

*Arab Food Security and Agricultural Development Policies
Experiences of Iraq and Algeria*

Nawfal Kasim Ali Shahwan, University of Mosul, Iraq

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Abstract

This study aims to identify the key elements of the Arab food security gap, and analyses the indicators of treatment, which repeatedly re-focus on agricultural development and related policies. The current focus in the development of Arab agricultural capacity is on experience of Iraq and Algeria being of resource-rich economies and poor in food production. The Arab region is suffering decades of serious food dependency and rely on a deepening imports despite the abundance of material, financial and water resources, needed to achieve self-sufficiency. It assumes that the problem is institutional rather than real development and suggests scurrying to address the root of the problem on the relationships that can be estimated from a mathematical model for investment in technological sectors for quench, irrigation, and mass production and in the use of agricultural land.

Keywords: Arab Food Security, Arab Food Gap, Agricultural Development Policies

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Introduction

The purposes of the study is to set a contribution into a deterministic policies in the Arab agricultural development. Arab economies had occupied detectable levels of low agricultural productivity and performance for ten years ago, compared with AGRO global averages, as the 1st report on Arab Human Development 2002 (UNDP 2003). The Arab region remained with the largest food deficit in the world along the last decade (Solh et al 2017). The only region organized with lower level, beyond the sub-Saharan Africa' countries. The global food markets do not bode well (Lin 2012). An increasing dependency on food imports by the Arab countries has been continued for decades.

A growing phenomenon has deeply contributed in Arab food insecurity, led to political insecurity, besides risks on society and future. Less than one third of the Arab agricultural lands, counts about 160 million hectares are neglected and unused. In both, Algeria and Iraq it amount a half of the total national land. The agricultural sector contributes about 10% of GDP, and uses 25% of the whole local workforce (Kubursi 2012; Turrall and Marc 2011).

There are abundant local resources, but a serious and unfortunately increasing reliance on the imports. The question is where does the problem potent? Is it in: the agricultural land property? Inside the water sector? On the finance aspect? The regulation of the market? The awareness of the agricultural knowledge? Basic type of the scientific R&D? Or in the rural development?

This work aims at analysing the main factors of “the Arab food gap and drop of the most important indicators of agricultural development with the policies to be adopted, focusing on the Iraqi and Algerian experiments, resource-rich economies, suffering and, intimately seeking development and Growth”.

On problematic core the study considers the availability of financial resources, i.e. it hypothesise that ‘the problem is an institutional, scientific, and systematic one more than a real developmental, in nature’. In this case it is convenient to suggest the possibility of providing support and cooperation to other economies as an experiment, not to resolve it as a chronic problem in some difficult of nature.

Nature of the problem: food gap in the Arab countries has been evaluated and amounted \$12 billion in 2000 (AMF 2000). The continued increase in demand for food commodities and the decline in growth in agricultural production have contributed to the continued widening of the food gap to about \$ 33.8 billion by 2015, while about 71.2% of the total value of the gap is in cereals (AMF 2017). Population were account 260 million in 2000, grew to 310 million (AL Sharhan 2010), and to about 370 million people in 2018.

Numbers of hunders have doubled ten years later. These countries include large numbers of hungry people in the word, and also doubled from 16.5 million in

1990 to 33 million in 2016 (FAO 2015). The situation has become a massive concern and begun worsen since the mid-nineties of the past century (AMF 2001).

In order to fill the food gap it is supposed that the Arab agricultural output for 2010 to amount twice of the value for 2001, and double in 2020, plus the needs of fifty million people of population growth, that equivalent to $(260 \times 2 + 50 = 570)$ five million dollars. Fit for Iraq, specifically at Nineveh Governorate, which has been called the breadbasket of Iraq (a second larger district of population beyond Baghdad). The food gap where up to 75-80% of the overall needs of the Iraqi population, in a relative sense (Ould Abdel Dayem 2003).

