

Toward a Socially Oriented Agricultural Model for Africa's Renaissance

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Abstract

In this paper, African Renaissance is discussed from the perspective of new interests in African agriculture. Opportunities in Africa in agribusiness are growing. But accompanying this growth is a model of agriculture based on application of high technical inputs, under the narrative of agricultural intensification. However, there is evidence to suggest that new interests and practices toward harnessing Africa's potential for agricultural development for the African Renaissance are not sustainable due to constraints and disadvantages to small-holder farmers. This paper draws from empirical qualitative research on sugarcane farming in the Chemelil area in western Kenya to demonstrate that the high technical input model of agricultural intensification stifles farmers' political power and will to control their lands and thus to innovate to benefit from their lands. The paper calls for a socially oriented model of agriculture toward contributing to the African Renaissance.

Keywords

agriculture, inputs, control, farmers, renaissance

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Introduction

Drawing from field research in Chemelil, western Kenya, this paper addresses renaissance with particular reference to agricultural systems that place control of production in the hands of farmers and thus promotes locally driven agricultural approaches. The African Renaissance, therefore, is discussed in this work within the frame of agricultural development. Opportunities in African agriculture from on-farm production through to agribusiness in general keep on a growth path attracting investments. From the perspective of new interests in African agriculture as a major contributor to poverty reduction and fostering prosperity, this work draws attention to the urgency of farmers' control over agriculture as a practicable means for local economies to regain the benefits of agriculture that have been lost over the years to neo-liberal, profit-oriented extra-local interests. Particularly, this present work links agricultural intensification in the form of sugarcane production in Kenya with land productivity theory, and analyses outcomes of this linkage for sugarcane farmers' ability to gain control over agriculture and thus benefit appropriately. In a country where agriculture, particularly intensive cash crop farming such as sugarcane contributes more than 25% to national income,¹ and land being the primary asset of farmers, agricultural intensification connects with liberal, extra-local input markets to pose significant financial and political constraints for the development of an integrated agriculture especially for small holders. Land productivity theory applied in current intensified commercial agriculture emphasizes high investments in chemical and mechanized agricultural inputs such as fertilizers, weedicides, pesticides, tractors, and scientific soil testing. Decisions over financing and application of these inputs however lie largely outside the discretion or control of farmers. It is contended, based on field research findings for this work, that African agriculture pursued within external input-driven intensification does not incentivize farmers and agribusinesses to invest in local infrastructure over which farmers could have stronger control. Such agricultural development infrastructure include integrated livestock and crop farming, agro-forestry systems, micro-climates, and local research infrastructure among others.

Agricultural intensification is a discourse within the debate on how best to promote the production and conservation of agricultural land. This debate is dominated by two disparate contentions, which are the land sparing and land sharing positions (Loconto et al., 2020; Loos et al., 2014). On one hand, the land sparing position, supported by agribusinesses and pro-liberal scientists, contends that land production and environmental conservation can be served better when production and productivity of land are concentrated on defined land spaces thus preventing encroachments on reserved or biodiversity-rich

lands. In this sense, the efficiency of cultivated land would be increased through application of technical inputs, which would make it unnecessary to encroach on biodiversity rich areas. On the other hand, the land sharing position argues that land production and environmental conservation can be obtained in a mutually beneficial relationship where different commodities are produced on the same piece of land, though yield would likely be lower than in a land sparing production (Loconto et al., 2020). The land sharing position, unlike land sparing, does not support mono-cropping, which is the main approach of the land sparing stance to attain increased land productivity. Rather, land sharing supports a diversity of crops, animals, and other environmental resources and infrastructure beyond mere inputs, reproducing side-by-side on a piece of land.

In both positions however, the belief is that technology and capital inputs can lead the way in increasing land productivity, that is, to produce more with a set of given inputs. For instance, Mdee et al. (2021) referencing Manjengwa et al. (2014) note that a technical narrative of efficiency often is the basis for framing answers to questions of how and who can make the best use of agricultural land in Africa. In this work, this author makes a distinction between the two strands of the debate and re-categorizes them as technical input-centered approach to agricultural development and socially oriented approach to agricultural development. The technical input-centered approach to productivity and agricultural development is heavily dependent on capital inputs like industrially manufactured improved seedlings, inorganic fertilizers, weedicides, and small farm machinery. The production of these inputs occurs mainly outside the agency of farmers. Based on results of the field research that is presented in latter parts of this paper, the socially oriented approach in the context of this work denotes a more integrative development of agriculture that recognizes the potentials and capacities of human and material resources of farmers to contribute to locally driven agricultural practices. The latter approach thus requires identifying and developing capacities of local people and local resources to integrate into technical inputs in the production of farmland. In this way, renaissance processes that place African agriculture in the hands of the dominant small-holder farmers can be assured. This would counter the imposition of alien values and practices on African peoples (Nabudere, 2001).

