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ASRIC Journal on Agricultural Sciences 1 (2020) 43-57

The Small Farmer Infrastructural Incentive Imbroglio in Rural Cameroon

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Received 9 December 2019; revised 30 August 2020; accepted 30 September 2020

Abstract

Infrastructural incentives constitute a primordial agricultural booster to small farmers in sub-Saharan Africa (SSA) though many development agencies acclaim tenure security as the main driver for agricultural investment. In SSA where the bulk of the farmers are smallholders in inaccessible rural areas, basic small-scale on-farm and off-farm infrastructural incentives remain critical within the productivity, production and market chain derivatives. This study relied on conceptual insights from different scholars, oral histories captured through interviews, informants conversations, focus group discussions and field observations to investigate and analyze the correlation between on-farm and off-farm infrastructural incentives and better rural livelihoods achievements through smallholder productivity, production and improved food chain marketing systems. The study was carried out in two and three rural communities in the North West and Centre Regions of Cameroon respectively. Results show that small farmers generally lack on-farm water infrastructures for irrigation and spraying of crops, and those that exist were improvised and were often cost and course ineffective. Water stresses were observed to accentuate with climate change, impacting negatively on crop productivity and production. Storage facilities were also improvised and no post-harvest washing and cooling infrastructures for fruits and vegetables were available. Findings equally show that off-farm infrastructures such as roads and transport were a major challenge to farm produce evacuation and ensuring fluidity in market chains. The study has proposed pathways for investing in basic small-scale on-farm and off-farm infrastructural incentives in rural Cameroon in order to address salient issues of smallholders ranging from improved productivity and production for quantitative and qualitative household food security to poverty reduction.

Keywords: Infrastructural incentives, off-farm infrastructure, on-farm infrastructure, food security, poverty reduction, small-scale farmers, Cameroon

1. Introduction

Small farmers in the context of this paper are those with farm holdings of two ha or less and in SSA, they own about 80% of all farms and contribute up to 90% of the production in some SSA countries (Wiggins, 2009 and Livingston et al. 2011). Infrastructural incentives are guided by the general theory of incentive, which is grounded on the principle of motivation and suggests that behaviour is subject to a desire for reinforcement (Ogolo, 1996 and Syed and Miyazako, 2013). The responsiveness of agricultural

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reinforcers or enablers or incentives vary widely with geographical regions, an aspect which are yet to address. Practical application of the theory of incentive in the domain of agriculture has taken an all global neoclassical economic approach, which has led to confusion and ambivalent outcomes in SSA (Razavi, 2003).

Incentivizing Agriculture in Sub-Saharan Africa

Agriculture is both an economic and socio-cultural venture, and therefore, requires specific incentives to fulfil its mission in the different geographic regions of the world. All economic ventures are inextricably linked to incentives, implying that human behaviours are driven by a desire for reward (Laffont and Martimort, 2002). Agricultural incentive discourses in Africa keep making headline news at global and regional levels with two philosophical underpinnings, the pro-land tenure security incentive school of thought and the pro-rural infrastructure incentive school of thought. Proponents of the land tenure security incentive option are attuned to a Western and globalized neoclassical economic approach to agricultural productivity and production, which is ill-adapted in SSA as captured by Steven Lawry. According to the scholar, many of those who may come from the West assume that land rights certification, registration or titling are important attributes of any kind of land tenure or property rights system for agricultural investment (Lawry, 2015).

Studies from across SSA have proven that tenure security is a marginal incentive for agricultural productivity and production (Townsend, 1999 and Razavi, 2003). In this connection, it has been posited that a systematic and rigorous exercise, based on internationally-recognized methodologies that generate indicators comparable across countries and time, is needed to measure the level and trend of policy support to the agriculture sector (Pernechele, Ghins and Balié, 2018). This study is quite fundamental given that despite a series of decisions and initiatives by African leaders, including the adoption of the Maputo Declaration, the Comprehensive Africa Agriculture Development Programme (CAADP) and the Malabo Declaration to garner and mobilize investment and resources towards agricultural development (UN, 2017), agriculture is not competitive and food insecurity still reigns in SSA (AfDB, 2019). The results of such a study will obviously be in consonant with the postulations of Robert E. Townsend in 1999 and Steven Lawry in 2015.

As the driving force of many economies in SSA, agriculture was perceived as the mainstay of government revenues through heavy taxation. Such taxation in the agricultural sector was estimated to serve as an incentive for public investment (public services and infrastructure) in rural areas. Unfortunately that did not happen as up to currently, infrstructural investment remains poor in SSA (Townsend, 1999) and keep undermining agricultural productivity and production. The scholar intimated further that if indeed these high taxation levels were complemented with significant public investment as observed in Asia, then agricultural growth would not have faired so poorly in Africa.

In suggesting incentives for agro-industry investment, Syed and Miyazako (2013) mapped out a hierarchy of enabling conditions, which consists of essential, important and useful enablers. Among the essential enablers are land tenure and property rights, infrastructure, and domestic and foreign trade policy, while the important enablers include norms, standards, regulations and services relating to production, research and development, and financial services for agro-industries. The useful enablers include the ease of doing business in a country, the business development services available to prospective investors, and the general intensity and effectiveness of business linkages between enterprises in value chains (Syed and Miyazako, 2013). These enablers are macroeconomic constructs in line with Robert E. Townsend's approach to agricultural incentives in SSA.