The same think fits for other Arab economies, i.e. for Syria, Algeria, Sudan, Yemen etc. The situation for Egypt, most pressing. One of the dramatic factors the Arab economies face in the era of globalization. The problem is not new stretch; it is of ten years ago (Houari 2007). The problem still of adverse effects when developed countries asked developing ones to drop their support to the agricultural sector, while they inturn didn't commit with. It is expected to have negative impacts, will be doubled more and more for the Arab countries in case the developed countries reduce their supports to the agricultural products (Ali 2007). It may benefit from the higher world prices and transition to cover the entire food needs locally, by encouraging the Arab agricultural investments. The Algeria's economic growth is still driven by the growth of hydrocarbon revenues.

Elements of Food Gap

Iraq, as an agricultural country, the rainwater land basically depends on rainfall in North. However, the situation has become critic more and more. Mostly locates in Nineveh Province in major, ideals of the Levant, i.e. Syria. Basing on the rates of the annual rainfall as it has classified: high rainfall; almost guaranteed rained; limited rainfall; and natural pastures areas, as shown in (map 1).

More than two thirds of the agricultural areas of Nineveh compound of limited rainfall areas and natural pastures. It doesn't conducive to ensure a sustainability capacity of agricultural output, between latitudes 36 and 37 only. In this case it has to rely on the supplementary irrigation techniques in the east and south Island draft irrigation. Although the area of Nineveh constitutes about 10% of the total area of Iraq it provides 70% of the total output of wheat in Iraq.

