

Unveiling Solutions: Overcoming Socio-Economic Challenges from Agricultural Land Fragmentation in Egypt

Jacinthe Ibrahim Rihan*

Professor of Rural Sociology and Sustainable Development, Department of Rural Sociology & Agricultural Extension, Faculty of Agriculture, Ain Shams University, Cairo, Egypt

***Corresponding Author:** Jacinthe Ibrahim Rihan, Professor of Rural Sociology and Sustainable Development, Department of Rural Sociology & Agricultural Extension, Faculty of Agriculture, Ain Shams University, Cairo, Egypt.

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Abstract

Agriculture land in Egypt is paramount to the nation's economy, food security, and social fabric. Egypt's rich history of agriculture, dating back to ancient civilizations along the Nile, has shaped the country's identity and sustenance for millennia. Agriculture has been the lifeblood of Egypt for thousands of years, with the fertile Nile Delta and Nile Valley serving as the cradle of Egyptian civilization. The annual inundation of the Nile River, combined with innovative irrigation techniques developed over centuries, has allowed Egypt to sustain a thriving agricultural sector. Today, agricultural land in Egypt remains a cornerstone of the nation's economy, providing food, raw materials, and employment for millions. Small land holdings play a pivotal role in Egypt's agricultural landscape. These holdings are typically characterized by limited acreage, often less than two hectares, and are predominantly managed by individual families. Small-scale family farms form the backbone of Egypt's agricultural sector, contributing significantly to crop production, livestock rearing, and the livelihoods of rural communities (Muhammad, 2018). Fragmented land indicates that it is divided among many legal heirs as it passes from one generation to another. Moreover, non-conducive government policies also lead to such fragmentation. It severely affects agriculture as the mechanization cannot be carried out on small fragmented land.

Due to this numerous adverse challenges are to be expected besides the direct loss of agricultural land due to urban settlement expansion and road network construction. Such effects are caused mainly due to the mechanisms of fragmentation; and division of large patches of agricultural land into smaller and smaller patches. This leads to smaller land patches, which means higher agrarian costs and the inability to use new agricultural techniques that favor larger patches, added to the increased water requirements, loss of biodiversity, soil erosion, and fertilizer leaching. Plus the emissions from the urban settlements and the continuous traffic on the road networks, which lead to contamination of the soil and plants surrounding them (Mahmoud, 2014).

In Egypt, small land holdings are integral to achieving food security and economic stability. They facilitate diversified crop cultivation, promote local agricultural production, and empower individuals to contribute to the nation's self-sufficiency in staple crops such as wheat, rice, and vegetables. Lastly, these small-scale farms provide a safety net for millions of Egyptians, offering a source of income and subsistence.

Finally, this paper discussed the challenges of Egyptian land fragmentation and proposed several solutions to mitigate the socio-economic impacts in rural communities.

Keywords: Egypt; Fragmentation; Agricultural land holding; Socio-economic challenges

Introduction

Agriculture is a major component of the Egyptian economy. In 2017, agriculture, forestry, and fishery represented 11.5% of the country's GDP, with over 1,900 companies operating in the agriculture sector. The agricultural sector accounts for 28 percent of all jobs, and over 55 percent of employment in Upper Egypt is agriculture-related (USAID,2022). Egypt counts as one of the largest agricultural markets in the Middle East and North Africa (MENA) region. In 2016, the Egyptian agribusiness sector accounted for a revenue equivalent to 36 billion USD (this number includes revenues from agriculture, forestry, and fishing). Producing a wide variety of crops, the agriculture sector's horticultural products continue to hold the highest value and profitability for Egyptian farmers. Until 2010, 80% of the Egyptian agricultural export earnings came from edible fruits, nuts, peel of citrus fruits, and melons. Agriculture can be an important engine of growth and poverty reduction. However, despite its economic importance, the sector is underperforming in part because women, who are a crucial resource in agriculture and the rural economy in general, the sector employ around 45% of the women workforce in Egypt, and faces specific constraints that hinder their potential productivity.

