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Planning For Agro-Industries in Kinangop Sub-County, Nyandarua County – Kenya

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Abstract

Agro-industries catalyse rural development in areas with abundant agricultural raw materials, making these industries popular in poverty reduction. These industries create demand for inputs in the farm from other sectors, requiring deliberate planning, but it is not always the case, even in countries that have devolved planning functions. The "Nyandarua District Integrated Regional Plan (NDIRP)" and "Nyandarua County Integrated Regional Plan (NCIRP) 2, 2018-2022" were inventoried for data on planning for agro-industries in Kinangop sub-county. The District Integrated Plan and the County Integrated Plan had 15 and 29 agro-industrial planning interventions in five areas of action planning, respectively. The planning interventions in the district-integrated plan were disaggregated to the sub-county around four regional strategies and the five areas of action planning. This makes the plan more resourceful in planning for agro-industries compared to the County Integrated Plan. Data on social characteristics, agricultural production, and marketing and data on the location and sighting of six agro-industries were inventoried from a study report on planning for agro-industries in the sub-county. Over 80% of respondents grow potatoes, cabbages, carrots, maize, and snow peas; and rear dairy cows to produce milk for their own consumption and surplus for the market. Myriad challenges, including exploitation by middlemen and lack of appropriate land sites for agro-industries, undermine the agricultural production efforts of the farmers and the development of agro-industries. The article recommends planning for agro-industries that disaggregates strategies and areas of action planning to sub-county level or below to address location and site accessibility needs of agro-industries as a norm of territorial rural development.

Keywords: Area of action planning, interventions, agro-industries, agro-processing, smallholder farmer, sub-county

INTRODUCTION

Agro-industries catalyse rural development in areas with abundant agricultural raw materials, making the industries popular in poverty reduction strategies. The industries also create demand for inputs in the farm from other sectors. Deliberate planning for agro-industries is necessary. However, this is not the case even in countries like Kenya that have devolved planning to sub-national units of governance and territorial development (Chimhowu et al., 2019). Planning for agro-industries to serve adjoining rural hinterland and prioritize the needs of Small-Holder Farmers is an effective rural development strategy (Zhang, 2021). This perspective rests on the notion that planning enhances the delivery of agricultural services; and also mainstreams access to raw materials, and aligns and fosters agro-processing in diversifying livelihoods. Views that agriculture is the source of livelihood for 75% of the world population living below Ksh 222 a day and competing for raw materials with other sectors no longer hold (Fatah, 2007). Agriculture has evolved into a critical source of food and income, on-farm and off-farm employment for smallholder households while generating gross domestic product (GDP) from trade in agro-industrial products.

The devolution of planning functions and responsibilities for the delivery of agricultural services to counties in Kenya was underpinned in the Constitution of Kenya (KC) 2010 (Kenya, 2010). Popular political participation of grassroots communities in the counties was legislated to operationalize democratic principles in planning. However, planning for agro-industries to utilize

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agricultural raw materials of SHF remains a daunting challenge (Tumshindi, 2021).

This article is about the effectiveness of planning for agro-industries for rural development in the context of formal sub-regional devolved planning and territorial development in sub-counties of Kenya. The focus on agro-industries and smallholder agricultural production as a source of raw materials is informed by the dominance of smallholder agriculture in Kenya's rural economy, which remained weak in policy, planning, and technical support over the years. It begins with an introduction, followed by a literature review on agro-industries as critical institutions of rural development. Theoretical perspectives from the review that clarify policy areas and constitutional and legislative initiatives launched to promote agriculture and agro-processing in rural development follow. An outline of research methods and results of data analysis are presented before a discussion of the main findings, conclusions, and recommendations.

THEORY

Conceptual and Operational Issues of Agro-Industries

Agro-industries develop and transform the lives of rural communities in three main ways (Mitullah et al., 2017). Agricultural raw materials from crops and livestock are processed to add value and increase prospects for better and sustainable incomes for the farmers. Value addition in agro-industries creates new products and also demand for raw materials produced by smallholder farmers and for farm inputs produced by non-farm sectors. The new products are sold in the market to generate revenue for the whole economy while generating direct and indirect jobs. Lastly, the industries provide appropriate institutions for implementing the industry-led development strategy of a country or region in a country.

Agro-industries in resource-rich rural areas are a critical source of processed agricultural products in a market economy (Mittal, 2007). The industries enhance food security, drive trade, and deepens regional economic growth and local social development. Parashar (2014:101) suggests that agro-processing is a comparatively high potential source of employment, low-level investment, and a reliable source of rural income. Failure to attract investors in rural infrastructure led to a weak agro-industrial base in the Asia Pacific region while the lack of policies on agro-processing in India hindered the use of the raw materials (Jhingan, 2004:720-721).

