



Efficiency of Agriculture and Water Sector and the Reality of Food Security in Arab Countries (2010-2017)

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Abstract

The main aim of the paper is to presents the reality of food security in Arab countries (that means literally the Arab peninsula and the North African Arab States); in the light of the efficiency of agriculture and water sector during the period (2010-2017). The descriptive analytical approach was used. Secondary data were collected and used to describe challenges that faced Arab food security during that period. The results found that agricultural production is insufficient to meets the demand for food in Arab countries because it highly depends on rain-fed irrigation which causes low productivity; in connection with poor strategic planning. Further, it is found that, poor exploitation and miss-management of water resources, conversion of farmland to urban uses, application of old technology, population growth, rising demand for food and degradation of natural resources have contributed to widening of food gap. The study recommends that, if Arab countries want to achieve the food security and self-sufficiency they have to consider the following: use of modern technology to improve the productivity, cooperation in agricultural research, good utilization of water resources and effective agricultural and financing policies.

Keywords: Efficiency, Agriculture, Water sector, Reality, Food security, Arab countries.

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Contribution of this paper to the literature

This study contributes to existing literature by presenting the reality of food security in Arab countries (that means literally the Arab peninsula and the North African Arab States); in the light of the efficiency of agriculture and water sector during the period (2010-2017).

1. Introduction

Arab world still suffers from a chronic food gap. Agriculture sector is heavily dependent on rainwater where irrigated area is approximately 21.5% of the cultivable area. Also, demand for food has long exceeded domestic agricultural production [1]. The per capita of water availability in Arab region is annually estimated at 790m³, which is less than the water poverty line defined globally by 1000m³. Moreover, estimates of 60% of irrigation water is wasted and about 1.3 billion tons of materials used for human consumption are lost.

1.1. The Problem Statement

In recent years, importations of food commodities by Arab countries - issue of food security - have been increased. This situation raises questions about the reality of Arab food security and the role of agricultural and water sector in reducing of the Arab food gap?

1.2. The Research Significance

The study focuses on the agriculture and water sector as important factor in achieving food self-sufficiency for Arab countries. It also concentrates on the reality of food security and challenges that are facing the bridge of food gap.

1.3. The Research Objectives

- To recognize the reality of food security in Arab countries.
- To explain the relation between food security and efficiency of agriculture and water sector.
- To highlight challenges that face Arab food security.
- To track and analyze the food gap in Arab countries.

1.4. The Research Questions

- What is the reality of food security in Arab countries?
- What are the challenges facing Arab food security?
- Are agriculture and water sector effective in reducing the food gap in Arab countries?

1.5. The Research Methodology

To answer the questions and achieve the objectives, the study draws on the descriptive-analytical approach in explaining the reality of food security in Arab Countries and its relation to efficiency of agriculture and water sector. Data were collected from secondary sources.

1.6. Literature Reviews

FAO [2] defined the concept of food security as a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Mohammad [3] stated that there is a need to differentiate between the relative food security and absolute food security when defining food security. Relative food security is the ability of a state to provide the regular needs of its people from food commodities fully or partially.

Talukder [4] used time series data to examine the relationship between food security and self-sufficiency status of Bangladesh 1999-2000. The analysis showed that in relation to standard nutritional norm of food intake, Bangladesh virtually remained a surplus producer of food grains from the year 1999-2000.

Awatif, et al. [5] assessed the challenges confronting the expansion of agricultural production in Sudan. The results stressed the critical role of Agricultural Bank of Sudan in enhancing of agricultural production.

Najib [6] discussed food security, efficiency and shifting of dietary habits in Arab countries. The results pointed out that Arab countries, in their quest to enhance food self-sufficiency, face serious challenges emanating from a backdrop of constraining factors, including aridity, limited cultivable land, scarce water resources and serious implications of climate change.

Al-Fawwaz and Ahmed [7] investigated the reality of food security in the Arab World. The study concludes that the reality of food security is unstable and fluctuated; there is no self-sufficiency to cover the needs of the Arab states. In addition, food security is connected to the power of water security, as most of water resources come from non-Arab states. Water shortage may lead to the food gap for Arab countries.

Lee, et al. [8] suggested that the water-energy nexus might be a serious issue in future sustainable planning and policies, given the impacts of climate change in the world in general and in Arab world particularly.

Hameed, et al. [9] reviewed the 21st century challenges that face food, energy and water (FEW) security in the Middle East. The study found that, most of the studied countries are facing FEW resource insecurities. Also the study suggested that climatic and socioeconomic factors have contributed to the subsequent stress on FEW resources, particularly the water sector.