Methods

The author of this work has been conducting field research on the sugarcane plantations in Chemelil and Mumias, both in the western part of Kenya, since 2018 on questions around environmental resources conservation. In this

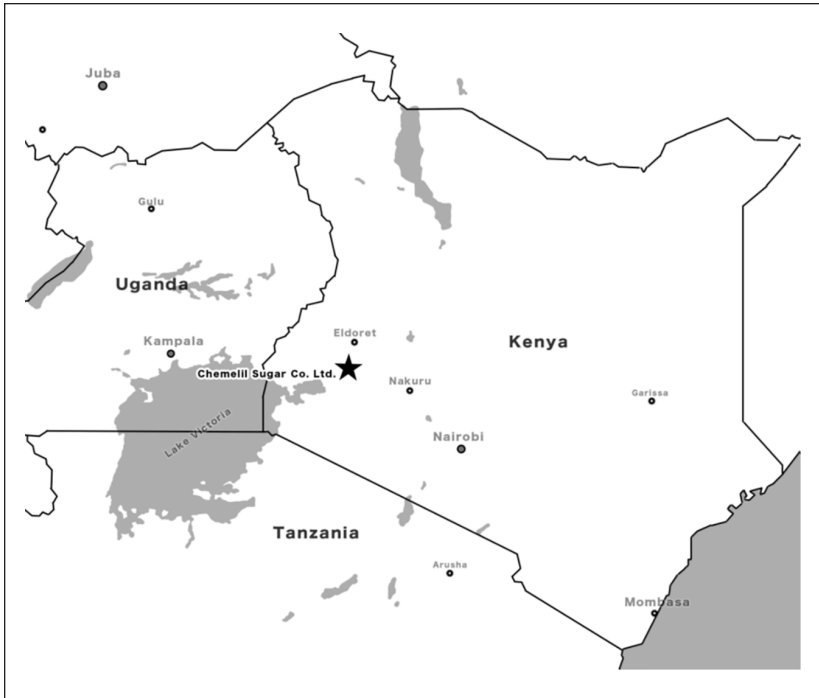


Figure 1. Map of Kenya showing location of Chemelil.

Source. Adapted from Narh (forthcoming).

regard, this paper draws from this extended field research, with more focused interactions in July 2021 toward this work, among 28 farmers and four officials of Chemelil Sugar Company in Chemelil. Located in the Nyanza region of Kenya, the Chemelil area (Figure 1) is chosen for this paper as a part of a wider study on agricultural intensification and conservation rights in Kenya.

Motivation for deciding on Chemelil stems from the Company's recent history of suspensions in operations and resumption, reported by residents and Company officials during the author's casual visits in Muhoroni, Mumias, and Chemelil. These casual visits were held few months before substantive field research in 2020. The Company's resumption in operation affords the researcher the opportunity to identify agricultural development factors that might have contributed to the suspension and new innovative ideas that may have been incorporated into farming toward resumption of operations.

Farmers owned their farmlands, with only a few leasing their lands from their neighbours for two or three cane growing seasons. Land leasing has

implications for conservation. Farmers on leased lands are less concerned about conserving the lands, in terms of introducing more organic forms of farming. This is because these farmers often must leave the land after harvest, often after the second or third ratoon (4–5 years), meaning that they would exploit it with all the chemical inputs they can afford. Nonetheless, the input-centered model of sugarcane production is practiced by both farmers; those who own their lands as well as those who lease land.

Qualitative in-depth interactions and informal conversations were conducted among 28 sugarcane farmers in the operational zone of Chemelil Sugar Company. These farmers were sampled purposively based on prior-obtained consent and willingness to interact with the researcher. Most of them were small-scale farmers cultivating between 2 and 10 acres of land. Medium-scale farmers cultivated between 11 and 150 acres of land, and large-scale farmers cultivated farms bigger than 150 acres. Interactions with the farmers were conducted within the operational zone or cane catchment zone of the Chemelil Sugar Company. This means that all the farmers interviewed supply their cane to the Company and take extension service advice from it.

The Chemelil sugarcane catchment zone is a large area in Nyanza, bordering the Nandi hills and extending almost to Kisumu city. The zone is divided into four, with four extension service officers from the Chemelil Sugar Company each operating to assist farmers in a zone. All the interviews were conducted in the presence of these extension officers. They assisted with interpretation of interactions where necessary, from Kiswahili to English, and generously provided a motorcycle for mobility into the remote areas of farmers. Thus, the time for traveling around each day with these officers offered opportunity to this researcher to interact extensively with them on the issues of the research.

