

E-ISSN: 2583-9667

Indexed Journal

Peer Reviewed Journal

<https://multiresearchjournal.theviews.in/>



Received: 03-11-2023

Accepted: 09-12-2023

INTERNATIONAL JOURNAL OF ADVANCE RESEARCH IN MULTIDISCIPLINARY

Volume 2; Issue 1; 2023; Page No. 22-30

Regional development policies and their implications on agricultural development in Sudan 1899-1993

Samir Muhammad Ali Hassan Alredaisy

Faculty of Education, Department of Geography, University of Khartoum, Sudan

Corresponding Author: Samir Muhammad Ali Hassan Alredaisy

Abstract

This research aims to clarify regional development policies and their implications on agricultural development in Sudan from 1899 to 1993 AD. Pre-British colonial society in Sudan was a closed, traditional society that relied on a self-sufficient rural economy. The colonial government worked to change this economic model into a modern economy by establishing separate economic policies covering the periods 1899-1918, 1919-1939, 1946-1951, and 1951-1956 AD. In 1946, the proposed five-year development program for the post-World War II period was considered the beginning of planned development in Sudan, as varying percentages were allocated to various economic sectors. During British colonialism, regional agricultural development included agricultural expansion, licensing private pump schemes, building large irrigation schemes, and focusing on the mudflats of central Sudan to produce cash crops. Following the British departure, a development program was launched for the period 1957-1961, and agriculture received a significant proportion of public investment. The ten-year plan 1961/62 - 1970/71 also set a 29.9% rate for agriculture and irrigation. The five-year plan 1970/71-1974/75 emphasized the two sides of goods produced and goods consumed, while the six-year plan 1977/8 - 1982/3 aimed to push the Sudanese economy towards self-supported growth, reduce the ratio of agricultural income to non-agricultural income, to expand social services, balanced regional distribution of investment, and provide food products, by focusing on agricultural industries and importing industry. The National Salvation Government proposed an economic rescue program for the period 1990-1993, focusing on agricultural development and implementing a liberalization policy for export goods. Cumulative agricultural development during colonial and post-colonial produced a deteriorating traditional type of agriculture and another advanced modern type. All development plans have preferred the modern irrigated agricultural pattern because agricultural production in the traditional pattern is under risks of unreliable rainfall, lack of marketing and storage facilities, personal risks, commercial risks, uncertainty in production processes, lack of individual communication, and marketing problems. The focus on advanced irrigated agriculture in central Sudan also led to regional disparity of development. Future agricultural and regional development in Sudan should considerably develop traditional agriculture in its arid and semi-arid parts, benefiting from local and non-local experiences.

Keywords: development policy, regional policy, agricultural development, agricultural dualism, regional disparity

Introduction

The natural and human components of Sudan provided the necessary infrastructure for the implementation of economic and social development plans, especially for agricultural development. Many development plans were drawn up during the British colonial period and subsequent periods of national governments. Differences in the physical and environmental characteristics of Sudan, and the associated social and administrative obstacles and challenges in its various regions, have influenced the success of implementing these targeted regional development policies. This has resulted in regional disparities in agricultural development that have created overlapping social and political issues, especially since the vast majority of

Sudanese depend on agriculture as their main craft. This research aims to clarify regional development policies and their implementations on agricultural development in Sudan 1899 - 1993 AD and recommends some proposals that may help achieve balanced regional agricultural development. It is worth noting that agricultural development policies are embedded into the development plans of Sudan.

Briefing physical resources for development in Sudan

Before the secession of the South in 2011 AD, Sudan was considered the largest African country in terms of area (2.411 million km²), but it shrunk to an area estimated at about 1,800,000 km² and began to extend between the two circles of latitude (8° 45' - 23° 8' N) to the north and two

lines of longitude. (21° 49' - 34° 23') east, and has land borders with several countries and maritime borders on the Red Sea coast. This great latitudinal extension, enormous area, and long maritime borders gave great importance to its geographical location and geopolitical status. The surface of Sudan is mostly flat, as we find, based on sea level, that 45% of its area ranges in altitude between 300-500 meters, 50% of which is less than 1,200 meters in height (Barbour, 1961)^[7], and 2% of which is less than 300 meters. The Jebel Marra area, which reaches an altitude of about 3,089 meters, is considered the highest area, and the Red Sea Mountains occupy 2.7% of the area of Sudan.

There are three groups of basic rocks in Sudan, distributed in varying proportions over the total area of the country. They include bedrock (48%), sedimentary rocks (47%), and modern deposits (3%) (GRAS, 2006)^[16], in addition to the Umm Rawaba sediment series, which covers a wide area of central and northern Sudan and consists of clay, unconsolidated continental sand, and sandy clay. These geological formations contain metallic and non-metallic minerals such as deposits of iron ore, kyanite, nickel, talc, tungsten, zinc, gold, chromium, manganese, salt, and mica. Rocks are a source of different types of soil in Sudan. There is sandy soil in the desert and semi-desert regions in northern and western Sudan. It is characterized by fragile and low-fertile soil that is used to grow many cash crops and important pastures for livestock and camels. Clay soils, which are classified as vertisols in three of the international soil classification systems (Blockhuis, 1993)^[10], are found in central and eastern Sudan and extend from west of Kassala through the Geziera region and then South Kordofan. They are the main agricultural areas for the production of corn, cotton, and mechanized agriculture, and a major source of agricultural products, forests, especially Gum Arabic.

