above figure it's evident that industrial cash crops e.g. tea, coffee, sugar and cotton forms the largest share of total agricultural exports at 55 percent while contributing to 17 percent of total GDP. Horticulture subsector is the highest contributor to the total GDP at 33 per cent while food crops and livestock & fish each contribute 32 and 14 percent respectively.

Agriculture in Kenya is rain fed thus affected by fluctuations in rain patterns exacerbated by effects of climate change[34]. Overreliance on rains by smallholder farmers in rural areas has led to low productivity leading to poor income streams for rural farmers.

[34] Alila, P. O.and Atieno, R. (2006). Agricultural Policy in Kenya: Issues and Processes. A paper for the Future Agricultures Consortium Workshop, Institute of Development Studies, 20-22 March 2006. Retrieved from: http://www.fao.org/fileadmin/user_upload/fsn/docs/Ag_policy_Kenya.pd

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Irrigation agriculture is mainly done by large scale farmers. Agricultural potential remains untapped as more than 83 percent of the available 540,000 hectares of suitable land remains un-irrigated[35].

Adoption of agricultural technology among smallholder farmers in Kenya is low. A report by the Kenyan government in 2009 affirms that, there is a great potential in increasing the productivity of these farmers if they adopted modern and green farming practises[36]. Though various key policy documents have been put in place to enhance productivity of smallholder farmers in Kenya, the actual productivity remains relatively low. These policy documents are discussed below

Kenya's agricultural policy

In the year 2004, the Kenyan government established Strategy for Revitalizing Agriculture (SRA) 2004-2014. The aim of this strategy was to transform Kenya's agriculture into a profitable, commercially oriented and internationally and regionally competitive economic activity that provides high quality gainful employment to Kenyans.

At its inception, annual growth was set at 3.1 percent during 2003-2007. This target was surpassed in 2006 when the growth rate was 6.2 percent as opposed to the targeted 5 percent by the year 2007.

SRA identified interventions to achieve the targeted sector growths. The targets included enhancing delivery of research and extension services, making financial services and farm inputs accessible to farmers and improving access to both local international markets for farmers

SRA however did not achieve much in terms of technology capability building for smallholder farmers since it was GDP growth oriented. This necessitated its review in 2009 to incorporate the new developments in agricultural sector. During this year the Kenyan government introduced Agricultural Sector Development strategy (ASD) 2009-2020.

The strategy outlines the characteristics, challenges and opportunities of agriculture in Kenya and possible intervention strategies to make the sector more vibrant and highly productive. This

[35] GoK (Government of Kenya). (2004). Strategy for Revitalising Agriculture 2004-2014, Ministry of Agriculture andMinistry of Livestock and fisheries Development, Nairobi.

[36] GoK (Government of Kenya).(2009). Agricultural Sector Development Strategy (ASDS). Retrieved from: http://www.kecosce.org/downloads/AGRICULTURE_SECTOR_DEVELOMENT_STRATEGY_2009_2025.pd

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strategy used participatory approach to connect all actors from both agricultural and non agricultural sectors to work towards achieving a food secure nation. The major goal of ASDS was to transform agriculture into a profitable and highly commercial oriented venture through increasing productivity, commercialisation and competitiveness of agricultural products Dysfunctional institutions such as research and extension services, training services and tractor hire service became more vibrant and agricultural productivity especially with smallholder farmers increased since the inception of this strategy

ASDS as a technology capability enhancement tool seeks to address challenges faced by smallholder farmers in their quest in accessing productive agricultural resources. It provides relevant framework conditions to ensure that specific interventions are put in place to help farmers overcome their challenges in accessing these resources.

The table below gives a brief summary of ASD goals and the relevant technology capability component and specific framework conditions necessary to address the challenges.

Table 3: Summary of ASD goals

ASD goal (2009-2020)	Technology capability provisions in ASD	Available framework condition
-Improving effectiveness of extension services to smallholder farmers.	-Absorptive	-Financial -Education and support
- Improve technology transfer and absorption among smallholder farmers	-Innovation -Access to complementary assets -Innovation	-Education -Financial -Legal
- Increasing access to financial credits to smallholder farmers	-Innovation	-Financial
- Making farming inputs available and cheaper to smallholder farmers.	-Innovation -Absorptive	-Financial
- Reduce pre and post harvest looses for smallholder farmers	-Access to complementary assets -Absorptive	-Financial -Education

Source; Gok, (2008).

