

The Role of Integrated Agro-Industrial Parks in Transforming Agriculture and Their Impact on Food Security among Smallholder Farmers

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THE ROLE OF INTEGRATED AGRO-INDUSTRIAL PARKS IN TRANSFORMING AGRICULTURE AND THEIR IMPACT ON FOOD SECURITY AMONG SMALLHOLDER FARMERS

Abstract: The Ethiopian government is promoting integrated agro-industrial parks (IAIPs) to transform agriculture, but their impact on smallholder farmers' food security is yet to be studied. IAIPs contributions to agricultural transformation and its implication on smallholder farmers food security was studied in Ethiopia. Publications of journal articles, books, proceeding, international conference reports, policy papers, and unpublished reports, newsletters, and speeches of scholars were reviewed for the analyses of this study. The findings showed IAIP is an engine for agricultural transformation in the country. It builds big tent and collective actions of policy makers, leaders, international donors and financial institutions, investors, global practitioners, consultants, agricultural producers, food processors and traders for changing the supply-based subsistence farming system to market oriented and demand driven agriculture. Smallholder farmers participate in different forms in accordance with their key roles to play. Potential farmers have access to improved production technologies to produce and supply raw materials to the IAIPs while others provide off-farm labor. They gain increased income from sales of their products and off-farm employment that increases their financial capacity and ability to buy quality materials including food for their families. In conclusion,, IAIP plays key roles for transforming agricultural sector and have positive implication on smallholder farmers food and nutritional security in Ethiopia. **Keywords:** Integrated Agro-Industrial Parks, Agriculture transformation, Smallholder farmers, Food Security

Introduction

In the coming decades, world agriculture will need to undergo major changes to meet the future food demands of a growing and an increasingly rich and urbanized population. Almost every industrialized nation began its economic ascent with an agricultural transformation among which Brazil, China, and Vietnam, each of which at least doubled the value of its agriculture sector within 20 years of starting its transformation (Sara., *et al*, 2017). Integrated Agro-industrial Park (IAIP) – is a new economic model, driven by the need to facilitate modernization and advancement of agriculture and to help developing countries carry out the structural transformation of the industry and commercialize it. In Africa, the first country to start implementing IAIP was Ethiopia which inspired several other countries such as Zambia and Zimbabwe (Gavrilova and Mukhametzyanov, 2021). Agro-industrial Park is an industrial park that has a significant or exclusive focus on agro-industries (Haile, 2017; Gálvez-Nogales and Isahakyan, 2017; Norman, 2020) while Agro-industry is any economic activity that delivers material inputs to the farming sector or transforms, distributes or otherwise adds value to agricultural and food products (FAO, 2017).

Agricultural transformation is part and parcel of the larger economic process of structural transformation, which, as economist Peter Timmer notes: “has been the main pathway out of poverty for all societies” (Timmer, 2012). It is broadly defined as the process over time by which the agri-food system transforms from subsistence oriented and farm centered into more commercialized, productive and off-farm centered (Laborde *et al*, 2018v). Rising labor productivity is the basic tenet of the agricultural transformation (Timmer, 2012). Agricultural transformation efforts depend upon political commitment, organizational arrangements, and technical areas of focus. Political commitment refers to sustained buy-in from a country’s top leadership, without which true change can be difficult to achieve.

It is thus necessary to assess and generate evidence on IAIPs contributions to agricultural transformation and implications for smallholder farmers food and nutrition security in Ethiopia. Hence, agricultural

transformation and IAIPs scenario and consequences related publications of journal articles, books, proceedings, international conference reports, policy papers, and unpublished reports, newsletters, and speeches of scholars were reviewed for the analyses of this study. The report present evidence on the ways IAIP in Ethiopia: (1) becoming an engine for agricultural transformation in the country; (2) builds big tent and collective actions of policy makers, leaders, international donors and financial institutions, investors, global practitioners, consultants, agricultural producers, food processors and traders for changing the supply-based subsistence farming system to market oriented and demand driven agriculture; (3) participates smallholder farmers in different forms in accordance with their key roles to play and contributes to their food and nutrition security.