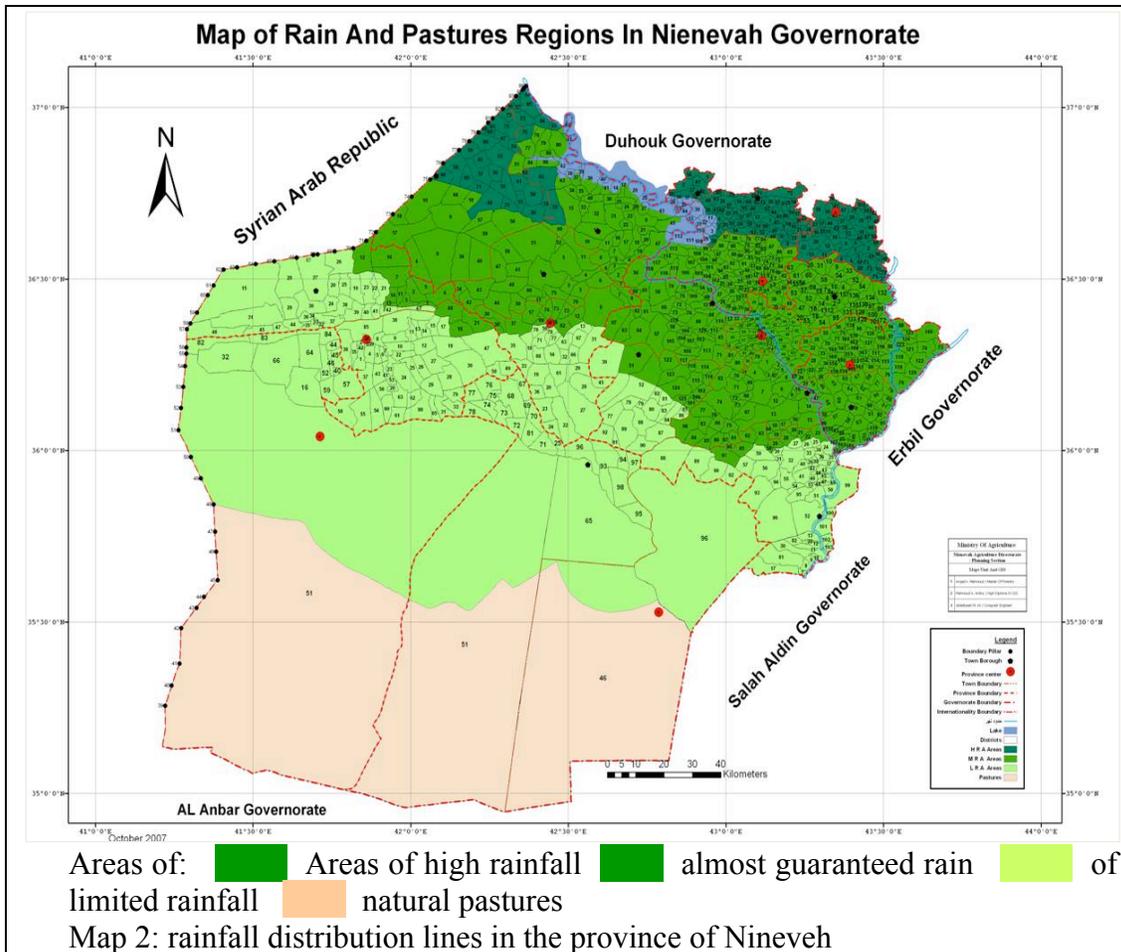


Map 1: Iraq Agriculture Map

For the overall Arab countries, the total area occupies more than 1400 million hectares (14 million square kilometres) equivalent to 10% of land area in the world, the estimated area of the agricultural land is about 26% of the total, while the exploited area does not exceed one third of that rate. The ratio is half in Algeria and Iraq, for instance at best, and it is a noticeable essential restricting factor.

In 2000 the Arab cultivated area was 70 out of 197 million hectares, and roughly remained eighteen years later. That's about one-third and this issue is one of the most diagnosed causes of food shortages that's non-farmed land to be used as required, as well as the prevailing reality of exploitation of cultivated land.

What was a reform in the fifties and sixties of the last century, now become in need for reform steps totally in the opposite direction, just on new basis, to be built on the state's strategy in constructing modern agricultural sector with sophisticated technology and a balance of urban and rural growth. It requires encouragng the reform and distribution of agricultural land to large farmers, those peasants who are really adopt *Mass Production*. With them is the hope



Maghreb countries, i.e. Libya, Tunisia, Algeria, Morocco and Mauritania capturing one fifth of the available surface resources water, in front of more than one third for the Middle East district for Syria, Iraq, Lebanon, Jordan and Palestine, and the Mediterranean Territory: Egypt, Sudan, Djibouti and Somalia. The remaining is up to 5% of the territory of the Arab semi-island. There is a relative scarcity of water in Algeria as well as the rest of the Maghreb countries and a lack of use in Iraq while the scarcity of strong in Jordan, Kuwait, Saudi Arabia. This sector alone, consumes 87% of available water resources in the relative scarcity in the world, letting the rest for the industrial use, residential, service and others uses, while still less than 10% of the total Arab population working in.

Arab food gap has quantitatively determined by the proportional difference between what is really produced and the overall need, e.g. the self-sufficiency sealing, which cover the society needs. Its dimensions are: 50% for cereals, especially wheat, worth six billion dollars, and a same ratio -and value- of oil about two-thirds of requirement of sugar, 1999 figure (AMF 2001).

There are: (1) a relatively high rate of population growth, which a given exogenous variable being dealt with, as a reality for granted; (2) the relative

improvement in the overall levels of incomes, by developments of contemporary life and water consumption style, besides, the nature of nutrition in the Arab region; and (3) a high extensively rate of consuming cereals, sugar and oils. These three aspects -demography, incomes, and the evolution of tastes- are external variables for the demand elasticity for food, and therefore cannot be considered an influential source for use in the economic policies to some extent.

The low levels of the Arab agricultural production for the three strategic goods I.e. cereals, oils and sugars, can be seen to two factors, (I): the lack of production volume; and (II): the deterioration of agricultural productivity. The first is due to a lower contribution of cultivated land and to actual production techniques followed. The second is due to the non-correct large dependence on rain-fed agriculture associated with climate change and the absent expansion of novelist -of gravity-agriculture to achieve levels of necessary production to reduce the food gap. A trial step for model building and assessment will be later in section 5.

Agricultural Experience of Iraq

Demonstrating the likelihood of self-reliance for each Arab economy instead of joint teamwork, can stand at the Iraqi situation in a time of economic blockade, where required self-reliance on local agriculture coverage of the needs from basic food crops. It has achieved highest rates of self-sufficiency in cereals, oils and re-cultivation of beet and sugar production besides operating plants associated with this crop as producing yeasts, which was parked off work for years. In Al Najaf Province, at the mid and south of the Iraqi land, the farming of 'Unber' Rice was famous production in the past decades, until the nineties of the twenty century. But now there is nothing, but the imported types (Figure 1). Throughout that decade efforts were also doing well in the other agricultural programs. Those were being stimulated the growth of the agricultural sector and of productivity, in spite of the continuing low proportion of the people working in agriculture.

