



(REVIEW ARTICLE)



The spatial impacts of Sudanese theoretical bases of development and the relevant designated policies

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International Journal of Science and Research Archive, 2024, 11(01), 401–412

Publication history: Received on 07 December 2023; revised on 14 January 2024; accepted on 17 January 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.11.1.0076>

Abstract

This research aims to clarify and discuss the spatial impacts of Sudanese theoretical bases of development and the relevant designated policies where it was revealed that both the development theoretical base and regional development policies have relevance to the many central problems of Sudan. They included disparate regional development; environmental degradation; rural impoverishment; the production of the agrarian duality of a modern and developed irrigated agricultural sector and a traditional and backward rain-fed agricultural sector; conflict over resources; food insecurity; and socio-political instability. This research views these problems as due mainly to the alienation of development planning from Sudan's internal reality.

Keywords: Development thought; Development policy; Disparate regional development; Rural poverty; Environmental degradation; Agrarian dualism

1. Introduction

Sudan is considered one of the largest countries in Africa and the Middle East and includes numerous physical geographical regions and different tribal and ethnic compositions. Since the colonial period and the subsequent national governments, Sudan has adopted development planning based on theoretical concepts and development theories. Many development plans were drawn targeting socioeconomic development. However, Sudan's physical characteristics and the associated social and administrative obstacles influenced the success of these targeted regional development policies. This has resulted in the initiation of many central problems in the Sudanese State. Therefore, this research aims to clarify and discuss the problems related to Sudanese development planning with a major emphasis on the agricultural sector.

2. The spatial impacts of Sudan's theoretical base of development planning

Sudanese development planning was designed on various sources of theoretical bases where many relevant central problems were initiated, with a major emphasis on the agricultural sector.

Agricultural production systems in Sudan before the advent of colonialism were characterized by the presence of two ecological strategies. First, the practitioners of nomadic pastoralism and shifting agriculture benefited from the advantage of accumulating nutrients available from the energy of harvestable food due to their continuous movement. Second, they benefited from the flood irrigation strategy that takes advantage of the flows of water and nutrients through technology and simple methods to overcome moisture and fertility problems in soil (Cox et al., 1979).

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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). 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 Gedaref, 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.

The British administrators brought most parts of tropical Africa into the global exchange system by introducing some basic cash crops, which affected the development of self-sufficient agriculture and imposed external factors. The success of producing cash crops depended on the relationship between that crop and the existing complexity of food crops and the exchange mechanism. The inclusion of self-sufficient agricultural systems into capitalist methods of production has changed the entire food production system in Sudan. The traditional agricultural system based on communal ownership collapsed under the influence of colonial economic policies and foreign control activities (La-Anyane, 1985).

The differences in natural conditions and economic resources in Sudan and the demands of the colonial state, the means used to transform self-sufficient farmers differed greatly, as did the degree of intervention of the colonial state in this regard. As a result, this has affected the regional and sectoral development of the country. During the colonial period in Sudan, the country was a margin that produced cotton for the heartland region, which was British, and similarly produced food to meet local demand. In western Sudan, the impoverishment of self-sufficient farmers by including them in the capitalist economy through cash crops led to the instability of families to fully reproduce themselves in agriculture, as large numbers of the population, especially young males, were forced to lose income from their work in production, on the entry of wage labor economies in cities (Ibrahim, 1978).

The British administration has neglected the traditional sector for several reasons. They include the fact that this sector requires a large monetary supply to raise its productivity, the fragility of its production, and its susceptibility to failure, and it cannot produce long-staple cotton, which is considered the most profitable crop in the international markets. The British also realized that they would not stay in Sudan long, so they focused their efforts on exploiting the easy-to-exploit clay plain in central Sudan. The preference for the modern agricultural sector over the traditional sector has resulted in a clear inconsistency in the patterns and characteristics of production in the modern export-oriented sector, and between those patterns and characteristics that prevail in the traditional sector. This traditional sector is characterized by the lack of surplus raw materials that developed countries need for recycling and processing in their factories and by the presence of a geographical hinterland in which a population lives, the majority of whom work to produce food and local consumption.