Sometimes informal, impromptu, and casual, extensive interactions were held with four key officials of the Chemelil Sugar Company, in the Outgrowers, Cane Development, and Cane testing sections of the Company. These interactions with Company officials focused more on cane development visions and practices of the Company. Most of the practices and technical inputs involved in cane development were recommendations from national research institutions such as the Kenya Agriculture and Livestock Organisation (KALRO). The core insights obtained in these interactions with these officials, as well as with the extension service officers on their motorbikes, centred on technical requirements for cane development and support for farmers. These insights served usefully to triangulate with the results of the interactions with farmers.

Transcripts of these qualitative interactions were analyzed inductively through the Atlas.ti qualitative data analysis software. Codes that describe segments of transcripts were first generated, primarily following the ‘Noticing, Collecting, and Thinking-about’ method (NCT method) of Atlas.ti analysis (Friese, 2014). These were categorized into broad themes, and subsequently into cross-references to identify relationships between themes. The inductive process pursued in data analysis meant that the field interactions, and subsequent generation of codes, categories, and themes were not directed by the dictates of any specific theory. In line with qualitative research, insights from literature and existing discourses served as guiding frames for analysis but researchers are open minded to uncover new events and processes (Creswell, 2014)

The Situation in Chemelil

Intensive application of capital inputs in monocrop sugarcane agriculture, characteristic of agricultural intensification systems, presents opportunities as well as challenges for farmers. Opportunities include access to ready markets, cash income, and reduced labor needs from the employment of technologies. Nonetheless, the case of Chemelil shows that challenges for farmers from application of fertilizers, weedicides, pesticides, and plows, among others in the cultivation of sugarcane pose significant costs and control on them on their own lands. Below in subsequent sections, results (illustrations) from the field research are presented that demonstrate two main conditions of cane farmers: (1) farmers are highly dependent on the sugarcane processing firm for agricultural advice; and (2) farmers face a liberal input market where they could get chemicals, machinery, and labour from market sources but also expend hugely on these inputs. These field transcripts demonstrate that farmers, together with the extension service advice from Chemelil Sugar Company, are deeply integrated into the financial profit-driven, market-oriented form of farming at any costs, and thus there is little concerted effort for home-initiated agricultural development infrastructure that could emphasize conservation goals, as well as social and political capacity development of farmers to control agricultural development and benefit sustainably.

Farmers’ Dependence on Farm Inputs

The quotations below from field transcripts were generated from the Atlas.ti qualitative data analysis software. They demonstrate that development of sugarcane farms has led to farmers’ heavy dependence on the Chemelil Sugar

Company. Cane development is constituted of a set of processes through which company officials and farmers work together to ensure proper functioning of cane farms for high productivity. Farmers are supervised by field officers from Chemelil Sugar Company to ensure continued production and provision of sugarcane to the firm. Farmers expressed this dependence clearly:

13:1 U: #00:01:32-0# No, you see first of all the Company encourage... . . (1190:1229) - D 13: Chemase Kibisem farmer1_feb2020

U: #00:01:32-0# No, you see first of all the Company encourages the farmers to obtain the right seedlings from their officers or other farmers. So that means it also advises us on development of our plots, that is, how we apply fertilizers, weedicides, control pests, plant maize in between the young canes etc. These are done in any of the ratoons. #00:02:20-3#

42:1 A #00:02:18-8# So, Chemelil Sugar Company, at the starting. (1655:2159) - D 16: Chemase Kibisem farmer3_nov2018

A #00:02:18-8# So, Chemelil Sugar Company, at the starting point, their officers came to every farmer to advise on how we can grow our cane. Now, we mostly do not need them that much because we do things from experiences. But we still follow their advice even if from our own experiences. But anytime we call the field officers they are here promptly. #00:04:10-7#

24:4 D #00:03:41-4# So, Chemelil Sugar Company advises us on... . . (3073:3401) - D 56: Kibigore farmer1_nov2018

D #00:03:41-4# So, Chemelil Sugar Company advises us on fertilizers use such as Urea and NPK application. But we buy these fertilizers and other chemicals from anywhere in the market. We also buy weedicides such as Sencor Plus and some pesticides. Every farmer here uses one chemical or the other. We buy them ourselves and sometimes the cost can be so high on us. #01:56:33-8#

Agribusinesses like Chemelil Sugar Company in pursuing cane development provide constant input application advice to all farmers. Doing rounds in Chemelil with two of the field officers revealed that some farmers have gained experience from these practices, and hardly do they need the field officers unless new developments occur. For the company, this is important support for farmers. But against the background that farmers spend a lot of money on these inputs, the contention is evidenced, that the input-centered model of agriculture integrates farmers highly into the chemical-based productivity paradigm of agricultural development and ensures that they remain so integrated keenly, irrespective of expenditures that they incur.