The author emphasized on global price environment, together with the macroeconomic export crop, food crop and fertilizer where policy diamonds are constructed as incentive indicators. According to the scholar, the incentive indicators are reflecting the state of macroeconomic (monetary, exchange rate and fiscal) and agricultural sector policies (on exports, food crops and fertilizers) relative to a perceived frontier (Townsend, 1999). The macroeconomic policy scores are developed from an aggregate of monetary, fiscal and exchange rate policies, as in the Adjustment in Africa study (World Bank, 1994) (Townsend, 1999) and have very little to do with the real incentives of small farmers in SSA where in

many of the countries, 10-40% of harvest remains stranded and as much as 89% in Tanzania due to inadequate supply of transport (Were-Higenyi, 2010).

In this connection, the essential enablers which focus on land tenure and property rights, infrastructure, and domestic and foreign trade policy, are appealing, though with the exception of infrastructure, issues of foreign trade policy and land tenure and property rights are less realistic.

Land Tenure-Agricultural Incentive Gap in Sub-Saharan Africa

The euphoria of independence lured African countries to enact pro-tenure security incentive policies that have so far been responsive to agriculture and rather created disincentives for agricultural investment and production (Syed and Miyazako, 2013). Since then, many voices are still being raised in support of individualised tenure based on cadastral treatment and registration of freehold titles considered by economists and agribusiness partners as an important incentive for agricultural investment. For instance, the U.S. Agency for International Development (USAID) and the World Bank have recently emphasised the need to promote freehold tenure with titles and registration as a means to incentivizing owners to use land efficiently and maximise agricultural production (Barrows and Roth, 1990). Similarly, the Organisation for Economic Co-operation and Development (OECD), G20, G8 leaders and the New Partnership for Africa's Development (NEPAD) are unanimous that private investment is essential if agriculture is to fulfil its vital function of contributing to economic development, poverty reduction and food security (OECD, 2013).

Private investment in this respect is alluding to private property rights in terms of land and agricultural investment, which is associated with tenure security. Tenure security as an incentive for agriculture investment, works well for those who are non-natives or the urban-rural commuter elite who acquire land for purely agribusiness purposes and not the small farmer native who operates within the confines of the concept of bundle of customary land rights (Deininger and Jin, 2006; Deininger and Ali, 2006; Deininger et al., 2008). This distinction is very important as many studies based on macroeconomic analysis such as the work of Stéphane Korsaga in 2018, are generic in nature and putting to question many of the conclusions derived from small samples originating in limited geographical domains which point to the fact that in SSA, tenure security is a marginal incentive among smallholder farmers. In many countries of SSA, hardly is there any correlation between land title and long-term investment in smallholder agriculture as observed among the Kisii-Kenya farmers where smallholders wanted to develop their land regardless of title to meet subsistence and cash crop needs (Barrows and Roth, 1990). Under the customary tenure system, to which sub-Saharan Africans adhere, people gain access to land as a social right, granted by virtue of their membership in a community, and therefore need no other form of security.

Considerable attention has been paid to analysing the security of land tenure and investment in agriculture. On that score, individualised tenure based on cadastral treatment and registration of freehold titles, is viewed as a strong agricultural investment incentive for poverty reduction and social well-being in Africa (Barrows and Roth, 1990). In SSA where the bulk of the farmers are smallholders in inaccessible rural areas, it is increasingly dawning upon policy makers and researchers that basic small-scale on-farm and off-farm infrastructural incentives remain critical within the productivity, production and market chain derivatives. In rural SSA, statutory tenure security has been mistakenly taken for a major agricultural investment incentive within the scope of smallholder agriculture (Laffont and Martimort, 2002). Land being a primary input for agriculture (AfDB, 2017), access and accessibility to it are fundamental (AfDB, OECD&UNDP, 2017), particularly as 61% of the land is non-cultivated, suitable for cropping, non-forested, non-protected and has low population density (Kagwanja, 2012). Similarly, a fair share of the 90% of unutilised arable land in SSA is located in areas with limited transport infrastructure, and therefore, not easily accessible (Were-Higenyi, 2010; Gajigo and Lukoma, 2011 and Jayne *et al.* 2014).

In most of rural SSA, communities are predominantly agricultural with exceptionally liberal land tenure system that operates and only marginally affects both the size of individual farm holdings and the way the land is cropped (Atteh, 1985). This situation results mainly from the fact that land is perceived as a God-given entity and therefore it is held in trust for Him and that the population density is very low,

with plenty of land to go round. In the present circumstances, large-scale agricultural projects developed in the Okun area in Nigeria over the last decade have been offered land freely by the people rather than finding the land tenure system a hinderance (Atteh, 1985).

On-Farm and Off-Farm Infrastructural Incentives

Sustainable agriculture in the world relies on infrastructural incentives. Many scholars have categorized agricultural infrastructures into three, to wit, road networks, irrigation technology and post-harvest storage technology (Gajigo and Lukoma, 2011), and capital intensive (irrigation, roads, bridges), capital extensive (extension services) and institutional infrastructure such as formal and informal institutions (Wharton, 1967 and Patel, 2010). The different categorizations point to the fact that agricultural infrastructure, both on-farm and off-farm, have the potential to transform existing traditional agriculture or subsistence farming into a most modern, commercial and dynamic farming system (Patel, 2010). On that score, agricultural infrastructure comprises all those activities and facilities which help to sustain the growth in production and income generation in the rest of the economy rather than production and income generation within the infrastructure enterprises themselves (Bhatia, 1999). This dichotomy is still not clear even within the European Union (EU) as the issue of whether rural development policy should serve the needs of farmers or of broader civil society in rural areas is a continuing source of tension in formulating rural development policy (Matthews, 2004). The small farmer on-farm and off-farm infrastructural incentives in SSA are equally impacted by these policy discourses in Europe, which remain unclear and are compounded by emphasis on tenure security.