The application of the concept of cumulative causation has led to the emergence of agrarian duality between a modern and developed irrigated agricultural sector and a traditional and backward rain-fed agricultural sector. This latter sector is characterized by several characteristics, including its inability to absorb large employment, unemployment-underemployment, low annual productivity, and zero-marginal productivity for the worker. Meanwhile, the modern irrigated sector in central Sudan has received extensive research on the possibility of applying high-yield seed types and modern methods for improving husbandry crops, chemical fertilizers, marketing services, financial credit assistance, and others. Agricultural development and the establishment of industries and basic services in the mudflats of central Sudan by British rule provided the infrastructure for cumulative causation to operate.

Also, the major consequence of implementing cumulative driver policies in Sudan is the emergence of pockets of food deficit in degraded regions such as Kordofan and Darfur, especially in the northern ranges adjacent to the Sahara. The deterioration of traditional agriculture and income distribution is considered one of the most important causes of the food deficit there (World Bank, 1990), as farmers, who were previously exposed to the blows of weak development policies in Sudan, are concentrated in these marginal lands (Green, 1986).

Related to the previous results is what is known as center-periphery relations, between the core region, which is central Sudan, and the margin regions, which are the other parts of Sudan. The mudflats of central Sudan were imposed as a core region; it created a state of organized dependence on its margins through the construction of institutions in the marginal regions governed by the authorities of the core region (Friedmann, 1966).

The inclusion of the resources of the marginal regions within the heartland region of Sudan can be seen, for example, through the impoverishment of self-sufficient farmers by introducing them into the capitalist economy through cash crops. This led to the impoverishment of families in Darfur in reproducing themselves entirely in agriculture (Ibrahim, 1978), and for government authorities to control small producers in the Umm Rawaba region in Kordofan through a policy of converting an estimated portion of crop production in the traditional sector to commercialization during the period 1983-1984 (Khogali, 1991). Self-sufficiency agriculture was also exposed to threats of depletion of its resources, such as manpower and the continuous transfer of (value) costs at the expense of the pockets of the traditional sector through the export sector, which works in the interest of the market economy (OestdieKhoff et al., 1980). The inevitable result of this was the depletion of the value of the surplus from the traditional sector.

The agricultural regions for self-sufficiency have formed margins that produce manpower for the core regions. These margins are exposed to strong negative forces aimed at countering the trickle-down effects of economic growth so that the balance of this group of forces increases the process of regional imbalance. Likewise, centrifugal forces and the failure of businesses to realize investment opportunities at the margins lead to negative effects of industrial development to expand the regional imbalance in Sudan.

The emergence of “growth poles” to overcome these contradictions led to the emergence of new centers of depletion on the margins of Sudan. The development of growth pole centers is called “polar development”, which is considered an important focus in Sudan due to the prevalence of the concepts of “redistribution with growth”, where two forces influence these policies (Apparaju et al., 1976). First, there are the forces of influences and persistent patterns of relations inherited from situations of colonialism, marginality, external domination, and internal underdevelopment. Secondly, the forces that emerged after World War II, in the post-colonial periods, and the political economy of the Third World countries.

The distribution of many growth pole centers has covered different parts of Sudan. Examples of this included the Kosti Meat Factory, the Babanusa Dairy and Cheese Production Factory, the Sag el Na’am Project in Darfur, the development of the Habila region in the Nuba Mountains, the construction of the Kadugli Textile Factory, and others. Many projects were developed at the national level but failed at the local level (Arifi, 1978). The inclusion of Bedouins in the case of the Babanusa project to produce powdered milk for markets created a conflict between the aspirations of the Bedouins and those responsible for the project. The Bedouins’ resistance to the project was based on their doubts about the government’s true goals (Al Mowag, 1983). The closure of open pastures and imposing them on certain individuals or groups has also, led the Bedouins to find themselves forced to live in a fence or stop their ownership according to what is determined by the project. The shortcomings of the livestock production system and pasture management in motivating Bedouins to adapt to living in a fenced pasture system have become clear (Behnke, 1985).