The soil between the White and Blue Nile includes two groups of soils. There is the riverine soil, which includes the silt of the White Nile, the silt clay of the Blue Nile, and the various soils that consist of sand and silt with a mixture of fine materials, and the silty soil that is found in the lower valleys of the White Nile and along the Blue Nile and the Nile River up to the High Dam Lake, the Gash Delta, and the Khor Baraka Delta. (Library of Congress, 2007)^[24]. There is a dark clay group located above the current flood level of the rivers between the White and Blue Nile (Mubarak, 1982)^[32].

Rainfall distributions in Sudan follow seven natural vegetation ranges, starting from 0 mm in the north to 1,500 mm in the south. The extension of Sudan into thirteen transverse circles resulted in the desert and semi-desert regions located north of 16° north latitude, forming 30% and 20% of its area, respectively, while the savanna region, which extends from 10° to 16° north latitude, constituted about 38% of its area. It is rich in natural collections of more than 100 species of trees, which differ greatly between them, and at the level of the same species, due to the difference in amounts of rain and soil type (Omer, 2005)^[34]. They form the natural pastures, most of which are found in Kordofan and Darfur, and occupying an area of 110 million hectares. Nearly 90% of the livestock in Sudan are raised in the traditional pastoral system that relies on natural pastures that provide 86% of the feed for the herds, concentrates

provide 4%, while irrigated fodder, crop residues, and agricultural by-products provide 10%. Sudan annually produces about 18.6 million tons of crop remnants and less than 126 thousand hectares of cultivated fodder (Babiker, 2015)^[5].

Rainfall provides an important main natural resource, contributing about 400 billion cubic meters annually to the total water in Sudan. The amount of water available to Sudan annually is about 30 billion m³, less than 50% of which is currently exploited, and the annual per capita amount is less than 1000 m³ (<1000 m³) (Babiker, 2015)^[5]. However, water is considered limited for Sudan, despite the abundance and availability of land for irrigation, due to its geographical location upriver in relation to Egypt and downstream in relation to Ethiopia and the tropical lakes (Osman *et al.*, 2005)^[34].

Sudan's flat surface, rock formations, and wide latitudinal extension provide enormous potential for agricultural investment and pastoral activity. Agricultural activity in Sudan is based on these resources to accommodate about 75% of the total population (Dawelbeit, *et al.*, 2010)^[14]. They are more concentrated in the clay plain in the Geziera region and the narrow strip on the Nile, where the population density reaches 87 people per km compared to the average general density which is 4 people per square kilometer (Dawelbeit, *et al.*, 2010)^[14].

Regional development policies in the colonial period: 1898-1956

Pre-British colonial society in Sudan was a closed, traditional society that relied on a self-sufficient rural economy. The colonial government worked to change the sufficient rural economy existing in Sudan into a modern economy by establishing separate economic policies covering four periods: the period 1899-1918, the period 1919-1939, the period 1946-1951, and the period 1951-1956 (Beshai, 1976)^[9].

Priority was given to agricultural development, and even the infrastructure that was built was allocated to serve agricultural expansion in central Sudan. In the period from 1899-1918, emphasis was placed on the infrastructure economy, such as the telegraph and transportation lines, in preparation for modern agriculture, as agriculture received only 1.8% of the budget (Beshai, 1976)^[9]. In the period 1919-1939, the investment pattern changed completely, as spending on transportation was reduced from 76.3% to 26%, and spending on agriculture was increased to 58% through the introduction of irrigated agriculture schemes, such as the Geziera Cotton Production Scheme. Accordingly, a large portion of self-sufficient agricultural land was converted to agriculture for the purpose of export.

The British administration has developed modern agriculture in the island region since 1925 over an area of 240,000 acres. It rose rapidly to 670,000 acres in 1931 and covered 1 million acres by 1954 (Ali, *et al.*, 1984)^[2]. In 1946, the government proposed a five-year development program for the post-World War II period. This program is considered the beginning of planned development in Sudan, as varying percentages were allocated to various economic sectors. 16.1% was allocated to agriculture, 13.7% to irrigation, 0.7% to veterinary services, 8.6% to education, 6.2% to health, and 21.8% to railways (Beshai, 1976)^[9].

The agricultural development policy also extended to include areas along the Blue and White Nile, where private agricultural schemes irrigated by pumps along them grew very quickly and doubled in number between 1952 and 1956.