Agricultural efficiency recorded metrics numbers, evolved Iraq in 1980, 1989, 2000 from (0.15) to (0.62), and to (2.54). It is despite low agricultural labour proportion of total employment from 30.44% to 21.92%. Then decreased to 12.61% respectively. Note that these numbers have been recorded while the Arab agricultural rates of efficiency being estimated at (0.55). The reason beyond the Iraqi numbers was the increasing contribution of agricultural output in GDP from 5.69% to 13.71%, and to 32.1% respectively as well (Na'osh 2004). "Per capita share of the Iraqi agricultural GDP equalized more than four times of Tunisian and Syrian, and eight times for Moroccan, while the three mentioned countries were not experiencing lack of nutrition like Iraq. Never the less, they were respectively occupied the three first ranks in Arab agricultural exports" (Na'osh 2004). Arabs could not assist Iraq in those circumstances, while many economists considered it as an economic miracle. Causes suggested due to the use of modern scientific techniques and appropriate materials for production stages as well as improving the agricultural work productivity, in the light of limited financial resources at that time. One of main Iraqi products was 'Unber' rice.



Figure No. 1: 'Unber' Rice farming

Note: Was produced in the past decades in mid the of Iraq land, Al Najaf Province

The experiment remembers with the Saudi experience in achieving self-sufficiency in cereals production, especially wheat. It clearly demonstrates the potential to bridge the AFS gap despite the large support by government that provided to fertilizer and the incentive prices for crops, not to make them compete global production but enough to solve the dilemma and overcome the gap, under the Arab will to abroad (Ould Abdel Dayem 2003).

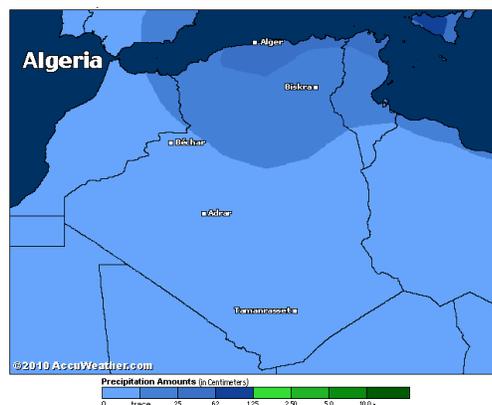
Agricultural Experience of Algeria

Development Reports call for a renewed focus on agriculture that to increase investments in agriculture for transition economies to a market system, stresses a great importance in improving welfare and reducing the numbers of millions of poor people living in rural areas (World Bank 2008). At the same time warns that the reduction of their numbers by the year 2015 cannot be met unless it is overridden low investments in agriculture and rural areas infrastructures during the next two decades.

According to conditions of poverty in Algeria, specifically the proportion of people living on less than one dollar per day, about 2% of the population counted 25.3 million in 1990. They were almost representing 506 thousand people. The third millennium goals has identified the need to reduce the ratio of poor to half by 2015 in general, which will lift 253 thousand people plus, 160 thousand more, representing half of the resulting increase from population growth at the end of 2006 of \$ 8 million. What is needed today is to reduce poverty from 0.8 to 0.4 million people.

In late 2006 Algerian population exceeded 33 million, with Gross National Income exceeding a hundred billion dollars, while Gross Domestic Product had recorded about 114.7 billion dollars, growing at a rate of 3%, lower than the rate for a year before, at (5.3%), despite the decline in the inflation rate from 15.6% to 9.1%.