So far in SSA, the tendency has been to focus on agricultural infrastructures that boost production and productivity without regards to those infrastructures that allow for easy evacuation of farm produce to homes and markets. Boosting agricultural production and productivity is one phase and farm produce reaching the needy population and in good condition is another. In SSA, the challenge of infrastructural incentives for smallholder farmers is not only limited to on-farm infrastructure, off-farm infrastructure such as roads serve as one barrier facing small farmers in terms of distribution and market access (Njara, 2017). From the time the wind of independence started blowing across Africa till now, a plethora of agricultural policies have been adopted at global, regional and country levels without the smallholder farmers in SSA gaining access to on-farm and off-farm infrastructure. These policies and initiatives such as the Presidential Infrastructure Champion Initiative (PICI) projects following the adoption of the Dakar Agenda for Action in June 2014 and the launch of the Continental Business Network as well as the MoveAfrica initiative seem to bear an infrastructural missing link vis-à-vis the small farmer in SSA. Corroborating this assertion, Njara (2017) opined that lack of access to post-harvest storage (store-rooms and cold-rooms to keep their products in good condition after harvest) and processing facilities constitutes a barrier to entry into agricultural markets, since buyers are preoccupied with quality.

In most countries in SSA, agriculture is not only the largest contributor to gross domestic product (GDP), but also provides employment and livelihood for a significant proportion of the population (AfDB, 2019 and FAO, 2012). It has been observed that adequate infrastructural support to farmers is a pre-requisite for accelerated productivity and production as well as guarantees fluidity in market chains and lower the unit cost in the production activities (FAO, 2012 and Bhatia, 1999). Unfortunately, these infrastructural incentives, which are actually public services that facilitate production, procurement, processing, preservation and trade (Munyanyi, 2013 and Njobe & Kaaria, 2015) remain critical in SSA (FAO, 2012). Studies have shown that the overall level of agricultural infrastructure development in most countries in SSA is lower than that of other regions of the world, making it the lead impediment to agricultural productivity (FAO, 2012).

In this region, greater attention is often paid to those agricultural incentives such as land tenure security, removal of domestic trade barriers, improvement of access to foreign markets, coping with international commodity price decline and fluctuations and removal of excessive agricultural taxation, which in reality insufficiently cover the issues at hand (Njobe & Kaaria, 2015and Gajigo and Lukoma, 2011). For instance, Agenda 2063 calls on African countries to transform agriculture and industrialize their economies, including by modernizing agriculture and agro-business through value-addition and

increased productivity while farm-to-market roads are near absent in SSA. Small farmers in the region, particularly the women, keep grappling with inadequacy of on-farm and off-farm infrastructural incentives in an effort to feed the population (AfDB, 2019; Njobe & Kaaria, 2015 and FAO, 2012). The small farmer in SSA lacks road networks, irrigation technology and post-harvest storage technology, which are the three types of infrastructure with a direct impact in boosting agricultural productivity (Gajigo and Lukoma, 2011). Essential public goods, such as rural infrastructure, including roads and electricity, cannot be provided by farmers and the private sector, and therefore, requires government action and supportive policies and institutions (Syed and Miyazako, 2013).

2. Methodology

Cameroon is a country found in sub-Saharan African and located in the Gulf of Guinea with a surface area of 475 650 km^2 and a population of about 25.3 million inhabitants according to current estimates (https://www.worldometers.info/, 2019). It shares boarders with Chad in the north, Equatorial Guinea and Gabon in the south, Central African Republic, Chad and the Republic of Congo in the east, and Nigeria in the west. The physical and cultural diversity of the country has made many people to refer to it as Africa in miniature. Cameroon hosts 5 key agro-ecological zones differentiated by the relative length of the potential growing period for rain-fed agriculture (Bationo et al. 2006 and Livingston, Schonberger and Delaney, 2011).

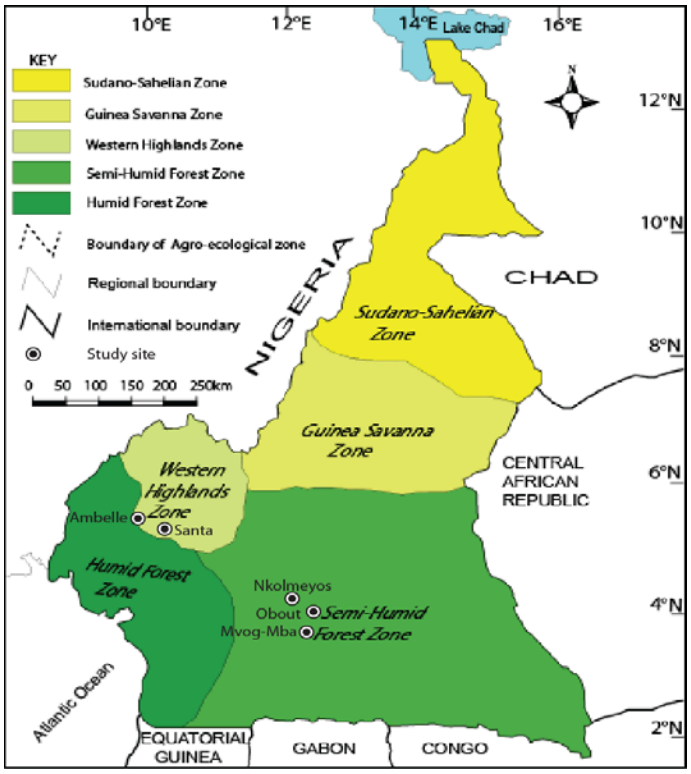

Figure 1: Agro-ecological zones in Cameroon
Source: Adapted from IRAD Annual report (2007)

