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A Review of Agricultural Policy in Egypt

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Abstract: - Agricultural policy is considered of the most important national economic policies through which the country can achieve the goal of improving the level of national agricultural income thus the economic and social standards for workers in the agricultural sector in particular, and the whole population in general. Since the 1980s of last century, the Egyptian economy has been witnessing radical changes that led to major and direct impacts on Egypt's agricultural sector. Such changes continue to have many impacts that interact together and lead to radical changes in agricultural development and the future of Egyptian agriculture. It is worth mentioning that Egypt embarked on implementing economic reform policies in 1987 by undertaking a number of measures that aims to achieve liberalization of the agricultural sector, such as adopting indicative planning of cropping pattern rather than central planning, in addition to activating the role of market mechanisms in directing economic resources towards optimal use, especially in regard to allocating investments among different production branches in the national economy, referred to as Structural adjustment. In the framework of structural adjustment program, these policies have directly and indirectly influenced agricultural price policy variables by influencing such main factors or variables affecting profit, namely yield or productivity of the acre, farmgate price per produced unit and the producing cost per acre, which directly affect the relative profitability of the produced crops thus farmers' preference to grow crops that generate high profitability.

A. ***Keywords: -*** *Agricultural Policy, Agricultural Price Policy, Agricultural Economic Policy, Economic Reform Programs, Egypt.*

I. INTRODUCTION

Reviews of agricultural policy in Egypt has been completed by numerous teams over the years, each concentrating on a definite policy dimension. For example, (Tellioglu and Konandreas,2017) underscored the interlinkages between agricultural policies targeting self-sufficiency and Egypt's agricultural trade balance. (Cassing et al. 2009) analyzed obtaining and price policies within the agriculture sector, while (Gutner, 2002) and Ghoneim (2012) both studied the political economy about the food subsidy system. Egypt's long history of food subsidies has been the emphasis of many studies over the years, with Alderman et al. (1982) and Ecker et al. (2016). Numerous studies have also highlighted the interrelationship between natural resource managing and the development of the agriculture division. Barnes (2010; 2014) and (Abdel-Gawad,2007), for illustration, reviewed water distribution policies in Egypt with an emphasis on the irrigation system.

This study assessments agricultural and other related policies and their effect on the general economic performance of the agricultural sector in Egypt. This evaluation of policies is to serve as the basis for developing a more comprehensive agricultural strategy and policy outline that aligns sectoral policy purposes with policy events in an effective and dependable manner. The study is intended to serve as an orientation for policymakers, researchers, and organizations. In addition, reviewing previous studies related to the study subject is considered very important as it helps identify efforts other researchers exerted in the study subject and related economic studies. It also helps identify the statistical and economic methods researchers applied and findings reached in order to link such results to possible results to be achieved. The reviewed literature has been classified into three groups, under which the reviewed studies are presented in a chronological order. The first group focuses on studies and scientific research related to the impact of applying economic reform programs to agriculture, while the second focuses on the impact of agricultural price policy applied to major strategic crops. While the third one focuses on other Public Policies with Impact on Agriculture in Egypt.

II. THE THEORETICAL FRAMEWORK FOR AGRICULTURAL POLICY

The theoretical framework for agricultural policy represents the main and basic structure for understanding the nature of such policy and determining its relationship with other economic policies. It is also critical for identifying the concepts and milestones that can guide and be applied when analyzing and evaluating price policies, in addition to identifying the extent of aligning or not with the concepts, principles, laws and economic theories, where it represents a real reflection of the economic, social and political policies in the society. It is worth mentioning that agricultural price policy plays an essential role in the implementation of the policies' objectives, especially agricultural policy, due to the multiple links it has with several aspects, the most important of which is determining the pattern of agricultural resources' allocation, income distribution and consumption, where price policies mainly aim to achieve an appropriate level of farmgate prices that helps improve farmers' incomes thus achieve fair distribution of incomes.

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B. Policy

Osman sees that (2004). Policy is a branch of social sciences that deals with studying the origins of government organization and State affairs. Policy can be defined as State science, or a combination of ways and means to maximize the general welfare of all members of the society. The difference between policy and strategy can be illustrated by the fact that policy is a set of actions, laws, regulations and programs that may be taken to achieve a particular goal, i.e., policy requires planning and operational procedures that are followed by monitoring and evaluation, while a strategy is based on broad lines to achieve its objectives. In addition, policies' time frame can be short, medium or long, while strategies are always long-term. Some argue that a policy is merely suggestions that reflect specific needs through which plans, programs and projects are directed as a guide and framework for current and future plans. Policy is also defined as "how power and influence are distributed within a given society or system", or as "the relationship between the rulers and the ruled peopled" or "the State and everything related to its affairs" or "the great authority in human societies and everything related to the phenomenon of power".

C. Economic Policy

According to Abd El-Hameed. (2001), Economic policy refers to the approach adopted by a particular country in dealing with the goods and services' sector. In this regard, either the State adopts a free policy/system, i.e., open-market policy, or adopts a directed economy system/policy. An open-market economy is a system in which the government abolishes restrictions on certain goods and services in the circle of transactions between individuals or institutions within a single country and beyond borders. On the other hand, directed economy is an economic system in which the authority of the State is the dominant and guiding policy of economic activities in the market of goods and services, such that prices are determine by the State, and subsidized in case a difference exists between real prices and market prices under the prevalence of low-incomes individuals.

D. Agricultural Economic Policy

According to El-Khouly et al., (1972). Agricultural economic policy is one of the branches of the State's general economic policy. It is defined as the part of economic policy applied in the agricultural sector of the national economic structure. It is also defined as a set of objectives, methods, programs, means and procedures that the society may resort to apply in the agricultural sector in order to maximize economic welfare. and (Tweeten,1970) defined agricultural policy as an action plan adapted to the economic situation of the State, drawn up by the Government, and implemented through clear and specific programs to raise the standard of living of agricultural workers in general by helping them improve their production in terms of quantity and quality, thus provide food and clothing to the community at appropriate costs. Also, (Spitz,1974) defined agricultural and food policy as the set of governmental actions directed to address a range of problems in farm production, processing and distribution of farm goods, food processing and consumption and the rural society. Agricultural policy is also defined as the practical constitution that comprises all the structural and reform programs, the implementation of which results in improving the overall agricultural production in terms of quantity and quality, leading to higher, fair distribution, continuity and stability of the National Agricultural Income.

E. Economic Reform Policy

Is a set of policies and programs that aim at restructuring the economy to allow market forces and mechanisms to take place in order to achieve internal and external balance, to transform the economy into a developmental policy that is based on continuous economic and social development, and to activate the export sector, in addition to encouraging and activating private sector's role in achieving economic reform (El-khouly et al., 1991).

F. Agricultural Price Policy

Agricultural price policy is one of the main tools of economic policy that aims to raise the standard of living of all members of a given society. It plays a vital role in the structure of agricultural economics and contributes to achieving economic efficiency of agricultural resources' use. It also helps achieve fair distribution of national income among the agricultural sector and other economic sectors (Osman, 2004).

III. AGRICULTURAL POLICY (A BRIEF HISTORY)

In the 1960s, farming was pivotal to Egypt’s growth policies, with the rural national and the factory employee at the middle of post-independence national Egyptian individuality (El-Kouny 2018). The period was described by Nasser’s “Arab Socialism” stemming from the 1952 revolt, the 1956 nationalization of the Suez Canal that shadowed, and the birth of mega-projects in the designation of breaking out of foreign reins and structures. Policy absorbed on leveling the playing arena via a additional equitable distribution of income and the provision of affordable food to urban zones from peri-urban and rural areas while strengthening the connection between rural and urban areas.

Crop revolving schedules[1], crop zone allocations, compulsory quantity transfer quotas at prices fixed below global market rates, and subsidized consumer prices stood all put in place during this period (Kassim et al, 2018). Agricultural collectives were tasked with surveillance inputs, production, and marketing at the community level, while also coordinating accredit provision and output shares with agricultural credit banks. This officious

[1] Generally typical for wheat, clover, and sugar beet to be cultivated in the winter, and maize, rice, potato and tomato and cotton to be cultivated in the summer (Ouda and Zohry 2015; Ibrahim and Ibrahim,2003).

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institutional structure eventually caused agricultural stagnation as farmers became frustrated, yields dropped, cropping patterns became distorted, exports (such as cotton) fell, crop self-sufficiency gaps grew wider, the food subsidy system imposed a heavyweight on the government's financial plan, and the urban-rural revenue gap expanded as taxes took up a higher portion of what farmers gained via artificially low producer prices (Cassing et al., 2009).

As a result, subsidies on farmhouse inputs were increased, food subsidies were extended to rural zones, and land reform laws tackled redistribution of land ownership. Initial in 1986 and over the 1990s, a reversal of these interventionist policies started with a sweeping wave of liberalizing economic reform policies, providing the private subdivision a greater role in the agriculture sector and reducing that of the government[2].

Two agrarian policy reform programs were applied between 1987 and 2002: The Agricultural Production and Credit Plan (1987-1995); and the Agricultural Policy repair Program (1996-2002). The Agrarian Production and Credit Project included reduction of subsidies in some agricultural inputs, in addition to the removal of controls on zone allotments and price and marketing restrictions for some main crops (Baffes and Gautam,1996; Cassing et al.,2009). It also flagged the way for the privatization of state-owned firms through the overview of a new law reorganizing community firms into holding companies in which the administration is a joint stakeholder (Ender and Holtzman, 2003). The Agricultural Policy Reform Program which followed was broader in context and included the privatization of public firms (Kassim et al, 2018).

In parallel, the launching of the Economic Reform and Structural Adjustment Program in 1991, with the International Monetary Fund and the World Bank, had an indirect effect on the agriculture subdivision. By instable government policy from a state-controlled to a market economy, the structural adjustment program faster the liberalization of markets and encouraged the private sector to play a bigger role in agriculture trading. This was ended in part through the removal of most subsidies on agrarian inputs, lifting the mandatory crop rotations, and removing pricing and marketing controls (Cassing et al., 2009; Gouda,2016).

[!] Crop prices were liberalized as delivery quotas and input subsidies were relieved and the market was opened to private investment. This evolution of policies impacted agricultural output and trade. Cotton has previously come at the top of Egyptian exports, constituting about 80 percent of all exports in the 1960s. Rice exports followed. Both commodities fell in importance in the export market as oil and gas came to take their place. Imports were also affected as imports of maize, sugar, and wheat came to hold a seemingly irreplaceable grip at the top of the list (Cassing et al., 2009).

