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Bio-Economy and Sustainable Agri-Food Value Chains: Involvement of Local Stakeholders through Contract Farming

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Abstract

Due to expanding middle-class populations' increased awareness of food safety and quality as well as the high standards set by developed countries' export markets, contract farming has a bright future. In many developing nations, contract farming has become more significant. Previous research examined the impact of contracts on the welfare of smallholder farmers, but they often did not take into account the variety of contractual arrangements. As a result, agri-food sustainability makes an effort to use acceptable farming methods' potential for mitigation to lessen rather than exacerbate the environmental problem and climate change. Prior to now, the focus of policymakers has mostly been on the production end of the food chain. However, for food systems to be sustainable, they must also be productive, environmentally friendly, and provide equitable revenue distribution across the food chain. Whether the products are bought by governmental organizations, multinational corporations, smaller businesses, farmer cooperatives, or independent business owners, it is a factor that is becoming more and more significant in agribusiness. Sponsors must therefore assess how a replacement crop might also be introduced and take into account social attitudes before implementing new cropping practices. Contract farming is frequently seen as a crucial strategy for raising social welfare, strengthening food security, increasing food quality and productivity, and protecting the environment. It aids farmers in overcoming obstacles such lack of capital, insurance, good input availability, output markets, and managerial and technical skills. The majority of studies show that contract farming increases income. The influence of contract farming on farmers' income, according to certain research findings, is either negligible or even detrimental. This study empirically examines the effects of local stakeholder participation in contract farming on income and farming challenges and theoretically hypothesizes the influencing mechanism.

Keywords: Contract Farming; Bio-Economy; Sustainability; Agri-Food Value Chain (AFVC); Agriculture

Introduction

Businesses and governments are coming under growing pressure to focus more on the effects of the ever-expanding production, distribution, and consumption of agro-based products on the environment and resource use. With an annual revenue of over €2 trillion and 18 million employees, or 8% of the total EU workforce, the agriculture and bioeconomy industry is one of the largest in the EU [9]. It accounts for about 4.2 percent of the EU's GDP and notably boosts economic growth in rural and coastal areas [10]. The majority of players in the sector are farmers, small and medium-sized firms, mid-caps, and cooperatives, whom the banking system underserves. 28% of people in the EU reside in rural areas, where development is frequently slowed down by issues with access to public services and transportation, a lack of local employment opportunities, and insufficient broadband coverage. Outside of the European Union, food security remains a significant problem [10]. Major issues on the sustainable development agenda include the inclusion of farmers, especially small farms, in sourcing networks as well as institutional measures that help them comply with the strict food safety and quality requirements. Long-term agri-food chain establishment could be significantly aided by corporations, notably those in the retail industry [14].

Most people agree that contract farming is a crucial instrument for enhancing social welfare, raising food quality and productivity, enhancing food security, and safeguarding the environment [22]. It helps farmers overcome challenges like a lack of financial resources, insurance, and availability of high-quality inputs, output markets, and managerial and technical skills. Growing populations and shifting eating patterns are driving up global food consumption. This development consequently affects the competition for land and other natural resources. The value chain (VC) development strategy, for instance, uses systems thinking to explore how value is created and captured by producers as well as by other stakeholders including workers, governments, and consumers. VC development places a priority on systemic evaluations and integrated solutions to enhance the chain's performance. However, because the VC development strategy is focused on a single commodity, it frequently overlooks how interdependent other VCs are. Consumers' nutritional status

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depends on diets that contain a variety of commodities, and farmers, especially smallholders, commonly combine crop production with livestock, fisheries, and/or forestry operations. The interconnections of all food VCs at the level of the food system must therefore be more thoroughly examined in order to achieve broad-based developmental effects.

For instance, the shift in the common agricultural policy from a policy of price support, as it was before Agenda 2000, to a policy of strategy, achieved via investments, bringing out the idea of agri-food chain sustainability, is what spurred this economic transition in Europe. Resources and inputs are being used more effectively as a result of the decline in price support in agricultural output.

Contract Farming

Contract farming has transformed agriculture by boosting agricultural productivity in both developing and developed nations. Governments, particularly in developing nations, have been urged by non-governmental groups, legislators, donors, and researchers to support and permit contract farming in order to boost agricultural productivity [1,25,27,]. Contract farming is a legally binding arrangement between a producer (a farmer) and a buyer (an agriculture company) for a predetermined period of time and under specific terms. Under this arrangement, the producer receives agricultural inputs and financial resources in return for letting the agricultural company supervise and instruct farmers on how to produce crops of a certain quality and quantity [28]. Contrarily, contract farming is a contentious practice. On the one hand, contract farming offers small-scale farmers several benefits, such as risk sharing, access to higher-value markets, financing services, cheaper inputs, lower transportation and marketing expenses, access to technology, and training and technical assistance from large agricultural enterprises. Despite all the benefits, there have been a number of worries about contract farming's negative effects on small farmers [7,26]. Researchers like have drawn attention to the drawbacks of contract farming [1,25,29].