IAIP Contributions to Agricultural Transformation

An engine for agricultural transformation

According to (CASA 2021), IAIPs are industrial parks focused exclusively or partly on agro-processing and agro-inputs activities, are increasingly recognized as potentially powerful solutions for generating direct and indirect job creation; income generation and security for smallholder farmers; food security; creating export earnings; import substitution; increasing tax revenues; and upgrading into higher value-added industrial activities. Their potential to deliver these impacts derives from AIPs' ability to: (1) concentrate scarce resources to provide priority firms/sectors with high-quality public infrastructure and services; (2) encourage firm clustering to unlock economies of scale and scope, positive agglomeration externalities and industrial linkages; and (3) enable the integration of local small and medium-sized enterprises (SMEs), as well as surrounding agricultural production zones to ensure reliable input as well as forward linkages to the market.

Rising labor productivity is the basic tenet of the agricultural transformation, which can be raised in three keyways (Timmer, 2012). These key drivers are: (1) New and improved technology for a given amount of labor; (2) More labor absorbed in other sectors away from agriculture ensuring the same or higher output with fewer labor in agriculture; (3) Improve agriculture terms of trade – higher real income for farmers. One could add (4) agricultural livelihood diversification from mono-cropping staple crops to more diversified, intensive and high-value crops as well as value chain development, and (5) land tenure. Transformation is said to be inclusive if the results lead to food security, poverty alleviation and reach the socially and economically disadvantaged groups, in particular women, minorities, the disabled and the elderly persons.

It is believed that IAIP is driving force for agricultural transformation. Economic growth, in and of itself, is insufficient, and must be accompanied by economic transformations that equip smallholder farmers with the ability to grow and diversify their livelihoods. For this to occur agriculture sector itself must be transformed (Getachew and Christian 2019). The authors' justification is that the Ethiopia's strong and forward-looking world's fastest economic growth largely driven by public investments in infrastructure daunted with challenges posed by remaining poverty, population pressure, and recurrent rainfall shortages. According to them, during Ethiopia's first poverty reduction strategy in 2002 Economic growth surpassed population growth and exceeded 7% rate targeted to achieve Millennium Development Goal 1 of halving poverty by 2015 and number of populations live in poverty fell from nearly half to less than one in four between 2000 and 2016, the share of Ethiopians living in poverty fell from nearly half to less than one in four. Despite the rapid decline in poverty, more than a fifth of the country's population is still impoverished. Poverty is concentrated in rural areas where population growth put greater pressure on natural resources base and land is increasingly scarce and recurrent drought continues to undermine agricultural livelihoods.

Growth in agriculture is on average more poverty reducing than an equivalent amount of growth outside agriculture (Ravallion and Datt 1996). Agricultural transformation takes different forms, depending on the context, but some general features are shared across countries: increasing incomes for farmers, rising

output per hectare of land, rising output per worker, expanding commercial agricultural enterprises along the value chain, and greater adoption of machinery and improved inputs. Initially, agricultural productivity improves as farmers shift to higher-value crops, gain better access to markets, achieve economies of scale, and capitalize on technical innovations such as planting modern seed varieties, utilizing customized agronomic advice, and mitigating post-harvest loss with cold storage. Improved agricultural productivity subsequently results in higher farmer incomes, and thus more spending on and demand for—goods and services that are off-farm. To meet this demand, new economic enterprises arise and pull agricultural labor out of fields and into new jobs and opportunities. Such migratory patterns tend to be rural-to-urban and over time lead to the expansion of industrial sectors and the attenuation of the agriculture sector (Getachew and Christian, 2019).

The process of agricultural transformation

1. Technical innovation & economies of scale & shifts to higher-value crops & improved market access
2. Growth in agricultural productivity
3. Farmers spend surplus income
4. Demand is generated for goods, services, and jobs in non-farm sectors of the economy, pulling in agricultural labor
5. Gradual transition of labor force from farm to non-farm activities & rural-urban migration
6. Slowing of rural population growth & attenuation of agriculture sector

IAIP building big tent and collective actions

Agricultural transformation efforts depend upon political commitment, organizational arrangements, and technical areas of focus. Political commitment refers to sustained buy-in from a country's top leadership, without which true change can be difficult to achieve. Organizational arrangements concern the institutional architecture through which transformation is pursued. Ethiopia has a dedicated agricultural transformation Agency (ATA), now renamed as Agricultural Transformation Institute (ATI), and this defines the possibilities of transformation. Finally, technical areas of focus are the nuts and bolts of transformation: input markets, land reform, agricultural financing, and enhancements to the enabling environment (Sara, *et al.*, 2017).