In the next, we describe crucial agricultural policies that are now in place in detail:

IV. PROVISION OF AGRICULTURAL INPUTS

A. Agricultural Cooperatives

Next, the Egyptian revolution of 1952, agrarian cooperatives were established in each village to control the distribution of farmhouse inputs, such as chemical fertilizers, seeds of strategic crops, and pesticides (Saad, 2002; Cassing et al.,2009). Through the 1960s and 1970s, the government depends on agricultural cooperatives in the application of the country's development policy over ensuring crop rotation schedules (Abdel Aal, 2008). Cooperatives were also accountable for the procurement of crop shares besides the marketing of the most important crops. Membership of farmers in agricultural cooperatives has been compulsory since 1961, with annual membership charges being automatically deducted from farmers' transactions with the cooperatives (Kassim et al, 2018). Agricultural cooperatives as well played a role in the provision of credit to farmers in collaboration with the Principal Bank for Development and Agricultural Credit (PBDAC). Nevertheless, this changed after the shutdown of cooperatives between the mid-1970s and initial 1990s (Saad, 2002).

Later, credit services and storage facilities possessed by cooperatives were fully transferred to PBDAC. After the restructuring of farming cooperatives in 1992, their role shifted towards the dissemination of information to farmers. Currently, the central character of unions is linking farmers in rural zones to information about markets, technical assistance, and supply chains for exports (Christiansen et al., 2011). Nevertheless, the effectiveness of cooperatives in playing this role is questionable. One of the significant limitations of the existing unions structure is inflexibility in allowing unions to develop independent marketing activities (World Bank, 2014). As of 2013, there were 6,000 agrarian cooperatives in Egypt, with more than 4 million members (CAPMAS, 2015).

B. Seeds

The Egyptian government continues to play a significant role in the production and distribution of seed for staple crops, even though the policy reforms of the 1990s have reduced government monopoly in the seed division. Opening with Agriculture Law 53/1966, the Agriculture Research Center (ARC) of MALR was made responsible for the "control and regulation of seed multiplication and production, domestic seed trade, and seed imports and exports" (Delouche, 1998). In the early 1990s, the national seed industry policy was directed towards minimizing the involvement of ARC in seed multiplication and marketing and replacing it with the Central Administration for Seed Production (CASP) (Abd El-Wanis, 2001 CASP was restructured in order to implement the new policies for reforming the seed industry. Mainly, CASP's role was to support the transfer of public seed production plants to private centers. Nevertheless, ARC continues to play a significant role in the processing,

storage, and distribution of foundation and registered seeds with coordination from CASP. CASP's structure contains a general directorate for seed marketing and distribution as one of its four central departments. The role of this directorate is to set prices and market seeds produced by CASP. As of 2000, the seed market share of CASP was 100 percent for cotton, barley, and lentil, 82 percent for fava bean, 67 percent for wheat, and 65 percent for rice (Abd El-Wanis, and Weisbecker, 2001). At the retail level, the structural reforms of the early 1990s included the transfer of seed distribution from the Principal Bank for Development and Agricultural Credit (PBDAC) to agricultural cooperatives and the private sector. In IFPRI's 1998 Egypt Wheat Producer Survey, unions were the most important source for modern seed varieties, with 55 percent of farmers in the survey purchasing seeds from cooperatives (Gruhn et al., 2000).[3]

C. Pesticides

The Agricultural Pesticide Committee has been the main government entity responsible for the assessment, evaluation, and registration of agricultural pesticides in Egypt since 1966 (Abdel Megeed, 2017). The subsidy for pesticides was phased out as part of the 1986 reforms. This ended the government monopoly over the provision of pesticides to farmers (Baffes and Gautam, 1996; Ender and Holtzman, 2003; Cassing et al., 2009).

Since 1999, the government has authorized agricultural cooperatives to offer pest control services and sell pesticides to village farmers (Kassim et al, 2018). However, the government still provides registration and standards. Controls and licenses pest management through pesticide companies (Ender and Holtzman, 2003).

In 1998, the government introduced new registration procedure for pesticide companies as part of an integrated pest management strategy. Nevertheless, concerns remained over the exposure of farmers and agriculture workers to hazardous substances due to limited enforcement of regulations (Fleischer et al., 2002). In 2017, a ministerial decree was issued by MALR giving the Agricultural Pesticide Committee additional control over the licensing and regulation of the pesticide industry in Egypt (MALR 2017).

D. Fertilizers

The Government of Egypt has a history of direct intervention in the fertilizer market with a general impact of increasing access by farmers to fertilizer and holding prices below world levels. As a result, fertilizer use in Egypt is generally high on the global scale (Kassim et al, 2018).

The monopoly of MALR over the distribution of fertilizers lasted for about three decades starting from the mid-1960s. The Principal Bank for Development and Agricultural Credit (PBDAC) was the primary institution within MALR responsible for the provision of fertilizer for each crop until the early 1990s. Then, the government began to break up PBDAC's monopoly. In 1992, the fertilizer subsidy was phased out (Gruhn et al., 2000).

Fertilizer production was entirely state-controlled until the early 1990s. Since 1991, the government's approach has been to privatize public sector enterprises, including fertilizer factories. However, many fertilizer factories are organized in collaboration. In 2001, approximately four-quarters of the production of chemical nitrogen fertilizers and total phosphorus production were transferred to companies regulated by the law on private companies (Saad, 2002).

Since 1992, private traders have been allowed to compete with PBDAC and agricultural cooperatives in the distribution of mineral fertilizers (FAO, 2005; Cassing et al., 2009). Private traders include wholesale distributers that deal directly with fertilizer factories and smaller retailers located in villages, some of them not even licensed (FAO, 2005). The government previously set quotas for wholesale distributors based on their storage capacity and past transactions with manufacturers. However, there were important interruptions to this new system, particularly in 1995 when the government intervened by instructing PBDAC to take over the distribution of all domestic production due to substantial shortages in supply. PBDAC's quota in the distribution of fertilizers then fluctuated between 10 percent in 1998 and 50 percent in 2002. It is popularly believed that the government tends to change the quota for private traders from year to year in order to reduce fertilizer exports at times when there are shortages in the local market.

The government obliges factories to supply these quotas to PBDAC at a price set below market price (Werr, 2017; Ghoneim, 2012). Two factories, Abu Qir and Delta, are supposed to supply threequarters of the required quantities (Elgerzawy, 2014). According to the Ministry of Investment and International Cooperation, there are twelve major fertilizer producers in Egypt, only three of them are state-owned, while the rest are shareholder companies (El-gabaly, 2015). In some cases, however, the government still holds the majority in shareholder companies, which can be considered parastatals.

PBDAC in turn sells fertilizer to cooperatives at only a small mark-up. Farmers obtain fertilizer from cooperatives at the artificially low price and are only allowed to purchase an amount that is determined by their landholding size and type of crop produced. Experts explained during field interviews that this distribution system tends to prioritize wheat cultivation over other crops problems associated with the fertilizer subsidy scheme include a poor distribution system, lack of supervision, and sometimes a lack of sufficient fertilizer entitlements for farmers (Ghoneim, 2012) As a result, a black market is a major drawback of the subsidy scheme.

[3] International Food Policy Research Institute, 2000, "Egypt Wheat Producer Survey, 1998", https://hdl.handle.net/1902.1/17087, Harvard Dataverse, V1.

A second distortion to the fertilizers market is the imposition of import taxes at some points, including high levels in the 1970s, which artificially constrains further the supply in Egypt. These tariffs were likely implemented for the benefit of the fertilizer industry rather than as part of a comprehensive agricultural policy (Cassing et al., 2009).

In addition to direct intervention in the fertilizer market, the government also subsidizes nitrogen fertilizer production indirectly by subsidizing natural gas, a main input in producing nitrogen fertilizers. The fact that the government is gradually reducing natural gas subsidies is pushing the official price of nitrogen fertilizer up over time (Werr,2017). Moreover, restrictions on imports of liquified natural gas by fertilizer factories is further limiting their production. It is estimated that in 2016 private fertilizer factories on average were running at 70 percent of their capacity (Kassam and Dhehibi, 2016) suggest that this indirect subsidization of nitrogen fertilizers relative to phosphate fertilizer is another way in which the government prioritizes wheat production over other crops, several of which do not require nitrogen fertilizer to the same degree as wheat.

V. AGRICULTURAL CREDIT

While official agricultural policy has long provided subsidized access to credit for agriculture, in practice formal loans have been inaccessible for the vast majority of farmers. Reforms in 2016 may somewhat increase the share of farmers who can access credit, but the impact of these reforms is not yet known (Kassim et al, 2018).

The Principal Bank for Development and Agricultural Credit (PBDAC), established in 1931, is the most important financial institution with strong presence in rural areas. Prior to the restructuring of PBDAC in December 2016, it was classified as a special bank under the supervision of MALR. Hence, PBDAC was exempt from the Central Bank's reserve requirements. Most of its deposits were owned by cooperatives and other agricultural organizations, while loan funds were mostly financed by commercial bank loans at subsidized interest rates (Baydas et al., 1995). The credit subsidy provided through PBDAC was universal, which implied that both large agriculture corporations as well as smallholder farmers can benefit from subsidized loans (World Bank, 2014).

PBDAC accounted for 70 percent of all formal institutional lending to the agriculture sector in 2014. However, the agriculture sector's access to credit is still inadequate. It received only one percent of total lending compared to 38 percent and 26 percent for the industry and services sectors, respectively (World Bank, 2014).

A study by (Baydas et al., 1995) demonstrates that demand for credit in the agriculture sector is primarily met through the informal sector (Kassim et al, 2018). This study showed that, even among employees of PBDAC, rotating savings and credit associations played a significant role in the provision of informal credit. In some cases, informal finance provides financial services that are not offered by PBDAC, but for which there is a high demand, such as small, short-term loans.

In terms of access to formal credit, women farmers are more limited than men. Only 7% of women farmers represent formal financial administration, while 12% for men. This is the case - rural women playing a major role in producing food in local markets for consumption and domestic sale - food production accounts for around 60 percent (World Bank, 2014).

Recent reforms to PBDAC aim at improving the bank's efficiency and transforming it into a "commercially run agriculture-focused bank serving rural Egypt" (World Bank, 2014). In November 2016, PBDAC was renamed the Egyptian Agriculture Bank and its supervision was transferred from MALR to the Central Bank (Werr, 2016). Under Central Bank management, the bank will be required to adhere to reserve ratios and capital requirements on par with other commercial banks. The World Bank has also recommended the restructuring of PBDAC to include reform of interest rate subsidies in order to improve subsidy targeting (World Bank, 2014).

According to the chairperson of the Egyptian Agriculture Bank, the bank is planning to expand its client base from its current level of approximately 3 million clients to reach 7 million clients, which is still a small number relative to the population (Mounir, 2017).

VI. PRICE AND PROCUREMENT POLICY FOR KEY CROPS

The Egyptian food subsidy system, which dates back to 1941, has strongly influenced agriculture policy in Egypt (Alderman et al., 1982). The political significance of the bread subsidy in ensuring stability has motivated strong government intervention in the wheat sub-sector in particular. However, government policy has encompassed other major crops as well, such as cotton, rice, maize and sugar cane.

