

# Theories and Models of Agricultural Development



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## Abstract

Agricultural development is a sub-set of rural development. However, rural areas cannot attain development without its agriculture being developed because majority of the rural dwellers are engaged in agricultural practices as their major source of income. The main objectives of agricultural development are the improvement of material and social welfare of the people. Therefore, creating a sustainable agricultural development path means improving the quality of life in rural areas, ensuring enough food for present and future generations and generating sufficient income for farmers. Supporting sustainable agricultural development also involves ensuring and maintaining productive capacity for the future and increasing productivity without damaging the environment or jeopardizing natural resources. In the light of this, this paper employed available literature to review agricultural development and theories of agricultural development such as frontier model, conservation model, the urban-industrial impact model, diffusion model and high-pay off input model.

**Keywords:** Agricultural Development; Theories and Models.

## Agricultural Development

Agriculture plays a key role in food security and economic development. However, most of the world's population in rural areas depends directly or indirectly on agriculture for their livelihoods. Yet as the world's population increases and migration to towns and cities intensifies, so the proportion of people not producing food will grow [1].

Agricultural development according to Nwachukwu [2], is a multi-sectional activity that support and promote positive change in the rural and urban areas. However, the main objectives of agricultural development are the improvement of material and social welfare of the people. Therefore, agricultural development is seen as synonymous with rural development, the two terms are different but intrinsically related. Agricultural development is a part of rural development; rural areas cannot develop without its agriculture being developed because about 90% of the rural dwellers are engaged in agricultural practices as their major source of income.

Nigeria as a country seeks to become a leading economy in Africa and a major player in the world's economic and political affairs of which their 20-20-20 plan is their guideline. To become a developed nation, Nigeria needs to speed up its economic growth by focusing on vital economic sectors like education, energy, agriculture and manufacturing. At this point in Nigeria's development, the best approach is to focus on the agricultural sector. By focusing on agricultural development, Nigeria can speed up its economic growth in the coming decade [3].

Agricultural development can also address gender disparities. In Sub-Saharan Africa and South Asia, women are vital contributors to farm work, but because they have less access to improved seeds, better techniques and technologies, and markets, yields on their plots are typically 20 to 40 percent lower than on plots farmed by men. Addressing this gap can help households become more productive and reduce malnutrition within poor families. Economic growth is seen as a long term rises in the capacity to supply increasingly diverse economic goods to its population. It also entails a sustainable rise in national output with a manifestation of economic growth [4]. Therefore, the role of agriculture in transforming both the social and economic framework of an economy cannot be over-emphasized. It has been the source of gainful employment from which the nation can feed its teeming population, providing the nation's industries with local raw materials and as a reliable source of government revenue.

According to Adegoye & Dittah in Research Clue [4], a full developed economy, especially in agricultural sector, means an increase in the production of export crops with an improvement in the quantity and grades of such export crops. However, for a country to industrialize, agricultural output will be said to have acquired growth if agriculture can supply enough materials to agro-allied industries. In the light of this, Reynolds in Research Clue.com [4] opined that agricultural development can promote economic development of underdeveloped countries in four different ways:

- a) By increasing the supply of food available for domestic consumption and release labour needed for industrial employment.
- b) By enlarging the size of the domestic market for the manufacturing sector.
- c) By increasing the supply of domestic saving and
- d) By providing foreign exchange earned by the agricultural exports.

Therefore, creating a sustainable agricultural development path means improving the quality of life in rural areas, ensuring enough food for present and future generations and generating sufficient income for farmers. Supporting sustainable agricultural development also involves ensuring and maintaining productive capacity for the future and increasing productivity without damaging the environment or jeopardizing natural resources. In addition, it requires respect for and recognition of local knowledge and local management of natural resources, and efforts to promote the capabilities of current generations without compromising the prospects of future ones. Consequently, economic and environmental sustainability, adequate farmers' income, productive capacity for the future, improved food security and social sustainability are important elements of developing countries' agricultural development [5]. Thus, When farmers grow more food and earn more income, they are able to feed their families, send their children to school, provide for their family's health, and invest in their farms and this makes their communities economically stronger and more stable for agricultural development

### Theories of Agricultural Development

The main aim of agricultural development is the improvement of material and social welfare of the people. Therefore, it is often seen as integrated approach to improving the environment and well being of the people of the community [2].