Corn and sesame production began in the Gedaref region during World War II, and an area of 54,000 acres was added in 1954, then quickly increased to one million acres by 1959 (Simpson, 1980) [36]. One of the major achievements in the field of agriculture is the raising of the Sennar reservoir, which enabled the completion of the extension of Managel to the Geziera scheme, and the mechanization of corn cultivation. During the development program for the period 1951-1956, 16.8% was allocated to agriculture, 27.3% to social services, 26.8% to communications, 13.4% to public utilities, and 13.8% to administration (Beshai, 1976) [9]. What distinguishes this program is the shift from investment in irrigation and public works to transportation and public services. The railway system was extended to the south within the central rain-lands, increasing the load capacity of the entire system. The extension of the Gezira scheme also began, providing drinking water to the dry parts of western Sudan, and exploiting Gum Arabic from Kordofan.

The pattern of development during the colonial period focused on the mudflats of central Sudan for the production of cash crops, especially cotton. Even the provision of infrastructure, especially railways, was intended to connect cash crop production areas to these central areas. In addition to agricultural expansion in the mudflats of central Sudan, the British administration developed modern communication systems such as radio, telegraph, railways, roads, and airports, and applied modern urban planning to the cities in central Sudan, so that some cities began to dominate Sudanese life, such as Khartoum, WD-Madani, Sennar, and Gedaref where their population began to increase rapidly due to the concentration of development in this region.

The five-year post-World War II development program in 1946 included three major irrigation schemes: the construction of the Roseires Dam to enable expansion and intensification of crops in the Gezira Scheme, and the development of new pump schemes on the Blue and White Nile. This led to an increase in the irrigated area by 1,200,000 acres. As for the second scheme, it enabled the extension of the Managel to expand the cultivation of long-staple cotton and the production of corn. The Khashm al-Girba reservoir also added 500,000 acres to Sudan's irrigated areas. This plan proposed the expansion of agricultural schemes for pump irrigation in the Upper Nile, the development of Jebel Marra, the development of tea and coffee cultivation in South Sudan, the development of Al-Dali and Al-Mazmoum, and the Agadi scheme and the Sesame areas for the production of corn and sesame.

The policy of diversifying agricultural production aimed to introduce peanuts, castor, and other oil seeds, corn, wheat, and kannaf. The import substitution program also proposed expanding the production of sugar, wheat, rice, and coffee. The program also encouraged the cultivation of short-staple cotton in the rain-fed sector. Agricultural expansion and investment have led to increased inputs by increasing planted areas and applying some modern agricultural techniques. The area of the Geziera scheme increased to

about 2,000,000 acres as a result of the expansion of the Managel. The number of tractors also increased from 2,040 to 8,000 and the number of plows used from 120 to 700 (Lee *et al.*, 1977) [23]. The population of the city of Gedaref increased from 12,000 to 24,000 between 1950 and 1960 AD, as large numbers of citizens of Kordofan, Darfur, Nigeria, and traders from northern Sudan arrived (Davies, 1964) [13].

Regional development policies in the post-colonial period: 1956-1993 AD

Many development plans were formulated following the departure of British colonialism. In the 1957-1961 development programs, agriculture received an estimated percentage of public investment amounting to 28.1%, as did the transportation sector, and 30.2% was allocated to administration and social services. Among the major government schemes were the extension of Al-Manaqil to expand the Geziera scheme, preparations to build the Al-Rusayris farm to introduce more agricultural lands under irrigated agriculture, preparations for the construction of the Khashm Al-Qirba reservoir, and the construction of the Al-Junaid sugar factory and the sugar cane farm associated with the factory. The program allocated 19.9% to industry for the first time in the history of development planning in Sudan. There has been a noticeable increase in the number of private agricultural schemes that are irrigated by pumps. The expansion policy continued to search for ways to improve the traditional rain-fed sector away from private mechanized agriculture during this program.

The ten-year plan 1961/62 - 1970/71 set a rate of 29.9% for agriculture and irrigation, and estimated percentages for the mining, industry, transportation, public utilities, education, and health sectors from the state's general budget (Ministry of Finance and Economic Planning, 1961). The ten-year plan focused on large irrigation schemes and types of industry based on processing these agricultural products.

The Five-Year Plan 1970/71-1974/75 emphasized both aspects of goods produced and goods consumed, both of which were taken from the Marxist development model that aimed towards social planning for development while securing foreign-owned businesses and reclaiming agricultural land. Large increases were also allocated to the sectors of education, culture, health, and public services, the development of urban and rural energy networks, increasing exports and reducing imports, and urban and rural water, especially pits for watering humans and animals.

The five-year plan was amended to cover the period up to 1977, a great consideration was given to agricultural development, such as improving the efficiency of existing agricultural schemes, achieving self-sufficiency in all imported agricultural products, and regional integration of agricultural production. It also aimed to increase agricultural production through the development of hydroelectric energy and included increasing the use of Sudan's share of the Nile water, developing other water sources in parts of Sudan, and additional provision of hydroelectric energy. The development schemes that were previously proposed or new schemes included Northwest Sennar Sugar Factory, Al-Rahad Scheme, Sennar Dam, Al-Kanaf scheme in Abu Na'ama, replacing flood irrigation with relief irrigation in the northern state, and expanding the wheat growing area in

the Geziera Scheme.