During the 1960s, Nasser's regime adopted a socialist policy characterized by central planning and price controls. The government-imposed crop rotation schedules, crop area allocations, and compulsory procurement for most major crops, usually at prices lower than the market price (Scobie, 1981; Cassing et al.,2009). The intuition behind such policy was to transfer agricultural surpluses to the government in order to finance industrial growth.

As mentioned above, the agricultural policy reform process that began in 1987 partially liberalized these policies. However, the state remains heavily involved in setting the prices farmers receive for key crops.

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VII. OBJECTIVES AND INSTRUMENTS IN AGRICULTURAL POLICY

Intervention through agricultural policy is an actual important phenomenon in the agrarian sector in many nations. Often, the intervention takes place through the market, and the goal is to progress or stabilize the economic situations. Intervention itself is not an objective, but it is an instrument to achieve the general objectives and goals set by society. Previously the examination of the different instruments, it will be valuable to expose the underlying factors that legitimize those instruments, including support and price policy, of agricultural policy. There is a close relationship between the objectives and the instruments in agricultural policy. Essentially, society has set up a number of aims, which lay down guidelines and directions for the progress of agricultural policy. These objectives, which to a greater degree are similar from country to country, clarify and set the grounds for the instruments in agricultural policy. There is a numeral of common features in the objectives that are found in agricultural policy in developed countries.

Many different kinds of instruments can be used to achieve the given objectives, and it is a very complicated relationship. Approximately instruments can be used to achieve several different objectives, whereas other instruments benefit the achievement of some and limit the achievement of others. Lastly, important differences with respect to financing, impact on production and trade, transparency, and other elements are observed.

Objectives of agricultural policy: Agricultural policy aims at improving	Income in agriculture.
	Income distribution amongst farmers.
	Yield in agriculture.
	Efficiency in the processing and marketing chain.
	Supply and price constancy.
	Rural development and the demographic condition.
	Environmental position.
	Export, Employment, Production, added value, etc.
Instruments in agricultural policy	**Price Support** Support in the form of greater market prices than, for example, on the global market.
	Deficiency Payments Transfers from taxpayers to farmers corresponding to the production multiplied by the variance between the global market price and a given target price on the local market.
	Support Coupled to Input Factors Area premiums Financial funding Other supports to reduce charges
	Direct Support Coupled with Other Factors Support to enhance structural change Economic development in rural zones

Table 1: - Objectives and Instruments of Agricultural Policy
According to (Henning, 2016)

VIII. IMPACT OF APPLYING THE ECONOMIC REFORM PROGRAMS IN EGYPTIAN AGRICULTURE

Throughout the stage of governmental planning in the national economy, the agricultural sector was managed by a plan designed using several tools to ensure its implementation (such as the organization of the crop rotations, pricing, cooperative marketing, control over inputs, etc.). However, after launching the economic reform programs, the government stopped intervening in the management of the agricultural sector. Economic liberalization in Egypt's agricultural sector was based on the abolition of: compulsory delivery of agricultural crops; government's intervention in determining the areas of agricultural crops and cropping patterns, and subsidies on agricultural production inputs. Market mechanisms and forces became the main determinants of agricultural commodity prices.

The following are studies that focused on explaining the impacts of economic liberalization of Egyptian agriculture on agricultural production:

A study by El-Bahnasawy (1992). that was conducted to assess agricultural policies adopted by the Arab Republic of Egypt in order to identify the impacts of adopting such policies and their repercussions, either negative or positive, on Egypt's agricultural sector, revealed year-over-year fluctuations in the productivity of main field crops. The study attributed such fluctuations to the adoption of variant agricultural policies that did not encourage the adoption of modern technology packages that lead to increasing yield per acre, in addition to low investments allocated to the

factors leading to higher productivity in the agricultural sector. The study recommended increasing investments allocated to research studies that focus on increasing productivity and production, improving the quality of seeds, abiding to proper planting dates, as well as the proper method and timing of harvesting to reduce losses, in addition to ensuring proper performance of agricultural operations, as well as implementing the recommendations of research studies. The study pointed out that achieving self-sufficiency is an elusive goal that contradicts with economic principles, and deprives the society of the advantages of specialization and maximizing economic output. To avoid that, the study suggested that the main aim should be to try to achieve the greatest possible self-sufficiency rate by applying appropriate policies that motivate farmers to increase production. Another study by (Habashy et al., 1995) conducted to assess the economic impacts of agricultural policy in light of economic liberalization found that the area under grain crops during the period (1991-1993) outmatched that recorded during the period (1985-1987) by 32.9%, which the authors attributed to the higher prices of grain crops compared to other crops in which Egypt has no comparative advantage like forage crops. Study results also showed an increase in the production costs of wheat, rice, maize, cotton, broad beans and sugarcane during the period (1991-1993) as a result of eliminating subsidies on production inputs and increases in land rent due to adjusting the relationship between tenants and owners of agricultural lands, even though the increase in farm prices was higher than the increase production costs, especially for cotton and wheat crops.

A study that was conducted by (El-Batran, 1995) to assess the impact of economic reform programs on some of the strategic crops in Egypt showed that the low efficiency of the performance of Egypt's agricultural sector during the sixties and seventies of the last century was due to heavy governmental interventions in the agricultural sector, and tightening the government's grip on this sector, and that applying the policy of economic liberalization in the framework of implementing economic reform programs resulted in affecting the efficiency of resource use, which led to higher coefficients of the elasticities of output of capital used in the production of major crops. However, the use of such resource remained below the optimal level of production. In addition, analysis results of measuring the impact of economic liberalization policy on the production cost structure showed a significant increase in the production costs of strategic crops, especially those that were subject to partial or full intervention by the government. The study also found that the most significant negative impacts of implementing such programs were the higher costs of production.

According to study by (El-Sabaa, 1996) to assess the impact of price relations on the production and consumption of major field crops in Egypt, and to evaluate and compare agricultural price policies applied before and after the implementation of economic liberalization showed that farmgate prices that prevailed during the second period has been characterized by substantial increases compared to those that prevailed during the first period. In addition, farmer's share of retail price declined during the second period. The study assumed that this might be due to the nature of the liberalization period and the emergence of new marketing services that did not exist before. Studying the main determinants of the supply response of agricultural crops showed that 60% of the changes in wheat area is due to reductions in the area under faba bean, and in local and international prices during the pre-economic liberalization period, while about 90% of the changes during the post-economic liberalization period is due to the world price and decline in cotton planted area. In addition, around 65% of the changes in the price of maize are due to cotton planted area, world price and the price of rice during the first period, while about 96% of the changes during the second period are due to the world price of rice crop.

A study by (Emara, 1996) on economic liberalization policies and programs and structural adjustments and their impacts on some important variables in the agricultural sector estimated that the value of gross agricultural product and net agricultural income in current prices have been increasing at annual rates of 15.6% and 15.4%, respectively, during the period (1980/1981) when structural adjustments were applied. In regards to the impact of such policies and programs on crop patterns, results showed that areas under wheat, barley, broad beans, potatoes, winter tomatoes and summer maize have been increasing, while areas under cotton, clover, soybeans, Nile Maize and Nile sorghum have been declining during the period (1987-1993) compared to the period (1980-1986). Moreover, total area within control of agricultural land increased from 5.86 million acres during the first period to about 6.67 million acres during the second period, in addition to achieving significant increases in the productivity of most crops, especially food grains.

A study by (Gab-Allah and El-Ashmawy, 1997) was conducted to assess the impacts of implementing economic liberalization policy on the economics of production of major agricultural crops in Egypt, including wheat, cotton, rice and potatoes, and farmers' income from such crops. Findings showed that yield per acre of wheat and rice increased during the period of economic liberalization, while yield per acre of cotton declined. At the same time, farmgate prices increased at a rate higher than the increase in the production costs of such crops, which resulted in improved net revenue from the study crops during the period of economic liberalization compared to the period prior to liberalization, indicating that the increase in farmers' incomes is a result of implementing the policy of economic liberalization.

A study conducted by (Ghaneima, 1997) on the impact of economic liberalization policy on cotton production in Egypt aimed to measure the impact of Egyptian production policies on the economics of cotton production during the period (1985-1996) through studying planted area, production, yield, production costs, total and net revenue and comparative advantage of the crop during the mentioned period. Results showed that production

policies adopted during the study period were not in favor of producers due to the high implicit taxes imposed, which led to negative impacts on incentives that encourage producers to increase planted area and productivity thus crop production. The study recommended that agricultural research development programs align with the implemented economic reform programs to increase cotton yield, in addition to conducted more studies on the comparative advantage such that it starts at the level of production areas; drawing new production plans in the light of new changes; studying the future of the economics of Egyptian cotton after the implementation of the GATT so as to minimize the expected negative impacts on the future of cotton production in Egypt; studying the conditions of small farmers to identify the proper crop rotations they should adopt and the funding policy appropriate to their capabilities in order to reduce the negative impacts on limited-income farmers. Such results mean that not all of the impacts of economic reform programs are positive.

According to (Atia, 2002) Evaluating effectiveness of price policy mechanisms applied within the framework of the implemented economic liberalization policies and structural reform programs by analyzing the structures of price levels of some agricultural crops, with the aim to measure some indicators and price relations necessary for policy makers, and implications of such findings to optimum allocation of resources and taking production decisions. The study highlighted evolution of various price levels, in current and real values, over the period (1975-1999), which the study divided into two periods: pre-economic liberalization period (1975-1989) and the post-economic liberalization period (1990-1999). Findings showed that price levels of the study crops (wheat, rice, maize and cotton) followed statistically significant increasing trends during the two study periods, whereas their real prices have been declining. Econometric analysis of the efficiency and effectiveness of price policies applied to the study crops using the Policy Analysis Matrix showed differences between the computed nominal protection coefficients, and between the two study sub-periods. Results indicated high protection levels for wheat and cotton producers due to receiving implicit subsidy from the government. The study also analyzed the applied price policy mechanisms using two indicators, total transfers outside the agricultural sector and measuring change in producer surpluses.

The study conducted by Siam et al., (2005) on the analysis of changes in the consumption, production and imports of food grains aimed to clarify the main features of change in such variables as a result of the changes that took place in the local and international arenas in order to take them into account while making decisions regarding the development of food security policies, cropping patterns and international trade. Findings showed an increase in the relative prices of wheat as a result of applying price reform policy. Such finding and devoting more attention to research related to developing and the use of high-yielding varieties resulted in increased production and a noticeable improvement in self-sufficiency rate thus a 10% decline in imports during the period (1995-2003). Also, the role agricultural policies play in confronting repercussions of the global financial crisis on Egypt's agricultural sector has been studied by (El-Bahnasawy, 2009). Results revealed that implications for the agricultural sector is not due to the global financial crisis that occurred in (2008) as much as to the applied agricultural policies, where the period prior to implementing economic liberalization program has been characterized by many negative aspects such as the diminishing contribution of agriculture to GDP, the weak rates of growth in agricultural production, the increasing burden on the government's budget due to subsidizing food commodities and agricultural production inputs, the diminishing rates of self-sufficiency and the increasing deficit in the Balance of Agricultural Trade. As a result, the government adopted the policy of economic liberalization in the agricultural sector with the aim to remove restrictions imposed on that sector, whether production, marketing or legislative restrictions. The government gradually left the economic decisions related to crop production, pricing and marketing to producers and market forces. The study pointed out that when market forces fail, this is due to the lack of supportive and effective institutions. Therefore, the study recommended that the government should play a role in building better marketing institutions. And since this cannot be done by governmental marketing institutions as they cannot solely balance the conflicting governmental objectives, (including credit, tax collection, food security and price stability), it is important that the government facilitates the establishment of private marketing institutions as one of pillars necessary for the success of economic liberalization policy.

