

Agro-Food Chains and Networks in Ethiopia: A Review on Theories and Practices

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Abstract

The population in Ethiopia is relied on agriculture. Food system in general and agro-food chains in particular contribute for development. High population growth and rapid urbanization put increasing pressure on agro-food chains. The objective of this paper was to assess agro-food chain and networks in Ethiopia. Various data were collected using desk review and analyzed in qualitative descriptions. The food potential in Ethiopia was high but a small amount was marketed with minimum quality standards. In the value chain, post harvest loss, less farm size, low access to processing technologies, low crop productivity, fragile ecosystems, inappropriate storage facilities, civil conflicts, lack of market information, natural calamities and lack of integration among actors were the key challenges. It is found that agro-food chain was a complex process. The channels of supply chain particularly horticultural crops were not studied in Ethiopia. The link among producers and different actors was weak. The role of market in the value chain was uncertain. Food insecurity and vulnerability to famine were threats of agro-food chain exacerbated with poor infrastructure, market and state failure that resulted in inefficient agro-food chains. Well-organized agro-food value chains and effective institutional linkages were suggested to improve marketing efficiencies and food qualities.

Introduction

Over 2.5 billion people reside in developing countries, of which 1.2 billion people are living in Africa and a large number of populations are engaged in agriculture [1]. Ethiopia has an estimated population of more than 100 million, of which 80.5% of the rural population is relied on agriculture for their livelihoods [2]. Agriculture has continued to play a central but passive role in economic development. Agriculture is not a mere solution to address food and nutrition insecurity, poverty and inequality. Agro-industries are also important for efficient value-chain and marketing activities [3]. The market exerts a dual pressure on agro-food chains, forcing towards continuous innovation and agency coordination. Bridging the gaps between local economic development and chain integration asks for the emergence of new institutional and organizational networks that enable producers to meet business requirements and trade standards. New procedures and practices for organizing food supply networks—with direct ties between primary producers, processors and retailers—emerged to cope with food safety and health demands [4].

One of the instruments of development is food systems in general and agro-food chains and networks in particular. Agro-food chain encompasses production, marketing, manufacturing, processing, distribution and consumption activities [5]. Ethiopia's agro-food potential is high but only a small amount is marketed and rarely met minimum quality standards [6]. In the food chain, the intermediate marketing link includes transport, storage, export and logistic services. The cold storage capacity per capita in urban areas of Ethiopia is 2 litres [7]. On the one hand, the country exports meat for many countries [8]. The distribution components such as wholesalers, importers, exporters, as well as supermarkets compete with small and medium sized retail outlets. On the other hand, many processed products are imported to the nation [9]. Through the process, the post harvest of the chain is highly diverse in terms of size, locations, and level of involvement with rural producers and consumers. For instance, the processing loss of false banana, '*enset*' is about 28.8% while the loss for *tef* is estimated 8.2% at a farmer level [10].

Small and medium size producers are primary actors of the food chain that differ in terms of factors of production such as farm size, level of education, access to technology, productivity and level of organization. Marketing networking consists of the company and its supporting stakeholders—customers, employees, retailers, suppliers, distributors, and others—with whom it has built mutually profitable business relationships [11].

In Ethiopia, high population growth and rapid urbanization put increasing demands on organizations for agro-food chains and networks. The current urbanization rate of Ethiopia is 20% [9]. In Ethiopia, agricultural productivity per unit of land is exceedingly declining. It is constrained by lack of access to land, poor technology and harsh environment in terms of low soil fertility, erratic rainfall and fragile ecosystem. On top of that, access to processing machines, appropriate storages facilities, marketing constraints, and post harvest losses are some of the key challenges of production [4]. The integration of local and cross border agro-food chain is a challenge for development. Poor farmers have limited resources and scarcely access marketing information. These constraints may therefore exclude them from different business making activities (*Ibid*). The complex linkage between market integration and globalization accompanied by changing consumption patterns, bring about fundamental changes in the organization of agro-food chain and networks.

In Ethiopia, food availability in terms of calories per capita per day is lower than other many countries in Africa such as Cameroon, Cote d'Ivoire, Ghana, Nigeria, South Africa, and Kenya though it shows an increasing trend [9]. Ethiopia is a poor country where international food and financial aid is common. Household food security is positively correlated with child nutritional status in Ethiopia [12]. Poverty is more persistence in urban areas compared to rural areas of Ethiopia [13]. In addition, the available food is not efficiently supplied for consumers or end users. The objective of this paper is, therefore, to assess the theoretical foundations and practical applications of agro-food-chain and networks in Ethiopia within the context of developing countries. The methods of data collection are desk review with perspectives of development theories and empirical studies. Qualitative descriptions and content analytical methods were employed for the collected information. The remaining sections include agro-food chains and networks, challenges of agro-food chains and networks, and conclusions and policy implications.