Agrarian reform schemes have also been designed to increase productivity through electrification, reorganization of land uses, and improved management policies. It also aimed to promote industry and internal and external trade and proposed programs for the development of natural resources. These included the development of water and forest projects and rural development. Underground and surface water programs included drilling and maintaining wells, expanding water recording stations in large valleys, feasibility studies to provide drinking water to large cities, and building dams and excavations. As for forest development programs, they included developing the Gum Arabic belt and increasing Gum production to increase production to 2,500 tons annually, in addition to feasibility studies for preserving forests, developing forests in desert areas, and ongoing research to improve the use of forest capabilities.

The rural development stage also found cooperation with various specialized institutions interested in promoting and developing rural development, through the settlement of Bedouins and the development of the Abzi scheme as a future model for cultural integration between North and South Sudan. The inclusion of Bedouin settlement in this development plan is due to several reasons, including the belief in the necessity of providing social services, as the settled man is considered to be at a higher level of development than the Bedouin man, in addition to including sections of the population within the monetary economy (Pearson, 1980) ^[35]. There are those who believe that including the Bedouins within the capitalist system of production has led, as is the case in the Babanusa scheme to produce dry milk in western Sudan, to a conflict of interests between the aspirations of the Bedouins and the owners of the scheme, as the Bedouins' resistance to this development scheme was based on their doubt about the real goals of the government (Almoag, 1983) ^[31].

The Six-Year Plan 1977/8 - 1982/3 aimed to push the Sudanese economy towards self-sustaining growth, reduce the ratio of agricultural income to non-agricultural income, expand social services, and balance the regional distribution of investment and provision of food products by focusing on agricultural industries and importing alternative industry (Ministry of Finance and Economics Planning, 1977). This plan focused on developing the traditional agriculture sector, preserving Sudan's national wealth, achieving self-sufficiency in food, increasing agricultural inputs, stimulating rural development and community participation, and relying on regional planning to highlight that development schemes come through the special capabilities of each region. Therefore, 27% of the budget was allocated to agriculture and irrigation, 22% to industry and mining, and 21% to social services. Agricultural development strategies included vertical expansion to achieve the maximum possible use of various resources and horizontal expansion to increase production through extensive agriculture, focusing on rain-fed agriculture areas. It proposed implementing these strategies by modernizing the traditional sector by introducing mechanized agriculture, increasing animal and fish production, taking measures to combat animal diseases, establishing integrated agricultural-animal production schemes, surveying fish wealth

resources, and organizing fish cooperatives and processing mechanisms.

The intensification of the expansion of agriculture the Six-Year Plan 1977/8 - 1982/3, proposed rehabilitating public sector schemes and completing schemes under implementation throughout Sudan. These schemes represent carefully planned regional capacity development, such as the Geziera Scheme, and the development of local pressure group activities, such as the implementation of the Sag Ana 'am scheme (Thimm, 1979) ^[39]. These schemes were included in what is known as the policy of transforming Sudan into the world's food basket, which aimed to attract investments from Arab countries, especially in the field of animal production, mechanized crop production, and industrial-agricultural production such as the production of meat, leather, and fodder. The Nuba Mountains scheme was considered a model that could be taken to build commercial schemes in the traditional subsistence sector. This scheme included some partially mechanized government-run farms that produced cash crops and food crops for local consumers. For the first time in the history of Sudan, the huge resources of the traditional sector were realized in this development plan.

The political system in Sudan changed after the fall of the rule of Jaafar al-Numeiri, and elections were held in 1986 AD. The period from 1986 to 1989 AD witnessed political instability, deepening social problems, civil war, and tribal tensions in a number of parts of Sudan. No development program was announced during these four years by the elected government. In June 1989, the National Salvation Government came and proposed a program to rescue the Sudanese economy to cover the period 1990-1993. Ways to achieve the program included focusing on agricultural development, implementing the liberalization policy for export goods, encouraging the private sector and citizens to invest, and removing administrative, economic, and legal obstacles through institutional reform to attract investors.

This program adopted growth through capital incentives to accelerate agricultural development in Sudan. All state-owned agricultural enterprises have been floated, privatized, or sold. In view of agricultural development through policies to encourage the exchange of commercial and foreign resources (NESP, 1990) ^[33] by increasing exports, especially livestock, including cows and sheep, and some non-traditional and new crops in the field of export, such as maize, and liberalizing export prices, with the exception of cotton and Gum Arabic from this policy during the period 1990-1991, removing marketing control from all agricultural commodities and introducing a retention reserve system for all exporters of up to 40% for traditional exports and 100% for new marginal goods, on the condition that exporters use it to provide financial support for production inputs and priority industries such as food industries, agricultural inputs, devices, and machinery. The program also encouraged agricultural and livestock production and investment by providing appropriations and providing guarantee loans to encourage agricultural dependence.