Sudan inherited, following colonialism's departure in 1956, a dual economic system consisting of a broad sector of traditional rural agriculture alongside a small modern non-agricultural sector. Development efforts during the British colonial period and subsequent national governments resulted in a pattern of polar development centered around the fertile areas in central Sudan, which have high potential in agricultural and livestock production in addition to water sustainability compared to the regions of western and eastern Sudan and the far north of Sudan. The Gezira scheme played a paradoxical role in the capitalist transformation of Sudan, as it worked to strengthen non-capitalist production relations and develop marginal capitalism (Tony et al., 1991). The areas previously developed by colonialism continued to attract agricultural production, industries, and urban growth, which led to its continuation as the heartland region of Sudan.

In the post-colonial period, the neglect of the traditional agricultural sector can be attributed to the focus of Sudanese development plans on short-term investment returns, which the modern agricultural sector achieves with high reliability, and the belief that the future lies in the mechanization of agriculture production and the commercial aspects associated with it. In addition to that, the dominance of the concept of the unrecoverable expenses of an investment in this sector, the tyranny of development thinking of the colonial era, the lack of appropriate methods and methodology for developing natural and human resources in it, and the difficulty of collecting Taxes, and its need for huge financial credits and loans that Sudan cannot meet.

One of the positives of adopting dual economic models was that Sudan made great efforts during the colonial period and after its departure in intensive scientific research on the possibility of applying high-yielding seed types, modern methods of growing crops, and the use of fertilizers, and in researches related to marketing, and financial security assistance for modern agriculture and irrigation destined for export. The shortcomings of dual economic models have contributed to further neglect of this sector, such as their treatment of agricultural productivity gains as a factor that transforms the agricultural production function without imposing a demand on resources, in addition to their neglect of the problems of resource use in intersectoral goods markets (Hayami et al., 1971).

The application of the high pay-off input model in Sudan has many shortcomings such as not including how resources will be allocated between alternative public and private sectors of economic activity, and not treating investment in research as a source of mechanisms for High debt repayment, in addition to not explaining how to develop and localize technologies in a specific society governed by economic conditions.

The adoption of the theory of diffusion of innovation in Sudanese development resulted in the introduction of modern agriculture since the period of British colonialism in Sudan, then the introduction of modern agricultural machinery such as tractors in the extensive rain-fed agriculture in eastern Sudan, then in the regions of the Blue Nile, Kordofan and Darfur, and the associated development of agricultural research and training of cadres. Working and improving the breed of cows to increase milk and meat production, as types of cows were brought from the temperate regions and were crossed with local types to produce milk during the plan to make Sudan the food basket of the world, in addition to fodder production. In the field of improving poultry, a new type that produces more eggs and meat was introduced and implemented by the state, such as Geziera Farms for dairy products and Hillat Kuku Farms for dairy products, as well as by the private sector.

The adoption of the concept of diffusion of innovation during the colonial period led to the improvement of some sectors of the macro-economy, but the transfer of technology created some aspects of conflict, such as the different views of participants who worked in institutions, consulting bodies, and others toward technology. Some view technology as a marketable commodity, while others see it as challenging the prevailing traditions in traditional societies. This is because it stimulates citizens to do different things in different ways and also proposes new goals for human efforts such as obtaining money and the dynamics of desires, and some view growth economics as a demand for social justice (Goulet, 1975).

According to Marx's five stages, Sudan can be placed in the feudal stage of the middle Ages, while according to List's classification; it can be placed in the second, third, and fourth stages. The nomadic stage still exists in parts of western, eastern, and southern Sudan (formerly). Feudalism prevails in rural areas where farmers have large holdings or ownership of agricultural land. This feudalism is characterized by un-free labor, forced economic coercion over withdrawing the surplus, and the integration of economic and political forces at the point of production and the living economy, where the surplus is consumed and does not accumulate in the form of expanded production. In the feudal system, ownership of the means of production is divided between the direct producers and the ruling class of the land, which takes the surplus production in the form of rent for working time, production, or money (Alavi, 1982). As a result, a two-class model of feudal society will emerge. This can be represented in Sudan by the production of crops on the island of Aba, where farmers produce for the Mahdi family who own the land. This may provide an understanding of what tensions exist between the landless class and direct producers in the Third World (McEachern, 1982).