The agricultural land percentage didn't exceed 17% of the total Algerian area - compared with 26% for Iraq- and \$ 2.4 million km², (See Map 2). But the contribution of agriculture, represented by the value added to GDP, 8.5% for 2005. For comparison, the Arab agricultural output was 6.4%, compared with 61.5% for industry and 30.1% for the services sector. Agricultural efficiency in Algeria Amounted, 0.37 which is equals 8.5/23, according to the definition been explained previously, and the coupling of 1.13 for Iraq (= -8.9/7.9) for the same year, 2005. This, necessarily requires doubling the contribution of the agricultural sector more than twice at least. This increase can be achieved to intensify the using modern and introducing advanced technology in agriculture as long as Algeria, as well as Morocco and Egypt spending between 20% through 30% of their budgets on the water (World Bank 2011).

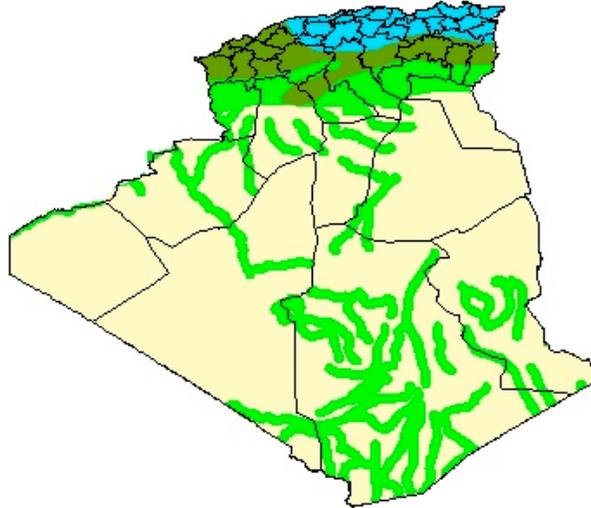


Map 3: Rainfall distribution lines in Algeria

Source: <http://www.accuweather.com/en-us/dz/blida/hammam-melouane/precipitation-amount.aspx>

For as long as weak public sectors associated with the weak departments there, therefore the balance don't tend to the interests of efficiency for the private sector than do for other developing societies. The development of domestic agricultural market in each Arab country requires recreating the way for private sector participation to impose export to the world markets with stages of self-sufficiency.

The current conduction considers that expansion of public agricultural sector to be limit on development of government investment in infrastructure and irrigation, fertilizers, agricultural machines, land reclamation and expansion, as well as its role in the reforms and appropriate transformations that represent the foundations of: agriculture investment climate, development of local and international private competitiveness.



Map 4: Farming System Area (Sq Km) Largely Uninhabited

Source:

<http://www.fao.org/countryprofiles/index.asp?lang=en&iso3=DZA&subj=4>

In oil countries, such as Iraq, Algeria and Libya, there is a need to establish a stock exchange, especially for grain, and the raising of product markets of crops, agricultural infrastructure, particularly grains and oils, produced by the private agricultural sector on grounds of technical sophisticated communications, and offer incentive prices for farmers in front of the received amounts above the level of world prices.

There is a great need to raise the sailings of individual ownership of agricultural land, rehabilitation and reform agricultural production on the basis of mass production which to be controlled by systems of tax revenues and adapted to the realities of each Arab country (Al Amin 2010).

Table 1: Index of Per Capita agriculture production in most Arab Countries and Turkey

COUNTRIES	1994-1996	1999-2001	2003	2004	2005	2006	2007
Algeria	99	100	119	128	127	130	122
Bahrain	101	100	114	107	110	105	101
Comoros	104	100	96	94	86	87	88
Egypt	89	100	104	106	105	107	101
Iraq	112	100	89	88	96	98	81
Jordan	120	100	111	119	124	121	109
Kuwait	74	100	108	113	100	103	101
Lebanon	123	100	95	102	96	96	95
Libyan A. J.	100	100	99	94	94	89	88
Mauritania	103	100	98	97	98	95	93
Morocco	105	100	125	126	117	136	110
Oman	77	100	83	100	113	99	99
Qatar	115	100	75	80	52	47	56
Saudi Arabia	101	100	108	121	103	98	96
Sudan	95	100	109	104	105	111	107
Syrian A. R.	98	100	105	108	104	113	98
Tunisia	92	100	125	106	111	108	108
Turkey	100	100	99	98	103	102	92
UAE	51	100	44	47	45	41	40
Yemen	92	100	104	102	101	104	105

Source: FAO Statistical Yearbook2009.