Agro-processing sub-sector in Sub-Saharan African countries contributes between 20% and 25% of GDP, but there lacks a strong agro-industrial foothold (Manandhar et al., 2018). Low capacity in agro-processing partly contributes to post-harvest losses of between 35% and 50% for fruits and vegetables and between 15% and 25% for grains annually. Household-owned small and medium-scale (SMS) agro-processing establishments produced 62.2% of output in agriculture and contributed to the socio-economic well-being of rural communities on an account of backward and forward linkages in Ghana; and Egypt, Nigeria, and Tunisia – respectively (Figueroa et al., 2018).

SHF in four East African countries account for 75% of agriculture production that also generate 75% of the jobs (Salami et al., 2010:4). Weak institutions, restricted access to the market, and inadequate infrastructure, however, constrain agricultural production and processing as drivers of economic growth in the region. Export of non-processed raw materials undermined forward and backward linkages in agro-processing and expected economic multipliers in Tanzania (Daninga, 2020:60). Fowler and Rauschendorfer (2019:2) point out that Uganda has failed to coordinate industrial policy to fully utilize existing agro-industrial capacity even though agriculture generates 24% of GDP and 54% of export earnings. Ethiopia built industrial parks to strengthen inter-industrial forward and backward linkages and ease access to raw materials (Avram and Braga, 2018).

Planning for Agro-Industries

Planning is the linking of available information to agro-processing activities in the context of socio-cultural and economic systems and endowed resources (Fainstein and Campbell, 2012 eds: 2). Planning for agro-industries creates a basis for empowering rural households through value addition of their farm produce; and optimizes dispersal tendencies in spatial patterns of rural settlement by relating costs of infrastructure and services to sources of raw materials. Planners

in China and India prioritized the long-term development of regional industrial structures, improving urban-rural relations and balanced spatial development to address the tendencies (Sigurdsson, 1978).

In Africa, Mukazi et al. (2018) advocate laws, policies, and institutions to address challenges that undermine the flourishing of 36 agricultural growth poles and nine corridors in 23 countries. Planning will facilitate the location of agro-industries and reduce the costs of delivery of raw materials and transportation to the consumer market. It will also incentivize farmers to produce more and better raw materials. Self-organization of the farmers to access services and inputs promote economic development regionally and nationally while the link of local territories to global trade is fostered. Land use planning of the farmlands will follow for which agro-industries adopt a long-term strategy of value addition in agricultural raw materials.

Agro-Industrial Strategy, Devolution, and Framework of Sub-County Planning

Agro-Industrial Strategy

The special rural development program (SRDP), focusing on promoting an agrarian rural economy in the 1960s and early 1970s, introduced agro-processing to deepen rural development in Kenya (Livingstone, 1976). A strategy of promoting SMS agro-processing establishments and fiscal incentives for large-scale sugar, horticulture, and pyrethrum agro-industries followed SRDP (Kenya, 1978: 122-123). Physical planning was also introduced to link agro-industrial sites and the farmlands. The ineffective involvement of local communities in identifying projects and programs, and the fragmentation of smallholder land derailed the SRDP role in laying an agro-industrial foundation to catalyse development and transformation in the 1980s and beyond (Kirori, 2015:35).

The national food policy focusing on promoting farming, post-harvest storage, and marketing was launched to guide the role of agro-industries in national development (Kenya, 1994). A 16-year policy for industrial transformation from 1996 to 2020 was also launched, premised on prospects for increased production of agricultural raw materials by SHF and value addition. The policy heralded an era of strong forward and backward linkages agro-industrial economy. However, as of 2009, processed food, beverages, and tobacco (FBT) accounted for a mere 32.9% of total agro-processing value addition in manufacturing and 34.25% share of employment in the industrial sector (Ngui et al., 2016: 79 and 82). Growth of agro-industries soon fell to between 26% and 27% of the GDP, making agro-processing remain a daunting challenge (Kenya, 2019).

Three strategies for promoting the industrialization of the rural economy were formulated to address past failures (Kenya, 2020:15 and 18). The first is revitalizing the productivity of coffee, cotton, pyrethrum, and tea of the SHF. The second is establishing 1,000 agro-processing small and medium enterprises (SMEs) in meat, dairy products, fruits, nuts and oils, fish feed and fish to create 600,000 new jobs. The third is preparing territorial county and sub-county plans to provide a spatial framework for land use, placement of settlements and enhancing ecological productivity of natural resources and agriculture to industrialize rural economy (Kenya, 2012:52-53).