The implications of regional development policies on agricultural development 1899 - 1993

The cumulative efforts of regional development policies on agricultural development during the both British

administration and subsequent national governments were diverse. Agricultural development at the time of British colonialism included general efforts for agricultural expansion, pumping schemes, and the construction of large irrigation schemes focused on the continued development of the Geziera Scheme. The same development trends toward modern irrigated agriculture after independence followed the same geographical pattern of development that colonialism followed, where development was concentrated in the Khartoum Complex and around the Geziera region, with some axes to the east and a few to the west and South Sudan. The traditional rain-fed sector did not receive as much from these plans as it did the modern agricultural sector.

British administration policy has resulted in two main patterns (sectors) of agricultural use, namely the traditional

pattern (sector) and the modern pattern (sector) irrigated from Nile dams, pumps, or rain in the Gedarief region. As for modern agriculture, Sudanese development plans have shown a clear bias towards it because it uses modern technology and specializes in cash crops, making it the mainstay of the Sudanese economy. These included large schemes that cover thousands of hectares under government supervision and are irrigated comfortably, such as the Gezira Scheme, or with pumps, such as most sugar schemes and the White Nile and Blue Nile agricultural schemes, in addition to a large number of small irrigation schemes that are irrigated by deep wells or with pumps from river water (Figure 1). The development of modern agriculture in Sudan took place among a population that had a long and good experience with animal husbandry since ancient times.



Source: <https://reliefweb.int/map/sudan/map-livelihood-zones-sudan-january-2015>

Fig 1: Agricultural livelihood zones in Sudan

The traditional agricultural sector includes the vast majority of traditional farmers in Sudan who produce for survival. There are several types of it, but they are all restricted by the agronomic-dry crop limit (Cox, *et al.*, 1979) [11]. There is a full-nomadic style, which is practiced between the two rain lines of 200-400 mm/annual, with the cultivation of few crops, and a semi-nomadic style, with more emphasis on

crop production, and is practiced between the two rain lines of 400-600 mm/annual, and there is a semi-nomadic style, as a result of ethnic traditions, and is practiced. Between the 600-1000 mm/annual rain line, there are permanent herd breeders with semi-nomadic emergencies as a result of ethnic traditions. This is practiced at the 1000 mm/annual rainline and is found in South Sudan. All of these species

can be included in the shifting cultivation that is distributed throughout Sudan in central Kordofan, southern Kassala, southern Blue Nile, Equatoria Governorate, Bahr El Ghazal, over the clay plain, and to a small extent over the sandy loamy soil west of the former White Nile Governorate, and around the main Nile between... Khartoum and Roseris, the Dinder and Rahad rivers, around the outskirts of villages (towns), the margins of the mud plain in Upper Nile State, Jebel Marra, and the Nuba Mountains.

Mechanized rain-fed agriculture does not differ from shifting agriculture except in the technology applied and the cultivated area. It is found in the mudflats east of the Blue Nile, the areas around Gedarief, and southern Kordofan State. It produces corn, short-staple cotton, sesame, peanuts, and food for local consumption and also contributes to the Sudanese economy with animal products.

Colonial and post-colonial policies resulted in many changes in the traditional sector since agricultural production in the rain-fed sector is defined as production under risk. This is due to the unreliability of rain and the lack of marketing and storage facilities. Besides that, there are personal risks and business risks. There are also risks associated with a lack of confidence and certainty in production processes, social risks due to the lack of individual communication, and risks associated with ignorance and marketing (Magnusson, 1969) ^[25]. In addition to this, there are risks associated with technical uncertainty, practical risks, and price risks. The rainwater sector suffers from most, if not all, of these risks, with inter-regional and intra-regional differences determined by the distribution of natural resources, historical events, and population change.

The humanitarian and human history of Sub-Saharan Africa during the Six-Year Plan period in Sudan is an evolution and development of poverty and hunger. The crises that occurred at the end of the seventies and early eighties, which were represented by famines, resulted in two types of response, the first of which was structural adjustment and stabilization programs associated with the World Bank and the International Monetary Fund, and the second of which was a direct and extended response to emergency aid for survival (Green, 1986) ^[18]. These programs aimed to increase and change the production structure to achieve the availability of resources and benefit from them, which had a significant impact in various aspects, including the trend towards exporting corn, which became the second source of income from exports in Sudan at a rate of 14% of the total value of exports. It also affected Sudan's ability to produce and purchase wheat, as the rate of self-sufficiency in wheat before implementing these programs averaged 48% and the rate of commercial wheat imports reached 32%, after its implementation it deteriorated to 26% and 21%, respectively. It also affected the total foreign exchange export revenues.