Writings on colonialism and associated changes have characterized some parts of the Third World economy as feudal or semi-feudal, with colonial societies resembling European societies before the advent of capitalism. Feudalism embedded embryonic in the relations of advanced capitalist production and the environment available to it in the Third World helps in the maturity of these relations to liberate the rapidly growing capitalist incursion into these countries. During the British period in Sudan, tribal chiefs and clerical leaders received the largest private pump projects on the Blue and White Nile. Sayyed Abd al-Rajman al-Mahdi received the Gezira Aba area in the White Nile, in addition to 9,000 hectares of arable land on the Blue Nile (Ali et al., 1984), and likewise Sayyid Ali al-Mirghani and Sharif Youssef al-Hindi in the Gezira and Blue Nile area.

Capitalist feudal production relations in these agricultural holdings were applied, where farmers were responsible not only for basic agricultural operations, but also for expenses on the main irrigation canals, installation of pipes, and the cost of cotton production. The tenancy arrangement in the island project also relied on pre-colonial social relations existing in irrigated agriculture. The socio-economic structure of the island witnessed a fundamental transformation in the process of colonization, represented by the method of transforming land into a commodity and labor into a factor of production. This process enabled certain classes in the social structure in the Geziera region to achieve economic sovereignty, and these classes maintained their positions as money lenders in a production structure that allowed

production at relatively low prices compared to the prices of imported manufactured goods. Feudalism has undergone great changes in production relations and the shift from joint to individual accounts in the Geziera project in the late 1970s, in the years followed independence in 1956.

The application of these development theories and concepts, generally, has negative impacts on food security in Sudan. The traditional sector in Sudan has faced the risks of depleting resources, such as the labor force leaving the food production system, and the continuous shift of cost (value) in traditional agriculture into the export sector in favor of the market economy leads to the exploitation of the surplus value in this sector. This phenomenon is not limited only to migration and the internal labor force, but it is a characteristic associated with all production processes where traditional agriculture and market economies overlap (Oesterdiekhoff et al., 1980). This same situation can be applied to the production of cash crops in the traditional sector and the production of food for farmers and agricultural labor in export-oriented agricultural projects. The combination of the cumulative effects of capitalist agricultural expansion under Arab capital during the 1970s put Sudan on a path of increasing food deficit.

Farmer producers faced a rapidly declining ability to meet their consumption needs, including food, through direct production at the same time as capitalist rain-fed agriculture was reoriented toward production for increased export (O'Brien, 1985). This has produced groups exposed to food insecurity. They included the group of poor rural families who lack access to good land, some of whom depend on wage labor in areas of irrigated agriculture and mechanized rain-fed agriculture, and the group of landless people who will be expelled to marginal lands in valuable traditional rain-fed agriculture areas, relatively high actual value (World Bank, 1990). Groups of food-insecure people are entirely limited to developmentally backward regions.

The application of these theoretical concepts of development in Sudan also has many environmental impacts. Efforts to develop rain-fed agriculture in northern Sudan focused on the latitudinal belts of the semi-desert and lower savanna. They followed three methodologies, including land use planning, conducting agricultural research, and stimulating the private sector. The land use planning methodology has failed due to the lack of guaranteed land ownership and the private sector's lack of motivation in agricultural planning and research (Wallach, 1989).

The establishment of large mechanized agricultural projects, the concentration of the population around water sources, and the growth and development of large urban centers with high demand for firewood for fuel and charcoal also contributed to environmental degradation. These effects were multiplied by the use of laws displacing traditional farmers and Bedouins from their lands in favor of large agricultural projects. As a result of the difficulties that the state faced in achieving its goals, there was a shift from development to crisis management and from crisis management to achieving order and mastery.

The government's inability to intervene on behalf of the victims of drought and famine led to it using subjugation as the only means of legitimizing its use of force (Salih, 1990). Rapid population increase and climate change may reduce the carrying capacity of the land in the long term (Martin, 1975), and there is a need to expand the far-flung transportation system for agricultural areas to develop along with an adaptive physical plan for transportation under four scenarios including the reference project, agriculture for export, and growth balanced regionalism and a common Arab-African orientation (Thomas, 1977).

Intensive agricultural expansion has contributed to the degradation of natural vegetation and provided inimical conditions for sustainable agricultural production. The intensive expansion of mechanized rain-fed agriculture has been linked to the factor of high economic returns from crops, especially corn, and has also been affected by other factors outside the agricultural sector (Abdelmoneim et al., 1994). Large commercial agricultural projects had proven to fail before the economic crisis, political instability, and natural disasters in the mid-1980s in Sudan and it is difficult to say that any of them have achieved commercial success (Kontos, 1990).