Devolution and Framework of Sub-County Planning

Bresser-Pereira (2004) defines devolution as the political, legislative, and/or constitutional transfer of policy, planning, and development management and commensurate fiscal resources to sub-national and/or sub-regional institutions and territories. Its essence derives from the demands of communities for autonomy, restructuring power relations between the centralized national state and sub national and sub-regional communities to embed and deepen devolution. The dissatisfaction of local and sub-national/regional communities with top-down approaches to public policy, decision-making, and planning to achieve territorial development drives the quest for devolution (Matsumoto, 2019:157). Disparities in resource endowment, limited information, and ineffective policy and planning undermine devolution as a key plank of sub-national/regional territorial development.

Devolution led to the establishment of the national government and 47 county governments in Kenya (Kenya, 2010). The institutional and organizational design of the counties includes forty-five sub-regional rural municipality counties, one

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urban-rural municipality for Mombasa City and mainland south, and one city county for Nairobi city. Integrated, spatial, and sectoral county planning is expected to foster rural development, with county governments further decentralizing planning to sub-county, wards, constituencies, or any other feasible lower units in a county provided for in the County Government Act (CGA) (Kenya, 2012:31-32). Planning for crop and livestock farming focusing on integrating settlements, including agro-industries, aligning territorial and functional nuances of ecological ethics, social equity, and employment creation are premised on decentralization within counties (Friedmann and Weaver, 1979:1-3).

RESEARCH METHODS

Data was inventoried from "Nyandarua District Regional Development Plan, 2001-2030: An Integrated Plan for Sustainable Regional Development," cited in this article as Nyandarua District Integrated Regional Plan (NDIRP), and "Nyandarua County Integrated Development Plan 2 2018-2022" similarly cited as Nyandarua County Integrated Regional Plan (NCIRP); and study report on "Planning for Agro-Industries in Rural Communities: The Case of Kinangop Sub-County, Nyandarua County" (UNCRD, 2003:4 and Nyandarua, 2018; and Gitau, 2020). "Yerkes (1989:748) defines inventory as a detailed systematic compilation of the attributes of items that explain specific factors of a phenomenon. The method has been used to generate data on the utilization of biomass resources for appraisal and evaluation to ascertain the utility of the resources (Nemec, 2015). The two plans were inventoried to catalog strategies, areas of action planning, and prescribed interventions to promote agro-industries in the Kinagop sub-county. The study report, which covered a sample of 138 SHF respondents representing 0.12% of the 66,790 households, was inventoried for data underpinning agricultural raw material resource base. Data were analysed through the evaluative description, explanation, and discussion of ordinal, ratio, and scale statistical information organized in text prose and tables.

RESULTS AND DISCUSSION

NDIRP

Proposals on planning for agro-industries were organized around four county strategies in the plan, including urban and industry, agricultural development, institutional development, and natural resource conservation and management **(Table 1).** The strategies anchor planning for agro-industries along areas of action planning and development interventions. Fifteen agro-industrial interventions were distributed in seven areas of action planning, and the four strategies cascaded to the sub-county.

TABLE 1

Areas of action planning, interventions, and impacts by development strategies in Kinagop Sub-County

Strategy	Areas of Action Planning	Interventions
I. Urban and industrial development strategy	***Area of Action Planning 1:*** Industrialization	1.Coordinate policy for industrial development 2.Revive collapsed agro-industries
	Area of Action Planning 2: Land management	3.Prepare physical development plans for local centres 4.Provide sites for informal sector activities in designated local centres 5.Regulate land subdivision and change of use to urban use
	Area of action planning 3: Public Education	6.Establish training and farm technology demonstration centres
II. Agricultural development strategy	***Area of action planning 4:*** Farming Practices	7.Reduce taxes on farm inputs 8.Support poultry farming 9.Provide agricultural extension services for crop and livestock production 10.Manage unregulated subdivision of smallholder land
	Area of action planning 5: Market and Marketing	11.Improve handling by the farmers', the milk, vegetable and potatoes that they deliver at the collection centres. 12.Increase the market value of agricultural raw produce 13.Construct agro-processing installations
III. Natural resource conservation and management strategy	***Area of action planning 6:*** Agro-forestry	14.Establish tree nurseries and encourage on-farm afforestation
IV. Institutional development strategy	***Area of action planning7:*** Building capacity of Institutions	15.Consultation and Building partnerships among sub-county development institutions

Source: Authors, 2022

Table 2 summarizes areas of action planning, interventions, and impacts by development strategies in **Table 1.**

TABLE 2
Summary of areas of action planning and interventions by development strategies in Kinangop Sub-County