After the 1952 revolution, the government dispossessed the rich agricultural lands of large areas and donated them to poor farmers, withholding five Fedans by the Agrarian Reform Law. According to the family inheritance laws, the owners of the smallholdings divided them over the years into smaller holdings. Egypt's population is about 100 million citizens, who derive their food from the cultivation of nearly 9 million acres, which indicates the limited agricultural land available to provide food. Therefore, Egypt imports about 60% of the essential crops from abroad. The farmland share per capita is less than 0.08 acres (Seyam, 1995).

The scarcity of fertile soils and water resources is one of the basic features of agriculture in Egypt, challenging the capacity to produce food and attain food security in the future. Arable lands in Egypt are scarce (Table 1) and the Farmland area covers 3.83 million ha, taking up only 3.8% of all of Egypt's land in 2017 (CAPMAS, 2019a).

<i>Year</i>	<i>Agricultural landArea million ha</i>	<i>Population millions</i>	<i>Per capita Agricultural land ha</i>	<i>Year</i>	<i>Agricultural landArea million ha</i>	<i>Population millions</i>	<i>Per capita Agricultural land ha</i>
2000	3.29	69.91	0.047	2009	3.69	82.47	0.045
2001	3.34	71.23	0.047	2010	3.67	84.11	0.044
2002	3.42	72.59	0.047	2011	3.62	85.90	0.042
2003	3.41	73.98	0.046	2012	3.70	87.81	0.042
2004	3.48	75.38	0.046	2013	3.76	89.81	0.042
2005	3.52	76.78	0.046	2014	3.75	91.81	0.041
2006	3.53	78.16	0.045	2015	3.82	93.78	0.041
2007	3.54	79.54	0.044	2016	3.82	95.77	0.040
2008	3.54	80.95	0.044	2017	3.83	97.75	0.039

Source: CAPMAS, 2020.

Table 1: Agricultural land area and per capita agricultural land in Egypt during the period 2000 -2017.

Fragmented land holdings, seasonal production processes and work, and unstable earnings characterize most of Egypt's agriculture and thus leave millions of women who rely on this sector for their livelihoods impoverished. While no accurate figures exist, we can safely estimate that about 27 million females live in rural areas, based on the national proportion of females to males, and on the percentage of the rural population in the country. From the rural poverty rate of 32 %, we can estimate that about 8 million rural women many of whom work at an age younger than 15 are poor including those who work in agriculture. The average daily wage for a seasonal farm worker in Egypt is in the range of \$5 - \$8; it is usually lower for women compared to men (Abdelaal, 2021).

The fragmentation of agricultural holdings in Egypt, and its accompanying negative effects on the agricultural sector, is one of the most prominent files affecting the future of agricultural development on the one hand, and achieving the goals of the 2030 Sustainable Economic and Social Development Plan on the other hand.

The objectives

The main goal of the study is to propose solutions to address the socio-economic challenges related to the fragmentation of land holding in the Egyptian agriculture sector. To tackle the above goal, the following specific objectives are introduced:

1. To identify the distinctive features and characteristics of fragmentation of agricultural holdings.
2. To demonstrate the disadvantages and challenges of fragmentation of agricultural holdings.
3. To propose methods and solutions to confront the fragmentation problem of agricultural holdings.

The methodology

To achieve this paper's objectives information was gathered through in-depth interviews with small landholders during October 2022 and data available from the latest Agriculture Census 2009-2010. (CAPMAS, 2010).

First objective: Distinctive features and characteristics of agricultural holdings

The phenomenon of fragmentation in Egyptian agricultural lands is not recent but rather has been rooted and renewed since the 1950s for three reasons: 1) A massive and unrestrained population increase, with relative stability in the area of agricultural land and an increase in demand for it, and 2) Islamic inheritance system that leads to the division and fragmentation of land inheritance among heirs. 3) The successive agricultural reform laws contributed to a noticeable decline in large holdings and a concomitant increase in small holdings.