Challenges of Contract Farming

- Contract farming agreements are commonly accused of favoring companies or large farmers while taking advantage of the weaker negotiating position of small farmers.

- Growers deal with problems like firms cutting produce's quality too much, delayed factory deliveries, late payments, low prices, and pest attacks on the contract crop, all of which drive up production costs.

- Contractual agreements are typically verbal or informal, and even written agreements do not necessarily provide the same level of legal protection as in other countries.

- If a clause in the contract is unenforceable, either party may break it.

- Multiple Sellers - One Buyer (Monopsony).

- There are gender-based disparities in access to contract farming, with women having less access than men.

Overcoming Challenges of Contract Farming in the Agri-Food Value Chain

The adoption of beneficial changes in more resilient food systems has been hampered by a number of challenges. Smallholder farmers and communities may not be able to benefit from innovative production and consumption habits because of unfavorable market-distorting policies, such as subsidies for inorganic fertilizers. Market failures may also be influenced by consumer choices and the degree to which consumers have control over their food supply. Food production and consumption are out of balance, which makes it difficult for individual individuals and groups to work together for favorable economic, environmental, and social consequences. The 10 Elements of Agro ecology demonstrate how important it is to adopt holistic frameworks to guide the transition to sustainable food systems [6,11].

Improved agri-food logistics infrastructure, decreased postharvest losses, facilitated market access, increased resource efficiency along the supply chain, and improved waste reduction and valorization through circular economy approaches are some additional actions that could be implemented along the agri-food value chains to improve mitigation benefits.

Improvements in the agri-food value chains will benefit all market participants, especially small and marginal farmers who are unable to benefit from economies of scale. Well-developed agri-food value chains can help solve the problem of food security by fostering capacity and knowledge sharing throughout the various phases of such value chains. As previously said, efforts are being made by both the public and private sectors to enhance the functionality and effectiveness of various agri-food value chains globally, particularly in terms of giving farmers access to the internet.

Prospects of Contract Farming

Food product demand is rising daily as a result of the expanding population, and it can only be satisfied when supply and demand are balanced. However, due to a lack of scientific and technological knowledge, as well as financial restrictions on farmers, the supply and demand in our country is not balanced. The best solution to this issue is contract farming, which uses high yielding variety (HYV) seeds, labor, and equipment in addition to introducing new technology. Governments have occasionally been duped by questionable or "fly-by-night" businesses wanting to make a quick buck. The value chain perspective depicts the sequence of connected actions necessary to deliver a product or service from material inputs to production, marketing, sales, final consumption, after-sales services, and, eventually, recycling. The functional division of value chain tasks into separate units in some value chains as well as the outsourcing of these tasks to competent producers around the world have been made possible by technological advancements, organizational innovations, and trade and investment liberalization and deregulation policies. The agri-food value chain is shown in (Figure 1), starting with input manufacturers and ending with customers and service providers for marketing and distribution. The initial stage of agricultural inputs includes manufacturing inputs for crop cultivation and animal breeding, such as fertilizers, seeds, herbicides, equipment, and agricultural machinery. Pre-production services are what make up the value chain. This stage is followed by the production of agri-food products and by-products, primary food processing, crop cultivation, and animal breeding. The final phase typically requires substantial equipment expenditure.