For better insights into the past and current issues of misplaced priorities vis-à-vis infrastructural incentives for small farmer agricultural investment in SSA, a scoping study was carried out in five rural communities in Camroon. The study was based on qualitative data sourcing through a review of infrastructural incentive-related literature, oral histories, focus group discussions and semi-structured interviews in Santa and Ambelle communities in the North West Region, and in Obout, Nkolmeyos and

Mvog-Mba in the Centre Region of Cameroon. Ambelle in Momo Division is located between the Humid Forest and Western Highlands ecological zones, while Santa in Mezam Division is in the Western Grassfields found in the Western Highlands ecological zone (Nkwi and Warnier, 1982). Obout, Nkolmeyos and Mvog-Mba are rural communities in Mefou and Afamba Division found in the Semi-Humid Forest ecological zone (fig.1). The rationale for choosing study sites from different ecological zones was to observe for spatial variations in the level of trouble and problems associated with rural infrastructural incentive and on small farmer agricultural investment, productivity and production for quantitative and qualitative household food security and poverty reduction.

Secondary data were gleaned from existing literature on small farmer on-farm and off-farm infrastructural incentives, transport and transportation, land tenure security as an agricultural incentive, rural infrastructure, agricultural investment in SSA and implications of macroeconomic and neoclassical analysis of agricultural incentives in different geographical regions of the world, particularly the developing countries. Africa and country level policy documents related to infrastructure such as the Programme for Infrastructure Development in Africa (PIDA), Presidential Infrastructure Champion Initiative (PICI) projects were consulted. In relation to agriculture, the 2003 Maputo Declaration, the Comprehensive Africa Agriculture Development Programme (CAADP) and the 2014 Malabo Declaration to garner and mobilize investment and resources towards agricultural development also constituted sources of literature. Other sources of literature included those of UN (2017), FAO (2012), Richard Barrows and Michael Roth (I990), Stéphane Korsaga (2018), Steven Lawry et al. (2014), Steven Lawry (2015), Ousman Gajigo and Alan Lukoma (2011), Amrit Patel (2010), Bongiwe Njobe (2015), Robert E. Townsend (1999), Manjeet Singh Bhatia (1999), Geoffrey Livingston, Steven Schonberger and Sara Delaney (2011), Watson Munyanyi (2013), Sununtar Setboonsarng (2008), Lunga Njara (2017) and Alan Matthews (2004).

Primary qualitative data for the study were collected from Ambelle, Santa, Obout, Nkolmeyos and Mvog-Mba rural communities in Cameroon. The enquiry was intended to investigate and analyze the level of misplaced emphasis on on-farm and off-farm infrastructural incentives in SSA as observed in the five rural communities. Focus was on whether the small farmers in these study sites acknowledge tenure security and macroeconomic policies of removing trade barriers as stronger small farmer infrastructural incentives in SSA or not vis-à-vis land availability, farm-to-market roads, irrigation and post-harvest storage and processing facilities. To ease collection of relevant data, three approaches were used:

i) In each of the five study sites, Focus group discussion (FGD) participants were presented a form carrying 13 different agricultural infrastructural incentives compiled from existing literature (Njara, 2017; Lawry, 2015; FAO, 2012; Gajigo and Lukoma, 2011; Were-Higenyi, 2010 and Barrows and Roth, 1990). This infrastructural incentive preference scale form was adapted to Ragnar Frisch 1926 scale of preference. With this form, unanimously agreed ranking of on-farm and off-farm infrastructural incentives was obtained from each study site.

ii) Data sourcing through focus group discussions (FGDs), interviews and informal discussions. Five mixed sex FGDs were organised, one per community and the participants were 35 with Ambelle (6), Santa (6), Obout (8), Nkolmeyos (8), and Mvog-Mba (7). The FGD held in Mvog-Mba rural community was, however, with migrant farmers who were mainly in the domain of market gardening. Data from FGDs were corroborated by data from three semi-structured interviews (in Ambelle, Santa and Mvog-Mba) and additional oral histories gathered through informal discussions with two local employees (in Santa and Nkolmeyos-Mfou) of the Ministry of Agriculture and Rural Development (MINADER). FGDs and interviews targeted priority on-farm and off-farm infrastructural incentives, challenges of accessing the incentives, environmental constraints, on-farm and off-farm infrastructural coping strategies, level of networking as small farmers and their interactions with the local personnel of MINADER. Other related issues targeted included gender roles in the cultivation of food and cash crops, household labour use and management, and the influence of market price on farm investment and food security. Data from FGDs were recorded as unanimously agreed oral histories to facilitate coding.

iii) Field observation in the five rural communities constituted the third phase of the data gathering process. Field visits led to the observation of on-farm and off-farm infrastructures. On-farm

infrastructures included land preparation and sowing/relief adapted ploughing infrastructure, irrigation and watershed development facilities, compost production and fertilizers application facilities, crop harvesting infrastructures, post-harvest storage and washing, processing and cooling infrastructures. Off-farm infrastructures included transport and transportation infrastructures such as types and state of roads leading to farms, means through which farm produce is evacuated and type and access to markets.