A study conducted by (El-Gendy, 2010) on the impact of agricultural policy on main economic features of wheat grown in Egypt showed that the implementation of economic liberalization policy represented a new stage that influenced Egyptian agriculture in the short and long runs in terms of resource distribution, production efficiency and the level of prices. The study aimed to identify the impacts of applying economic liberalization policy on the various production and economic phenomena related to wheat, in addition to forecasting the future outlook of such phenomena under the assumption that influencing factors continue to prevail during the study period until the end of the forecast period (2013). Findings revealed a number of characteristics that distinguish the two periods prior and post implementation of economic liberalization policy, the most important of which are: a statistically significance impact of the implemented economic liberalization policy on wheat planted area, productivity and the total production, where forecasts for the year 2013 showed that wheat planted area, yield and total production are forecasted to reach about 3322.6 thousand acres, 3.12 ton/acre and 9656.2 thousand tons. The study also forecasted a decline in wheat imports from 5911 thousand tons in 2007 to 5048.4 thousand tons by 2013. The study recommended continuing to apply economic liberalization policy due to positive impacts on wheat production cost and net revenue.

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A study was conducted by (Ismail, 2011) to assess the role agricultural development strategies play in improving the production of major grain crops in Egypt and analyze agricultural development strategies over the period (1980-2010) in order to identify their impacts on developing the agricultural sector in terms of raising self-sufficiency in grain crops. Results showed potentials for increasing self-sufficiency rates in wheat, maize and rice under some assumptions, these are increasing yield per acre by 1.44 tons, increasing planted area by 1.97 thousand acres and reducing per capita wheat consumption from 190 kg/year to 155 kg/year, which can help raise self-sufficiency rate to about 80% by 2017. As for maize, assumptions include: increasing yield/acre by 1.61 tons, increasing planted area by 1.01 thousand acres and reducing per capita consumption from 156 kg/year to 130 kg/year, based on which self-sufficiency rate can be increased to 66.2% by 2017. In regards to rice, assumptions include: increasing yield/acre by 1.57 tons, reducing planted area to 1.35 million acres and keeping average per capita consumption at 74 kg/year, based on which self-sufficiency rate in rice can be increased to reach 93.4% by 2017.

A study by (Eid et al., 2013) on production policies applied to main export crops in the light of local and global variables showed that, since the mid-eighties of the last century, the government has adopted economic policies that aim to liberalize the economic sectors and stop governmental interventions. For the agricultural sector, such policies focused on abolishing: compulsory delivery of agricultural crops, governmental interventions in determining planted areas and cropping patterns, and subsidies to production inputs. As a result, market mechanisms and forces became the main determinant of the prices of agricultural commodities. And since agricultural production, like other economic activities, is influenced by the extent of success and soundness of agricultural policies pursued by the government, the study targeted analyzing production policies applied to rice and cotton in light of the changes in local and international prices in order to measure Nominal and Effective Protection Coefficients for producers and consumers, in addition to the coefficient of domestic resource cost. Findings showed that rice and cotton producers are not receiving protections that encourage them expand in cultivated areas, and that reducing subsidies to input resulted in increasing the production costs of both crops. The study recommended applying protection measures to the two crops as both are among the main export crops for Egypt, in addition to setting appropriate prices, close to international prices, in order to eliminate imbalances between domestic and international prices, as well as following a stable production policy that helps achieve competitive advantage under the current international agreements Egypt singed with various economic blocs.

IX. IMPACT OF AGRICULTURAL PRICE POLICY ON MAJOR STRATEGIC CROPS IN EGYPT

A study conducted by (Swaidan, 1990) to analyze the current state of price policies applied to major grain crops and determine the bases that can be used in formulating alternatives showed that average monthly net return per pound invested in grain crops is lower compared to traditional and forage crops, and that a strong correlation exist between domestic and international prices. Comparing the prices estimated using different pricing methods and applying ANOVA revealed that prices estimated using production costs method (allows a net revenue equivalent to 35% of the total cost of production) were low, especially for wheat. However, farmgate prices estimated using other methods, such as multiplying the base price by the wholesale price index, consumer price index in rural areas, or by the export/import price index returned higher values. Measuring the price efficiency of the study crops by estimating the nominal protection coefficients during the period (1976-1987) returned figures less than unity for wheat, rice and maize. The study attributed such result to the governmental policies that impose indirect taxes on producers of the study crops. Results of applying the partial equilibrium model to gain crops grown during the period (1980-1987) revealed that the adopted pricing policy led to losses for the society, both on the production and consumption sides, where it resulted in reducing producers' welfare as it works in favor of consumers' welfare. In addition, the implemented policy resulted in negative impacts on the country's foreign exchange earnings due to increased consumption of wheat and maize on the one hand, and the decline in rice exports on the other hand. However, the government can increase foreign exchange earnings in case of applying a price policy whereby producers can get actual revenue from their produce and consumers bear the real cost of consumption. In addition, findings revealed positive response in rice planted area to lagged changes in rice planted area, cost/benefit ratio, and adjusted average farmgate prices of wheat and maize. Also according to study by (Aqladius, 1991) that aimed at identifying the features and components of Egypt's agricultural policy, how it evaluates and the impacts it has at the national level and the level of Assiut governorate in order to establish solid bases for a long-term agricultural strategy revealed that the strongest changes in the prices of agricultural crops was that witnessed during the eighties, indicating higher impacts of the supply and demand forces in determining such prices, which led to prices increasing at rates higher than the cost of production for the majority of agricultural crops. Nevertheless, the prices of many agricultural crops are still less than international prices. The study also found contradictions between farmers' wills and governmental measures regarding crop rotations and the compulsory delivery of agricultural crops, thus recommended gradual removal of state control and encouraging competition between farmers.

According to Mousa (1996) conducted qualitative and quantitative analysis to the implemented agricultural policy using agricultural policy assessment methods. One of the most important results reached was the necessity of formulating agricultural policies related to land use and cropping patterns on sound scientific bases that take into

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account the value of the water per unit of land and capital per unit of land. The study explained that applying the pricing policy in the agricultural sector was not in its favor, where change in governmental revenues in the case of wheat was not accounted for until after the partial liberalization in 1986. Not only that, self-sufficiency in wheat also improved by 56% in 1990. Part of such improve is due to eliminating subsidies, which led to rationalizing consumption. Therefore, the study recommended implementing free tools and setting flexible achievable goals, in addition to regular evaluation of agricultural policies using internationally accredited methods and tools, and establishing an agricultural policy information center that comprises an integrated field information unit and a unit that takes care of the technical aspects related to the implementation of agricultural policy.

In their study, (El-Mallah and Soliman, 1997) focused on competition in the English market of potatoes, and reflections on Egyptian potato exports. Results revealed the importance of Egyptian potato in the English market, where demand proved relatively inelastic (-0.69). Therefore, the implemented policy of reducing the prices of Egyptian potatoes usually has a limited impact in the face of competing countries, especially the Netherlands, Belgium and the rest of the world, unless accompanied by a good quality of the exported potatoes.

A study by (Abd El-Hady, 1997) investigated the impacts of some global variables on the farmgate prices of some major crops in Egypt. Results revealed some of the basic influencing factors, including unit cost of production, parity prices, cost trends, crop budget, production function, demand projections, farm incomes, consumer prices and trends in international prices. It was also found that determining farmgate prices in Egypt mainly depends on the cost of production. Such method is based on two basic components besides the costs; these are the value of byproducts and yield per acre. The study found that the annual growth rate of wheat, rice and maize prices increased by 12.5%, 12.42% and 10.7% respectively during the period (1980-1994), which affects the supply of such crops, and that crop price has a significant impact on the dependent variable during the post-liberalization period. After applying economic liberalization to rice production, the significant impact of rice farmgate price on the dependent variable was very apparent during the post-liberation period. As for maize, results showed no significant impact of the explanatory variables on the dependent variable during the study period, and also showed that prices have significant impacts on some of the price policy indicators regarding the study crops, including nominal protection coefficient, effective protection coefficient, net loss to producers, producer's welfare and domestic resource cost. Nominal Protection Coefficient reflects the government's tendency to reduce taxes, while Effective Protection Coefficient is an indicator for producing the commodity under subsidies in favor of producers and taxation of the consumer. The third indicator, Net Loss, reflects farmers' attitude towards the economic use of the of production inputs. Finally, change in producer surplus is the cost of domestic resources. It should be noted that Egypt's comparative advantage in the production of this crop is declining in the light of increasing production costs. The study recommended regular calculation of the difference between the nominal and effective protection coefficients, and changes in producer surplus as guides for designing price policies.

The impact of economic liberalization on consumption patterns and food content before and after the implementation of economic liberalization was also studied by (Khidr, 1998). Results showed that consumer prices of wheat flour and rice remained fixed for a long period, leading to a gap between prices. Consumer price of fine flour was liberalized in 1993, while that of rice was liberalized in 1992. The study also showed a widening food gap after applying the policy of economic liberalization to some commodities, namely wheat and maize, in which the food gap increased by 15% and 8%, respectively. A study by (Mahmoud, 1999) explained the impact of economic liberalization policies on field crops production and developments in Egyptian plant production. Results showed that increases in the prices and productivity of crops are higher than the increases in their production costs. Profitability of annual crop rotations or cropping patterns, especially for field crops, helped in such trends, which proved the soundness of implementing economic liberalization to Egyptian agriculture to achieve the objectives of raising farmers' living standards. Wheat production increased by 36.67% compared to that achieved during the pre-liberation period. In case of rice crop, results showed that after the implementation of the economic liberalization policy rice planted area has been increasing at an annual rate of 1089 thousand feddans, while farmgate price increased by 10.66%. In addition, rice production cost increased and net revenue per acre increased by 70.74%. According to (Haggag, 1999) study the results of measuring the impacts price policies have on grain consumption in Egypt, analyzing the levels of grain prices and estimating the functional relationship between price levels over the period 1974-1990 showed that adjusted farm prices of grains followed annual increasing trends estimated at 3.1% for wheat, 1.8% for rice and 1% for maize, which proved statistically significant for wheat and rice, but not for maize. Measuring the relationship between wholesale and farm price showed strong correlation exceeding 0.90 for wheat and maize, while reached 0.84 for rice due to the increase in annual rates of adjusted wholesale prices, nearly three times the annual increase in adjusted farmgate prices. The study also showed that, contrary to maize, farmgate prices of rice and wheat remained lower than the world prices of the two crops. It was also noted that rates of exchange for the agriculture sector were less than 100, i.e., they were not in favor of the agricultural sector, indicating that prices farmers received for their products were less than the prices they paid for production inputs. The study also showed that farm prices during the previous season did not have significant impact on crop production or area during the current year, except in some cases. Lack of response to price indicators from farmers' side can be explained by the constraints and imbalances resulting from