To enhance competitiveness of smallholder farmers this policy provides the best framework and guiding principles that ensures smallholder farmers access basic services and inputs that were previously constraining the production capabilities.

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Challenges facing smallholder farmers in Western Kenya

Smallholder farmers in western Kenya face a number of challenges. Adijah et al.. 2011 conducted a study to establish the challenges facing smallholder maize farmers in western Kenya[37]. According to the study, the challenges were categorized into; challenges related to acquisition of seeds, access to finance and inadequate credit facilities.

Based on acquisition of seeds category, 42.9 percent of interviewed farmers admitted of using uncertified seeds while 41.7per cent cited planting late due to inadequate finance to buy seeds at the right time.

The study also revealed that farmers had challenges in choosing the type of maize seeds to plant since there existed more than 30 suppliers of maize seeds. Therefore, the decision on which type of seeds to buy was somehow elusive and hard to make for most farmers.

In addition, majority of the respondents admitted buying seeds late due to lack of finance. Surprisingly, 89.5 per cent of respondents did not acquire credit facilities available from agricultural finance corporation and the corporative Bank of Kenya[38]. This was attributable to high interest rates charged by the said financial institutions. Lack of knowledge about the availability of these credit facilities, lack of collateral, stringent credit terms, small size of land and the fear of inability to repay the loans were cited as the major reasons as to why many farmers did not take up the credit facilities.

The study also revealed that many smallholder maize farmers were less productive. Resistance to change, lack of awareness on the modern production methods and lack of technology know how were identified as the main aspects encumbering the productivity of these farmers.

Other challenges specific to women farmers included lack of security of tenure to land and access to extension services.

Current opportunities for Women farmers in Western Kenya

Several organisations including the Kenyan government have worked with smallholder farmers in western Kenya to transfer technology and establish new farming systems. They include, Equity Bank, Kenya Women Finance Trust, Kenya Agricultural Research Institute (KARI) and Alliance for a green revolution in Africa (AGRA). Equity bank and Kenya women finance trust provide loan facilities to smallholder farmers and women farmers respectively at a relatively low

[37] Adijah et al.. (2011), Challenges Facing Small Scale Maize Farmers in Western Province of Kenya in theAgricultural Reform Era,Kenya.

[38] GOK. (2008). Ministry of Agriculture Strategic Plan (2008-2012). Nairobi, Kenya, Government Printers.

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interest rates to enable them access new technologies and farm inputs. The others are involved in capacity building and training programs to facilitate knowledge transfers while coming up with new improved agricultural inputs.

Equity bank has been on the forefront to ensure smallholder farmers access credit facilities at an affordable rate. Through their loan facility *Kilimo Biashara*[39] more than 8,373 smallholder farmers have benefited[40]. The Bank also provided funds for farmers in Eastern Kenya to benefit from irrigation project scheme, which enabled many farmers, triple their agricultural production during the project period.

Access to credits is cited as one of the greatest challenge facing smallholder farmers. AGRA partnered with the Kenyan government, IFAD and Equity Bank to provide loan facilities to smallholder farmers at relatively low interest rates[41]. They are using an impact investing model called Kenyan Incentive-based Risk Sharing System for Agricultural Lending to increase the capacity of financial institutions in providing agricultural loan facilities to smallholder farmers. They also run agro leadership projects in western Kenya. This is a project bringing together all leaders in agricultural fields, whose major objective is to reinforce rural agro dealer networks to help enhance farmers' incomes and productivity through better access to technology and agricultural inputs[42].

The composition of these agro leaders includes 30 percent women who are trained on business management and offered grants to enhance their agricultural productivity. To facilitate absorptive capabilities for the farmers, these agro leaders provide group training, plot demonstrations, technical assistance and farmer-to-farmer training assistance to enhance technology diffusion and agricultural productivity among themselves.