Strategy	Areas of Action Planning	Interventions by Areas of Action Planning		Interventions by Development of Strategies	
		No.	%	No	%
Urban and industrial development strategy	***Area of action planning 1:*** Industrialization	2	13.3	6	40.0
	Area of action planning 2: Land management	3	20.0		
	Area of action planning 3: Public Education	1	6.7		
Agricultural development strategy	***Area of action planning 4:*** Farming Practices	4	26.6	7	46.6
	Area of action planning 5: Market and Marketing	3	20.0		
Natural resource conservation and management strategy	***Area of action planning 6:*** Agro-forestry	1	6.7	1	6.7
Institutional development strategy	***Area of action planning 7:*** Building capacity of Institutions	1	6.7	1	6.7
Total	-	**15**	**100**	**15**	**100**

Source: Authors 2022

Areas of action planning and interventions link the production of agricultural raw materials to industrial processing. The strategy for agricultural development accounts for the highest proportion (46%) of planning interventions, distributed in Area 4 on farming practices and Area 5 on market and marketing. The urban and industrial strategy follows with 40% of interventions in Area 1 on industrialization, Area 2 on land management, and Area 3 on public education. Natural resource conservation and management and institutional development strategies have 6.7% each distributed in Area 7 on agro-forestry and Area 8 on building the capacity of institutions.

As noted from the distribution of interventions by areas of action planning, three interventions in land management account for 50% of all interventions in one strategy, followed by two interventions representing 33.3% in industrialization. Training and farm technology demonstration centres account for 16.7% of interventions in the strategy is unique in addressing the capacity needs of the farmers through information dissemination to sensitize them. Farmers will also be brought to demonstration centres to see, learn and internalize technology aspects of farming. Interventions in this area of action planning enhance land management for an efficient spatial organization of local nodal settlements, location, and identification of sites for agro-industries.

One area of action planning in natural resource conservation and management and institutional development strategies each was, respectively, identified. This reinforces county planning provisions and territory and function nuances in sub-county development (Friedmann and Weaver (1979). Interventions to establish tree nurseries and on-farm agroforestry areas of action planning focus on improving smallholder farm productivity and securing a supply of agricultural raw materials for agro-processing.

NCIRP

Similarly, this plan – NCIRP, has four strategies. Compared to NDIRP, it has 29 interventions in five areas of action planning at the county level **(Table 3).**

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TABLE 3

Areas of action planning, interventions, and impacts by development strategies in Nyandarua County*

Strategy	Areas of Action Planning	Interventions
I. County industrialization strategy**	**Area of Action Planning 1:** *Industrialization*	1.Formulate a framework for establishing special industrial zones 2.Construct roads to support industries 3.Install electricity utilities and water supply systems
	Area of action planning 2: *Flagship Industrial Projects and programmes*	4.Agro-processing plant for potatoes, vegetables, and fruits 5.Small and medium-scale factories for beetroots and sunflower 6.Milk processing plant 7.Hides and skins leather processing plant 8.Industrial parks and special economic zone 9.Agro-processing beetroot plant for sugar production 10.Giant bamboo plant, mills for maize feeds, hide and skin tannery 11.Laboratory for potato tissue culture
II. Crop diversification and marketing strategy	**Area of action planning 3:** *Agribusiness*	12.Diversify crops grown 13.Diversify marketing strategies 14.Construct irrigation projects 15.Improve livestock genetic pool 16.Establish value additional institutions 17.Adopt and promote modern livestock farming technologies 18.Support for farming high-yield fodder varies 19.Implement strategy for crop and livestock production practices
III. Survey and mapping for squatter resettlement strategy	**Area of action planning 4:** *Land use and management*	20.Resettle squatters 21.Survey and map public land 22.Repossess illegally acquired public land 23.Enforce planning and development control in urban areas 24.Improve land tenure 25.Transfer of settlement fund trustee land to Nyandarua County Government
IV. Construction of markets and stalls and operational strategy	**Area of action planning 5:** *Trade Development*	26.Construct and operate strategic markets and stalls. 27.Provide affordable capital 28.Offer tailor-made modular business management training to framers 29.Adopt agricultural produce trade facilitation regulations

Source: Authors 2022

***As expected, the spatial coverage of CIDP2 is "County-wide."**

**** Urban nodal centres in Kinangop Sub-County are not specified in this agro-processing-related strategy in Nyandarua County Integrated Regional Plan.**

The four areas of action planning, industrialization, agri-business, land use and management and trade development and interventions are not disaggregated by sub-county, which makes them implicit to the sub-county in reflecting the ones in the district plan. Proposing areas of action planning and interventions at county instead of sub-county levels undermines decentralization for effective sub-county territorial development (Matsumoto, 2019). However, the strategies, areas of action planning and interventions in the plan and the ones in NDIRP converge to complement and reinforce into composite sub-county strategy, and area of action planning interventions. Area 1 of action planning on industrialization and Area 2 on flagship industrial projects and programmes in the table confirm this information. The interventions in Area 3 of action planning on agribusiness, Area 4 of action planning on land use and management, and Area 5 of action planning on trade development each in crop diversification and marketing, survey and mapping for squatter resettlement, and market and stall construction and operationalization strategies, also reinforces this confirmation, respectively.