Simple Model for Food Security Policy

More efficient land uses and better consuming for surface & groundwater's as well as the adoption of advanced agricultural technology-you-go (for the agricultural equipment, pesticides and natural organic) are the real concern of urgent agricultural policies.

Consequently, Arab agricultural production, must meets the self-sufficiency and eliminates chronic and worsening food gap in an opened word markets. The production is a function of the needy to: doubling the already exploited agricultural land; upgrading irrigation agricultural techniques; and catching up all fields of agricultural technology, serving mass production. This relationship can be expressed as follows with a mathematic module.

$$Y = f(L, S, W, T)$$

As: Y: Agriculture Production, L: labour, S: Land space, use, W: Water usage, T: Embodied Technology.

It has suggested that production value is the product of global technology for the three explanatory factors.

$$Y = F(L, 2S, WI, MT)$$

I: stands for investment, M: method of mass production. Supposing that production function with Cobb-Douglas one:

$$Y = Ae^{rt} \cdot L^\alpha \cdot S^\pi \cdot WI^\beta \cdot MT^\Omega$$

As, A: stand to Exogenous disembodied Technology; e: natural base; r: rate of growth with the time; I: gross Investment in the water irrigation improvement; M: net embedded Investment in agricultural production techniques.

Then the linear interpretation for it postulate:

$$\log Y = r \cdot \log A + \alpha \cdot \log L + \pi \cdot \log S + \beta \cdot \log WI + \Omega \cdot \log MT$$

The current production function relation (i.e. in period 1):

$$\log Y_1 = r \cdot \log A + \alpha \cdot \log L_1 + \pi \cdot \log S + \beta \cdot \log WI_1 + \Omega \cdot \log MT_1$$

After achieving three agricultural Investments, production relation:

$$Y = r \cdot \Delta A + \Delta \alpha \cdot I \cdot L + \pi \cdot I \cdot S + \Delta \beta \cdot I \cdot WI + \Delta \Omega \cdot I \cdot MT$$

$\log A$: log of constant, I: new net investments.

$$Y = r \cdot \Delta A + \alpha L + I (\pi \cdot S + \beta \cdot WI + \Omega \cdot MT)$$

Empirical Findings

Using MATLAB Programming with the three variables and solving main steps of both Iraq and Syria data for investment in three factors: X1, X2, and X3, gives the estimated relation of agricultur measures.

Values of Xs, (S, WI, MT) and take a virtual matrix of 6 lines, the values would be a great store in excel and import them, while here the procedure took in principle:

$$Y = -29.1412 + 0.3615 S + 0.6346 WI + 0.7958 MT$$

These elements pose three basis reservoirs to address the AFS gap with avoidance of competing with less expense foreign imports at any stage of openness-up to the global markets. The only one subscript factor between land reform, irrigation improvements, and production techniques is the investments in the new and recent technologies. It would be in shapes of machines, equipment, tools, and professional skills for training and agricultural guidance in the use and maintenance as well as protection of agricultural products. The later will benefit from knowledge including investments in mankind and human capital. The pace of introducing new technologies would be considered the rate of technological change, in the case. The process with this view may take double dimensions: finance, i.e. the abundance of the essential factor of the natural wealth revenues; and the investments climate with which rules and legislative infrastructures relating lands use and the introducing of new technology besides using.

However, all of the investment types would depend on the public policy that deals with the state investment in the sophisticated technology at the beginning and the investment climate that has to be for private investments to deal with, in later stages. The model would be up to the promotion of the approach for experimental data estimation within due course of analytical debates.

At the same time the Arab agriculture to be stand upon urgent fact, long been overtaken by the literature and policies concerned with the problem of the agricultural sector. It can be summarised by thoughts of the direct Arabic jump to the economic integration and cooperation policies between Arab countries, when coming to held workshop sessions, passing all the already mentioned properties, those obstacles all unique and assemble works. This omission has continued for more than two generations in Iraq as well as many other Arab counties, while policies were working on placing hopes on the Arab common treatments.