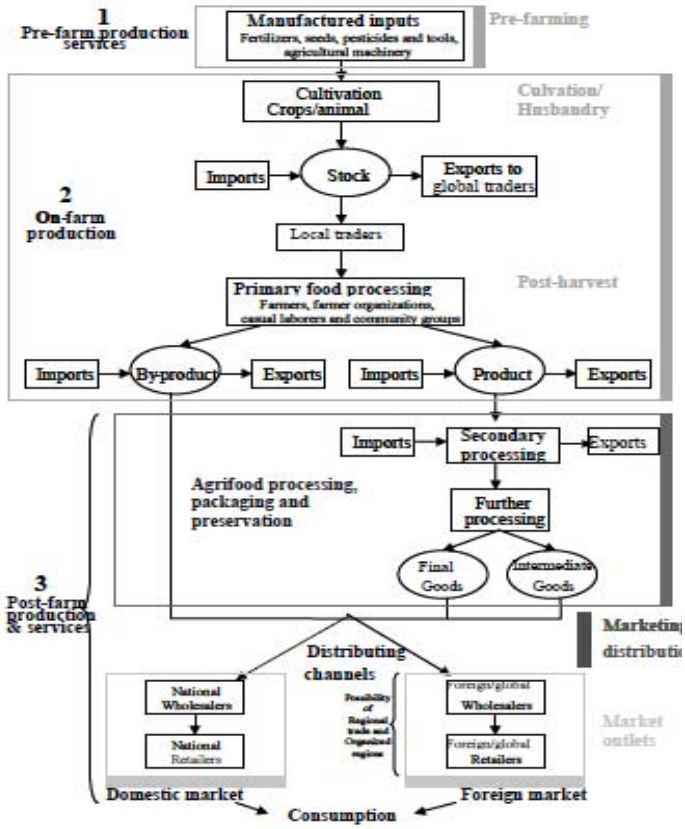

Figure 1: Global agri-food value chains (Memedovic, UNIDO, 2004, adapted from Institute for Food Studies and Agro-industrial Development (IFAO), in [15].

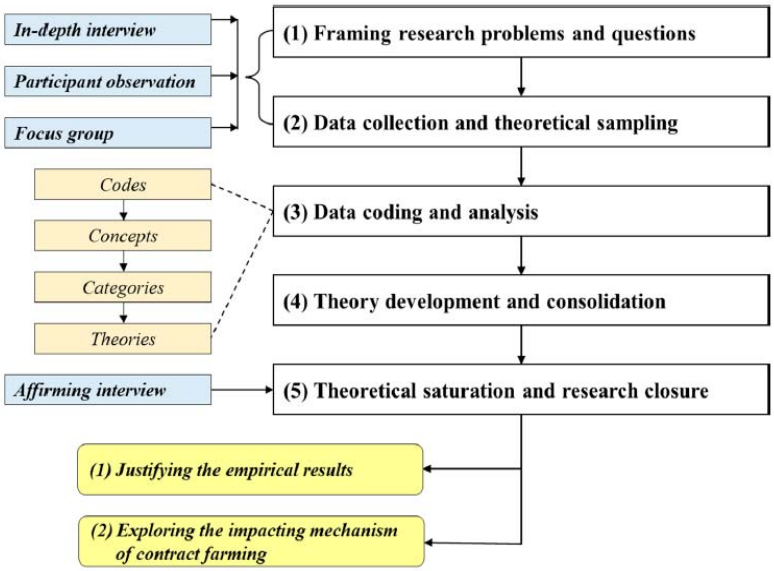

Figure 2: The framework of the theoretical analysis.

Theoretical Contribution and Sustainability of Development

By understanding the relationship between relational norms, social capital, and local stakeholder involvement in contract farming for triple bottom line results, this study highlights innovation. Such difficulties have not been covered in earlier work. By doing this research, this initiative will add to the current body of knowledge in contract farming and social enterprise. By demonstrating a connection between relational norms and social business contract farming performance using relational norms, relational theory,

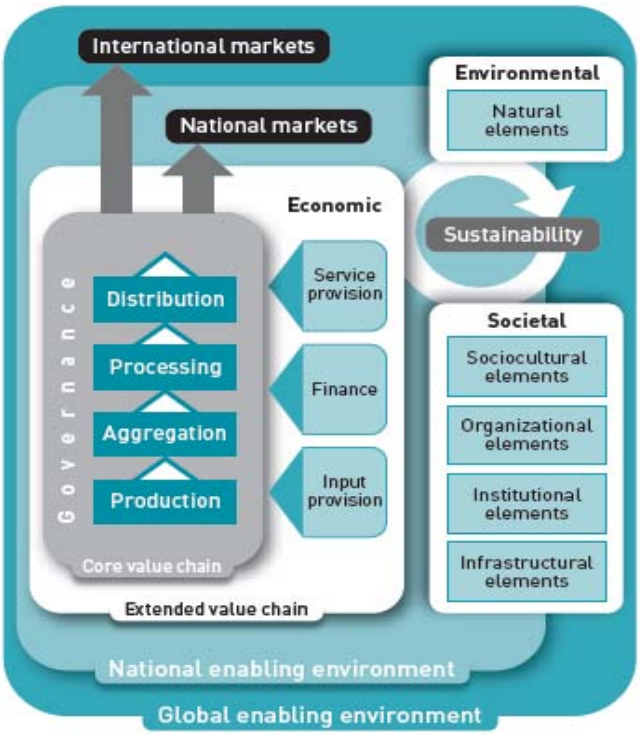

Figure 3: The sustainable food value chain framework.

and social capital theory, this research will also add to the body of knowledge.