Despite, a number of research bodies have discussed the dilemma of food security in the world, this paper seeks to highlight efficiency of both agriculture and water sector to identify the reality of food security in Arab countries during the period (2010-2017).

2. Environmental and Climatic Characteristics of the Arab Region

Arab region is characterized by environmental diversity caused by several factors, of which are: geographical location, wide area and the diversity of its topography. These factors led to the diversity of the environment in terms of temperature and the amounts of rain. Arab region is divided into three main climatic regions, the largest of which is the arid desert region, which covers about 75% of the total area. It is characterized by a hot continental climate in summer, cold in winter with scarcity of rains (less than 100mm per year). Followed by the semi-wet / semi-arid tropical region, which covers the southern parts of the Arab world with rainfall in average between 100mm-600mm annually. The Mediterranean region includes the coastal strip of Arab countries bordering the Mediterranean Sea characterized by mild climate and annual rainfall of 1000mm. It also includes land south of the coastline, with area of one million km² and annual rainfall ranged between 600mm to 1000mm [10].

2.1. Agricultural Land in Arab Countries

Total arable area in Arab world is about 197 million hectares, representing 14.7% of the total area of 1344 million hectares. This area is well below the global average of 37%. The cultivated area is estimated at 75 million hectares in 2016-2017. It represents about 38.1% of the arable area and 5.6% of total area of Arab region [11].

Table-1. Agricultural and wastelands in Arab Countries (2010-2017).

(Million Hectares)

Year	Cultivated Area	Rainfed Agricultural Lands			Irrigated Agricultural Lands			Uncultivated Lands	
		Seasonal Rainfed	Sustainable Rainfed	Rainfed as % of Cultivated	Seasonal Irrigated	Sustainable Irrigated	Irrigated as % of Cultivated	Wasteland	Uncultivated as % of Cultivated
2010	68.48	35.47	5.93	60.5	10.44	3.05	19.7	13.572	19.8
2011	68.75	34.20	6.01	58.5	10.61	3.09	19.9	14.804	21.6
2012	68.97	32.90	6.09	56.5	10.79	3.13	20.2	16.037	23.3
2013	69.69	36.70	5.70	60.8	11.03	3.70	21.1	12.553	18.0
2014	69.92	33.58	5.74	56.2	10.15	3.77	19.9	16.664	23.8
2015	77.21	39.06	5.79	58.1	9.920	3.86	17.8	18.520	23.9
2016	75.08	31.25	5.84	49.4	9.770	3.84	18.1	24.380	32.5
2017	76.14	35.15	5.81	53.8	9.840	3.85	17.9	21.450	28.2

Source: AMF [12].

Table 1 shows that:

- Arab countries depend on rain-fed agriculture, where the percentage of rain-fed land to total arable area ranged 60.5% in 2010 to 49.4% in 2016.
- During the period 2010-2017, the percentage of irrigated land did not exceed 22% of the total agricultural land, this, might led to expansion of food gap.
- The percentage of uncultivated land ranged between 18% and 24%, indicating inefficiency uses of cultivated.

2.2. Performance of Agricultural Sector in Arab Countries (2010-2017)

Usually the performance of the agricultural sector is measured by its contribution to GDP and by the average per capita income of agricultural output.

Table-2. Agricultural product in Arab countries (2010-2017).

Million Dollars

Year	Arab GDP	Agriculture Production	Agriculture Product as % of Arab GDP	Per Capita Income of Agriculture Product(\$)	Growth Rate of Arab GDP	Growth Rate of Agricultural Product
2010	2004730	124419	6.2	395	17.0	9.4
2011	2365373	132802	5.6	386	17.9	6.7
2012	2485542	130144	4.9	372	5.08	-2.0
2013	2775394	141280	6.4	394	11.7	8.5
2014	2807440	146553	5.3	399	1.15	3.7
2015	2457553	141876	5.9	392	-12.4	-3.2
2016	2381302	142373	6.1	383	-3.10	0.35
2017	2471390	138320	5.6	366	3.78	-2.8

Source: AOAD [13].

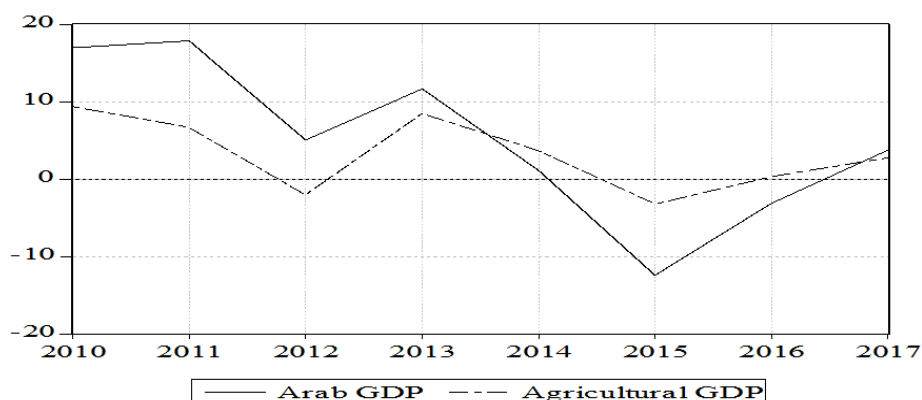


Figure-1. Growth rate of Arab GDP (2010-2017).