These policies did not improve the cost of living and achieve food security for families, and the deterioration of development activity in Sudan in the mid-to-late 1970s led to deep economic crises. In the early eighties, only a few of the development schemes that were proposed were completed, and even the schemes that were completed did not achieve their set goals. The gradual deterioration included all existing agricultural and industrial schemes and was accompanied by the outbreak of war in South Sudan in

1983 AD.

The introduction of the traditional sector into the regulated government marketing system is another change that occurred in Sudan through the Agricultural Bank of Sudan since 1984/5 by buying and selling corn, giving licenses to exporters, subsidizing wheat flour, and distributing grains for free or at subsidized prices (Maxwell, 1991) ^[27]. This is similar to most exchange systems in the semi-arid tropics that act as sinks and attractants for resources (Harris, 1982) ^[19]. The effects of state intervention in the marketing of cereal crops in the African Sahel region are represented by the loss of the license, as "control" over purchasing is only after the harvest, and is characterized by a limited duration and ends in all places when state funding dries up or when mobile phones are not available, forcing farmers with pressing needs to obtain Cash after the harvest season to sell grains at low prices to traders.

Direct sales from individual producers to itinerant urban consumers in a "significantly incomplete market" and the confinement of trade in interregional cereal crops are limited not only by parastatals but also by local civil administrations. As a result of the lack of approved transport containers and good storage capabilities in Sudan, traders take risks in collecting, classifying, and distributing agricultural commodities, and they are considered the main link between small producers and distant markets. In conclusion, the introduction of the traditional sector into the Sudanese state's marketing system was a kind of transformation rather than a transition to economic development.

Sudanese development plans referred to the restoration of agrarian reform of agricultural lands in rural areas, as it resulted in the presence of individual ownership among farmers, which led to the eradication of elements of duplication and semi-duplication in the end, and led to the emergence of cooperative associations for farmers that aimed to provide financial dependence, expand crop cultivation, guarantee yields, and provide agricultural inputs. This type of reform is considered unnecessary for economic growth to occur (Sinha, 1976) ^[31]. The cooperative societies of farmers in Sudan failed due to the recent experience in Sudanese society (Suliman, 1988) ^[38], and also due to the absence of an elaborate implementation of agricultural reform, and the political influence of most of the old landowners who worked to slow down its implementation, in addition to the lack of financial dependence and the debts of merchants and creditors on small farmers who lost their lands, after all. Therefore, agricultural reform did not have a positive impact on the traditional sector in Sudan.

Contemporary agricultural policies in Sudan focused on achieving increased grain production by expanding the area of large mechanized rain-fed agriculture only without working to increase the agricultural yield per unit. The total plowed land increased regularly from about 4.5 million hectares in 1961 to 14 million hectares in 1996, with variation from year to year in the area of plowed land and thus the total return. Here a fragile balance emerged between production and actual need, and the unit's revenues decreased regularly and reached a level much lower than its inherited capabilities. This is due to several factors, including loss of soil fertility and fluctuations in rainfall

(Ayoub, 1999) ^[4]. One study showed damage to fruits and vegetables at a rate ranging between 30-40% during harvest, transportation, and handling, which adds an increase to the cost of production in addition to its negative effects on marketing and the national economy, especially in circumstances where blame is directed to circumstances.

The introduction of corn cultivation and the expansion of wheat production to achieve self-sufficiency in the economic salvation program 1989-1993, to rescue the Sudanese economy to cover the period 1990-1993 was accompanied by some shortcomings, including ignoring the rainfed sector and focusing more on previously developed areas where the proposed expansion will take place.

The absence of a clear plan to reduce the regional imbalance in development despite the reference to rebuilding South Sudan, and the focus on The major increase in wheat production to meet the growing urban demand without moving towards upgrading the production of most of the foods consumed and wild tree food products and providing opportunities for financially capable citizens in agricultural investment, with the absence of a clear strategy to encourage the poor to produce and invest and taking into account the preservation, protection and rehabilitation of the environment.

The creation of a hybrid between traditional activities and profound change has pushed Bedouin societies to the brink of collapse, as the ancient relationship between humans, animals, and the environment has collapsed (Baker, 1978) ^[6]. It also resulted in the provision of water from deep underground reservoirs and the administration's imposition of peace to reduce war and hunting, as the population numbers increased at a very rapid rate, which led to an increase in demand for the herds of livestock owned by families. These effects occurred within the traditional content of the concept of "insurance" and internal economic-social exchange based on livestock herds and not on money and wealth. The size of herds has increased dramatically in these communities, and this has not been accompanied by migration policies for the sake of marketing, pasture development, and cooperative schemes, which have exacerbated the devastating environmental and social disasters for rural communities in Sudan.

The prioritization of agricultural production is based on the fact that creating the inevitable surplus in agriculture is technically easy and has a short growth or "gestation" period (Dantwalla, 1969) ^[12]. The priority policy for agriculture confirmed Malthus's writings on effective demand. The industrialization policy will also intensify the trend towards attracting savings from the countryside by making urban industrial investment more attractive. Increasing agricultural output per capita will also produce an increased demand for industrial products, will release workers to work in industry, and will make capital available for industrial expansion. The Gezirascheme has absorbed 300,000 immigrants to work in it, as have mechanized agricultural schemes. This agricultural expansion was linked to the increasing local demand for its products. It also enabled Sudan to avoid the negative effects of drought in the period 1968-1973. It also protected the rural poor from the risks of food insecurity in the short term, but it led to an economic crisis in the long term. It is clear from this development plan that the lands designated for growing

wheat and corn have increased significantly with the focus on the mudflats of central Sudan, and no clear plan has been developed for developing the sufficient rainfed sector. However, development in these areas has provided job opportunities for seasonal migrants from the rainfed sector, especially from Western Sudan.