The first step in the process of agricultural development is to abandon the view of agriculture in pre-modern or traditional societies as essential static. However the problem of agricultural development is not that of transforming a static agricultural sector into a modern dynamic sector, but of accelerating the rate of growth of agricultural output and productivity consistent with the growth of other sectors of a modernizing economy (<https://ageconsearch-umn-edu/bitstream/135054/Fris-1972-11-02-245pdf>). Therefore, any attempt to embrace a meaningful perspective on the process of agricultural development must abandon the view of agriculture in pre-modern or traditional society as essential static. Hence, a theory of agricultural development should provide insights into the dynamics of agricultural growth, either into the changing sources of growth, in economies ranging from those in which output is growing at a rate of 1.0% or less to those in which agricultural output is growing at an annual rate of 4.0% or more [6].

In view of the above, there are about five (5) general models in the literature on agricultural development;

- a) The frontier model
- b) The conservation model
- c) The urban-industrial impact model
- d) The diffusion model
- e) The high-pay off input model

### The Frontier Model

The history expansion of the area cultivated or grazed in the western countries has represented the main way of increasing agricultural production. However, the most dramatic example in western history was the opening up or creation of the new continents - North and South America and Australia - to European settlement during the 18<sup>th</sup> and 19<sup>th</sup> centuries [6]. These countries of the new continents became increasingly important sources of food and agricultural raw materials for the metropolitan countries of the Western Europe.

In earlier times, similar processes had proceeded, though at a less dramatic pace, in the peasant and village economies of Europe, Asia and Africa. Intensification of land use in existing villages was followed by pioneer settlement, the establishment of new villages and the opening up of forest or jungle were a series of successive change from Neolithic forest fallow to system of shifting cultivation on bush and grass land followed first by short-fallow systems and in recent years by annual cropping. As regard to the above, where soil conditions were favorable, as in the great river basins and plains, the new villages gradually intensified their systems of cultivation. While where soil resources were poor, as in many of the hill and upland areas, new areas were opened up to shifting cultivation or to nomadic grazing. As a result of rapid population growth, the model did not last, the limits to the frontier model were quickly reached. Crop yields were typically low- measured in terms of output per unit of seed rather than per unit of crop area. Output per hectare and per man hour tended to decline - except in the Delta areas such as in Egypt and South Asia, and the wet rice area of East Asia [6]. In some areas, the result was to worsen the wretched conditions of the peasantry while there are relatively few remaining areas of the world where development along the lines of the frontier model will represent an efficient source of growth during the last quarter of the 20th century. The 1960s saw the "closing of the frontier" in most areas of South East Asia, in Latin America and Africa, the opening up of new lands awaits the development of technologies for all control of pests and diseases (such as the Tsetse fly in Africa) or for the relation and maintenance of productivity of problem soil.

### The Conservation Model

The conservation model of agricultural development evolved from the advances in crop and livestock husbandry associated

with the English agricultural revolution and the concepts of soil exhaustion suggested by the early German chemists and soil scientists. The conservation model emphasized the evolution of a sequence of increasingly complex land and labour-intensive cropping system, the production and use of organic manures and labour-intensive capital formation in the form of physical facilities to more effectively use land and water resources. This model was the only approaches to intensification of agricultural production that was available to most of the world's farmers.

Agricultural development within the ambit of the conservation model, clearly was capable in many areas of the world of sustaining rate of growth in agricultural production around 1.0% per year over relatively long periods of time. This rate is not compatible with modern rates of growth in the demand for agricultural output which typically fall between 3-5% in the developing countries.