Since land represents the main production element in the agricultural production process, the aggravation and continuation of the phenomenon of fragmentation in agricultural land holdings stand in the way of achieving a sustainable agricultural renaissance because the level of return on investment in modern agriculture from an economic perspective is directly proportional to the area invested, given that this investment is based on intensification. The Use of high-cost agricultural technologies and employing agricultural digitization in implementing, leading, and managing modern farms. This modern way of agriculture, known as smart agriculture, which aims to increase agricultural production per unit area while reducing the cost of production, is impossible to be economically feasible when used in small holdings.

In general, Egypt has to work in every way to address the effects of this critical phenomenon, which has become a nightmare that threatens the future of Egyptian agriculture, especially in the ancient lands of the valley and delta, and turn this challenge into a starting point towards building an agricultural economy capable of overcoming the negative effects of fragmentation and then achieving a renaissance to modern agricultural (Ministry of Agriculture and Land Reclamation, 2009).

Analysis of Egypt's Agriculture Census (2009-2010) related to the first objective

The distinctive features and characteristics of agricultural land holdings in Egypt

Number and area of holdings

The total number of holders of agricultural lands in Egypt, whether by ownership, rent, or share, according to the results of the 2009/2010 agricultural census, was about (4.4) million holders, Table No. 2. While their numbers did not exceed (2.4) million holders in 1981/1982, that is, an increase of About 2 million holders in twenty-eight years. The total area of agricultural holdings, according to the results of the same census, amounted to (9.7) million acres, compared to (6.6) million acres in 1981/1982. This large increase in the number of agricultural holdings reflects the continuing fragmentation of agricultural holdings. If the situation continues, agricultural holdings will become unable to meet the basic needs of a single family.

Number of possession pieces

About 70% of agricultural landholders have continuous, undispersed holdings comprising a single plot of land, occupying an area exceeding half of the agricultural land. On the other hand, the land holdings of about 30% of the holders are characterized by dispersion, as one holding is distributed over more than one piece of land separated from each other, either by land of another holding or an irrigation and drainage canal within the same village (the mother village), or other satellite villages within the administrative borders of the Rural local unit. This dispersed tenure pattern, which includes more than one plot of land per possession, includes about 45% of the total area of agricultural holdings (Table 2).

Area of holdings in thousand acres		No. of holdings in thousand holders		No. of plots of land holding
%		%		
5343	54.9	3084	69.5	One piece (undivided possession)
2664	27.4	988	22.3	Two pieces
1252	12.9	299	6.7	Three pieces
320	3.3	55	1.2	four parts
152	1.5	14	0.3	Five pieces or more
9731	100.0	4440	100.0	Total

Source: Collected and calculated from the results of the 2009-2010 Egypt Agricultural Census, (CAPMAS, 2010).

Table 2: Distribution of the numbers and area of agricultural land holdings according to the number of plots of land in each holding (2009/2010).

Geographic distribution of holdings

The Delta governorates contain most of the agricultural holdings in Egypt, and their holders represent about 58.7% of the total holdings nationwide. They occupy an agricultural area that represents about 60.8% of the total area of the holdings. The governorates of Upper Egypt followed this and then the desert governorates, with holdings representing 39.7% and 1.6% of the total holdings, respectively (Table 3). By comparing the numbers of holders to the area of holdings in both the Delta and Upper Egypt governorates, we can conclude how small the size of holdings is in each of the two regions, as the average size of holdings in the Delta was 0.43 acres, and in Upper Egypt, it was about 0.57 acres.