The reliance on chemical and machinery inputs has created a high dependence of farmers on the input market and on Chemelil Sugar Company for

what is often described by both farmers and the Company as good cane development process. Until recently, the absolute weight of the harvested cane determines how much a farmer makes. Yet even now, the sucrose in the cane determines to a large extent how Chemelil Sugar Company accepts the cane and pays for it (i.e., according to the sucrose content). To this end, farmers have no option or have only little room to maneuver. They strictly follow the standards of the Chemelil Sugar Company. Under financial and environmental pressures, farmers continue to grow cane because it is the economy they find themselves in, where at least market and cash revenue are mostly assured, however low or high. It is not in doubt that the cane industry has benefited farmers financially to some extent. Yet, the results of this dependence and control is that agriculture serves the interests of stakeholders including farmers individually, but not environmentally sound and integrated agriculture that places control over land and development processes in the hands of farmers and develops their local economies (Narh, 2019).

Liberal Input Market and Farmer Innovation

Farm chemical inputs such as fertilizers, weedicides, and pesticides are sold on the open market in major agrochemical shops in Chemelil. These shops (Agrivets) are reliable, operating most days. The owners live with farmers thus, are conversant with and understand farmers' needs. They also form an infrastructure of farm input advice for farmers. These input markets are liberal, with owners determining their own prices to some extent, according to market conditions, relationship with the farmer, and distance of the shop from the farming community. Though Chemelil Sugar Company advises on which inputs are suitable for which farming zones, it does not supply farmers with fertilizers nor any chemicals. Thus, farmers are at liberty and at their own risk to buy from shops in the open market.

Buying from these shops are convenient for farmers than buying from Kisumu city or Nairobi city and transporting all the way to Chemelil. The sugar factory promotes the use of fertilizers to increase yield and thus, farmers feel justified to purchase them. These Agrivets therefore play a significant role in mediating the cost expenditures of farmers. Year in and out, farmers apply these chemicals to sustain their industry, even though they complain that the farms are losing their productive capacities unless more doses of fertilizers are applied. These sentiments expressed below are revealing:

**10:4 B #00:02:12-4# Every farmer should use the fertilizers after.
(3063:3201) - D 18: Nandi farmer3_Oct2020**

B #00:02:12-4# Every farmer should use the fertilizers after ploughing and plants are on the field else you cannot meet the goal of Chemelil Sugar Company or even you would not produce much for revenue for you. You see, but we are also suffering. The soils are weak from years of fertilizer application and ploughing and now we must increase the fertilizers we apply to achieve the same amount of yield. #01:76:22-9#

11:2 K #00:04:14-5# We know we have land, animals, and some. . . . (5022:5102) - D 08: West songo farmer1_July2021

K #00:04:14-5# We know we have land, animals, and some native crops that benefit us a lot in terms of food but can also be used on our farms to minimize our use of fertilizers. But for me per se, and for so many farmers in fact, we are not interested in these traditional things beyond using them for food. Our science of these things as farm inputs is low and that is how it has been for a long time. #01:13:20-7#

Chemelil Sugar Company is confident that farmers do apply the inputs required for standard harvest. Yet, financially the burden of these inputs is borne by the farmers. Financing these inputs every year is a high priority of these farmers even with the observed negative consequences for soils and farm conservation. Especially for small scale farmers, the high dependence on, and cost of, these inputs mean that they cannot afford to cultivate less else they would earn nothing. In these circumstances, farmers are even more indebted to these input markets and the extension services of Chemelil Sugar Company. Farmers do not have the capacity to develop their local agricultural development infrastructure such as integration of livestock with crops farming, agro-forestry, micro-climatic conditions, and local research infrastructure among others.

Chemelil farmers are not oblivious of the opportunities for developing of local infrastructure for agricultural development that can provide them with better control over their farms. For instance, crops like peas, maize, and numerous legumes are interplanted with sugarcane during the early years of cane growth. Cow dung is abundant in rural Kenya, where almost every home owns a cow or two. Moreover, Chemelil Sugar Company produces a lot of by-products from its cane processing, such as bagasse and molasses, which could add to locally driven agricultural development that utilizes farmer agency. The Company produces some minimal level of electricity with the bagasse for its operations and sells molasse to local vendors who sell to livestock farmers (Figure 2). Farmers are aware that these are potential sources of local resources for agricultural development that minimize their dependence on externally driven inputs. They are also aware that these local



Figure 2. A local molasses vendor in Chemelil.

resources hold potential economically and environmental to sustain their lands into the future.