Kenya Agricultural research institute has been providing better quality seeds to farmers to ensure improved agricultural production. They carry out research on new production methods involving improved seed varieties, which have early maturity rates, pests and drought resistant.

[39] Swahili words to mean Agriculture for Business.

[40] Equity Bank,2013.

[41] Equity Bank,(2013),Partnering with farmers for food security,Kenya. Retrieved from http://equitybankgroup.com/digitalpaper/e6/PDF/EQN_edition6.pdf (January 10,2016)

[42] International Center for Research on Women,(no date), Agrodealerships in Western Kenya: How Promising for Agricultural Development and Women Farmers?,USA. Retrieved from http://www.icrw.org/sites/default/files/publications/Kenya%20Agrodealers%20FINAL.pdf

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They came up with new varieties of bananas for smallholder famers, that are disease resistant and provides high yields for farmers[43]. KARI has also been providing other improved seed varieties including rice, soybeans, cotton, coffee and maize as well as animal breeds for farmers.

Smallholder farmers in Kenya are embracing the use of mobile phones in their daily agricultural activities. Currently, the general mobile phone usage in Kenya stands at 80.5 % with over 32.8 active mobile subscriptions in 2014[44]. Internet penetration increased also in the last few years. Kenya has been ranked second in Africa ahead of South Africa in terms of internet penetration and usage.. According to the Kenya National Bureau of Statistics, the internet penetration stands at 54.8% with over 22.3 million Kenyans using the internet[45]. In addition Kakamega county in Western Kenya launched a program called "Internet Villages" where they intended to ensure internet access is available in all public places like schools, hospitals and markets to increase access to information by the residents, majority of which are smallholder farmers. The project was being funded by the United States Agency for International Development, NetHope and Intel, in partnership with World Vision and the Kenyan government[46]. The above developments provide good opportunities for smallholder farmers in Western Kenya to access information that would be used to enhance their agricultural productivity.

Though the current developments in the agricultural sector seem bright and promising, the number of women farmers who engage in agriculture still cannot access basic resources for farming for various reasons. High illiteracy levels exhibited by low enrolments of girl child in schools and lack of security of tenure to land negatively affects women uptake of modern agricultural practices. Access to land and education are key roadmaps to a highly competitive agriculture for smallholder women.

CONCLUSIONS AND RECOMMENDATIONS

In this study, the author examined various factors affecting the productivity of smallholder women farmers in western Kenya. The outstanding barriers affecting farmers' productivity included inadequate excess to extension services, inadequate access to land, illiteracy, poor technology and inadequate access to credit facilities.

[43] Equity Bank news,2013, Tissue culture banana technology saves sub sector,Kenya.
[44] Communication Commission of Kenya, **Mobile Penetration hits 80 per cent**.,2015. See http://ca.go.ke/index.php/what-we-do/94-news/285-kenya-s-mobile-penetration-hits-80-per-cent
[45] Citizen TV, **Kenya ranked second in Africa in Internet Usage**., 2016. see https://citizentv.co.ke/news/kenya-ranked-second-in-africa-in-internet-usage-117698/
[46] The Nation, **Villages set to go Hi Tech in Internet Connection Drive**.,2015. See http://www.nation.co.ke/counties/Villages-set-to-go-hi-tech-in-Internet-connection-drive/-/1107872/2738036/-/p4mjeb/-/index.htmlhttp://

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Access to land specifically for women farmers in India was enhanced by the India's National policy for women farmers. The land Revenue Act directed joint ownership of land for spouses giving women farmers a security of tenure to land, which is a crucial resource in agriculture. In Brazil on the other hand, PRONAF a program established to strengthen family farming puts more emphasis on ensuring women farmers have equal access to land and can exercise this right in buying, selling and transferring the land.

In Kenya, the new promulgated constitution in 2010, though gives women rights to access land, various cultural practices and beliefs still prevent women to exercise this right. In some extreme cases, married women loose their rights over their family land once their husband dies. Though the legal framework system exist to protect women over ownership of land various capacity building programs need to be initiated to enlighten rural women farmers realise their land rights.

