

Agricultural Trade and Sustainable Economic Development: A Theoretical Analysis of the Role of Comparative Advantage and Food Security

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Article Info

Article type:

Review Article

How to cite this article:

Anguoti Klocheh, P., Nessabian, S., Moghaddasi, R., & Khosravinejad, A. (2025). Agricultural Trade and Sustainable Economic Development: A Theoretical Analysis of the Role of Comparative Advantage and Food Security. *Journal of Resource Management and Decision Engineering*, 4(3), 1-5.

<https://doi.org/10.61838/kman.jrmde.133>



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ABSTRACT

Agricultural trade is recognized as one of the key instruments in achieving sustainable economic development. This article, with a theoretical approach, analyzes the role of comparative advantage in agricultural trade and its impact on food security. The findings indicate that the utilization of comparative advantages in the production and trade of agricultural products can lead to improvements in food security and economic development. However, the risks associated with international trade and dependency on imports require intelligent policymaking to maintain sustainability in the agricultural sector.

Keywords: *Agricultural trade, sustainable economic development, comparative advantage, food security, trade policies*

1. Introduction

In recent decades, agricultural trade has been considered one of the key factors influencing economic

development and food security. With the expansion of globalization and the increasing dependence of countries on imports and exports of agricultural products, the importance of analyzing the role of comparative advantage in this

domain has become more evident (World, 2020). Comparative advantage, as an economic concept, refers to a country's ability to produce goods at a lower opportunity cost relative to other countries (Balassa, 1965). This concept plays a crucial role in determining production and trade patterns in agriculture. On the other hand, food security has been highlighted as one of the Sustainable Development Goals (SDG 2) emphasized by the international community (Headey & Ecker, 2013). Agricultural trade can improve food security by transferring food from surplus regions to deficit regions (Fao, 2021). However, excessive dependence on imports can expose countries to risks arising from fluctuations in global markets (Negi & Ramaswami, 2019).

In this article, with a theoretical approach, the role of comparative advantage in agricultural trade and its impact on sustainable economic development and food security is examined. The main objective is to analyze how the utilization of comparative advantages can strengthen food security and economic development while managing risks associated with international trade.

2. Theoretical Background

Theories of international trade play an important role in explaining the causes and consequences of agricultural trade. In Adam Smith's theory of absolute advantage, each country should produce and export goods in which it has superiority in cost and productivity. However, Ricardo's theory of comparative advantage demonstrated that even if a country is less efficient in producing all goods compared to others, it can still benefit from trade provided it has a comparative advantage in producing at least one good (Balassa, 1965). This theory forms the basis of interactions between countries in agricultural trade, as many developing countries enjoy comparative advantage in primary agricultural commodities (Anderson, 2010).

Economic growth in Solow's model is analyzed as a function of capital accumulation, labor, and technological progress. Yet, in developing countries, agriculture is considered one of the main engines of growth. Schultz highlighted the role of agriculture in development, arguing that investment in agricultural knowledge and productivity can accelerate the growth process (Pretty et al., 2011). Neoclassical and institutionalist development models have also stressed the necessity of institutional support, market access, infrastructure, and education to exploit agricultural potential effectively (Frankenberg & Thomas, 2019).

According to the Food and Agriculture Organization (FAO), food security is achieved when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs (Fao, 2021). Food security is a multidimensional concept analyzed at the levels of production, distribution, access, consumption, and stability, with trade being one of its most essential components (Headey & Ecker, 2013).

3. The Role of Comparative Advantage in the Development of Agricultural Trade

Comparative advantage is one of the fundamental principles of international trade, and its role in agricultural economics is more prominent than in any other sector. The concept asserts that countries should specialize in producing goods with the lowest opportunity cost compared to others (Krugman & Obstfeld, 2018). In agriculture, such advantages may arise from specific climatic conditions, fertile soil, cheap labor, or local production traditions (Swinnen & Kuijpers, 2019). One of the most important economic criteria for production, export, and import planning is comparative advantage. Examining comparative advantage across various products enables policymakers to design appropriate frameworks that guide producers toward cultivating goods with the highest profitability (Barrett, 2008).