Yet, the strong urge to produce quickly and to meet the current standards of Chemelil Sugar Company so as to make as much revenue, constraint farmers' (and Chemelil Sugar Company) enthusiasm to develop these farm-level potentials into viable agricultural development resources. The high financial outlay on farm chemicals also reduces capacities of farmers to develop these resources.

A socially Oriented Model of Agricultural Development

Drawing from findings of the field research in Chemelil, and through a conservation infrastructure framework, this paper seeks to redirect attention toward the potential of integration of farmers' agencies and local resources in integrated agricultural development that places farming in the control of farmers. The integrated agricultural development approach addresses the integration of environmental, social, and political benefits for farmers with infrastructural development in agricultural intensification (Chester et al., 2019; da Silva & Wheeler, 2017). Conservation infrastructure here denotes

physical and institutional set-ups through which practices and processes that provide goods and services for societal consumption are performed, and through which everyone that consumes a product has a chance to contribute to sustaining the environmental resource producing that product. In the context of this work, conservation infrastructure that facilitate integrated agricultural development include irrigation schemes, marketing cooperatives, crop research facilities, agro-forestry systems, micro-climates among others (Buhr, 2003; Netshipale et al., 2020). The development of these infrastructure should not however reduce the relevance of agribusinesses like Chemelil Sugar Company. In fact, they possess capacities and form a potent partner for farmers to develop agriculture that address not only profit needs but political, social, and environmental needs as well (Yumkella et al., 2011).

To envision and develop agriculture as an integrated system of infrastructure in the hands of farmers, one would look out, for example, for how water canals connect with compost making structures; how composting structures connect with harvest and silo residues; how harvest and silo structures connect with fodder banks and so forth. These sets of integrated conservation infrastructure provide various integrated services, such as irrigation water flow through canals; the composting structure producing organic manure that can be transported through the flowing irrigation water to farms; the composting structure fed by harvest and silo residues to maintain reproduction of organic manure; harvest and silo materials linked to energy and transportation channels to and from farms and so forth. The essence is that whatever infrastructure exist, they should be interconnected to provide a holistic space of opportunity for farmers to innovate. The idea is that integrated infrastructure provides more space for farmers to act freely to express and put their skills and potentials to practice, than directly being supplied with industrially developed inputs and information to work with that lead to their dependence and domination.

In the sense of the preceding paragraph, the renaissance of agriculture means that agricultural development is in the hands of local farmers. Collaborative efforts between farmers, agribusinesses, and the state can pay for the development of these infrastructure. Control over the network of infrastructure would be jointly held by farmers, agribusinesses, and the state such that farmers can find leverage to decide over their lands while contributing to wider economic, social, and environmental policy goals. The integrated agricultural development based on conservation infrastructure as posited in this work for agricultural renaissance is premised on the idea that farmers would be enabled to employ their own ideas to farming, thus counter the hegemonic control of agribusinesses and the state on their lands. Thus, the space for farmers to express freedoms for innovation is fundamental to this socially oriented agricultural model and agricultural renaissance.

With enhanced value in the farm-level resources available to farmers to develop agriculture in their own hands, farmers can reduce their expenditures on inorganic capital inputs which has been shown to lead most often to soil and land degradation (Koch et al., 2019; Loos et al., 2014). Farmers, with support of agribusinesses and the state, can develop their capacities to innovate. The UNDP defines capacity as “the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner.” (UNDP, 2007). Increased capacities of farmers continually means that with even more options and liberty by which to take decisions over their lands, farmers can solve their own problems with support from other stakeholders rather than entirely depend on these stakeholders.

The Problem With Technical Input-Centred Agriculture

Pursuing the goal of high land productivity to save land and land resources is premised on a high technical input model of production and sustaining agricultural land (Loconto et al., 2020; Mdee et al., 2021). This is where farmers are directed through “experts” advice to adopt extra-local inputs and technologies, crop production standards, and marketing standards, all aimed at enhancing the yields of and profits from farmland. The land productivity goal pursued in this model has driven intensified agriculture into prominence in Africa over the last five decades (Loconto et al., 2020). It has promoted intensive application of high capital inputs such as chemical fertilizers, weedicides, pesticides, mechanical plows, and “improved” seedlings in agriculture in many countries that also integrate farmers into a market economy (Loconto et al., 2020).