Agro-Food Chains and Networks: Literature Review

Components of Agro-Food Chains

Value Chain

This section provides an overview about the agro-food chains and networks in Ethiopia. Agro-food system is a set of activities that combine to make and distribute agro-food products, and consequently act to meet human nutrition needs [5]. Food chain is very complex, involving many actors and steps. Value chain focus on distribution of value added throughout the supply chain amongst different agents [4]. In the rural market of Ethiopia, the food supply chain is composed of a large number of smallholder producers, retailers, cooperatives, wholesalers, producers, and consumers [6]. The value chain has primary and supportive activities; bringing material into a business, converting material into final products, transportation the final products, marketing or selling, procurement, technology development, human resource management, and establish infrastructure. Every firm is a synthesis of activities performed to design, produce, market, delivery, and support its product [11]. Cost of production, transport, processing, and available surplus for each partner are the major concerns of value chain.

Actors' Linkage

Different actors build links between them, allowing an agricultural product to reach consumers in competitive, secure, accessible and sustainable conditions. Food chain is a tool for organizing the flows of phases and linkages leading to agricultural products reaching consumers. Input-supplier, subsistence and commercial agriculture, agro-industry, distribution and consumption are essential components of agro-food systems. The components are interlinked and where changes occur in one component such as prices, supply, quality, regulations, and others they affect all the others. Different types of linkages exist between these components and their environment like supporting, technical and financial services. However, the link between the producers and the export markets is weak [14].

Agribusiness provides inputs to the farm sector, and it links the farm sector to consumers through handling, processing, transportation, marketing, and distribution of food items and other agricultural products [15].

The link promotes competitiveness, together with the principle of equity, food security and sustainability. It can promote the organization of small and medium size producers in cooperatives that are crucial for linking-up the dynamic actors with competitive agro-food chains. In addition, actor-linkage fosters consultation between different economic operators who have traditionally been loggerheads over matters such as price, quality, and means of payments. The link encourages consultation between different institutions in the public sector as well as between the public and private sectors. Agro-food chains are operating in increasingly competitive markets where there are efficient actors willing to cut their costs to a minimum without sacrificing quality. By organizing agribusinesses in line with the agro-food chain model, it often becomes possible to reduce transaction costs and increase profit margins of agribusinesses by rationalizing operations, achieving economies of scale and reducing the steps between production and consumption. In addition, organizing the agro-food chain leads to better planning of primary and industrial production and guarantees stable product volume and quality [5].

Networking

Networks are horizontally structured relationships between agents that enable to reduce transaction costs for coordination and information exchange. The concept for net chains refers to a multi-layer hierarchy between suppliers, processors and retailers where horizontal coordination between reciprocal agents is embedded in a framework of vertical deliveries. Production and distribution processes involve a mixture of socioeconomic, technological, legal and environmental criteria that are highly complementary in explaining overall agro-food chain performance. The following figure represents different dimensions of the food chain.