While agriculture is one of the key sectors meeting global consumption needs, Iran, despite its significant agricultural resources, has failed to achieve desirable growth due to factors such as low productivity, weak management, inefficiency in production units, and reliance on traditional farming methods (Binyaz & Mohammadi, 2018). Iran's geographic and economic structure underscores the importance of agriculture in its economic development, both in terms of food provision, job creation, foreign exchange supply, and contribution to GDP. The agricultural sector, with its inherent natural advantages and vital role in national food security, requires more focused attention. Therefore, considering the sector's capital, climatic, and technological limitations, adopting the principle of comparative advantage is of great importance (Jahansouri & Farahani, 2017).

Although comparative advantage in agricultural products is partly influenced by technological progress and innovation (Zarei & Izadi, 2024), unique climatic conditions, taste, color, and region-specific characteristics ultimately define the comparative advantage of products and create differentiation among producing regions (Ebrahimi Khosfi et al., 2013). Identifying both the potential and actual

comparative advantages of the agricultural sector can facilitate its presence in international trade (Masters & Winter Nelson, 1995). This identification can be done using indices such as Revealed Comparative Advantage (RCA), Domestic Resource Cost (DRC), and the Social Profitability Index. For example, if the DRC for a product is less than one, it indicates that its domestic production is more cost-effective than importing it (Balassa, 1965; Masters & Winter Nelson, 1995). If governments can identify products with comparative advantages through appropriate analytical tools, they can optimally allocate national resources toward the production of these goods, thereby increasing resource efficiency and strengthening foreign trade (Anderson, 2010). For instance, countries such as the Netherlands and Chile have been able to become major exporters by focusing on specific agricultural products like flowers and fruits (Fao, 2021).

4. Agricultural Trade and Its Link with Food Security

Improving food security in a country requires increasing access to food through higher domestic production, with sustainability as its main feature. Therefore, production needs comprehensive support, particularly in infrastructures and structures, in a way that targets the causes of food insecurity. In fact, food insecurity reflects the complex interplay of economic, social, political, and technical issues, and addressing these issues is crucial in any food security framework. Agricultural trade can directly influence food security. On the one hand, the export of agricultural products increases foreign exchange earnings, enabling the import of strategic and nutritious goods. On the other hand, targeted imports of agricultural products during low-yield seasons or times of drought can help maintain supply stability and control prices (Anderson, 2010).

One of the challenges of food security in developing countries is the high volatility of agricultural supply due to climate change or lack of storage and transportation infrastructure. Regional and international trade can reduce the risk of shortages by creating broader supply networks and ensuring the stability of food supply (Pingali, 2012).

Agricultural trade also increases the diversity of household diets. While many countries are unable to produce all food groups, imports of nutritious goods such as legumes, grains, fruits, and dairy can improve dietary quality and help prevent malnutrition and related diseases (Headey & Ecker, 2013).

5. Agricultural Trade and Sustainable Economic Development

The agricultural sector plays a role beyond food security because of its influence on setting political, social, and economic priorities. Globally, approximately 34.3% of land and 70% of water consumption are allocated to agriculture. About 37.3% of employment in Iran and 18% worldwide is concentrated in this sector.

Sustainable agricultural development is one of the essential dimensions of a country's overall development. In other words, sustainable and continuous development of any country depends on the sustainability of its agricultural system. The term "sustainable agricultural development" covers a wide range of approaches, from modernization and transformation in advanced industrial agriculture to practices incorporating technologies compatible with conventional farming. Sustainable agriculture must be ecologically sound, economically viable, and socially acceptable. The first major transformation in attitudes toward sustainable agricultural development can be traced back to the 1971 development and environment group meeting, where a panel of experts highlighted sustainable agriculture as an urgent need for food security in developing countries. Following this, three other important meetings—Stockholm Environment Conference in 1972, the Brundtland Commission in 1987, and the Rio Earth Summit in 1992—further emphasized the recognition of sustainable agricultural development.