Area of holdings in thousand acres %		No. of holdings in thousand holders %		Region
5917	60.8	2608	58.7	
3086	31.7	1763	39.7	Upper Egypt governorates
728	7.5	69	1.6	Desert governorates
9731	100.0	4440	100.0	Total

Source: Collected and calculated from the results of the 2009-2010 Egypt Agricultural Census, (CAPMAS, 2010).

Table 3: Absolute and relative distribution of agricultural holdings in the Delta, Upper Egypt, and desert governorates according to the number of holdings and area (2009/2010).

Distribution of land holdings according to holder's age groups and size of holding

The vast majority of Egyptian agricultural landholders are in the age group of 50 years and over, as their percentage reached 55.6% of the total holders. In contrast, the percentage of young holders (less than 30 years) did not exceed 5.2% according to the 2009/2010 Agricultural Census (Table 4). The results presented in the tables reveal a positive relationship between the number of holders by the age group of 50 and over and the increase in the size of the holding. Those holding less than one acre represented about 49.8%, and

those holding seven acres and more represented about 66% of the holders in that category. As for the second age group (30-50 years), the results reveal a negative relationship between the number of holders in that age group with an increase in the size of the holding. The percentage of holders of less than an acre is 43.7%, compared to 30.8% for holders of seven acres or more. As for the young age group (less than 30 years), a negative relationship was observed between the number of holders in that age group and the increase in the size of holdings.

In general, it can be said that in light of the previously mentioned relationships between the ages of the holders and the size of their holdings, the seriousness of the future situation can be predicted, as it is expected that more fragmentation of agricultural holdings will occur, with most holdings concentrated in the hands of the elderly, especially if we take into account that the history of the agricultural census The one conducted in 2009/2010 has passed for about eleven years, meaning that the age group of 50 years and over is at least 63 years old today.

<i>Age categories in years</i>								<i>The size of the holding in acres</i>
<i>Total</i>		<i>50 years and over</i>		<i>30-50 Years</i>		<i>Less than 30 years</i>		
<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	
100.0	2144	49.8	1068	43.7	936	6.5	140	Less than an acre
100.0	1069	58.3	623	37.3	399	4.4	47	1 acre and less than 2 acres
100.0	531	62.7	334	33.7	179	3.6	19	2 acres and less than 3 acres
100.0	230	64.6	149	32.0	74	3.4	8	3 acres and less than 4 acres
100.0	99	64.8	64	31.8	32	3.4	3	4 acres and less than 5 acres
100.0	170	56.8	97	39.6	68	3.5	6	5 acres and less than 7 acres
100.0	192	66.0	127	30.8	60	3.3	7	7 acres or more
100.0	4440	55.6	2462	39.4	1748	5.2	230	Total

Source: Collected and calculated from the results of the 2009-2010 Egypt Agricultural Census (CAPMAS, 2010).

Table 4: Absolute and relative distribution of the numbers of agricultural landholders per thousand acres according to age groups in years, and the size of the increase in acres.

Distribution of holdings according to the educational level of the holder

Most of the holders of Egyptian agricultural lands, regardless of the size of their holdings, have not received any formal education. However, the percentage of those who can either read only or read and write among them reached about 42.6%, and the percentage of illiterate people reached 30% (Table 5). Therefore, the lack of formal education by about three-quarters of the holders simply means that they are unable to manage their holdings in a modern manner or at least follow the technical recommendations recommended by agricultural extension agencies.

Distribution of holdings according to gender, male-female

The percentage of male and female holders of agricultural land reached about 96%, and 4% of the total holdings nationwide for each gender, respectively. The number of holdings less than an acre, owned by males, represents about 10.1% of the total holdings of males, and those owned by females represent about 15.7% of the total holdings owned by women.

Naturally, women's low ownership of agricultural land is logical and expected in Egypt like other developing countries for social and cultural reasons that discriminate between the sexes, especially in the ownership of agricultural land.