Table 4 summarizes the interventions in Table 3. Distribution of the 29 interventions in the five areas of action planning shows the highest number of agro-processing interventions accounting for 27.6% in Areas 2 and 3 of action planning each. These are flagship industrial projects and programmes, and agribusiness, respectively. The importance of industrializing the county, crop diversification, and marketing strategies is noted. Land use and management areas of action planning have the second highest proportion of interventions at 20.7%. Four and 3 interventions

representing 13.8% and 10.3% in Area 5 on trade development and Area 1 on industrialization strategy, respectively, are the lowest.

TABLE 4
Summary of interventions by areas of action planning and development strategies in Nyandarua County

Strategy	Areas of action Planning	Interventions by Areas of Action Planning		Interventions By Development Strategies	
		No.	%	No	%
	Area of action planning 1: *Industrialization policy strategy*	3	10.3	3	33.3
I. County industrialization strategy	**Area of action planning 2:** *Flagship Industrial Projects and programmes*	8	27.6		
II. Crop diversification and marketing strategy	**Area of action planning 3:** *Agribusiness*	8	27.6	2	22.4
III. Survey and mapping for squatter resettlement strategy	**Area of action planning 4:** *Land use and management*	6	20.7	3	33.3
IV. Construction of markets and stalls and operational strategy	**Area of action planning 5:** *Trade Development*	4	13.8	1	11.1
Total	-	**29**	**100**	**9**	**100**

Source: Authors, 2022

Combined Areas of Action Planning and Interventions

Table 5 shows the comparative distribution in respective areas of action planning, cross-checking similarity, significance, and co-relevance to planning for agro-processing in the two plans.

TABLE 5
Comparative distribution of interventions by areas of action planning in Kinangop Sub-County in the two plans

NDIRP			NCIRP		
Areas of Action Planning at Kinagop Sub-County Level	Agro-Processing Interventions in Kinagop Sub-County		Areas of Action Planning at the Nyandarua County Level	Agro-Processing Interventions in the county	
	No.	%		No.	%
Area of action planning 1: Industrialization	2	13.4	***Area of action planning 1:*** Industrialization	11	37.9
Area of action planning 2: Agribusiness, Trade, and Marketing	3	20.0	***Area of action planning 2:*** Agribusiness, trade, and marketing	12	41.4
Area of action planning 3: Land management and farm practices	7	46.6	***Area of action planning 3:*** Land management and farm practices	6	20.7
Area of action planning 4: Agro-forestry	1	6.6	***Area of action planning 4:*** Land use and management	None	None
Area of action planning 5: Public Education and Building capacity of institutions	2	13.4	***Area of action planning 5:*** Trade Development	None	None
Total	**15**	**100.0**	**Total**	**29**	**100.0**

Source: Authors, 2022

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Interventions in Area 3 of action planning on public education in urban and industrial strategy in the NDIRP were combined with interventions in area 7 on building the capacity of institutions in the institutional development strategy. The interventions in Area 5 on markets and marketing and those in Area 4 on farming practices were also combined. NCIRP interventions in Area 3 of action planning for agribusiness and Area 5 for trade development were combined into agribusiness, trade, and marketing. The ones in Area 1 of action planning for industrialization policy strategy and Area 2 for flagship industrial projects and programmes were combined into one area of action planning. The seventeen agro-industrial interventions distributed in five areas of action planning and 29 interventions distributed in three areas of action planning in county-integrated development planning were noted.

Table 5 also shows that NCIRP has no interventions in Area 4 of action planning on agro-forestry and Area 5 on public education and building capacity of institutions. The interventions in the plan are concentrated in Area 1 of action planning for industrialization and Area 2 for agro-business, trade, and marketing. These account for a combined proportion of 89.3% of all interventions. NDIRP shows a more balanced distribution of proposed interventions by area of action planning. Land management and farm practices account for 46.6% of the interventions and combine with 20% agribusiness, trade, and marketing to account for sub-county strategy for increased raw materials the farmers could sell to agro-industrial firms. This would reduce the adverse role of the middlemen. Lastly, interventions in Area 4 of action planning for agro-forestry and public education and building capacity of institutions accounting for 6.6% and 13.4%, respectively, reflect the importance of planning at the sub-county level in addressing ecological sustainability and enhancing the capacity of the farmers.