For long-term rural growth, food security, and the sustainability of biological resources, sustainable, diverse, and resilient value chains are necessary. Supply chains for both food and non-food items operate in an environment that is becoming more complicated and dynamic due to changing consumer expectations, new technologies that can occasionally change the game, altering organizational structures, and new forms of collaboration.

Three general categories can be used to group the operations of the food system: Food is produced, processed, packaged, and distributed, and then it is retailed and consumed. Numerous social, economic, physical, and biological factors affect these activities, which range from land tenure, input costs, agricultural or harvest technologies, to government policies and programs to safeguard or boost output. To wrap up the theoretical investigation, a qualitative framework based on exploratory interviews and a grounded-theory approach is constructed. Exploratory interviews may include participant observations, in-depth interviews, and focus groups. According to protocols and evaluative criteria, the grounded-theory process is modified from the methods of [16,32] to achieve a methodological fit and rigor [13]. The five core steps of the strategy include confirming interviews, participant observations, focus groups, and in-depth interviews. Four fundamental procedures in data coding and analysis are codes, concepts, categories, and theories. The qualitative research framework is shown in (Figure 2).

Methodological Contribution and the Sustainable food Value Chain Framework

By developing a social business contract farming framework, this project will operate as a methodological foundation for tracking triple bottom line performance in agriculture and other industries where contracts are used. Future research can increase the accuracy of measurement frameworks by incorporating new social business governance mechanisms into the framework utilizing the framework that has been presented.

The framework depicted in (Figure 3) is based on a number of available VC frameworks. In essence, it shows a system where a complex environment affects how farms and other agribusinesses behave and operate. The system is founded on core (VC), which is a term for VC actors, or those that produce or purchase from upstream sources, add value to the product, and then resell it to a higher level. Participants in the value chain are often private sector companies, but they may also be public sector organizations like institutional buyers (e.g. food-reserve agencies, emergency food buyers such as the World Food Programme, and the military). A certain level of the chain has heterogeneous actors, each of which links to a range of end markets with its own size, technology, and goals through a distinct channel.

Production (such as farming or fishing), aggregation, processing, and distribution are the chain's four main processes (links) (wholesale and retail). Utilizing sustainability assessment techniques can assist in identifying obstacles to the development of sustainable food production systems that have an influence on the environment, the economy, and society [3]. The aggregation step is crucial for food VCs in developing countries since it can be challenging to efficiently collect and store small quantities of products from dispersed smallholder farmers. The aggregate role can be carried out by producer organizations, aggregation intermediaries, food processors, and, less frequently, food distributors (wholesalers or retailers). There

Figure 4: Principles of sustainable food value chain development.

are three main categories of assistance providers:

1. Physical input suppliers, such as those who offer seeds for production or packaging materials for processing;

2. Providers of non-financial services include processing, field spraying, storage, and transportation; laboratory testing; management training;

3. Financial service providers due to the crucial role that working capital and investment capital play in putting the venture capital firm on a path of long-term growth, these services are set apart from others.

Sustainable Collective Innovation" in Agri-Food Value Chains

Innovation is essential to preserving a company's competitiveness and market position in the agri-food sector [22,24]. Given the sector's significance for both employment and production, innovation is necessary [18]. All SFVCD efforts are governed by ten interconnected concepts, despite the fact that each food VC is individual and has unique attributes that call for upgrading techniques tailored to those qualities (Figure 4).

According to empirical data, recent years have seen a substantial evolution in the innovative methods used in agri-food supply chains. The reason for this is that modern citizen-consumer demands for food quality, safety, and environmental sustainability in manufacturing operations must be addressed in light of new problems [22]. The systemic agri-food supply chains perspective, which considers all decisions and operations that occur throughout the value chain, from the raw materials used to the transformation process that results in the creation of the final product, has internalized these qualities along with ethical aspects of production processes (such as respect for workers' rights, fair wages, etc.) [20]. Agri-food also contributes to the expansion of other closely related industries [8]. Leader firms in some agri-food supply chains have the financial and human resources to support development without relying on the dissemination of long-term knowledge and discoveries.

The extent to which this relationship exists is yet unknown, despite several authors have highlighted how agri-food supply chain governance can affect innovation processes [17]. This advantageous relationship becomes especially clear when governance frameworks enable the supply chain to distribute the value produced by innovation (the governance value chain), recognizing governance as a factor [12]. Additionally, governance models based on shared values help to foster an environment of trust between parties, enabling agents to manage contractual agreements with more flexibility and resulting in simpler and more affordable contracts [23]. There is currently no analytical framework in the literature that views innovation as a collective activity, despite some research suggesting that inventive processes are not restricted to corporate bounds [34].