Educational Status								The size of the holding in acres
Total		Other*		Read & write		Illiterate		
%	No.	%	No.	%	No.	%	No.	
100.0	2144	28.5	610	41.2	883	30.3	651	Less than an acre
100.0	1069	24.8	265	42.9	459	32.3	345	1 acre and less than 2 acres
100.0	531	23.2	123	42.7	227	34.1	181	2 acres and less than 3 acres
100.0	230	23.9	55	43.7	151	32.4	75	3 acres and less than 4 acres
100.0	99	26.7	27	43.9	44	29.4	29	4 acres and less than 5 acres
100.0	170	35.6	62	43.6	74	20.8	35	5 acres and less than 7 acres
100.0	192	38.2	75	53.2	104	8.6	17	7 acres or more
100.0	4440	27.4	1217	42.6	1890	30.0	1333	Total Republic

*Others include all educational levels: below elementary school, middle school, high school, university degree and above.

Source: Collected and calculated from the results of the 2009-2010 Egypt Agricultural Census, (CAPMAS, 2010).

Table 5: Absolute and relative distribution of the number of agricultural landholders per thousand acres according to educational status (in thousand holders) and size of holding (2009/2010).

Second objective: To demonstrate the disadvantages and challenges of fragmentation of agricultural holdings.

Small land holdings have numerous challenges, including land fragmentation, limited access to resources, and the need for sustainable agricultural practices. Balancing the interests of youth and women in land ownership and management is another vital aspect of this dynamic landscape. In the modern era, Egypt is grappling with evolving agricultural practices, increased urbanization, and changing demographics. As the nation seeks to enhance the efficiency and sustainability of its agricultural sector, addressing the complexities of small land holdings becomes a central concern. Land fragmentation has a massive social impact elaborated as follows:

- Inefficient Land Use:** Fragmented land ownership often leads to inefficient land use as small, disconnected plots are harder to cultivate and manage. This can result in lower agricultural productivity, affecting food security and the livelihoods of rural communities.
- Rural Poverty:** Land fragmentation can contribute to rural poverty as small landholdings may not generate sufficient income to support families. This can force people to seek additional sources of income, often through seasonal or temporary employment, which can be economically unstable.
- Limited Opportunities for Youth:** With limited arable land available, younger generations in rural areas may face difficulties securing land for farming, which can lead to a lack of economic opportunities and incentivize migration to urban areas, adding pressure on cities.
- Social Conflict:** Land fragmentation can lead to disputes and conflicts within communities, especially when it's not clear who owns which portion of the land. These conflicts can strain social relationships and create tensions among neighbors and extended families.
- Women's Land Rights:** In many cases, women in Egypt have limited land and property rights access. Land fragmentation can further complicate issues related to women's land ownership, Islamic inheritance, and economic empowerment.
- Urbanization and Overcrowding:** As people migrate from rural areas due to land-related challenges, urban areas may face increased population growth, leading to overcrowding, inadequate housing, and pressure on urban infrastructure and services.
- Socio-Environmental Impact:** Land fragmentation can also lead to environmental issues, as small, scattered plots are less conducive to sustainable land management practices. This can result in soil degradation and other environmental challenges.

Analysis of Egypt's Agriculture Census (2009-2010) related to the Second objective

The lower profitability per acre in small holdings compared to large holdings takes place due to the inability to take advantage of economies of scale to reduce production costs. The small size of the holding only allows for the cultivation of one crop in most cases, which means a certain loss if the price of this crop decreases in the markets. In large holdings, the holder can divide them into different types of crops, which reduces the possibility of loss. The prices of grain crops grown on this land are linked to international prices, as the government prices the crop according to them. Low net return per unit area for field crops compared to vegetables and fruits. For example, the net return for an acre of wheat in the 2016/2017 season was four thousand pounds, compared to 18 thousand pounds on average for the watermelon crop. Low negotiating power when dealing with merchants or intermediaries to determine the selling price of the final product.