Data Processing

The filled infrastructural incentive preference scale forms were assembled and input in adobe illustrator software where five preference scales were produced corresponding to the five study sites. The 13 infrastructural incentives checklist was compared for variations and unanimity in priority incentives for easy grouping. Based on the unanimity and variations in the arrangements of the preference scales priority incentives, three categories of i) Very strong incentives ii) Moderate incentives and, iii) Weak incentives emerged for easy analysis in relation to the imbroglio inherent in small farmer infrastructural incentives in SSA. Oral histories on on-farm and off-farm infrastructural incentives from unstructured interviews and FGDs were processed based on the *in vivo* approach of Anselm L. Strauss (1987), Meghan Cope (2003) and Miller-Rosser et al. (2009).

This involved: (i) Unanimous testimonies from participants in each of the five FGDs and those of the three interviewees and two informants were transcribed using Microsoft Word and interpreted to derive meaning from each historic account using *in vivo* codes and analytic coding framework; (ii) interpretation of the coded narratives on priority on-farm and off-farm infrastructural incentives emanating from the different data sources led to the identification of themes emerging from the data generated. Using content analysis (Adam et al. 2015), the themes were extrapolated and cross-validated for misplaced emphasis on or priority on-farm and off-farm infrastructural incentives in the study sites that served for the write-up. The themes were drawn in respect of the four categories of codes such as conditions, interaction among stakeholders, strategies and tactics, and consequences, commonly used in qualitative data analysis (Strauss, 1987, Gilbert, 1998 and Cope, 2003). Other aspects that guided the choice of themes were small farmer responsiveness to incentives and their coping strategies in farm production, productivity, evacuation of farm produce and commercialization for agricultural competitiveness, food security and poverty reduction as captured by the AfDB (2019) within the framework of High 5s and Agenda 2030 and Agenda 2063 in the light of the sustainable development goals (SDGs).

Oral histories generated by the FGD participants and the other informants were directly compared in the write-up with existing literature on the responsiveness of different incentives to small farmer investment in Cameroon and sub-Saharan Africa by extension as provided by African Development Bank (AfDB), Food and Agriculture Organisation (FAO), the African Union (AU), European Union (EU), New Partnership for Africa's Development (NEPAD) through the 2003 Comprehensive Africa Agriculture Development Programme (CAADP) and scholars. The comparison was intended to identify gaps in the data set between small farmer infrastructural incentives provided and the incentives actually needed by these smallholder farmers in Sub Sharan Africa (SSA) (Njara, 2017; Lawry, 2015; FAO, 2012; Gajigo and Lukoma, 2011; Were-Higenyi, 2010 and Barrows and Roth, 1990). This data processing phase, paved the way for presentation of the results and discussions.

3. Results and Discussion

Small farmers, particularly the women, feed the population of SSA and food resilience incentives in the sub-region are paradoxically least associated with land certification or titling unlike is predicted and confirmed in other developing regions of the world such as Asia and Latin America (Lawry, 2015). Working with 35 small farmers during FGDs in five different study sites in Cameroon, 13 proposed smallholder agricultural infrastructural incentives were arranged into three categories of very strong, moderate and weak incentives (fig. 2). In the first category where the scale of preference was uniform, the small farmers in this part of SSA, acclaimed land, seedlings, labour availability, roads and transportation as the lead priority agricultural infrastructural incentives. The second or moderate and the third or weak

categories of infrastructural incentives have some variations in the arrangement of the different incentives. The discrepancies notwithstanding, all the five priority preference scales carry land title as a smallholder agricultural infrastructural incentive at the last or 13 position on the scale. Oral histories on on-farm and off-farm smallholder agricultural infrastructural incentives provided ample justification narratives for the unanimity and variations observed either between or within categories.