These technologies and capital inputs, often developed inorganically, are expected to guide how much and what kind of yield can be produced from a given piece of land. Yet, the persistence of land degradation, loss of farmers’ ingenuity, and rising land fragmentation have produced concerns about the sustainability of the technical input-centred model of agriculture (Narh, Forthcoming). The premise that intensive agriculture based on the technical input-centred model can be sustainable to produce land efficiency and conservation falsely suggests that all stakeholders can pursue conservation and sustainability as core interests. Mdee et al. (2021) extensively report that agricultural intensification has failed to be sustainable and inclusive. Though agricultural intensification is touted as a viable path for agricultural development in so-called developing countries, the sustainable intensification goals of equity, environmental sustainability, and productivity have not been achieved in Africa (Mdee et al., 2021).

In Africa, agricultural development cannot be separated from the political, cultural, and social conditions of people. These are important factors that shape sustainability of land production and grant control of farmers over their lands (Sarfo-Mensah & Oduro, 2010; Somé, 1999; Teye, 2011). Indeed, agricultural development has attempted to shift on from intensification with exclusive application of chemicals and machinery to boost productivity, to sustainable intensification that emphasizes the minimization of negative environmental impacts. Yet, this later effort only tends to prioritize more the importance of minimizing the environmental impacts of intensification (Cook et al., 2015) and does not necessarily place agriculture in the hands and agency of farmers. In fact, in sustainable agricultural intensification, though sustainability and inclusive goals are emphasized, there is still the risk to pursue agricultural development through a narrow focus on technical interventions to increase production, that do not lead to environmental sustainability nor inclusiveness (Mdee et al., 2021).

Nonetheless, the technical input-centred model, capital intensive commercial agriculture driven largely by high profit interests remains dominant in agricultural development in Africa. It is obvious from the results of this author's field research that response to the dominance of the technical input-oriented approach to agricultural development has left farmers reeling at the expense from the high expenditure in financing productivity (Waswa et al., 2012). Purchases of fertilizers, weedicides, pesticides, plowing services, and soil testing services, among other inputs bear heavily on farmers. In these circumstances, not much funds is left to spend on investments to develop integrated infrastructure such as farm conservation, agro-forestry, integration of plant and animal residue to produce inorganic manure, among others. These are crucial infrastructure and have shown to produce profitable results (Lindell & Kroon, 2010). But in view of the motive of agribusinesses to harvest for profit, and ironically, governments' emphasis on modernizing agriculture based on high technical inputs (see Kenya Vision 2030 for instance), the author's research in Chemelil shows that little has been invested in the development of these on-farm local resources into a viable agricultural development infrastructure.

Political Outcomes of Technical Input-Centred Agriculture

The argument in this work is not against agricultural intensification nor technical inputs contributing to solutions toward addressing agricultural challenges. In fact, it supports intensification because it is an important approach to tackling poverty and redundancy in agriculture. Some authors have warned that constructing large-scale development interventions such as intensification

solely as obliterating locally grounded agricultural strategies masks the complexities of agrarian change and does not make for understanding the nuanced ways in which local agency interacts, overlaps, and intersects with external interventions to produce hybridities and complexities that are important for rural transformation (Clay, 2018). From a Rwandese experience, Clay (2018) observes that large-scale state supported intensification as development intervention has existed alongside small-scale intensification by smallholder farmers, in overlap, integrative, and parallel manners. Yet, in Chemelil, evidence suggests that the dominance of the technical input-centred model of sugarcane production stifles farmer control over land and their capacities to develop farm-level agricultural conservation infrastructure. Politically, the technical input-centred model of agriculture has rendered farmers to not believe in their own capacities to innovate effective farming models. For instance, though farmers in Chemelil believe growing legumes such as beans provides some nutrients to soils, adhering to the cultural practices taught by Chemelil Sugar Company and the application of chemicals to obtain a certain standard of cane is more important to them. Thus, they grow beans but not much for its relevance to provide nutrients to plants.