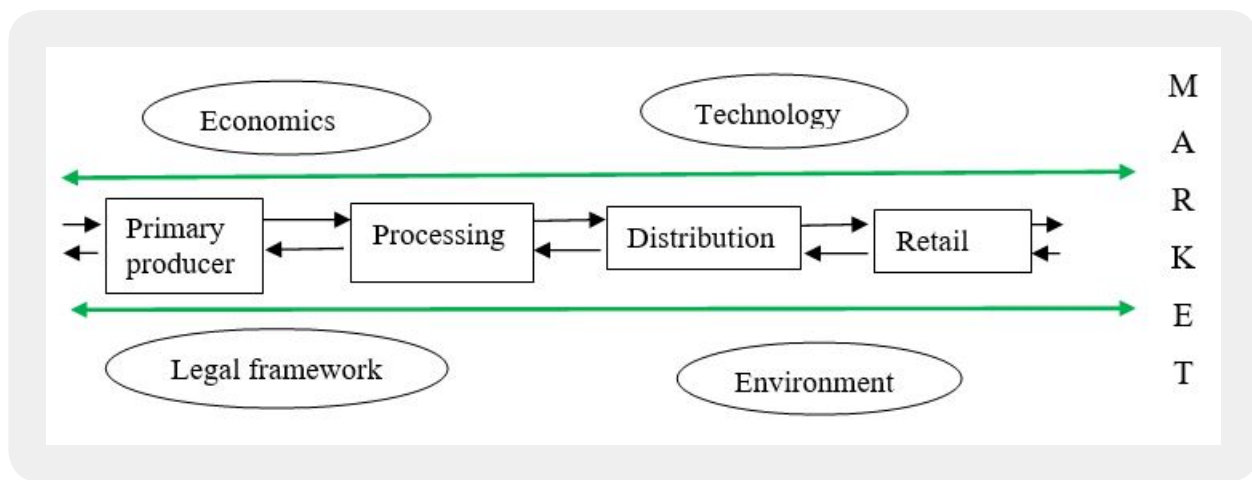


Figure 1: Analytical perspectives on food chains.

In the food chain, economic returns and consumer orientation are important economic dimensions. Different levels of systems that numerous traders operating and freely available of information to all participants are the key dimension of efficiency. To increase efficiency and profitability, individual companies may establish alliances with other parties in the production column resulting in supply chains and networks. Such net chains offer better prospects that production and distribution systems comply with consumer values,

enable the establishment of integrated quality and safety control systems, and might enhance the external competitiveness of businesses.

Application of technologies, logistical systems, information and communication can improve quality performance and enhance innovations in food products. Methods of production, trade and distribution of food are embedded in ecological environment. Important performance issues are related to the use of energy and energy emissions in production and distribution of food products, the recycling of waste and packaging materials throughout supply chains, and the prospects for sustainable food production systems. Norms and values related to societal constraints to production, distribution and trade of food are legal and social dimensions of human well-being and sustainable entrepreneurship.

Supply Chain Management: Theory and Practice

Supply chain management is the integrated planning, implementation, coordination and control of all business processes and activities necessary to produce and deliver, as efficiently as possible, products that satisfy market requirements [16]. Supply chain management is important tool for value added creation. This is a customer-oriented approach that aims at the integration of business planning for balancing supply and demand across the entire supply chain. Supply chain is a longer channel stretching from raw materials components to finished products carried out to final buyers while network is essential for collaboration, power and trust. The traditional cooperation was commonly focused on producers while in recent years, buyers and retailers have begun to play a key role in the integration of production and distribution networks [11]. Technology transfer, research, linkages between hardware (production, processing and logistics) and software (organization and management) are important elements of innovation process in a value chain. Supply chain organization has become strongly oriented towards continuous delivery and flexible sourcing. Linking of stakeholders including producers, traders, processors and retailers can reduce transaction costs and reinforce learning capacities as a result market access and competitiveness can be improved.

In practice, channels of supply chain for horticultural crops are not well documented in Ethiopia [17]. The most selected business in Ethiopia is coffee [9]. Coordinated supply chains are durable arrangements between producers, traders, processors and buyers about what and how much to produce, time of delivery, price, quality, and safety conditions. Good organization of farmers and effective leadership are crucial factors in overcoming many of the weaknesses. Reduction in transaction costs, enhancing quality and sustainability, reduction in uncertainty of outlets, and wealth creation are the most important functions of supply-chain integration with food chain.

Local smallholders can better compete if they have embedded in institutional arrangements, which enable them networking for coordination and strengthen entrepreneurship to pursue a gradual improvement of the terms of trade. Agro-food chain involves considerable processing activities that generated most value-added including appropriate inputs, handling, labeling, and certification. Agricultural lands are expanding for crop production and animal husbandry. The growth for agriculture in terms of production is strongly favored by the use of fertilizers, technologies and chemicals. However, the farmland per capita is reducing due to population growth.

The growing trade has shown positive impacts while the negative effects of globalization are increasing the social exclusion and concentration of wealth. Economic development, food security and sovereignty, foreign-exchange earnings, creation of employment, and effective utilization of resources are the major roles of trade in developing countries. Nevertheless, most developing countries in Africa including Ethiopia have fallen from being net exporters to importers of not only cash crops but also food crops [18]. Contractual farming, low entrepreneurial skills and inability of farmers to influence policies are elements in the institutional capacity. Networks at local level is paramount important to create better partnership among landownership, agricultural graduates, marketing experts, transporter and the asset owner.