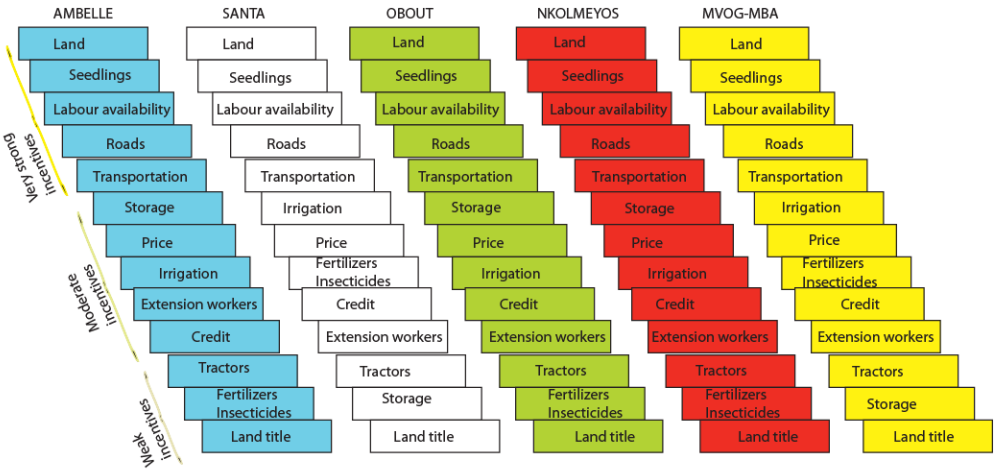

Figure 2: Smallholder agricultural infrastructural incentives preference scales

Oral histories from the three interviewees corroborated the preference incentive scale of the FGD participants. The informants acknowledged land as a primary input for agriculture in conformity with existing literature (AfDB, 2017; Malambo, 2014; Koffi, 2004 and http://www.yourarticlelibrary.com). They were of the view that for small farmer agriculture in SSA to sustain its role of feeding the population and enhancing poverty alleviation, the input based infrastructural incentives (land, seedlings, labour availability) should of necessity be complemented with roads and transport, which constitute physical infrastructural incentives (Patel, 2010) provided by states . Unfortunately, the levels of public investment (roads and transport) in rural areas in Africa are much lower than they are in Latin America and Asia (Lawry, 2015; Gajigo and Lukoma and World Bank, 2011). The lacing of agriculture, road connectivity and transportation in SSA remains critical as in many of the countries, 10-40% of harvest and as much as 89% in Tanzania does not reach the consumer due to inadequate supply of transport (Were-Higenyi, 2010). This is indicative of the quantitative and qualitative inadequacies of roads in SSA which have largely undermined evacuation of farm produce to homes and the markets. According to the World Bank, SSA has just 15% of paved roads (fig. 3) and comes last after Latin America in terms of road quality in the world (World Bank, 2011) with only about 30 percent of its rural residents have access to all-season roads (AfDB, 2009).

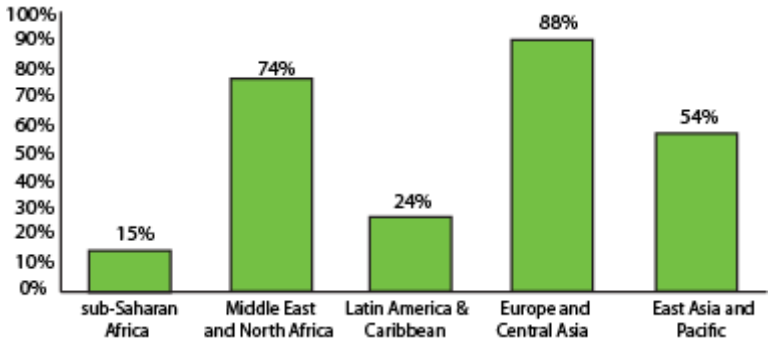

Figure 3: The percentage of paved roads between 1990 and 2005 across various regions
Source: World Bank (2011). World Development Indicators

Oral histories confirmed the fact that a well-maintained road network is crucial when infrastructural issues relating to agricultural productivity are discussed. Roads link small farmers not only with their input markets but also with their farm produce markets (fig. 4).

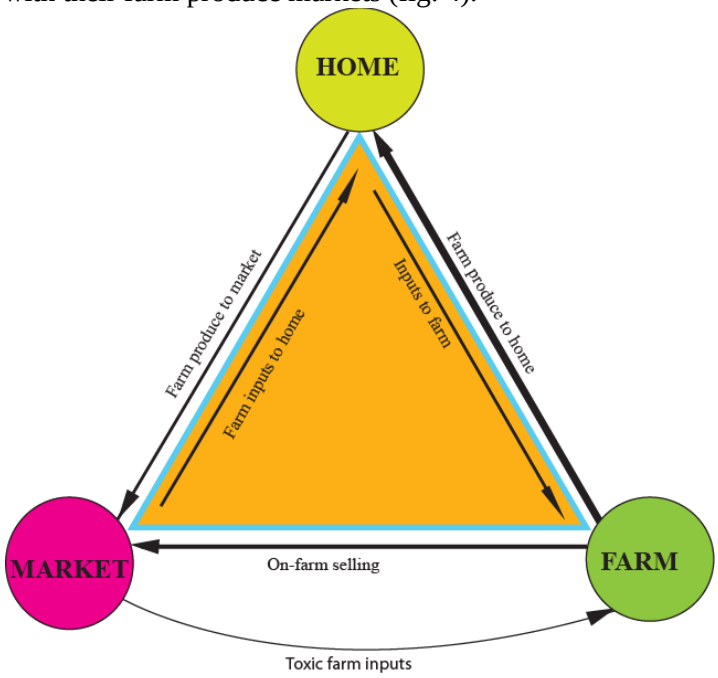

Figure 4: Small farmer tripodal transport circuit in SSA

In consonant with these narratives, it has been aptly concluded that lack of efficient transportation links and substandard roads decrease farmers' margins by increasing the cost of inputs and reducing their accessibility to their produce market (Gajigo and Lukoma, 2011). Corroborating these assertions, informants in all the study sites were unanimous that during the rainy season, farmers struggling to take produce to homes and subsequently markets, and women who sustain urban food systems through rural-rurban-urban food market linkages commonly known in Cameroon as *bayam-sellam*, spend, at times, close to a week on the way due to poor state of roads (fig. 5) or absence of transport vehicles. Such unexpected delays have often resulted in losses of the perishable produce.