Promoting Sustainable Agri-food Value Chains

The establishment of more robust food systems is a goal shared by industrialized and developing nations. The agri-food value chains are positively impacted by some governmental policy decisions. A law (i.e. Law no 11.947) that required that at least 30% of food purchases for public schools be made directly from family farmers, with preference given to those who use organic or agro ecological practices, gave rise to the National School Feeding Program (PNAE) in Brazil, an institutional market. This effort demonstrated that public policy can simultaneously address food and nutrition security, social inclusion, and agriculture that is friendly to biodiversity by providing strong support to family farming, which is closely related to agro-ecological food production.

Before the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, several nations included food system-related activities in their intended Nationally Determined Contributions (NDCs). The majority of NDCs (58%) from Least Developed Countries (LDCs) and Small Island Developing States

(SIDS) mention food value chain issues, while 43% of NDCs with pertinent references originate from Sub-Saharan African Parties [33].

Future Direction

Recent agricultural development strategies, such as those focusing on food production and food security, have mostly failed to lower the total numbers of people who lack access to food or to assure environmental sustainability [3]. Despite the impressive improvements in food production over the past 50 years, one of the biggest challenges to achieving food security for all continues to be the global disparities in food entitlements, which refer to people's access to and control over productive resources as well as their ability to obtain food [5].

The following three areas could be the focus of future research: Measuring the economic and social effects of contract farming: Future studies should examine the influence of contract farming on income over two stages. The influence of contract farming on intermediate factors is measured in the first step, and the impact of intermediate factors on income and social welfare is assessed in the second stage.

Alongside contract farming, it's usual to find agricultural cooperatives, certifications, and supporting initiatives that offer education, advice, and technology to modernize the food value chain. The data collected via a survey questionnaire may be evaluated using partial least squares structural equation modeling (PLS-SEM) due to the strong data, predictive capacity, and ability to manage with small sample sizes and non-normal data sets [19]. Due to inefficient, ineffective, and inappropriate implementation of numerous programs designed to increase production, agriculture has been ignored over time [5]. Contract farming may therefore be able to help "the global food manufacturer" offer the right foods in ample amounts, at prices that are lucrative for farmers and affordable for consumers. Contract farming therefore has the potential to enhance global food security. Environment and contract farming: Through intermediary factors like food quality standards and other private certifications, contract farming affects farmers' decisions about appropriate production systems, efficient techniques, and ethical behaviors.

Conclusion

Contract farming is one of the feasible options for creating an agricultural economy that ensures food and nutrition security for a billion people. It is a workable alternative farming model that might provide farmers with guaranteed and trustworthy input services and contracting companies with necessary agricultural produce. Most people agree that contract farming is a crucial instrument for enhancing social welfare, raising food quality and productivity, enhancing food security, and safeguarding the environment. It helps farmers overcome challenges like a lack of financial resources, insurance, and availability of high-quality inputs, output markets, and managerial and technical skills. A growing global population and shifting dietary patterns are driving up food consumption. This development consequently affects the competition for land and other natural resources. The old idea of food security is reappearing in both industrialized and developing nations. The problem is a result of the overuse of natural ecosystems and their capability for production. The complexity of the world's agricultural markets has been influenced by a variety of factors, including shifts in consumer demand, the creation of complex food standards, primarily those related to food safety and quality, technological developments, and modifications to the industrial structure along the value chain. Value chain development won't be able to address every issue with the food system. Food venture capitalists can't fund everyone equally, they can't account for trade-offs in the food chain, and they can't totally prevent negative environmental effects. Public initiatives and national development plans are needed to address these restrictions. On the other hand, since VC tax revenues provide for the majority of funding for such programs and policies, VC development in general and sustainable agri-food value chain development (SFVCD) in particular should be at the core of any long-term plan to reduce poverty and hunger.

The majority of studies indicate that contract farming increases income. In order to address many of the problems small farmers have with market access, it also supports backward and forward market linkages, which are the foundation of commercial agriculture. But other empirical data indicate that contract farming has little, if any, effect on farmers' income. In this research, the impact of contract farming on income and farming-related difficulties is empirically investigated, and a theoretical affecting mechanism is proposed.

Contracting companies must take into account a variety of aspects, including the availability of inputs, societal issues, and physical and telecommunications infrastructure. Contrarily, in the current environment, contract farming benefits both businesses and farmers. The future of contract farming is reasonably bright due to the growing middle class's knowledge of food safety and quality as well as the high standards set by industrialized nations' export markets.

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