To demonstrate the disadvantages and challenges of fragmentation of agricultural holdings can be elaborated in:

- a. The high percentage of losses in agricultural produce during harvesting may be due to the use of traditional manual methods or the obsolescence of harvesting machines and equipment. The product is also exposed during transportation or storage to operations that are no less important than those during harvest due to the weakness of the storage infrastructure and the primitive means of transportation used.
- b. The productivity of dwarf holdings is characterized by severe fluctuation from one season to another. This may be due either to unfavorable weather conditions, or to fundamental differences in the quality of seeds and seeds from year to year, which leads either to a severe unexpected decrease in production or, on the contrary, a significant increase in productivity. This would cause price shocks that affect the farmer as well as the final consumer. As for large holdings, the situation is characterized by relative stability.
- c. Despite economic reform and the trend towards market economies, the state still controls the agricultural production system in the ancient lands in the valley and delta, which includes most of the fragmented small holdings, through cooperatives that are used as a tool for managing the agricultural system in Egypt, which needs revitalization and organization. On the other hand, the role of cooperatives is marginal and very limited in large holdings in new lands because they are largely independent of the government in making production and export decisions.
- d. Fragmentation of holdings and limited holding space lead to weak access to financing markets to obtain credit. In this regard, dwarf farmers rely mainly on the Agricultural Bank of Egypt (formerly the Agricultural Development and Credit Bank) to obtain credit, despite poor previous experience in dealing with it.
- e. The fragmentation of agricultural holdings contributes to the decrease in the holding area by leaving areas of land suitable for investment, such as the borders and roads that separate holdings.
- f. A lot of time and effort is wasted while moving from one holding to another and completing agricultural operations, which makes it impossible to use machines and equipment to their full production capacity.
- g. Land fragmentation destroys small investments that cannot withstand the competition of large agricultural investments.
- h. Fragmented agricultural holdings hamper the implementation of irrigation and drainage projects.
- i. Smallholdings prevent the use of modern agricultural techniques.

Third objective: Proposed methods and solutions to confront the problem of fragmentation of agricultural holdings

In the challenges and defects of the fragmentation of agricultural holdings in Egypt previously mentioned, and by reviewing the solutions that have been proposed, whether locally or internationally, to confront this problem and overcome it or at least mitigate its effects, we present below a set of proposals for the most appropriate solutions that the Egyptian state should adopt or issue. Some of them are to reform the Egyptian agricultural system.

- a. Encouraging smallholders to adopt policies aimed at consolidating agricultural holdings within the framework of a stimulating legislative and societal environment, by planting the same crop in adjacent ponds so that various agriculture operations can be

performed automatically at the same time for a single crop, which contributes to raising the efficiency of use and operation of agricultural machinery in various operations. In this regard, we can benefit from successful experiences and projects that have been previously implemented or are still being implemented. Such as the field irrigation modernization project, the project to link farms to markets, the value chains project, and the experience of civil society organizations represented by the “Al-Shams Associations” that were established in 2002 in the Middle and Upper Egypt spheres voluntarily to pool the efforts of small farmers, while providing expertise—technical, administrative, and marketing in the field of non-traditional crop production. One of the advantages of agricultural aggregation is the opportunity to use agricultural digitization methods, which means electronic management of lands in terms of quantities of water used, temperatures, humidity, pesticides used...etc., through sensors and devices to record needs—the plant. Of course, using agricultural digitization would save cost, time, and effort, thus achieving higher benefits and returns per unit area.