Financing the inorganic fertilizers, weedicides, pesticides and mechanization required in cultivating cane has become imperative such that farmers' cooperatives are more oriented toward loan provision to its members to finance these inputs. For instance, the Chemelil Outgrowers Company and the Gakwamba Farmers' Cooperative are very helpful to farmers and are focused largely on mediating cane marketing and technical input supply to farmers through credit schemes. These structures therefore serve to facilitate the dominance of the technical input-centred agriculture model. They contribute to entrench the power of agribusinesses and fertilizer producers over farmers' agency to innovate. The technical input-centred agriculture and associated corrosive outcomes for farmers is indeed pervasive beyond Chemelil. Mdee et al. (2021) report on Malawi, Tanzania, and Zambia that the technical input-centred agricultural intensification renders small holder farmers indebted financially in these countries. However, in Chemelil as in other parts of Africa, technological innovations toward improving agricultural productivity are even more indispensable today than before in view of increasing human populations, perceived scarcity of land, and decreasing labor force in agriculture. To this end, technical input-centred agriculture, as Clay (2018) argues, cannot be completely done away with. In fact, the force of technological innovations in harnessing our natural environment is so powerful that we cannot slow it down; rather we must redirect our values and economies toward genuine transformation that is owned by people affected most by transformation (Atkisson, 2006; von Weizäcker, 2006).

Nonetheless, while productivity technologies are collectively a means to continually reproduce land, increasing populations and growing demand for food mean that increasing use of these technical inputs are likely to occur even while their prices are high and agricultural lands become more limited in supply and productivity. Moreover, the current Covid-19 pandemic and associated profit loss to agribusinesses means that lands can likely be subjected to increased application of fertilizers and other chemicals to make up for lost revenues and to take advantage of rising food prices. But the prowess of technology and industrially produced capital can only likely become less efficient overtime as soils get exhausted, and the debt burden of farmers deepen through increased purchase of fertilizers and agro chemicals. Of course, the upside could be possible where farmers would earn more revenue to afford more farm chemicals to replenish soil nutrients. But then, projecting from current conditions of increasing exhaustion of land as well as debt burden of farmers (Waswa et al., 2012), it can safely be contended in this work that the technical input-centred approach to agricultural development focusing on application of high industrial and extra-local chemical and mechanical inputs, can lead to an alienation of the African farmer from their lands and agriculture. Under these circumstances, the sustainability of agriculture in Africa, and thus renaissance of home-grown solutions in agriculture and transformation in general are at risk. In the sugarcane industry in Chemelil, these risks of the technical input-centred approach are evident. Narh (forthcoming) found out that the outcomes of the technical input-centered approach to agriculture endangers resistance and counter strategies from farmers that eventually jeopardize the sustainability of agriculture and agrobusinesses.

Sustainability Outcomes of Technical Input-Centered Agriculture

Sustainability goals in agricultural intensification have been, supposedly, formulated and integrated into agricultural intensification to address the negative implications of the over reliance on technical inputs. Today, there is talk more of sustainable agricultural intensification than just agricultural intensification (Loos et al., 2014; Mdee et al., 2021). Sustainable agricultural intensification is supposed to strive toward simultaneous attainment of social and economic prosperity, environmental conservation, and a central place of the ingenuity of the farmer. However, the profit motives of agribusinesses and the state, which has also incorporated and overwhelmed the farmer, has produced results that are far from enabling conservation of natural resources (Koch et al., 2019). Farmlands are harnessed without benefits to environmental, social, and cultural needs of farmers.

Though agricultural intensification discourse has moved on from intensification to sustainable intensification, commercial agriculture in many parts

of Africa fails to address the social, political, environmental, and cultural concerns of farmers, because it is largely based on high technical solutions to produce increased yields (Loos et al., 2014). In Malawi, Tanzania, and Zambia for instance, Mdee et al. (2021) found that agricultural intensification has not been inclusive, sustainable of natural resources, and has been embedded in local and international politics that deprive farmers of real benefits. Similarly, Mazwi et al. (2019) and Amanor and Chichava (2016) reports on Zimbabwe, and on Ghana and Mozambique respectively, that intensified crop farming has weakened farmers political power to counter exploitative interests of agribusinesses. In same vein, in South Africa, high technical input solutions have not shown any positive results in crop yields more than traditional practices (Mather, 1996). In fact, ecological problems such as loss of soil fauna and important microbial activities persist from the continued monocropping culture and high chemical input application that mostly characterize agricultural intensification (Matson et al., 1997). Thus, Matson et al. (1997) had questioned the long-term sustainability of intensification of agricultural production.

Cook et al. (2015) note that sustainable intensification is a good paradigm for increasing food production. However, it is inherent with models that inadequately address cultural, social, and political factors that mediate conservation of land. Moreover, Koch et al. (2019) assessed the impacts of the land saving stance of the agricultural debate, which is the premise of agricultural intensification, and conclude that intensification can rather lead to loss of biodiversity and profits if population growth and demand for land is not contained within limits of land availability. With increasing population in Africa, and with land being subjected to fragmentation, it is the view in this work that the prioritization of the technical input-centred model for agricultural productivity by farmers, agribusinesses, and state institutions, has overshadowed investments in an integrated, socially oriented agricultural development approach that place the farmer at the centre of innovation and enable him or her to develop local resources to enhance productivity. This, it is contended in this work, is a surer way for an African Renaissance-inspired transformation through home-grown solutions.