The application of these theoretical concepts of development planning also resulted in conflict over resources, which occurs at the level of local communities and is exacerbated by state policies. This type of conflict in its traditional form in Sudan was the ancient competition between farmers and nomads over water and land resources. Because of its persistent nature, it took on an "ugly" identity that tore the country apart and became a challenge to many regions of Sudan (Assal, 2006). This type of conflict has also played a role in creating poverty and leading and sustaining the ongoing conflict, where the challenge lies in its ongoing complexities, not only in recognizing its dynamism as a manifestation of large political cleavage entities but in the presence of an agenda that pushes it from the top down and from the bottom up (Gunnar et al., 2010).

Environmental degradation or environmental scarcity (environmental discrimination) causes conflict when it interacts with economic, social, and historical factors. Environmental scarcity of renewable resources, especially agricultural cropland, freshwater, marine resources, and forests, is becoming more important as a cause and/or catalyst for armed conflict especially in the developing world (Suliman, et al., 2005). The conflict in Darfur is considered an ecological conflict in origin, based on competition over natural resources, which included plant genetic resources.

Despite the soft environmental balance, the lifestyles of farmers and Bedouins, through good use of water and genetic plant resources, have preserved the region's ecological balance (Robinson, 2005). It can be said that the government's attempt to make the Shukria tribe into medium-level stable farmers was successful because of some factors that hindered and determined their adaptation to the mixed economy and the subsequent ecological results and returns (Gunnar et al., 1977). Oil has played a role in the perpetuation of conflicts in Africa and Sudan, which confirms the relationship of natural resources to armed conflict. "Economic" businesses associated with violence and theft are not new in their connection to aspects of war, but what was new about many conflicts was the extent to which economic interests prevailed and competed with political programs (Reno, 2003).

The application of these theoretical concepts to development in Sudan has also disturbed the fundamental relationships between people and land under new dynamics of land encroachment and resource withdrawal. Although land has become a global commodity, it remains a source of livelihood and a basic reference for identity formation. The economics of resource withdrawal have spatial impacts that include foreign ownership of agricultural land, and competition between the industrial and traditional sectors in gold mining. People have experienced the loss of their lands during the recent waves of privatization and the commercialization of land rights in the regions of Darfur, South Kordofan, Red Sea, Blue Nile states, and Khartoum state (Gertel, et al., 2014). The eastern region of Sudan attracted large numbers of Bedouin refugees from the long war in Eritrea, and one of the most important consequences of their resettlement was the creation of intense conflict over land rights along the Ethiopian border, which resulted in the threat of nomadism and the extinction of herds (Bascom, 1990).

The conflict between North and South Sudan continued after the redrawing of the international borders between them, reaching the issue of ease of access and availability of lands. The claims of both parties to ownership of the borderlands between them have faced challenges from local and international actors, as contracts governing the privatization of natural resources continued, causing destabilization of land ownership.

One of the main consequences of applying these theoretical concepts in development planning in Sudan is the inability to address the problem of rural poverty. There are many major constraints to understanding the nature of rural poverty in developing countries. These obstacles arise not only from the nature of rural poverty itself but also from the circumstances of those who are not rural poor and who are aware or not aware of the nature of that poverty. This dialectic has implications for all rural development programs and projects and for trained workers (Chambers, 1981). As an example, the results indicated a decrease in poverty, income, and expenditure indicators among the Water Users Association in the Al-Gash Agricultural Scheme compared to non-farmers. Fundamental differences were found between them in the family income trend, the total return from agriculture, years of education, and the total cost of agriculture. Moreover, households headed by a member of a water users association are more likely to have income approximately four times above the poverty line than those whose heads do not belong to this association (Mohamed et al., 2015).

Sudan was expected to achieve high growth rates after independence due to its extensive, fertile, and rich agricultural lands, significant livestock component, and capable human resources. Much of this has not been achieved in the last five decades. After enjoying moderate rates of growth and economic stability until 1975 AD, Sudan began to enter into deep structural problems. It was found that the causes of rural poverty in Sudan are linked to the bias of development strategies towards urban areas since independence (Yaqoob, et al., 2016).