In Ethiopia, IAIP is the geographical cluster of independent firms grouped together to get economic out scale and positive externalities by sharing infrastructure by purchasing and selling. Seventeen zones across the country were carefully selected for the establishment of IAIPs. Four locations selected to host the first IAIP are Western Tigray, Central South Oromia, South-West Amhara, Easter Southern Nations and Nationalities and Peoples Region. Notable features of the IAIP – state of transport, industrial, commercial, social and environmental infrastructure and services. Processing zones of the entire agricultural and aligned sectors showing compatibility and sharing common facilities. Non – processing zones planning followed international standards to provide a Work -Life-Play concept. Proximity and linkages to agricultural production areas to high product quality, investment options to suit diverse interest and a range of government incentives to facilitate growth of fact and residence businesses. The banks themselves aligned by networking of rural transformation centres (RTCs). RTCs are aggregation centres for collecting produces from rural catchment areas and ensuring sustained supply of raw materials to the park. The development of IAIP is put into action by government of Ethiopia represented by Ministry of Industry (MOI) and Ministry of Agriculture (MOA) with technical assistance from United Nation Industrial Development Organization (UNIDO) feasibility study that was completed in 2016 by India based Mihindra Consulting Engineers limited followed by details design and engineering plan for the construction of the parks and centers (FAO 2012). Agro-Industrial Parks and RTCs are helping open the Agro-Industrial Sectors in Ethiopia driving additional economic growth and fostering the country shift to the middle-income state by 2025 (<https://www.youtube.com/@UNIDObeta>).

It is believed that agricultural transformation zones are a step towards food sovereignty in Africa. Beyond enhancing Africa's presence in global trade, agricultural transformation zones also address several key expectations of African economies:

- Economic development is a significant point, as the establishment of these zones leads to job creation and attracts investors, along with improvements in production conditions (mechanization, seeds, inputs, digitization), among others.
- Value addition to commodities at various stages of the supply chain, from production to storage and transformation into higher-quality finished products for markets.
- Increased income for the agricultural profession and a more attractive sector for young people.
- The implementation of research and innovation projects stimulated by the professionalization of supply chains and the creation of favorable ecosystems.
- Achievement of Sustainable Development Goals (SDGs), especially those related to food security and the reduction of losses and waste, through new conservation practices.
- Facilitation of exports of improved and standardized products with easily controllable quality and compliance.
- Diversification of the rural economy and a reduction in the dependence of small-scale farmers on subsistence agriculture.
- Enable a sustainable transition by improving profits and agro-industrial zones capable of training young farmers in sustainable practices.
- Creation of a community for sharing knowledge and sharing equipment, with better recognition from institutional or financial partners and increased visibility for the public.

<https://www.willagri.com/2023/08/07/agricultural-transformation-zones-a-step-towards-food-sovereignty-in-africa/?lang=en>

IAIP Contributions to smallholder farmers food and nutrition security

FAO definition of food security: “Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO. 2002). The last revision to this definition happened at the 2009 World Summit on Food Security which added a fourth dimension – stability – as the short-term time indicator of the ability of food systems to withstand shocks, whether natural or man-made (FAO, 2009). Smallholder farmers are participating in IAIPs in different forms in accordance with their key roles to play. It equips smallholder farmers with the ability to grow and diversify their livelihoods. Potential farmers able to access to quality inputs, trainings, finance, improved production and technologies to produce and supply raw materials for the IAIP. Others provide off-farm labor. It helps them to access good infrastructures and market for better prices for their products and gain increased income from sales of their products and off-farm employment. It increased their financial capacity and ability to buy quality materials including food for their families, reduced food losses and contamination and improved food safety. Hence, this paper discussed the great potential and positive implications of IAIP for smallholder farmers food security under different concepts.

Availability Concept

Availability of food is clearly a necessary condition for food security to occur. Food security is basically an issue of access. But access can be realized when there is available food. Therefore, it can be assumed that to ensure food security, food must be available through various means in the environment. Availability: refers to the possibility of either of feeding oneself directly from productive land or from well-functioning distribution, processing and market systems that can move food from the site of production to where it is needed in accordance with demand. Since IAIP involves stallholder farmers with access to production technologies (necessary equipment, machinery, irrigation facilities, trainings,

etc) and quality inputs (improved seeds, fertilizers, rural finance), production and productivity increases. Thus, availability of food increases through increased productivity and distribution system. This agrees with (FIVIMS 2002) statement: “Food availability is reached when sufficient quantities of safe and nutritious food are consistently available to individuals within a country, or in a reasonable proximity to them, or within their reach, and meet their food preferences.”