Figure 5: Transportation of farm produce
Poor road conditions in Santa make the transportation of farm produce very challenging.
Photos by Nfor Delphine Mbongsi (28/02/2014)

In this connection, interviewees alleged that small farmers in the study sites are at times demotivated to invest due to inadequate infrastructure to take inputs to the farms or speculative fears of being unable to evacuate farm produce to homes and markets in case of good harvests. Within the economic perspective, a farmer who loses part of his/her perishable produce due to poor road conditions and transport will not hesitate to inflate prices in a bit to make up for losses. It is obviously this premium that the quality of roads adds to transaction costs that renders African goods more expensive and less competitive in the global marketplace (Gajigo and Lukoma, 2011). Thus, boosting agricultural production and productivity through incentivizing infrastructures such as subsidies, credit facilities, fertilizers, pesticides, farm equipment and machinery, water/irrigation, farm power/energy without effective guardrails for farm produce to reach the needy population and in good condition is a misplaced priority. Equipment and machinery infrastructures such as tractors and ploughs are huge and less adapted to the small farm sizes exploited and the rugged relief common in many production basins in Cameroon and SSA. This indicates that roads and transport are major determinant agricultural incentives to small farmers in rural SSA, though emphasis is often laid on tenure security.

The results show that the second or moderate and the third or weak categories of infrastructural incentives adopted by FGD participants in the arrangement of the different incentives are less unanimous even within regions. For instance, the second and third categories of the preference scale from Ambelle has storage in the 6th position which is in the moderate category, while Santa has it on the 12th position in the weak category. It is the same scenario between Mvog-Mba, and Nkolmeyos and Obout in the Centre Region. On the contrary, the moderate and weak categories of Santa in the North West Region match with those of Mvog-Mba in the Centre Region, while those of Ambelle in the North West Region match with those of Nkolmeyos and Obout in the Centre Region. The intra-regional variation and inter-regional unanimity observed are probably associated with the agricultural system, types of crops cultivated and the primary objective for their cultivation.

Small farmers, particularly women, who cultivate mainly for household consumption, need storage facilities most in order to preserve off-season food. This was the prevailing situation in Ambelle, Nkolmeyos and Obout in the time of study. Conversely, those small farmers, mostly men, who cultivate primarily for income generation, do so the whole year round, carry out on-farm sales, and rather require a lot of irrigation water and infrastructure for off-season/dry season cultivation and not storage and processing infrastructures. It was observed that market gardening is a major practice in Santa and Mvog-Mba and FGD participants in Mvog-Mba acknowledged to be farming migrants from the North West Region. This farming system is irrigation driven, particularly during the off-season/dry season. This is obviously the reason for which irrigation is at the first position on their moderate categories and much lower on the incentive preference scales of Ambelle, Nkolmeyos and Obout.

In Santa and Mvog-Mba, FGD participants recounted many irrigation related challenges, which include access to credit, fertilizers, training and water stresses associated with the impact of climate change, which is associated with prolonged dryness, erratic rainfall and seasonal distortions. This is in harmony with the usage of the concept of climate change by Inter-governmental Panel on Climate change (*IPCC)* where it is a *change* in the state of the *climate* that can be identified (e.g. using statistical tests) by *changes* in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. These climatic anomalies have a severe toll on agriculture in SSA in terms of water stresses and unfortunately, the robust institutional and policy framework needed to address the issue is near inexistence in SSA. Their narratives pointed to the fact that insistence on land certificates by financial institutions made it difficult for them to access credit facilities whereas their system of farming and environmental conditions warrant them to make greater financial investments than they employ as permitted by their personal savings and thrift and loans (*njangi*). They were of the opinion that land titles constitute extra costs for them and besides the fact titles could enhance access to loans, they do not find them necessary, particularly as the arrangements used in accessing the land cultivated, such as rental agreements and inheritance, guarantee their rights over it. Probably, limited financial resources accounted for the lack of on-farm water infrastructures for irrigation and the fact that those observed in the field were only improvised and at times proved cost and course ineffective as the irrigation process sometimes

serves as a source of erosion and water wastage (fig. 6). It was observed that the erosional process was quite severe when fuel powered water pumps were used for irrigation as the pumping force was difficult to regulate.

Figure 6: Irrigation infrastructures
Improvised irrigation infrastructures in Santa for off-season farming. From right to left, photo 1 shows improvised infrastructure, photo 2 shows the irrigation process and photo 3 shows the erosional effect of the irrigation process. Photos by Nfor Delphine Mbongsi (28/02/2014)

In Mvog-Mba, informants decried water stresses accentuated by climate change, which was impacting negatively on crop production and productivity even in the month of August as observed in the field (fig. 7). This was not the case in Santa where farmers needed no irrigation water since natural rain in the month of August was enough for crop cultivation.

Figure 7: Application of drip irrigation
Farmer learning by practice how to regulate water flow used in drip irrigation in Mvog-Mba community in Mfou Sub-division in Centre Region. Photos by Enchaw Gabriel Bachange (16/08/2019)

Due to such water stresses in Mvog-Mba during the month of August 2019, and the inability of farmers to purchase fuel for FCFA2000 in order to run their water pump, the researching team proposed a simple drip irrigation method to the farmers which is environmentally friendly, time, cost and water saving efficient (fig. 8). This irrigation system makes use of the clinical drip set tube and 1 or 1.5 litre waste plastic bottles and limited amount of water that irrigates individual plants. The plastic bottles serve as reservoirs for irrigation water and the drip set tube, which is inserted into the cork of the bottle serves to regulate the flow of water.