Higher education developed simultaneously with agricultural and infrastructural development in central Sudan. In 1975, we find that of the 17 universities and higher institutes present in Sudan, 16 of them were located in Khartoum, Geziera, and Gedarief, with one university in South Sudan and a complete absence in Darfur, Kordofan, and the Northern Region. In 1975 AD, trends to decentralize higher education proposed new universities in Darfur, eastern and northern Sudan, but in parallel with these regional universities, other institutions were proposed in central Sudan, including the University of Gezira, the Abu Haraz College of Natural Resources, and the Abu Naama Agricultural Institute.

The provision of community-based animal health services also faces obstacles that include insecurity, poor communication, lack of adequate transportation, simple infrastructure, ease of marketing and trade, limited numbers of veterinarians, and climate extremes (Jones *et al.*, 1998). The industry also suffered from high taxes, the devaluation of the Sudanese pound, and increased levels of foreign currency exchange, so that the agricultural sector could no longer meet the economic requirements of the country, which needs more economic resources, in addition to changing the concepts and applications of privatization policies (Isam *et al.*, 2011) ^[20]. Good economic performance has been achieved when rates of exchange and harmonization are supported by fiscal and monetary control and few indirect taxes.

Long-term economic instability coupled with drought has left women in small villages in western Sudan vulnerable to impoverishment. Increasing drought and government indifference and neglect have pushed poor farmers to rely on local resources and adopt subsistence strategies. Differences were found in living strategies between women and men and between women of different ethnicities and social statuses in the village of Barika. This reflects inequality in agricultural production and social and economic obstacles, which make it difficult for women to succeed in accumulating assets and savings, which are considered primary insurance against the scarce agricultural season. These crises were coupled with a change in the nature of gender relations (Gray, 1993) ^[17].

Commercial services related to agricultural development developed rapidly in Khartoum, Gezira, and Gedarief. This was facilitated by the modernization of means of communication and roads, as the Sudanese Communications Authority (Suda-Tel) at the time introduced new methods of communication in Khartoum in 1995 and in most major cities in central Sudan. Few cities in Kordofan and Darfur, at that time, experienced this advantage. Roads were also built to connect Khartoum and the Geziera region with agricultural production areas in other parts of Sudan, such as Khartoum-Kosti-Al-Obeid, Khartoum-Madani-Sinnar-Singa-Al-Damazin, Khartoum-Atbara-Haya-Port Sudan, Khartoum-Madani-Gedarief-Kassala-Port Sudan, in addition. To build a road linking El-Obeid-El-Fasher-El-

Geneina. This led to an increase in the regional imbalance in development in Sudan.

Ambitious development policies have led to failure due to insufficient planning, lack of cohesion of central planning, and the misplaced use of the term "program," in addition to weak comprehensive planning, where some aspects were ignored, such as social change and the environmental load of the proposed type of development, in addition to the influence of external factors such as high oil prices. It also directed development efforts towards multiple large schemes that require financing that exceeds Sudan's financial capacity. The adoption of foreign thought in development led to the alienation of development from local reality. Also, adopting human development within economic growth has proven to be a mistake, as it is possible that the shortcomings in how to develop human resources can be attributed to the inclusion of the term economic only in the formulation of the plan without referring to other competent authorities. On top of all this, the neglect of the traditional agricultural sector has led to inequality in the distribution of wealth in Sudan, as the impact of drought on the areas of the traditional sector has led to the emergence of migration, and the war in South Sudan has taken a significant portion of the budgets allocated to development plans.

Conclusions

This research reviewed regional development policies and their implications on agricultural development in Sudan from 1899 to 1993. The review depicted their start of development planning from the period of British colonialism until the advent of the National Salvation Government and the formulation of its program from 1990 until 1993. Agricultural development, based on these regional development policies, emphasized the development of the modern irrigated agricultural sector rather than the traditional rain-fed sector where the majority of Sudanese work, especially in areas with high environmental fragility. They resulted also, in regional developmental disparity. Future regional development of Sudan should consider the development of traditional agriculture in its arid and semi-arid parts, benefiting from local and non-local experiences.

References

1. Abdeen MO. Biomass energy potential and future prospects in Sudan. *Renew Sustain Energy Rev.* 2005;9(1):1-27.
2. Ali T, O'Brien J. Labor, community, and protest in Sudanese agriculture. In: Barker J, editor. *The Politics of Agriculture in Tropical Africa*. Sage series on African Modernization and Development. London: Sage Pub; c1984.
3. Almoag SM. Tribal systems as obstacles to rural development, a case study of two rural development schemes in Sudan. Unpublished M.Sc. economics dissertation, University of Wales; c1983.
4. Ayoub AT. Land degradation, rainfall variability, and food production in the Sahelian zone of Sudan. *Land Degrad Dev.* 1999;10(5):489-500.
5. Babiker IA. Animal feed industry in Sudan, current status, problems and prospects. *J Dairy Vet Anim Res.* 2015;2(3):0036.
6. Baker R. *Nomadism in Africa*. Development Studies.