Social Profile and Agricultural Production

Social Profile

The highest proportion of household size was 1 to 5, followed by 6 to 10 members accounting for 74.5% and 28.5% of respondents, respectively. The significance of the sub-county average household size of 5 to the dominance of subsistence and agribusiness farming compare well with the county (Nyadarua) and national averages of 4.2 and 4.1, respectively. Eighty percent of married respondents reflect the significance of marriage institution as a feature of the smallholder subsistence household economy. The levels of education in the sub-county were 90.1% distributed: 35.5% (primary education), 25.8% secondary, 12.9% vocational and university, and 9.9% for those who did not complete primary schooling and/or enrol for formal schooling. Implementing interventions in public education to disseminate agricultural information also builds the capacity of the farmers at the farm level.

Crop Production

All respondents engaged in agriculture, while 19.4% and 6.5% engaged in business and formal employment in addition to farming. Over 80% of the respondents produce food for household consumption and selling. **Table 6** shows potatoes and cabbages were the most widely grown crops for income, with maize also sold as fodder for lactating cattle. While the 1,001- 5,000 kg production range and sale by 12.9% of respondents reflect the significance of growing carrots for household income, the sale of cumulative 12.9% of respondents for 10-500, 501-1,000 and 1,001-5,000 kg ranges for snow peas lay in its lightweight, better sale price and as the least consumed by households. Middlemen who purchase potatoes, cabbages, and carrots produced by 58.1%, 6.1%, and 3.2% of the respondents and re-sell to farmers' cooperative societies, agro-industries, and consumers, dominate the agricultural raw materials marketing value chain.

TABLE 6
Proportion of respondents who sold five crops of raw material per season*

Yield (kg) per season	Potatoes		Cabbages		Maize		Carrots		Snow peas	
	Produced (%)	Sold (%)	Produced (%)	Sold (%)	Produced (%)	Sold (%)	Produced (%)	Sold (%)	Produced (%)	Sold (%)
10-500	35.5	19.4	6.5	6.5	9.7	9.7	0.0	0.0	6.5	6.5
501- 1,000	16.1	16.1	0.0	0.0	3.2	3.2	0.0	0.0	3.2	3.2
1,001-5,000	25.8	19.4	3.2	3.2	3.2	3.2	12.9	12.9	3.2	3.2
5,001-10,000	9.7	9.7	0.0	0.0	3.2	3.2	0.0	0.0	0.0	0.0
over 10,000	0.0	0.0	0.0	0.0	0.0	0.0	3.2	3.2	0.0	0.0

Source: Authors, 2021
***The two seasons are October to December and March to May during long and short rains, respectively.**

Livestock Production
Cattle were reared by 28.0% of the respondents; 17.5%, 10.5%, and 3.2% were rearing sheep, poultry, and pigs, respectively. Ten sheep is the highest number reared for 10 to 100 kg of wool per shearing season, sale of live animals, and occasional slaughter for protein intake. Ownership of beef cattle was by 12.9% of the 28.0% of respondents, with all 35 kg to 350 kg beef produced per season consumed in Kinagop while pigs were sold live for consumption outside the sub-county.

Njabini Framers Cooperative Society purchased raw milk produced by 35.5% of the respondents, followed by 22.6% that sell to middlemen. Lucky Dairy Cooperative Society Limited and Muki Dairy Cooperative Society Limited purchased raw milk from the third (12.9%) and fourth (6.6%) highest proportions. A mere 3% of respondents sold their milk to Brookside Dairy Limited that processed milk outside the sub-county. Lastly, 26% of the respondent poultry farmers produced eggs consumed in the sub-county while 78.4% transported the product to outside markets.

Market Outlets and Income from Agricultural Production
Njabini town is the main market outlet where crop and livestock raw materials are sold for bulking, processing, and/or onward sale to outside markets. Cooperatives' societies dominate the marketing and agro-processing of agricultural raw materials. Membership in the societies was 61.3% of all respondents, distributed 38.7% in Njabini Farmers' Cooperative Society Limited, 9.7% (Lucky Dairy Cooperative Society Limited), 6.5% (Muki Dairy Cooperative Society Limited); and 3.2% - Githioro Cooperative Society Limited and Tana and Athi Cooperative Society Limited each. Milk earned farmers the highest income per month at 38.7% in the range of Ksh 10,001 to 100,000; 35.5% earning Ksh 5,001 to 10,000; and 9.7% - Ksh 1,000 to 5,000 per month. Sale of eggs was the second highest household income earner with 6.5% of respondents earning Ksh 10,001 to 100,000; 3.2% (Ksh 5,001 to 10,000), and 9.7% (Ksh 1,000 to 5,000).