- b. Encouraging the owners of agricultural lands with dwarf holdings to consolidate their agricultural holdings through voluntary consensual exchange between neighboring holdings, by granting conditional incentives such as giving priority in providing necessary agricultural services, implementing irrigation and drainage projects, etc. to areas that initiate the implementation of tenure exchange policies. adjacent by mutual consent. To ensure the achievement of absolute justice in exchange operations, state agencies must classify these lands and submit them cadastral to determine the degrees of similarity between the various holdings to build a high level of confidence among those wishing to exchange, even if this requires determining price differences between the plots of land that are being exchanged while reducing fees and registering agricultural lands in a way that facilitates dealing with them.
- c. While the Islamic inheritance system plays a pivotal role in the fragmentation of agricultural holdings, and as state institutions continue to ignore addressing this dangerous phenomenon over the past decades, we recommend that Egyptian legislative institutions intervene to develop administrative processes that prevent inheritance from becoming a source of fragmentation of agricultural holdings, by enacting legislation that would The heirs shall have their legal rights, or their shares of the proceeds if exploited. Provided that this legislation takes into account the social, economic, and cultural reality prevailing in every region of the land of Egypt by applying the legal rule “no harm, no harm”.

In this regard, it is proposed to hold a community dialogue on “the negative effects of inheritance on the fragmentation of agricultural holdings,” to be adopted and discussed by the Egyptian Parliament, provided that the Ministry of Agriculture coordinates between the Agriculture and Irrigation Committee and the agricultural development partners (agricultural cooperation) Federations of farmers’ unions and other stakeholders). Societal acceptance of a proposed law permitting the restriction of agricultural ownership. It permits the restriction of agricultural ownership upon liquidation of the estate to the eldest son or one of the sons who practices agriculture as the main profession, provided that the rest of the heirs are compensated for preserving the agricultural land that represents a national wealth from fragmentation, stunting, and collapse.

- d. Forming specialized companies to manage the agricultural process aiming to separate management from ownership of the land, managed by experts and specialists, so that each large agricultural basin has its own company, and the owners of this basin constitute the members of the company’s general assembly, and the company’s board of directors elected by the general assembly is responsible for preparing and equipping the basin for cultivation with crops. One, and they contract to market the product with other companies that may be internal or external, provided that the owners or their dependents have the right to participate in the agricultural process for a daily, weekly, or monthly wage, each according to his ability and experience depending on the need of the work, and by internal regulations that are prepared. Organize work.
The idea could be extended to include gathering the livestock owned by these farmers to form large barns that the company manages in the manner of livestock partnerships known among farmers.
- e. Promote the commercialization of small agricultural holdings, including equitable linkages between smallholders and the foreign trade sector.
- f. Supporting smallholders by issuing a set of incentive packages to stimulate the agricultural production process, including distributing fertilizers, supporting seeds and pesticides, leveling the land with a laser, and providing good extension services to

collect fragmented holdings and exploit them in growing strategic national crops.

- g. Enhancing the role of agricultural cooperatives in the field of consolidating agricultural holdings by granting them greater exploitation from the various administrative authorities, developing their administrative, institutional, and financing structure, and encouraging them to establish joint-stock companies for agricultural production among farmers to achieve economies of scale and achieve optimal independence of available resources.
- h. The return of the agricultural cycle more effectively and with a smart organization that takes into account all local and international economic variables, especially those crops with high economic value.

Conclusion

Agriculture is one of Egypt's most important sectors and a principal economic and social concern. It is not only an economic activity but also a part of the region's heritage and history, a matter of food security, a source of employment, and a significant driver of land and water use. The challenge to Egypt's agriculture is to sustainably expand agricultural production to meet escalating domestic demand for food and serve as a pathway out of poverty, particularly in rural areas. However, the agricultural sector faces many difficulties that have characterized the sector in recent years and could risk Egypt's ability and capacity to produce food in the future. These characteristics include agricultural intensification, land fragmentation and small farming systems, stagnant productivity, and increasing demand for food.

Encouraging smallholders to adopt new policies aimed at consolidating agricultural holdings within the framework of a stimulating legislative and societal environment, by planting the same crop in adjacent ponds so that various agriculture operations can be performed automatically at the same time for a single crop, which contributes to raising the efficiency of use and operation of agricultural machinery in various operations.

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