- University of East Anglia; c1978.
7. Barbour HK. *Geography of Sudan*. London: Oxford University Press; c1961.
8. Barker R. *Nomadism in Africa*. Development Studies Reprint No. 90, University of East Anglia; c1984.
9. Beshai AA. *Export performance and economic development in Sudan, 1900-1967*. London: Ithaca Press; c1976.
10. Blockhuis WA. *Vertisols in the central clayey plains of Sudan*. Washington dissertation abstracts. 1993;158(12).
11. Cox GW, Atkins MD. *Agricultural Ecology*. Oxford: Clarendon Press; c1979.
12. Dantwalla ML. *Agriculture in a developing economy*. In: Shukla T, editor. *Economics of Underdeveloped Agriculture*. Bombay: Von and Co; c1969.
13. Davies HRJ. *An agricultural revolution in the African tropics*. *Tijdschrift Voor En Soc Geografie*. c1964.
14. Dawelbeit SE, Salih FM, Dahab OA, Ahmed EH. *Status of fertilization and crop nutrition in irrigated agriculture in Sudan: Fertilizer use in Sudan*. *Research Findings: e-ifc*. No 22; c2010.
15. Duffield M. *Sudan at the crossroads: From emergency preparedness to social security*. Discussion paper No. 275, Sussex; c1990.
16. *Geological Research Authority of the Sudan (GRAS). International Event Partners*. Compiled by Obued A, Abel Rahman. Khartoum: GRAS; c2006.
17. Gray L. *The effect of drought and economic decline on rural women in Western Sudan*. *Geoforum*. 1993;24(1):89-98.
18. Green RH. *Degradation of rural development, development of rural degradation, change and peasant in Sub-Saharan Africa*. *IDS No. 265*, Sussex; c1986.
19. Harris B. *Agricultural marketing in the semi-arid tropics of West Africa*. Occasional Paper No. 17. *IDS*, University of East Anglia; c1982.
20. Issam AWM. *A Note on the role of agriculture in Sudan's economy*. *Agric Nat Resour Econ J.* 2011;3(128).
21. Jones B, Deemer TJ, Leyland W, Mogga ES. *Community-based animal health services in southern Sudan: The experience so far*. *AU.agris.fao.org*; c1998.
22. Khogali MM. *Famine, desertification, and vulnerable groups, the case of Umm-Ruwab district of Kordofan region*. *AMBIO*. 1991;20:204-206.
23. Lee FA, Brocks HC. *The Economics and Political Development of the Sudan*. London: MacMillan; c1977.
24. *Library of Congress. Soils of Sudan*. [Internet]. c2007 [cited 2024 Jan 8]. Available from: <https://countrystudies.us/Sudan/31.htm>.
25. Magnusson G. *Production under risk*. Uppsala: Almqvist and Wiksell Boktryckeri AB; c1969.
26. Marx K. *Capital*. Moscow: Foreign Languages Pub. House; c1961.
27. Maxwell S. *Introduction*. In: Maxwell S, editor. *To Cure All Hunger, Food Policy and Food Security in Sudan*. London: Intermediate Technology Pub., Short Run Press; c1991.
28. Maxwell S. *Food insecurity in north Sudan*. Discussion paper 262, Institute of Development Studies, University of Sussex; c1989.

29. Ministry of Finance and Economic Planning. 1961.
30. Ministry of Finance and Economic Planning. 1977.
31. The mission of the study of new universities. National Council for Higher Education. Khartoum; c1996.
32. Mubarak MO. The vegetation of central Sudan. In: Williams AJ, *et al.* A Land Between Two Niles; c1982.
33. NESP (National Economic Salvation Program); c1990. p. 8/9.
34. Osman EH, Atta B. Sudan and the Nile Basin. Aquatic Sciences. 2005;67(1):28-41.
35. Pearson M. Settlement of pastoral nomads, a case study of the New Halfa irrigation scheme in Eastern Sudan. Development Studies Occasional Papers 5, University of East Anglia; c1980.
36. Simpson IG. Institutional constraints to agricultural development in Sudan. In Post-Independence Sudan. Proceedings of a seminar held in Center of African Studies, 21-22 November, University of Edinburgh; c1980.
37. Sinha R. Food and poverty, the political economy of confrontation. London: Croom Helm Briddles; c1976.
38. Sulieman ES. A comparative study of three forms of cooperative schemes in Northern Sudan. Unpublished Ph.D. Thesis, University of Wales; c1988.
39. Thimm HU. Development schemes in Sudan, an analysis of their reports with implications for research and training in arid land management. Food Nutr Bull. 1979;11:41-45.

Creative Commons (CC) License

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) license. This license permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.