The other component of the food chain is procurement. Wholesalers, procurement systems, suppliers, and high quality and safe products are the key pillars of procurement systems. The first three are organizational changes while the fourth pillar is an institutional change. Determinants of change in procurement systems are technology capacity to demand and incentives. Meeting private standards give opportunities for producers and adopting standards can open the door to suppliers in terms of volume, value-added and diversity. The chain of marketing for a certain commodity is presented as follows:

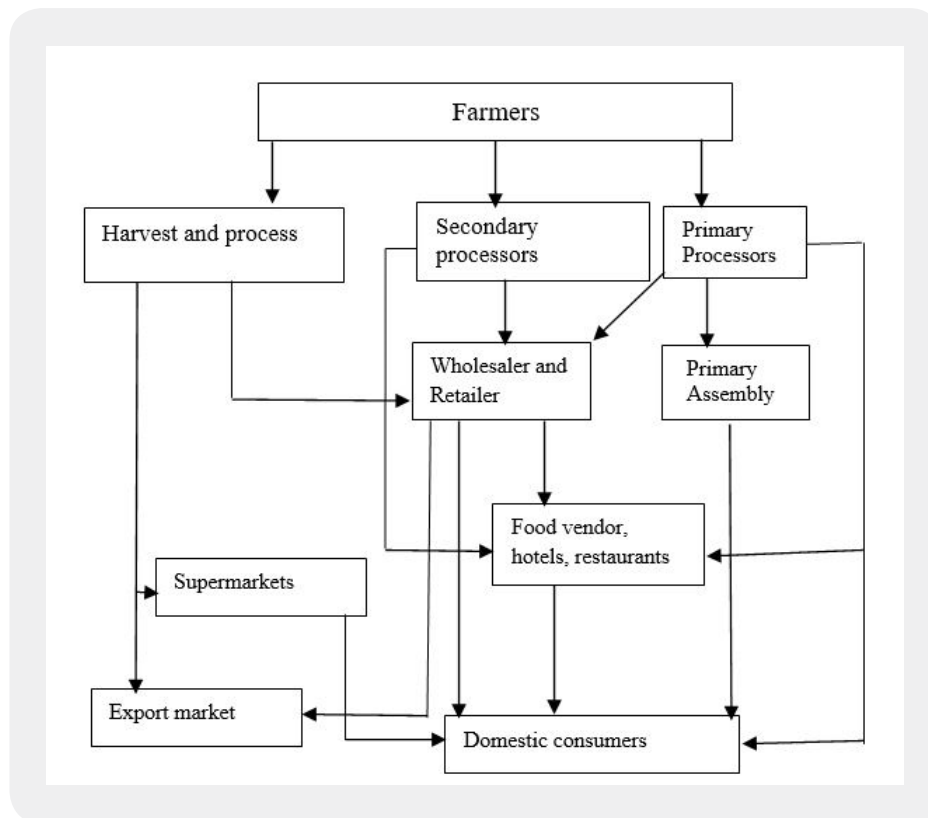


Figure 2: A model for marketing chains adapted in FAO (2007).

Local growers, integrated pest management and organic farming are production systems. Use of pesticides, fertilizer, institutional support, and participation are the major activities of production.

There are different types of consumers according to family size, the time available for shopping, preparing and eating food, age, residency and education. The supply chain starts from producers. Producers sell to agents and to processing industry. Intermediary traders distribute their product to retailers, which finally reached at customers. The large-scale chain has very complex networks.

Marketing channel is the route through which agriculture products pass from producers to consumers that composed of a set of intermediaries undertaking marketing activities. To reach a target market, the marketer uses marketing channels. Communication is one of the marketing channels, which delivers and receives messages from target buyers such as radio, newspapers, magazines, television, telephone, billboards, posters, fliers, audiotapes, and the internet. Marketers use distribution channel to display, sell or deliver the physical product or services to the buyers or users. These channels may be direct via internet, phone, or indirect through distributors, wholesalers, retailers and agents as intermediaries. Endogenous factors like experience of the firm, controlling system, sales volume, sales agent and exogenous factors such as number and location of customers, ways of communication, product class and competition might affect the channel.

Marketers can collect full information about markets, customers, prospects and competitors. They can tap into social media to amplify their brand message. They can also facilitate and speed up external communication among customers. The four “P” component of marketing mix (product, place, price, promotion) and the five “P” modern marketing management (people, processes, programs, packaging and performance) are important product strategies. The task environment includes the actors engaged in producing, distributing, and promoting the offering. These are the company, suppliers, distributors, dealers, and target customers. Distributors and dealers include agents, brokers, manufacturer representatives, and others who facilitate finding and selling to customers. The broad environment consist demographic, economic, socio-cultural, natural, technological, and political environments [11].