Challenges and Threats of Agro Industries
Respondents identified six main challenges SHF face. Lack of money to buy inputs, pay for labour, veterinary services; fertilizer and seedlings were cited by 74.5% and 45.2% of them, respectively. The third, 64.5% cited market distortion by middlemen, while 61.3% did not access agro-processing services. Fifth, lack of extension services and occurrence of crop and livestock diseases were cited by 41.9% of them; and lastly, lack of capital undermined acquiring of agro-processing technology by 19.4%. At the institutional level, the failure to diversify raw materials processed at the six agro-industrial firms restricted value addition to milk bulking, milk processing and marketing, potato seed production, and potato processing only **(Table 7).**

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TABLE 7
Seven agro-industries, year established, business type, and off-farm jobs

Agro-processing firm	Year Established	Agro-processing Business	Off-Farm Employees (2021)	
			No.	%
Njabini Farmers' Cooperative Society *(Engineer)*	1965	MB	17	7.7
Jekam Farm Limited *(Kinangop)* *	1987	PSP*	9	4.0
Brookside Dairy Limited **	1993	MB	-	-
Muki Farmers' Cooperative Society *(Ndunyu Njeru)* ***	2001	MB	136	62.9
Lucky Dairy Limited *(Kinangop)*	2016	MPM	30	13.7
Sasumua Dairy Limited *(Engineer)*	2017	MPM	7	3.0
Kinangop Fries Limited *(Engineer)*	2019	PP	19	8.7
Total	-	-	**218**	**100**

Source: Authors, 2022
***Process approximately 9,900 kg of seeds per month at high peak and 3,300 kg off-season.**
****Agro-processing factory of the firm is located outside of Kinagop sub-county but has milk collecting centre at Engineer where raw milk is bulked before it is transported to the factory.**
*****Manufactures animal feeds and provides artificial insemination (AI) and agro-veterinary services.**

Key: MB=milk bulking, MPM=milk processing and marketing, PSP=potato seed production, and PP=potato processing

Table 7 shows that agro-industrial firms bulk 33.3% of milk but account for 70.6% of the 218 off-farm jobs. Firms that process and sell milk account for another 33.3% of the milk and 16.7% of the jobs. Firms producing potato seed and process potatoes account for 16.7%, and each contributes 4.0% and 8.7% of the jobs, respectively. Three firms with 42.9% presence in the sub-county and operated for over 28 years between 1965 and 1993 account for a mere 11.7% of off-farms jobs. In contrast, the same (42.9%) proportion of firms that operated for only three years between 2016 and 2019 generated 25.4% of the jobs. Management of the agro-industrial firms prioritized five threats to agro-processing businesses, unavailability of land at sites identified for the construction of agro-processing factories being the most severe. Second, poor conditions of access roads to the sites and a lack of waste management ethos, sanitation facilities and unreliable water supply; disincentives the investors from expanding their businesses. Occasional weather fluctuation that disrupts the agricultural production calendar of the farmers; inability to afford veterinary services; sub-division and change of land use from agriculture to commercial and rental housing (cited by 50% of the respondents, with 35% of them having initiated subdivision of their land) – are third, fourth and fifth threats, respectively.

DISCUSSION

Strategies, Areas of Action Planning, and Interventions

Disaggregation of areas of action planning and interventions in NDIRP and NCIRP are the basis of planning for agro-industries in the sub-County. The strategic framework of the NDIRP provides for areas of action planning and interventions. The urban and industrial strategy of the plan provides for public education and industrialization. Natural resource conservation and management strategies have agro-forestry and institutional development strategies concerned with capacity building of institutions. NCIRP is not disaggregated into sub-county areas of action planning and interventions for agro-industries. Of the two plans, this plan is the least accurate, authoritative, and reliable. Industrialization, agribusiness, land use management, and trade development areas of action planning are formulated at the county level. Its technical reliability and political legitimacy at the sub-county level, is, therefore, undermined. However, concurrence in the comparative distribution of areas of action planning and interventions in the two plans compensates for the difference in levels of disaggregation of areas of action planning and interventions at sub-county and county, respectively.

The similarity of NDIRP and NCIRP rests in the five common areas of action planning, with industrialization, land use, and management and farming practices; representing a strong concurrence that synergizes land management. Marketing in the plan synergizes trade development and agribusiness in the NCIRP. Strategies that specify areas of action planning in the NCIRP are also in the NDIRP that was prepared before KC and CGA came into force. These make the two plans rich sources of planning information for agro-industries.