Source: Based on Table 2.

Table 2 and Figure 1 shows that:

- Agricultural sector has low contribution to Arab GDP and it ranged between 4% and 7%.
- During 2010-2017, Arab GDP achieved highest growth rate of 17.9% in 2011, while it achieved highest negative growth rate of 12.4% in 2015.
- During 2010 – 2017, per capita of agricultural GDP not exceed \$ 400.
- During 2010-2017, Arab agricultural product achieved highest growth rate of 9.4% in 2010, while it achieved highest negative growth rate of 3.2 % in 2015.

2.3. Water Resources in Arab Countries

Most of Arab region is located in arid and semi-arid climatic zones and it considered one of the poorest in the world in terms of water resources. Annual rate of water per capita is about 700m³ which is less than the water poverty line which is 1000 m³.

This rate expected to decrease to 500 m³ in 2025 in light of population growth. Water resources are distributed between renewable surface water and groundwater reserves. All these resources are estimated at 350 billion m³ per year in addition to non-conventional resources, including desalination and purification water, which is estimated at 10 billion m³ per year [14].

2.3.1. Surface Water Resources

Surface water resources in Arab countries are estimated at 296 billion m³ per year of total water resources, of which about 50% is used.

Agricultural sector, houses and industrial sector utilize about 88%, 7% and 5% respectively. Surface irrigation contributes to wasting quantities of water, increasing soil salinity, depleting nutrients and reducing land productivity [15].

2.3.2. Groundwater Resources

Due to increases of demand for groundwater in Arab countries, groundwater reserves estimated at 7734 billionm³. Also, based on the potential increase of population, volume of water resources allocated to agricultural is expected to rise to 378 billion m³ in 2025. This indicates that water crisis in Arab countries is putting its weight on the issue of achieving Arab food security, which requires development and rationalization of the means of using water resources to intensify agricultural production. As well as work to developing and training of human resource and raising awareness of efficiency use of water among farmers [16].

3. Food Gap and Self-Sufficiency in Arab Countries

Food deficit in Arab countries is related to the difference between domestic production and import (net imports) of different food commodities.

The continued disparity between growth rate of agricultural production and the demand for food commodities led to a food gap in 2016 of \$ 32981 million. Average food gap during the period (2010-2016) arrived \$ 33959 million and the gap in flour group constitutes 71.2% of the total value of Arab food gap in 2016.

Table-3. Food gap and self-sufficiency of major commodity groups (2010-2016).

Million Dollars

Statement	2010		2011		2012		2013		2014		2015		2016	
	Self-suff%	Food Gap	Self-suff %	Food Gap	Self-suff%	Food Gap	Self-suff%	Food Gap	Self-suff%	Food Gap	Self-suff%	Food Gap	Self-suff%	Food Gap
Total	-	35209	-	36000	-	36700	-	35600	-	38086	-	34932	-	32981
Flour	44.6	17479	52.1	23003	54.7	24106	51.2	22296	45.2	25604	45.1	20783	37.8	18271
Potato	101.2	-22	106.4	-105	109.1	-108	105.1	-100	107.9	-234	103.2	-78	92.4	-58
Sugar (refined)	33.4	2989	33.7	2623	34.7	2823	32.7	2430	37.6	3419	33.8	3227	47.8	2960
Legumes	55.5	507	69.5	750	72.5	815	65.5	730	63.2	575	56.2	911	50.9	860
Oils and Greases	36.8	3987	36.8	5140	38.4	5780	35.4	4587	29.1	4471	37.4	3699	32.2	4379
Vegetables	102.7	-2007	109.1	-2791	111.3	-2819	108.9	-2643	111.1	-3663	107.0	-2891	101.4	-1509
Fruits	97.5	-1136	107.9	-911	109.9	-973	107.3	-950	109.8	-2398	104.7	-1120	101.1	-1085
Meat	95.5	6018	96.0	8459	97.1	8760	95.7	7370	78.4	6865	73.3	7997	74.8	6957
Dairy Products	77.7	2088	81.0	1270	86.0	1340	83.0	1129	74.2	4252	74.9	3125	78.1	3453
Eggs	95.6	50.0	97.3	97.0	98.5	98	97.1	96	96.6	114	95.4	180	89.1	417
Fish	100.7	-499	105.3	-613	108.5	-685	101.5	-558	99.2	-918	101.5	-912	116.5	-1666

Source: AOAD [13] ,(-) Means Surplus, Food Gap for the years 2011 and 2012 is estimated.