Though not in Chemelil, Corporate sustainability reporting tools (SRTs) are often cited by agribusinesses involved with farmers' resources as the institutionalized mechanism to repair and safeguard the environmental resources affected by their operations. Such mechanisms as Global reporting initiative, Corporate-citizen responsibilities, Corporate social responsibilities, and Sustainability reporting indeed go a long way to contribute to repairing and saving environmental resources. Yet, it is the view in this work that these tools are crafted in the interests of capitalist corporations and not in the interests of farmers also'; they enhance corporate competitiveness and image more than

integrated and socially driven agriculture that enhances the control of farmers over their lands. Cooperate actions toward safeguarding environmental resources are designed as addressing environmental implications of firm activities. This then places discretion and control over conservation decisions and actions fully in the hands and heads of corporates, leaving farmers to the political will and philanthropy of firms. Cook et al. (2015) raise similar concern in their discussions on the sustainability of agricultural intensification. They note that criticism abounds that intensification is a justification of corporates to continue with usual productivity-centred and profit-driven interests, only sugar coated with sustainability, to control a high technical input model of agriculture. According to Cook et al. (2015), intensification becomes an economic and productive venture ignoring concerns over social, cultural, environmental, and distributive justice as well as wasteful consumption. A win-win situation for corporates and farmers and indeed for rural transformation can result from a reconfiguration of agricultural systems to provide space and opportunity for farmers to not feel pressed for profit and controlled by external agents.

The claim of the technical input-centred model is that agricultural intensification produces efficiency of land and labor through intensive use of technology and capital inputs. This claim has been investigated in this paper. In the sugarcane intensification systems in Kenya, farmers bear most of the costs of the large capital inputs (Narh, 2019; Waswa et al., 2012). Farmers are most often in debt from huge expenditure on capital inputs and this has resulted rather to eroding the innovative capacities of farmers to practice integrated agriculture with their agency at the centre. Moreover, the high capital costs in cane production stimulates farmers to strive for as much revenue as they would from their lands. The quest for as much revenue then creates a need for more inputs and the cycle continues. In Chemelil, this erosion of farmers' innovative capacities translates into continued reliance on the Chemelil Sugar Company, which enables the Company to construct local agriculture and gain control over farmers' land. Such erosion of innovative capacities and control of farmers' assets amount to wealth extraction that impoverishes African farmers and is not sustainable (Keiner, 2006). Thus, whereas the technical input-centered approach to agricultural development has sustained the sugarcane industry in Kenya to date, it has also eroded the resource and innovative capacities of farmers to control their lands. The local economies of the sugarcane producing areas do not see much economic and physical development, beyond the enclaves of the agribusiness estates.

Conclusions

In this paper, the call has been made with evidence from intensive sugarcane production for a differentiation between technical input-centred agricultural

development and a socially oriented and integrated agricultural development models. The distinction is crucial, to delineate and de-emphasize the dominance of the technical input-centred model that erodes farmer agency, innovation, and financial capacities. Rather, a socially oriented model of agricultural development is advocated, for farmers to develop and benefit from agriculture collectively with agribusinesses and the state. A socially oriented mode of agriculture would enable farmer agency and control over land to thrive to produce the kind of agriculture that sustainably benefit farmers, agribusinesses, and the state in equitable manner. Though farmers are centred in the socially oriented model, agribusinesses and the state with their research, technological, and financial capacities are important partners; they are not to be dispensed with. Agricultural productivity and its transformation must be defined and pursued not only in terms of financial profits but environmental, social, and political goals of the local economy. This, to this author, is the recipe for the renaissance of Africa. Home-grown solutions to African challenges are thus guaranteed to emerge.

Drawing conclusions from only this study of Chemelil for recommendations toward Kenyan agricultural policy nor the African Renaissance would be overambitious and limiting. Nonetheless, this work highlights key concerns about agricultural intensification that policy makers and theorists should be wary of, in discourse formation and policy formulation toward the African Renaissance. These concerns include the erosion of farmers' innovative capacities, power, and benefits from land because of the over-reliance on technical solutions at the expense of ororganic processes in agricultural development. To this end, that sustainable agricultural intensification if organized in the contexts of African societies can contribute to home-grown solutions for Africa's socioeconomic and political transformation is not in doubt in this work.

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1. <http://www.fao.org/kenya/fao-in-kenya/kenya-at-a-glance/en/>

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