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governmental interventions in agricultural price policies. The study recommended devoting more attention to price and marketing policies concerning cereal crops under the implemented free market policy. A study by (EL-Batran, 2002) investigated the impacts of some agricultural policies in Egypt. She explained that until the early 1980s, the implemented price policy focused on formal pricing of products. By the beginning of 1986/87, the government embarked on implementing economic reform programs to price policy. Subsidies to production inputs were abolished and their prices were liberalized, while prices of agricultural crops were gradually moved according to world prices. In addition, guarantee prices were set to ensure compensating farmers for the difference between actual cost and market prices. Results showed increases in current farmgate prices for most of the major crops during the average period of the nineties, namely wheat, rice and maize, indicating the significant impact of agricultural policies during the nineties on increasing wheat, rice and maize planted areas and net revenue per acre for the three crops in current prices. It was also found that the burden incurred by the government due to wheat imports during the 1990s has been higher compared to that incurred during the 1980s. As for the rice crop, although the burden incurred by the country during the 1990s has also been higher than that incurred during the 1980s, revenues have been realized during the 1990s due to increases in rice exports. The study also found net losses at the level consumer increased for all crops under study during the 1990s, except for cotton, which can be explained by implementing consumer-subsidy policy, which led to increased consumption under low domestic prices thus misallocation of consumer expenditure. As for net social loss, results showed that it has been higher during the 1990s compared to the 1950s for all the study crops. In regards to welfare indicators for producer and consumer, findings showed increases in average losses of wheat, maize and rice during the 1990s compared to average losses during the 1980s, which witnessed the implementation of free prices and marketing of agricultural crops, optional guarantee prices for strategic agricultural crops such as wheat and maize, and establishing price balance funds for agricultural crops, including cotton.

A study by (Daif, 2003) aimed to identify the features of price changes in Egypt for main vegetable crops during the periods before economic liberalization (1973: 1986) and after economic liberalization (1987: 2001), and the effectiveness of price changes in determining farmers' decisions. Results revealed significant impacts of economic liberalization policies on the real retail prices of wheat and rice, as well as on real wholesale prices, and responses of wheat, maize and rice planted areas to change in prices. Results of estimating price protection indicators for major field crops indicated that the government has been imposing direct or indirect taxes on wheat producers, in addition to subsidizing and protecting the crop in domestic market in favor of the consumer, then turned to implementing protection measures in favor of producers at the expense of consumers. In regards to maize, results revealed that the government started applying protection policy to support producers and the policy of imposing taxes on consumers as of 1991, and that the value added of maize in local price exceeds the value added at border price. Measuring the impacts of price changes on the production and consumption of the major agricultural crops using some indicators like net economic loss in production and consumption; change in producer and consumer surplus in order to assess the welfare for each of them, as well as changes in government's revenue, change in hard currency earnings and net economic loss for the society. In 1987, net economic loss in of wheat, rice and maize production averaged 176.3, 589.1 and 192.4 million pounds, respectively, and followed increasing trends. On the other hand, net economic loss in consumption averaged 277.2, 340.8 and 160.7 million pounds for the three crops, respectively. By assessing the impact of fluctuations in international wheat prices on Egypt's economy and the economic cost the economy (El-Sawalhy et. al., 2003) will bear in case world prices of wheat rise to $ 250 per ton, and under two alternatives, either keeping imports at the current level, 6 million tons, or to reduce imports to 5 million tons per year. Results revealed that, in case world prices of wheat rise by 10%, the cost of importing 6 million tons of wheat will increase by 93.6 million dollars a year; in case imports are reduced to 5 million tons, imports cost will increase by 78 million dollars a year; in case world prices of wheat rise by 30%, the cost of importing 6 million tons of wheat will increase by 281 million dollars a year; in case world prices of wheat rise by 50%, the cost of importing 6 million tons of wheat will increase by 468 million dollars a year; and in case imports are reduced to 5 million tons, imports cost will increase by 390 million dollars a year.

According to (Emara, 2004) enquired "Where are Agricultural Prices Heading To"? She investigated factors affecting market prices and found them to be collapse of prices, high production cost, deterioration in the competitiveness of Egyptian agricultural sector, uncontrolled equilibrium prices within the framework of market mechanism and inaccurate impacts of price incentives. She further applied supply response to price changes and found that cereal crops showed significant supply response to price changes in case price incentives are offered to producers of such crops, mainly wheat, rice and maize. The study explained that increases in the equilibrium prices of the mentioned crops and the prices of inputs used in their production is sometimes justified and sometimes not, which resulted in negative impacts on farm incomes thus instability of agricultural income, and therefore agriculture has been regarded as an undesirable investment profession. Also, a study that was conducted by (Abd El-Sadeq, 2006) to measure the impact of some domestic and foreign variables on the production and exports of Egyptian potatoes revealed that potatoes planted area followed an increasing trend during the period 1991-2003, both at the level of total and the level of the three seasons. Results also showed that farmgate prices, net yield per acre and total revenue demonstrated noticeable fluctuations during the study period.

In a study conducted by (Ismail, 2007) overlaps in price relationships between major cereal crops, namely wheat, rice and maize have been examined. The study examined demand and supply of the three crops and price relations, in addition to presenting a multi-market model for the three commodities. Results revealed that the estimated elasticities of supply for wheat, rice and maize reached 0.57, 0.87 and 0.76, respectively, indicating that the three commodities are necessary. The study used a sophisticated model for estimating consumer demand for goods as an integrated model of demand that reflects the impact of prices and income on consumer behavior. This model is Almost Ideal Demand Model (AIDS), the results of which showed an inverse relationship between commodity price and quantity demanded according to the estimated elasticities of demand, while showed a substitution relationship between rice and both wheat and maize on the basis of cross elasticities of demand. In addition, results of the multi-market model showed that wheat and maize producers did not receive opportunity cost equivalents, which calls for designing a proper price policy based on which consumers are charged the real consumption cost and producers receive real revenues from wheat and maize production according shadow prices in production and consumption sides.

A study by (El-Saeed and Atta, 2008), which investigated the marketing efficiency of potato crop grown in Egypt, revealed that planted area and production of winter potatoes recorded the highest annual rate of increase, while planted area and production of summer and Nili potatoes followed a declining rate. The study also found that productivity of summer potatoes recorded the highest rate of increase; followed by productivity of winter potato, while productivity of the Nili potatoes ranked last. As for the efficiency of potato production, it reached 1.85, indicating that potato production falls in the economic stage of the production function, which also reflects economic efficiency in production. Studying the impacts of biofuel production on world prices of cereal crops revealed increases in the quantities of ethanol produced at the level of world over the period 1997-2008, which led to a rise in the world prices of wheat and maize. Brazil ranked first in terms of ethanol production, followed by the USA. However, such ranking differed in 2008. Findings revealed a positive relationship between the world price of maize and ethanol production, where 1% increase in the amount of ethanol produced leads to increasing world prices of maize, rice and barley by 0.82%, 2.52% and 0.76%, respectively. The study recommended diversifying the import markets wheat and maize, taking into account quality standards, in addition to pursuing efforts to raise the profitability of domestic wheat over that of competing crops such as clover, maize, and rice in order to enhance farmers' response, thus the quantities and quality of cereal crops, especially wheat and maize. (Salim, 2008; El-Bahaee and Nagaty, 2008) to estimating self-sufficiency rates of major grain crops and the impact of increasing world prices of grain crops on Egypt's balance of trade revealed that self-sufficiency of wheat increased from 47.9% over the period 1992-1997 to 58.6% over the period 2002-2007. Consequently, wheat imports declined from 5.7 to 5.2 million tons between the two periods. However, increases in the world prices of grain led to increasing deficit in the balance of trade of wheat by US$519 million in 2007. Self-sufficiency of maize declined from 69.4% to 62.5% due to increased consumption, which resulted in increasing maize imports to 4.1 million tons over the period (2002-2007), leading to increasing deficit in the balance of trade by US$389.6 million in 2007. The study predicted the total value of imports from the study crops at US$4.1 billion in 2010, and US$4.7 billion in 2015.

Another study was conducted by (El-Gundy, 2010) to analyze the Impact of Agricultural Policy on the most Important Economic variables of Wheat Crop in Egypt, as well as to evaluate Egyptian agricultural policies applied to wheat crop using Policy Analysis Matrix. The study concluded that the estimated nominal protection coefficient of output during the pre-implementation of economic liberalization period reached 0.63, which implies that farmers incurred high taxes while consumers received subsidies during this period. As for the value of this coefficient reached 0.93 during the post-implementation of economic liberalization period, indicating that domestic price of wheat is close to world price, which also means reduced value of indirect taxes and subsidies to consumers during the second period compared to the first period. Such results indicate reduced price distortions. The study recommended pursuing economic liberalization policies for the positive impacts on the cost and net revenue of wheat production.

A study that was conducted by (Mohamed, 2011) to estimate and analyze the supply response of major cereal crops grown in Egypt using several statistical models revealed that lagged real net yield per acre and lagged planted area represented the main factors affecting wheat planted area in the current year. Results also showed that factors affecting rice planted area in the current year include lagged real agricultural price as well as lagged farm area. The study recommended taking into account such factors, especially farmgate prices and real net revenue per acre, in addition to lowering their productions costs in order to promote farmers grow them.

According to study that applied a number of research methods by (Tolba and Kamel, 2011), including descriptive and quantitative analysis, PAM and Partial Equilibrium Model to measure the impacts agricultural price policy have on wheat variables revealed that wheat planted area and yield amounted to 2.8 million acres and 2.73 tons/acre, respectively, and that annual rate of decline reached -0.01 ton/acre, while average production reached 7.6 million tons and has been increasing at an annual rate of 2.2%. Average national consumption reached 14.3 million tons and has been increasing at a statistically significant annual rate of 3%. Results revealed that producers received subsidy representing 33% of their product's value, and that the implemented policy aimed at encouraging producers expand in wheat planted area to increase domestic production. The study also found that domestic value of inputs used in wheat production was less than the

international prices of corresponding inputs, and that wheat enjoyed governmental protection, which all indicate that the implemented production policy has been in favor of wheat producers, where the government pursued protection policies represented in increasing the value added per ton in farmgate price over the corresponding border price value. Distortions in domestic market prices of production and production inputs have also been eliminated after implementing economic liberalization policy. The study indicated that local production of wheat to cover domestic demand is preferred to importing the crop due to the continuous increase import cost, which proved higher than producing the crop domestically. The study attributed fluctuations in net losses over the study period to fluctuations in domestic prices of wheat and inputs use, which caused fluctuation in production costs. Results indicated increase in gains and reduction in losses in consumer surplus, which the study attributed to the decline in domestic prices of wheat, indicating inefficiency in consumption expenditure on wheat, decline in government revenue and thus decline in hard currency earnings over the study period. The study offered some recommendations including: continuing to pursue price policies that promote farmers expand wheat planted areas in order to raise self-sufficiency rate of this strategic crop such as early announcement of procurement prices, enhancing the role agricultural extension services play in improving farm operations and pest and insect control, in addition to immediate payment to farmers upon crop delivery, dissemination and distribution of high yielding varieties, and maintaining fair procurement prices to farmers. The study also recommended rationalizing consumption and consumption expenditure on wheat, revisiting wheat domestic prices and exerting efforts to achieve stability in price levels.