In terms of agricultural credits, India has well laid out strategy for increasing women access to agricultural credits. The government established a debt relief commission to write off debts relating to women farmers. The commission also guarantees loans to women farmers at very low interest rates of 4 per cent. This gives women farmers the financial ability to access agricultural inputs as well as other relevant agricultural technologies for increased production. In Brazil, the National Rural Credit system established by Law No 4829 in 1965 gives support to rural farmers on costs arising from production and marketing agricultural products. In Kenya on the other hand Equity Bank, Kenya Women Finance Trust, the Kenyan government through Women Fund and Uwezo Fund gives loans to smallholder farmers especially women. Mobile phone money transfer services (*M-pesa*) and loans facility (*M-Kopa*) offered by the telecommunication giant safaricom are both cheap and convenient ways for smallholder farmers in rural areas to access financial services.

With the current 74.2 percent active mobile phone usage in Kenya, rural farmers' access of these services enhanced[47]. Kenya is now ranked the second in terms of internet penetration ahead of South Africa and this means that information access by farmers on their mobile handsets will tremendously grow over time. The uptake of loans however has been slow since the interest rates charged are relatively high and the collateral required usually a land title deed isn't available to most women farmers. Women farmers' access to land should be enhanced to enable them have title deeds -the only valuable asset available to rural farmers to help them access financial credits. These loan facilities should be costly friendly and take into consideration the specific

[47] Daily Nation,(2016), Kenyan mobile phone users up to 38 million, Nairobi. Accessed from http://www.nation.co.ke/business/Kenyan-mobile-phone-users-38-million//996/3023970//9fseoo//index.html (January 09 2016)

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needs of women farmers. Flexible repayment schedules often through mobile phones have to be enhanced to enable women farmers conveniently service their loans.

Access to extension services is crucial to success of any agricultural system. India council of agricultural research (KVK) for example provides extension services and training services to farmers to improve their absorptive capabilities and easiness to adopt new technologies. Brazil on the other hand through EMBRAPA, (Brazilian Agricultural Research Corporation), conducts wide range of biotechnology research and extension services. The corporation engages in knowledge transfer trainings for farmers to equip them with proper knowledge on modern agricultural practices.

KARI a body mandated to carry out agricultural research therefore has to strengthen its research programs and offer alternative knowledge and information to smallholder farmers in western Kenya. Hiring more extension women farmers could also make new knowledge and technology diffuse easily to farmers. Time and resource constraints limiting women farmers in participating in extension activities should be given due consideration in designing extension programs. Apart from KARI, other private organisations and NGOs in the region should also join hands in providing support services to farmers. Capacity building activities by one acre fund[48], an agricultural NGO operating in Western Kenya should replicated to reach out more rural farmers to improve their productivity.

Effects of climate change have increased agricultural risk in today's farming activities thus necessitating the need for insurance services. The rural insurance program in Brazil is heavily subsidised and most smallholder farmers finds it easy to adopt. Kenya Women Finance Trust also runs an insurance scheme for farmers which can substantially boost agricultural production among women farmers in Kenya[49]. Its uptake whoever remains low due farmers limited knowledge about its availability, its cost and the potential benefits. The services should be made cost friendly and adequate capacity building programs made to sensitize farmers about their availability for easy uptake.

To reduce post harvest losses, the county government should invest into rural infrastructure. Currently farmers lack adequate transport facilities to get their products on the market. This often resulted into major losses especially for perishable horticultural products. Inadequate storage facilities for dairy farmers have led to dairy farmers experiencing many losses of their milk products. Proper investments into rural roads and milk cooling facilities for example could help

[48] One Acre Fund is a nonprofit organization that supplies smallholder farmers in East Africa with asset-based financing and agriculture training services to reduce hunger and poverty.

[49] Mgobo,S.2008. Kenya: new scheme for low-cost health insurance launched. News article Retrieved from(accessed January 09 2016) http://allafrica.com/stories/200806231599.html

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farmers access markets easily and substantially reduce post harvest looses. Establishment of renewable energy sources and the related technologies for smallholder farmers could help them process, store and handle their produce effectively thus maximising their incomes for every agricultural unit produced.

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