Social and Technical Factors in Agricultural Production

The sub-county has a strong agricultural resource base with two social factors predisposing SHF to the sustainable production of agricultural raw materials. To begin with, 74.5% and 28.5% of respondents own land sizes of 1 to 5 and 6 to 10 members, respectively. The literacy of 97% contributes to the strong resource base for farm productivity that favourable geo-climatic factors reinforce. Second, the high proportion of married households (80%) reflects a strong social and cultural foundation securing a predominantly smallholder farm production economy.

Sub-county planning for agro-industries accounts for six factors that bear on the role of technology. First, farmers diversified agricultural production by growing more than one crop across seasons. Second, combined growing of cabbages, potatoes, and carrots by 21.8%, 20.2%, and 9.7%, among other crops, respectively; and rearing dairy cows by 28.0% of them, followed by 17.5% for poultry, 10.5% sheep and 3.2% pigs – is a guarantee for continued resourcing crop and livestock raw materials for agro-industries. Third, agricultural production has the potential for generating inter-linkages between crop and livestock sub-sectors. Maize was an input as animal feed for dairy cattle. Supply of fertilizer and access to agronomy and veterinary services to control and manage crop and livestock diseases and pests are also potentials for inter-sub-sector linkages between SHF, crop and livestock production professionals, and the commercial sector. Lack of access to affordable capital to purchase farm inputs and pay for hired farm labour and veterinary services by 74.5% of the respondents undermined the backward linkage between agro-industries and SHF. The lack of fertilizer and seedlings by 45.2% of the respondents also underpinned unutilized capacity for forwarding linkages between the smallholder sub-sector within crop and livestock production professionals and the commercial sector.

The fourth factor is the presence of seven agro-processing industrial firms in the sub-county, with the seventh involved in the bulking and processing of milk outside the sub-county. The industries are the basis for forward linkages between the production of potatoes and milk. The six agro-industries do not utilize outputs from any of the five other industries to foster inter-industry linkage even though the potential exists. Potato processing and utilizing eggs that 78.4% of poultry farmers produced but sold to markets outside the county can be used to process baking products in the sub-county. The fifth factor is organizing agro-processing and marketing around farmers' cooperative societies in the sub-county. The 70.6% proportion of all off-farm jobs that 33.3% of agro-agro-processing firms generated reflect the importance of the societies as self-organizing grassroots institutions of SHF. However, the agro-processing operations of the societies were bulking to stockpile raw milk before selling it to other firms with the capacity for processing and marketing operations.

A comparatively low proportion of off-farm jobs, at 29.4%, are generated by the agro-processing societies, underline the need for building technical capacity. Lastly, the proportion of off-farm jobs suggests agro-processing operations are confined to utilizing raw milk but constrained from value addition of potato products. Analysis has shown Kinagop sub-county produces substantial vegetables (including cabbages, carrots, and snow cow peas) requiring the deliberate provision of services to up-scale production for inputs in agro-industries.

CONCLUSION

In the first conclusion, organizing results of the inventory of the two plans around 4 strategies and 5 five areas of action planning to itemize interventions secured a basis of reliable generalization on subjects each of the two plans contributed to planning for agro-industries. This provided an effective analytical framework that also contributes to planning methodology, techniques and principles. It also has underpinned

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the object of inventory in addressing planning for agro-industries as an aspect of sub-county rural development on its own merit. The planning is resting on a strong agricultural resource base and smallholder agriculture under conditions of limited access to technology, middlemen-dominated marketing, and lack of supportive policy and agricultural services. Second, cooperative societies lack the capacity to stem endemic market distortion and enhancing the income of the farmers from the sale of agricultural produce. The societies also lack the institutional capacity to facilitate access to capital, farm inputs, and technology. Finally, failure to plan for access roads limits access to the farms and agro-industrial sites. Weak waste management ethos and lack of appropriate sanitation and water supply facilities are disincentives for investors, and together with ongoing sub-division of smallholder land and conversion to commercial and rental housing; are threats to the production of agricultural raw materials.

RECOMMENDATIONS

The four recommendations the article makes include planning for agro-industries at the county level that disaggregates county development strategies to areas of action planning and interventions by sub-county to account for location, sites, and accessibility needs for SHF and agro-industrial firms. Sub-county, the lowest level of rural territorial regional planning in the counties, should be the norm for preparing plans for agro-industries that utilize agricultural raw materials produced by SHF. Second, cooperative societies should build technology capacity for agro-processing and packaging of milk and organization for marketing. Third, agro-industries established by cooperative societies should diversify to value addition of potato and vegetable raw materials as a strategy for diversifying income streams of SHF and revenue into the sub-county economy. Finally, mechanisms and guidelines for oversight of the farmers' access to credit, farm inputs, and agricultural extension services by the societies should lead to the realization of the first three recommendations by securing sustainability in the supply of agricultural raw materials and enhanced agro-industrial processing capacity.

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