A study that assessed the impact of agricultural price policy on wheat production and consumption in Assiut governorate by (Isa et. al., 2012) divided the study period into three sub-periods; the first before applying economic liberalization policies (1980-1986), the second is the partial liberalization period (1987-1992) and the third is full liberalization period (1993-2010). Results revealed statistically significant changes estimated at 111.16, 80.64 and 71.11 thousand feddans for planted area; around 8.60, 14.75 and 14.9 ardabs for the yield per feddan; and around 969.65, 1204.40 and 379.56 thousand ardabs for total production of wheat for the three sub-periods, respectively, indicating higher levels of the study variables for each annual growth rate, which clarifies the impacts of economic liberalization on structural change in the study variables. Results also revealed statistically significant annual change in wheat planted area over the first sub-period, estimated at -3.33 thousand acres. The study also estimated nominal protection coefficient for wheat in fixed prices in Assiut, the results of which showed that wheat producers received 43%, 84% and 40% of the value their product is worth in international prices over the three study sub-periods, respectively. Finally, the study recommended that the government set minimum guarantee procurement prices close to international prices, in addition to announcing such prices early enough before planting season to help farmers make proper decisions, which might encourage farmers expand their wheat planted areas. Moreover, the study recommended revisiting producer taxes imposed under the implemented economic reform program in order to eliminate the negative impacts producers suffer, where higher taxes resulted in raising net economic loss wheat producers incur.

Another study by (Georgi and Hanna, 2013) investigated the impacts agricultural price policies have on some cereal crops in Egypt between two periods: (1977-1987) and (1998-2011), with the aim of identifying the variations between domestic and international prices of such crops and assess the impacts of the implemented polices by applying Policy Analysis Matrix. Results revealed statistically significant differences between wheat, maize and rice grown over the two study periods in terms of planted area, yield and total production, except for maize planted area. The study also found that planted area, yield and total production of all the study crops followed increasing trends over the two study periods, but the rates of increase during the second period proved less than the rates of increase over the first period. The study assessed the financial and economic values of production cost items and found that the financial assessment of labor wages outmatched the economic assessment of labor wages for all the study crops over the two study periods, which means that domestic labor wages are higher than international labor wages. By contrast, economic assessment of the cost of mechanical work outmatched the financial assessment over the two study periods. As for production inputs (seeds, chemical fertilizers, pesticides), economic assessment outmatched the financial assessment over the two study periods, indicating that production inputs are subsidized by the government. Turning to revenue per acre, economic assessment outmatched the financial assessment for the three study crops over the two study periods. On the other hand, results of PAM analysis revealed that subsidy to production inputs declined from 31%, 30% and 29% during the first period to 8%, 7% and 9%, during the second period. Results also revealed that producers' shares of the value of their products have been increasing; indicating positive incentives that contribute to curbing the differences between international and domestic prices, and help accelerate the wheel of economic development. The computed effective protection coefficient revealed reduction in implicit tax producers incurred during the two study periods, where it declined from 32% to 23% for wheat, from 37% to 27% for maize and from 52% to 34% for rice, respectively, indicating that full liberalization of farm land rent led to raising the value added for the study crops, and to reducing the difference between value added in local price and that in international price. The study revealed that Egypt enjoyed comparative advantages in wheat, maize and rice produced during the two study periods, where the computed values of the coefficient of comparative advantage reached 0.30, 0.31 and 0.23 for the mentioned crops during the first study period, respectively, and 0.41, 0.42 and 0.43 for the mentioned crops during the second study period respectively. The study recommended

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designing production policies that aim to raise the comparative advantage in wheat and maize production; and to enhance farmers expand wheat and maize planted areas by setting procurement prices close to international prices to guarantee rewarding net revenues to farmers, and pursuing early announcement of prices before the start of the planting season, in addition to designing policies that aim at: reducing direct and indirect taxes producers incur; subsidizing producers, especially where major import commodities are concerned in order to reduce net losses producers and consumers incur; and reducing the burdens producers incur to save hard currency.

According to study that applied Partial Equilibrium Model by (Sied, 2013) to assess the imposed value of implicit taxes, or the value of domestic subsidy for producers and consumers over the period 1995-2011 revealed that maize production and yield followed increasing trends estimated at 0.03 tons/acre and 79.38 thousand tons/acre, respectively, and that domestic consumption, gap between production and consumption, and farmgate price also followed increasing trends estimated at 289.42 thousand tons, 210 thousand tons respectively, at rates of change of 2.69%, 4.21% respectively. Results of applying Partial Equilibrium Model to real prices revealed average values for nominal protection coefficient and rate estimated at -0.59 and 0.41, respectively, indicating that maize producers received 41% of their product's value in international prices, and incurred 59% of implicit tax during the period 1995-2011. The study recommended designing agricultural price policy that guarantees closing the gap between domestic and international prices of maize to encourage farmers produce the crop, which helps save hard currency, in addition to guaranteeing subsidy and protection for domestic maize producers to reduce net economic loss in production. The study also recommended reduction of implicit tax imposed on producers in order to reduce economic losses, which leads to positive impacts on producer and national welfare.

The results of the agricultural policy analysis matrix that applied by (Abu-Rajab, 2013) indicated that the value of the nominal protection coefficient for output per feddan of the potatoes crop during the period 2000-2010 was less than the correct one. It also indicates that the local farm price per ton of potatoes was less than the border price. The existence of hidden taxes bear by producers of the potatoes crop in general, as indicated by the results of the matrix that the coefficient of nominal protection of the inputs traded for the potatoes crop was less than the correct one, which indicates that the cost of inputs at local prices less than its counterpart at the border, To be there The value of the coefficient of effective protection of potatoes crop was less than the correct one throughout the study period. This means that the value added of the potatoes crop at local prices was lower than that of world prices. There are hidden taxes bear by the producers of the crop. Relative to the potatoes crop is less than the correct one, which confirms the comparative advantage enjoyed by Egypt in the production of the crop as a result of lower cost of locally produced than the cost of importing from abroad.

A study that assessed the impacts of implementing policies on producer and consumer welfare by (El-Gundy, 2014), on the efficiency of input and outputs use and on national income, and the relationship between these variables and curbing the wheat gap revealed that the estimated multi-regression model and all the estimated regression parameters proved statistically significant, indicating defined trend line for each of the periods under study. Equations derived from the estimated model revealed that wheat planted area followed increasing trends, at annual rates of 19.52, 76.98 and 58.55 thousand acres, representing 1.48%, 3.8% and 2.17% of the average planted area at the level of each of the three study periods, respectively. In addition, wheat yields followed increasing trends, at annual rates of 0.016, 0.041 and 0.001 tons representing about 1.1%, 1.88% and 0.04% of the average yield per acre at the level of each of the three study periods, respectively, while total wheat production followed increasing trends, at annual rates of 81.68, 235.68 and 169.96 thousand tons representing 4.29%, 5.32% and 2.34% of the average wheat production at the level of each of the three study periods, respectively. Results also revealed that wheat planted areas, yields and total production quantities followed increasing trends during the study periods, however, the rate of increase recorded during the third period was lower than that recorded during the second period, which the study attributed to the sharp increase in production cost as a result of liberalizing the rental relationship between owners and tenants, which led to negative impacts on the rate of increase in the study variables during the third study period. The computed nominal protection coefficients for the study products reached 0.49, 0.76 and 1.13 for the three study periods, respectively. Such result revealed that producers incurred high taxes during the first study period given the fact that they did not receive real prices for their products, which in turn resulted in shrinks in planted area. This situation changed during the second period, where the government reduced taxes imposed on producer. After that, the government started offering subsidy to wheat farmers, which led to increasing farmgate price over the border price. At the level of consumer side, nominal protection coefficient over the three study periods reached 0.7, 1.16 and 1.56, respectively, indicating that the first period witnessed promoting consumer support policies, whereas the second and third periods witnessed gradual shifts in policies not in favor of consumers. The study recommended continuing to pursue economic liberalization policies given the positive impacts on the supply side, in addition to setting procurement prices close to the international prices of wheat. The study stressed the need to reorganize and develop the role of agricultural cooperatives in providing production inputs at appropriate prices to help wheat farmers overcome some of the negative impacts of implementing economic liberalization policies, such as the increasing cost of production, and the need to reformulate consumer support policies that led to irrational consumption of wheat.

According to study by, (Khamis, 2015) investigated price policy applied to some of the cereal crops grown in

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Egypt in the light of economic liberalization in order to identify the features of price policies applied to wheat, rice and maize and in the same time monitor the currently applied policies. She applied some of the models used to estimate the supply response of areas under the study crops so as to identify factors affecting planted areas. Results revealed that lagged farmgate price (two and three years) affects changes in current year planted area by 73.2%, while farmgate price of maize lagged three years affects changes in current year planted area by 77.8%; and farmgate price of rice lagged one, two and three years affects changes in current year planted area by 98%. The study applied Policy Analysis Matrix to calculate nominal and effective protection coefficients, and also applied partial equilibrium models. The study recommended devoting more attention to studying markets in general, and prices in particular, in addition to devoting great attention to developing the agricultural sector, reducing subsidies to production inputs, moving towards implementing indicative pricing policy to encourage producers grow the required crops, examine the negative impacts of cultivating rice due to excess water consumption, rationalizing food consumption patterns and redistribution of income.