The national governments of Sudan have sought to reduce the poverty rate, however, despite that, it is still widespread (Abdelmawla, 2014), showing a pattern characterized by unidimensional and low multidimensional occurrences for both children and adults. This pattern indicates that Khartoum is the least poor, while North Darfur and Warab states are the poorest. While the level of poverty increased, its severity decreased in the period 1978-1980 compared to the period 1967-68. Available evidence suggests that the level and severity of poverty will increase significantly in the 1980s (Farah et al., 1995).

The degradation of natural resources in rural areas of the Third World affects the productive capacity of the land, which in turn threatens food production and livelihoods among rural and urban populations. Since the poor primarily live in rural areas and depend on the land for their livelihood, rural poverty, and land degradation in these areas are considered

to be linked together. Despite the significant economic growth that has occurred in developing countries since 1965 AD, extreme poverty has continued to exist. Despite the rise in per capita income, the number of poor people continued to increase. Historical migration movements, especially long-distance ones, have become less feasible with the emergence of populist states and borders. With the rapid increase in population in recent decades, there are few uninhabited areas to move to. There was also demographic pressure on resources, an increase in per capita income, and improved means of transportation and communication, which greatly stimulated internal migration, most of which headed toward urban areas (Bilsborrow, 1992).

There is an effective role for any policy in its impact on poverty and land degradation problems. A comparative study among poor farmers in northern Sudan on gum Arabic revenues in the forest agricultural system revealed the existence of links between poverty and the environment, which is responsible for land degradation. It also confirmed that “good” and “bad” policies can affect the economic incentives that determine the decisions of poor rural families to preserve or degrade their lands (Barbier, 2000).

Poverty is considered a complex phenomenon that is linked to impoverishment in one aspect and to the good situation of individuals in several aspects. Although many indicators of effective care can be used to determine the level of poverty of a population, the most accepted one is based on the consumption factor. In Sudan, about 45.5% of its population lives below the poverty line. There is a significant difference in the poverty rate between rural and urban areas, reaching 26.0% in Khartoum and 69.4% in North Darfur (Ahmed, 2015). It is expected that the trend towards reducing global trade taxes resulting from trade liberalization will negatively affect the government budget in general and spending on education, health, and transfers to poor groups in society in particular, which contributes greatly to the exacerbation of the absolute poverty rate (Mohamed, 2011). The informal trade sector has the potential to contribute to rural economic development by increasing income and reducing rural poverty in the Sinja region in Sudan (Adam et al., 2013).

3. The spatial impacts of Sudan’s regional development policies



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

Figure 1 Agricultural livelihood zones in Sudan

The cumulative efforts of regional development policies during the British administration and subsequent national governments were diverse. Colonial development agricultural policies included general efforts for expansion, pumping schemes, and the construction of large irrigation schemes focused on 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 development plans as it did the modern agricultural sector.

The British administration's agricultural policies have 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 Gedaref 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.

Colonial and post-colonial development 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). 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 Development 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). 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 development 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). This is similar to most exchange systems in the semi-arid tropics that act as sinks and attractants for resources (Harris, 1982). 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). The cooperative societies of farmers in Sudan failed due to the recent experience in Sudanese society (Sulieman, 1988), 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). 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.

There is an absence of a clear plan to reduce 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.

These development policies have created 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). 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 by these development plans 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). 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 Geziera scheme 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.

Sudan's development policies worked to develop higher education 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). 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 gender relations (Gray, 1993).

These development policies made commercial services related to agriculture to develop 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 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 Jazira region with agricultural production areas in other parts of Sudan, such as Khartoum-Kosti-Al-Obeid, Khartoum-Madani-Sinnar-Singa-Al-Damazin, and 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.

Sudan's 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.

4. Conclusion

This research reviewed and discussed the spatial impacts of Sudanese theoretical bases of development and the relevant designated policies. These impacts have resulted in disparate regional development, agricultural dualism, rural poverty, environmental degradation, drought, conflict over resources; food insecurity; and socio-political instability are the main and their alienation from Sudan's internal reality. There is a need for future research on the theoretical basis of Sudanese development planning, and future regional consideration of the development of traditional agriculture in Sudan's arid and semi-arid parts, benefiting from local and non-local experiences.

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