Figure 8: Drip irrigation for withering maize
Proposed drip irrigation method to fight against climate change and ensure sustainable farming in Mvog-Mba in Mfou, Centre Region. Photos by Enchaw Gabriel Bachange (16/08/2019)

Oral histories indicate that access to fertilizers and training were critical and controversial. While FGD participants in Santa and Mvog-Mba were considering fertilizers as a necessary incentive for their market gardening activities, they noted that the price African Financial Community (CFA) 25000 per bag of 50 kg is not very affordable. With the collapse of the structural adjustment programme and the disengagement of the State of Cameroon from the agricultural sector, issues of fertilizers and subsidies have become complicated and prices for both farm inputs and outputs are determined by market forces, putting the small farmer out of steam. Even training of farmers has become so challenging as agricultural extension workers focus on elite farmers who are more involved in export crops as observed in Ambelle. The three interviewees representing the ministry of agriculture and rural development were unanimous that working in the communities and with individual farmers is herculean and farmers do not easily form legal common initiative groups through which the can work with them. From the incentives preference scales, the communities of Ambelle, Nkolmeyos and Obout had little regards for fertilizer as an agricultural incentive, not only for its exorbitant prices, but also for its associated health effects. Informants ascertained that health wise, subsistence production in SSA is quite grounded in quality and one of them alluded to the fact that in towns, when mothers send housemates to markets for the purchase of vegetables, they caution them to buy only from the women coming from the villages.

4. Conclusion

What is most important as to priority incentives to small farmers in SSA has up till now been a subject of controversy. While global approaches to agricultural incentives prime land tenure security and macroeconomic policies, existing literature vis-à-vis SSA holds a contrary view. Emphasis on boosting agricultural production and productivity through incentivizing infrastructures such as tenure security, subsidies, credit facilities, fertilizers, pesticides, farm equipment and machinery, water/irrigation, farm power/energy without effective guardrails for farm produce to reach the needy population and in good condition is a misplaced priority. The bulk of farmers in SSA are smallholders who live mainly in inaccessible rural areas and function within the realm of customary tenure system and institutions where people gain access to land as a social right, granted by virtue of their membership in a community (Lawry, 2015). Customary law institutions guarantee tenure security and adjudication without recourse to complex, costly and time consuming statutory procedures. In that respect, statutory tenure security is not an issue in the domain of agricultural investment as they are preoccupied with the fluidity of inputs to the farms and evacuation of farm produce to homes and markets. Even in situations where on-farm sales take place, the buyers must ascertain the possibilities of merchandise evacuation before any transactions are made. If not, they go in for a pre-emptive approach where farmers use whatsoever means (head and backload, trucks, wheelbarrows and bikes) to evacuate farm produce from inaccessible rural areas to rurban areas where buyers could easily convey them to urban centres. This has led to the emergence of the phenomenon of rural-rurban-urban food market linkages commonly known as *bayam-sellam* in

Cameroon. The underpinning factor here is accessibility (transport and transportation) and if a farmer knows *apriori* that he/she will lose as much as 40% of harvest due to inability to take the farm produce to home or market (Were-Higenyi, 2010), then, the level of input investment will be affected. The quest for farm produce evacuation has been observed to be the driving force behind unprecedented unplanned pioneer fronts in most of SSA after logging activities wind off in an area.

A small farmer incentivizing policy shift is therefore indispensable in SSA for policy and reality to coincide. Infrastructural incentives constitute a primordial agricultural booster to small farmers in SSA rather than registration of titles. It has been said, where a road passes, development follows. The precarious state of transport and transportation in SSA is a reflection of the general characteristics of on-farm and off-farm infrastructure in the sub-region. At the level of the small farmer, on-farm and off-farm infrastructure are only improvised. In addition, with the disengagement of states from the agricultural sector since the collapse of the structural adjustment programmes in the 1980s, effort to stimulate rural infrastructural development is rather dwindling. This has a bearing on the small farmer, food security and the competitiveness of agriculture in SSA. Best practice title registration policy in SSA should be viewed as a policy to assist in the evolution of land tenure institutions already under way, rather than a policy to stimulate fundamental change in small-scale agricultural investment. In which case, registration should be a strategy to avoid negative equity effects when farmers are threatened with loss of land to politically powerful individuals (Townsend, 1999).

5. Acknowledgments

It will be intellectual dishonesty on our part to claim that only the effort of the two researchers and authors of this paper led to its successful end. We thank Dr Ndi Roland Akoh for forwarding the call for papers to us and we are grateful to the all the small farmers in Ambelle, Santa, Mvog-Mba, Nkolmeyos and Obout who were very collaborative and took us to their farms, particularly those in Ambelle and Santa at this time of war in the Southern Cameroons. We are also grateful to the bike riders who equally served as confidence builders and eased the organization of focus group discussions. We are particularly thankful to the Chief of Mvog-Mba and the wife who also served as field facilitators in Mfou. We are also indebted to the local employees of the Ministry of Agriculture and Rural Development (MINADER) in Santa and Nkolmeyos-Mfou and the interviewees in Ambelle, Santa and Mvog-Mba as well as the authors whose works we consulted. We equally thank the organizers of the 2nd Congress of the African Scientific, Research and Innovation Council (ASRIC) for putting us to task by selecting our abstract. Finally, we thank God for providing us with the means, inspiration and health to do the job. We have no valuable words to express our thanks, but our hearts are still full of the favours received from everyone.

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