In other words, all concepts of the gaps caused in food and agricultural output, the policies and strategies for the agricultural sector do not portrayed, but only the common denominators and the great distinctive aspects, but not solutions. Those policies cannot accept the division into joint solutions, neither close nor far, or supports it. What reveal with this fact is that exacerbate of the problem of food security, as well as the Arab economic reality, useless developments in various aspects for the past three decades or more.

Hereby, each country must have self-reliance with endogenous development and there is nothing wrong for a later benefit from some of the successful experiences and excellent for others.

This does not include the diagnosis, relevance with this fact areas of financial and technical cooperation, financial and employment potential among Arab countries, but stressed the necessity of any idea of the direction of integration in any field is a form of dependence and reliability and is a well establishing for all existing Arab gaps, particularly the gap of AFS.

Conclusion

The public agricultural policies in both of Iraq and Algeria couldn't succeed to overcome natural constrains and to reduce food gap during the eighties of the last century. The estimated equarion suggests increases of three factors by percents of parametters for both countries.

The same trend sounds to drive for Syria, Egypt, and Sudan (Abdel Salam 1982). The objectives have been studied and examined in-depth many decades ago while researches focused on policy attention (al-Najafi 1993) but did not produce something or success in raising the economic efficiency to ensure verification inadequate production or modernization of the agriculture sector on the basis of modern technology. It is obvious for reasons related the government departments

and state farms besides cooperatives, while the administrative policies were political rather than economic, or agricultural (Al Amin 2010).

Half of the agricultural land in Iraq were not exploited while more than half in Algeria as well. The policies of distribution have to stimulate the exploitation of unused land and to be effective up to doubling the levels of agricultural production for each types of the staple crops, particularly grains.

The following options are possible and plausible, particularly for wealthy countries with abundance of finance natural resources such as Iraq and Algeria, whereas the necessity refers to doubling the production levels to much more than twice with (Ould Al Sheikh 2007):

Intensive use of advanced agricultural technology, such as modern irrigation systems;

Developed sensor equipment that reaching irrigation water to areas by symmetric and equal distribution;

Least expensive techniques and most efficient Technologies such as desalination of sea water and groundwater substitute for the watering of land near the rain.

With the following factors as certain essential technologies in doubling output:

Provision of organic fertilizers policies (non-chemical) with tax exceptions and seeds subsidies in the early stages of agricultural investment;

Supported prices of energy products involved in the extraction, transfer, and pumping of groundwater; and

Terrestrial distribution stations.

It is essential for the investors to be encouraged by new agricultural lending for ease farming, tax-deductible in land reclamation and ownership of modern equipment machines in achieving mass production.

ASAP the outlet of the above strategy, Arab food deficit remains a voluntarily one but not imposed. It can get benefit from several past experiences to focus on the productive efficiency, on the other hand to keep development to access external competitiveness as soon as possible. The main remedy view includes the following:

The state has to encourage agricultural investment to exploit all the available agricultural land.

Development of agricultural technology in the foundations of modern and sophisticated natural fertilizers uses, mechanization, equipment, and irrigation methods, "which included raising the economic efficiency and increase agricultural productivity.

Increasing of banks branches for agricultural lending by ease policies stand soft with zero interest rates, Consistent with the purposes of Islamic Sharee'a and the general orientations of an Islamic resource rich country.

Doubling the agricultural credit with the possible extent of expanding credits by the peasants and farmers, especially large farmers.

Providing customs exemptions as possible for procurement of technical equipment, land reclamation, and stations & equipment of extraction, desalination, and irrigation distribution, of groundwater.

Expansion of infrastructure networks and basic services for rural development that enable the resettlement of the intensive farming families in the new lands that can be added and distributed to the new investors.

If the case of integration of these policies with each other and coordinate the functions of financial, commercial and industrial sectors with the agricultural & irrigational activity sector by responsible, the optimistic beginnings to be confirmed the possibility of final eliminating on AFS gap. With the reduction in the cost of the product and the achievement of agricultural surplus, country to be eligible to enter the abroad market competitiveness with efficiency of the ripe conditions for the other economic sectors and desired stages of development.

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