Highly important commodities due to large population involved in the production process and to their contribution to food security. These are also source of foreign exchange and have good potential for short-term impact with relatively low investment-cereals (wheat, maize, tef and barley), oilseeds (sesame, Niger seed, linseed and rapeseed), coffee, and sugar. Commodities that are important for economy due to the number of people involved in production, processing and marketing as well as for food security. They are also important for foreign exchange earnings and employment opportunities. However, these groups need significant investment such as dairy products, meat, tea, fruit and vegetables. They are attractive to investors and have a potential for short-term impact. They are more important for niche or specialized market but have low national economic importance. These are honey, pulses, spices and grapes. The role of market reforms on private sector development is uncertain. The supply chain for coffee may start with Ethiopian farmers who plant, tend, and pick the coffee beans, selling their harvest to wholesalers or perhaps a Fair Trade cooperative [12].

Challenges of Agro-Food Chains and Networks in Ethiopia

The natural calamities and civil conflicts are the major challenges of agro-food chains. Food insecurity and vulnerability to famine are the substantial challenges [13]. Market failure is the adverse impact on society of imperfect or non-working markets.

Market failure can be characterized as farmers are poorly organized, risks and high transaction costs (costs of information, negotiation, monitoring, coordination, and enforcement of contracts), incomplete information and insufficient technology [4]. Some of the market failure can be recognized as lack of competition, presence of externalities, incomplete property rights, presence of public goods, asymmetric or disproportional information [19].

Another problem is the topography of rural communities creates challenges for different activities. For instance, constructing roads on rocky terrains makes difficulty. The spatial features constitute problems in transportation and easy access to target groups. Failures of the administrative and technical advices are common problems in Ethiopia. Some rural communities are yet to enjoy such facilities as roads, markets, electricity, health services, extension services, rural banking and cooperative societies.

Some externalities are costs that are not incurred by the private operator but represent dis-benefits to other members of the community, such as the impacts downstream river users of pollution by a private industrial plan. Open access resources are resources of communal access where the private cost of using more of the resource is lower than the social cost incurred by the community as a whole resulting in over exploitation and possible permanent damage to the resource. Market failure also can be explained as a situation in which a market left on its own fails to allocate resources efficiently. Incomplete markets are failed to produce commodities or services for which there is a private demand at prices above production costs.

There is also a policy failure including lack of control markets for agro-chemicals, political interferences, and poor contract enforcement increase. Government intervention has two broad reasons i.e. efficiency and equity promotions. State failure refers to the pervasive inefficiency and impropriety of different institutions in areas. State failure includes mismanagement, malpractice, nepotism, bribery, corruption, and others. State failure in recent literature includes “rent-seeking” or directly unproductive profit seeking. The most important challenge is the social and economic gaps between the poor and the rich. Several constraints limit smallholders to enter international market by smallholder farmers. Insufficient market information, poor bargaining power, stringent market conditions or standards, regulation barriers and distortions, and lack of institutional capacity are the major constraints.

Economic problems loss of traditional jobs; social challenges health and safety issues, and environmental problems the tragedy of commons and water quality can be mentioned. One of the challenges facing is to determine how to bring stakeholders with different interests and competences together in an effective way to improve chain performance and to enhance farmers’ livelihoods. The partnership is complex, involving multiple and sometimes contrasting objectives. The other important weakness of smallholder farmers is lack of knowledge about modern markets, modern technology and proper use of modern inputs and lack of access of capital. According to Kotler and Keller (2012) [11], marketers face a design challenge in choosing the best mix of communication, distribution, and service channels for their offerings. The practice of vegetable production in Ethiopia (for instance Addis Ababa) is associated with health risks where tannery, garage, and garbage wastes disposed off to irrigation water in Akaki sub-city [20].

Conclusions and Implications

Agriculture continues to play a central role in economic development and to be a key contributor for poverty reduction. One of the current evolving themes of transformation is agro-food chain systems. Agro-food chain and networks are instruments of development. However, globalization, urbanization and agro-industry are the major determinants of agro-food chain and networks. Food chains have complicated processes, classifications, and interrelated activities. Food chains have economic, technological, environmental and social dimensions. Supply chain requires coordinated efforts and durable arrangements among producers, traders, processors, and buyers. Agro-food chains and networks have been challenged by many factors such as civil conflicts, state and market failures, food insecurity, lack of fund, social constraints and anthropogenic factors.

Safer food can generate both health and wealth. Food in poor countries like Ethiopia is neither safe nor fair. It requires management and better communication on food safety in informal and formal markets [21]. In this regard, training, food safety test, and women friendly and affordable technologies are important interventions for food chains. Reliable, adequate and recent information are required to explain explicitly the status of agro-food chains and networks. This paper suggests further research on agro-food chain and networking for major commodities produced in Ethiopia. More attention should be given for not only for food and nutrition security but also for food safety and quality standards.

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