Studying the economic impacts of price policies on rice production in Egypt by (El-Saeed and Mansour, 2017) revealed that rice planted area reached a maximum of 9.1 million acres in 2015 and a minimum of 7.1 million acres in 2010. Rice planted areas increased as of 2011 due to political instability after the 25th of January 2011. Findings revealed that rice exports reached a maximum of 1203 thousand tons in 2006 and its minimum in 2010. Exports share in production recorded a maximum of 8.17% in 2004 and a minimum of 8.3% in 2014.The study computed Egypt's comparative advantage in rice production by applying PAM to identify protection indicators (nominal and effective protection coefficients), and to identify comparative advantage indicators (domestic resource cost) at the country and governorate levels. Results revealed that the computed nominal protection coefficient reached a minimum of 0.32 in 2008 and a maximum of 0.83 in 2003, which means that it is less than unity, indicating that domestic rice prices are less than the international prices of rice, which means that rice producers incur implicit taxes. As for the computed effective protection coefficient reached a minimum of 0.29 and 0.24 in 2008 and 2009, respectively, and a maximum of 0.84 in 2001. The estimated value of domestic resource cost revealed that Egypt enjoys a comparative advantage in rice production, and that such advantage is higher in some governorates than others. Applying partial equilibrium model revealed that the implicit taxes producers incurred have been reflected in the form of implicit support to consumers, which led to higher consumer surplus on the account of producers. On the other hand, the country bears the burdens resulting from the net losses incurred by producers and consumers, which together form net losses incurred by the society. Results of computing the average revenue per cubic meter of water used in rice irrigation revealed that Dakahlia governorate ranked first in terms of comparative advantage and average return on Egyptian pound paid per cubic meter of irrigation water. The study offered some recommendations including: promoting expansion in rice planted areas in the governorates that enjoy higher comparative advantages in rice production and higher average revenue per cubic meter of irrigation water and cutting rice planted areas in the governorates that proved otherwise, especially under the current water scarcity conditions. The study also recommended increasing implicit taxes on rice producers in Egypt to boost the competitive ability of Egyptian rice in world markets, where it represents a source of hard currency earning for Egypt, in addition to exerting efforts to improve the production efficiency of rice and pursuing efforts to develop new varieties that consume less amounts of water to tackle the problems associated with the changing water condition in Egypt.

Studying the impacts of applying agricultural policies on rice and maize by (Mahmoud, 2018) revealed that rice planted area reached 1.22 million acres representing 22.8% of the total summer planted area, estimated at 5.36 million acres in 2015; whereas maize planted area reached 2.26 million acres representing 65% of the total summer planted area, estimated at 5.36 million acres in 2015. In the framework of limited water resources, Egypt's agricultural policy targeted reducing rice planted area, which called for conducting a study to measure the impacts such policy has on rice and maize as two competing crops during the summer season. The research applied partial equilibrium model to rice and maize production and consumption over the two periods 2010-2012 and 2013-2015, and applied descriptive and quantitative methods to secondary data published by the Central Administration of Agricultural Economics and Food and Agriculture Organization of the United Nations (FAO) for the period 2003-2015. The research concluded that the policy of reducing rice planted area has not been accepted by farmers, where indicators attained from applying partial equilibrium model returned negative values. Nominal protection coefficient for consumption amounted to 0.54, indicating that the implemented policy had negative impact on consumers, where the estimated elasticity of demand amounted to 0.016, nearly zero, indicating no response from consumers' side to change in rice price, which means that rice is a necessary commodity which consumers cannot reduce the quantities consumed of. In addition, increasing the quantities supplied of rice led to reduced price, where the estimated elasticity of supply amounted to 1.32, indicating that producers did not abide to the announced policy. Also, average maize planted area increased from 1.97 million acres during the first study period to 2.19 million acres during the second study period, up by 11.34%, which resulted in increasing domestic production by 1.28 million tons and reducing imports to 802 thousand tons during the second study period, down by 12.4% compared to average imports during the second first period, resulting in reduced deficit in the balance of trade in maize. On the other hand, it can be stated that, in case farmers implemented the issued governmental policy, part of the water resources would have been saved, but violating the issued policy resulted in planting extra 73.65 thousand acres of rice, an extra area

which if planted with maize would save some 170 million cubic meters of water to be used in other cultivations, or in horizontal expansion.

X. OTHER PUBLIC POLICIES WITH IMPACT ON AGRICULTURE IN EGYPT

A. Food Subsidy System

Egyptian food subsidy system was a driver of significant interventions in the agricultural sector. As part of the socialist policy adopted by the Nasser regime, the food subsidy program was expanded in the 1950s and 1960s to provide basic commodities at subsidized prices to all Egyptians (Kassim et al, 2018).

A universal subsidy of baladi bread was the cornerstone of the subsidy system. Until recently, government had directly intervened at every level of bread production from wheat procurement to flour milling to bakery production so as to maintain production quotas at the subsidized price. There was a high rate of leakage in the system as economic incentives were misaligned. In consequence, government was forced to procure more wheat than would have been demanded even at the subsidized price (Kassim et al, 2018).

The number of subsidized commodities increased gradually until the early 1970s, reaching 18 food items (Cassing et al., 2009; Ecker et al., 2016). After an unsuccessful attempt to remove the subsidies in 1977 was met with riots, in the 1980s and 1990s, the government gradually reduced food subsidies in order to ease the growing fiscal burden of the subsidy bill (Löfgren and El-Said, 2001). A few foods items, such as meat, chicken, and fish, were removed from the subsidy system between 1990 and 1992. Government also increased the prices of the remaining subsidized food items incrementally (Abdalla and Al-Shawarby, 2018). However, this trend was reversed in the 2000s, as government attempted to contain public discontent about high inflation and high food prices, in particular, by providing subsides on more food items, such as beans and lentils, and increasing the quantities consumers received of some rationed goods, such as rice, sugar, and cooking oil (Ecker et al., 2016).

During the global food price crisis in 2008, Egypt solved the problem of food delivery and delivery in two ways. First, the Egyptian army assigned its personnel to mass production of bread (Ghoneim,2012). Second, subsidized bread sales were no longer reserved for the bakeries where they were produced. (Ghoneim,2012; Coelli,2010). Distribution locations, operated by local states, have been created to manage food sales, with home-based housing services introduced in some areas. The World Bank (2010) estimated that about 60 percent of subsidized bread sales happen through these outlets.

As a result of the economic contraction in the aftermath of the 2011 revolution, food subsidy costs represented 25 percent of total public expenditure and about 8 percent of GDP between the years 2011/2012 and 2013/2014 (Abdalla and Al-Shawarby,2018). In addition to the high cost of food subsidies, the system was perceived to be poorly targeted, with 88 percent of Egyptian households having access to a ration card allowing purchases of food at subsidized prices. Starting from 2014, the government introduced comprehensive reforms to the food subsidy system with the aim of increasing efficiency, minimizing leakages, and improving targeting.

The baladi bread subsidy became limited to ration card holders and shifted to a direct subsidy of production costs for bakeries, rather than supplying bakeries with quotas of subsidized flour. Advantages of this new system included interrupting leakages of subsidized flour to the black market and incentivizing bakeries to improve the quality of subsidized bread rather than attempting to minimize the use of flour. In addition, instead of only fixing a limit per capita on how many loaves of bread can be purchased at the subsidized price, the new system allows beneficiaries to substitute other commodities for baladi bread. For every loaf of bread less than the maximum used by the beneficiary per month, EGP 0.10 are transferred to the smart ration card, which can then be used to purchase other commodities under the ration card system (Abdalla and Al-Shawarby,2018). In 2017, the sale price for baladi bread was EGP 0.05, or less than one tenth of production cost, so the opportunity cost introduced by this reform is expected to reduce household bread consumption and waste.

In parallel, the new system expanded the basket of subsidized goods to include more food items, such as pasta, lentils, milk, and frozen beef, as well as non-food items, such as soap (Ecker et al.,2016). Beneficiaries must contribute an out-of-pocket cash co-payment in addition to the amount that is deducted from their smart ration card. On average, the out-of-pocket co-payment ranges from 5 to 10 percent of the card deduction amount for all commodities. The price of subsidized commodities, i.e., the amount deducted from the ration card plus the cash co-payment, is fixed at below market prices, while government pays for the difference between the subsidized price and the market price from the fiscal budget. The monthly allowance for each person registered on the ration card increased from 21 to 50 EGP in June 2017, and is expected to increase further to compensate for increases in prices following the energy subsidy cuts introduced in June 2018. The reform program also includes a national project to upgrade wheat storage facilities to further reduce leakage of domestic wheat. Consequently, about 40 percent of the open-land barns have been upgraded with proper ventilation and improved storage capacity. Additional silos have also been built to increase the government's storage capacity of wheat (Abdalla and Al-Shawarby,2018).

B. Land Rent and Tenure

As part of an agrarian reform effort, a law was promulgated in 1952 ,1961 Law and 1969 which was important for the distribution of feudal land. According to these laws, the amount of land an individual could own. The amount of land an individual could own; starting at

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200 feddan, then falling to 100 feddan, and settling at 50 feddan per individual and 100 feddan per nuclear family. Before 1952, 65 percent of arable land was owned by only 5.7 percent of the population (Ibrahim and Ibrahim, 2003). Between 1951 and 1970, about 12.5 percent of all arable land (87,000 feddan) was sold at below market prices to 342,000 farmers, predominantly in plots of less than five feddan.

The laws also made the rights of tenants more robust against landlords. Cancelling of land leases became easier, and tenants had the right to pre-emption in cases where landlords wanted to sell their lands. (This was done, in part, to reduce the prevalence of absentee landowners.) The laws have exacerbated the fragmentation of agricultural landholdings in the country. This arose due both to increased sales of land to smallholders and to Islamic inheritance partitioning. Egypt's plethora of smallholders originates from this (Kassim et al, 2018). The average landholding is now between 0.8 and 0.9 feddan (Ibrahim and Ibrahim, 2003; Sims, 2015).

In 1992, government raised rents for land more than threefold, which impacted smallholders' ability to pay their annual per feddan rent. With the New Land Reform Law of 1997, landowners were further able to evict current tenants and rent the land to new tenants at the higher rental rates set in 1992 (Ibrahim and Ibrahim, 2003; Adriansen,2009). About one million tenants lost their land, as a result, becoming sharecroppers instead. They came to be known as El Mutadarerin ("The Affected") which later land reclamation initiatives would attempt to compensate (Sims 2015). Today, an annual change of tenants on rented agricultural land is not uncommon, which could have adverse effects on soil quality.

C. Land Reclamation

As Egypt suffered from a water shortage, its political vision shifted from land adjacent to the river to desert farmland. The presence of groundwater in the desert made this a possibility. As a result, land in Egypt is described in two separate categories; Old Lands and New Lands, as discussed earlier in the section on water and irrigation policy.

Land reclamation involves several stages, including land surveying, clearing and rclearing of soils, classification and classification of land, preparation and installation of wastewater and water infrastructure. waste. Irrigation and apply soil remedies as needed. The planting phase is then followed by other soil treatments, product selection and selection of axes, as well as fertilizers and pesticides. On a policy-level, land reclamation involves another sequence of phases, including planning, transition, economic and social development, handing over, and incorporation (Adriansen,2009).