Agricultural trade can contribute to inclusive economic growth through increased production, employment, and foreign exchange revenues. The expansion of agricultural exports creates job opportunities not only in production but also across the value chain, including processing, packaging, transportation, and marketing, thereby reducing poverty and enhancing social equity (World, 2020).

One of the advantages of agricultural trade is the development of rural areas, which in most countries are relatively impoverished. By improving access to foreign markets, rural producers can offer products with higher added value, thereby narrowing the economic gap between urban and rural regions (Barrett, 2008).

One of the challenges of extensive agricultural trade is the degradation of natural resources. Overuse of water, land, and chemicals may threaten environmental sustainability. Hence, agricultural trade should be developed within the framework of environmental sustainability standards such as

organic farming, resource conservation, and renewable energy use (Pretty et al., 2011).

The development of agricultural trade toward sustainable development requires effective governance, institutional support, infrastructure reform, regional agreements, access to credit, and farmer education. Countries that have established such institutional foundations enjoy greater sustainability in trade and economic growth (Swinnen & Kuijpers, 2019).

Strengthening and expanding the agricultural sector plays a significant role in consolidating the economic foundation of developing countries. Since agriculture is vital for meeting food needs, supplying raw materials for industry, creating jobs, and generating income, the stability and continuity of agricultural growth are among the main factors ensuring social stability and economic growth (Ebrahimi Khosfi et al., 2013). The role of agriculture in the economic growth process has been perceived in different ways over time. In early studies of economic development, agriculture was often overlooked, with industrial development emphasized as the engine of growth. However, in the 1970s, the paradigm shifted toward agricultural-based development perspectives. The Green Revolution in Asia highlighted the potential of agriculture in contributing to economic growth (Pingali, 2012). Over time, the potential impact of agriculture on growth has continued to attract the attention of development economists. Many early studies examined the role of agriculture in promoting economic development in low-income countries, often emphasizing the intersectoral linkages between agriculture and industrial production (Masters & Winter Nelson, 1995). Research in this field is highly significant, as it provides policymakers with sufficient knowledge and data at both domestic and international levels on how scarce resources should be allocated to agriculture and its supporting infrastructures (Fang & Wang, 2025; Lu, 2025).

6. Discussion and Conclusion

The theoretical analysis conducted on the link between agricultural trade, comparative advantage, and sustainable economic development indicates that the global trade system in agriculture can simultaneously play a facilitative and accelerating role in the process of economic growth and enhancing food resilience. Utilizing comparative advantages in the production of agricultural products enables countries to focus on goods with higher productivity, more suitable resources, and lower opportunity costs, making them

competitive in global markets. This, in turn, increases foreign exchange revenues, improves the trade balance, contributes to sustainable employment in rural areas, and helps reduce poverty.

On the other hand, food security, as one of the main components of sustainable development, directly interacts with trade policies. Targeted imports, comparative-advantage-based exports, diversification of trade partners, and improvement of agricultural infrastructure can simultaneously enhance access, stability, and quality of food. However, an exclusive emphasis on market logic and trade liberalization, without considering domestic capacities as well as environmental and social vulnerabilities, may lead to production concentration in specific regions, excessive dependence on imports, degradation of natural resources, and weakening of national food security.

Therefore, policymaking in agricultural trade must be based on an integrated and long-term approach in which the principles of comparative advantage are aligned with sustainability and social justice considerations. To achieve this goal, a set of key measures is recommended, including targeted support for domestic producers, investment in innovation and green technologies, facilitation of access to global markets, strengthening of institutional capacity, and diversification of export products. In addition, monitoring and data-driven systems should be established to assess the impact of trade policies on food security and natural resources.

Future-oriented planning in agricultural trade should ensure that, while enhancing the country's competitive advantages in the global arena, it also guarantees a path of sustainable and resilient economic development. Agricultural trade, if designed on the principles of equity, resilience, and sustainability, can become a strategic tool in addressing 21st-century challenges such as food poverty, climate change, and global economic instability.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

None.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethics Considerations

Not applicable.

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