Concept of “All people”

IAIP involves participations of smallholder farmers in accordance with their key roles to play – potential farmers as producers and suppliers of agricultural raw materials and others as off-farm labors. Hence, it gives an opportunity for more peoples to access food and/or cash to buy food for themselves and family members from own production and/or the earnings from off-farm as labor compared to subsistence farming system. In such way, IAIP contributes towards attainment of the Universal Declaration of Human Rights (1948) Article 25, that states “everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food”.

Concept of “At all times”

In relation to food availability all the time, World Food Conference in 1974 defined as “The availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (United Nations, 1975). IAIP creates an opportunity for potential smallholder farmers to access improved production technologies, irrigation water & facilities, rural finance, training and advisory supports that help them to increase production by mitigating climate factors. Other community members can participate as off-farm labor and earn money for their livelihoods. In such way, it helps smallholder farmers to have enough production and/or money to last the entire year in areas compared with one primary growing season and characterized by poverty. In other words, smallholder farmers working with IAIP can overcome problems from the main causes of cyclical or chronic food insecurity than subsistence farming system.

Concept of “Access”

Accessibility is guaranteed when there is economic and physical access to food. Food access consists of three elements, namely physical, economic/financial and social (Peng and Berry, 2019).

One component of integrated agro-industrial park is development of infrastructures -roads, means of transport and communication facilities. Hence, it creates better chance for food be accessible to all, including to the physically vulnerable, such as children, the sick, persons with disabilities or the elderly, compared to for whom it may be difficult to go out to get food in other areas where subsistence farming practicing and access to food can be constrained physically. Because of constructions of bridges and road maintenance continuously connect people to the nearby market town.

Food security exists when people can afford to buy sufficient food. Increased productivity from the improved production systems, access to seeds, fertilizers, rural finance, focus for high value crops and reduced postharvest loss can increase food supply and make the price affordable to people. Income opportunity from off-farm labor can also give build financial capacity for those buy food from market. Hence, IAIP can increase food availability at smallholder farmers stoke and build economic capacity for those buy food from market. From the economic access point of view, too, market systems are important to ensure access to food. Market systems support the rural poor by not only providing food and essential goods and services for purchase but also for selling their produce. Income, and the purchasing power it provides, is a major determining factor for people to have access to the food that enables them to be food secured. Access to credit systems also has a similar positive outcome.

Access to training and inclusive participation of both men and women in diverse activities of IAIP may reduce variation between men and women due to the problems of social structures, norms and traditions that affect people's access to food, if not avoided. In such way, an IAIP contributes better social access to food for women and children than in situation of subsistence farming system.

Concept of "Sufficient Food"

The issue of sufficiency in the food security concept means having enough food, both in quantity and quality to maintain an active and healthy life. In rural areas in developing countries, heavy physical activities by all members of a household need food sufficient to supply the daily needed energy. IAIP involves stallholder farmers as producers and suppliers of raw materials in which others provide off-farm labor. Increased productivity from improved production technologies and focusing for nutritious and high value crops such as fruits and vegetables increases great chance for availability of sufficient and quality food for fulfilling household requiring energy and nutrition.

Concept of "Safe Food"

Food safety is the protection of food supply from microbial, chemical and physical hazards. One core value of IAIP is reducing postharvest losses and increasing quality management of raw and processed products across the value-chains. Hence, it has potential benefit to maintain food safety by reducing the burden of food-borne diseases in different stages. It addresses the handling of food items from farm to fork and typically focus on animal health, animal residues, pesticide residues, good agricultural practices, pasteurization, slaughter procedures, harvest procedures, storage, transport, food preservatives and additives and preparation of food products. Food safety has positive impacts on food security. Improved food safety along the food chain reduces food losses, resulting in increased food availability. Access to safe food reduces food-borne illnesses with their associated social and economic implications.

Concept of "Nutritious Food"

Nutrition is the consequence of the intake of food and the utilization of nutrients by the body. Nutritious food helps the body to have healthy physical and physiological condition. Food is said to be nutritious when it provides all the essential nutrients such as energy sources, proteins, vitamins and minerals in the required amount for the proper functioning of the cells. The nutrients required at relatively large amounts, e.g. carbohydrates, lipids and proteins, are called macro-nutrients. Those required in small or trace amounts are called micro-nutrients. Poor nutrition hampers the healthy functioning of the body. Smallholder farmers will have better income from production and supply of raw materials and/or off-farm labor to the IAIP. They, then, have better physical, economic, social access to the right amounts of dietary energy and other nutrients. Consequences of obtaining nutrition can improve their physical and mental development, increase immunity, reduce susceptibility to disease, increased ability to do work and increased productivity. Improvement of infrastructure open good opportunity for smallholder farmers for a safe food supply, clean drinking water, a sanitary environment, adequate health, education and care are essential for good nutrition, along with a balanced diet. Every individual has the genetic potential to perform human functions.