Efforts to expand outwards from the Nile Delta and Valley have been in place since the early 1900s. However, the period beginning in the 1970s, following the completion of the Aswan High Dam, is notable for a series of government desert development megaprojects. Megaprojects are large-scale, with broad visions (usually accompanied with political dimensions), multiple objectives, and extremely high costs. Their impact is often large enough to be irreversible. Today, between one quarter to one-third of cultivated lands are classified as New Lands by the Ministry of Agriculture and Land Reclamation[4]. In addition, MALR estimated that one million feddan had been reclaimed informally by 2010 by peasants expanding into the desert on the edges of cultivated area (Sims, 2015).

The General Authority for Reclamation Projects and Agricultural Development (GARPAD) was created in 1975 to manage the entirety of the land reclamation process. According to Sims (2015:7879), this includes identification of areas to be reclaimed and their "planning, subdivision, provision with infrastructure, pricing, allocation and post-award monitoring and policing". GARPAD also oversees the auction process through which these lands can be sold. In 1987, the Mubarak Youth Program allowed college graduates and landless peasants to respond to newspaper announcements by GARPAD. If they met a certain set of criteria, beneficiaries would be awarded small parcels of land in any of the newly reclaimed Western Desert oases watered solely by groundwater. No Nile water reaches this desert. In many areas, 5 feddan plots of land were awarded to university graduates, while 2.5 feddan plots were allocated to landless farmers. Until the Investment Law of 2002, settlers neither held the titles to their lands nor were they allowed to sell or lease them out until full repayment to the government had been achieved, usually over a 30-year period. The law also reversed a prohibition on the early settlement of this payment (Bush, 2007).

Other notable megaprojects in which the government engaged include the El-salam Canal and the Toshka project. The El-salam Canal project sought to find a way to innovatively provide irrigation water to North Sinai. The project planned to divert 4.45 billion cubic meters of water from Lake Manzala from the Nile's Damietta branch into North Sinai for the reclamation of 400,000 feddan and the settlement of 3 million people. It was announced by President Sadat in 1976. The canal would mix freshwater with Nile Delta drainage water and transport it to the Sinai via a siphon that passes under the Suez Canal (constructed between 1995 and 1997). Land was offered for sale to investors by GARPAD starting in 1996. By 2002, the project was announced to be fully operational. As a megaproject, El-salam Canal had the objectives of reducing loss of Nile water into the Mediterranean and increasing agricultural production by settling people into North Sinai, thus reducing overcrowding and unemployment in the Nile valley (Sims, 2015; Tutwiler, 2010; Nile Water Lab; Hafez, 2005).

The Toshka project, which began in 1997, had the objective of creating a "new delta" in the Western Desert. It sought to reclaim and develop 540,000 feddan of new farmland that would be used to produce fruits and vegetables for export to Europe. The project would pump

[4] Calculation based on data provided by MALR 2015 and 2016.

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water out of the Toshka Lakes and Lake Nasser, the reservoir for the Aswan High Dam, via the Mubarak Pumping Station's 24 pumps, which opened in 2005. The water would be transported up the 50 km length of the Sheikh Zayed Canal, which opened in 2002, before diverting it into various areas in the Western Desert (Tutwiler, 2010). The project was to rely on private sector investor financing. The Kingdom Agricultural Development Company (KADCO), Al-Dahra, and Sheikh Zayed Al-Nahyan were all Arab Gulf stakeholders that invested in the project along with the Egyptian Armed Forces Engineering Company. The development of the Toshka project however was hindered by high levels of water seepage, which could potentially cause groundwater contamination, as well as high levels of soil salinity due to evapotranspiration. The project, therefore, has yet to reach its goals.

Additional megaprojects include the moderately successful South Tahrir Province project, which started in 1958, and the East Oweinat project, which now successfully includes 115,000 feddan of cultivated land (Sims, 2015). Dr. Farouk El-baz's Desert Development Corridor is a megaproject discussed across several decades, although it so far has not been operationalized. More recently, planning is underway for the 1.5 Million Feddan project, which was announced in 2015, and the New Capital project, which is now under construction.

Overall land reclamation projects have both widespread support and face significant challenges. While privatization and liberalization policies appear to have substantially improved the economic performance of agriculture in the New Lands, the technical performance of agriculture in these lands would improve with continual cultivation and a technically sound approach to long-term improvements (Tutwiler, 2010). Government, in the late 2000s, was active in its pursuit of a policy of selling desert land to raise revenues and encourage private investment in land reclamation. There has been and continues to be significant efforts in support of agriculture in the New Lands.

Critics of land reclamation projects question whether the funds invested in these projects could have been better spent on agricultural improvements in the Old Lands. Environmental issues caused by land reclamation projects have also been a point of discussion. These problems include short or long-term groundwater contamination, groundwater depletion, and water quality loss. Additional questions circle around whether there is enough water in Egypt to sustain the New Lands and any further expansion into the desert, as well as how agricultural development in the desert may impact other regions.

D. Trade Policy

Despite Egypt's agricultural trade deficit, which has been growing since 1974, there is potential for increasing exports of high value crops in order to increase export revenues (Tellioglu and Konandreas,2017b). The Egyptian government is one of the major global importers of wheat. In general, Egypt is a net importer of cereals and pulses, with a widening gap between domestic production and consumption since 2008. On the other hand, production exceeds consumption for fruits and starchy roots. Indeed, fresh fruits, e.g., oranges and grapes, and vegetables, e.g., potatoes and onions, have recently been the major sources of agriculture export revenues for Egypt. The value of agricultural export revenues has been increasing over the past decade. Noticeably, the value of agricultural exports as a share of the value of agriculture imports shows an upward trend, which implies an increase in export revenues relative to the costs of imported agriculture products (Figure 1) (Kassim et al, 2018).

Fig 1:- Trends in value of Egypt's agricultural exports and imports, 1990 to 2016
Source: Authors' calculations based on FAOSTAT 2017

The agricultural trade policy of the Egyptian government focuses on increasing production, and hence self-sufficiency, of crops that have high domestic consumption. For instance, the Agricultural Development Strategy 2030 sets self-sufficiency targets for wheat and maize of 81 percent and 92 percent, respectively (MALR, 2009). This policy has been criticized for not considering the economic value of scarce resources, such as land and water. The opportunity cost of growing cereals is

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considerable when compared to fruits and vegetables that have relatively high economic returns.

Land reclamation initiatives are gradually shifting government policy towards promoting the cultivation of exportable high value crops on reclaimed lands (Sims, 2015). The fact that production on reclaimed land is characterized by relatively low productivity and high production costs implies that only high value crops would provide farmers with economic incentives to move to and produce on these lands. The government of Egypt also promotes exports through the establishment of trade zones, especially around major ports such as Alexandria, Suez, and Port Said. Moreover, in 2002 a new export promotion law was adopted, setting the stage for the establishment of an Export Development Fund and the introduction of an export subsidy program under the supervision of the Ministry of Trade, Industry and SMEs (General Authority for Investment and Free Zones 2002; N Gage Consulting 2015). Agricultural and agri-food products qualify for an export subsidy in the range of one to ten percent, which is financed by the Export Development Fund. The Fund generates part of its budget from import fees.

The main challenges for increasing agricultural exports are quality considerations, particularly pesticide damage and residues that disqualify Egyptian exports from meeting sanitary and phytosanitary requirements of trading partners, especially in the European Union. High humidity during storage and transportation also affect the quality of agricultural products, especially in Upper Egypt due to lack of cold storage infrastructure (USAID, 2017). In addition, non-value adding intermediaries that connect farmers to exporters add a price margin in the range of 25 to 40 percent, decreasing the cost advantage of Egyptian exports and reducing farmers revenues (Tellioglu and Konandreas,2017b).

Processed agri-food exports have a high potential in Egypt. The share of processed agri-food products in agricultural exports has increased from 46 percent in 2002 to 53 percent in 2014 (Tellioglu and Konandreas,2017b). However, this figure includes items that are primarily processed without much value addition, such as frozen and prepared fruits and vegetables. Excluding these semi-processed items, Egypt's processed agri-food exports would represent only 31 percent of agri-food exports in 2014.

The quality and safety of agri-food products is being given increasing attention by the Egyptian government. In January 2017, the National Food Safety Authority (NFSA) was established with the aim of adhering to "the highest standards of food safety and hygiene" (Mansour, 2017). The procedures and conditions set by NFSA apply to food produced and processed for both the local and the export markets. In addition, government controls the quality of agricultural imports and exports through regular inspections by the Central Administration of Plant Quarantine (Central Administration of Plant Quarantine, 2015).

XI. THE MAIN RECOMMENDATIONS THAT SHOULD BE APPLIED IN THE FUTURE:

- Continue to implementing food subsidy policy and reforming the implemented price policy at the sectoral and national levels.
- Multiplicity of entities formulating price policies and lack of coordination between them resulted in negative impacts on farmers' income. In addition, Under-pricing of major cereal crops represented the main factor influencing quantities produced from such crops.
- Setting appropriate procurement prices for agricultural crops at some point in time must be revisited periodically based on: evolutions in the production costs of producing such crops, yield, profitability of competing crops, evolutions in international prices, and comparing domestic to world demand for such crops.
- Improve the state of food security depending on domestic production through improving self-sufficiency rate in food commodities.
- Self-sufficiency rate in wheat, wheat flour and maize can be raised by reducing losses along the chain, in addition to devoting attention to some other factors.
- Should analyze actual production costs, its change over time, and compare them with other criteria when determining farmgate prices.
- It is important to study the international prices of crops periodically to use them as guides when setting the prices of export and import crops, which helps in promoting exports and reducing imports.
- It is important to link price policy to non-price policies and procedures in order to realize successful implementation of the designed price policy.
- Establishing a high institution responsible for prices that comprises all bodies responsible for agricultural price policies in Egypt, with the participation of representatives of producers and consumers, which aims to propose and follow up agricultural prices in the light of economic interdependencies between multiple sectors and commodities in order to realize the maximum possible of national economic and social goals.
- Establishing an Agricultural Policy Information Center that comprises an integrated field information unit and a unit for technical aspects related to the implementation agricultural policy.
- Must calculate the difference between both nominal and effective protection coefficients and change in producer surplus to use them as guides when formulating price policies.
- Linking agricultural price policies in the production side to that in the consumption side to achieve coordination between the two.

XII. CONCLUSION

This study sheds light on the agricultural policy in Egypt by evaluating the performance of government policies in the farm sector. The study included a theoretical framework for agricultural policy to understanding the nature of such a plan and determining its relationship with other economic systems. The government has regularly

shifted from full control towards more considerable liberalization through increased involvement of private firms. Historic attention on self-sufficiency in main crops has led to the implementation of interlinked policies of grain procurement and food subsidies, while a series of reforms – as well moving mostly in the direction of liberalization – has sought to address unintended consequences of those policies. Land inheritance practices and tenure laws mean that the average size of agricultural landholdings is low. This has motivated strategies to prioritize landless farmers and smallholders in state-sponsored land reclamation projects. Besides, the investment in extension and research and growth for traditional harvests has fallen, while recent reforms emphasize the restructuring of the agrarian sector towards exports and high-value crops, for example, by increasing access to credit and linking farmers to export marketplaces.

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