### The Urban-Industrial Impact Model

In the conservation model, location variations in agricultural development were related primarily to differences in environment factors. It stands in sharp contrast to models which interpret geographical differences in the level and the rate of economic development primarily in terms of the level and rate of urban-industrial development. Initially, the urban-industrial impact model was formulated (by Von Thunen) to explain geographic variations in the intensity of farming system and in the productivity of labour in an industrialized society (<https://ageconsearch-umn.edu/bitstream/135054/Fris-1972-11-02-245pdf>). Later this model was expanded to explain the more effective performance of the factor and product markets linking the agricultural and nonagricultural sectors in regions characterized by rapid urban-industrial development. The model has been tested extensively in the limited states but has received only limited attention in the less developed world.

### The Diffusion Model

The diffusion approach to agricultural development rests on the empirical observation of substantial differences in land and labour productivity among farmers and regions. The route to agricultural development, in this view is through more effective dissemination of technical knowledge and a narrowing of the productivity differences among farmers and among regions. The diffusion of better husbandry practices was a major source of productivity growth even in pre-modern societies. Before the development of modern agricultural research systems' substantial effort was devoted to crop exploration and introduction. Even in nations with well-developed agricultural research systems a significant effort is still devoted to the testing and refinement of farmers' innovations and to testing and adaptation of exotic crop varieties and animal species. Model was developed emphasizing the relationship between diffusion rates and the personality, characteristics and educational accomplishments of farm operators. Diffusion model provides the major intellectual foundation of much of the research and

extension effort in farm management and production economics since the emergence, in the later of the 19th century of agriculture economics as a separate sub discipline linking the agricultural sciences and economics. The developments that led to the establishment of active programs of farm management research and extension occurred at a time when experiment-station research was making only a modest contribution to agricultural productivity growth. A further contribution to the effective diffusion of known technology was provided by the research of rural sociologists on the diffusion process. The limitations of the diffusion model as a foundation for the design of agricultural development policies became increasingly apparent as technical assistance and community development programs, based explicitly or implicitly on the diffusion model, failed to generate either rapid modernization of traditional farms or rapid growth in agricultural output.

### The High Payoff Input Model

The inadequacy of policies based on the conservation, urban-industrial impact and diffusion model led to a new perspective in the 1960s. The key to transforming a traditional agricultural sector into a productive source of economic growth is an investment designed to make modern, high-pay off inputs available to farmers in poor countries. Peasants, in traditional agricultural systems were viewed as rational, efficient resource allocators. They remained poor because in most poor countries, there were only limited technical and economic opportunities to which they could respond.

According to Ruttan [6], the new high pay-off inputs were classified into three categories.

- a) The capacity of public and private sector research institutions to produce new technical knowledge
- b) The capacity of the industrial sector to develop, produce and market new technical inputs.
- c) The capacity of farmers to acquire new knowledge and use new inputs effectively.

The enthusiasm with which the high pay off input model has been accepted and translated into economic doctrine has been due in part to the proliferation of studies reporting high rates of returns to public investment in agricultural research. It was also due to the success of efforts to develop new, high productivity grain varieties suitable for the tropic. New high-yielding wheat varieties were developed in Mexico, beginning in the 1950s, and new high-yielding rice varieties were developed in the Philippines in the 1960s. These varieties were highly responsive to industrial inputs such as fertilizer and other chemicals and to more effective soil and water management. However, the high returns associated with the adoption of the new varieties and the associated technical inputs and management practices have led to rapid diffusion of the new varieties among farmers in several countries in Asia, Africa and Latin America.

The model remains incomplete as a theory of agricultural development. However, education and research are public goods not traded through the market place. The mechanism by which resources is allocated among education, research and other alternative public and private sector economic activities are not fully incorporated into the model. More so, the model does not treat investment in research as the source of new high-pay off techniques. It does not explain how economic conditions induce the development and adaption of an efficient set of technologies for a particular society. Nor does it attempt to specify the process by which factor and product price relationships induce investment in research in a particular direction.

### Conclusion

As regard to the effects and the emergence of agricultural growth is critical for industrialization and economic growth in the 1960s, however, the process of agricultural growth itself has remained outside the concern of the most developing economics. Both technical change and institutional evolution have been treated as exogenous to the systems. In this paper, analytical approach was used to review agricultural development theories

and models of agricultural development for the sustainability of urban-rural development

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