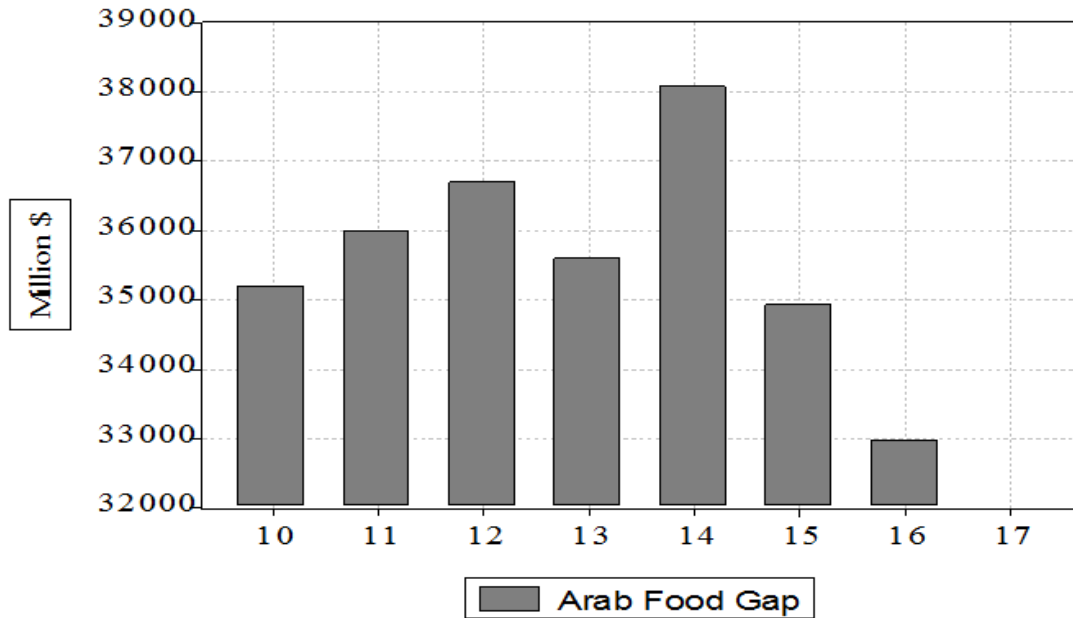


Figure-2. Food gap in Arab Countries (2010-2016).

Source: Based on Table 3.

Table 3 and Figure 2 shows that:

- Food gap in the consumer goods group reached highest value in 2014 of \$ 38086 million and it declined to \$ 32981 million in 2016. This reflects some efforts to improve the performance of agricultural sector.
- Food gap continued in commodity groups include flour, sugar, legumes, oils and fats, meat, dairy products and eggs.
- Food gap in flour group constituted the highest during the period 2010-2017, so Arab countries failed to achieve self-sufficiency in this group.
- Arab countries in 2016 achieved self-sufficiency of 116%, 101.4%, 101.1% and 92.4% with surplus of \$ 1666 million, \$1509 million, \$1085million and \$58million in production of fish, vegetable, fruits and potatoes respectively.

4. Conclusions

- Despite the contribution of agricultural sector in provision of food in Arab countries, but it continued to record a weak performance indicator, as evidenced by low self-sufficiency rates and the persistence of food gap in basic commodity groups.
- Low performance of agricultural sector can be attributed to high dependence on rain irrigation, which covers about 55% of the total arable areas.
- Inefficient use of water resources contributed to wasting amounts of water that could have been directed to agricultural sector to help in reducing the food gap.
- There is a growing in the food gap, which is worth paying attention, if Arab countries want to achieve food security and self-sufficiency.

5. Recommendations

In order to integrate agriculture and water sector to achieve Arab food security and reduce food gap, it is necessary to consider the following:

- Work to use modern technology because traditional agriculture leads to poor productivity.
- Agricultural policies should be more effective in developing agricultural sector.
- Cooperation in the establishment and development of a scientific centers specialized in the field of agricultural research at the level of Arab countries.
- It is important to pay attention to effective management of water resources to be supportive and integrated with agricultural policies.
- Financing policies should be formulated to accommodate the development of agricultural and water sector in Arab countries.

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