Concept of "Cultural Preference"

Cultural preference implies the need to consider, perceived, non-nutrient based values attached to food and food consumption. Several societies have unwritten social rules regarding which food is not permitted to consume. These are commonly termed as food taboos. Probably food taboos exist in one form or another in every society on earth. Nowhere in the world, does a people, a tribe, or an ethnic

group, make use of the full potential of edible items in its surroundings. Food preferences are indications of a culture. What is extremely objectionable in one culture is a delicacy in another. For example, while pork and beef are readily consumed in western culture, pork is seen as unfit for consumption by those practicing Orthodox Christianity, Islam and Judaism. Many food taboos are designed to protect humans from health hazards real and assumed. Other taboos are designed to protect resources. Some are meant to express empathy such as giving “taboo status” to pet animals. Still others are factors in group-cohesion and group identity. In striving to attain food security, the cultural preferences of the household must be brought into consideration.

Concept of “Active and Healthy Life”

Healthy life means life where the physical, mental and social wellbeing of an individual is maintained. Food gives the body the materials it needs to function properly. If the body does not obtain the proper quantity and quality of food, metabolic processes suffer and the health of the individual declines. The nutrients in food enable the cells in the body to perform their necessary functions. Nutrients are the nourishing substances in food that are essential for the growth, development and maintenance of body functions. When nutrient intake does not regularly meet the body needs dictated by the activity of cells, the metabolic processes slow down or even stop. Poorer populations usually consume few animal products, so their intakes of certain vitamins and minerals are inadequate. Poor diets may also contain few fruits and a limited variety of vegetables and, therefore, low amounts of important vitamins found in vegetables. Failure to address the problem of these neglected micronutrients means that a high proportion of households, especially infants, children, women of reproductive age, and the elderly, will continue to suffer the illnesses and physical weaknesses associated with this form of malnutrition. To lead a healthy life, food should also be free from biological, chemical and physical hazards.

Active life means life which includes regular physical activity. The life of the rural households is active. Strong physical activities such as plowing, in some cases repeatedly, weeding, harvesting, thrashing, etc, require a lot of energy. Eating the right foods at the right times can optimize physical performance and give a competitive edge. Leading a healthy life is a precondition of leading an active life. In addition to the macro- and micronutrients that are needed for a healthy life, carbohydrates are particularly needed as immediate sources of the required amount of energy needed for physical activities. Daily energy requirement is measured in calories or joules. In a rural setting in Ethiopia, a working female (aged 16-50 years) requires around 2400 calories a day and a working male (aged 16-50 years) needs about 3200 calories a day in during an active season. Considering the fact that one full enjerra yields about 380 calories, and assuming, for example, that enjerra is the major source of carbohydrate, the daily energy requirement can be satisfied by consuming about 6-8 full enjerra a day. Feeding oneself with low-energy foods, such as vegetables, particularly during the farm activity season, would make one very unproductive.

Conclusion

IAIP contributes to agricultural transformation playing key roles as spearhead for trade and agriculture development to improve livelihood and food security for consumers and producers around the world through integration in the global trading systems. The industrial parks initiative plays two key roles in Ethiopia perspective on trade, agriculture, smallholder farmers food and nutrition security. One is on policy side and second is on program side. On policy side, government is leading the charge and open transparent, predictable and fair trade for smallholder farmers profitability. Establishment of supportive institutions that allow producers and the processors trade agriculture products is not only economic vital for farmers, but also market based open predictable system is a key to increase their income and capacity to purchase things including food. It is a key to provide local agri-food processing enterprises an opportunity of access to raw materials and expand their business and farmers find new customers from their agriculture products with better price.

In program side, government is active many decades invest in research and provide extension services to help smallholder farmers to better adopt improved technologies and implement productivity enhancement activities. Improvement in infrastructure connect smallholder farmers with better markets for procurement of inputs and supply their products. In general, IAIP in Ethiopia bridges the gap between agricultural trade, food Security and the Forgotten Smallholder farmers. Smallholder farmers obtain opportunities to access improved technology & quality inputs, business linkage with the factories, encouraged to produce market-oriented products, and make money. More production more supply to who needs it; and the more farmers make money the more they invest on their family food & nutrition security.

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